DOCKETED

Docket Number:	79-AFC-05C
Project Title:	Compliance - Application for Certification for PG&E Geysers Unit 16 (78-NOI-6)
TN #:	206749
Document Title:	Quicksilver (Unit 16) 1981 Final Decision and Compliance Plan
Description:	N/A
Filer:	Camile Remy-Obad
Organization:	California Energy Commission
Submitter Role:	Commission Staff
Submission Date:	11/24/2015 10:12:22 AM
Docketed Date:	11/24/2015

STATE OF CALIFORNIA
ENERGY RESOURCES CONSERVATION
AND DEVELOPMENT COMMISSION

In the Matter of:

Application for Certification of Pacific Gas and Electric Company's GEYSERS UNIT 16 and a related 230 kV Transmission Line from Castle Rock Junction to Lakeville

Docket No. 79-AFC-5

COMMISSION

DECISION

September 30, 1981

P800-81-007

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STATE OF CALIFORNIA
ENERGY RESOURCES CONSERVATION
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In the Matter of:	)	
	)	Docket No. 79-AFC-5
Application for Certification of Pacific Gas and Electric Company's GEYSERS UNIT 16 and a related 230 kV Transmission Line from Castle Rock Junction to Lakeville	)	DECISION

In this proceeding, Pacific Gas and Electric Company (PG&E) seeks certification for a geothermal power plant, Geysers Unit 16, and a related electric transmission facility from Castle Rock Junction to the Lakeville substation, pursuant to section 25500, et seq. of the Public Resources Code.

PART ONE

I. DESCRIPTION OF THE PROPOSED PROJECT

A. The Power Plant Facility

The Geysers Unit 16 which PG&E proposes to construct in Lake County is a dry steam geothermal power plant with a net normal operating capacity of approximately 110 megawatts. It is scheduled for commercial operation in June 1985. The major structures of the proposed facility are a turbine building, cooling tower, electrical switchyard, and a hydrogen sulfide abatement facility. The turbine building would house the steam turbine generator and other associated equipment required for electrical power production. The mechanical draft cooling tower would dissipate heat from the power cycle. PG&E plans to abate hydrogen sulfide (H_2S)

emissions through the use of a surface condenser/Stretford process which partitions the H_2S into gaseous and condensate (liquid) forms. The Stretford process scrubs the H_2S from the vent gas stream from the surface condenser and catalytically oxidizes the gas to elemental sulfur. The H_2S remaining in the condensate would be treated with hydrogen peroxide to oxidize H_2S in the condensate stream to soluble sulfur compounds.

The switchyard would step up the voltage of the electrical power from the generator level of 13.8 kV (kilovolt) to the 230 kV level required for economical power transmission. In the Application for Certification (AFC), PG&E proposed to construct a 230 kV transmission tap line with seven single circuit lattice transmission towers from the Unit 16 site to existing Unit 13, a distance of approximately 1.4 miles. During the regulatory review of the AFC, PG&E amended its proposal so as to provide an alternative route for the transmission tap line to NCPA 2 (Northern California Power Agency, Unit 2), a distance of 1.3 miles, contingent upon its securing a wheeling agreement with NCPA and a lease from the United States Bureau of Land Management for placement of the eight new single circuit lattice transmission towers.

B. The Power Plant Site

The site is situated on the east slope of the Mayacamas Mountains above Anderson Springs in Lake County. It will occupy approximately 6.4 acres of flat graded surface established by excavating approximately 360,000 to 450,000 cubic yards of soil and rock material to be disposed of off-site at Big Injun Mine, above Bear Canyon Creek. (See Figure A)

GEYSERS UNIT NO. 16

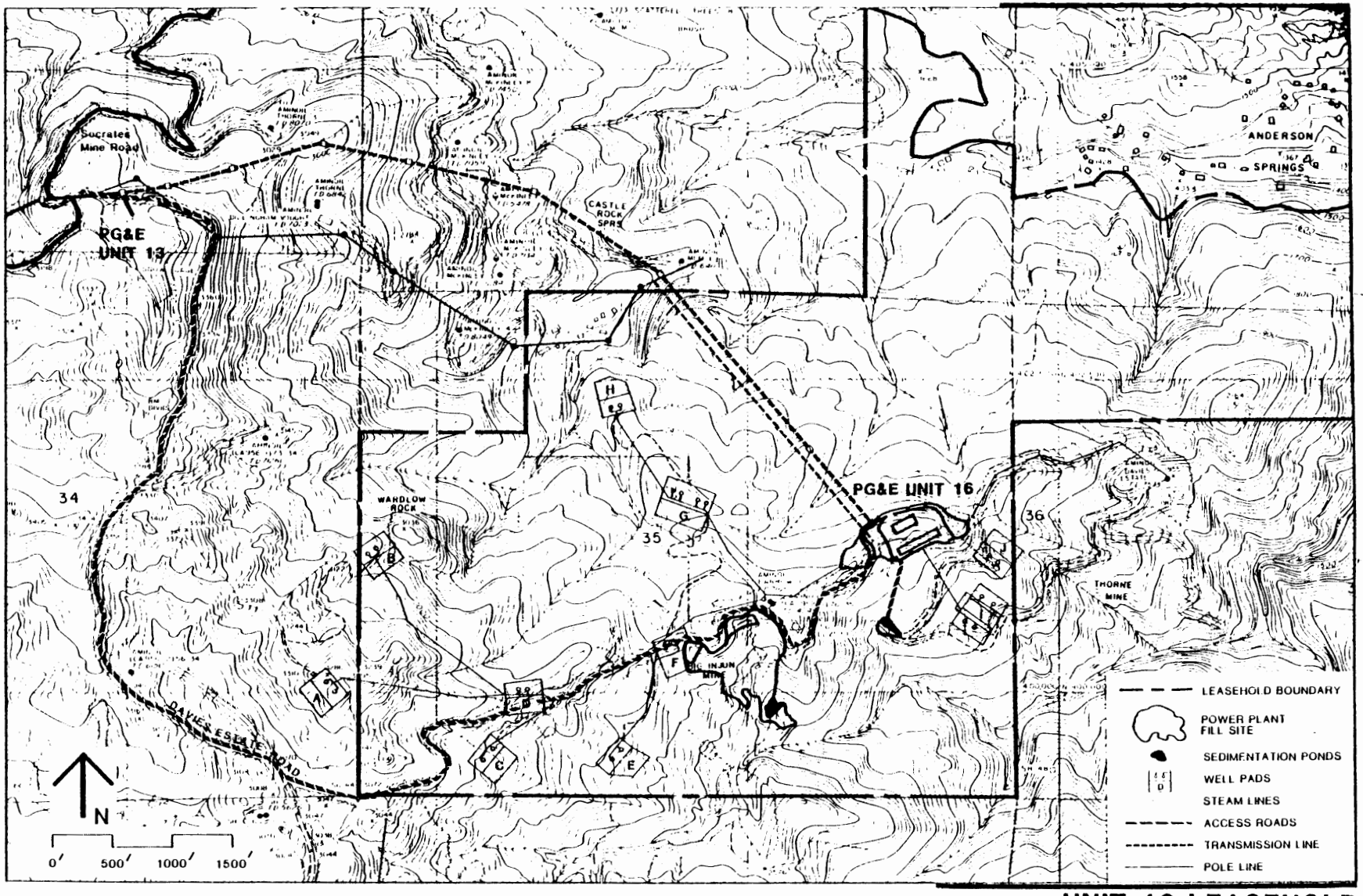


FIGURE A - **UNIT 16 LEASEHOLD**

C. The Steam Field

Four wells have been drilled within the Unit 16 steam supply field. Prior to completion of power plant construction, additional wells would be drilled to provide the necessary steam supply. Aminoil USA, Inc., the producer who would be supplying the steam under contract to PG&E, estimated that 14 to 16 wells would be required initially. Thereafter, approximately 10 additional wells would be needed over the next 30 years to compensate for steam flow decline in the original producing wells. All of the steam field is located in Lake County.

D. The Related Transmission Line Facility

PG&E proposes to construct a 230 kV double circuit tower line (DCTL) from Castle Rock Junction to the Lakeville Substation, the point of junction with the interconnected transmission system. The line would have two 2,300 kcmil aluminum conductors per phase and would be adequate, in conjunction with the existing Castle Rock Junction-Fulton-Ignacio 230 kV DCTL transmission line, to carry about 2,600 MW (megawatts) of Geysers generation.

Related upgrading of the 230 kV transmission line from Lakeville to Sobrante is subject to the jurisdiction of the California Public Utilities Commission in a companion proceeding, No. 59330.

E. The Transmission Line Route

As shown in Figure B, the Castle Rock Junction-Lakeville Substation transmission line traverses approximately 43 miles. Approximately 9.6

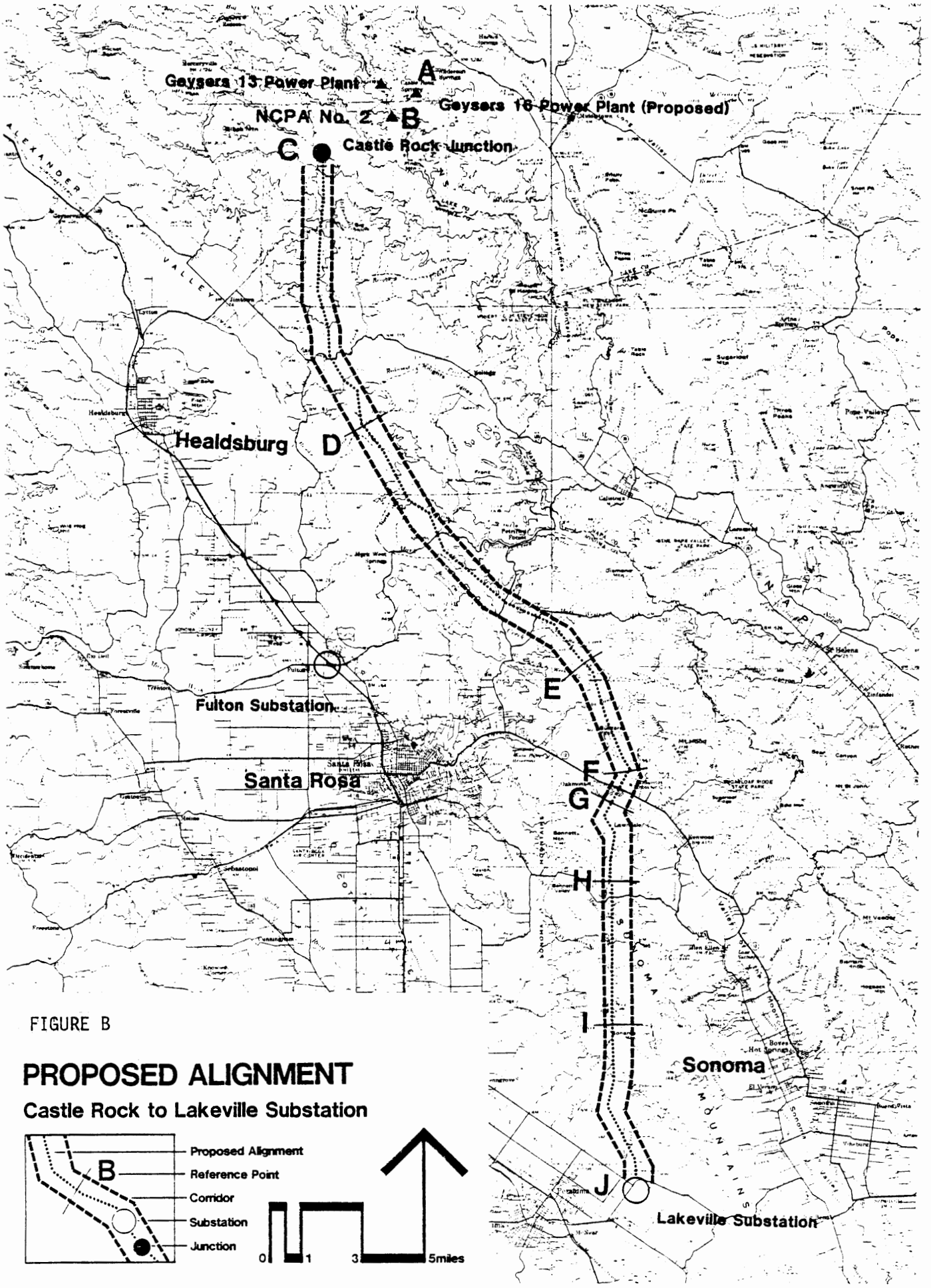


FIGURE B

PROPOSED ALIGNMENT

Castle Rock to Lakeville Substation

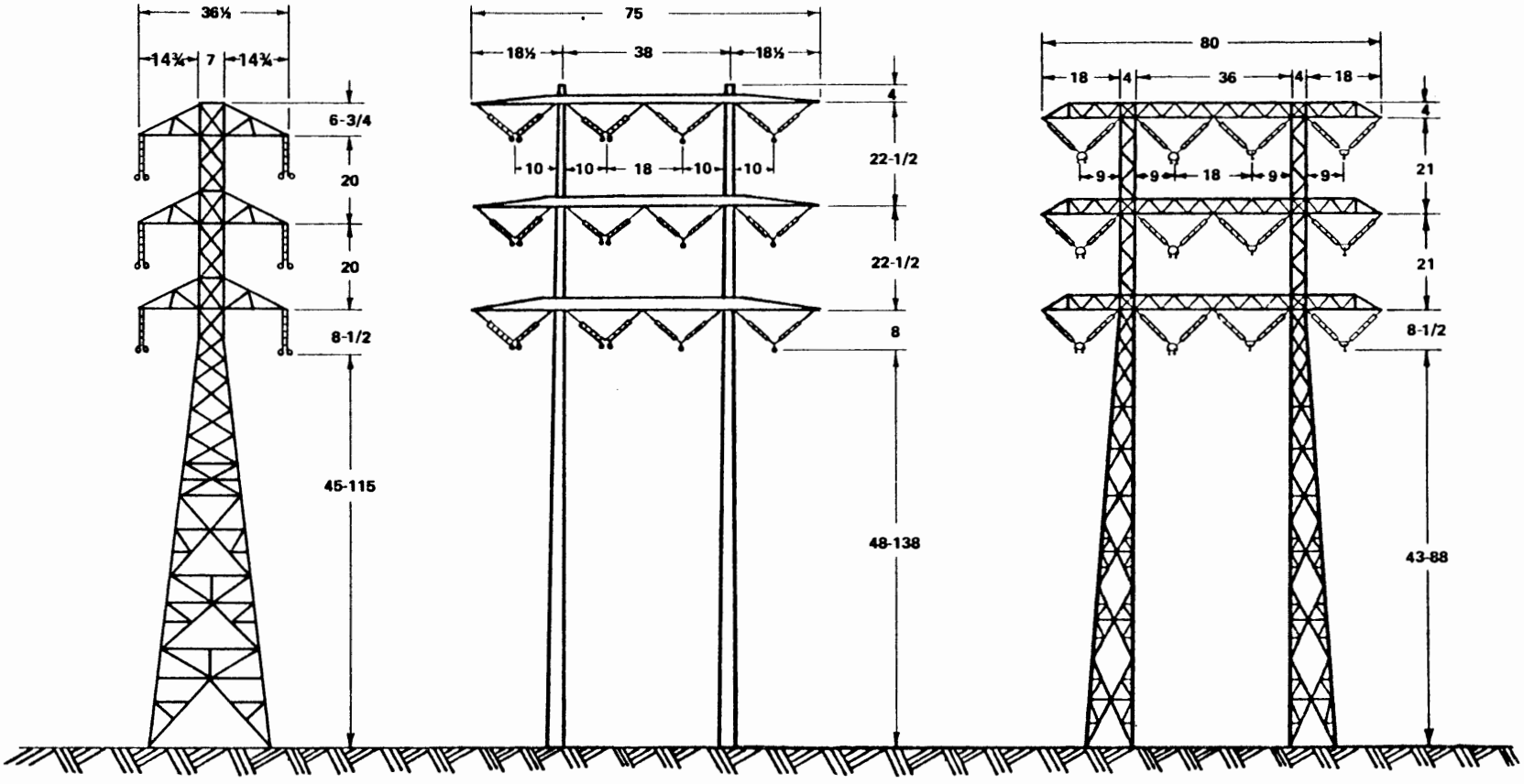
miles of new transmission line would be strung parallel to the existing 230 kV transmission line on 40 new double circuit lattice towers between points C and D. A new 11.2 mile right-of-way must be acquired to create a new, non-parallel transmission line with 44 double circuit lattice towers between points D and E. Between points E and F, and for a distance of 3.7 miles, the new transmission line would parallel the existing transmission line on 18 new double circuit lattice towers. For a distance of 1.2 miles within the community of Oakmont (points F and G), the new transmission line would be consolidated with the existing 230 kV transmission line on 5 new four circuit tubular towers. For a distance of 2.65 miles through the planned Wild Oak community and Annadel State Park (points G-H), the new transmission line would be consolidated with the existing 230 kV transmission line on 13 new four circuit lattice towers. From points F to H, the existing transmission line will be reconductored with 2,300 kcmil conductors. For approximately 10.2 miles from point H to termination at point J, the new transmission line would parallel the existing 230 kV transmission line on 45 new double circuit lattice towers.

The configurations of the double circuit lattice tower, 4-circuit tubular tower, and 4-circuit lattice tower are shown in Figure C-1. The right-of-way configurations are shown in Figure C-2.

Findings

1. PG&E's Geysers Unit 16 is a thermal power plant with a net generating capacity of 110 MW located in the County of Lake, State of California.

2. The 230 kV tap line from Geysers Unit 16 via NCPA 2 (or alternatively via Unit 13) and the related 230 kV transmission line from Castle Rock Junction to Lakeville Substation would carry electric power from Unit 16 to the Lakeville Substation, a point of junction with the interconnected transmission system.



2 Circuit Lattice Tower

4 Circuit Tubular Tower

4 Circuit Lattice Tower

NOTE:
ALL DIMENSIONS SHOWN IN FEET

GEYSERS UNIT 16 AFC
PROPOSED STRUCTURES
FIGURE C-1

FIGURE C-2

Tower Arrangements

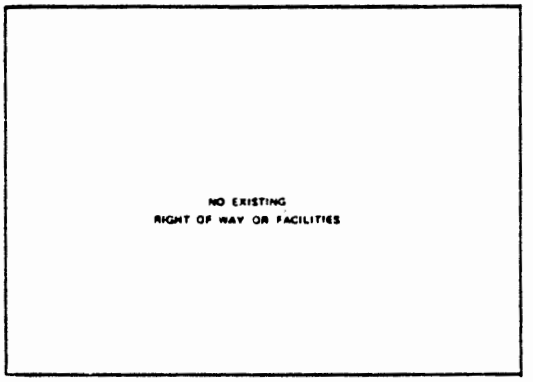
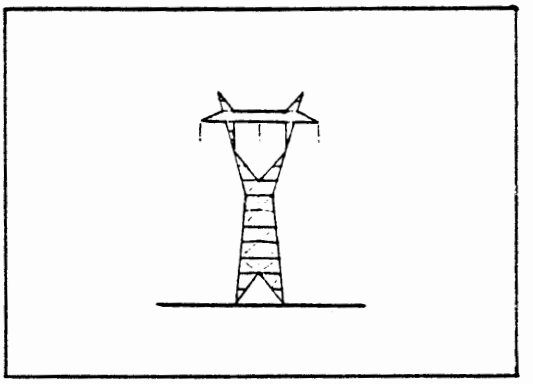
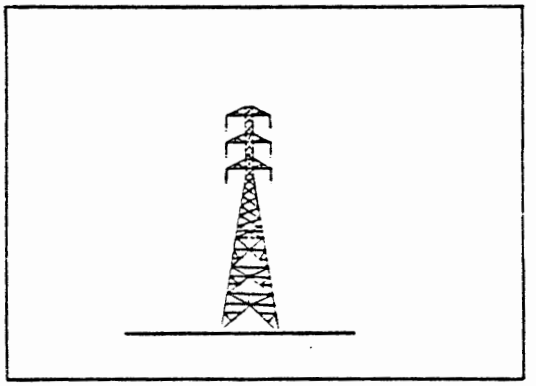
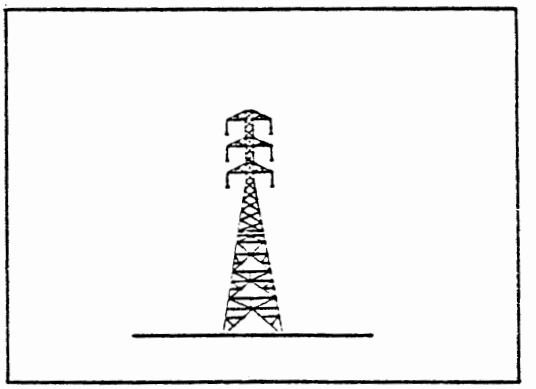
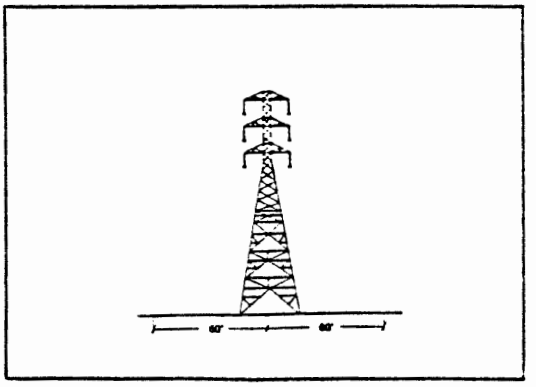
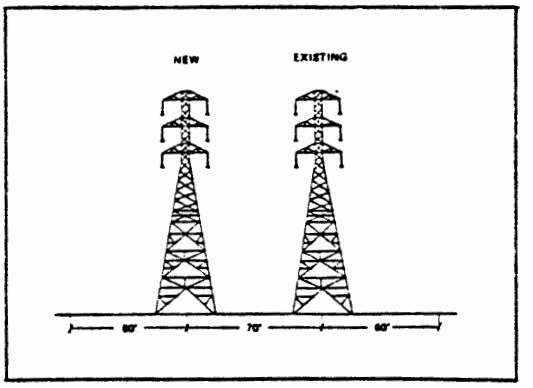
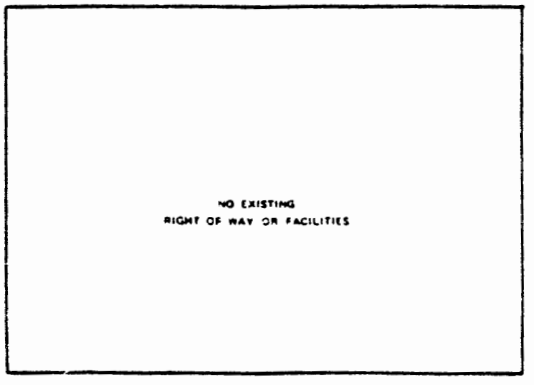
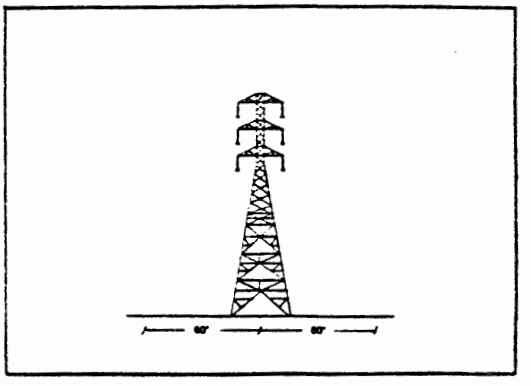
	Existing	Proposed
A to B		
B to C		
Castle Rock Junction		
C to D **9.6 Miles** Towers 1-40		
D to E **11.2 Miles** Towers 41-83		

FIGURE C-2

Tower Arrangements

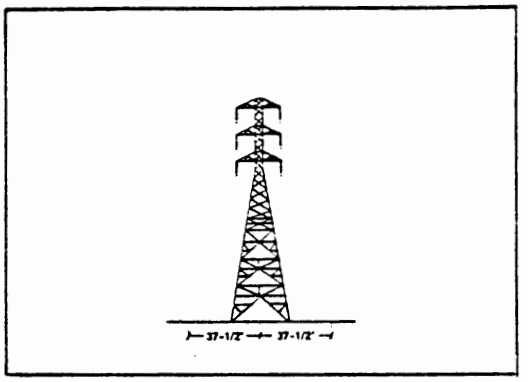
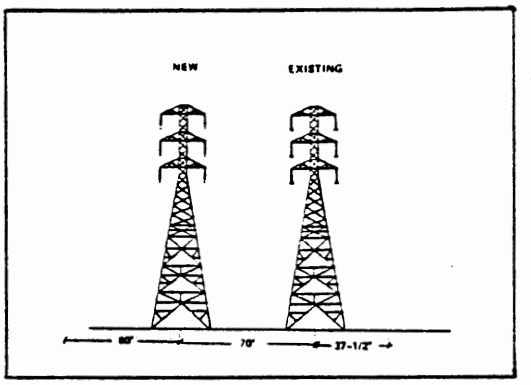
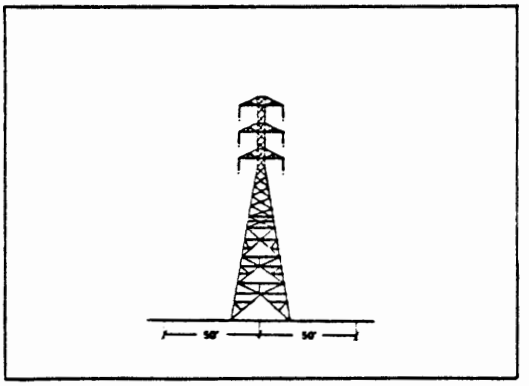
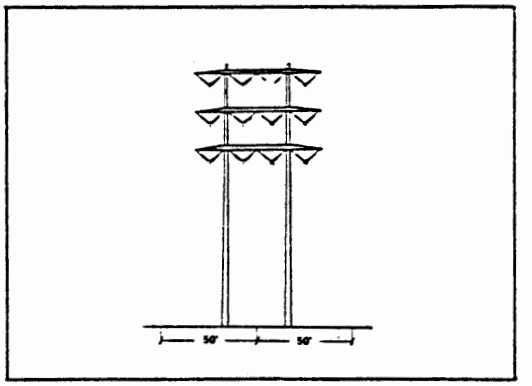
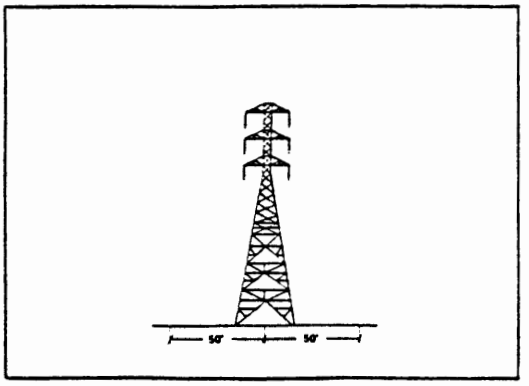
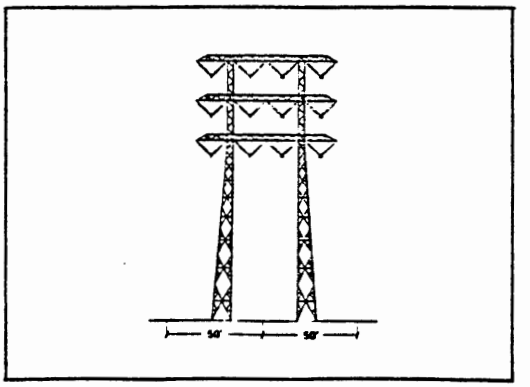
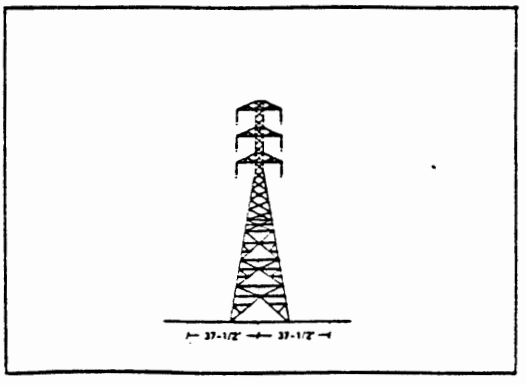
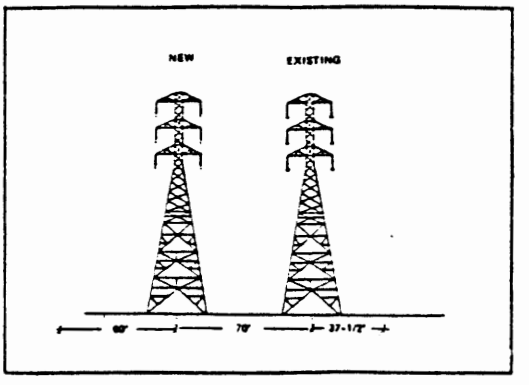
	Existing	Proposed
E to F **3.7 Miles** Towers 84-102		
F to G **1.25 Miles** Towers 103-107		
G to H **2.65 Miles** Towers 108-120		
H to I **4.8 Miles** Towers 121-138		

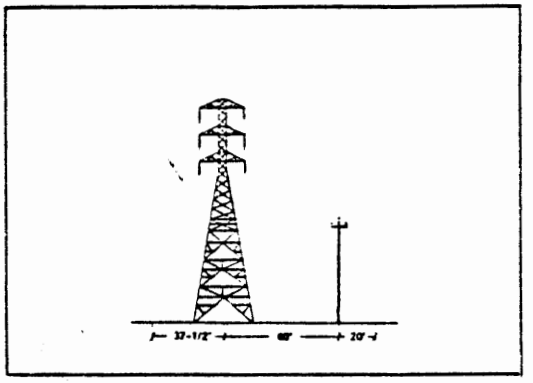
FIGURE C-2

Tower Arrangements

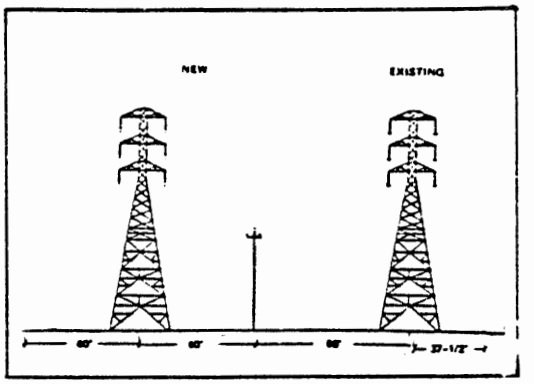
I to J
5.4 Miles

Towers
139-164

Existing



Proposed



3. That portion of the existing Fulton-Ignacio transmission line which is consolidated with the proposed Castle Rock Junction-Lakeville transmission line (points F to H), is proposed to be reconductored with new 2,300 kcmil conductors of 25 percent greater peak kilowatt capacity and will be new supporting structures (transmission towers).

II. THE PROCEEDINGS

A. Relationship of the NOI Record to the AFC

The following Decision is rendered in the Application for Certification (AFC) portion of the Commission's two-phase regulatory siting process. The initiating proceeding, the Notice of Intention (NOI), commenced on August 30, 1978 and concluded with a final Commission Decision of September 20, 1979.

During the conduct of the AFC, PG&E requested the Commission to take notice of the Final Report and Decision of the NOI and further to have the Commission incorporate portions of the NOI record, essentially testimony, into the AFC record pursuant to Title 20, California Administrative Code, section 1746(g).

By its COMMISSION ORDER ON APPEAL filed December 31, 1980, the Commission took notice of the NOI Final Report, amendments thereto, and the Decision upon Reconsideration for their existence and content. The designated NOI testimony was admitted as hearsay.

In the absence of a clear statutory expression of the legal relationship of the NOI record and decision to the AFC, the Commission Committee sought to create a legally independent AFC record in the event that the Notice of Intent and Application for Certification are legally separate and independent proceedings.

B. The Evidentiary Basis of the AFC Decision

The findings and conclusions of this Decision are based upon oral testimony and documentary evidence taken during evidentiary hearings on matters in controversy and upon facts established by uncontroverted stipulations supported by declarations of competent witnesses.

Following the close of the discovery period, the Commission Committee conducted a Prehearing Conference at which all parties to the proceeding could identify issues in controversy and matters in agreement. Prior to the Prehearing Conference, PG&E and the Commission staff, as an independent reviewer of the proposed project, conducted public meetings to identify those technical areas in which there were no factual controversies. Agreements between PG&E and the Commission staff were reduced to stipulations and submitted to all parties in a Joint Prehearing Conference Statement, dated July 2, 1980.

At the Prehearing Conference, any party who disagreed with a stipulation contained in the Statement was given the opportunity to cross-examine a witness from PG&E and/or the Commission staff and to produce its own affirmative witness. The absence of a request to cross-examine or produce a witness was taken to mean that a party did not object to the Commission's using the stipulation to support findings in its Decision, assuming the stipulation was supported by a declaration of a competent witness.

Following the Prehearing Conference, the Commission Committee issued a series of Hearing Orders to schedule for hearing (1) issues upon which

there was no agreement, (2) issues upon which there was disagreement with a stipulation and a request for cross-examination of a PG&E or Commission staff witness, and (3) testimony of affirmative witnesses. Lastly, to achieve administrative economy in the use of hearing time, the Committee ordered PG&E to submit declarations to support the uncontested stipulations.

III. CONFORMITY TO THE DEMAND FORECAST

The Commission adopted its forecast of PG&E service area electrical demands in the 1981 Biennial Report (Electricity Tomorrow, Final Report, p. 374), of which the Commission took notice:

> Need Determinations in Siting Cases
>
> Although the full available potential for geothermal, renewable energy sources, interutility connections, and cogeneration could exceed the 1992 need for new electricity supplies specified by the Commission, it is extremely unlikely that enough projects can be developed and proposed within the next two-year regulatory period to realize this potential. Because of this, and to further encourage applicants to propose facilities within these priority categories, the Commission will give preferential treatment to such proposals as follows:
>
> Geothermal
>
> We will continue to certify the maximum number of geothermal sites and facilities that demonstrate reasonably mitigable environmental impacts and that meet existing air and water quality standards. Any facility that meets these criteria will be deemed needed.

Findings

4. The additional capacity to be added by Geysers Unit 16 is needed to meet anticipated growth in demand for electricity, retirement of older facilities, potential losses from the expiration of contracts for power from the Pacific Northwest, and oil and gas reduction policies shown in the forecast of service area electric power demands adopted pursuant to Public Resources Code section 25309(b).

5. As a facility related to Geysers Unit 16 and necessary for the transmission of electrical energy therefrom to the PG&E service area, the proposed 230 kV Castle Rock Junction-Lakeville transmission line conforms to the Commission-adopted forecast.

PART TWO--THE POWER PLANT

I. ENVIRONMENTAL RESOURCES

A comprehensive record on environmental matters was developed in this proceeding through public evidentiary hearings, preparation of Draft and Final Environmental Impact Reports (DEIR and FEIR) by the Commission staff, and stipulations of the parties concerning uncontested matters supported by declarations of competent witnesses.

This Decision includes a series of findings on the environmental impacts of the proposed power plant and mitigation measures proposed to minimize those impacts. Since the subject matters hereunder are inter-related, the discussions, findings, and conditions below must be considered an entirety, the specific elements of which may crossover into related subject matters.

A. Air Quality--Power Plant

PG&E's proposed Geysers Unit 16 is located within the Lake County Air Pollution Control District. Under the terms of the Joint Policy Statement, entered into by the Commission and the California Air Resources Board on January 23, 1979, the Air Pollution Control Officer (APCO) for the District shall review the Applicant's air quality data and make a "Determination of Compliance" whether the proposed facility meets the requirements of the applicable law and district regulations.

In September 1980, the Lake County APCO issued his initial Determination of Compliance on the Unit 16 project. PG&E objected to the conditions set forth in the Determination of Compliance and on September 12, 1980, petitioned the Hearing Board of the Lake County Air Pollution Control District

to review the Determination of Compliance and the conditions therein. Following hearings by the Hearing Board, the Lake County Air Pollution Control District, the Air Resources Board, and PG&E reached agreement on the appropriate conditions to apply to the project. Representatives of the Anderson Springs Residents Taxpayers and Homeowners for Clean Air and Water (ARTHCAW), intervenors in the Commission's AFC proceeding, also signed the agreement. The conditions are set forth in the "Settlement of the Parties Regarding Petition for Review of the Determination of Compliance", dated December 22, 1980 (hereinafter "Settlement"). The Settlement and PG&E's petition for withdrawal of its petition for review were subsequently accepted by the Lake County Air Pollution Control District Hearing Board on January 14, 1981. Thereafter, the Settlement was filed with the Commission on January 19, 1981.

On March 5, 1981, the Determination of Compliance and the Settlement containing revised conditions were accepted into evidence during the testimony of Mr. Robert Reynolds, the Lake County APCO, and were not contested by any party.

Based upon the Determination of Compliance and the Settlement, Geysers Unit 16, operating normally at the agreed-upon (H_2S) emission level of 5 lbs/hr, should not make a measurable contribution to a presently continuing violation of the H_2S ambient air quality standards. Furthermore, the Lake County Air Pollution Control District Hearing Board determined that Stretford abatement equipment supplemented by secondary condensate treatment shall be used to meet this requirement.

Findings

6. Based upon the Determination of Compliance and revised conditions contained in the Settlement of the Parties Regarding Petition for Review of Determination of Compliance, dated December 22, 1980, Geysers Unit 16 will conform to the applicable air quality laws and regulations. (RT 13,049:11-12)

7. Unit 16 is approved on the basis of a design which includes a surface condenser, Stretford unit and a hydrogen peroxide/catalyst system. If necessary or preferable, the Applicant may use other means of secondary abatement to comply with the limitations of emissions stated in the conditions below.

Conditions

(a) Determination of Compliance (DOC), condition #1 Pacific Gas and Electric Company (PG&E) shall use equipment and/or procedures expected to be capable of maintaining the emissions of hydrogen sulfide (H_2S) from the power plant at 5 pounds per hour.

(b) DOC, condition #2 PG&E shall operate the abatement systems in the manner expected to limit the emissions of H_2S from the power plant to 5 pounds during each hour the plant is operating. Within 30 days of completion of the performance test required by Condition 12, PG&E shall submit, for approval, an operating procedure expected to limit the emissions of H_2S from the power plant to 5 pounds per hour. The Lake County Air Pollution Control Officer (LCAPCO) shall approve or disapprove the procedure within 30 days of receipt. Upon approval, compliance with the procedure shall be deemed compliance with this Condition 2, provided that in no case shall the H_2S emissions from the power plant exceed 7.5 lbs/hr for more than a total of 72 hours each year. These 72 hours are intended to allow for reported unforeseen outages of air pollution abatement equipment. Nothing in this condition shall relieve PG&E from compliance with Section 510 of the Rules and Regulations of the Lake County Air Pollution Control District (LCAPCD).

In the event that the emissions exceed 5 pounds per hour, PG&E shall immediately report to the LCAPCO: (1) the reason why the power plant emissions exceeded 5 pounds per hour of H_2S; and (2) the action taken or proposed to be taken in accordance with the approved operating procedure to reduce the H_2S emissions to 5 pounds per hour.

(c) DOC, condition #3 The hydrogen peroxide/catalyst and Stretford/surface condenser system as proposed in the AFC shall be the equipment used to satisfy the requirements of [DOC] Condition 1. In the event that PG&E seeks to change the equipment to control H_2S emissions PG&E shall request that the LCAPCD Hearing Board and California Energy Commission (CEC) determine whether the alternate technology satisfies the requirements of [DOC] Conditions 1 and 2. PG&E may use the alternate technology only if the LCAPCD Hearing Board and CEC determine that it will comply with [DOC] Conditions 1 and 2.

(d) DOC, condition #4 Not later than two (2) years prior to the scheduled operation date of any alternative abatement technology to be installed at the Unit 16 power plant, PG&E shall submit to the LCAPCD and the CEC the conceptual design of the alternative technology which will be installed to satisfy the requirements of [DOC] Conditions 1 and 2.

(e) DOC, condition #5 Not later than 30 days prior to the scheduled start of construction of the alternative technology, PG&E shall submit to the LCAPCD and the CEC data from a full scale or pilot 5-day test (similar to that conducted for the hydrogen peroxide/catalyst process at Unit 13 in 1980) demonstrating that any proposed alternative technology is expected to be capable of maintaining emissions of H_2S from the power plant at the levels specified in [DOC] Conditions 1 and 2. If PG&E proposes to change the H_2S abatement technology, PG&E shall not commence construction or installation of any alternative technology until the LCAPCO concurs in writing that such alternative technology is expected to comply with the emissions limitations specified in [DOC] Conditions 1 and 2. The LCAPCO shall either concur or deny concurrence within fifteen (15) days of receipt of the data submitted by PG&E. Failure to submit data from the above specified test demonstrating compliance with [DOC] Conditions 1 and 2 may be a basis for the denial of concurrence by the LCAPCO. The type of data and format shall be similar to that contained in PG&E's Department of Engineering Research Report 420-80.179. In no event shall PG&E operate the Geysers Unit 16 power plant at this site without either H_2S control technology specified in Condition 3 or alternative H_2S control technology approved by the LCAPCO.

(f) DOC, condition #6 PG&E, with the steam supplier, shall develop a plan to limit H_2S emissions during power plant outages to the H_2S emission limitation specified in [DOC] Conditions 1 and 2 within 15 minutes, or as close to 15 mintues as is obtainable, but in no case later than 60 minutes after cessation of power generation. Said Plan shall specifically consider the use of a turbine bypass system consisting of the following components: valving, tubing and sparger enabling 50 percent of the full steam flow to be treated using the power plant surface condenser and abatement equipment to control H_2S emissions during power plant outages. If such a system is not proposed, said Plan shall include a justification for the decision.

Said Plan shall be submitted, within 120 days of issuance of PUC certification, to the Executive Officer of the Air Resources Board (ARB) for approval and shall: (1) identify the technology proposed to control H_2S emissions during power plant outages (stacking emission control system); (2) provide general operating procedures for the stacking emission control system specifying the duties of PG&E and the steam supplier; and (3) include the development of performance data to submit to the LCAPCO and Executive Officer of the ARB demonstrating that the stacking emission control system can comply with the H_2S emission limitation specified above.

Within 30 days of receipt of the Plan, the Executive Officer shall determine whether the Plan satisfies this [DOC] Condition 6 and, if satisfactory, shall approve the Plan. The Plan shall be approved only if H_2S emissions are controlled as specified in Conditions 1 and 2 within 15 minutes, or as close to 15 minutes as is obtainable, but in no case later than 60 minutes after cessation of power generation. PG&E shall not commence installation of the power plant H_2S control technology prior to receiving approval of the Plan. Upon approval of said Plan it shall become a part of the terms and conditions of the Determination of Compliance and shall be incorporated into any certification and any Permit to Operate issued for Geysers Unit 16 at this site.

(g) DOC, condition #7 The direct off-gas vent to the atmosphere shall be used only during cold start-up of the power plant turbine and failures of the cooling tower fans or the direct off-gas system to the cooling towers. PG&E shall notify the LCAPCO at least one hour prior to each cold start-up involving direct venting. Within normal operating constraints, PG&E shall use best efforts to avoid cold start-ups under adverse meteorological conditions (e.g. strong drainage and limited downward mixing). Cold start-up shall not involve direct venting of the untreated non-condensibles for steam flows exceeding 25,000 pounds per hour.

(h) DOC, condition #8 The cooling towers shall have a guaranteed drift rate of no more than 0.002 percent. "Drift" shall be defined as it was in PG&E Report No. 7485.16-74.

(i) DOC, condition #9 The components of the air pollution abatement systems shall be properly winterized.

(j) DOC, condition #10 PG&E shall submit approved-for-construction drawings of the power plant secondary H_2S control technology to the LCAPCD and the CEC at least 30 days prior to commencing construction of the technology.

(k) DOC, condition #11A PG&E shall continue to pursue development of continuous H_2S monitoring devices to meet the following requirements: H_2S shall be monitored by measuring parameters indicating total volume flow rates and H_2S concentrations at the following locations: (a) outlet of the Stretford unit; and (b) in the treated condensate or in the circulating water upstream of the cooling tower. A log of such monitoring shall be maintained and made available to LCAPCD and CEC staff upon request. The H_2S monitoring devices must have an accuracy of plus or minus 1 ppm, provide measurements at least every 15 minutes, and be readily accessible to LCAPCD staff. Flow rate measuring devices must have accuracies of plus or minus 5 percent at 40 percent to 1,200 percent of the total flow rate and calibrations must be performed at least quarterly. The monitor shall not require more than 16 hours of maintenance per month. Calibration records must be made available to LCAPCD staff upon request. PG&E shall submit a copy of the continuous monitoring development plan to the LCAPCD and the CEC.

One year after the commencement of commercial operation, PG&E shall submit a final report to the LCAPCO on the availability of acceptable continuous monitors which satisfy the above criteria. Within 30 days of receipt of the report, the LCAPCO shall determine whether or not such monitors are available and should be installed at Unit 16. Until such monitors are installed or in the event that the LCAPCO determines that monitors meeting the above specifications are not commercially available within one year of commencement of commercial operation, PG&E shall conduct testing no less than once every thirty (30) days to ensure compliance with [DOC] Conditions 1 and 2. The testing procedure used to determine compliance shall be submitted to the LCAPCD for approval. A log of such testing shall be maintained and available to the LCAPCD and CEC upon request.

In all cases, a summary of the monitoring and/or testing shall be forwarded to the LCAPCD every three (3) months.

DOC, condition #11B The incoming steam to the power plant shall be analyzed for H_2S, ammonia, arsenic, boron, mercury, and radon^{222}. These components (except H_2S) shall be monitored every quarter for a period of two (2) years after the scheduled date of commercial operation and annually thereafter. H_2S shall be monitored at least every 30 days for the life of the power plant, unless a continuous monitoring system as described in [DOC] Condition 11.A is used to monitor emissions. Reports summarizing the results of such analyses shall be submitted to the LCAPCD and the CEC quarterly.

DOC, condition #11C PG&E shall operate or participate in the operation of a monitoring station to be located at the Anderson Springs Recreation Center. Such monitoring shall be conducted for one (1) year prior to and one (1) year after the scheduled date of commercial operation. The constituents to be monitored shall be H_2S, boron, mercury vapor, radon^{222}, and its daughters and particulate matter. Particulate matter shall be analyzed for silica, boron, vanadium, and mercury solids. The frequency method of collection and the testing methods shall be approved by the ARB and the LCAPCO. Quarterly reports summarizing the results of such monitoring shall be submitted to the LCAPCD, the ARB, and the CEC.

DOC, condition #11D PG&E shall provide safe access to sampling ports that enable representatives of the LCAPCD or ARB to collect samples from the treated condensate or the circulating water upstream of the cooling tower, cooling tower stacks, the noncondensible exit gas from the Stretford unit and the direct off-gas vent.

(1) DOC, condition #12 At least 60 days prior to scheduled commercial operation, PG&E shall submit, for approval, a detailed plan for testing the performance of the Geysers Unit 16 abatement system at normal full load operation. Normal full load is defined as operating Geysers Unit 16, at a minimum of 80 percent of the gross electricity generating capacity, and the abatement system. This one time test shall incorporate tests for emissions from the cooling tower of components of potential concern in geothermal steam.

PG&E shall complete the performance test plan approved by the LCAPCO within 90 days or as soon as possible following the date of commercial operation. The LCAPCO shall approve, disapprove or modify the plan within 30 days of receipt.

(m) DOC, condition #13 PG&E shall file an application for a Permit to Operate with the LCAPCD within 90 days after the commercial operation date or as soon as possible thereafter and submit appropriate permit fees. The application shall include the results of the performance test plan in [DOC] Condition 12.

(n) DOC, condition #14 PG&E shall issue quarterly reports to the LCAPCO detailing: a) hours of operation; b) any periods of abatement equipment malfunction, reasons for malfunctions and the corrective action; c) types and amounts of chemicals used for condensate treatment; d) periods of scheduled and unscheduled outages and the cause of the outages if known; e) a summary of any irregularities that occurred with the continuous emissions monitors, if used; and f) the dates and hours in which Unit 16's H_2S emission rate was in excess of the emissions limitations specified in [DOC] Conditions 1 and 2.

(o) DOC, condition #15 PG&E shall allow authorized representatives of the LCAPCD and ARB to enter the premises where the source is located, within one hour of notification, to inspect the plant for compliance with the conditions of this Determination of Compliance.

(p) DOC, condition #16 PG&E shall comply with all applicable federal, state and local laws, standards, and ordinances in the operation of Geysers Unit 16.

(q) PG&E shall comply with the terms of, and perform all the acts required of it as enumerated in Section 12, Air Quality, of the COMPLIANCE PLAN FOR PG&E'S GEYSERS UNIT 16, attached hereto as Appendix A and incorporated by reference herein.

B. Air Quality--Prevention of Significant Deterioration (PSD)

Based upon the Final Environmental Impact Report, pages I-92 and 93, PG&E may be required to obtain from the U.S. Environmental Protection Agency (EPA) a Prevention of Significant Deterioration (PSD) permit for H_2S for Unit 16. Similarly, Aminoil USA, Inc., may be required to obtain a PSD permit for H_2S steam field operation.

The proposed project and its associated steam field are located in an area presently designated as Class II. All areas assessed for air quality impacts related to Unit 16 are also classified as Class II. The nearest Class I area is approximately 50 miles north of the proposed project site.

So long as conditions (a), (b), and (f) (Air Quality--Power Plant, above) are met, the impact of the proposed Unit 16 and the associated steam field will be far below the allowable Class II increments. The facility would be too far from the nearest Class I areas to cause any significant air quality deterioration in such areas. Furthermore, the H_2S abatement equipment described in Finding 7 is expected to satisfy the federal BACT requirement.

Finding

8. Based upon the Final Environmental Impact Report, Unit 16 and its associated steam field will satisfy the requirements for a federal PSD permit, if required.

C. Air Quality--Steam Field

The Lake County Air Pollution Control District has sole jurisdiction over the steam field operator and sets limitations on steam stacking (the

venting of geothermal steam to the atmosphere) which occurs during periods of power plant outages. The steam supplier, Aminoil USA, Inc., must obtain all of the air quality permits relating to the steam field from the Lake County Air Pollution Control District.

To the extent that the abatement facilities applicable to the steam field are integrated in the power plant, the conditions of the Determination of Compliance and Settlement, referred to above and agreed to by PG&E, will allow Aminoil USA, Inc., and PG&E to coordinate and integrate abatement systems for periods of steam stacking.

Based upon the conditions contained in the Determination of Compliance and Settlement, and likely imposition of similar conditions applicable to the steam field operator, the Lake County Air Pollution Control Officer has determined that it is likely that the steam field operator will be able to secure a permit to operate. (RT 13,054:7-14) Thereupon, there will be an available fuel supply for Geysers Unit 16.

Findings

9. The Lake County Air Pollution Control District has sole jurisdiction over the steam field operator and sets limitations on steam stacking which occurs during periods of power plant outages.

10. The steam supplier, Aminoil USA, Inc., must obtain all of the air quality permits relating to the steam field from the Lake County Air Pollution Control District. The District has stated that it is likely that the steam supplier will obtain all necessary permits and that the environmental impacts of steam stacking should not be significant if the conditions of the steam field permit are observed. (RT 13, 054:7-14)

D. Biology

Impacts to plant and animal species will occur during the construction of the facility due to site preparation and during power plant operation. These impacts include loss of vegetation and habitat, increased erosion and sedimentation, and increased human activity associated with power plant construction, operation and maintenance.

Vegetation

Brush (primarily chaparral) and mixed evergreen forests are the predominant vegetative communities on the Geysers Unit 16 leasehold. Riparian vegetation is found in the leasehold along the permanent and intermittent creeks. No rare or endangered plant species listed by state or federal agencies have been reported for the power plant site or fill disposal area, and such species are not likely to occur on the portions of the power plant site or fill disposal area subject to disturbance. Plant species of special concern have been reported near the fill site area. (RT 10,061; 10,077)

The primary vegetation impacts associated with the proposed project will result from (1) direct disturbance or removal of vegetation during construction and maintenance activities and (2) possible vegetation damage or loss from aerosol deposition (such as cooling tower drift) or accumulation of substances (such as boron) on vegetation or in the soil. These impacts will result from activities associated with the power plant, transmission tap line and steam field. (FEIR I-46) The impacts are of concern because of their cumulative nature over time and over the full Geysers Known Geothermal Resource Area (KGRA).

Wildlife

The wildlife which inhabit the area in the vicinity of the proposed project reflect the type and density of vegetation, availability of water and nature of human activity. The principal wildlife habitats found in the project area correspond to the primary vegetative communities.

The chaparral is one of the most extensive habitats in the project area. It supports a variety of small mammals, migratory and resident birds, and a year round population of black tail deer. Of greater wildlife value are the mixed evergreen forest, foothill, woodland and riparian habitat. These habitats support a large and diverse assemblage of birds, large and small mammals, reptiles and amphibians. The presence of water and moist conditions further increases the value of the riparian and mixed evergreen habitats. The grassland habitat and Douglas-Fir forest are of lesser wildlife value than the previous habitats because they have less diverse plant composition and plant forms. However, the grassland is important as a feeding area to animals that nest or find cover in adjoining woodlands or chaparral. The Douglas-Fir forest provides abundant cover habitat. (FEIR I-51)

The areas of critical concern to wildlife in the project are the riparian habitats. Aquatic habitat is very limited on the leasehold. Bear Canyon, Anderson and Hot Springs creeks are located adjacent to the leasehold. Recreational fisheries are supported by Bear Canyon and Anderson creeks. Runoff to these Creeks from their tributaries within and adjacent to the leasehold is important to the maintenance of trout populations in these Creeks, Putah Creek, and Lake Berryessa. No fish or wildlife species of commercial importance are found in the leasehold. (FEIR I-52)

The primary impacts on the area's wildlife will occur as a result of vegetative loss, disturbance from construction activities, or the possible release of substances at toxic levels. Disturbance to wildlife will also result from increased human activity and noise in the area. Bear Canyon, Hot Springs, and Anderson creeks are the most likely to be affected by increased soil erosion and possible accidental releases of toxic materials from the proposed project. Soil erosion and sediment deposition in these creeks will increase because of vegetation removal and soil disturbance during construction. There may be some loss of rainbow trout spawning habitat in Bear Canyon Creek from the project, and such loss may not be fully compensated by the Applicant's mitigation measures. Therefore, the Commission has imposed additional mitigation measures. Furthermore, withdrawal of water from local creeks for construction uses may adversely affect rainbow trout habitat and populations. (RT 9,345:24-25; 9,346:1-7) The Commission has limited the locations for withdrawal of water to minimize such impacts.

Mitigation Measures

PG&E has proposed mitigation and monitoring programs that will mitigate or compensate for potential adverse impacts to vegetation and wildlife associated with the power plant development. These measures are specified in the NOI, in responses to Staff's data requests, and in the AFC. Additional measures for erosion control are set forth in the Harlan Report. (See PART TWO, Soils)

Findings

11. No rare or endangered plant species listed by state or federal agencies have been reported for the plant site or fill area and these species are not likely to occur on the portions of the plant site or fill area sites subject to disturbance.

12. Loss of vegetation and damage to vegetation from cooling tower drift in The Geysers has been reported. The PG&E drift elimination specification for the Unit 16 power plant tower is set at a drift loss rate of 0.002 percent of the 168,000 gallons per minute (gpm) circulating water mass, or 3.4 gpm. This is below the specification drift loss rate for existing Geysers units for which there is information on vegetation effects.

13. Plant species of special concern have been reported near the fill site area. A serpentine outcropping just above the western edge of the fill site supports populations of jewel-flower (Streptanthus breweri), Jepson's ceanothus (Ceanothus jepsonii), and cliffbrake (Onychium densum).

14. Wildlife habitat at the power plant site will be permanently destroyed. Wildlife habitat at the disposal site and near the power plant site will be temporarily disturbed by construction activities.

15. Bear Canyon Creek is an important rainbow trout (Salmo gairdneri) spawning and nursery area for the trout of Putah Creek and Lake Berryessa. There may be some loss of rainbow trout spawning habitat in Bear Canyon Creek resulting from soil erosion and sedimentation deposition from the project.

16. If the mitigation plans to stabilize the cut and fill slopes and to control erosion can be successfully implemented, impacts on the trout fishery in Bear Canyon Creek will not be significant.

17. Use of water from local creeks for construction purposes may adversely affect rainbow trout habitat and populations.

18. The environmental impacts resulting from the construction and operation of Unit 16 can be mitigated or compensated by the conditions below:

Conditions

(r) PG&E shall obtain from Aminoil USA, Inc., a written agreement allowing access to the entire leasehold for the purpose of performing the mitigation and monitoring requirements enumerated herein.

(s) PG&E shall request that Aminoil USA, Inc., notify PG&E when it (Aminoil) applies for a well pad permit. Upon receiving notice from Aminoil USA, Inc., of such application(s), PG&E shall immediately notify the Commission of such application(s) so that the Commission may assess whether any activity related to such application(s) will affect the terms and conditions of this certification.

(t) PG&E shall comply with the terms of, and perform all the acts required of it as enumerated in Section 1, Biological Resources, of the COMPLIANCE PLAN FOR PG&E'S GEYSERS UNIT 16, attached hereto as Appendix A and incorporated by reference herein.

E. Water Resources and Hydrology

During the 32-month construction period, PG&E will require about 11 acre-feet (3,600,000 gallons) of water for dust control, soil compaction, concrete batching, drinking water and other minor uses. (RT 11,077:6-10) A maximum of 2 acre-feet per month will be used during the first six months of construction. (RT 11,082:13-14) Water required for plant operation and domestic needs will be less than 0.03 acre-feet per month. Approximately 1.1 to 1.2 acre-feet (350,000 to 400,000 gallons) of water will be needed initially, to fill the cooling tower basin. PG&E will utilize condensed steam for cooling water purposes. The source of this water will be condensate from operating units that would otherwise be reinjected. Condensate is available in sufficient quantities to fill the cooling tower basin; however the quality is inadequate for some construction purposes. (RT 10,185:11-25)

PG&E intends to delegate responsibility for obtaining construction water to a contractor thereby requiring the contractor to abide by all applicable laws and regulations, including those pertaining to the acquisition and use of water. (RT 11,077:10-14)

PG&E will acquire water for plant operation. Options available to PG&E or its contractor, either separately or in combination are:

(1) buying water from a water hauler or water company;
(2) buying, or taking with permission water from an existing appropriative water right holder;
(3) buying, or taking with permission, water from an existing riparian right holder if the water will be used on another parcel riparian to the same stream;
(4) obtaining a permit to appropriate water from the State Water Resources Control Board; or
(5) using well water. (RT 11,079:3-24)

Adequate water sources, or combinations of sources, are locally available. The primary source of water during operation will be rainfall from the roof of the turbine building. (RT 11,823:24-11,824:1) PG&E intends to acquire the water (and rights necessary to secure the water) to meet domestic water supply needs not provided in the four-month storage of collected rainfall. (RT 11,083:1-2) PG&E has suggested the following sources of water for either construction or operation: Bear Canyon, Hot Springs, Anderson, Gunning, and Putah creeks (See Figure D), Sanke's Pond, nearby communities of Anderson Springs, Forest Lake and Middletown, blowout pond near Unit 18, Big Sulphur Creek at Unit 14, Clear Lake vicinity and the Russian River vicinity. (RT 11,083:9-10; 11,078:10-25; 11,108:4-20)

The power plant site is located on the ridge between Bear Canyon Creek and Hot Springs Creek. Both creeks drain into Anderson Creek. Gauged stream-flow records are available for Anderson Creek and estimates of flow characteristics are calculated for Bear Canyon Creek and Hot Springs Creek, based upon theoretical precipitation and run-off data. (RT 11,111:18-25) PG&E witnesses testified that Bear Canyon Creek and Hot Springs Creek, during the average year, would probably be insufficient as sole sources of water for plant construction (10,187:8-20; 11,112:22-11,113:1)

The Anderson Springs Water Company, which supplies most of the community of Anderson Springs with domestic, drinking-quality water, draws a portion of water, with only minor filtration, from Gunning Creek. (RT 9,698) Anderson Springs' domestic water supply does not come from Bear Canyon or Hot Springs creeks, therefore the community's water supply would not be adversely affected by withdrawals from these creeks. (RT 9,698)

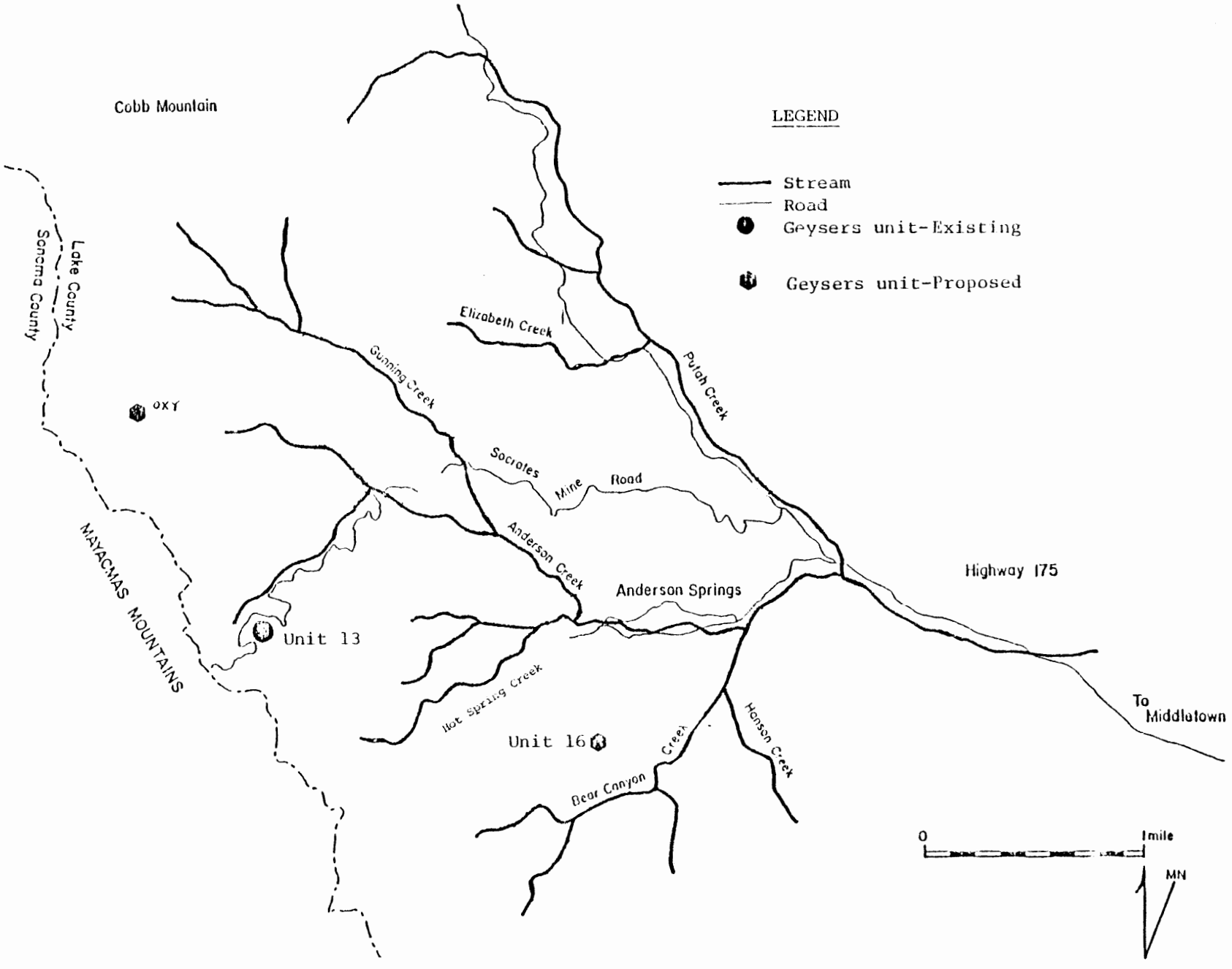


FIGURE D - Upper Putah Creek drainage.

Anderson Creek supplies water for domestic and recreational purposes to residents in the vicinity of Anderson Springs not served by the Anderson Springs Water Company. Withdrawals from the watershed upstream of the confluence of Bear Canyon and Anderson creeks could adversely impact aquatic biology in the watershed by increasing the potential for sedimentation as a result of access road construction and/or streambed alteration. Withdrawals upstream of this point would seriously limit the dilution capability of the receiving water to reduce the impact of an accidental spill involving toxic materials. (RT 9,698; 11,104:15-19)

Findings

19. Approximately 11 acre-feet (3,600,000 gallons) of water will be required during the 32-month construction period.

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

21. The source for the fresh water necessary for power plant operation will be from either trucking water from existing water sources, using the turbine building roof for collecting rain water, drilling a water well nearby, or pumping water from a nearby creek or stream in accordance with applicable law and the conditions of certification.

22. PG&E proposes to utilize condensed geothermal steam for the plant cooling water supply.

23. Bear Canyon Creek and Hot Springs Creek, as sole sources, would be inadequate to supply the water necessary for plant construction, based upon stream flow calculations.

Conditions

(u) PG&E is responsible for conveying all conditions imposed by this certification to the appropriate contractors.

(v) PG&E shall require its contractors to:
(1) identify the source(s) of water used;
(2) provide evidence of permission to use water from a given source;
(3) provide a monthly summary of the quantity of water used from each source; and
(4) obtain and provide a copy of the streambed alteration permit from the California Department of Fish and Game, if one is required. (RT 11,077:15-11,078:1)

(w) To assure that the water supply to Anderson Springs will not be diminished and impact the current users at current levels by the construction of the power plant; PG&E, its contractors or agents, shall not withdraw water from Anderson Creek upstream of the confluence of Anderson Creek and Bear Canyon Creek.

(x) PG&E shall comply with the terms of, and perform all the acts required of it as enumerated in Section 11, Water Quality, Hydrology, and Water Resources, of the COMPLIANCE PLAN FOR PG&E'S GEYSERS UNIT 16, attached hereto as Appendix A and incorporated by reference herein.

F. Water Quality

The surface waters possibly affected by construction and operation of the Unit 16 power plant are within the Upper Putah Creek watershed and include Bear Canyon, Hot Springs and Anderson creeks. Except for Hot Springs Creek, these waters are beneficially utilized for irrigation, stock watering, recreation, domestic and municipal use, and aquatic and wildlife habitat. (RT 9,698) There are no planned discharges either to surface or groundwaters. The principal potential sources of water pollution stemming from the construction and operation of the plant are:

(1) spills from the hydrogen sulfide (H_2S) abatement process areas, the circulating water and condensate reinjection systems;
(2) plume-drift deposition;
(3) storm runoff;
(4) disposal of domestic wastewater; and
(5) sediment from soil erosion.
(RT 10,205)

PG&E plans to store Alkali (sodium carbonate or sodium hydroxide), Sodium Ammonium polyvanadate (Vanasol), and Anthraquinone disulfonic acid (ADA) in the Stretford portion of the H_2S abatement area. If PG&E employs a hydrogen peroxide secondary H_2S abatement system, hydrogen peroxide and the catalyst, in addition to any other chemicals which may be used in an alternative secondary abatement system, will be stored within the bermed area of the plant site.

To prevent spills of Stretford process material from leaving the immediate vicinity, PG&E plans to surround the H_2S abatement process area with an impermeable concrete barrier. Spilled Stretford material will drain to a sump where it will be pumped to a chemical storage tank for reuse in the Stretford

process or disposal off-site at an approved Class II-1 solid waste disposal site. Rainwater entering the Stretford process area will not enter surface water or groundwater, but will be used in the Stretford process or pumped to the cooling tower overflow structure. (RT 10,032)

Steam condensate from the plant will be used for cooling water, with any excess reinjected into the geothermal reservoir. To prevent spills of condensate and other materials from leaving the site, PG&E plans to construct an impermeable concrete or asphaltic concrete retention barrier around the plant and pave the site, with the exception of the switchyard. As a result of this construction, the paved area of the plant site will serve as a spill retention basin, designed to retain the maximum condensate spill expected to occur before plant personnel can correct the cause of the spill (170,000 gallons). (RT 10,253) Any spilled materials would flow to a concrete-lined catch basin located at the lowest point in the plant site, then be pumped to the cooling tower basin for reinjection. Alarm systems will notify plant operators when a spill has occurred and when the catch basin pump has started. PG&E has prepared an Emergency Accidental Spill and Discharge Control Plan and Procedures manual, to instruct plant operators in what to do and who to call in the event of an on-site spill.

Plume drift (boron, mercury, and ammonia) deposition from Unit 16 is not expected to adversely affect water quality or nearby waterways significantly. (RT 10,229:15-16)

During the dry season, drift, oil drips from the machinery and vehicles, residuals from spills, particulates settled from the air, and other pollutants

will accumulate on the impermeable plant site. Runoff from the first significant storm may contain sufficient quantities of these materials from the plant site to adversely affect the quality of Bear Canyon and Anderson creeks below the confluence with Bear Canyon Creek. (RT 10,032) To minimize the potential adverse water quality impacts PG&E will return plant site runoff to the cooling tower basin for subsequent injection into the geothermal reservoir. When the capacity of the return system is exceeded and a spill has not occurred, runoff may, if necessary, be released from the site through a manually controlled valve. Under such conditions, the impacts on water quality should be minimal due to material dilution from heavy rainfall. (RT 10,032)

PG&E plans to dispose of domestic waste water by injecting it into the reinjection system. The waste will be treated in a septic tank to remove solids, and discharged to the reinjection line at a point between the condensate surge pond and the reinjection well.

Regional Water Quality Monitoring

The Known Geothermal Resource Area Aquatic Resource Monitoring (KGRA ARM) program is designed to monitor long-term regional water quality, sedimentation, and aquatic fauna in the presently developed geothermal areas of Lake and Sonoma counties. Routine sampling will be conducted at stations along Gunning, Anderson, Bear Canyon, Hot Springs, and Putah creeks. The KGRA ARM program is not designed to measure transient impacts resulting from chemical or condensate spills or other project-specific impacts. (RT 9,338:18-25; FEIR I-42)

Findings

24. The principal potential sources of water pollution resulting from plant construction and operation are:
    (a) spills from the hydrogen sulfide (H_2S) abatement process areas, the circulating water and condensate reinjection systems;
    (b) plume drift deposition;
    (c) storm runoff;
    (d) disposal of domestic wastewater; and
    (e) sediment from soil erosion. (Refer to PART TWO, Soils for description of sedimentation and erosion control).

25. Chemicals used in the Stretford process and secondary abatement system will be stored within the bermed area of the plant site.

26. A spill retention basin, formed by an impermeable concrete or asphaltic concrete barrier around the plant and paving of the site, is designed to retain runoff spills.

27. KGRA-ARM is a regional water quality, sedimentation and aquatic fauna monitoring program, to conduct routine sampling along Gunning, Anderson, Bear Canyon, Hot Springs and Putah creeks. Transient impacts resulting from chemical or condensate spills or other project-specific impacts will not be measured.

28. With implementation of the mitigation and protection measures described herein, it appears that water quality of the Upper Putah Creek watershed will be adequately protected and preserved from impacts resulting from construction and operation of Unit 16.

Conditions

(y) In the event that the Geysers KGRA-ARM program is not operational by commencement of power plant operation, PG&E shall conduct an appropriate independent water quality and aquatic biology monitoring program in the Bear Canyon, Hot Springs, and Anderson creeks and their tributaries, as described in the COMPLIANCE PLAN FOR GEYSERS UNIT 16, Section 1-5, Biology and Section 11-1, Water Quality, Hydrology, and Water Resources.

(z) PG&E shall comply with the terms of, and perform all acts required of it as enumerated in, Section 11, Water Quality, Hydrology, and Water Resources, of the COMPLIANCE PLAN FOR PG&E'S GEYSERS UNIT 16, attached hereto as Appendix A and incorporated by reference herein.

G. Soils

The soils in the vicinity of the power plant site exhibit a moderate to high erosion potential and those at the proposed site itself are highly erosive. (RT 9,384) Earth moving activities associated with the construction of the proposed power plant create a significant potential for accelerated erosion of these highly erosive soils and consequent sedimentation downstream from the areas disturbed by the construction of the power plant, well pads, roads, transmission tap line and steam lines.

There are two main consequences of accelerated soil erosion. One is the loss of the soil resource itself and the associated loss of watershed and biological habitat. The other is the degradation of the water quality of the Upper Putah Creek and its tributaries caused by the sediments that reach the streams and the consequent adverse impact on beneficial uses of the water, including impacts on aquatic biology. (RT 9,326:6-14; 9,698-9)

Under pre-construction conditions, PG&E estimates existing soil losses at about 9 tons/acre/year at the plant site. If the proper mitigation measures were not implemented during construction, the rate of erosion would be unacceptably accelerated. (RT 9,385)

PG&E proposes to mitigate soil erosion and sedimentation impacts by using standard engineering practices supplemented by the system's approach to erosion control proposed by United States Environmental Protection Agency. Specifically, the mitigation measures utilized for the power plant to control loss from erosion are as follows:

a. The temporary and permanent measures for the site and transmission tap line outlined in the NOI at pages 156-160; and

b. The measures for the off-site waste disposal site C included in the September 1970 report "Detailed Geotechnical Investigation, Geysers Power Plant Unit 16" by Harlan and Associates at page 54. The mitigation measures are generally shown in Figures E and F.

With the implementation of the foregoing mitigation measures, the project will comply with applicable standards.

Findings

29. The soils in the vicinity of the power plant site and disposal site exhibit a moderate to high erosion potential, and those at the proposed power plant site itself are highly erosive.

30. Earth moving activities associated with the construction of the proposed power plant create a significant potential for accelerated erosion of these highly erosive soils.

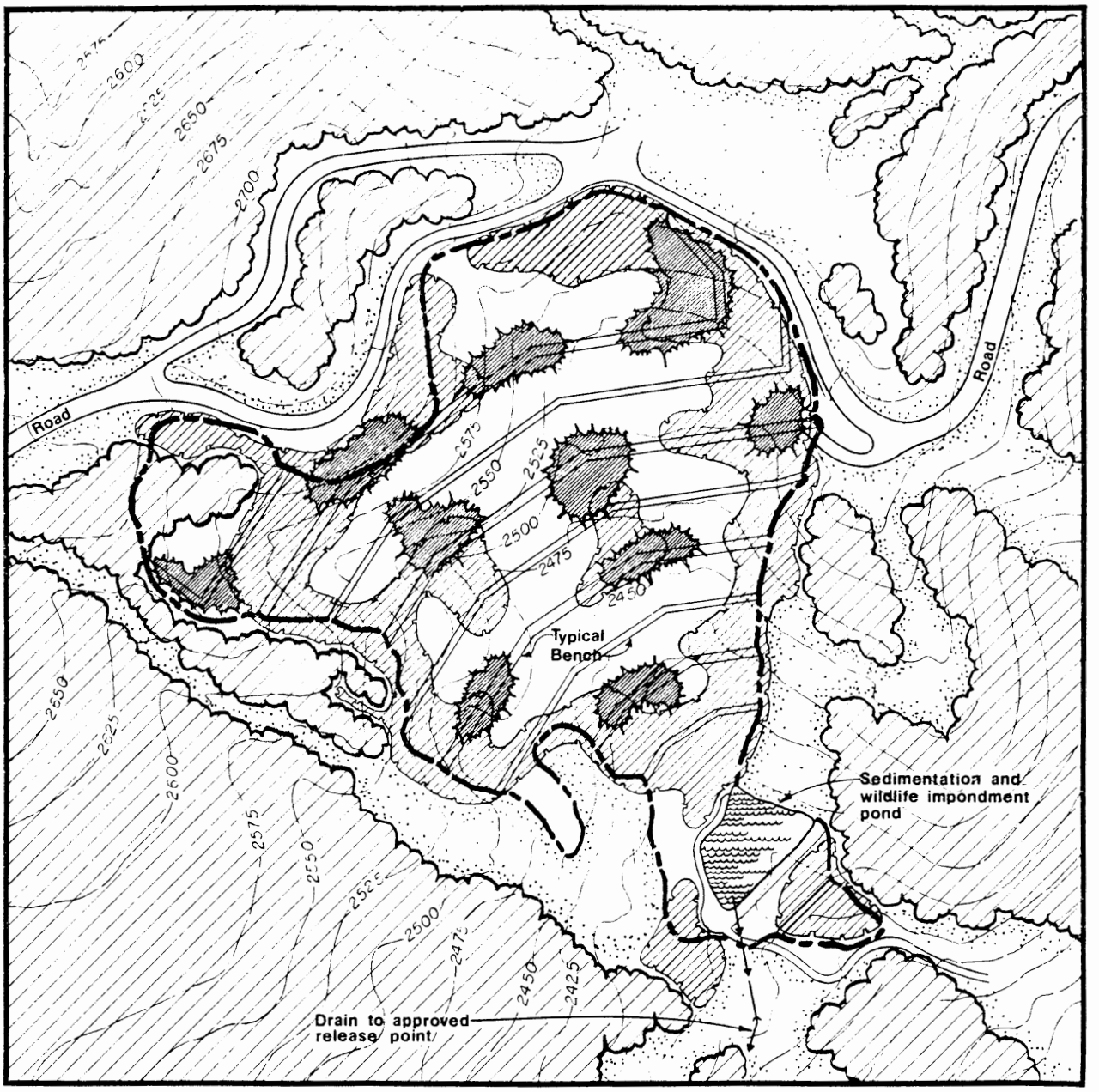
31. Accelerated erosion of soil will cause not only the loss of the resource itself but the degradation of water quality of the Upper Putah Creek watershed.

32. With the implementation and mitigation measures specified herein to control erosion, there is limited potential for high erosion or sediment transport from the power plant site or disposal site to the existing streams and watershed.

Conditions

(aa) PG&E shall implement all of the following mitigation measures:
   (1) The temporary and permanent measures for the site and transmission tap line outlined in the NOI at pages 156-160;
   (2) The measures for the off site waste disposal site C included in the September 1978 report "Detailed Geotechnical Investigation, Geysers Power Plant Unit 16" by Harlan and Associates at page 54; and
   (3) Mitigation measures shown on Figures E and F.

(bb) To avoid soil erosion and resultant sedimentation from construction of the disposal site sedimentation pond itself, PG&E shall construct a temporary, hand-made barrier between the sedimentation pond and Bear Canyon Creek to act as a temporary sedimentation pond. This barrier shall be constructed prior to the construction of the permanent sedimentation pond or the excavation of any soil, whichever occurs first, and shall be removed no earlier than following the revegetation of the disposal site.



PLAN

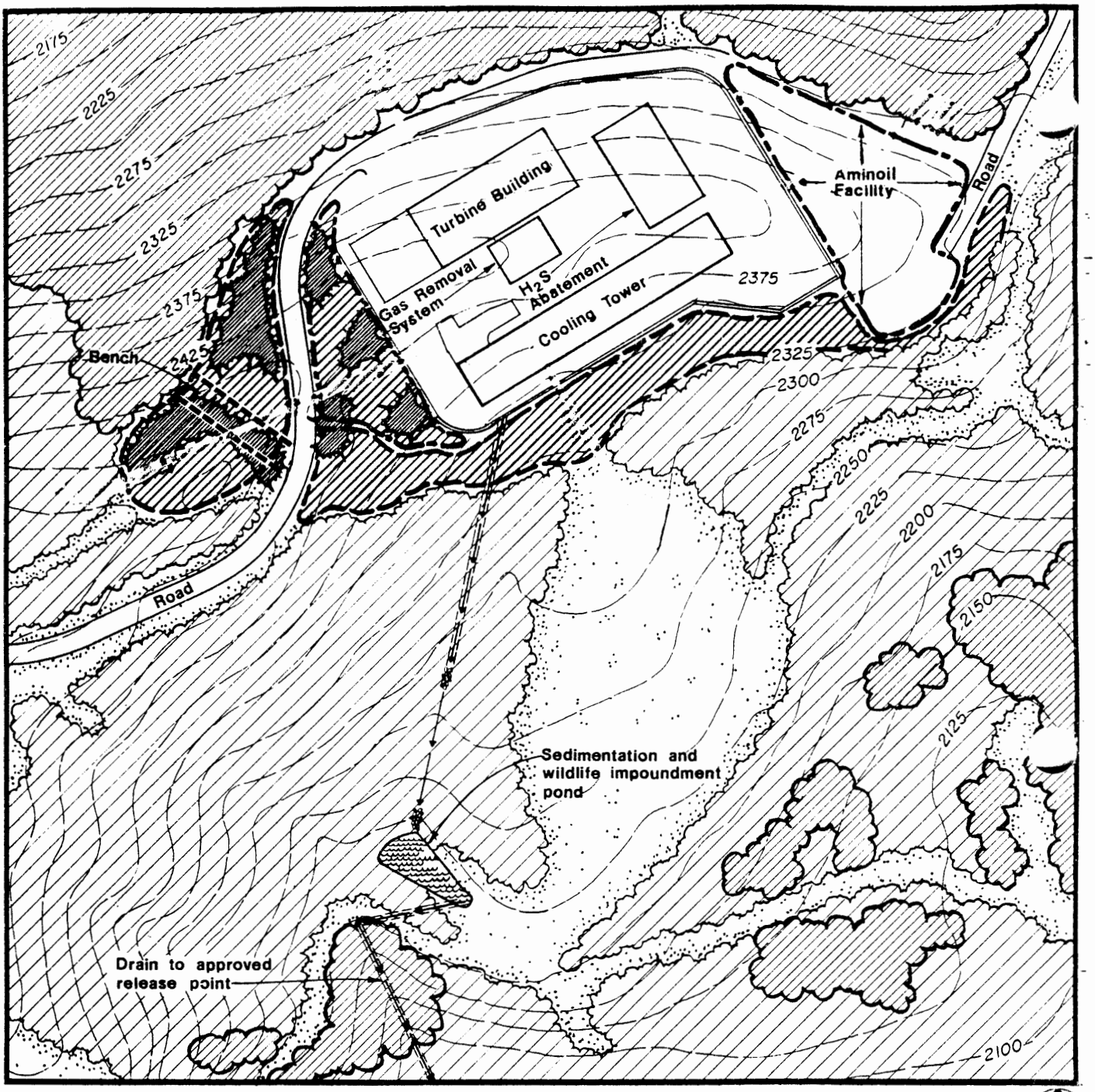
0 50 100 200

N

LEGEND

- Existing vegetation
- Proposed tree planting to match local species
- Proposed shrub planting to match local species
- Punched straw and hydroseed
- Open

GEYSERS UNIT 16 AFC
FILL DISPOSAL AREA EROSION CONTROL AND LANDSCAPE PLAN
FIGURE E



PLAN

LEGEND

- Existing brush
- Existing trees
- Proposed tree planting to match local species
- Open
- Proposed shrub planting to match local species
- Hydroseed
- Slope step and hydroseed

GEYSERS UNIT 16 AFC

POWER PLANT SITE EROSION CONTROL AND LANDSCAPE PLAN

FIGURE F

(cc) PG&E shall apply hydroseeding or punched straw erosion control to the downstream surfaces of the sedimentation ponds and all disturbed surfaces surrounding the sedimentation ponds following construction of the sedimentation ponds. If necessary, these surfaces shall be irrigated periodically to assure growth of the hydroseeded areas.

(dd) To evaluate the effectiveness of PG&E's erosion control measures, PG&E shall quantify the amount of sediments accumulated annually in the sedimentation basins, beginning the first year after the start of site preparation and continuing for three years after plant start-up, and report this data to both the CEC and the Central Valley Regional Water Quality Control Board (CVRWQCB). The accumulated sediment will be estimated by adequate measuring techniques (e.g. staff guage). Sediment quantities will be verified when sediment is removed. The sedimentation pond should not be fuller than 60 percent of its actual capacity prior to each winter season. The pond will be cleaned as necessary.

(ee) If the sediment yield information referred to in Condition (dd) above or other data supplied to the Commission indicates that the proposed erosion control mitigation measures appear to be ineffective, PG&E and the Commission (with the assistance of the CVRWQCB, if necessary) will evaluate the need for alternative mitigation measures and remedial measures. If alternative mitigation measures and remedial or compensatory measures are established by the Commission, they shall become conditions of this certification.

(ff) PG&E shall comply with the terms of, and perform all the acts required of it enumerated as in, Section 8, Soils, of the COMPLIANCE PLAN FOR PG&E'S GEYSERS UNIT 16, attached hereto as Appendix A and incorporated by reference herein.

H. Cultural Resources

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

There are no ethnographic or archaeological sites nor natural features which will be disturbed by the construction of Unit 16. It is conceivable that an unknown archaeological site could be uncovered during construction activities. (RT 10,058; 10,133)

In the event cultural resources are discovered during construction activities, such operations in the potentially impacted area shall cease until an archaeologist evaluates the significance of the resource.

Finding

32. Construction activity on Unit 16 will not adversely affect any identified archaeological, ethnographic, paleontological, or historical resources.

Condition

(gg) PG&E shall comply with the terms of, and perform all the acts required of it as enumerated in, Section 3, Cultural Resources, of the COMPLIANCE PLAN FOR PG&E'S GEYSERS UNIT 16, attached hereto as Appendix A and incorporated by reference herein.

I. Noise

Lake County has adopted a noise element to its General Plan. It is the intent of the noise element to limit the ambient noise levels at residential receptors to 55 dBA L_{dn}. (FEIR, I-113) Lake County currently establishes noise limits by placing conditions in its Use Permit. Construction activities, such as the movement of heavy equipment, are excluded from the Lake County standard.

The California Occupational Safety and Health Administration (Cal/OSHA) regulates allowable noise exposure of industrial workers. The provisions of Cal/OSHA are enforced by the Division of Occupational Safety and Health (DOSH). The federal occupational noise standards are set by the Occupational Safety and Health Act of 1970 and are basically the same as Cal/OSHA standards.

The closest sensitive receptor to the proposed power plant site is at Camp Verdant Vales (approximately 0.5 miles from the power plant site). (RT FEIR, I-113) The next nearest receptors are located in the community of Anderson Springs. (FEIR, I-114-7)

The highest plant construction noises will be caused by large earthmoving equipment. The noise associated with this equipment will be discernible to some of the closest receptors. However, this activity will be temporary in nature and performed during daylight hours, whenever possible. Based upon the estimated projected operational noise level, operational sounds should be generally inaudible at Camp Verdant Vales; however, occasionally the sound may be barely audible to inaudible. (FEIR, I-127-8) The projected operating noise levels would be less to the other identified sensitive receptors which are farther away, such as residents of Anderson Springs.

If unabated, the noise from construction and operation of the power plant may exceed the standards applicable to industrial workers. (FEIR, I-115, I-121)

With the implementation of the noise impact mitigation measures specified herein, the power plant noises during normal operation should be generally inaudible and in compliance with the Lake County noise standards and the requirements of Cal/OSHA. (FEIR, I-130)

Findings

34. With the implementation of mitigation measures to control noise, the power plant noises during normal operation should be generally inaudible, and only occassionally audible to the closest residential receptors to the power plant.

35. With the implementation of noise impact mitigation measures, power plant noises during normal operation will be in compliance with the Lake County noise standard, the requirements of Cal/OSHA, and with federal requirements.

Conditions

(hh) PG&E shall implement the following mitigation measures:
- (1) 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).
- (2) Thermal (high density) insulation will be installed on the exterior surfaces of the steam turbine and will reduce the noise inside the turbine building.
- (3) The turbine building walls and roof will reduce noise propagating to the outside environment.
- (4) A sound proof office space will be built on the turbine-generator floor inside the building.
- (5) 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.
- (6) Steam-drain lines will be routed back into the condenser during unit start-ups.
- (7) During unit outage conditions, steam will be routed through a rock muffler system (or its equivalent) installed and operated by the steam supplier.

(ii) To verify compliance with standards for the protection of employees from noise impacts during operation, PG&E has agreed to perform a noise evaluation as required by Title 8, California Administrative Code, Article 105, to determine the magnitude of employee noise exposure. The results of the evaluation shall be available within 180 days of the time the facility has reached its rated power generation capacity and construction is complete. The results of the noise survey shall be maintained by the Applicant and shall be made available to DOSH or CEC upon request.

(jj) PG&E shall comply with the terms of, and perform all the acts required of it as enumerated in, Section 5, Noise, of the COMPLIANCE PLAN FOR PG&E'S GEYSERS UNIT 16, attached hereto as Appendix A and incorporated by reference herein.

J. Land Use

The proposed power plant is located in an area in which a principal land use is the exploration, development and utilization of geothermal energy. (FEIR, I-138)

Finding

36. Unit 16 and its associated facilities are compatible with the land use plans of Lake County.

Conditions

(kk) Power plant buildings, switchyard structures, pipelines and transmission towers will be painted colors that will blend with the local soil and vegetation colors.

(ll) Cut and fill areas and the disposal site will be revegetated to reduce contrast with surrounding areas. PG&E shall conduct tree planting to match local species (predominantly mixed evergreen forest) along the entire length of the northern and northeastern perimeter of the power plant site (including the Aminoil USA, Inc. facility) to reduce visual impacts and noise impacts and compensate for loss of vegetation. See Figure F.

(mm) Upon the permanent cessation of power plant operations, PG&E shall undertake the restoration of the power plant site by recontouring and revegetating to reduce the environmental impacts identified in this Decision to pre-project levels to the extent feasible.

K. Socioeconomics

During the power plant's peak construction time, the project will employ approximtely 100 workers. (RT 9,795) During its 32-month construction period, the project will have an average employment level of 40 to 50 workers. Previous geothermal operations in The Geysers have established a resident labor force in Lake and Sonoma counties. Both Lake and Sonoma counties will have economic benefits from the construction and operation of the Geysers Unit 16 power plant. These benefits reflect the additional economic activity generated in the two counties as a result of the personnel in the Unit 16 project.

It is estimated that there are a greater number of construction workers residing in Sonoma County than in Lake County. (RT 9,795) Therefore, Sonoma County will most likely receive the greater amount of the payroll effects. PG&E asserts that commuting workers from Sonoma County will have access to the Unit 16 site from Sonoma County. Access from the Geysers-Healdsburg Road, the Geysers-Cloverdale Road, and Pine Flat Road will require passage over Union Oil's private roads. Incentives by PG&E to cause construction workers to relocate their residences are neither necessary or proper in this case.

Lake County will derive tax revenues from the proposed power plant and the development of the Geysers Unit 16 steam field. According to Jack E. Worthington, Administrative Coordinator for the Board of Supervisors of Lake County, the County will receive approximately $385,438 annually in tax revenue from the Unit 16 project based upon the assessed evaluation figures in the Draft EIR. (RT 9743) Under the County's allocation formula,

3.9 percent tax revenues to road construction and maintenance, approximately $15,000 would be allocated annually for such purposes. (RT 9743) Subsequent PG&E revision of the total project cost raised the assessed value to $89 million, from which annual property taxes to Lake County are approximately $700,000. (RT 10,962) The annual proceeds derived from this project under the present allocation formula that the County uses for appropriating ad valorem tax revenues would be inadequate to finance the reconstruction of Socrates Mine Road, the principal access to the Unit 16 site from Lake County. (See Transportation Safety)

Applying the same allocation formula for road construction and maintenance, approximately $27,000 annually would be available for such purpose. In either case, $15,000 or $27,000 annually is insufficient to fund the reconstruction of Socrates Mine Road which is estimated to cost approximately $2.7 million. (RT 9,508:14-19)

Although the construction and operation of Unit 16 itself will not adversely affect the ability of local school districts to provide educational service, there will be an incremental impact therefrom which will be part of the cumulative impact of geothermal development in Lake County, which impact may be of greater significance. PG&E's annual property taxes will adequately compensate the incremental impact upon local schools. (RT 9,972:19-22)

Findings

37. Due to the present resident labor force in the Sonoma-Lake County area, the proposed project, by itself, will not cause a significant increase in the number of construction workers who may migrate to this area in order to work on the Unit 16 power plant.

38. If Union Oil Company permits use of its private roads, Sonoma County workers will have direct access to the Unit 16 site from the Geysers-Healdsburg Road, the Geysers-Cloverdale Road, and Pine Flat Road.

39. Payroll and income benefits generated by the construction of the proposed power plant will occur in Sonoma and Lake counties. Sonoma County, because of the larger proportion of geothermal related workers residing there, will likely receive the larger share of these income benefits.

40. Direct and indirect costs to Lake County as well as the local communities near the project as a result of PG&E's construction and operation of the power plant (except county road improvement) appear to be less than the anticipated tax revenues associated with the project.

41. Projected tax revenues, derived from the construction and operation of the plant, as well as effects from construction payrolls appear to be of sufficient magnitude to cause the economic benefits to exceed cost.

42. There are no tax revenues for Sonoma County from the Unit 16 power plant.

43. Projected property taxes derived from Unit 16 by Lake County are sufficient to fund any services performed by the local school district as a result of PG&E's construction and operation of Unit 16.

44. Projected property taxes derived from Unit 16 by Lake County are insufficient to fund the reconstruction of Socrates Mine Road.

Condition

(nn) PG&E shall participate in the Commission sponsored proceeding regarding the cumulative geothermal development-related impacts and comprehensive, coordinated mitigation planning for the KGRA.

II. ECONOMICS

A main attraction of using dry steam geothermal energy at The Geysers for generating electricity is the relative economic advantage of this source compared to other available methods of generation. (1981 Biennial Report)

The total project cost for the Unit 16 power plant and transmission tap line is estimated to be approximately $89 million. (RT 10,937:1)

The geothermal energy cost in 1984 is $37/MWH (megawatt hour). Replacement non-geothermal energy cost in 1984 is $102/MWH. (RT 13,686)

Findings

45. The construction and operation of Geysers Unit 16 and the transmission tap line by themselves will not have any appreciable effect on customer rates or PG&E's financial requirements because of its small size and cost relative to the entire PG&E system. (RT 10,954)

46. The additional cost of various mitigation measures, such as a turbine bypass valve at a cost of $4 million and reconstruction of Socrates Mine Road at a cost of an additional $4 million, would have a negligible effect on customer rates. (RT 10,954)

47. Geysers Unit 16, as part of the overall PG&E geothermal development at the Geysers, has a positive impact on rates, because of the favorable economics of this energy source relative to other sources of electric energy. (RT 10,957)

III. PUBLIC HEALTH AND SAFETY

A. Public Health

Geothermal power plants release to the atmosphere many pollutants, which when inhaled or ingested in sufficient quantities, can adversely impact human health. These pollutants include (1) regulated pollutants, (2) nonregulated pollutants, and (3) nonregulated pollutants resulting from hydrogen sulfide abatement systems.

Atmospheric transport of power plant emissions can result in increased pollutant concentrations in ambient air in nearby populated areas. The potential for adverse impacts to public health depends upon the following factors: pollutant emission rates and atmospheric transport, background pollutant concentrations at the time the proposed plant is operational, the potential population at risk and health implications of exposure to the pollutants. (RT 10,147)

It is difficult to determine with certainty what impacts geothermal development will have on public health because background concentrations of pollutants, particularly nonregulated pollutants, in populated areas near The Geysers KGRA are largely unknown. With the exception of hydrogen sulfide, and to some degree, other regulated pollutants, there has been very little monitoring of existing air pollutant levels in the vicinity of The Geysers. Available monitoring results, particularly concerning nonregulated pollutants, are often based on limited duration sampling conducted several years ago. (RT 10,147)

Findings

48. Geysers Unit 16 will emit pollutants that can be adverse to human health when present in sufficient concentrations. The severity of the impact depends upon the concentration, length of exposure and sensitivity of the individuals exposed. These pollutants include regulated pollutants (pollutants for which there are ambient air quality standards or emissions standards) such as hydrogen sulfide, sulfur dioxide, particulate matter, sulfates, and radon^{222}; and unregulated pollutants (pollutants for which there are presently no standards) such as mercury, arsenic, boron and ammonia. Hydrogen sulfide abatement systems can result in the emissions of Anthraquinone disulfonic acid (ADA), vanadium, sulfates and other particulate matter.

49. Due to expected low resultant ambient concentrations of total suspended partriculates, sulfur dioxide, sulfates, carbon monoxide, nitrogen dioxide, oxidant, lead and nonmethane hydrocarbons, adverse health impacts should not occur from exposure to these pollutants resulting from the proposed operation of Unit 16. Adverse health impacts should not occur from exposure to hydrogen sulfide resulting from the proposed operation of Unit 16 at the level of abatement required herein.

50. Because emissions of radon^{222} from Geysers Unit 16 are not expected to exceed radon^{222} effluent standards, significant health impacts are not expected to occur.

51. Exact rates of emission of ammonia, arsenic, boron, mercury, vanadium and ADA are not known for Unit 16.

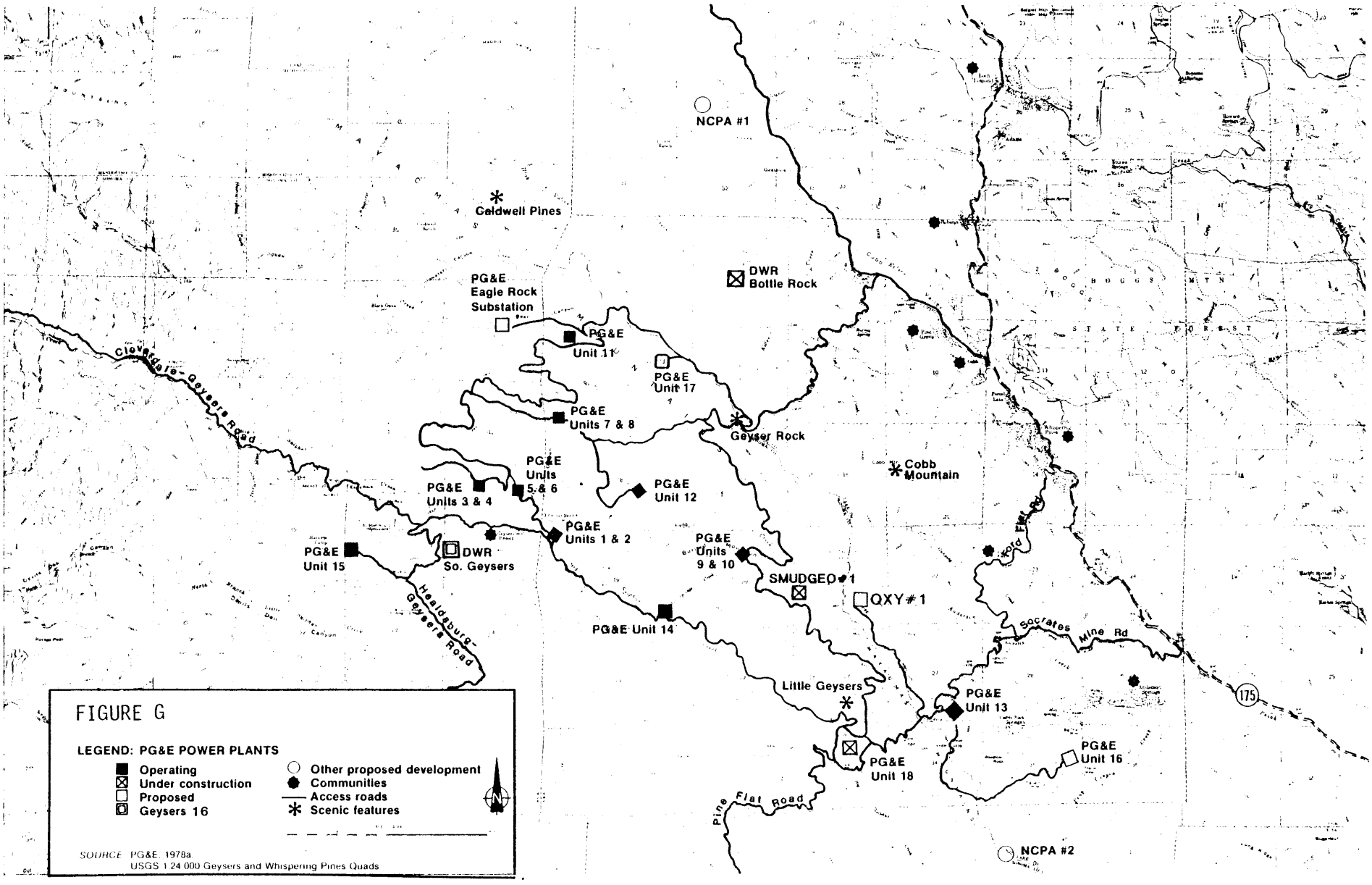
Condition

(oo) PG&E shall comply with the terms of, and perform all the acts required of it as enumerated in, Section 6, Public Health, of the COMPLIANCE PLAN FOR PG&E'S GEYSERS UNIT 16, attached hereto as Appendix A and incorporated by reference herein.

B. Transportation Safety

The principal means of vehicular access to the Unit 16 power plant area are Socrates Mine Road, and Ford Flat Road from Lake County; and the Geysers-Healdsburg, Geysers-Cloverdale and Pine Flat roads from Sonoma County. (RT 9,594:9) Access from Sonoma County requires passage over private roads owned by Union Oil Company. (See Figure G) During the construction of Unit 16, all of these roads could serve as the access for construction workers and for light and heavy construction equipment. During the operation of Unit 16, various of these roads could serve as the means of access for plant operating personnel, and for transporting chemicals to the facility and the removal of wastes from the power plant. Two approved sites for disposal of wastes are in Lake County at Kelseyville and Middletown. (RT 9,636:23-26)

Eugene Collins, Lake County Director of Public Works, testified that Socrates Mine Road is in a substandard condition which creates a traffic safety hazard for users of the road. (RT 9,469:25) Specifically, Socrates Mine Road is a 4.4 mile long narrow, winding mountain road, the most substantial portion of which is unpaved. Travel on the unpaved portions create an excessive amount of dust, impairing visibility for following and oncoming traffic. There are sixteen curves with substandard sight distances. Paved portions of the road do not have an adequate structural base. The grade of the road exceeds minimum standards in many places. The road is too narrow to allow the installation of guard rails where needed. Roadside ditches are subject to excessive erosion due to the steep terrain. Two bridge crossings at Anderson and Gunning creeks are located on short radius curves and are deteriorating structurally. Lake County road studies indicate a fifty percent increase in traffic over the last three years,


NCPA #1
Geldwell Pines
DWR
Bottle Rock
PG&E
Eagle Rock
Substation
PG&E
Unit 11
PG&E
Unit 17
PG&E
Units 7 & 8
Geyser Rock
Cobb
Mountain
PG&E
Units
5 & 6
PG&E
Units 3 & 4
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Unit 12
PG&E
Units 1 & 2
PG&E
Unit 15
DWR
So. Geysers
PG&E
Units
9 & 10
SMUDGEO #1
QXY #1
PG&E Unit 14
Little Geysers
PG&E
Unit 13
PG&E
Unit 18
PG&E
Unit 16
NCPA #2
Cloverdale-Geysers Road
Healdsburg-Geysers Road
Socrates Mine Rd
Pine Flat Road
175
FIGURE G
LEGEND: PG&E POWER PLANTS
Operating
Under construction
Proposed
Geysers 16
Other proposed development
Communities
Access roads
Scenic features
SOURCE: PG&E, 1978a
USGS 1:24 000 Geysers and Whispering Pines Quads

and approximately twenty percent of that traffic consists of trucks. On July 30 and 31, 1980, the County took a traffic count indicating an average daily traffic of 684 vehicles. (RT 9,482:15-17)

The Commission staff concurred with the County's characterization of the condition of the Road. (RT 9,677)

PG&E witness Rasmussen testified that Socrates Mine Road, in its condition at that time, did not constitute a traffic safety hazard. (RT 9,577:11) For use as a highway, servicing a construction area with construction equipment and construction personnel, Socrates Mine Road is more than adequate, according to PG&E, even though it is not adequate for normal public traffic. (RT 9,582:3-6)

Mr. Collins testified that Ford Flat Road, a 2.8 mile long narrow, winding dirt mountain road, is used by construction workers as a short cut from the Cobb residential area to Socrates Mine Road, which causes noise and dust for residents along the Ford Flat Road. (RT 9,470:11-16)

The effects of the substandard condition of Socrates Mine Road can be multiple. As a traffic safety hazard, Socrates Mine Road has a greater potential for single and multiple vehicle accidents. Since the Road crosses Gunning Creek which provides domestic drinking water to the Anderson Springs community (through intakes which are downsteam from the crossing), a vehicular accident causing a spill of hazardous materials or wastes into the watercourse would contaminate such water and have potential adverse human health effects. (RT 9,598; 9,669) Since the Road also crosses Anderson Creek, which provides water for recreation to Anderson Springs, a vehicular accident causing a spill of hazardous.

materials or wastes into the watercourse would contaminate such waters and have potential adverse human health effects. (RT 9,717; 9,698) Additionally, spills of hazardous materials or wastes into either Anderson Creek or Gunning Creek may adversely affect downstream spawning areas and aquatic biology. (RT 9,699)

An accidental spill of certain chemicals used in the operation of Unit 16, could cause explosion and fire under conditions which could occur during a vehicular accident. (RT 9,666)

Additionally, the dust resulting from use of the unpaved portion of Socrates Mine Road, near and across Anderson and Gunning creeks, causes direct sedimentation into those water courses. Additional sedimentation is caused when collected dust is washed by rain from vegetation within the watershed. The sedimentation results in a degradation of the aforementioned domestic drinking and recreational waters and may adversely affect aquatic biology in the watershed. (RT 9,586:2-6; 9,698-9,700)

Lake County claims that the unsafe condition of Socrates Mine Road can be mitigated by the reconstruction of the Road. Such reconstruction would reduce the potential for accidental spills of hazardous materials and would reduce the soil erosion and resultant sedimentation in Gunning and Anderson creeks. (RT 9,700)

Mr. Collins testified in August of 1980 that he was conducting negotations with all the road users for a collective reconstruction and maintenance program. However, based upon the condition of Socrates Mine Road at that time, Mr. Collins requested, on behalf of the County, that no certification for Unit 16 be authorized until an agreement existed for the reconstruction of Socrates Mine Road. (RT 9,475:23-25)

In addition, Butts Canyon Road, the access road to the waste disposal site, has experienced heavy geothermal waste disposal truck traffic to the point that the surface and roadbed are totally failing. (RT 9,470:20-24) The heavy truck traffic creates a combination of depressions and bumps in the roadway which requires automobiles to drive into the oncoming traffic lanes to avoid being high-centered. (RT 9,507:10-17) The condition of the road could be cause to close the road to heavy trucks during the winter. (RT 9,507:20-23)

Sonoma County asserts in resolution No. 69955, which the Commission officially noticed, that current geothermal development is destroying the major access road to the Geysers from Sonoma County and that future development, made possible by certification of new geothmeral power plants, will ensure the destruction of the Geysers-Healdsburg Road by overuse. The Geysers-Healdsburg Road was designed, built, and intended for light passenger vehicle traffic and occassional agricultural equipment, and is unsuited and unsafe for the level of use created by the development of The Geysers. (Exhibit AA)*

There is no evidence in the record concerning the conditions of Pine Flat Road and the Geysers-Cloverdale Road.

PG&E has previously participated in the improvement and maintenance of local roads in other political subdivisions in California when there has been a demonstrated need for such work by the project being constructed. (RT 9,554:13-16)

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* See also (RT 14,463:19-14,465:23)

Northern California Power Agency (NCPA) and Sacramento Municipal Utility District (SMUD) have existing or proposed facilities in the vicinity of Socrates Mine Road, and according to PG&E, use only Socrates Mine Road. (RT 9,554:7-12)

PG&E contends that construction of Unit 16 will provide a minimal contribution to the total traffic on Socrates Mine Road. (RT 9,557:7-9) For that reason, presumably, PG&E asserts that it should not be solely responsible for the improvement of Socrates Mine Road. (RT 9,557: 12-13)

The application of a simple "but for" rule is appropriate in this instance; namely "but for" the construction and operation of Unit 16 to provide electrical generation for the PG&E system, there would be no added, incremental use of these roads by contractors, construction workers, construction equipment, and chemical and waste haulers.

Findings

52. The construction and operation of Unit 16 will require vehicular access on roads of Sonoma or Lake counties, or both; most likely Socrates Mine Road or the Geysers-Healdsburg Road, or both.

53. Socrates Mine Road is in a substandard condition and represents a traffic safety hazard to its users and a potential health and safety risk to the residents of Anderson Springs.

54. The unpaved condition of Socrates Mine Road at the Anderson and Gunning creeks crossings results in sedimentation of those watercourses, degrading the drinking and recreational waters of Anderson Springs and potentially causing adverse impacts to acquatic biology in the watershed.

55. The hazardous condition of Socrates Mine Road increases the potential for a vehicluar accident to cause a spill of hazardous materials, which in turn means the potential for explosion and fire, or if such materials enter a water course, increases the potential for adverse human health impacts and adverse impacts to aquatic biology in the watershed.

56. The primary approved disposal sites for hazardous wastes are in Lake County at Middletown and Kelseyville and require some use of Socrates Mine Road.

57. PG&E's assertion that it can limit the use of Socrates Mine Road, related to Unit 16, to a level which will not cause a material increment of deterioration to the Road, or sedimentation to Anderson and Gunning creeks, or risk of accidental spills of hazardous materials is not credible.

58. The Geysers-Healdsburg Road is in a substandard condition for use as a means of access for construction workers and as a primary access for heavy construction equipment and materials, delivery of chemicals or hauling of wastes.

Conditions

(pp) PG&E, its agents or contractors, shall not commence any excavation or construction activities, whatsoever, related to Geysers Unit 16 prior to the commencement of the reconstruction of either Socrates Mine Road or Geysers Healdsburg Road, whichever occurs first.

If, during the period of construction of the power plant, only one of the two aforementioned roads is reconstructed or is in the process of being reconstructed, PG&E shall use such road as the principal vehicular access for heavy construction equipment, hazardous material deliveries and waste disposal.

(qq) PG&E shall construct, or cause to be constructed, a temporary water intake system on Gunning Creek, upstream of Socrates Mine Road as it exists prior to reconstruction, to be connected to the existing domestic water supply system for Anderson Springs, such construction to commence within 60 days of this certification. The temporary water intake system shall be maintained in service until a permanent water intake system or storage facility is constructed, not necessarily by PG&E, or the passage of three years from the completion of the temporary water intake system, whichever occurs first.

C. Transportation of Hazardous Materials and Wastes

As stated herein the following materials will be used during power plant operation and pose a potential threat to the safety of the general public:

Anthraquinone disulfonic acid (ADA);
Vanasol (38.5 percent Vanadium);
Caustic soda (Sodium Hydroxide);
Hydrogen peroxide (if hydrogen peroxide secondary H_2S abatement system is necessary); and
Hydrogen gas.

ADA, vanasol and caustic soda, if delivered in powdered form will be contained in drums. Hydrogen peroxide will be in liquid form delivered by tank truck. Hydrogen gas will be contained in cylinders. (RT 9,664:2-14)

There is a possible risk of rupture of all of the aforementioned containers in the event the transporting vehicle accidentally left the roadway. (RT 9,665:11) The containers for hydrogen peroxide could rupture forcibly because of their pressurized contents. (RT 9,665:25) Hydrogen gas when combined with oxygen from the ambient air in proper concentrations and an ignition source such as a hot part of the truck-tractor could cause an explosion. (RT 9,666:24)

If the caustic soda entered Gunning Creek and thereby Anderson Springs water supply, the caustic soda would represent a hazard to human health. The hydrogen peroxide would be easily diluted in water, but may pose a hazard to human health. (RT 9,669)

A variety of liquid and solid wastes are going to be produced during the construction and operation of Unit 16. The wastes of principal concern are

Stretford process wastes, steam condensate, cooling tower sludge, and maintenance wastes. Stretford process wastes include elemental sulfur which may have commercial value and the Stretford purge stream which can be reinjected in the steam disposal resource and hauled to an approved site. Stretford process wastes and steam condensate cooling tower sludge contain substances which are considered hazardous by the California Department of Health Services. (RT 9,686)

The operation of Unit 16 will contribute approximately 20 to 25 truckloads per month of waste material. (RT 9,687)

Unless properly disposed of, hazardous operational wastes might cause significant adverse environmental impacts on water quality, public health and vegetation.

Hazardous wastes must be disposed of at sites approved by the Regional Water Quality Control Board. Approved sites in the vicinity of Unit 16 for the disposal of hazardous wastes from geothermal power plant operation are located near Middletown and Kelseyville in Lake County accessible by Socrates Mine Road, among others. Together, the capacities of the approved sites at Middletown and Kelseyville appear sufficient to accommodate the hazardous wastes generated during the lifetime of Unit 16 as well as all existing and proposed geothermal plants at The Geysers. (RT 9,683)

Only registered haulers may transport hazardous wastes in conformity with applicable sections of the California Health and Safety Code and regulations.

PG&E intends to contract with a registered hauler to dispose of wastes generated by Unit 16 at either the Middletown or Kelseyville site.

An accidental spill of hazardous waste materials entering Gunning Creek or Anderson Creek would have adverse human health effects and adverse environmental impacts to aquatic biology. (RT 9,332:16-20; 9,669:24-25; 9,698)

Although commercial haulers maintain a spill clean up capability in the area (RT 9,524:3-5), neither the Lake County Director of Public Works (9,505:15) nor the PG&E representative responsible for securing permits related to hazardous wastes (RT 9,652:12-13) is aware of any contingency plan among local entities or developers to deal with major spills of hazardous materials off the power plant site. Fundamentally, PG&E's position is that by hiring an independent contractor to haul hazardous materials, that hauler becomes entirely responsible for the transportation of those wastes off the power plant site. (RT 9,636:12-14)

The Commission is not persuaded that PG&E's entry into a contractual relationship with an independent contractor should absolve it of some responsiblity to address the mitigation of an incremental increase of risk from the transportation of hazardous materials and hazardous wastes, which increase in risk would not occur, but for the construction and operation of Unit 16.

Findings

59. The wastes of principal concern generated by the proposed power plant include Stretford process wastes, steam condensate cooling tower sludge and maintenance wastes.

60. Stretford process wastes and steam condensate cooling tower sludge contain substances which are considered to be hazardous.

61. The foregoing materials and wastes are potentially hazardous to public safety, to human health, and to the environment particularly to aquatic biology if they enter surface waters.

62. If Socrates Mine Road is used for the transportation of these materials or wastes, there is an increased potential for the accidental spill of these materials and wastes because of the substandard condition of the Road.

63. The hazardous wastes will be disposed of at an approved site located in Lake County near Middletown or Kelseyville.

64. The combined capacities of the approved sites at Middletown and Kelseyville are sufficient to accommodate the hazardous wastes generated during the life-time of Geysers Unit 16.

65. The California Health and Safety Code and regulations adopted pursuant to it require that hazardous wastes be hauled by registered hazardous waste haulers.

Conditions

(rr) In the event that PG&E does not dispose of such wastes at either the Middletown or Kelseyville site, PG&E will dispose of the wastes at an alternative approved waste site and shall inform the Commission of any change in the site chosen for disposal.

(ss) Only a registered waste hauler may remove wastes from the power plant site. In the event a secondary treatment system is used to abate H_2S emissions, PG&E shall submit a waste disposal plan to the Commission for review not later than 120 days prior to commencement of such a secondary treatment system.

(tt) Prior to the commencment of commercial operation of Unit 16 PG&E shall deliver to the Commission a contingency plan for the response to accidental off-site spills of hazardous materials associated with the operation of Unit 16. Such plan shall be formulated with the assistance of federal, state and local agencies responsible for the enforcement of laws relating to hauling hazardous materials and laws related to the contamination of surface waters, as well as local fire fighting and roadway policing agencies. The purpose of this plan is to coordinate among public agencies and private companies their response to a major off-site spill of hazardous materials or wastes, whether occuring in Lake or Sonoma counties.

D. Handling and Storage of Hazardous, Toxic and Flammable Materials (Including Worker Safety)

Findings

66. The following materials, which will be used during power plant operations, pose a potential threat to the safety of Geysers Unit 16 workers and the general public:

    Anthraquinone disulfonic acid (ADA);
    Vanasol (38.5 percent vanadium);
    Caustic soda (sodium hydroxide);
    Hydrogen peroxide (if hydrogen peroxide secondary H_2S abatement system is necessary); and
    Hydrogen gas.

67. The provision of adequate on-site storage and containment facilities, together with the use of proper handling procedures for the materials listed above, in accordance with the Condition below, will minimize to an acceptable level the risk to safety posed by these chemicals and compounds.

Condition

(uu) PG&E shall comply with the terms of, and perform all the acts required of it as enumerated in, Section 9, Safety, of the COMPLIANCE PLAN FOR PG&E'S GEYSERS UNIT 16, attached hereto as Appendix A and incorporated by reference herein.

E. Fire Safety

Findings

68. The principal sources of combustion at Unit 16 are the wooden cooling tower structure, generator coolant (hydrogen gas), lube oil, seal oil, the main transformer and the hydrogen peroxide stored at the plant site.

69. PG&E proposes to provide automatic sprinkler systems for the cooling tower, lube oil reservoir and purifier, seal oil tank, and the main transformer, to install an automatic SO_2 purge system on the generator, to construct gravel blotters and a retention basin to contain oil leaks from transformers, to locate fire hose stations and manually operated fire extinguishers throughout the site, and to install three 1,000 gpm fire pumps with two independent power supplies. PG&E also proposes to install a manual spray wetting system on the cooling tower to be operated during shut down periods so as to reduce the flammability of wooden members.

70. The Middletown Fire Protection District and the California Department of Forestry are responsible for structural and off-site fire prevention and protection.

Condition

(vv) PG&E shall comply with the terms of, and perform all the acts required of it as enumerated in, Section 9, Saftey, of the COMPLIANCE PLAN FOR PG&E'S GEYSERS UNIT 16, attached hereto as Appendix A, and incorporated by reference herein.

IV. ENGINEERING

A. Geotechnical

The power plant site for Unit 16 will be created by excavating along an east-west trending ridge which separates Hot Springs Creek on the north from Bear Canyon Creek on the south. (Exhibit A; FEIR, I-21)

Generally, the power plant site will be bounded on the west by a cut slope and will be supported on the south and east by fill.

More material, approximately 450,000 cubic yards, will be excavated than will be used for fill, thereby requiring disposal of the excess material on the site of Big Injun Mine. (RT 10,258:13-10,259:10)

Findings

71. The nature of the site geology is adequately described in "Detailed Geotechnical Investigation Geysers Power Plant Unit 16", Harlan and Associates (1978). The geologic conditions at the power plant site and fill disposal site are complex, not completely known, and potentially more adverse or more favorable than represented in the foregoing Harlan Report.

72. About 450,000 cubic yards of excess materials will be generated by the site development.

73. The Big Injun Mine site, located about 1,200 feet west of the plant site, has been proposed as the disposal site for the excess material.

74. A large, potentially unstable, active to dormant landslide exists on the south side of the power plant site. PG&E proposes to remove the material at the top of the landslide down to competent bedrock, then construct a 70-foot high retaining wall with an exposed height of about 45 feet and backfill behind it up to plant grade to obtain the necessary space for plant facilities. Part of the cooling tower structure will rest on this backfill.

75. Zones of weaker fractured rock occur in the proposed 150-foot high cut slopes on the west end of the power plant site. Failure of any rock material in the cut slope could result in encroachment of landslide debris onto the site and facilities.

76. A final determination of site geologic conditions and the necessary protection measures cannot be made until completion of site excavation.

77. If geologic conditions do not differ substantially from those conditions represented by the Harlan Report, adverse conditions can be acceptably mitigated by the recommendations in the Harlan Report.

78. If the conditions at the fill site are not substantially different from those reported in the Harlan Report and if the recommendations for the fill site in the Harlan Report are implemented, the site is satisfactory for the disposal of excavated material.

Condition

(ww) PG&E shall comply with the terms of, and perform all the acts required of it as enumerated in, Section 4, Geotechnical, of the COMPLIANCE PLAN FOR PG&E'S GEYSERS UNIT 16, attached hereto as Appendix A and incorporated by reference herein.

B. Civil Engineering

Findings

Refer to the Findings in the Geotechnical section.

Condition

(xx) PG&E shall comply with the terms of, and perform all the acts required of it as enumerated in, Section 2, Civil Engineering, of the COMPLIANCE PLAN FOR PG&E'S GEYSERS UNIT 16, attached hereto as Appendix A and incorporated by reference herein.

C. Structural Engineering

Seismic hazards at the Geysers Unit 16 site are adequately represented by Keith Feibusch Associates, Engineer's Report No. 01-3170-1067. (RT 10,254; 10,142; 10,051)

Findings

79. The design of Unit 16 for critical structures and components will be adequate to achieve performance criteria requiring that structures and components withstand a seismic event having a 10 percent probability of being exceeded during the plant design life using the combined sources response spectrum set forth in Keith Feibusch Associates, Engineer's Report No. 01-3170-1067, (design life of 40 years for structures and 30 years for equipment components) with minor damage and no structural collapse. The H_2S Stretford abatement system will be included in the list of critical structures and components for Unit 16. (Critical facility structures and components are essential to continued power generation, or are those whose replacement cost or time is excessive).

80. The design of Unit 16 for structures and components not designated "critical" will be adequate to achieve the Applicant's performance criteria.

81. Although a final determination of compliance with applicable laws and standards cannot be made until after the preparation of final design plans and calculations, which occurs after the AFC, the Applicant's design of Unit 16 appears to comply with applicable laws and standards with respect to structural engineering.

Condition

(yy) PG&E shall comply with the terms of, and perform all the acts required of it as emunerated in, Section 7, Structural Engineering, of the COMPLIANCE PLAN FOR PG&E'S GEYSERS UNIT 16 attached hereto as Appendix A and incorporated by reference herein.

D. Reliability

Findings

82. The Operating Availability Factor of Geysers Units 1-11 was 90.6 percent in 1976, 91.2 percent in 1977.

83. The average Capacity Factor of Geysers Unit 1-11 was 81.8 percent in 1976, 81.3 percent in 1977.

84. Major generating equipment and most other equipment for Unit 16, 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.

85. Design and construction of the facility as specified in the Structural Engineering section will reasonably ensure facility reliability with respect to potential seismic events.

86. Complete operating data on the H_2S abatement system that will be employed at Unit 16 is currently unavailable.

87. To ensure a high degree of operability, the Stretford system will employ equipment redundancies as appropriate for components necessary for abatement operation and all active components (valves and pumps) will be redundant on the secondary abatement system.

88. Based on historical operating experience in The Geysers, Geysers Unit 16 could reasonably be expected to operate at a 90 percent or greater Availability Factor and have the capability to operate at an 80 percent or greater Capacity Factor at plant maturity.

V. TRANSMISSION TAP LINE

The initially proposed (Unit 16 to Unit 13) tapline and the alternate tap line alignments are shown on Figure H.

A. Environmental Impacts

Unit 16-Unit 13

Existing roads reach one-half of the tower sites. Approximately 1,200 feet of new roadway will be necessary to reach the remaining tower sites. (DEIR, p. II-12) One quarter acre tower sites will require the removal of vegetation. Some trees between towers may be trimmed or removed. (DEIR, p. II-13)

The tap line traverses ridgetops and hillsides underlain by moderately unstable bedrock and unstable active landslides, but does not cross an active fault. (DEIR, p. II-18 and 20)

There is significant potential for soil erosion which could increase sedimentation in surface waters, thereby impacting water quality and aquatic biology. (DEIR, p. II, 24, 30, 32 and 33)

Impacts to wildlife will be insignificant. (DEIR, p. II-53)

Unit 16-NCPA No. 2

Existing roads reach several of the tower sites. Some new roadway will be necessary to reach the remaining tower sites. (FEIR, p. II-11)

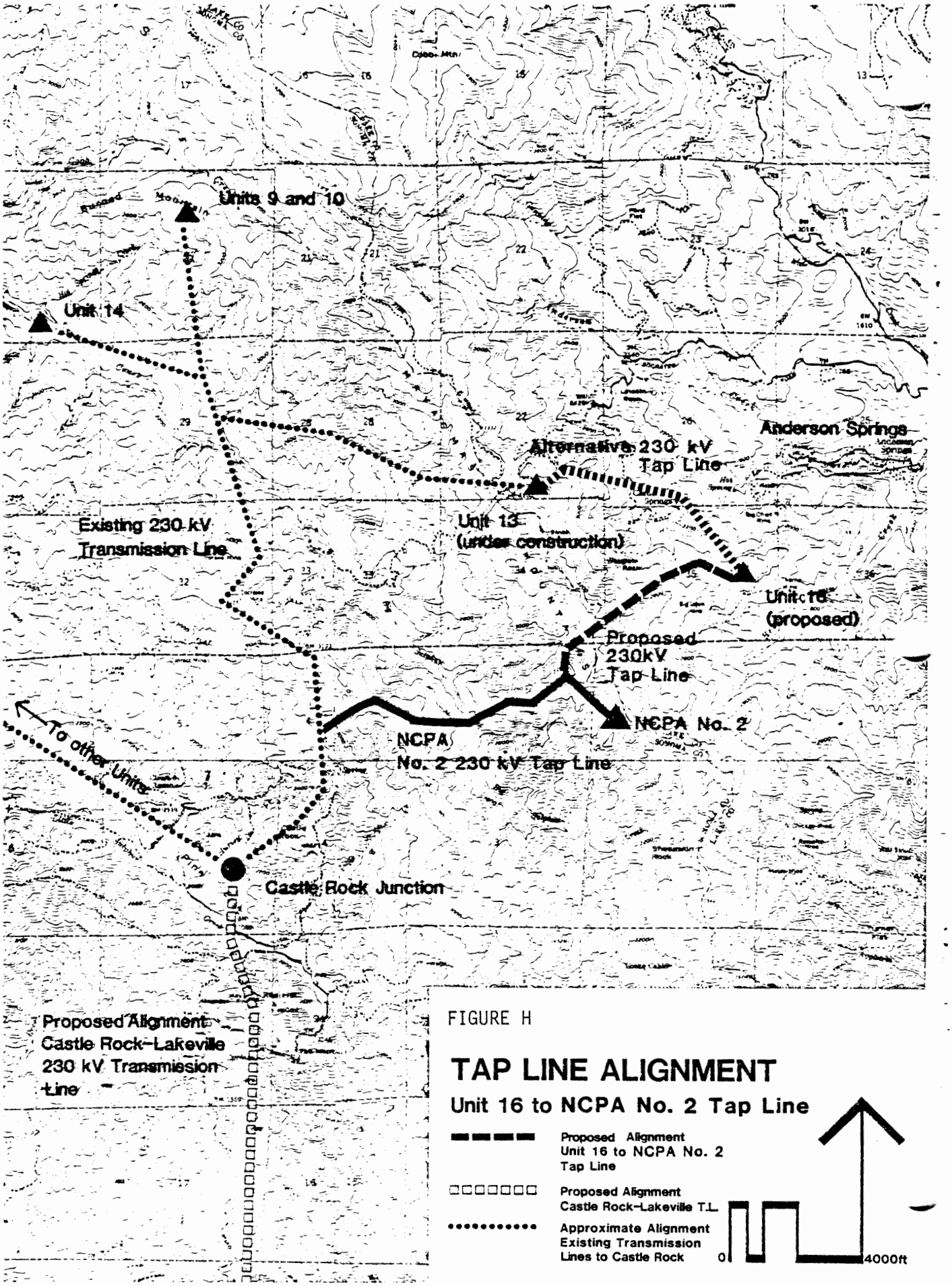

FIGURE H

TAP LINE ALIGNMENT

Unit 16 to NCPA No. 2 Tap Line

- Proposed Alignment Unit 16 to NCPA No. 2 Tap Line
- Proposed Alignment Castle Rock-Lakeville T.L.
- Approximate Alignment Existing Transmission Lines to Castle Rock

0 4000ft

One quarter acre sites will require removal of vegetation. Some trees between towers may be trimmed or removed. (FEIR, p. II-12)

The tap line traverses ridges underlain with moderately unstable bedrock and unstable active landslides but does not cross an active fault. (FEIR, p. II-17 and 19)

There is significant potential for soil erosion which could increase sedimentation in surface waters, thereby impacting water quality and aquatic biology. (FEIR, p. II-23, 29, 31 and 33)

There is a unique dense stand of cypress within the tap line corridor (FEIR, p II-35) which should be avoided and which would not preclude construction of this tap line. (FEIR, p. II-35 and 39)

Impacts to wildlife would be insignificant. (FEIR, p. II-55)

B. Engineering and Economics

As shown in Figure H, the Unit 16 tap line via NCPA No. 2 to Castle Rock Junction is shorter than the alignment via Unit 13.

Due to lighter loading and the shorter electrical path, the NCPA No. 2 alternative reduces excess transmission energy losses resulting in a savings of $219,000 and lower construction and other costs. (RT 10,977:17-25)

The use of the NCPA No. 2 alternative requires PG&E to negotiate a satisfactory right-of-way agreement with the Bureau of Land Management and a satisfactory wheeling agreement with NCPA. (RT 10,978:3-12)

Findings

89. Neither of the tap line alignments cause significant environmental impacts.

90. The NCPA No. 2 tap line alternative results in excess transmission energy loss savings and lower construction and other costs.

Conditions

(zz) PG&E shall construct the tap line via NCPA No. 2 unless PG&E has not obtained both (a) a satisfactory right-of-way agreement from the Bureau of Land Management and (b) a satisfactory wheeling agreement with NCPA on or before March 1, 1982. PG&E shall immediately notify the Commission in writing of the absence of such agreements, and may petition to construct the tap line from Unit 16 to Unit 13 as originally proposed in the AFC. The Commission shall hold a publicly noticed hearing and render a decision within 30 days after receipt of such notification and petition.

(aaa) PG&E shall comply with the terms of, and perform all the acts required of it as enumerated in, Section 13, Biological Resources; Section 14 Cultural Resources; Section 15, Geotechnical/Structural Engineering; and Section 16, Safety and Nuisance Effects of the COMPLIANCE PLAN FOR PG&E'S GEYSERS UNIT 16, attached hereto as Appendix A and incorporated by reference herein.

PART THREE--CASTLE ROCK JUNCTION TO LAKEVILLE 230 kV TRANSMISSION LINE

A significant portion of the topics hereunder are also discussed in PART FOUR. As a general rule, any matter applicable to transmission lines generically is discussed in PART THREE, and site specific or comparative matters are discussed in PART FOUR.

The PG&E proposed Castle Rock Junction to Lakeville transmission line is shown in Figure I.

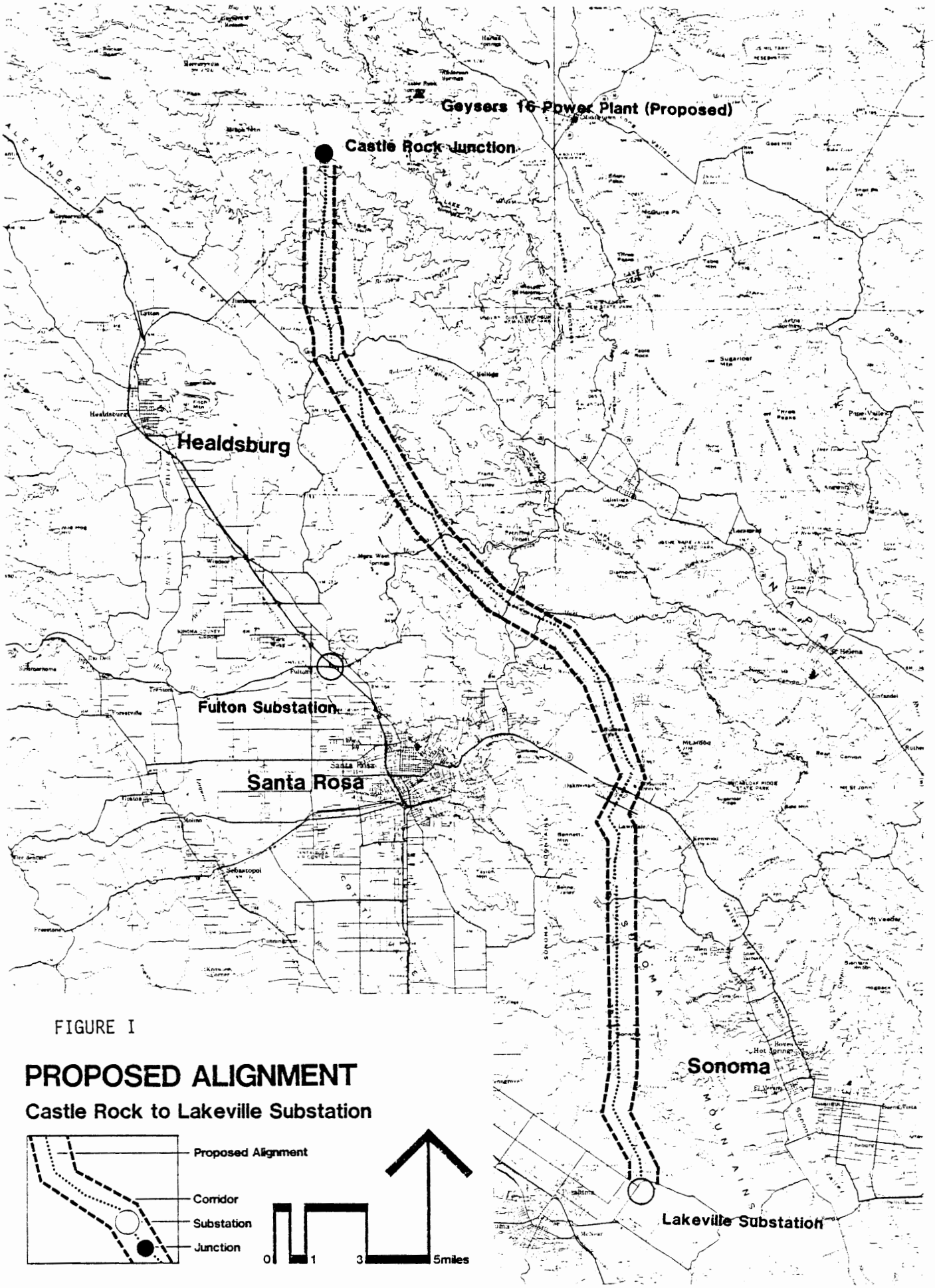

FIGURE I

PROPOSED ALIGNMENT

Castle Rock to Lakeville Substation

I. ENVIRONMENTAL RESOURCES

A. Biology

(See also PART FOUR)

Findings

91. The following vegetation types are found in the vicinity of the transmission routes and may be subject to adverse impact:
    (a) grassland
    (b) chaparral
    (c) oak woodland
    (d) forest

92. The northern portion of the proposed Castle Rock Junction to Lakeville route lies within a region which is well known for its rare, endemic plant species. However, no legally protected species listed by state or federal agencies will be affected by construction or operation of the transmission line.

93. The northern portion of the transmission route from Castle Rock Junction to Lakeville is located within the foraging range of the Mt. St. Helena peregrine falcons. The American peregrine falcon is an officially recognized endangered species. Federal and state law protects the falcon's critical habitat but not its foraging area.

94. Construction of the transmission line from Castle Rock Junction to tower 77 could increase the possibility of peregrine falcon mortality or injury from collisions. Peregrine falcons have reportedly been killed or injured due to collisions with high voltage transmission lines, but no collisisons with 230 kV lines have been reported and the probability of such collisions along the Castle Rock Junction to Lakeville route is low.

95. No nesting or concentration areas for fully protected wildlife species or species of special concern are known to occur along the proposed transmission route. However, the route does cross preferred habitat of the Cooper's hawk and white-tailed kite, and construction activities in this area may result in the loss of potential habitat for these species.

96. Important wildlife habitat features in the project area include:

    within the proposed right-of-way:
    (a) snags
    (b) seasonal water bird concentration areas

    outside the right-of-way:
    (a) colonial nesting sites
    (b) cliffs.

97. Tower construction and line clearance will result in loss of snags at sites 107, 118, 119, and 134. The cliff faces and rock outcrops near tower 108 will not be affected.

98. If PG&E performs the Condition below, the proposed project will comply with applicable laws, ordinances, and standards, and biological impacts will be reduced to an acceptable level.

Condition

(bbb) PG&E shall comply with the terms of, and perform all the acts required of it as enumerated in, Section 13, Biological Resources, of the COMPLIANCE PLAN FOR PG&E'S GEYSERS UNIT 16, attached hereto as Appendix A and incorporated by reference herein.

B. Water Quality, Water Resources and Hydrology

(See also PART FOUR)

Findings

99. Water quality within the project area may be adversely affected by soil erosion and sediment input into streams as a result of improper transmission line, tower, and access road construction, operation and maintenance.

100. The fisheries of the project area, including portions of steelhead trout spawning and nursery streams, may be adversely affected by erosion and stream channel sedimentation.

101. Topographic alteration associated with access road and transmission tower construction will be minimal and will have an insignificant impact on existing groundwater conditions and groundwater discharge.

102. The proposed transmission line will not significantly affect water quality or fisheries if PG&E performs the Conditions below.

Conditions

(ccc) PG&E shall perform the following mitigation measures:

(1) Clear ditches and culverts periodically to maintain drainage systems.
(2) Limit vehicle use of access roads during wet weather except during required maintenance or operation and emergency procedures.
(3) Conduct a reconnaissance of roads periodically to determine and correct areas where water tends to collect and may cause washouts.
(4) Deposit spoil piles from road construction and drilling operations in a location where rainfall will not wash any portion of these materials into adjacent intermittent or perennial streams; also if necessary, construct a sediment retention basin down-slope of spoil piles and maintain it until the materials are stabilized and revegetated.
(5) Angle and space waterbars on access roads carefully so that the runoff flowing toward the waterbar does not exceed its capacity to direct, discharge and dissipate the erosion energy of the water.
(6) Stabilize areas of exposed soil by the beginning of the rainy season.
(7) Not operate heavy equipment along streambanks or in stream channels.

(8) Avoid removal of streamside vegetation in order to provide shade to the stream channel.
(9) Provide workers with portable chemical toilets during construction activities.
(10) Dispose of used oil, oil cans and oil filters properly and not discard or bury on-site.

(ddd) PG&E shall comply with the terms of, and perform all the acts required of it as enumerated in, Section 18, Water Quality, Hydrology and Water Resources, of the COMPLIANCE PLAN FOR PG&E'S GEYSERS UNIT 16, attached hereto as Appendix A and incorporated by reference herein.

C. Cultural Resources

(See also PART FOUR)

Findings

103. Cultural resources include archaeological, historical, paleontological, and ethnographic resources, including resources of educational, scientific, religious and other significance.

104. The following archaeological sites may be subject to adverse impacts resulting from construction and/or maintenance activities associated with the proposed transmission line:
   (a) CA-Son-850 - a prehistoric campsite, characterized by the presence of a surface scatter of obsidian flakes and a tool fragment, and some midden, located along the access road to proposed tower No. 97.
   (b) CA-Son-926 - a prehistoric campsite, characterized by the presence of a sparse lithic scatter of obsidian flakes and artifacts, located south of Van Buren Creek, midspan between towers Nos. 82 and 83.
   (c) CA-Son-995 - possible quarry site, characterized by a moderate scatter of naturally-occuring obsidian nodules and flakes, located adjacent to proposed tower No. 110. This site is already disturbed by the existing tower and access road.
   (d) CA-Son-1200 - a seasonal prehistoric campsite, characterized by an obsidian flake scatter and some historic debris, located southeast of proposed tower No. 102, partially crossed by the existing access road.
   (e) CA-Son-1208 - a prehistoric task-specific site, characterized by the presence of an obsidian lithic scatter, located east of proposed tower No. 44, partially crossed by the existing access road.

105. Sites CA-Son-850, CA-Son-926, CA-Son-995, CA-Son-1200, and CA-Son-1208 appear ineligible for inclusion on the National Register. However, each site is of regional significance from an archaeological or historic standpoint.

106. The following historic resources could be subject to adverse impacts resulting from construction and/or maintenance activities associated with the proposed transmission line project:
   (a) CA-Son-1210H - a historic stone structure constructed in the random course, block and mortar fashion, formerly part of the McClendon Ranch located southwest of the proposed tower No. 46. No significant determination has been made.
   (b) Duerson Cabin - an oil woodcutter's cabin located adjacent to the transmission line right-of-way between towers No. 134 and No. 134A. Although not eligible for inclusion on the National Register, the cabin is of regional significance with respect to early building techniques and potential information about turn of the century land use patterns in Sonoma County.

(c) Rock fence segments constructed during the late 1800s located near towers Nos. 86, 102, 119, 134A and 135. These fences are of regional significance as being representative of the period when Spanish land grants were sold to private owners; however, they are not eligible for inclusion on the National Register.

107. The proposed transmission line will not adversely affect any significant paleontological, ethnograhic resources, archaeological, or historic resources if PG&E performs the Condition below.

Condition

(eee) PG&E shall comply with the terms of, and perform all the acts required of it as enumerated in, Section 14, Cultural Resources, of the COMPLIANCE PLAN FOR PG&E'S GEYSERS UNIT 16, attached hereto as Appendix A and incorporated by reference herein.

D. Land Use

During the Notice of Intention (NOI) phase, Sonoma County testified that the PG&E proposed Castle Rock Junction to Lakeville transmission line did not conform to its General Plan and the Franz Valley Specific Plan; the City of Santa Rosa also testified that the proposed transmission line did not conform to its General Plan regarding Oakmont.

In the NOI, PG&E testified that the proposed transmission line did conform to applicable County and City general plans.

On the basis of the PG&E testimony, the Commission made the finding in the NOI Final Report that the PG&E proposed transmission line conformed to the Sonoma County General Plan (NOI Final Report, pp. 149 and 151).

The issue of conformity to local land use plans was examined anew in the Application for Certification (AFC).

Sonoma County repeated its testimony that the PG&E proposed transmission line did not conform to the General Plan, nor the following adopted specific plans: Franz Valley Specific Plan, North Sonoma Valley Specific Plan, Bennett Valley Specific Plan and the Sonoma Mountain Specific Plan. (RT 10,512; 11,023)

Likewise, the City of Santa Rosa testified that the overhead consolidated portion of the proposed transmission line through Oakmont-Valley of the Moon was inconsistent with the City General Plan.

The Staff testified that the proposed transmission line was inconsistent with the General Plan and the Franz Valley Specific Plan. (RT 10,482:7-10,484: 21)

PG&E testified that none of the policies of the Franz Valley Specific Plan prohibited the development of the proposed transmission line. (RT 10,548: 1-4) However, PG&E altered its previous position in the NOI and declared that in the AFC the Commission was bound as a matter of law to the local agency determination of conformity or nonconformity.

The Commission need not determine in this instance whether it is bound to a local determination of conformity for based on the weight of the evidence in this record, the Commission has determined that the proposed transmission line does not conform to the Sonoma County General Plan, the Franz Valley Specific Plan, the North Sonoma Valley Specific Plan, the Bennett Valley Specific Plan, the Sonoma Mountain Specific Plan, or the City of Santa Rosa General Plan.

Since pursuant to the terms of Public Resources Code section 25525 the Commission could not certify the proposed nonconforming transmission line without additional findings, the Committee made interlocutory findings of nonconformity to allow a continuation of the proceedings for the purpose of making findings pursuant to Public Resources Code section 25523(d) and if necessary 25525. (See NOTICE AND ORDER RE DETERMINATION OF CONFORMITY TO FRANZ VALLEY SPECIFIC PLAN AND PROCEDURES FOR MAKING FINDINGS PURSUANT TO PUBLIC RESOURCES CODE SECTION 25525, filed September 3, 1980; and NOTICE RE DETERMINATION OF CONFORMITY TO THE CITY OF SANTA ROSA GENERAL PLAN, THE SONOMA COUNTY GENERAL PLAN, etc., filed October 22, 1980).

Pursuant to the terms of Public Resources Code section 25523(d), the Committee met with the affected local agencies in public hearings to determine whether the nonconformity could be eliminated or corrected.

Sonoma County had testified that conformity to its General Plan and Franz Valley Specific Plan would require paralleling the existing Castle Rock Junction-Fulton transmission line, undergrounding in Larkfield, Wikiup, and Oakmont and consolidation in certain sensitive areas. (RT 10,517)

The City of Santa Rosa testified that undergrounding the proposed and existing transmission lines through Oakmont was necessary to achieve conformity to the General Plan. (RT 11,134:4)

The Committee determined that since correction or elimination of the nonconformities related to Sonoma County required a change of location to a new and different site, which change would affect persons not originally affected by the PG&E proposal, such a modification to the AFC proposal would be "substantial". (See AMENDED NOTICE RE DETERMINATION OF CONFORMITY TO THE FRANZ VALLEY SPECIFIC PLAN, filed October 14, 1980).

Similarly, the Committee determined that the correction or elimination of the nonconformity to the City of Santa Rosa General Plan required a modification of the proposed facility from overhead to underground and that such modification was sufficiently substantial that the nonconformity had to be considered one which could not be eliminated or corrected. (See NOTICE RE DETERMINATION OF ELIMINATION OR CORRECTION ON NONCONFORMITIES TO SANTA ROSA GENERAL PLAN, etc., filed November 17, 1980)

Following a determination that the nonconformities of the PG&E proposal could not be corrected or eliminated except by a substantial modification, PG&E sought relief pursuant to the terms of Public Resources Code section 25525.

Findings

108. The proposed 230 kV Castle Rock Junction-Lakeville DCTL does not conform to the Sonoma County General Plan, the Franz Valley Specific Plan, the North Sonoma Valley Specific Plan, the Bennett Valley Specific Plan, the Sonoma Mountain Specific Plan, and the City of Santa Rosa General Plan, and the nonconformities cannot be eliminated or corrected, except by a substantial modification thereof.

Annadel State Park

PG&E's proposed transmission line is to be consolidated with the existing Castle Rock Junction-Fulton-Ignacio 230 kV DCTL through Annadel State Park. The existing transmission line was constructed prior to the creation of the Park.

Pursuant to Public Resources Code section 25527, the Commission is prohibited from certifying a site within a State park unless (1) the proposed use is not inconsistent with the primary uses of such park lands, (2) there will be no substantial adverse environmental impacts, and (3) the approval of any public agency having ownership or control of such park land is obtained.

The primary uses of Annadel State Park are horseback riding, sightseeing, hiking and picnicking. (RT 10,551)

The PG&E-Department of Park and Recreation Memorandum of Understanding (Application for Certification, Vol. II, Appendix F) enumerates mitigation measures related to the design, construction, and operation of the proposed transmission line in Annadel State Park.

Russell Cahill, Director of the California Department of Parks and Recreation at the time the AFC was submitted, has given approval for the consolidated transmission line to traverse Annadel State Park.

Findings

109. The transmission line consolidation is not inconsistent with the primary land use of Annadel State Park.

110. By implementing the Condition below, there will be no significant adverse environmental impact by the proposed transmission line consolidation.

111. The approval of the necessary public agency, the California Department of Parks and Recreation, has been obtained for PG&E's consolidation of the existing and proposed transmission lines.

Condition

(fff) PG&E shall implement the terms of the Memorandum of Understanding, AFC, Vol. II, Appendix F therein.

E. Socioeconomics

Findings

112. The proposed transmission line will have no measurable impacts on local housing supplies, health care, educational facilities, recreational facilities, police and fire protection, water supplies, or sewage disposal and sanitation facilities, because of the small size of the expected work force. No major road construction will be required by the project. There will be some incremental increase in commuter traffic on local roads due to employee traffic, but this is insignificant when compared to current traffic levels.

113. Additional employee wages will not generate a significant increase in local purchasing power except perhaps temporarily in some of the local small towns in the northern Sonoma County region. The small size of the work force and the relatively short construction period will not significantly increase levels of service employment.

114. PG&E company personnel will maintain the transmission lines. These personnel are already located in the Bay Area and consequently no additional labor for this purpose is anticipated. The proposed lines will be maintained and inspected by a ground patrol at least once a year to insure that they are in good repair and to maintain a high order of service continuity.

115. In view of the relatively short duration of the construction period, and the small number of workers involved relative to the local labor force, the proposed project will not cause a significant increase in the number of construction workers who may migrate to these areas. Some minor payroll and income benefits generated by construction of the proposed lines will occur on a short-term basis in some of the more remote towns and villages in the five counties region.

II. ECONOMICS

See PART FOUR.

III. PUBLIC HEALTH AND SAFETY

A. Electromagnetic Fields

On its own motion, the Committee of the Commission directed PG&E and the Staff to present evidence upon the potential for health effects from electromagnetic fields caused by the Castle Rock Junction to Lakeville 230 kV alternating current (ac) transmission line.

General Transmission Line Characteristics

There are two basic systems for the transmission of electric power; alternating current (ac) and direct current (dc). Since ac voltages can be readily stepped up and down, ac transmission was the logical choice for home and industrial use; consequently, almost all transmission lines in the United States have been ac until quite recently. As it has become desirable to transmit electrical power over greater distances, it is more efficient to utilize much higher ac voltages, and over very long distances (greater than 400 miles) to use high voltage dc lines. As a result there has been study of the physical characteristics and possible effects of extra high-voltage (EHV) lines which operate at 60 Hertz (Hz) above 345 kV, and on high voltage direct current (HVDC) lines which operate above ±200 kV. The immediate effect of both types of lines on the local environment is the production of an electric field, a magnetic field, and a corona of ionized particles. (Biological Effects and Physical Characteristics of Fields, Ions, and Shock, Addendum to the Report "Public Health and Safety Effects of High Voltage Overhead Transmission Lines", DOW, August 1980; hereinafter "DOW", p. 1-6).

Alternating current transmission lines are built with at least three parallel conductors, each 120 degrees out of phase with the others. The 60-Hz voltage and current in each conductor produces 60 Hz electric and magnetic fields which extend out into the transmission line environment.

If there are irregularities on the conductors (nicks, dust, insects, water, etc.), the electric fields at those points may become exceedingly large, sufficient, in fact, to ionize nearby molecules. The line is then said to be in "corona" because visible light is often generated by the highly excited molecules surrounding the conductors. Ionic species charged oppositely to the conductor potentially are drawn to the line, while those of like charge are repelled. For ac lines, the ionic environment is confined to a region just surrounding the conductors, since species which are repelled in one half-cycle, during the next half-cycle will be attracted to the conductor, which has now changed polarities. In any case, this process, even for the ac lines, produces secondary effects such as audible noise, electromagnetic interference ozone, and nitrous oxides.

Maximum electric and magnetic field strengths at ground level occur directly beneath the overhead conductors and depend on the voltage and current in the conductors, and on the height of the conductors above the ground. For power lines in common use today, the maximum vertical electric field expected at ground level is approximately 1.6 kV/m (kilovolts per meter) per 100 kV of line-to-line voltage for single-circuit ac lines (MEQB, 1977). This value is often compared to the highest known 60 Hz electric field in the modern home--0.25 kV/m at a distance of 30 cm away from an electric blanket (Miller, 1974)--or to the natural static (dc) electric

field in fair weather conditions, which is typically 0.13 kV/m. In the case of frequency dependent effects, however, the natural 60 Hz component of the earth's electric field may be more relevant and is on the order of 10^{-6} kV/m (Polk, 1974).

The magnetic field strength associated with EHV lines is expressed in tenths of gauss (about 0.3 G = 0.03 millitesla). This value may be compared to the earth's static magnetic field, which is near to 0.5 G, or to the highest known 60-Hz magnetic fields in the modern home--10-25 G for a hair dryer and 5-10 G for a fluorescent desk lamp (Miller, 1974). Here too it is worth noting that the earth's natural magnetic field has a 60 Hz component that is less than 10^{-8} G (Polk, 1974).

Alternating current fields may also couple to relatively isolated conductors such as fences, motor vehicles, or biological organisms. The fields may, therefore, induce currents directly in these conductors, or indirectly by creating a potential difference between the object and ground and thereby provide the possibility of shock upon being touched. (DOW, p. 1-6 & 7).

Field Strengths For Existing and Proposed Transmission Line

The following table represents the existing Castle Rock Junction-Fulton-Ignacio and proposed Castle Rock Junction-Lakeville* transmission line configurations and their respective electric field strengths at the center line and the edges of the rights-of-way: (RT 10,687; 13,022)

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* See Description of the Proposed Project, infra.

	Type	Conductor Clearence Ft. Above Gr. At Pt. Of Max Sag	Max kV/m On R/W (1 m Above Gr)	Max kV/m At Edge Of ROW (1 m Above Gr)	Width Of ROW (Feet)	Average Tower Ht. (Feet)
EXISTING						
Annadel/ Valley of the Moon	2 circuit	27 32	Max: 2.6 Typ: 1.	0.5 0.5	100	108
Oakmont	2 circuit	32 41	Max: 1.9 Typ: 1.1	0.5 0.5	100	146
Parallel	2 circuit	27 32	Max: 2.6-4.2 Typ: 1.9-3.2	1.1-0.5 1.1-0.5	75-120*	115
PROPOSED						
Annadel/ Valley of the Moon	4 circuit	27 32	Max: 4.0 Typ: 3.1	2.0 2.0	100	114
Oakmont	4 circuit	51 61	Max: 1.4 Typ: 1.05	1.1 .9	100	173
Parallel	two 2 circuit	27 32	Max: 4.1-5.8 Typ: 3.1-4.9	1.1-0.5 0.9-0.5	97.5-110*	120

The maximum electric fields at the centerline and the east edge of the right-of-way if the four circuit Oakmont line were at a height comparable to the existing Oakmont two circuit transmission line:

At 32 feet: ROW Field = 3.1 kV/m, Edge of ROW = 2.0 kV/m
At 41 feet: ROW Field = 2.0 kV/m, Edge of ROW = 1.5 kV/m

The maximum field that could occur under the proposed transmission line is 4.3 kV/m and this would occur, if ever, only at the point of maximum conductor sag with emergency line loading, 100 degree F ambient temperature, and a 2 ft/sec. wind. (RT 8707:15-21) The "average" edge of right-of-way field strength for the entire Castle Rock Junction-Lakeville transmission line is approximately 0.59 kV/m. (RT 10,687:20-22) The average electric field strength for the double circuit tower line is 0.53 kV/m and 1.14 kV/m for the four circuit tower line. (RT 10,694)

The proposed transmission line will typically produce a maximum magnetic field of 0.2 gauss.

* Does not include M.P. 33-38 (towers 138-164); See AFC Figure 11.4-3.

Burden of Proof

In attempting to review highly technical and detailed scientific studies and methodologies and at the same time fit an ultimate analysis into the legalistic regulatory framework of findings and conclusions, the Commission faced the same predicament acknowledged by the New York Public Service Commission (NYPSC) in its "Commission Record Hearings on Health and Safety of Extra-High Voltage Transmission Lines" (Opinion 78-13, Cases 26529 and 26559, June 19, 1978)*:

> It might be tempting for a tribunal assessing the safety of an innovation to put its proponent in the impossible position of having to prove a negative: that the innovation will cause no harm. But to impose such a burden on the applicants would be to rule against them in advance, and applicants do not, because they know they cannot, assert 100 percent certainty that the lines will produce no ill effects. Their position boils down to asserting that no ill effects have been shown, that scientific theory and the weight of experimentation suggest that no ill effects are likely, and that a reasonable weighing of risks and benefits requires that the lines be authorized [with the right-of-way as proposed].
>
> To relieve the applicants of the burden of proving a negative of course, is not to impose on advocates of more rigorous protective measures the task of demonstrating beyond any doubt that the lines as proposed would be hazardous. Here, too, the parties acknowledge the uncertainty: Dr. Marino does not predict the occurrence of particular effects; he claims only that effects can occur and that some unspecified ones probably will occur. In deciding the case, we will be choosing not between absolutes but between widely separate positions on a spectrum ranging from asserting that ill effects are probable to asserting that they are extremely unlikely.

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* Dr. Morton Miller, PG&E's witness, had testified for the applicants in the NYPSC proceeding. The Energy Commission staff presented Dr. Andrew Marino as its witness herein. Dr. Marino had testified for the NYPSC staff in the referenced proceeding. The NYPSC proceeding related to a proposed 765 kV transmission line for which a 1 kV/m right-of-way electric field strength was required.

> In these circumstances, we believe it is only fair to proceed by considering the successful operating experience as imposing the burden of going forward and suggesting potential hazards on those parties who claim they exist; once that burden of going forward has been satisfied, however, prudence suggests imposing on the applicants the burden of refuting the inferences of harm, or showing that its likelihood is so small that any reasonable analysis requires authorizing operation as they propose. The stronger the unrefuted inferences of harm, the more rigorous the protective measures we must adopt. (NYPCS, pp. 16-18).

In the California Energy Commission proceeding, PG&E has the burden of proof on all matters necessary for certification. [Title 20, California Administrative Code, section 1748(e)].

Dr. Morton Miller

To meet its burden of proof on the potential for electromagnetic health effects, PG&E presented the two-page testimony of Dr. Morton Miller:

> The present scientific literature does not indicate that there are deleterious biological effects induced by electromagnetic fields comparable to those of the proposed Castle Rock to Lakeville 230 kV transmission line (4.2 kV/m and 0.2 G maximum). Additionally, insights gained of the mechanism whereby cells are perturbed by electric fields continue to provide evidence that there is little reason to expect induction of biological effects by exposure to an air electric field of 5 kV/m or less.
>
> Thus, I can confirm my previously submitted concluding summary statement that:
>
> Neither animal and plant experimentation or clinical studies nor years of experience with operating transmission lines have, to date, provided convincing evidence for a harmful effect of exposure to electric and magnetic fields associated with transmission lines, in spite of numerous attempts to find such effects. Likewise, on a biophysical basis one would have no reason to expect there to be effects. Thus, while one can never prove the negative (i.e., that there is no effect), the overwhelming body of scientific evidence indicates that electric and magnetic fields associated with high voltage transmission lines have no deleterious biological effects. (RT 8,726:7-8,727:3)

Dr. Miller used, among others, a biophysical method of analysis in his testimony.

The use of a biophysical approach rekindles a controversy which existed in the NYPSC proceeding:

> One difference of scientific opinion that permeates the case is between advocates of what are termed the "biological" and "biophysical" methods of analysis. The applicants' witnesses generally adhered to the biophysical method, which proceeds by applying the principles of physics to biological material, determining how, in theory, electromagnetic fields can affect biological material, and then calculating whether the electromagnetic fields produced by the power lines under consideration are theoretically capable of producing those effects. Experimental results showing subtle effects must be questioned, according to this method, if the effects cannot be explained by biophysical principles, and applicants' witness [Schwan] insisted that it was necessary to understand the reasons for a particular effect before extrapolating it from the experiment in which it is found to other situations...Dr. Marino believes mathematical models and theoretical analyses and predictions useful in the absence of experimental research and helpful in guiding scientists in choosing experiments. They cannot, however, themselves be evidence on the likelihood of biological effects, and must yield to contrary experimental results even if those results are not fully understood. Biophysical theories, according to Dr. Marino, cannot explain complex life processes, and knowing what can happen is often more important than knowing how or why it happens.
>
> The parties' differences over scientific method are of more than academic interest. We cannot ignore scientific theory, and our decision must weigh the claims of responsible theoreticians who use widely acceptable scientific theories in their attempt to demonstrate the extreme unlikelihood--not the impossibility--that the lines would produce adverse effects. But though the theoretical approach portrayed on this record is certainly a valid method for conducting scientific inquiry, it provides, in the short run, an inadequate basis for determining public policy. (NYPSC, pp. 19-21)

Notwithstanding his insistence that none of the present scientific literature indicated deleterious biological effects, Dr. M. Miller testified that there are some studies of low-level electromagnetic field effects and their biological, neurological or any other sort of effect upon human health or behavior with which he agrees. (RT 8,907:17-23)

Miller testified, "There are effects on people and on animals, and lots of things, and I agree that there are effects." (RT 8,907:23-25) "The only effect that I am aware of in terms of human exposure to transmission line electric fields is hair vibration, that I have experienced it personally. It occurs somewhere for me between 10 and 15,000 volts per meter [10-15 kV/m] electric fields. Other than that I do not know of any effect in people. (RT 8,908:9-14) There is a biological factor associated with hair vibration." (RT 8,936:7-9)

Furthermore, Dr. M. Miller's own research has reported thresholds for cell perturbation at 300 volts per meter (0.3 kV/m). (RT 8,909:21-23) However, Dr. M. Miller explained effects were caused where the field strength represented the field in the conducting medium and that such fields strengths could not be obtained by an air field exposure. (RT 8,910)

Lastly, Dr. M. Miller testified that there are studies which show that there are effects induced upon cells by exposure to electromagnetic fields of a strength on the order of 100 v/m (0.1 kV/m) but that such field levels do not occur in people's bodies when they are exposed to the air fields of the transmission line. (RT 8,939:17-25)

Dr. Andrew Marino

Dr. Marino formulated his opinion upon a review of the literature in the field and his own experiments with rats and mice. Dr. Marino published results of an experiment with mice between the time of the NYPSC decision and this proceeding.

In presenting an analysis of literature in the field, Dr. Marino testified that his methodology in determining whether a biological effect was reported

was to examine the "raw" experimental data published in the study. If Dr. Marino believed that the study's data reported an effect, he associated the study with an effect, even if the study's author offered an opinion of no effect. (RT 9,089:2-7; 9,247:13-21) In several instances, Dr. Marino acknowledged that he reached a professional opinion contrary to the author's using the author's experimental data.

Taken as a whole, the literature in the field confirms this aspect of Dr. Marino's testimony: an effect can be induced in a biological organism by electromagnetic fields, some of which occur at a field strength and frequency similar to the proposed transmission line. (RT 9,075:24-25)

Dr. Marino uses his own experiments to support the same testimony. However, Dr. M. Miller and others have criticized Dr. Marino's multi-generational mice experiments for the potential that micro-shocks while the mice drank water affected the results. (RT 8,810-11)

Dr. Marino updated this experiment to purportedly eliminate the micro-shocks and found effects from the exposure to the electric field. (RT 8,814:9-14; 8,975) Dr. M. Miller asserts that even the updated experiment may still be flawed by the micro-shock potential. (RT 8,815:4-8, 24-25)

According to Dr. Marino, all of the available studies of electric fields bio-effects have been done in the laboratory, usually with animals. (RT 8,990)

Dr. Marino states that the specific laboratory results cannot be directly linked to specific health risks from exposure to the proposed transmission line. Despite this imprecision, Dr. Marino insists that the proposed transmission line will present a health risk because it will result in

human exposure to an uncontrolled human population to a known physiological stimulus in an uncontrolled fashion. (RT 8,993)

Nonetheless, Dr. Marino in his own testimony points out the findings of the National Board of Canada and the Public Service Commission of West Virginia that there are no known biological effects of electromagnetic fields in people who were regularly exposed to high voltage transmission lines and states that they are technically correct. But he claims such findings reflect an absence of inquiry and the application of improper "dead-body" theory of regulation, requiring evidence of actual harm. (RT 8,990)

According to Dr. Marino, acute exposure to the electromagnetic fields of the proposed transmission line does not represent a health hazard. (RT 8,992) However, Dr. Marino recommends that the transmission line right-of-way extend to 100 volts/meter (0.1 kV/m) and that all people residing within an electric field strength of 1 volt/meter (.001 kV/m) be notified of the possible risks.

Dr. Marino testified on cross-examination that the electric field at the edge of the right-of-way of the proposed transmission line is less than the field directly next to an electric blanket. (RT 9,235)

Dr. Diane Miller

Dr. Diane Miller, a biochemist, testified for one of the public intervenors approximately 11 months after Drs. Morton Miller and Marino. Dr. D. Miller resides near the PG&E proposed transmission line.

Dr. D. Miller reviewed the prior testimony in the proceeding, the DOW report for the Minnesota Environmental Quality Board (MEQB), and an assortment of literature in the field. (RT 14,464-5)

Based upon this review, Dr. D. Miller testified that the research appears to be taking a direction toward a strong chance of effects and very frequently toward adverse effects. (RT 14,492:19-21) With regard to the extrapolation of laboratory studies on animals, Dr. D. Miller referred to the DOW report which reported that by modeling the current densities induced in humans under a transmission line were predicted to be ten times higher than those induced in rats at the same field strength. (RT 14,468; DOW 2-10) In Dr. D. Miller's opinion, greater caution must be exercised for chronic exposure than for acute exposure. (RT 14,495:14-20)

Dr. D. Miller urged the selection of a transmission route which would minimize exposure of residents to electric fields. (RT 14,497:3)

DOW Report

Although the DOW Report was admitted into the hearing record as hearsay, it may be used to supplement or explain otherwise admissible evidence. (Title 20, California Adminsitrative Code, section 1212(d))

The authors of the DOW report analyzed a variety of studies on electromagnetic fields to provide the Minnesota Environmental Quality Board with an up-date of new literature concerning biological effects from electromagnetic fields, among other subjects.

Many of the studies had been considered by witnesses Drs. M. Miller and Marino in their testimonies earlier in the proceeding.

The DOW report concluded that certain measurable, specific biological effects attributable to electric fields have been demonstrated in laboratory studies under particular conditions of exposure. (DOW p. 5-2)

The DOW report further states, "extrapolation from biological effects induced under laboratory conditions to biological effects that might occur in the power line environment is of considerable practical importance. Such extrapolation requires great care and is beyond the scope of this report" (DOW, p. 5-2)

Nonetheless, the Commission notes an apparent extrapolation in the following passage, "It is therefore the position of this report that specific biological effects can be attributed to electric and possibly to magnetic fields in the immediate vicinity of power lines." (DOW, p. 2-28)

Discussion

Having considered the record before it, the Commission finds that there is substantial and persuasive evidence to demonstrate that biological effects can be induced in an electric field in a laboratory setting.

There is not persuasive evidence to establish that the biological effects found in such laboratory demonstrations are "adverse" biological effects.

Nor can a legal inference (Evidence Code section 600(b)) be drawn from the evidence in the record that such laboratory induced biological effects are adverse.

Furthermore, there is no evidence which persuasively associates such laboratory demonstrations with an adverse human health effect from exposure to electric fields created by high voltage transmission lines.

Additionally, no inference can be drawn from an ability to induce biological effects from electric fields in a laboratory to show that such effects can be

created in the electric field from a high voltage transmission line and that such effects, if they occurred, would be adverse to humans.

Since the evidence does not permit an inference that induced biological effects are adverse, there is no basis to establish a presumption (Evidence Code section 600(a)) that an induced biological effect is an adverse biological effect in the absence of evidence to the contrary.

To the contrary, the historical operating experience of high voltage transmission lines shows no adverse health effect from exposure to the electric fields.

In California, such operating experience occurred under right-of-way conditions similar to those proposed for the Geysers to Lakeville transmission line.

With the exception of Oakmont, the use of a 120 foot right-of-way for the proposed transmission line will prevent any greater chronic exposure to electric fields than has occurred historically. Given the limitation of the Oakmont right-of-way to 100 feet, exceedence of the existing exposure at the edge of the right-of-way to electric fields can be prevented by widening the right-of-way, increasing the height of the proposed four circuit tower line, or undergrounding the transmission line. (RT 9,237:17-22; 10,692; 13,022) The 100 foot Annadel State Park right-of-way combined with the temporary uses of the Park result in no chronic electromagnetic field exposure to humans. Development rights through the Wild Oak development should be limited to no closer than 60 feet from the transmission line center line, thereby requiring acquisition of a 120 foot right-of-way.

Findings

116. The field strengths for the various configurations of existing and proposed transmission lines are as shown hereinabove.

117. There are no federal or state standards for exposure to 60 Hz electromagnetic fields.

118. Under laboratory conditions, a biological effect can be induced in an electromagnetic field, including those field strengths similar to those caused by high voltage electric transmission lines.

119. There is disagreement in the scientific community as to the cause(s) of the observed effects and whether such effects are adverse.

120. There is no persuasive evidence to show that the biological effects induced in laboratory studies are adverse biological effects, nor can an inference of adverse biological effects be drawn from evidence in the record.

121. There is no evidence that persuasively associates such induced biological effects with adverse human health effects from exposure to electromagnetic fields caused by a high voltage transmission line such as proposed herein, nor can an inference of adverse human health effects from such exposure be drawn from evidence in the record.

122. To date, the historical operating experience of high voltage transmission lines, similar to the proposed line, shows no adverse human health effects from exposure to the electromagnetic fields caused by such transmission lines.

123. Operation of the proposed transmission line in the same manner as the historical operation of similar transmission lines poses no identifiable human health risk.

124. At 120 feet in width, the right-of-way configuration of the proposed transmission line, except for Valley of the Moon, Annadel State Park, and Oakmont, is similar to existing transmission lines in operation. The Valley of the Moon, Annadel State Park, and Oakmont rights-of-way are 100 feet. There is no evidence of prior operating experience within the PG&E system with a four circuit 230 kV transmission line within a 100 foot right-of-way.

125. The strength of electromagnetic fields can be reduced at the edge of the right-of-way by widening the right-of-way, increasing the conductor height, or undergrounding the transmission line.

126. Widening the 100 foot right-of-way in Oakmont to 120 feet would require the acquisition or condemnation of existing residences.

127. The text of the Final Environmental Impact Report (FEIR) concerning the potential for human health effects from electromagnetic fields is drawn from the same body of scientific literature as was available to the Commission in rendering this Decision.

The statement in the Final EIR that undesirable biological effects in humans occur after an acute exposure to a 15-16 kV/m electric field (p. II-65) is not persuasively established by the entirety of the record in the Commission's view.

Therefore, the application of mitigation measures recommended in the Final EIR (Nos. 1-4, pp. II-65 & 66) is unwarranted based upon the evidence before the Commission.

Condition

(ggg) So that PG&E will not expose humans to a strength of electromagnetic fields in excess of those caused by transmission lines currently in operation in similar circumstances, PG&E shall acquire rights-of-way as follows:

(1) for the non-parallel portion of the proposed DCTL a right-of-way of not less than 120 feet (60 feet on each side of the centerline);
(2) for the parallel portion of the proposed DCTL an outer right-of-way of not less than 60 feet from the centerline of the proposed transmission line;
(3) for the consolidated 4 circuit transmission line through the Wild Oak development a right-of-way of not less than 120 feet, 60 feet on each side of the centerline;
(4) Since Annadel State Park is used for intermittent, transitory recreational activity, only temporary exposure to electromagnetic fields should occur. Therefore, the 100 foot right-of-way in Annadel State Park is adequate.
(5) The Commission has ordered PG&E to underground the proposed transmission line through Oakmont on other grounds. Therefore, the Commission need not address whether such undergrounding would have been necessary for the purpose of limiting the strength of the electromagnetic fields in Oakmont. (See PART FOUR, Undergrounding Oakmont)

B. Induced Voltages and Currents

Occasional, annoying, non-hazardous electrical sensations may be experienced by persons touching ungrounded metal objects on or adjacent to the edge of transmission line rights-of-way. Typical types of ungrounded objects in this category include wire fences having dry wood posts, large vehicles with rubber tires and wooden barns with large metal roofs. These ungrounded metal objects sometimes acquire an electrical potential by electrostatic coupling. The sensation experienced may range from the slightest perceptable tingle to a distinct sensation.

The magnitude of the electrostatic voltage induced on ungrounded metal objects which are in the field of the proposed 230 kV transmission line would depend on the electrical field level, the surface area of the object, the distance of the metal surface from the transmission line conductor, and the height of the object above ground. The magnitude of the current a person could experience by touching such an object would depend on the electrical field level, the size and shape of the object, and the impedence of the current's path through the person touching the object to the ground. The latter varies greatly according to the individual and the manner in which the person is grounded.

Transmission lines may cause nuisance or hazardous induced shock from transient discharges, continuous currents, or ground fault currents. However, if proper grounding policy is followed, even under worst case conditions potential hazardous shock is highly improbable. (FEIR, p. II-60)

Of particular concern is the potential for shock from a steady state or continuous induced current, measured in milliamps, for objects within the

right-of-way. (RT 10,697:11-25)

At the maximum electric field strengths for the proposed transmission line, the discharge current in a large metallic object would be about 0.4 milliamps.

The threshold perception for a continuous 60 Hz current is measured in milliamps and occurs at the following levels: 1.1 milliamps for men, 0.8 milliamps for women, and 0.6 milliamps for children. (RT 15,569:1-11)

The "let go" threshold is defined as a certain value of current from which it is not possible to release one's grip on an object. The minimum "let go" thresholds are 9 milliamps for men, 6 milliamps for women, and 5 milliamps for children for a continuous 60 Hz current. (RT 15,561:2-4)

Discussion

Dr. Marino's testimony states that within about 100 feet of the line and depending on the size of the object touched, one might experience a maximum current of 5,000 to 15,000 microamperes (5-15 milliamps). A car parked directly under the Geysers 16 line would yield currents of about 5,000 microamperes, if touched. Currents above 5,000 microamperes are painful. (RT 8,986-8,987)

Based upon an assumption that the Loch Haven/Porter Creek area had the highest electric field strengths on the proposed transmission line, Dr. Diane Miller testified that 0.4 kV/m, the resistant field strength at the edge of the right-of-way may be dangerously close to a shock condition for children entering a school bus. She concludes that a potential hazard area for shock exists where the proposed transmission line crosses near the school bus turn-around at the Porter Creek Road and Franz Valley Road junction. (RT 14,466)

PG&E purported by its testimony to clarify some basic assumptions underlying Dr. Marino and Dr. Diane Miller's interpretation of the potential for human shock in the vicinity of the transmission line near the Porter Creek Road and Franz Valley Road area.

PG&E calculates the maximum electric field in the vicinity of the proposed transmission line to be 4.3 kV/m. The discharge current for a large metal object, such as an automobile, placed in a field of approximately 4.3 kV/m would be about 0.4 milliamps. The school bus turn-around area, located near Franz Valley Road and Porter Creek Road, is at least 160 feet from the centerline of the proposed transmission line route. The lowest conductors at that point will be at least 95 feet in the air, and the electric field gradient at that point will be approximately .06 kV/m. The maximum possible induced current at that point is calculated to be 0.05 milliamps. The worst case maximum induced current that would be expected from a 50 foot school bus is approximately 1/10 of the perception level of a child. (1/10 of 0.6 milliamps) (RT 15,534-15,536)

Findings

128. A transmission line may cause nuisance or hazardous induced shock from transient discharges, continuous currents or ground fault currents. A shock is caused when a conductive object which is insulated from the ground (ungrounded) is placed in the electric field of a transmission line and is thereafter touched by a grounded person.

129. Hazardous shock is defined as one in which the current is sufficiently strong to cause involuntary muscle contraction and thus prevent "let go". The minimum "let go" threshold for men is 9 milliamps, (9/1,000 ampere), for women is 6 milliamps; and for children is 5 milliamps.

130. The minimum level for perception of shock is 1.1 milliamps for men, 0.8 milliamps for women, and 0.6 milliamps for children.

131. The induced current for a large metal object, such as an automobile, placed in the maximum field of the proposed transmission line would be about 0.4 milliamps.

132. At the school bus turn-around at the intersection of Porter Creek Road and Franz Valley Road, the maximum induced current from a 50 foot school bus is 0.05 milliamps, or approximately 1/10 the perception level of a child.

133. The potential for hazardous shock from conductive objects permanently within the right-of-way can be reduced to an insignificant level by proper grounding.

134. Implementation of the grounding policy referred to in condition (hhh) below renders unlikely the possibility that the proposed transmission line would create a hazard due to induced current.

Conditions

(hhh) PG&E shall comply with the terms of, and perform all the acts required of it as enumerated in, Section 16, Safety and Nuisance Effects, of the COMPLIANCE PLAN FOR PG&E'S GEYSERS UNIT 16, attached hereto as Appendix A and incorporated by reference herein.

(iii) The Commission shall retain jurisdiction to impose additional conditions if there are unresolvable complaints of induced shock at the school bus turn-around at the intersection of Porter Creek Road and Franz Valley Road.

C. Corona

Findings

135. The corona discharges from a transmission line can generate insignificant amounts of ozone and NO_x. Under heavy rain conditions (worst case) the ozone level generated by the proposed transmission line is expected to be less than 0.01 parts per million (ppm). Oxides of Nitrogen (NO_x) emissions are also negligible. EPA's ozone limit is 0.12 ppm (1 hour average) and the California Air Resources Board's (CARB) limit is 0.10 ppm (1 hour average) EPA's NO_x is 0.25 ppm (1 hour average). It is anticipated that NO_x and ozone levels produced by the lines would be well within air quality standards. Thus, no impact is anticipated due to the NO_x or ozone generated by the proposed licensor as a result of cumulative production due to corridors with multiple lines.

136. Conductor corona produced by 230 kV lines can generate audible noise. The highest noise levels occur in foul weather.

137. Audible noise from transmission lines can be mitigated by design measures such as conductor sizing, the number of conductors and other parameters.

138. Based upon listening observations and noise measurements made beneath the existing Pittsburg-Sobrante 230 kV transmission line, the predicted maximum level of audible transmission line noise in a wide band frequency spectrum is 22 dBA (to be exceeded only 5 percent of the time) during foul weather at a distance of 120 feet.

139. Conversational speech at 3 feet is 60-64 dBA; background air conditioning noise is 30-40 dBA; and a jet airplane on a runway is 120 dBA.

140. Applied to the proposed transmission line in its entirety, conductor corona will not generally be audible.

141. In the specific case of Mr. Cowan, a blind person residing near the right-of-way of the proposed transmission line, the predicted maximum level of audible noise will generally be less than the present ambient noise in the area of Mr. Cowan's mailbox ranges from 36 dBA (Porter Creek waterflow) to greater than 90 dBA (high speed motor vehicles). Therefore, there is insufficient evidence to find that transmission line noise will be audible to Mr. Cowan a significant amount of the time. On those occasions when transmission line noise may be audible, it should not interfere with Mr. Cowan's navigation on his property because of the highly directional character of transmission line audible noise.

Condition

(jjj) PG&E shall report to the Commission and shall attempt to resolve all complaints concerning audible noise produced by the transmission line.

D. Cardiac Pacemakers

The Commission examined whether a person wearing cardiac pacemaker would be exposed by transmission line caused electromagnetic fields to a particular risk associated with the operation of the pacemaker.

There are two basic types of pacemakers: unipolar, in which the current is carried to the heart by an electrode wire but returned to the pacemaker through body tissue; and bipolar, in which a second wire is used to return the current to the pacemaker. Approximately 75 percent of the pacemakers implanted are of the unipolar design. (RT 8,825:11-22)

To date, there has been no report of a clinically significant episode of pacemaker malfunction attributable to the interference of electrical or magnetic fields from overhead power lines. (RT 8,830:11-14)

Experimentation has predicted that exposure to a field strength of 3.4 kV/m could produce reversion in 1-2 percent of all implanted pacemakers, where the recipient was well-grounded and standing erect. (RT 8,831:9-129) For all other pacemaker recipients, a field strength of 14 kV/m is predicted to be required to produce reversion. (RT 8,831:19-21) Reversion is the condition in which the pacemaker competes with the heart's pacing by reverting to an asynchronous or fixed rate mode of pacing. (RT 8,828:7-11) Reversion is a transient event and presents no risk or complication to the ambulatory patient. (RT 8,835:1-25)

Since the edge of right-of-way field strengths of the proposed transmission line are less than 3.4 kV/m, and since exposure to higher fields, up to or exceeding 3.4 kV/m, within the right-of-way will be transient, the proposed transmission line presents no hazard to pacemaker wearers in its vicinity. (RT 8,836:1-14)

Findings

142. To date, there is no documented case of cardiac pacemaker interference from transmission lines.

143. In only the most sensitive and limited number (1-2 percent) of pacemakers, reversion is predicted to occur at a field strength of 3.4 kV/m. The maximum field strength within the right-of-way of the proposed transmission line is 4.3 kV/m. Field strengths at the edge of the right-of-way are less than 3.4 kV/m.

144. Temporary reversion by a pacemaker to an asynchronous mode of pacing presents no significant medical hazard.

145. The proposed transmission line poses no hazard to pacemaker wearers in its vicinity.

146. The text of the Final Environmental Impact Report (FEIR) concerning the potential for cardiac pacemaker effects from electromagnetic fields is drawn from the same body of scientific literature as was available to the Commission is rendering this Decision.

147. The statement in the FEIR that exposure to the electromagnetic field at the edge of the right-of-way of the proposed transmission line will pose no serious risk to wearers of cardiac pacemakers is persuasively established by the entirety of the record in the Commission's view.

148. Therefore, the application of mitigation measures recommended in the FEIR (No. 5, pp. II-66) is not warranted based upon the evidence before the Commission.

E. Miscellaneous

Findings

149. The proposed line complies with FAA requirements. There are no landing strips, FAA repeater stations, VORTAC or radar stations near the proposed line.

150. During construction of the transmission line, construction equipment may produce noise levels high enough to be regulated by California Division of Occupational Safety and Health (DOSH). Applicant agrees to comply with applicable DOSH rules, and will not conduct construction activities that produce significant noise during evening hours unless necessary.

151. Radio interference and television interference (RI/TVI) from transmission lines can be caused by transmission lines due to corona, electrical discharges across small gaps and shielding or reflection of signals. Even in worst case conditions (i.e. foul weather) it is unlikely that there would be any significant interference with radio broadcast bands, television reception, amateur radio bands or police, fire or other public health and safety services due to the low level of corona-caused noise and absence of gap-type noises.

152. PG&E's proposed transmission line design is more stringent than PUC General Order 95, and is adequate to prevent safety hazards to the public during construction and operation. PG&E's design is also adequate to satisfy DOSH regulations with respect to public and employee safety.

Condition

(kkk) PG&E shall comply with the terms of, and perform all the acts required of it as enumerated in, Section 16, Safety and Nuisance Effects, of the COMPLIANCE PLAN FOR PG&E'S GEYSERS UNIT 16, attached hereto as Appendix A and incorporated by reference herein.

IV. ENGINEERING

A. Geotechnical/Structural Engineering

Findings

153. The proposed alignment is affected by potential seismic activity and geologic hazards (slope instability, landsliding, soil erosion, potentially active faults).

154. In the region traversed by the corridors there is a probability of 0.9 in a 50-year interval that the peak ground acceleration will not exceed levels ranging from 0.3 g to 0.7 g.

155. 230 kV lattice towers are commonly built to withstand a peak ground acceleration of 0.9 to 1.0 g as a consequence of satisfying wind loading and broken conductor loading. (CPUC criteria)

156. The presently proposed tower sites provide adequate protection from damage to lines and towers due to fault rupture.

157. Based on the geologic data provided in the AFC, the alluvial deposits at tower sites 105 and 106 near Oakmont do not appear susceptible to liquefaction potential during an earthquake.

158. Foundation conditions, slope stability and fault rupture and earthquake shaking do not appear to seriously constrain utilization of the Lakeville substation.

159. The sites of the proposed towers and substations appear adequate from a geotechnical perspective.

Condition

(111) PG&E shall comply with the terms of, and perform all the acts required of it as enumerated in, Section 15, Geotechnical/Structural Engineering, of the COMPLIANCE PLAN FOR PG&E'S GEYSERS UNIT 16, attached hereto as Appendix A and incorporated by reference herein.

B. Transmission Facility Planning

(See PART FOUR)

C. Transmission System Engineering

(See PART FOUR)

D. Reliability

(See PART FOUR)

PART FOUR--"OVERRIDE" PROCEEDINGS

I. PROCEEDINGS CONDUCTED PURSUANT TO PUBLIC RESOURCES CODE SECTION 25525

Public Resources Code section 25525 provides:

> The commission shall not certify any facility contained in the application when it finds, pursuant to subdivision (b) of section 25523, that the facility does not conform with any applicable state, local, or regional standards, ordinances, or laws, unless the commission determines that such facility is required for public convenience and necessity and that there are not more prudent and feasible means of achieving such public convenience and necessity. In no event shall the commission make any finding in conflict with applicable federal law or regulation. The basis for such findings shall be reduced to writing and submitted as part of the record pursuant to section 25523.

Following the determination that PG&E's proposed transmission line did not conform to local land use plans and that the nonconformities could not be corrected or eliminated within the meaning of Public Resources Code section 25523(d), PG&E sought relief under Public Resources Code section 25525 to certify its proposed transmission line.

In the COMMITTEE STATEMENT OF ADOPTED STANDARDS FOR A DETERMINATION PURSUANT TO PUBLIC RESOURCES CODE SECTION 25525, filed January 14, 1981, and affirmed by the Commission on February 25, 1981, the Committee published the standards to guide the "override" proceeding:

Background

> An "override" pursuant to Public Resources Code section 25525 is an extraordinary remedy available to an applicant which has failed to prove the conformity of its AFC proposal to applicable laws, etc., during its case in chief.

An applicant must seek by request the relief which may be provided pursuant to Public Resources Code section 25525. The applicant has the burden of proof on all matters necessary to make the findings that the proposed "facility is required for the public convenience and necessity and that there are no more prudent and feasible means of achieving such public convenience and necessity." Such findings necessarily require an evidentiary record.

In order to establish the record for the "override" findings, the Committee will conduct evidentiary hearings for the taking of new evidence or the designation of evidence already in the record. Such evidentiary hearings contemplate the applicant's opportunity to present its case for an "override" and a meaningful opportunity for all adverse parties to oppose and rebut the applicant's case.

Standards for Determination

Public Utilities Code section 1001, and administrative and judicial interpretations thereof, shall be used in determining whether the proposed facility is "required for the public convenience and necessity."

In determining whether "there are not more prudent and feasible means of achieving the public convenience and necessity" the following interpretations shall apply:

1. "not more" applies to both "prudent" and "feasible";

2. an alternative which is more prudent and feasible will result in the disapproval of the applicant's proposal, as proposed. An alternative which is equally or less prudent and equally or less feasible will not result in the disapproval of the applicant's proposal; and

3. whether an alternative is "not more prudent and feasible" will be determined "on balance" in consideration of the criteria listed below. In meeting its burden of proof, the applicant need not show that all alternatives are not more prudent and feasible for each criterion. Likewise, any party opposing the applicant on this matter need not prove that an alternative is more prudent and feasible for each criterion.

In determining whether an alternate means of achieving the public convenience and necessity is "not more prudent and feasible", the following criteria will be considered in comparing the proposal with such alternatives:

National, state, or local law or declared policy;

Economic impacts relating to both the costs of construction and operation as well as the impact upon ratepayers*;

Environmental impacts*;

Social and community impacts*;

Public health and safety*;

Reliability*;

Ability to be integrated into and best utilize existing systems*;

Indirect or consequential impacts beyond the specific proposal;

Time*;

A facility capable of being constructed in accordance with accepted engineering practices*;

A suitable construction site for the facility*;

Employment of a commercially available technology*.

Each criterion identified by an asterisk (*) is included within the definition of "feasible" taken from Title 20, California Administrative Code, section 1702(f).

Scope of Alternatives

As stated above, Public Resources Code section 25525 requires, in part, that the applicant prove that there are not more prudent and feasible alternatives to its own proposal. However, proof of the nonexistence of such alternatives should not be limitless and require the applicant to prove the nonexistence of alternate sites for its facility at each of the 360 degrees of the compass

and all other possible electrical or engineering options. Such a burden of proof would result in endless hearings and the burdening of the applicant and the record with consideration of alternatives which could not reasonably substitute for the applicant's proposal.

Therefore, in conducting the "override" hearings pursuant to Public Resources Code section 25525, the Committee shall require that the applicant address only alternatives which appear to reasonably substitute for applicant's proposal. Such alternatives may wholly substitute for the applicant's proposal or may substitute for a part of the applicant's proposal so as to lessen or eliminate the nonconformity.

Scope of Possible Commission Action

The Commission has a wide range of permissible action, the extremes of which are on one hand, to grant the "override" for the facility as proposed by the applicant, and on the other hand to disapprove the applicant's proposal in its entirety.

Notwithstanding the "override" provision, the Commission has the underlying authority to assess the need for and feasibility of modifications in the design, construction, or operation of the facility (Title 20, California Administrative Code section 1748(b)) and may make such modifications in the decision. (Title 20, California Administrative Code section 1752(c)).

Therefore, if necessary, the Committee for the Commission may order such a hearing as is necessary with regard to a modification, substantial or otherwise, of the applicant's proposal to afford persons not previously affected a meaningful opportunity to be heard thereon. Thereafter, the Commission may make modifications to the applicant's proposal in its decision in connection with its "override" determination.

II. PUBLIC CONVENIENCE AND NECESSITY

Pursuant to the Commission Committee's "STATEMENT OF ADOPTED STANDARDS FOR A DETERMINATION PURSUANT TO PUBLIC RESOURCES CODE section 25525", dated January 25, 1981, and affirmed by the Commission on appeal on February 25, 1981, the

showing that a facility is required for the "public convenience and necessity" shall be guided by judicial and adminsitrative interpretations of Public Utilities Code section 1001.

This Commission's determination of "public convenience and necessity" differs from and is broader in scope than the determination of conformity to the forecast of service area electricity demands pursuant to Public Resources Code section 25523(f) and 25309(b).

> The phrase "public convenience and necessity" is not susceptible of a comprehensive definition that will fit all cases. It is relative in its application. Absolute indispensability is not necessarily an element of "necessity". Any improvement that is highly important to the public convenience and desirable for the public welfare--even a thing that it is merely expedient to have--may be regarded as a necessity. The inconvenience of lack of a thing may be so great as to make it a necessity. At times the word connotes indispensability, at other times needfulness. And the public convenience and necessity is not necessarily confined to that of the present but embraces that which may be expected in the future. (53 Cal.Jur.3d, Public Utilities, §33, page 42.

As stated above (see PART ONE, Conformity to the Demand Forecast), the 230 kV Castle Rock Junction-Lakeville transmission line, as a facility related to Unit 16, conforms to the Commission's forecast adopted pursuant to Public Resources Code section 25309(b).

Including PG&E Geysers Unit 16, the proposed transmission line will serve the geothermal facilities listed in the following table showing scheduled date of operation, net generating capacity (in MW), generating capacity additions to the 230 kV transmission facilities only, and generating capacity additions to the 60, 115 and 230 kV transmission facilities:

Unit	Date	MW Size	230 kV Only	60, 115 and 230 kV Cumulative
Existing	June 1981	--	669	908
NCPA 2	September 1982	106	775	1,014
17	December 1982	110	885	1,124
18	May 1983	110	995	1,234
SMUDGEO 1	December 1983	72	1,067	1,306
Occidental A	May 1984	40	1,107	1,346
DWR Bottle Rock	June 1984	55	1,162	1,401
Occidental B	August 1984	40	1,202	1,441
16	June 1985	110	1,312	1,551
NCPA 1	September 1985	66	1,378	1,617
20	December 1985	110	1,488	1,727
DWR South Geysers (RT 12,661)	October 1986	55	1,543	1,782

The existing 60, 115 and 230 kV transmission facilities have a "summer normal condition"* capacity of about 1,100 MW. (RT 12,095:20-21) The 230 kV component of the existing transmission facilities, namely Castle Rock Junction-Fulton, has a summer normal condition capacity of 1,200 MW; however, that capacity exceeds the summer normal condition capacity of 889 MW out of the Fulton Substation. (RT 12,093:25-12,094:3)

This means that with 669 MW of Geysers generation (Units 5, 6, 9, 10, 11, 12, 13 and 14) connected to the Fulton Substation, there is normal summer condition capacity for only another 220 MW out of the Fulton Substation on existing facilities. (RT 12,094:3-7)

Therefore, the 230 kV Castle Rock Junction is needed for generation scheduled to be operational in June of 1983 assuming the occurrence of summer normal conditions. See Figure J. (RT 13,684)

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* "Summer normal conditions" are 70 percent loading and 109.4 degrees F ambient air temperature. (RT 12,253:9-22) PG&E has not attempted to calculate the probability of the coincidence of the 70 percent loading and the 109.4 degree ambient temperature. The only temperature data in the record showed coastal rating which assertedly can be extrapolated from inland temperatures of 6 days of 109.4 degree inland temperature for June, July and August. However, average Santa Rosa temperatures are 64.4, 66.8, 67 degrees for those months. (RT 12,516)

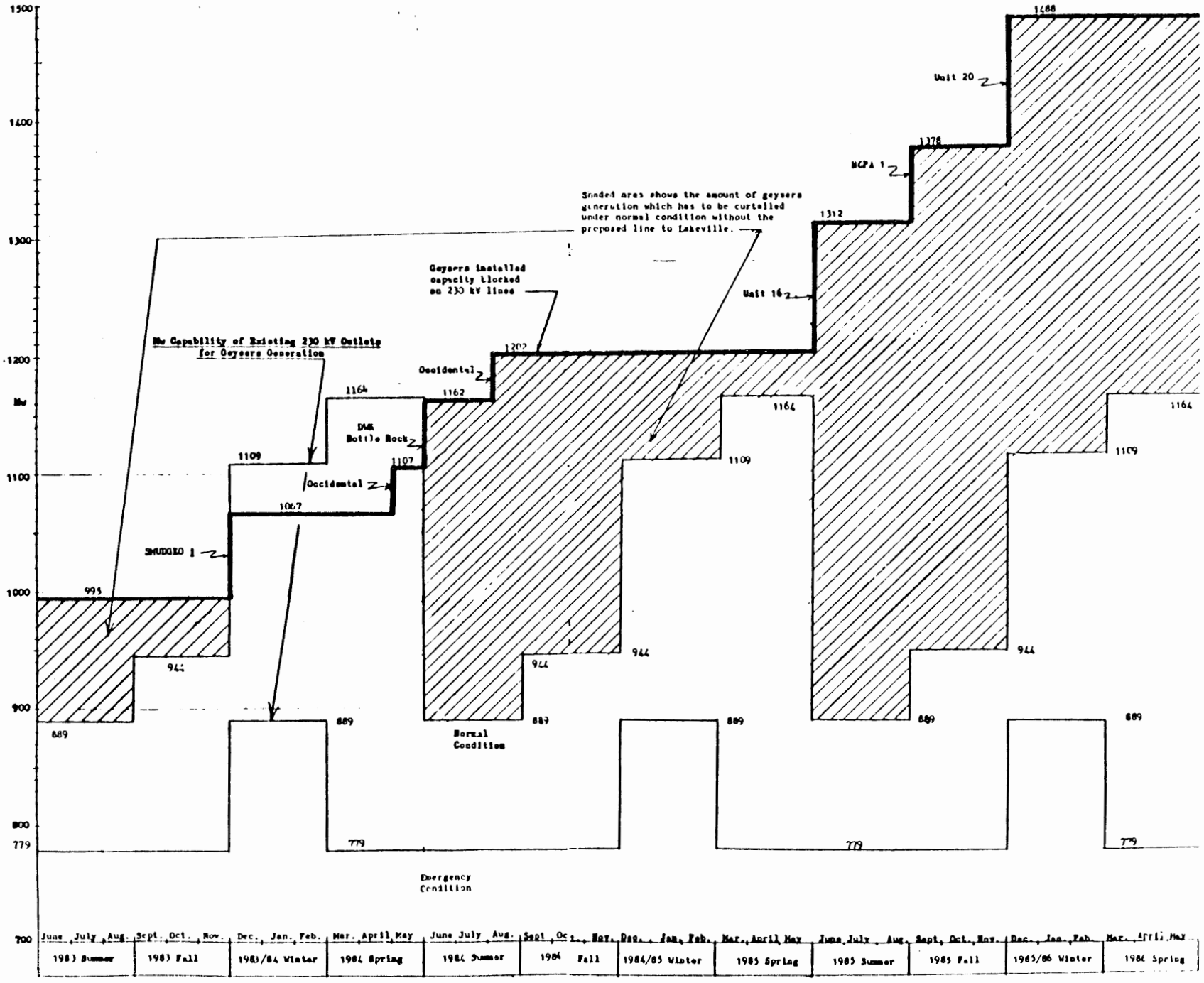

1500
1400
1300
1200
1100
1000
900
800
700
MW
Mw Capability of Existing 230 kV Outlets for Geysers Generation
Shaded area shows the amount of geysers generation which has to be curtailed under normal condition without the proposed line to Lakeville.
Geysers installed capacity blocked on 230 kV lines
Unit 20
Unit 16
NCPA 1
Occidental
DWR Bottle Rock
Occidental
SMUDGEO 1
1488
1378
1312
1202
1164
1162
1109
1107
1067
995
944
889
779
Normal Condition
Emergency Condition
June July Aug. Sept. Oct. Nov. Dec. Jan. Feb. Mar. April May June July Aug. Sept. Oct. Nov. Dec. Jan. Feb. Mar. April May June July Aug. Sept. Oct. Nov. Dec. Jan. Feb. Mar. April May
1983 Summer
1983 Fall
1983/84 Winter
1984 Spring
1984 Summer
1984 Fall
1984/85 Winter
1985 Spring
1985 Summer
1985 Fall
1985/86 Winter
1986 Spring

FIGURE J

According to PG&E, the earliest possible date by which the proposed transmission line can be placed in operation is June 1984, assuming Commission certification in September 1981. (RT 13,661:20-24)

Assuming the worst case, summer normal conditions for 1983, some 106 MW of Geysers geothermal generation may have to be curtailed. (RT 13,684) If the two components of the summer normal conditions do not coincide, or if all generating facilities are not operating, generation curtailment can be eliminated or avoided in summer 1983. (RT 12,259:20-12,261:11) PG&E and the Commission staff have estimated the amount of generation curtailment expected for an operational date of June 1984. In addition, for the purposes of comparing the potential generation curtailment associated with the proposed transmission line to the potential generation curtailment associated with some alternatives considered hereinafter, both PG&E and the Staff have estimated generation curtailment costs to June 1985. See Table 1.

Curtailment can be avoided in 1983 by using dynamic thermal loading to adjust loading to ambient temperatures. Such thermal loading could increase existing transmission capacity by 134 MW. Therefore, minimal or no generation curtailment would be necessary for 1983-1984. Cost for curtailment in 1984-85 could be reduced to $7.1 million by use of dynamic thermal loading. (RT 12,488-12,491) See Table 1.

Without the coincidence of the two components of the summer normal conditions and with all generating facilities operating, some generating facilities with operational dates after Unit 17 could operate with their generation being carried by the existing transmission line. (RT 12,191:20-12,192:4)

TABLE 1*

GENERATION CURTAILMENT

		ONE YEAR June 83-May 84				TWO YEAR June 83-May 85		
		NET MWH	$/MWH	COST		NET MWH	$/MWH	COST
PG&E (RT 12,129)	(1983)	370,061	57	21,093,477	(1983)	370,061	57	21,093,477
	(1984)	80,179	58	4,650,382	(1984)	1,474,464	58	85,518,912
					(1985)	442,099	58	25,641,742
		450,240		$ 25,743,859		2,286,624		$ 132,254,131
Staff (RT 12,507)	(1983)	45,134	41	1,850,494	(1983)	45,174	41	1,850,494
	(1984)	-0-	41	-0-	(1984)	747,750	41	30,657,750
					(1985)	313,491	41	12,853,131
		45,134		1,850,494		1,106,375		$ 45,361,375
Staff w/ dynamic thermal loading (RT 12,498)		-0-	41	-0-		174,000	41	$ 7,134,000

* Reproduced or extrapolated from testimony.

However, even if curtailment becomes unnecessary in 1983 because of weather conditions or the use of mitigation such as dynamic thermal loading, there will be increased loading of the existing transmission facilities causing excess transmission energy losses. (RT 12,307:13-12,308:19)

In electrical terminology, excess transmission energy losses represent the energy consumed in the transmission process itself, which varies in proportion to the resistance of the conductor and the square of the current. If the current on the conductor is doubled, the power loss will be increased by four times. (RT 12,482) Therefore, as more Geysers generation is put "on line" the current is increased and the excess transmission energy losses increase exponentially.

Estimates for one and two year excess transmission energy losses are shown on Table 2. There is no mitigation measure for the excess transmission energy losses that result from a two year delay of the proposed transmission line. (RT 12,499)

The impacts and costs of curtailment and excess transmission losses would be additive since the transmission line will be heavily loaded at the time when generation is curtailed. (RT 12,485) See Table 3 for Staff estimates.

Whether geothermally generated energy is curtailed or lost by excess transmission energy losses, it must be replaced by energy generated by other means.

The cost of geothermally generated energy is considerably less than the cost of energy to replace it:

TABLE 2*

EXCESS TRANSMISSION ENERGY LOSSES

PG&E

	ONE YEAR June 1983-May 1984		TWO YEAR June 1983-May 1985	
	(no figures available for calculation)			
	AVG. EXCESS LOSSES (MW)	COST	AVG. EXCESS LOSSES (MW)	COST
Staff (RT 12,511-12)	39.6	$ 25,684,949	61.1	$ 81,153,409

* Reproduced or extrapolated from testimony.

TABLE 3

AMOUNT AND COST OF ENERGY ASSOCIATED WITH GEYSERS GENERATION CURTAILMENT AND EXCESS TRANSMISSION LINE LOSSES

FIRST YEAR

SOURCE	AMOUNT OF ENERGY (MWh)	COST OF ENERGY ($)
Generation Curtailment	45,134	1,850,494
Excess Line Losses	347,846	25,684,949
Total	392,980	27,535,443

SECOND YEAR

SOURCE	AMOUNT OF ENERGY (MWh)	COST OF ENERGY ($)
Generation Curtailment	1,061,241	43,510,881
Excess Line Losses	688,536	55,468,460
Total	1,749,777	98,979,341

TOTAL - TWO YEARS

SOURCE	AMOUNT OF ENERGY (MWh)	COST OF ENERGY ($)
Generation Curtailment	1,106,375	45,361,375
Excess Line Losses	1,036,382	81,153,409
Total	2,142,757	126,514,784

Cost of the Geysers Energy - $/MWH

Year	Replacement Energy Cost	Geothermal Energy Cost	Difference	Difference in 1983
1984	102	37	65	58
1985	113	39	74	58
1986 (RT 13,686)	125	43	82	57

The Commission ranks geothermal energy as one of the two most preferred electric generation options. California Energy Commission, 1981 Biennial Report, pp. 98-99.

Finding

160. Given the state's energy policy preferences for geothermal energy expressed in the 1981 Biennial Report, geothermal energy's relative cost advantage, the cost of excess transmission energy losses and the potential for curtailment of geothermal generation, the construction and operation of a transmission facility to provide an outlet for Geysers geothermal energy is required for the public convenience and necessity. Failure to construct and operate an additional Geysers transmission outlet, or a protracted delay thereof, is contrary to the public interest financially, environmentally and from an energy planning perspective.

161. Generation from Geysers Unit 16 could be carried on the existing transmission line only during the non-occurrence of summer normal conditions and with some other generation facilities not operating.

III. ALTERNATIVES CONSIDERED FOR PRUDENCE AND FEASIBILITY

At the Prehearing Conference on January 27, 1981, the following alternatives to PG&E's proposal were designated as those for which PG&E would have the burden of proof:

1. Geysers to Vaca-Dixon, 230 kV DCTL, found conditionally acceptable in the Notice of Intention proceeding (NOI);
2. Geysers to Tulucay (West) 230 kV DCTL, found acceptable in the NOI;

3. Geysers to Tulucay (East) 230 kV DCTL, found conditionally acceptable in the NOI;
4. Geysers to Vaca-Dixon, 500 kV transmission line;
5. Fulton L, NOI alternative 3c;
6. Permanent or temporary modifications to existing transmission facilities;
7. Undergrounding through Oakmont.

Each of the foregoing alternatives would have eliminated, prima facie, one or more of the non-conformities of PG&E's proposed transmission line found to exist by the Committee.

Following the designation of the foregoing alternatives, Intervenor Lapham sought to have the "Chalk Mountain" Alternative designated and added to PG&E's burden of proof.

The Committee determined that since the Chalk Mountain Alternative did not appear, prima facie, to eliminate nor lessen the non-conformity to the Sonoma County Franz Valley Specific Plan, Intervenor Lapham, not PG&E, would bear the burden of proof on the issue of whether the Chalk Mountain Alternative was more prudent and feasible than the PG&E proposal.

Following extensive public hearings, and the Committee's observation of portions of the PG&E proposed transmission line and the Chalk Mountain Alternative, the Commission compared all alternatives using the twelve criteria set forth in its Order as affirmed on February 25, 1981.

(Reader's Note)

The following sections of PART THREE evaluate PG&E's proposed transmission line in comparison to the following alternatives:

Chalk Mountain
Undergrounding Oakmont
Reconstruction Alternatives
Alternative Undergrounding Technology
The Tulucay and Vaca-Dixon Alternatives
The Fulton-L Sonoma County Alternatives
The 500 kV Vaca-Dixon Alternative

PG&E's proposed transmission line and each of the foregoing alternatives are evaluated based upon these twelve criteria, with a final "on balance" evaluation of whether the particular alternative is more prudent and feasible than PG&E's proposal:

1. National, State, or Local Law or Declared Policy
2. Economic Impacts
3. Environmental Impacts
4. Social and Community Impacts
5. Public Health and Safety
6. Reliability
7. Ability to be Integrated with Existing System
8. Indirect or Consequential Impacts
9. Time
10. Acceptable Engineering Practice
11. Suitable Site
12. Commercially Available Technology

Following the comparison, a matrix is provided to show how each alternative was evaluated using each criterion. PG&E's proposal is the base against which the alternatives are determined to be better (+), equal (=), or worse (-) for each criterion. Each criterion does not necessarily have equal weight in the Commission's "on balance" determination of prudence and feasibility.

A. PG&E's Proposed Transmission Line

As stated in greater detail hereinabove (see Description of the Proposed Project) PG&E proposes to construct a 38 mile 230 kV transmission line which will parallel the existing Castle Rock Junction-Fulton-Ignacio 230 kV DCTL except for an 11 mile nonparallel section within Franz Valley and Alpine Valley. In the Valley of the Moon/Annadel State Park, the proposed transmission line will be consolidated on 4-circuit tubular or lattice transmission towers. By interconnecting with the PG&E transmission system

at Lakeville, subsequent system development is required from Lakeville to Sobrante which has been the subject of proceedings before the California Public Utilities Commission.

1. National, State, or Local Law or Declared Policy

PG&E's proposed transmission line does not conform with the Sonoma County General Plan, the Franz Valley Specific Plan, the North Sonoma Valley Specific Plan, the Bennett Valley Specific Plan, the Sonoma Mountain Specific Plan, and the General Plan of the City of Santa Rosa.

2. Economic Impacts

The construction and operating costs ($/1983) of the proposed transmission line are:

	Castle Rock Junction-Lakeville
Capital Cost of Transmission Facilities	70,840,000
Levelized Annual Revenue Requirement	12,920,000
Yearly Value of Excess Transmission Energy Losses	-0-
NET YEARLY COST (RT 12,100:13-22)	$ 12,920,000

If the PG&E proposed transmission line is operational by June 1984, there is the potential for generation curtailment and excess transmission energy losses as shown on Tables 1, 2, and 3.

The amount of generation curtailment is dependent upon the coincidence of normal summer conditions of ambient temperature 109.4° F and 70 percent loading. However, Staff estimates that with the use of dynamic thermal

loading, minimal or no generation curtailment would be needed for the period June 1983 through June 1984, the scheduled date of operation for the proposed transmission line. (RT 12,501)

3. Environmental Impacts

Within the 11 mile nonparallel portion of the PG&E proposal, the transmission line traverses an area up slope from Loch Haven Lake (aka Bass Lake). Due to slope conditions, disturbance of soil for construction of towers 55-57 could cause sedimentation in Loch Haven Lake, which has some value as a recreational fishery and wildlife watering area.

4. Social and Community Impacts

PG&E's proposed transmission line route has visual constraints that are most acute in Oakmont and at the Porter Creek Road area. In Oakmont, 4 circuit transmission towers, larger than the existing double circuit transmission towers, will cross the Valley of the Moon and the Oakmont and Wild Oak communities.

In the Porter Creek Road area, the proposed transmission line from tower 54 to tower 61 will be visible to various permanent residents. The proposed transmission line passes particularly close to, but not within the property boundaries of, several ridgetop residents who could have direct views of transmission towers or conductors from their properties. The placement of the proposed transmission line on certain subdividable parcels in the Porter Creek Road area may inhibit some aspects of anticipated development of those parcels.

5. Public Health and Safety

Since the Commission has found that exposure to the electromagnetic field caused by the proposed transmission line does not pose an identifiable adverse human health risk, none of the residents outside the transmission line right-of-way will be exposed to identifiable adverse human health effects. Furthermore, there is no significant risk from induced shock to children using the school bus stop at the intersection of Porter Creek Road and Franz Valley Road. Lastly, there is no significant noise impact expected from transmission line corona upon residents near the Porter Creek Road area.

There is no significant risk of fire from the operation of the transmission line.

6. Reliability

The probability of the loss of one or more circuits carrying Geysers generation is least on the nonparallel portions of the existing and proposed transmission line, somewhat greater on the parallel portion of the proposed and existing transmission line, and greatest on the consolidated four circuit transmission line.

The 230 kV double circuit transmission tower has a good record of reliability. The proposed tubular and lattice 4-circuit towers have adequate design criteria. However, according to the testimony of the Office of the State Architect, a determination of whether the tubular towers will stand requires detailed design drawings not in the record. (RT 8656:10-20)

7. Ability to be Integrated With Existing System

Lakeville is one of three acceptable points of termination for a second

Geysers transmission outlet. The others are Tulucay and Vaca-Dixon. Subsequent system development from Lakeville to Sobrante is required to integrate with the Bay Area transmission system.

8. Indirect or Consequential Impacts

Subsequent system development from Lakeville to Sobrante is an indirect impact.

9. Time

PG&E's proposed transmission line can be constructed by June 1984 to meet forecasted electricity demands. If PG&E's proposed transmission line can be operational in June 1984, there may be minimal or no generation curtailment.

10. Acceptable Engineering Practice

PG&E's proposed transmission line can be constructed and operated in conformity with the California Public Utilities Commission General Order No. 95 and accepted engineering practices.

11. Suitable Site

From the geologic point of view, there are no unacceptable tower sites which cannot be avoided.

12. Commercially Available Technology

The transmission towers, conductors and related equipment are commercially available.

B. Chalk Mountain Alternative

Intervenor Lapham proposed an alternative to PG&E's proposed transmission line which came to be known generally as the Chalk Mountain Alternative.

The Chalk Mountain Alternative realigns PG&E's proposal between towers 51 to 70 by taking a more easterly route as shown on Figure K-1 and K-2, which reproduces Exhibit M.

The Chalk Mountain Alternative has two more towers and is approximately 1,600 feet longer than the PG&E proposal. (RT 14,280-81)

1. National, State, or Local Law or Declared Policy

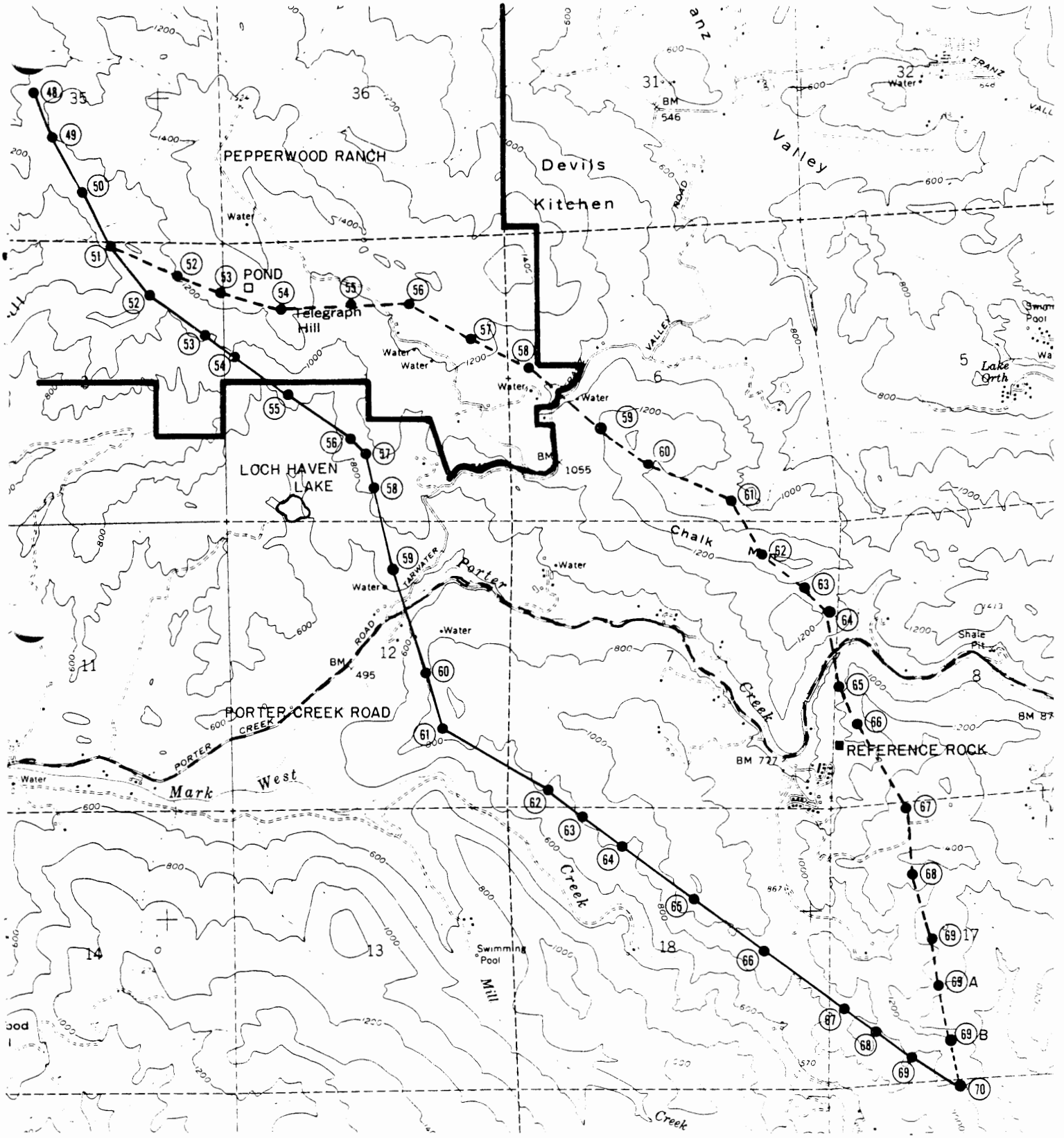
According to Resolution No. 69955 of the Sonoma County Board of Supervisors (Exhibit AA), the Chalk Mountain Alternative is not consistent with either the Franz Valley Specific Plan or with the County General Plan, but is preferable on the basis that it reduces the inconsistencies of the PG&E proposed transmission line to the Franz Valley Specific Plan.

Finding

162. The Chalk Mountain Alternative does not conform to the Sonoma County General Plan or the Franz Valley Specific Plan.

2. Economic Impacts

Estimated on a basis of cost per mile, the Chalk Mountain Alternative construction cost is $242,000 greater than the PG&E proposal. The excess transmission energy losses are increased by the Chalk Mountain Alternative from $933,000 (at 2,000 MW Geysers generation) to $2,574,000 (2,668 MW) for the life of the facility. (RT 14,280:14-17)



LEGEND

PG&E PROPOSED TRANSMISSION LINE

CHALK MOUNTAIN ALTERNATIVE

FIGURE K-1

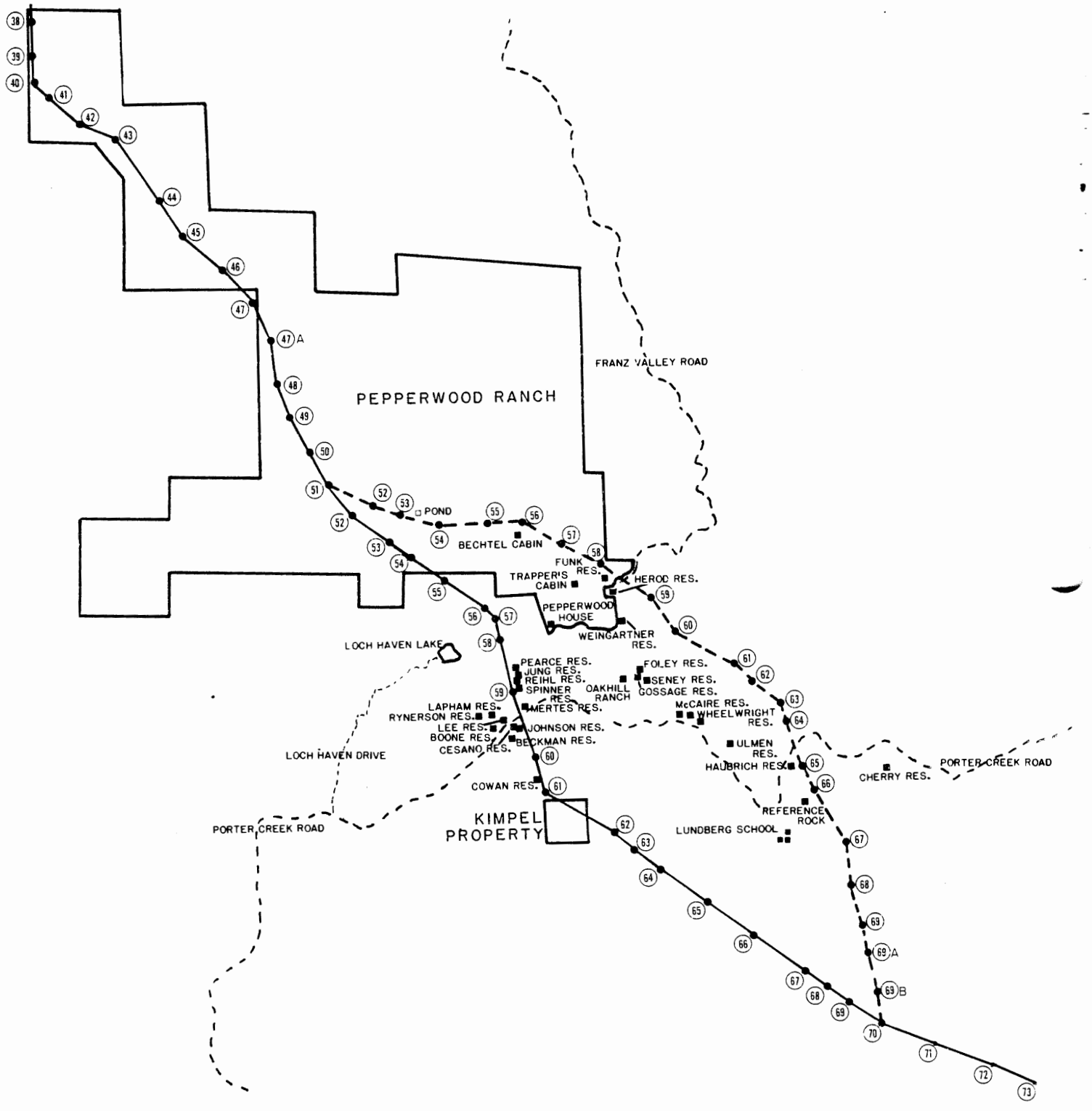

PEPPERWOOD RANCH
FRANZ VALLEY ROAD
POND
BECHTEL CABIN
FUNK RES.
TRAPPER'S CABIN
HEROD RES.
PEPPERWOOD HOUSE
WEINGARTNER RES.
LOCH HAVEN LAKE
PEARCE RES.
JUNG RES.
REIHL RES.
SPINNER RES.
OAKHILL RANCH
FOLEY RES.
SENEY RES.
GOSSAGE RES.
McCAIRE RES.
WHEELWRIGHT RES.
LAPHAM RES.
RYNERSON RES.
LEE RES.
BOONE RES.
CESANO RES.
AMERTES RES.
JOHNSON RES.
BECKMAN RES.
ULMEN RES.
HAUBRICH RES.
CHERRY RES.
PORTER CREEK ROAD
LOCH HAVEN DRIVE
COWAN RES.
KIMPEL PROPERTY
REFERENCE ROCK
LUNDBERG SCHOOL
PORTER CREEK ROAD
LEGEND
PG&E PROPOSED TRANSMISSION LINE
CHALK MOUNTAIN ALTERNATIVE
TRANSMISSION TOWER LOCATION

FIGURE K-2

Findings

163. The approximate increase in capital cost of the Chalk Mountain Alternative is $242,000, which is not a sigificant difference given the total cost of the transmission line.

164. The increase in excess transmission energy losses from the added length of the Chalk Mountain Alternative will cost between $933,000 and $1,574,000 more than PG&E's proposal for the life of the facility, which is not a significant difference given the total excess transmission losses of the transmission line.

3. Environmental Impacts

Biology

There are wildlife, vegetation and aquatic resources in the vicinity of both PG&E's proposed transmission line and the Chalk Mountain Alternative.

PG&E Proposed Route

Between towers 51 to 70, the area potentially most affected by PG&E's proposed route is Loch Haven Lake (aka Bass Lake) near towers 55, 56, and 57. Loch Haven Lake is a man-made water impoundment area, approximately 15 years old, for the private use of the Loch Haven community residents. (RT 15,101:7; 15,117: 22-24) PG&E's access road construction activities, transmission tower footings excavation, and clearing of brush have the potential to cause soil erosion and the consequent sedimentation of Loch Haven Lake. Such sedimentation could adversely affect the aquatic biology in the Lake and the wildlife which use the Lake. (RT 15,091)

The access roads pass close to the Lake, crossing the dam face and turning upslope steeply north of the Lake in the general direction of Telegraph Hill. The access roads cross back and forth over intermittent streams which tie to the main stream feeding Loch Haven. (RT 15,119:10-23) The primary source of water for Loch Haven Lake is a spring near tower 55. (RT 15,122:9-19)

If the access roads are not used by PG&E for tower construction near Loch Haven, a substantial amount of the concern regarding sedimentation would be alleviated. (RT 15,113:19-23)

Therefore, PG&E represented to the Commission that towers 55, 56, 57, and 58 on PG&E's proposed transmission line route would be constructed by helicopter and that the access roads along Loch Haven Lake would not be used for the construction of those towers. (RT 15,571:12-17)

However, Lapham represented that construction by either helicopter or vehicles using the access road will have a significant impact on Loch Haven Lake and, if the Commission certifies the PG&E proposed transmission line, the property owner and users of the roads prefer that the road be improved instead of helicopter construction. (RT 16,585:22-16,586:14)

Chalk Mountain Alternative

Both the PG&E proposed transmission line and the Chalk Mountain Alternative traverse the Pepperwood Ranch, owned by the California Academy of Sciences. The Pepperwood Ranch has been self-proclaimed by the Academy as a natural preserve. (RT 14,596:18-20)

The Pepperwood Ranch was conveyed to the Academy with the express conditions in the deed that the property be utilized to preserve the property in its present state and to conduct research and educational activities in the natural and environmental sciences. (RT 14,574-5)

The Academy is a nonprofit organization, and Pepperwood Ranch is not a publicly-owned park or preserve. (RT 14,601:5-17)

Pepperwood Ranch comprises approximately 3,100 acres of grassland, oak woodland, Douglas fir forest, serpentine chaparral, riparian woodland and pockets of redwood forest (RT 14,575) and is used for teaching, research and preservation. (RT 14,600:7-13) The teaching involves tours and short term summer camps. (RT 14,575-6) The Ranch is open to the public. (RT 14,600:14-15)

There are five residential structures on the Pepperwood Ranch:

1. the Garrison Place, located in the southwest corner of the Ranch, occupied permanently;
2. the Funk house, located on Franz Valley Road, occupied permanently by an Academy employee;
3. the Pepperwood house, located on Franz Valley Road, presently occupied by tenant;
4. the Trapper's Cabin, located at the southern end of the Ranch, used as interpretative center;
5. the Bechtel house, located near the southern end of the Ranch, intermittently occupied.
(RT 14,575)

A former barn is being converted into a taxidermy studio for preparation of exhibits for the Academy museum. (RT 14,575)

All of the foregoing buildings are located on the periphery of the nature preserve at the south end of Pepperwood Ranch which is an area traversed by the Chalk Mountain Alternative. (RT 14,705:13-14; 14,714:17-21)

A herd of 250 to 275 cattle are allowed to graze on the Ranch to decrease the danger of wildfire. The Academy derives some income from permitting such grazing. (RT 14,603:7-10; 14,606:10-17)

The PG&E proposed transmission line will traverse approximately three miles of the Pepperwood Ranch. (RT 14,610:5-6) According to the Academy, the Chalk Mountain Alternative, which diverges from the PG&E proposed transmission line at tower 51 on Pepperwood Ranch would destroy the naturalness of the area. (RT 14,597)

As shown in Figures K-1 and K-2, the Chalk Mountain Alternative is longer than the PG&E proposal and will pass near three occupied residential structures on Pepperwood Ranch.

The Chalk Mountain Alternative would also pass very close to Telegraph Hill which, as one of the highest points in the terrain, has an expansive view of the area. (RT 14,620:9-12)

Lastly, the Chalk Mountain Alternative tower 57 will come close (10-30 yards) to a permanent spring which feeds two intermittent creeks. (RT 14,719) The spring and creek support aquatic fauna and biology. (RT 14,677; 14,719-20) While some of the herpetological fauna at this spring are found in other parts of the ranch, this spring is the closest (100 yards) and most accessible to the Ranch dwellings and interpretive center. (RT 14,677; 14,684:13-16) Cattle and wildlife use the spring for watering, and their activities cause some siltation without apparent effect on the wildlife downstream. (RT 14,696:13-14,698:2)

The Chalk Mountain Alternative tower 53 will pass near a pond west of Telegraph Hill.

Although the Academy has never consented to the PG&E proposal (RT 14,609: 12-14), the Academy has determined that the least violence to its environment will be done by the PG&E proposal since it is kept at a low level through the terrain of the Ranch and is less visible from the primarily used portion of the Ranch. (RT 14,610:7-11)

With the exception of the impact to the spring which could be mitigated by relocation of tower 57, the thrust of the Academy's objection to the Chalk Mountain Alternative is the visual and aesthetic intrusion into the present

setting near the southern portion of the Ranch. (RT 14,644:5-10) Although the Chalk Mountain Alternative may affect the aesthetic sense of educational visitors to the Ranch, the educational activities themselves would not be precluded. (RT 14,928:15-17; 14,938:15; 14,951:6-15)

Discussion

The Commission staff presented testimony comparing the PG&E proposed transmission route and the Chalk Mountain Alternative route from tower 51 to tower 70.

Staff confirmed that construction, via access roads, of towers 54-57 around Loch Haven Lake could cause significant sedimentation in the Lake if proper erosion control measures are not undertaken. (RT 15,160:11-23)

It is unlikely that migratory water fowl using Loch Haven Lake will collide with the transmission lines (conductors) given the distance (1,100 feet) from the Lake. (RT 15,160:15-15,161:2) Other birds are not likely to collide with the transmission lines because of the 8 1/2 foot separation of conductors. (RT 15,161:7-9) Therefore, there are not significant adverse impacts to wildlife on the PG&E route. (RT 15,161:24-26)

The Chalk Mountain Alternative avoids Loch Haven Lake but passes near natural ponds and water impoundments. (RT 15,162:5-7) There is also no significant risk to birds of collision with transmission lines on the Chalk Mountain Alternative. (RT 15,162:7-11)

The adverse impacts along the entire Chalk Mountain Alternative do not appear to be significant, however, even the nonsignificant adverse impacts

would reduce the value of Pepperwood Ranch as a wildlife refuge, botanical preserve, and scientific and educational biological resource study area. (RT 15,163:2-9)

In the opinion of the Commission staff biologist, crossing the Pepperwood Ranch by either the PG&E proposed transmission line route or the Chalk Mountain Alternative is inappropriate to the uses of the Ranch. (RT 15,182:22-25; 15,184:5-7)

Cultural Resources

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

Staff testified that the only identified cultural resource site in the area, CA-Son-1151 H near tower 51, would be impacted by both the PG&E proposal and the Chalk Mountain Alternative.

Otherwise, no survey has been conducted on the Chalk Mountain Alternative which would permit a comparable anlaysis. (RT 15,224:25-15,225:5)

Public Resources Code section 25527

Public Resources Code section 25527 provides:

> The following areas of the state shall not be approved as a site for a facility, unless the commission finds that such use is not inconsistent with the primary uses of such lands and that there will be no substantially adverse environmental effects and the approval of any public agency having ownership or control of such lands is obtained:
>
> (a) State, regional, county and city parks; wilderness, scenic or natural reserves; areas for wildlife protection, recreation, historic preservation; or natural preservation areas in existence on the effective date of this division.
>
> (b) Estuaries in an essentially natural and undeveloped state.

> In considering applications for certification, the commission shall give the greatest consideration to the need for protecting areas of critical environmental concern, including, but not limited to, unique and irreplaceable scientific, scenic, and educational wildlife habitats; unique historical, archaeological, and cultural sites; lands of hazardous concern; and areas under consideration by the state or the United States for wilderness, or wildlife and game reserves.

No area along either the PG&E proposed transmission line route or the Chalk Mountain Alternative is a public park or in the ownership or control of any public agency.

Therefore, neither PG&E's proposed transmission line route nor Chalk Mountain Alternative are within areas prohibited from siting pursuant to the first paragraph of Public Resources Code section 25527.

Both PG&E and the California Academy of Sciences contended that the Pepperwood Ranch is an area of critical environmental concern as described in the second paragraph of Public Resources Code section 25527.

The evidentiary record deals primarily with an environmental comparison from the point at which PG&E's proposal and the Chalk Mountain Alternative diverge at tower 51.

The Pepperwood Ranch is a self-proclaimed natural preserve used for teaching, research and preservation of the natural environment. (RT 14,596: 18-20) There are specific sites of biological and geological significance. (RT 14,677) By virtue of the elevation of the Ranch, there are expansive scenic views from ridges and hilltops.

There are several occupied, permanent structures on the Ranch. (RT 14,575) The Ranch is also used for grazing cattle from which the Academy derives income. (RT 14,603:7-10; 14,606:10-17)

A part of the southern portion of the Pepperwood Ranch has been designated a "Unique Feature" on the Franz Valley Specific Plan, Critical Open Space map (Exhibit Z) by virtue of the presence of serpentine soils. No part of the southern portion of the Pepperwood Ranch, traversed by either the PG&E proposed transmission line or the Chalk Mountain Alternative, is designated a "Sensitive Area" or "Critical Habitat Zone". (See Figure P)

Taken as a whole, the southern area of the Pepperwood Ranch is not an area of critical environmental concern pursuant to Public Resources Code section 25527 since the specific sites of environmental interest have already been compromised by multiple uses such as permanent and temporary residences, cattle grazing and educational touring.

Lapham argues that Loch Haven Lake is an area of critical environmental concern. Loch Haven Lake is a man-made water impoundment area with an earthen dam which has been in existence for about 15 years. The Lake is used for recreational fishing and wildlife habitat and watering. There is no evidence of significant educational or scientific value of Loch Haven Lake. The Lake does have a scenic value to its users.

Although not the only location of permanent water, the Lake is one of the larger bodies of water in the area. (Exhibit M)

However, the existence of other water settings within the general area and the man-made character of the Lake prevents any characterization of the Lake as unique and irreplaceable. Loch Haven Lake cannot be considered an area of critical environmental concern within the meaning of Public Resources Code section 25527.

Findings

165. Loch Haven Lake may be adversely impacted by soil erosion from the construction of towers 55-58 of PG&E's proposed transmission line.

166. The Chalk Mountain Alternative, unless relocated, may adversely impact a permanent spring on Pepperwood Ranch.

167. Pepperwood Ranch is not an area of critical enviornmental concern as that term is used in Public Resources Code section 25527.

168. Loch Haven Lake is not an area of critical enviornmental concern as that term is used in Public Resources Code section 25527.

169. The environmental impacts of the PG&E proposed transmission line and the Chalk Mountain Alternative are not significant and are comparable between tower 51 and tower 70.

4. Social and Community Impacts

Visual

The following discussion is based upon the testimony in the record and the site observations of the Commission Committee conducted and reported on August 20, 1981.

For purposes of comparison of visual effects, the principal impacts occur between towers 54 to 61 on the PG&E proposed route and towers 53 and 54 to 67 on the Chalk Mountain Alternative.

PG&E Proposed Transmission Line

As shown graphically on Figure L, the closest views of the PG&E proposed transmission line route occur from a ridgetop between tower 58 and 59. Four residences located on the ridgetop are less than 500 feet from the transmission line. (RT 14,838) Due to conductor sag and the lower elevation of tower 59, one of the homes (Spinner) would not have views of tower 59 or the conductors to tower 59 from tower 58. (RT 14,838, Site Observation, RT 19:14-21:7) Spinner would view towers 60 and 61 and possibly tower 57, and 58. (Site Observation, RT 17:11-15) There would be a distant view from the Spinner property of Chalk Mountain Alternative towers 56, 66, and 67. (Site Observation, RT 23:20-25:8) Several of the other homes, Jung, Reihl, and Pearce, would have views of the conductors between towers 58 and 59 and the top of tower 58 on the PG&E proposed transmission line route. (RT 13,355:13-19; 14,838) The Pearce residence would have a prominent line of sight view of approximately 300 feet from the deck of the dwelling of tower 58, the conductor from towers 58-59 and a

partial view of towers 59, 60 and 61. (RT 15,355:3-8; Site Observation, RT 28:9-30:18) All of these views, except for tower 61, are backdropped by vegetation. (RT 14,838)

There are no opportunities for adjustment of sites for towers 55-59 to lessen the visual impacts. (RT 15,356:12-15,357:8) None of these ridgetop properties are within the right-of-way of PG&E's proposed transmission line. (Exhibit T; see Figure K-3)

The next closest resident with a view of the PG&E proposed transmission line is Johnson, who will have a skyward view of the conductors between towers 59 and 60, obscured somewhat by vegetation. (RT 14,838-9)

The Lapham, Lee, Boone, Jones, and Rynerson residences have intermediate, partially obscured views of towers 56, 57 and 58 and distant views of tower 61. (RT 14,838; 15,357:9; 15,358:3; 15,851:2-10)

There would be an intermediate, partially obscured view of tower 61* on the skyline from the Cowan residence. (Site Observation, RT 32:18-21)

Residents at the upper end of Loch Haven Drive would have a distant view of tower 56 backdropped by vegetation and hillside. (RT 14,838)

Motorists traveling northeasterly on Porter Creek Road at 40 mph would view tower 61 for nearly a minute. (RT 15,344:7-10) Motorists traveling

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* Tower 61 will be on a ridge and partially screened by vegetation. (RT 15,339:4-7) Staff recommends moving tower 61 to a lower elevation on the ridge (800 ft. elevation) so that it would be backdropped against the hillside rather than the skyline. (RT 15,339:4-12) Relocation of tower 61 would cause the conductors and towers to be located nearer to the Cowan residence and would more severely interfere with the development potential of the Kimpel property. For those reasons, the Commission does not recommend the relocation of tower 61.

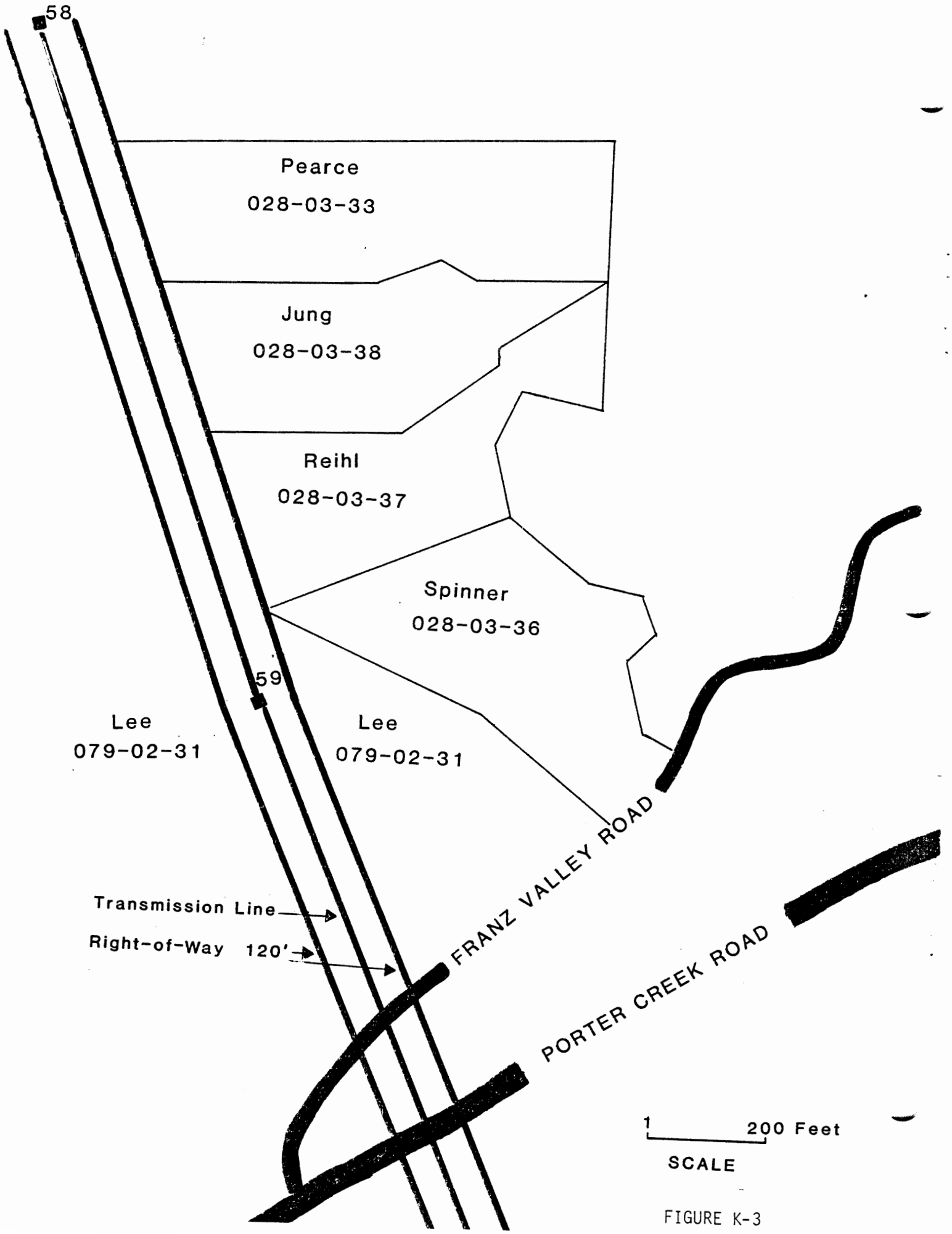

58
Pearce
028-03-33
Jung
028-03-38
Reihl
028-03-37
Spinner
028-03-36
59
Lee
079-02-31
Lee
079-02-31
FRANZ VALLEY ROAD
PORTER CREEK ROAD
Transmission Line
Right-of-Way 120'
1
200 Feet
SCALE

FIGURE K-3

either direction on Porter Creek Road at 40 mph would view the conductors between towers 59 and 60 for 15 seconds. (RT 14,838) Porter Creek Road between towers 59 and 60 is a designated scenic corridor. (Exhibit E)

Chalk Mountain Alternative

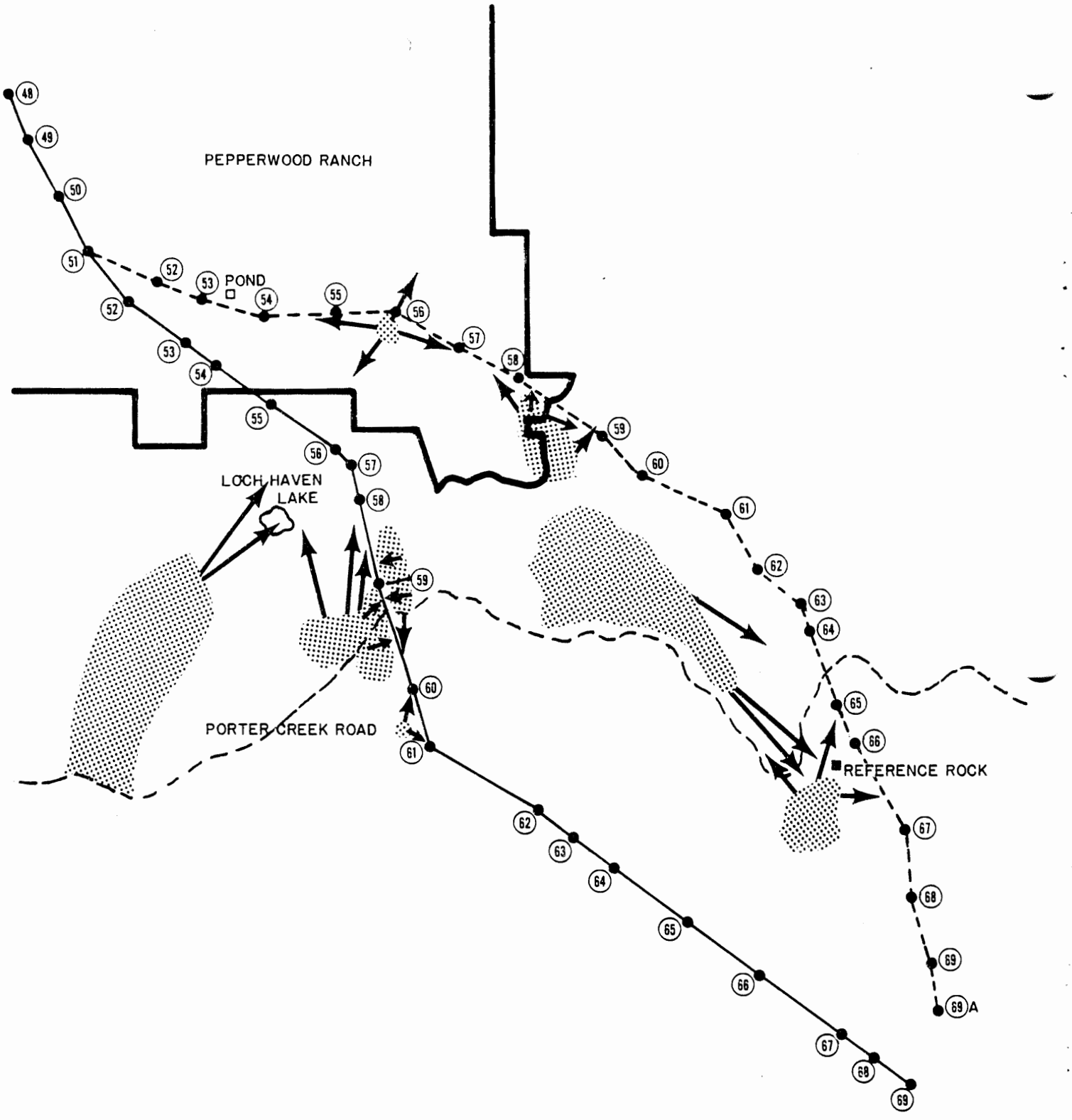
Although Exhibit M shows particular tower locations, the Chalk Mountain Alternative was not intended, according to its proponent, Lapham, to show specific tower locations, but rather a corridor or possible path of the transmission line. (RT 14,346:14-19)

The Chalk Mountain Alternative is graphically depicted on Figure L. Diverging from the PG&E proposed transmission line route at tower 51, the Chalk Mountain Alternative proceeds easterly in the Pepperwood Ranch. (RT 14,835-6) In general, the intensive educational and research study areas of the Pepperwood Ranch are between towers 53 and 58.

From the Bechtel house there is a panoramic view of 240 degrees. The primary view would be tower 55 within 500 feet with Telegraph Hill acting as a backdrop. (RT 15,275:8-12) The tops of towers 53 and 54 would also be visible. The conductors from towers 54 to 56 would be visible. (RT 15,275:14-16; Exhibit W-1, W-2, W-5; Site Observation)

Tower 56 would be visible from the rear deck of the Bechtel house. (RT 15,275:2-7) Acording to Exhibit M, tower 56 is approximately 500 feet from the Bechtel house. (Exhibit M)

Parts of towers 56 to 59 and their associated conductors would be partially visible. (Exhibit W-5)



LEGEND

- PG&E PROPOSED TRANSMISSION LINE
- CHALK MOUNTAIN ALTERNATIVE
- RESIDENCES
- VIEWS

VISUAL IMPACT MAP FIGURE 1

Tower 55 of the PG&E proposed transmission line route would be visible from the Bechtel house. (Site Observation, RT 8:25-9:16) The Bechtel house is intermittently occupied with plans to be permanently occupied by the end of 1981. (RT 14,613:9-13)

The residence on the Pepperwood Ranch with the closest view of the Chalk Mountain Alternative is the Funk house. Tower 58 would be in view 300-500 feet from the Funk house. (RT 15,276:10-21) The conductors from towers 58 to 59 would be 250-300 feet from the Funk house. (Exhibit M). The Funk house would have an intermediate view of towers 59 and 60 and the conductors from towers 58 to 60. (RT 15,275:18-22) Including towers 56 and 57, five towers would be visible from the Funk house. (RT 15,332:4-5) The Funk house is permanently occupied.

The trapper's cabin on the Pepperwood Ranch would have unobstructed views of towers 54, 59, and 60; a view of tower 57 against the skyline; and a partially screened view of tower 56. (RT 15,274:19-24) The trapper's cabin is not permanently occupied and is used as an interpretative center. (RT 15,673:10-14)

The Chalk Mountain Alternative would cross the main Pepperwood Ranch access road four times and would be highly visible to visitors to the Ranch. (RT 14,870)

The Herod house on Franz Valley Road would have direct views of towers 56 to 60 at a closest distance of 625 feet using the scale on Exhibit M. (RT 15,809:6-11; 15,811:5-7)

The Weingartner residence would have an intermediate view of tower 59 and conductors to and from tower 59. (Exhibit W-5; Site Observation, RT 13:3-9) According to Exhibit M, the Weingartner house is 1,000 feet from tower 59. (Exhibit M) The Oakhill Camp would not have a direct view of the Chalk Mountain Alternative. (RT 14,836; 15,711:16-21)

The Lundeberg School of Seamanship (aka Cook's and Steward's School or Seafarer's International Union) would have direct, and intermediate views of towers 64 to 67. (RT 14,837; Site Observation, RT 37:18-39:22) According to Exhibit M, towers 65 and 67 are 1,500 feet from residential structures and tower 66 is approximately 1,000 feet from residential structures. (Exhibit M)

The residents on the southwest slope of Chalk Mountain would have distant views (approximate 3/4 to 1 mile) of towers 65, 66 and 67 and their conductors backdropped by a ridge. (RT 14,837)

The Chalk Mountain Alternative would not be visible to motorists where it crosses Porter Creek Road between towers 64 and 65. (RT 14,836) Towers 66 and 67 would be visible to motorists traveling southeasterly at 40 mph on Porter Creek Road for approximately 25 seconds. (RT 14,837)

Porter Creek Road between towers 64 and 65 and Franz Valley Road between towers 58 and 59 are designated scenic corridors. (Exhibit E) The Critical Open Space map, Franz Valley Specific Plan, Exhibit Z, shows a Vista Point on Franz Valley Road near towers 58 and 59 and with a primary viewing orientation parallel to a portion of the Chalk Mountain Alternative with towers 66 and 67, at a minimum, visible at a distance of approximately 2 miles. (See Figure P)

The following table represents the comparison of proximity of residential structures to various towers on the PG&E proposed transmission line route and the Chalk Mountain Alternative:

Residences having a very close (500 feet or less) view of a transmission tower or conductors:

PG&E	Chalk Mountain Alternative
Pearce	Bechtel
Jung (partial tower and partial conductors)	Funk
Reihl (partial tower and partial conductors)	
Lee (partial tower and partial conductors)	
Spinner (conductors only)	
Johnson (conductors only)	
Mertes (conductors only)	

Residences having an intermediate (more than 500 foot) view of a transmission tower or conductors:

Spinner	Weingartner
Cowan	Bechtel
Lee	Funk
Johnson (tower)	Herod
	Lundeberg School

Residences having a distant direct view of transmission tower or conductors:

Lapham	Bechtel
Lee	Funk
Boone	Herod
Rynerson	Residents south of Chalk Mountain
Spinner	
Loch Haven Residents	

Along the entire Chalk Mountain Alternative, there are twice as many towers silhouetted on the skyline as the PG&E proposed transmission line route. (RT 15,312:19-15,313:11; 15,314:18-15,315:2)

As a general rule, it is preferable to locate transmission towers to be backdropped by a ridge rather than to be silhouetted on the skyline. (RT 15,312:13-18)

The Staff made a comparative visual analysis of the PG&E proposed transmission line route and the Chalk Mountain Alternative.

Based upon the asserted existence of greater opportunities to relocate transmission towers along the Chalk Mountain Alternative to reduce visual impacts, the Staff stated that the Chalk Mountain route was preferable. (RT 14,835)

Nonetheless, both routes would cause significant adverse visual impacts. (RT 14,835)

The criteria used by Staff to evaluate visual impacts were duration of use, distance of use, and number of dwellings with primary orientations (picture windows) in proximity to the transmission line. (RT 15,287) Permanent residents were given greater priority than motorists.

However, the Staff conceded that adjustments to tower locations on the Chalk Mountain Alternative may or may not be able to be made based upon engineering considerations. (RT 15,293:17-20; 15,306:9-15)

Relocation of towers on Chalk Mountain Alternative could worsen the visual impacts, according to Staff. (RT 15,306:3-7)

Visual impacts were included in Sonoma County's testimony comparing PG&E's proposed transmission line and the Chalk Mountain Alternative. (RT 15,989: 22-25) According to the County, the Chalk Mountain Alternative could result in lesser visual impacts than PG&E's proposed transmission line by avoiding projected residential development and reduced visual effect resulting from greater flexibility in tower siting along the Porter Creek Road scenic corridor. (RT 15,904)

The Sonoma County witness did not know the number of existing houses, number of residents, or projected populations for either the PG&E

transmission line route or the Chalk Mountain Alternative. (RT 15,970:11-15,971:2) Nor did the County's analysis include specific tower locations in the Chalk Mountain Alternative tower sites shown on Exhibit M, but relied on photographs and aerial maps. (RT 15,977:16-24)

Rather, for visual impacts the County considered permissible population densities on the PG&E proposed transmission line and the Chalk Mountain Alternative. (RT 15,971:2) The Chalk Mountain Alternative was considered using corridor dimensions. (RT 15,971:13-17)

The factors used for the County's evaluation and preference for the Chalk Mountain Alternative were motorists' views, orientation of existing residences shown on Exhibit M, and capability of topography of the Chalk Mountain Alternative to provide visual mitigation. (RT 16,005)

As with the Commission staff, the potential for lessening of visual effects by tower relocation on the Chalk Mountain Alternative underpinned the County's visual analysis and preference for the Chalk Mountain Alternative. (RT 15,903; 16,007:1-10)

However, the County also testified that there were potential adverse land use, visual, and environmental effects from the Chalk Mountain Alternative. (RT 15,993:12-23)

Depending on whether those potential adverse land use, visual, and environmental effects on the Chalk Mountain Alternative were realized, the Chalk Mountain Alternative may or may not be preferable to the PG&E proposed transmission line. (RT 15,993:24-15,994:6; 16,021:15-20)

The potential for these adverse land use, visual, and environmental effects on the Chalk Mountain Alternative was not addressed in the County's testimony. (RT 15,993:20-23)

The County's asserted preference for the Chalk Mountain Alternative, based upon the flexibility of the Chalk Mountain Alternative to take advantage of the potential for tower relocation, assumed that the potential for relocation, in fact, exists. (RT 16,008:9-13) The County did no specific siting studies to determine whether the potential could be realized. (RT 16,008: 14-17) Even though the number of towers silhouetted against the sky would affect the County's view of the preferability of the Chalk Mountain Alternative over PG&E's proposed transmission line, the County was not familiar with the number of towers on either route which might be silhouetted against the sky. (RT 16,008:18-16,009:23; 16,011:17-24)

The cornerstone supporting both the Staff's and the County's preference for the Chalk Mountain Alternative is the assertion that since they considered the Chalk Mountain Alternative as a corridor there is therefore greater potential to relocate towers to avoid identifiable adverse visual impacts. Neither the Staff nor County specifically address geological, engineering or environmental constraints for such relocation.

In fact, both the Staff and County acknowledge that their preference for the Chalk Mountain Alternative is based upon the assumption that such tower relocation potential can be realized. However, if the relocation potential is not able to be realized, the Chalk Mountain Alternative may be no better, or actually worse than PG&E's proposed route.

The Commission views the asserted advantage of the tower relocation potential on the Chalk Mountain Alternative to be a very significant weakness. The acknowledged absence of evidence as to whether the tower relocation potential can be realized makes that asserted potential only speculative. Such speculation is not the type of substantial evidence required to support findings.

The Chalk Mountain Alternative on Exhibit M, prepared by its proponent, is an alignment with specific tower locations. Furthermore, the Chalk Mountain Alternative has undergone revision by its proponent before being placed on Exhibit M. The Commission draws the inference from such revision that the revised Chalk Mountain Alternative represents its proponent's best effort to devise a transmission line route that is more prudent and feasible "on balance" than the route proposed by PG&E taking into account all the criteria established by the COMMITTEE STATEMENT OF ADOPTED STANDARDS FOR A DETERMINATION PURSUANT TO PUBLIC RESOURCES CODE SECTION 25525, filed January 24, 1981.

Since there has been evidence directed to the specific tower locations shown on Exhibit M, the impacts of such tower locations and minor tower relocation to mitigate alleged impacts, the Commission has focused on this body of substantial evidence for making its findings.

To the extent Staff relied upon the number of impacted residents, the Commission discounts Staff's preference for the Chalk Mountain Alternative since the comparative sensitivity analysis (RT 14,840-1) did not show that it took into account the impacts to the known current residences, such as Herod and Funk residences, and to a lesser extent the Bechtel house and Weingartner residences.

For the highly impacted, close viewing locations, those residences (Funk, Bechtel, and to a lesser extent Herod) are closer to the Chalk Mountain Alternative or view more towers than on the PG&E proposed transmission line route which principally affects the Pearce residence and, to a lesser extent, the Spinner, Jung and Reihl residences.

For the less impacted, longer viewing distance locations, those residents on the PG&E alternative have a greater number of partially obstructed towers and towers backdropped by ridges than do residents along the Chalk Mountain Alternative.

Lastly, it appears that the distant viewers of the Chalk Mountain Alternative and PG&E's proposed transmission line route will be subject to comparable impacts.

When comparing the two routes, the Commission finds that the Chalk Mountain Alternative does not reduce the visual impacts; rather, although it is a close question, the PG&E proposed transmission line and the Chalk Mountain Alternative have comparable visual impacts.

The Commission heard testimony concerning the undergrounding of the transmission line in the West Porter Creek-Loch Haven area. (RT 11,964:15-23) Although it is possible from an engineering standpoint to underground in the general area, unstable soil conditions, the steep terrain, and creek crossing would be difficult to mitigate and could create reliability problems. (RT 11,9701:12-23) Undergrounding in the area would require the removal of a significant amount of dense vegetation. (RT 11,964:25-11,965:11) A transition station at or near tower 61 would create adverse visual impacts. (RT 11,965:16-22) On the basis of total footage only, the

West Porter Creek crossing would have a marginally lower capital cost for undergrounding than the Valley of the Moon-Oakmont crossing. (RT 11,969: 15-11,970:11)

Further, since tubular towers have been used to mitigate visual impacts (See RT 12,897:2-8), the Commission took testimony concerning the ability to substitute tubular towers for lattice towers in the Porter Creek-Loch Haven area as well as the Chalk Mountain Alternative. There are no apparent engineering or geologic constraints that would prevent the substitution of tubular towers for lattice towers on the PG&E proposed transmission route from towers 54 to 61, inclusive. Each tubular tower structure and footing is individually designed for the soil condition and load of that location. (RT 15,829:7-9) There are no apparent constraints, other than construction considerations to the use of tubular towers on the Chalk Mountain Alternative. (RT 15,818:13-15)

As stated previously, PG&E has offered to construct towers 55-58 on its proposed route by helicopter to mitigate the potential for erosion from the use of access roads. The use of helicopters is incompatable with the construction of tubular towers principally because of the greater component sizes and weights. (RT 15,818:16-17; 15,819:16-15,820:15) Construction of tubular towers generally would require an access road and a level pad from which to lift the tubular tower into position by crane. (RT 15,837:10-13)

Findings

170. The PG&E proposed transmission line route and Chalk Mountain Alternative will each cause adverse visual impacts.

171. The PG&E proposed transmission line route will have a very close, direct or partially obscurred adverse visual impact upon the following properties: Pearce, Jung, Reihl, and Spinner.

172. The Chalk Mountain Alternative will have a close, direct adverse visual impact upon the following properties: Bechtel, Funk, and Herod.

173. The intermediate and distant views of both the PG&E proposed transmission line route and the Chalk Mountain Alternative are comparable.

174. Both the PG&E proposed transmission line route and the Chalk Mountain Alternative cross Porter Creek Road, a designated scenic corridor. Since the Chalk Mountain Alternative also crosses Franz Valley Road, a designated scenic corridor, near an area designated a Vista Point it has a greater visual impact than the PG&E proposed transmission line route.

175. The Chalk Mountain Alternative has a greater number of towers silhouetted on the skyline--a disfavored method of locating transmission towers--than PG&E's proposed transmission line route.

176. The PG&E proposed transmission line route and Chalk Mountain Alternative are comparable on the basis of visual impacts.

177. The West Porter Creek area is not a suitable site for undergrounding the proposed transmission line because of the unstable soil conditions, steep terrain, and environmental and visual impacts.

178. There are no apparent engineering or geologic constraints which would prevent the substitution of tubular towers for lattice towers on the PG&E proposed transmission line route from towers 54 to 61, inclusive, on the Chalk Mountain Alternative.

Land Use

The land use designations and zoning requirements for the areas traversed by PG&E's proposed transmission line route and the Chalk Mountain Alternative (towers 51-70) are found in the Franz Valley Specific Plan. (Exhibit Z)

Neither the PG&E proposed transmission line route nor the Chalk Mountain Alternative conform to the policies of the Franz Valley Specific Plan regarding the paralleling of existing transmission facilities. (RT 15,903; 16,053:6-7)

Four maps from the Franz Valley Specific Plan have been duplicated herein showing the locations of the PG&E proposed transmission line and the Chalk Mountain Alternative. Figures M, N, O, and P, respectively.

The Land Use Plan, Figure M, reflects existing and recommended land uses, i.e., Rural Residential, Open Land/Residential, Agriculture, Institutional, and Resource Conservation.

The Zoning Plan, Figure N, shows the base zone, i.e., rural residential, secondary agriculture, primary agriculture, and exclusive agriculture. Additionally, there are combining districts. B5/100 permits a maximum of one dwelling unit on a minimum 100 acre site. B6/10/3 permits multiple dwelling units, i.e., 1 dwelling unit for each 10 acres with a minimum site of 3 acres. B6/100/20 permits 1 dwelling unit for each 100 acres with a minimum site of 20 acres. B6/20/5 permits 1 dwelling unit for each 20 acres with a minimum site of 5 acres.

The Planning Units map, Figure O, shows that the PG&E proposed transmission line route and the Chalk Mountain Alternative traverse areas designated

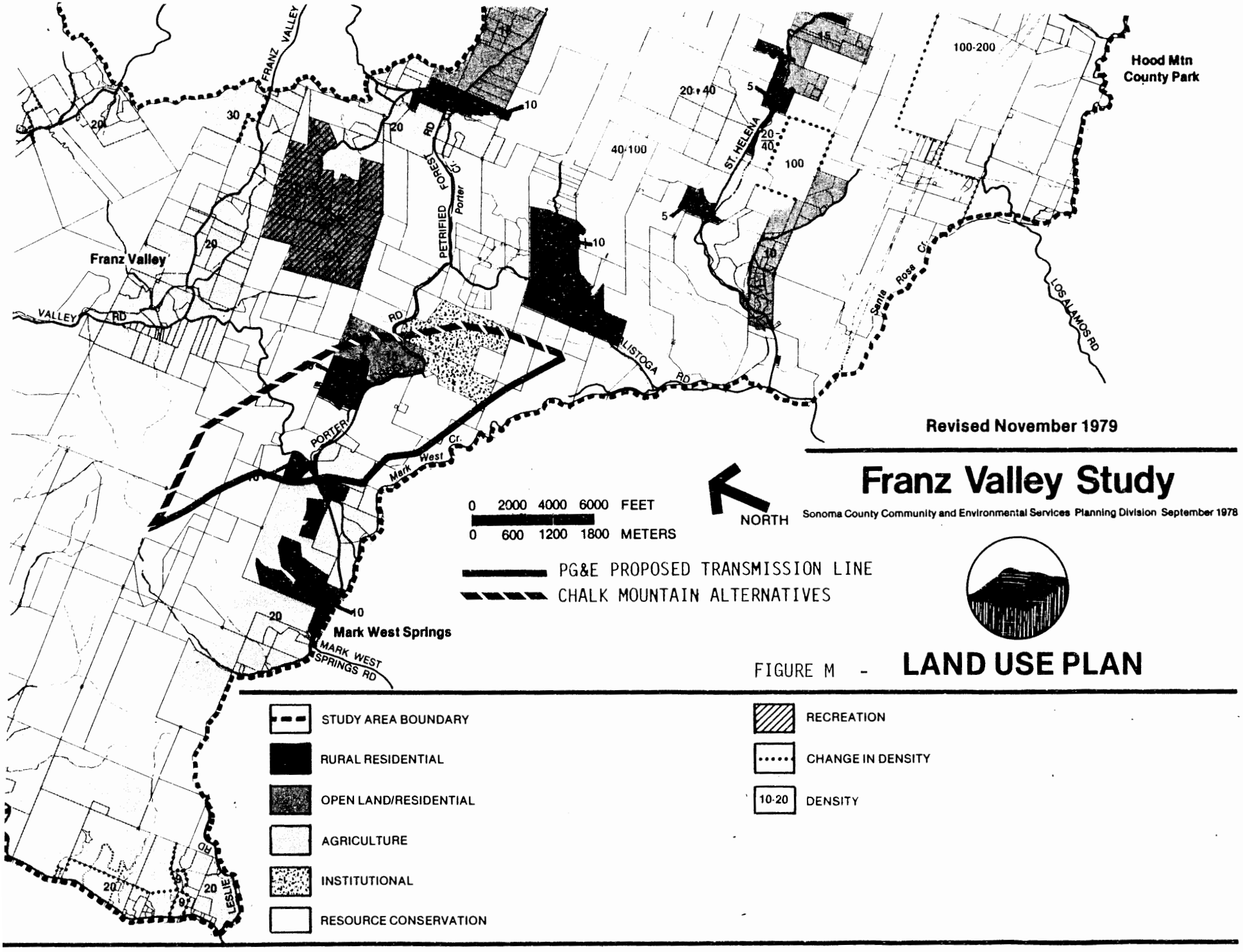


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FIGURE M - **LAND USE PLAN**

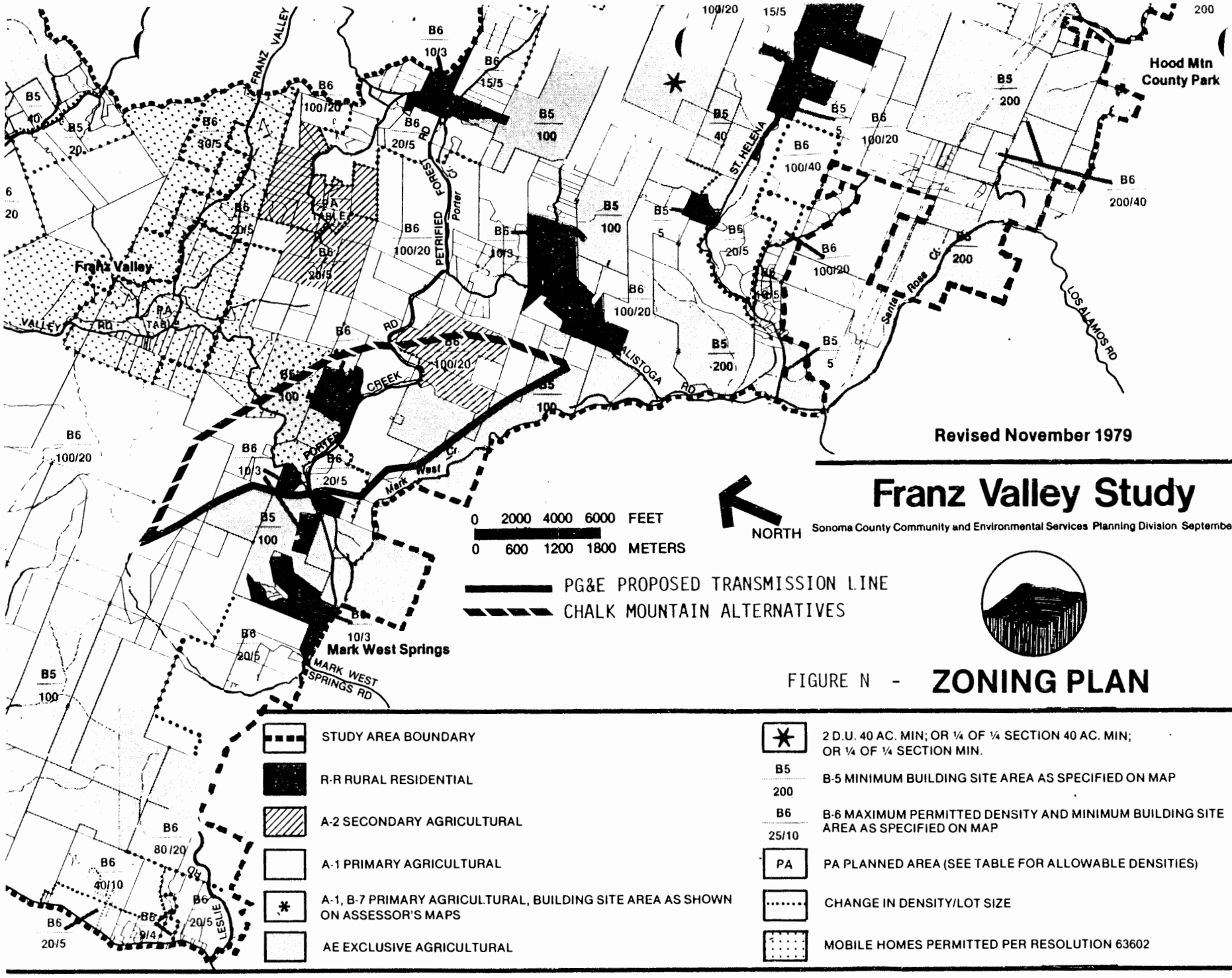

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FIGURE N - **ZONING PLAN**

- STUDY AREA BOUNDARY
- R-R RURAL RESIDENTIAL
- A-2 SECONDARY AGRICULTURAL
- A-1 PRIMARY AGRICULTURAL
- A-1, B-7 PRIMARY AGRICULTURAL, BUILDING SITE AREA AS SHOWN ON ASSESSOR'S MAPS
- AE EXCLUSIVE AGRICULTURAL
- 2 D.U. 40 AC. MIN; OR ¼ OF ¼ SECTION 40 AC. MIN; OR ¼ OF ¼ SECTION MIN.
- B5 / 200 — B-5 MINIMUM BUILDING SITE AREA AS SPECIFIED ON MAP
- B6 / 25/10 — B-6 MAXIMUM PERMITTED DENSITY AND MINIMUM BUILDING SITE AREA AS SPECIFIED ON MAP
- PA — PA PLANNED AREA (SEE TABLE FOR ALLOWABLE DENSITIES)
- CHANGE IN DENSITY/LOT SIZE
- MOBILE HOMES PERMITTED PER RESOLUTION 63602

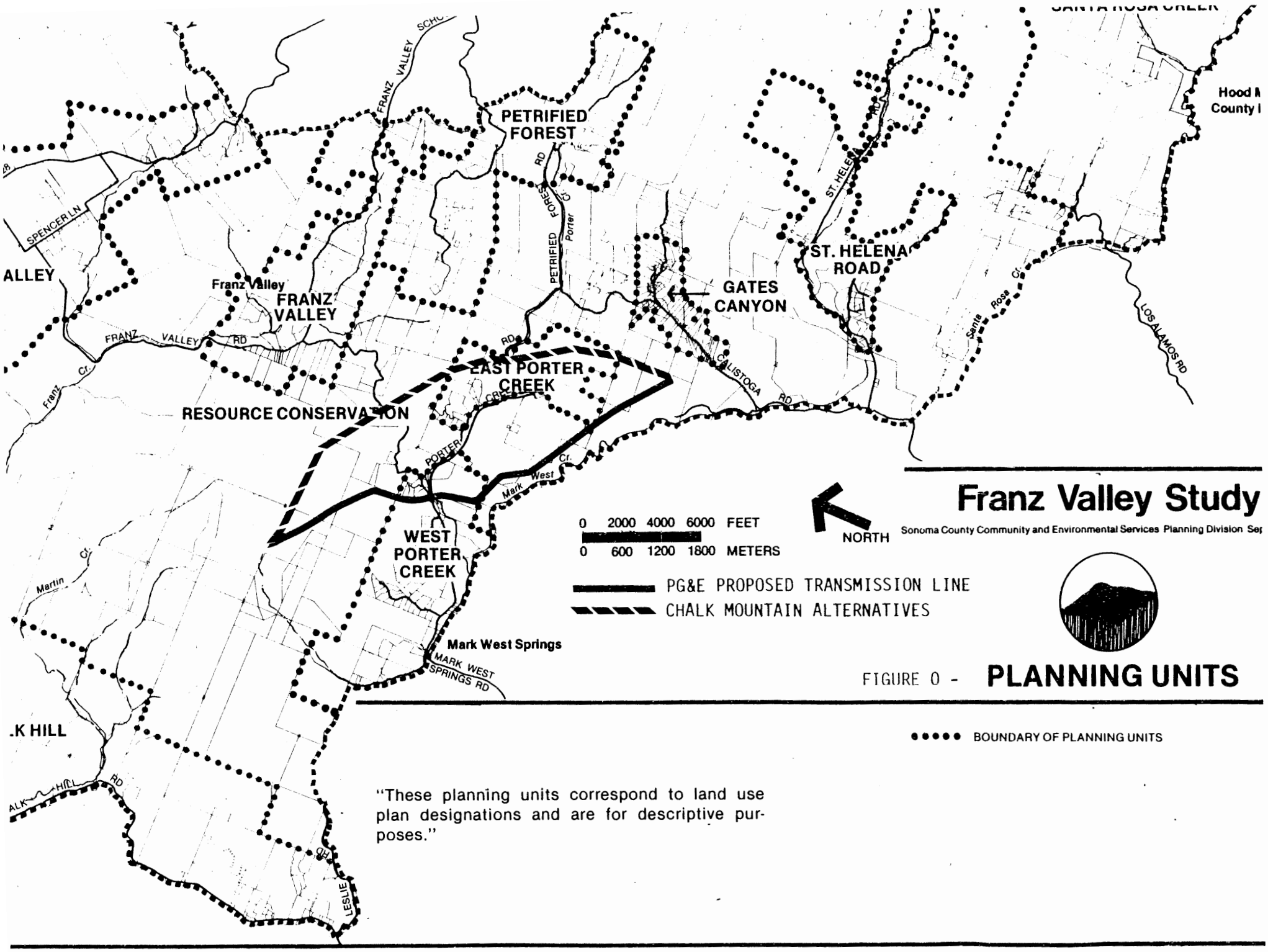

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FIGURE 0 - **PLANNING UNITS**

"These planning units correspond to land use plan designations and are for descriptive purposes."

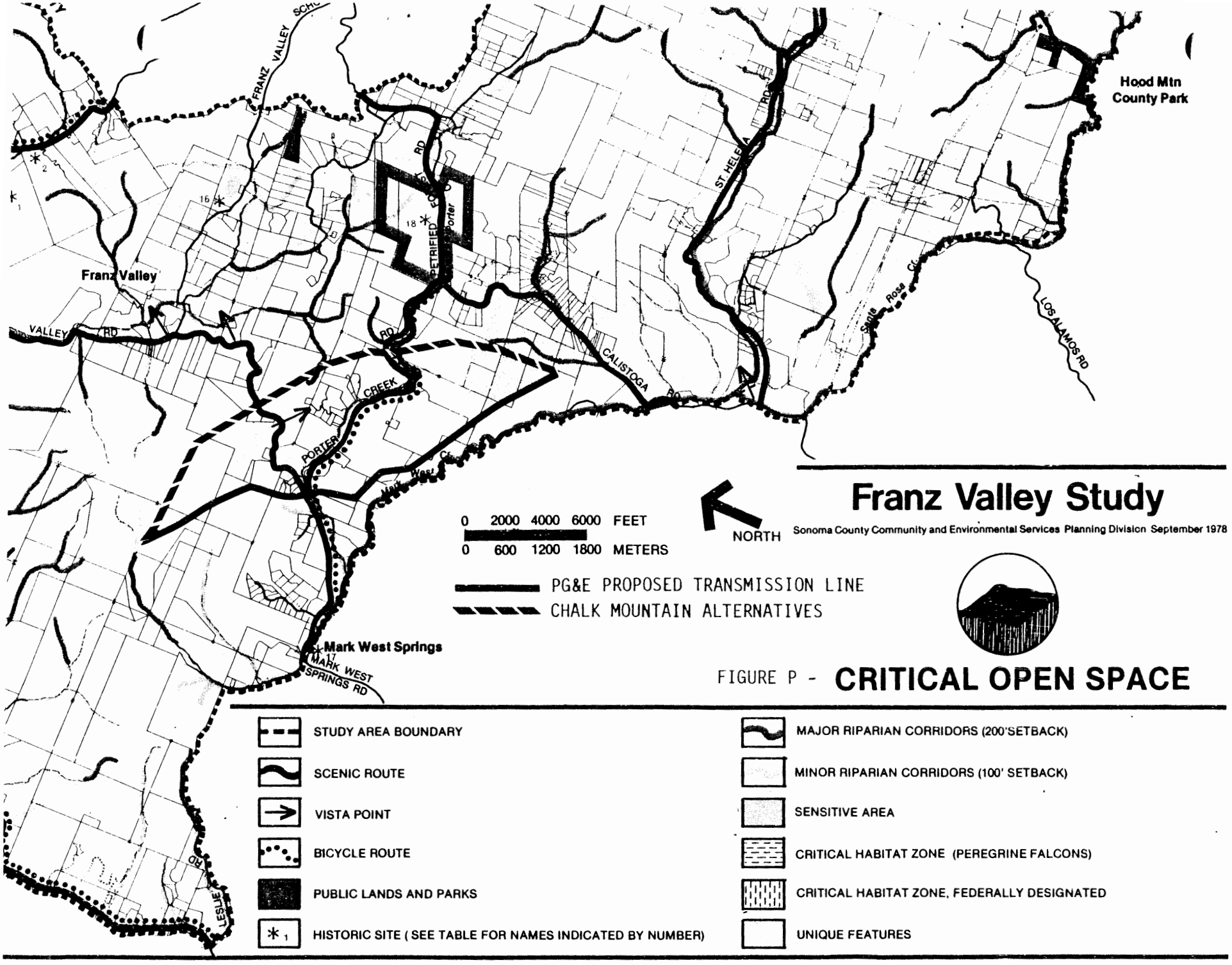

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FIGURE P - **CRITICAL OPEN SPACE**

- STUDY AREA BOUNDARY
- SCENIC ROUTE
- VISTA POINT
- BICYCLE ROUTE
- PUBLIC LANDS AND PARKS
- *1 HISTORIC SITE (SEE TABLE FOR NAMES INDICATED BY NUMBER)
- MAJOR RIPARIAN CORRIDORS (200'SETBACK)
- MINOR RIPARIAN CORRIDORS (100' SETBACK)
- SENSITIVE AREA
- CRITICAL HABITAT ZONE (PEREGRINE FALCONS)
- CRITICAL HABITAT ZONE, FEDERALLY DESIGNATED
- UNIQUE FEATURES

Resource Conservation, as well as West Porter Creek and East Porter Creek, respectively.

The Critical Open Space map, Figure P, shows that both the PG&E proposed transmission line route and the Chalk Mountain Alternative cross scenic routes and areas having unique features.

Viewing the Land Use Plan, the Zoning Plan, the Planning Units map and the Critical Open Space map, together, the PG&E proposed transmission line route and the Chalk Mountain Alternative traverse the areas shown below:

PG&E Proposed Transmission Line Route

Towers	Owner(s)	Land Use Designation	Zoning and Density	Critical Open Space
51 - 54	California Academy of Sciences	Resource Conservation	Primary Agriculture B6-100/20	--------
55 - 59	Lee	Agriculture	Exclusive Agriculture B5-100	-------
59 - 60	Johnson	Rural Residential	Rural Residential B6-10/3	Scenic Corridor (Tos. 59 - 60); Major Riparian Corridor (Tos. 59 - 60)
60 - 61	Cummins	Agriculture	Conservation B6-20/5	-------
62 - 70	Multiple (unknown and Kimpel)	Resource Conservation	Exclusive Agriculture B5-100	-------

Chalk Mountain Alternative

Towers	Owner(s)	Land Use Designation	Zoning and Density	Critical Open Space
51 - 58	California Academy of Sciences	Resource Conservation	Primary Agriculture B6-100/20	Unique (T. 58) Feature; Scenic Vista (Tos. 58 - 59)
59 - 61	Weingartner	Resource Conservation	Exclusive Agriculture B5-100	Minor Riparian Corridor (T. 61)
62 - 64	Multiple unknown and (Ulmen)	Open Land/ Residential	Primary Agriculture B6 - 100/20 B6 - 15/3*	-------
65 - 68	Lundeberg School of Seamanship	Institutional	Secondary Agriculture B6-100/20	Scenic Corridor (Tos. 66 - 65; Major Riparian Corridor (Tos. 64 - 65); Unique Features (Tos. 67 - 68)
69 - 69A	Multiple unknown	Resource Conservation	Primary Agriculture B6-100/20	Unique Feature (T. 69A)
69B - 70	Multiple unknown	Resource Conservation	Exclusive Agriculture B5-100	-------

* Per Franz Valley Specific Plan, p. 152.

The Commission staff and Sonoma County performed a comparative analysis of the land use impacts of the PG&E proposed transmission line route and the Chalk Mountain Alternative. Both the Staff and the County preferred the Chalk Mountain Alternative for its purportedly reduced land use impacts.

The Staff's land use analysis encompassed visual and public health impacts in addition to land use. (RT 16,051-16,057)

The Commission has already determined that with the proposed 120 foot right-of-way on the 11 mile nonparallel section the electromagnetic fields from the transmission line do not pose an identifiable adverse health risk. Therefore, any purported land use constraints attributed by Staff to electromagnetic fields from the transmission line have not been used by the Commission to perform the land use analysis.

Likewise, since the Commission has determined taking into account all Staff testimonies, among others, that the visual impacts of the Chalk Mountain Alternative render the PG&E proposed transmission route comparable, the Commission has factored out the visual component to the land use testimony for the purpose of performing an exclusively land use analysis.

According to Staff, the Chalk Mountain Alternative traverses 0.6 miles less of the area designated Resource Conservation. (RT 16,054:1-16) Since the Chalk Mountain Alternative is shorter through the Resource Conservation area, fewer land use options are limited on the Chalk Mountain Alternative. (RT 16,054:14-16)

PG&E's proposed transmission line route impacts the Porter Creek Road scenic corridor and the Chalk Mountain Alternative impacts Franz Valley Road scenic corridor and to a lesser extent the Porter Creek Road scenic corridor. (RT 16,055:14-18)

Because the Chalk Mountain Alternative may potentially affect some educational study areas, the Chalk Mountain Alternative has a potentially more adverse impact upon Pepperwood Ranch than PG&E's proposed transmission line route.

In Staff's view, there does not tend to be a conflict between an institutional use, such as the Lundeberg School of Seamanship, and a transmission line. (RT 16,090:19-22)

In Staff's view, the remainder of the Chalk Mountain Alternative does not appear to physically inhibit development. The PG&E proposed transmission line route inhibits development of two parcels near tower 61, though not in a substantial way. (RT 16,056:11-13; 16,084:9-16)

Due to the relative parcel size and lack of development along the Chalk Mountain Alternative, Staff concludes that there are more options available for both final route selection and limitation of land use impacts on the Chalk Mountain Alternative than on PG&E's proposed transmission line route. (RT 16,057:1-7)

Staff's preference for the Chalk Mountain Alternative on the basis of land use is that the Chalk Mountain Alternative be considered as a corridor thereby providing tower relocation potential to mitigate possible impacts on the Chalk Mountain Alternative itself. (RT 16,110:5-9) The Staff witness did not know whether such relocation was engineeringly feasible. (RT 16,110:20-24)

Sonoma County likewise prefers the Chalk Mountain Alternative because of the potential to significantly reduce land use impacts compared to the PG&E proposed transmission line.

The County analyzed the Chalk Mountain Alternative as a corridor and the PG&E proposed transmission line as a specific alignment. (RT 16,004:24-16,005:4)

The impact to land use was performed using the Land Use Plan and Zoning Plan to determine the permissible uses and development, whether existing or not. (RT 15,963:18-24; 16,038:1-23)

The County did not determine the number of existing dwellings or residents on either route. (RT 15,970:16-24)

The County did not ascertain specific tower locations on the Chalk Mountain Alternative. (RT 15,971:11-19; 15,977:16-21; 15,599:17-22)

Referring to the permissible uses and development, the PG&E proposal impacts the Rural Residential area in West Porter Creek. Rural Residential has the highest population density of the areas examined. (RT 15,904)

For the County analysis, it was irrelevant whether the Rural Residential parcels had houses on them. (RT 16,038:11-12)

Population density adjacent to the proposed transmission line was one of the most important factors in the County's conclusion that the Chalk Mountain Alternative was preferable. (RT 15,963:7-17)

The County did not consider the population density necessary to operate the Lundeberg School of Seamanship as an Institution. (RT 15,969:7-9)

The County testified on cross-examination that the Lundeberg School of Seamanship was a nonconforming use (15,936:1-2), that there was no issued use permit for the California Academy of Sciences as an educational facility (RT 15,928:23-15,929:2), and that a commercial campground was not a permissible use on property zoned Exclusive Agriculture. (RT 15,926:2-6)

The County's conclusion was that designated land uses and zoning, which translate into permissible population density, on the Chalk Mountain Alternative allows for greater tower relocation potential than on the PG&E proposed transmission line. (RT 15,903)

However, the County had not performed any specific siting studies to determine whether the tower relocation potential on the Chalk Mountain Alternative is able to be realized. (RT 16,008:9-18) Once the Chalk Mountain Alternative was narrowed to an alignment, the relative advantage of the Chalk Mountain Alternative over PG&E's proposed transmission line route could change. (RT 15,993:12-15,994:6)

As stated earlier, the Commission views the potential for tower relocation to avoid land use impacts in the same way as the potential for tower relocation to avoid visual impacts. Whether the potential exists is unknown; thereby, rendering the potential speculative and not substantial evidence which can support findings.

The Commission has used the record to determine the present impacts to land use and has gone to the County General Plan and the Franz Valley Specific Plan to examine the permissible uses and development in the future.

PG&E Proposed Route

In terms of land use impacts, that is, the continuing use of property as presently used, the PG&E route does not interfere with or preclude the present agricultural use of land on the Lazy G Ranch nor residential uses of any property within the West Porter Creek area.

The transmission line as proposed by PG&E may affect future, permissible development of the properties in the area. The Zoning Plan map identifies the West Porter Creek area as Rural Residential. None of the potential land uses in the area zoned Rural Residential will be precluded or interfered with given the parcel sizes. Most of the existing parcels can only accommodate one dwelling unit and are already fully developed; therefore, the potential for maximum future development is already constrained. The Cowan property, located in the Rural Residential zone, is not fully developed; however, the proposed transmission line will not preclude but may interfere with future subdivision of the Cowan property. The Lazy G Ranch, property owned by Nancy Lee, is zoned Exclusive Agriculture and can be subdivided to include at least one additional dwelling unit. The proposed transmission line would follow within approximately 60 feet the eastern boundary of the Lazy G Ranch. Therefore, the line would not likely interfere with future subdivision of the Ranch. The Cummins, Kimpel and Apel properties are located in a Primary Agriculture zone and offer the potential for subdivision. The proposed transmission line traverses the west side of the Cummins property and may interfere with, although not preclude, potential subdivision of the property. The transmission line cuts across the northeastern three-eights of the Kimpel property, thereby

interfering with, but not precluding, any future subdivision. The PG&E proposed route does not traverse the Apel property; therefore, any eventual subdivision will not be interfered with or precluded. There is no evidence in the record concerning potential land use effects to particular parcels between towers 62 and 70. However, the Exclusive Agriculture zone designation for these properties will restrict the occurrence of significant increases in density.

The establishment of privately owned and operated recreation facilities, such as Loch Haven Lake, is encouraged by the County General Plan. (Exhibit E) The PG&E proposed transmission line route will not interfere with nor preclude the use of Loch Haven Lake.

Chalk Mountain Alternative

The Pepperwood Ranch, owned by the California Academy of Sciences, property south of Pepperwood Ranch, and the Ulmen property are zoned as Primary Agriculture land and are capable of being subdivided.

The Pepperwood Ranch is contained within a county designated Resource Conservation area but is not an area of critical environmental concern. (See Environmental Impacts, infra) The Chalk Mountain Alternative, as proposed on Exhibit M, does not preclude any of the educational activities undertaken at Pepperwood Ranch, except to the extent that tower 58 might interfere with the permanent spring.

The County places importance on the use of such Resource Conservation lands:

> Large blocks of lands of limited access and marginal economic productivity are extremely important for maintaining and building soil, recharging groundwater, producing oxygen and consuming carbon dioxide, moderating climate and sustaining biological diversity and genetic adaptability to future change. An additional human benefit resulting from resource conservation areas is the preservation of some of the County for tranquility, the freedom from urban noise and congestion necessary for spiritual growth and artistic exploration. Scientific and educational uses of these areas are also important. The mitigation of the cumulative effects of development in urban areas depends upon the protection and enhancement of these often overlooked resource conservation values in rural areas.

The foregoing passage describes the Pepperwood Ranch more than any other area shown on the Land Use Plan and Planning Unit maps. Therefore, notwithstanding the greater mileage (0.6 mile) of the PG&E transmission line route identified by the Staff as within the Resource Conservation area, the Chalk Mountain Alternative has a greater impact upon Resource Conservation land use because the type of area most intended to be protected is the Pepperwood Ranch which is traversed for a greater distance by the Chalk Mountain Alternative.

The Chalk Mountain Alternative, towers 58 and 59, will parallel the primary orientation of a Vista Point, as designated on the Critical Open Space map (Figure P), thus interfering with present use of the property and conflicting with County objectives to protect especially noteworthy expansive views. (Franz Valley Specific Plan, p. 84)

The Weingartner property is zoned Exclusive Agriculture; therefore, the potential exists for at least one dwelling unit to be added to the property. Based upon testimony (RT 15,686:9-12; 15,694:6-11) and permitted zoning, the Chalk Mountain Alternative route could interfere with future residential development of the Weingartner property.

The development on the eastern facing slopes of the Ulmen property, if permissible, would in all likelihood be precluded by construction of the Chalk Mountain Alternative. The Ulmen property is 110 acres. (RT 15,754:13) According to the Franz Valley Specific Plan, page 152, the Ulmen property is subject to a B6/15/3 zoning designation on which permits 1 dwelling per 15 acres with a minimum site of 3 acres. There are presently two dwelling units on the Ulmen property. (RT 15,754:3; 15,756:11-19)

The Lundeberg School of Seamanship is categorized as Institutional in the Land Use Plan, which reflects a much greater density than is allowable under the School's Secondary Agriculture zoning. There are presently 20 to 21 permanent residents at the Lundeberg School. (RT 15,430:9-10) If the School is operated once again as a Seamanship School, it will have the highest population density use of any property on either the PG&E proposed transmission line route or the Chalk Mountain Alternative. (RT 16,095:14-20) Based solely on the Zoning Plan map, the property is capable of being subdivided.

The Commission has no jurisdiction to determine whether the uses of certain individual properties on the Chalk Mountain Alternative are in accordance with applicable County ordinances. The Commission's evaluation is based upon the uses of those properties as they appeared in the record. Notwithstanding an assertion that such uses may not conform to County ordinances, some permanent residential and agricultural uses of the particular properties are permissible under the Zoning Plan, and the Chalk Mountain Alternative would impact such uses.

Findings

179. On the basis of the Franz Valley Specific Plan, the PG&E proposed transmission line route does not interfere with nor preclude current land uses.

180. On the basis of the Franz Valley Specific Plan, the PG&E proposed transmission line route interferes with, but does not preclude, permissible development of four properties within the proposed right-of-way, specifically parcel Nos. 79-02-31, 28-06-17, 28-06-29, and 28-06-16.

181. On the basis of the Franz Valley Specific Plan, the PG&E proposed transmission line route will not interfere with nor preclude the permissible development of any property not within the proposed right-of-way.

182. Based upon the Franz Valley Specific Plan, the Chalk Mountain Alternative will interfere with the Resource Conservation land uses of the Pepperwood Ranch and the identified Vista Point. No other current use of property along the Chalk Mountain Alternative will be interfered with or precluded.

183. On the basis of the Franz Valley Specific Plan, the Chalk Mountain Alternative will interfere with, but does not preclude, permissible development of four properties within the necessary right-of-way, specifically, the Pepperwood Ranch and parcels Nos. 28-04-15, 28-08-12 and 28-08-24.

184. On the basis of the Franz Valley Specific Plan, the maximum permissible population density growth from this point in time is less along the PG&E proposed transmission line route than the Chalk Mountain Alternative since (1) the permissible growth in the Rural Residential area has been nearly maximized and (2) most of the remaining area is subject to Exclusive Agriculture zoning, a designation intended to restrict population growth.

185. On the basis of the Franz Valley Specific Plan, the maximum permissible population density growth from this point in time is greater along the Chalk Mountain Alternative than the PG&E proposed transmission line route since (1) there are large parcels subject to permissible development and (2) few of such parcels are in the Exclusive Agriculture zoning.

186. The PG&E proposed transmission line route is comparable to the Chalk Mountain Alternative on the basis of land use impacts.

5. Public Health and Safety

Since the Commission has found, based upon present research, that exposure to the electromagnetic field caused by the proposed transmission line with a 120 foot right-of-way does not pose an adverse human health risk, none of the residents along the Chalk Mountain Alternative will be exposed to adverse human health effects.

Fire Safety

The proposed transmission lines and their related construction activities, including vegetative clearing, will occur in areas of potential high fire risk. Eleven miles of new line construction will be required through Franz Valley where the fire risk is high especially during late summer and early fall, due to the highly flammable vegetation (grass, wooded or brushy vegetation) and steep topography. Almost every part of the area along both routes has burned at least once in the past century. (Franz Valley Specific Plan, p. 32) Transmission rights-of-way and related access can serve as fire breaks and fire deterrents and provide access for fire fighting vehicles and personnel. (FEIR, p. II-67)

The PG&E proposed transmission line route would receive fire protection serviced primarily from the Rincon Valley Fire Protection District; the Chalk Mountain Alternative from the Alpine Volunteer Fire Department. (RT 15,780:7-10; Franz Valley Specific Plan, p. 56) A mutual aid agreement exists for all fire departments in the County whereby aid can be requested from neighboring fire departments as necessary. (RT 15,781:17-20; 15,782:5-8)

The California Department of Forestry responds to both structural and wildland fires and is available for assistance during the declared fire season. (Franz Valley Specific Plan, p. 53-55) In addition to these sources of fire protection, fire trucks are located on the Weingartner property (RT 15,620:23-15,621:2), where ranch personnel are available to assist in fire fighting, and the Lundeberg School which currently has a limited resident population available to fight fires. (Franz Valley Specific Plan, p. 56)

Finding

187. The PG&E proposed transmission line route and the Chalk Mountain Alternative are comparable on the basis of Public Health and Safety.

6. Reliability

Finding

188. The Chalk Mountain Alternative would employ the same type of lattice transmission towers and 2,300 kcmil all aluminum conductor as the other portions of the proposed transmission line, which have a good record of reliability.

7. Ability to be Integrated with Existing System

Finding

189. The Chalk Mountain Alternative would employ the same type of transmission tower and conductor components presently used by PG&E and proposed for most of the remainder of the transmission line.

8. Indirect or Consequential Impacts

Finding

190. The subsequent system development for the Chalk Mountain Alternative is the same as for the PG&E proposed transmission line route.

9. Time

Finding

191. Since the necessary Supplement to the Final Environmental Impact Report has been prepared, there are no regulatory time constraints to the certification of the Chalk Mountain Alternative. There are no known engineering or construction constraints that would delay construction of the 230 kV Castle Rock Junction-Lakeville transmission line if the Chalk Mountain Alternative were certified.

10. Acceptable Engineering Practice

Finding

192. Based on the comparable geologic conditions of the Chalk Mountain Alternative and PG&E's proposed transmission line route and the use of comparable components, the Chalk Mountain Alternative can be constructed in accordance with Public Utilities Commission Order No. 95 and accepted engineering practices.

11. Suitable Site

Finding

193. From the geologic point of view, there is not significant difference between the Chalk Mountain Alternative and the PG&E proposed transmission line route.

12. Commercially Available Technology

Finding

194. The transmission towers, conductors and related equipment are commercially available.

"On Balance" Evaluation

The Lapham proposed Chalk Mountain Alternative represents a very significant contribution to this regulatory process. The evidence shows that there are adverse impacts in the West Porter Creek area which Lapham represents. It was entirely appropriate for Lapham to seek to find another route which he believed would mitigate those impacts and be as nonintrusive as possible.

The Chalk Mountain Alternative does not reduce the social and community impacts of the transmission line. Rather, the Chalk Mountain Alternative creates comparable social and community impacts in a different area.

Finding

195. The Chalk Mountain Alternative is as prudent and feasible as, but not more prudent and feasible than, the PG&E proposed transmission line route.

C. Undergrounding Oakmont

Undergrounding through Oakmont would involve either undergrounding the proposed 230 kV Castle Rock Junction-Lakeville transmission line or undergrounding both the newly proposed transmission line and the existing Fulton-Ignacio 230 kV double circuit transmission line across the Valley of the Moon and Oakmont. (Towers 103 - 107) See Figures Q & R. Both of these plans would require the installation of an overhead/underground transition station on each side of the valley. These stations would require approximately one acre of land and would contain the cable terminations, surge arrestors, and oil storage and pressurizing equipment. (RT 11,945:6-17)

1. National, State, or Local Law or Declared Policy

The Valley of the Moon-Oakmont transmission line crossing is subject to the terms of the General Plan of the City of Santa Rosa, and indirectly to the Sonoma County General Plan. (RT 11,040:8-11,041:13)

The City of Santa Rosa has declared its opposition to the PG&E proposed consolidated 4 circuit transmission line based upon its adverse land use, social, and visual impacts, including the crossing of Highway 12, a State, County, and City designated scenic corridor. (RT 11,008-9; Resolution 13482)

According to the City of Santa Rosa, undergrounding the proposed transmission line is consistent with the policies of the City's General Plan. (RT 11,009) In addition, the City believes undergrounding the existing transmission line is necessary to conform to the City General Plan. (RT 11,009; Resolution 13482)

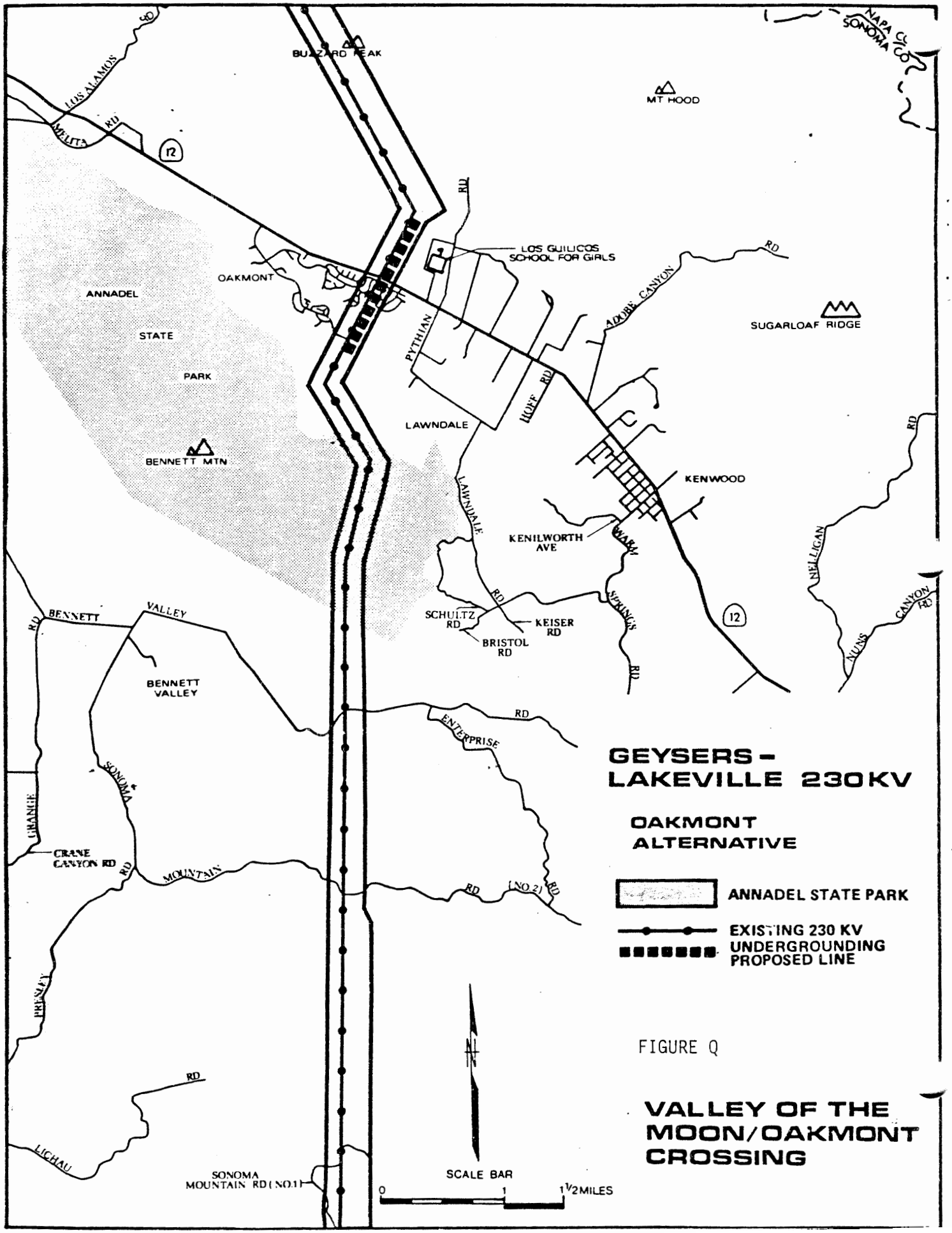

FIGURE Q

VALLEY OF THE MOON/OAKMONT CROSSING

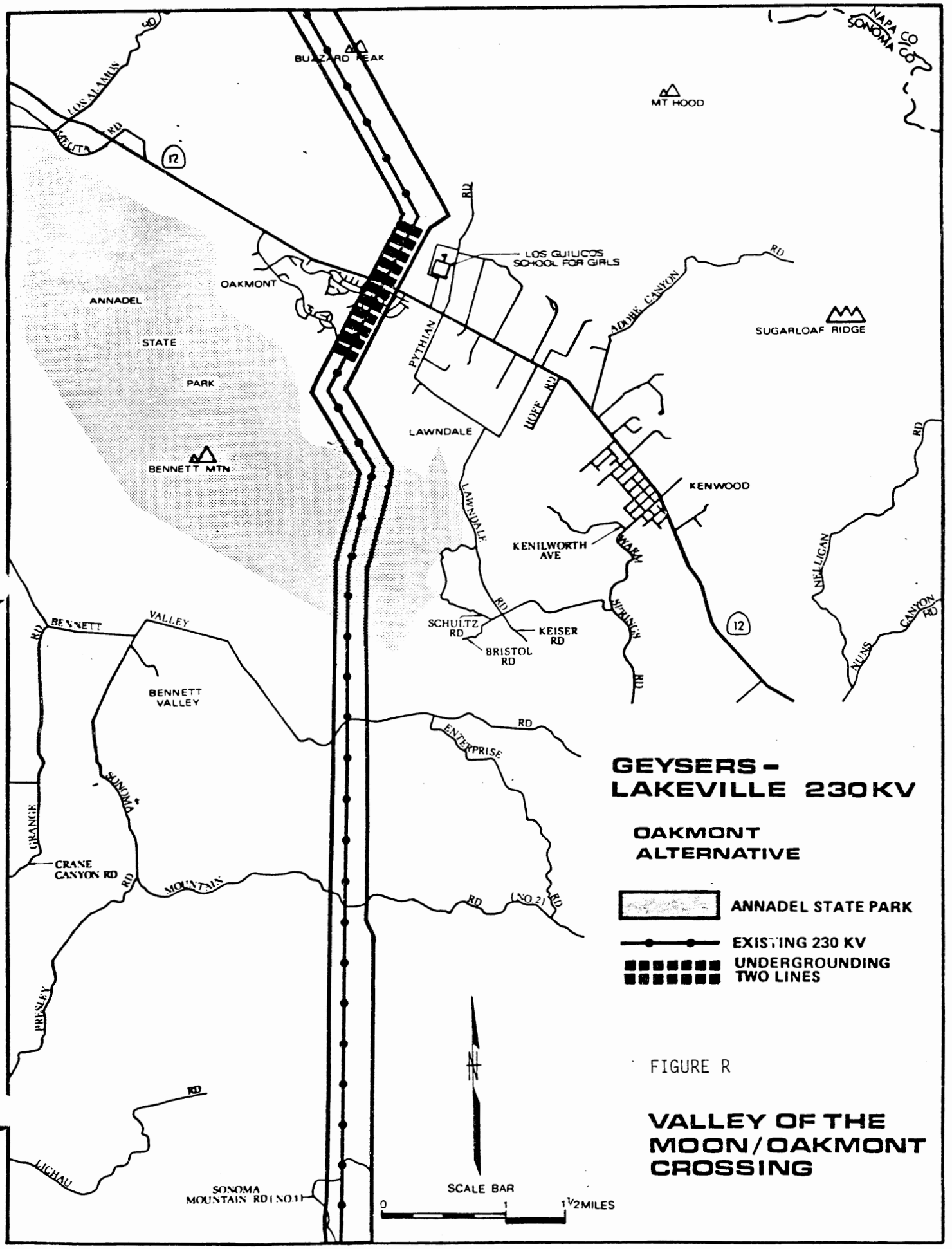

FIGURE R

VALLEY OF THE MOON/OAKMONT CROSSING

Likewise, Sonoma County, although not the governmental body with direct planning jurisdiction, has determined that the undergrounding of the proposed and existing transmission lines is consistent with the County General Plan. (Exhibit AA)

The existing Fulton-Ignacio 230 kV transmission line was originally constructed on undeveloped grasslands prior to the existence of the Oakmont community and before the adoption of the presently applicable City of Santa Rosa General Plan and the Sonoma County General Plan. (RT 11,062; 12,901)

PG&E has submitted both the proposed Castle Rock Junction-Lakeville 230 kV transmission line and the consolidated portion of the existing Fulton-Ignacio 230 kV transmission line to this Commission for certification.

The Commission's jurisdiction to certify the consolidated portion of the existing Fulton-Ignacio transmission line rests with the fact that the existing 1,113 kcmil conductor will be replaced with a 2,300 kcmil conductor having more than a 25 percent increase in peak kilowatt capacity and that the supporting structures (transmission towers) will be new facilities. (RT 13,698:8-13,699:3; see Public Resources Code sections 25107, 25110, 25123, and 25500)

It is axiomatic to say that since the Commission has jurisdiction to certify all the new consolidated transmission towers and the new, larger conductors as submitted by PG&E, the Commission also has jurisdiction to certify a modification of the PG&E proposal that would mitigate the proposal's adverse impacts and be consistent with applicable local land use plans by undergrounding the proposed transmission line or both the proposed and existing transmission lines.

Finding

196. Undergrounding across the Valley of the Moon-Oakmont is consistent with declared local land use plans, whereas the PG&E overhead consolidation is not.

2. Economic Impacts

The construction and operating costs ($/1983) for the Castle Rock Junction to Lakeville transmission line with undergrounding 1.2 miles across the Valley of the Moon-Oakmont are:

	Lakeville (proposed)	Underground VOM-Oakmont (proposed only)	Underground VOM-Oakmont (proposed and existing)
Capital Costs of Transmission Facilities	70,840,000	75,597,000	79,219,000
Difference		[+4,757,000]	[+8,379,000]
Levelized Annual Revenue Requirements	12,920,000	13,808,000	14,475,000
Difference		[+888,000]	[+1,555,000]
Yearly Value of Excess Transmission		278,000	278,000
NET YEARLY COST (RT 11,958; 12,124; 12,125)	$ 12,920,000	$ 14,086,000	$ 14,753,000

The estimated excess transmission losses are based upon sizing the underground facility to the anticipated generation level, not the thermal capacity of the overhead 2,300 kcmil transmission line. (RT 11,974:15-21; 11,975; 11,978; 12,084; 12,164) PG&E's undergrounding design (RT 13,742: 11-13,744:22), applicable as well to Oakmont, would use a 3,250 kcmil conductor which has the thermal capacity of a single 1,113 kcmil overhead conductor. (RT 13,756; 13,761) At that 3,250 kcmil conductor size, the Castle Rock Junction-Lakeville transmission line with undergrounding across the Valley of the Moon-Oakmont will accommodate 2,200 MW of Geysers generation. (RT 13,755) This represents 200-300 MW less capacity than the

entirely overhead system which has been oversized to reduce excess transmission energy losses. (RT 11,978) PG&E has consciously undersized the underground design to accommodate only anticipated generation (2,000 MW) from The Geysers and to reduce construction costs (RT 13,737; 13,755; 13,757)

To reduce excess transmission energy losses and increase capacity will require additional underground cables to be constructed (RT 12,978-9), forced oil cooling to be employed (RT 12,978-9) or the use of larger initial conductors. (RT 13,755) Each of the foregoing capacity increasing options adds to the capital costs of the facility. (RT 11,980; 13,755)

Even though PG&E has not conducted a cost-benefit analysis of increasing the initial conductor size for undergrounding, it may nonetheless be possible to increase the conductor size without increasing the costs of undergrounding, except for added costs of the larger conductor. (RT 13,758: 15-20; 13,759:9-19)

According to PG&E, the added costs of $4.76 or $8.38 million, namely the costs for undergrounding the proposed transmission line or the proposed and existing transmission lines respectively, would have a negligible effect, if any, on PG&E's ratepayers. (RT 10,953:8-11)

As discussed in PART FOUR, Reconstruction Alternatives, infra, Reconstruction Alternative No. 3 considered circuit consolidation* across the Valley of the Moon-Oakmont.

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* Consolidation of the proposed 4 circuit transmission line across the Valley of the Moon-Oakmont to two circuits to be placed on new double circuit transmission towers, 3-2,300 kcmil bundle per phase, with switching stations on each side of the Valley. (See Reconstruction Alternatives).

Generally, circuit consolidation would keep the visual impacts of the Valley of the Moon-Oakmont crossing closer to those which are caused by the existing transmission line than are caused by the consolidated 4 circuit towers. (RT 11,946:2-8) Only double circuit towers would be used for the circuit consolidation alternative. The towers would be slightly heavier than the existing towers. (RT 11,946:13-14)

Unlike the existing six 1,113 kcmil conductors, the circuit consolidation alternative would require eighteen 2,300 kcmil conductors using 3 conductor bundles per phase. (RT 11,946:9-13)

However, the cost for the switching stations only, as part of the circuit consolidation alternative, is more than twice the cost of undergrounding. (RT 11,946:14-19)

Findings

197. The added capital cost of undergrounding only the proposed transmission line across the Valley of the Moon-Oakmont is $4,760,000. The added capital cost for undergrounding both the proposed and existing transmission lines across the Valley of the Moon-Oakmont is $8,380,000.

198. The added cost of undergrounding either the proposed transmission line or the proposed and existing transmission line across the Valley of the Moon-Oakmont would have a negligible effect, if any, on PG&E's ratepayers.

199. An overhead transmission alternative for the Valley of the Moon-Oakmont crossing, circuit consolidation, would cost more than twice the amount for undergrounding both the proposed and existing transmission lines.

3. Environmental Impacts

Undergrounding a transmission line is not without environmental impacts. The impacts are merely different from those of an overhead transmission line. (RT 12,781) The principal environmental impacts of undergrounding

are clearing for trenching and clearing for transition stations on each end of the underground facility. (RT 12,763; 12,781)

There are two small, previously disturbed archaeological sites in the Oakmont area which would be virtually destroyed by undergrounding, which impacts would be mitigated by data recovery programs. (RT 12,683:21-12,684:9)

The principal impact of the consolidated 4 circuit tubular and lattice towers would be the construction of larger footings required tc support the heavier loads. There would be five tubular towers in the Valley of the Moon-Oakmont. (RT 13,751)

Notwithstanding the fact that the Oakmont Golf Course can be easily restored to present condition if the transmission line is undergrounded, the creation of the southern transition station site in the hills will cause slightly more adverse environmental impacts than the construction of footings for the 4 circuit transmission towers by virtue of the amount of vegetation and the potential for soil erosion.

4. Social and Community Impacts

According to the City of Santa Rosa, the County of Sonoma, the Commission staff, and the Oakmont Property Owners Association, the consolidated 4 circuit transmission line through the Valley of the Moon-Oakmont would cause an increased adverse visual effect compared to the present condition. (RT 10,519; 11,051; 12,781; 12,852:6-9)

Finding

200. Undergrounding across the Valley of the Moon-Oakmont has slightly more adverse environmental impacts than the use of consolidated 4 circuit transmission towers.

To reduce electromagnetic fields at the edge of the Oakmont right-of-way, PG&E is increasing the height of the 4-circuit transmission towers from an average 146 feet to 173 feet, thereby exacerbating the visual impact. Instead of the 6 conductors on the existing transmission line, there will be 18 conductors on the proposed consolidated 4 circuit towers. The proposed transmission line will be visible along Highway 12, a designated scenic corridor.

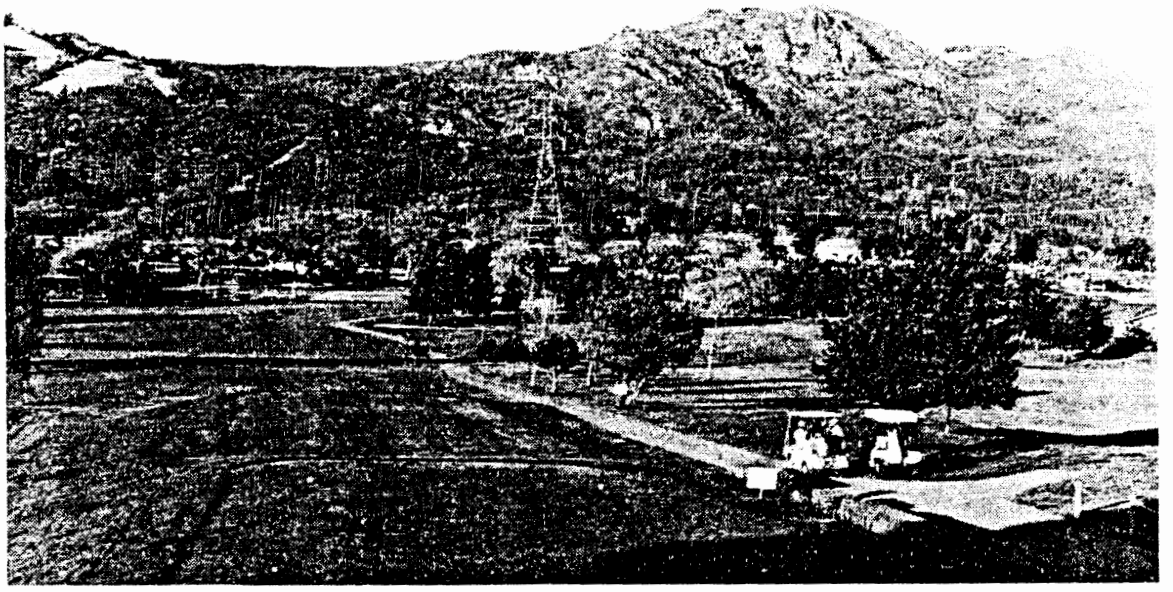
The visual effects are shown pictorially in Figures S, T and U.

The incremental visual impact of the consolidated 4 circuit transmission tower is exacerbated by the increase of tower height and visual mass of the new transmission towers in comparison to the existing double circuit transmission towers. (RT 10,519; 11,051)

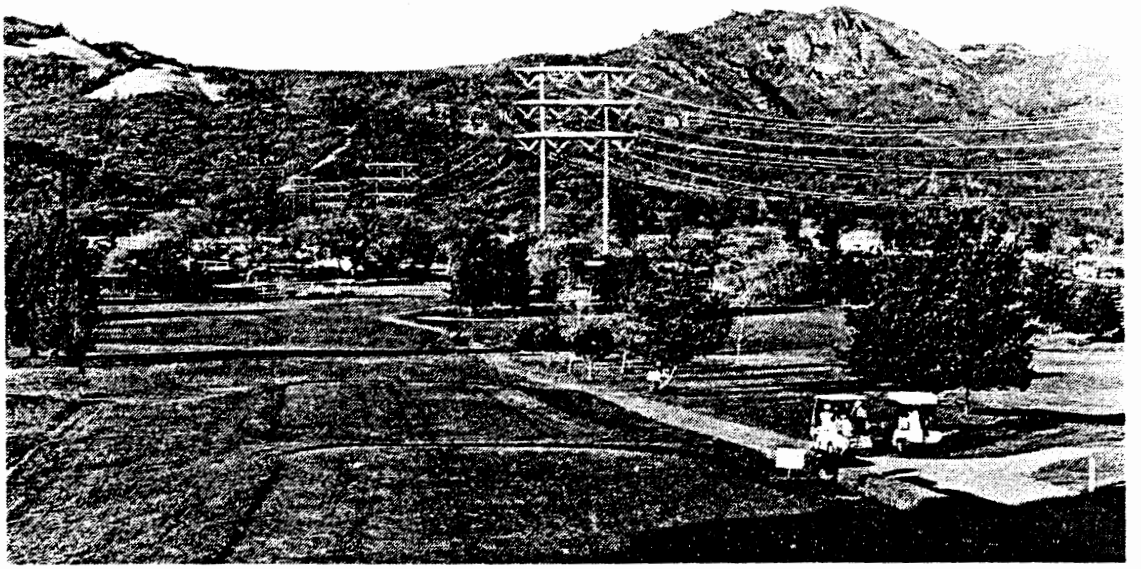
Undergrounding would alleviate the visual effects of the proposed 4 circuit transmission line. (RT 12,781)

The visual impact of undergrounding is created by the transition station site. (RT 12,781) The visual impact of the transition station site can be mitigated by the use of screening vegetation (RT 12,897:14-12,898:16), such as agreed to by PG&E and the California Department of Parks and Recreation for Annadel State Park and the Lakeville substation. (AFC, Vol. II, Appendix F)

Undergrounding would not necessitate purchasing of residential properties to widen the right-of-way, incrementally increasing the height of the 4 circuit tubular towers over the height of the existing double circuit towers, nor increasing electromagnetic field strength at the edge of the right-of-way in populated areas beyond historical operating practices. (See PART THREE, Public Health and Safety, Electromagnetic Fields)

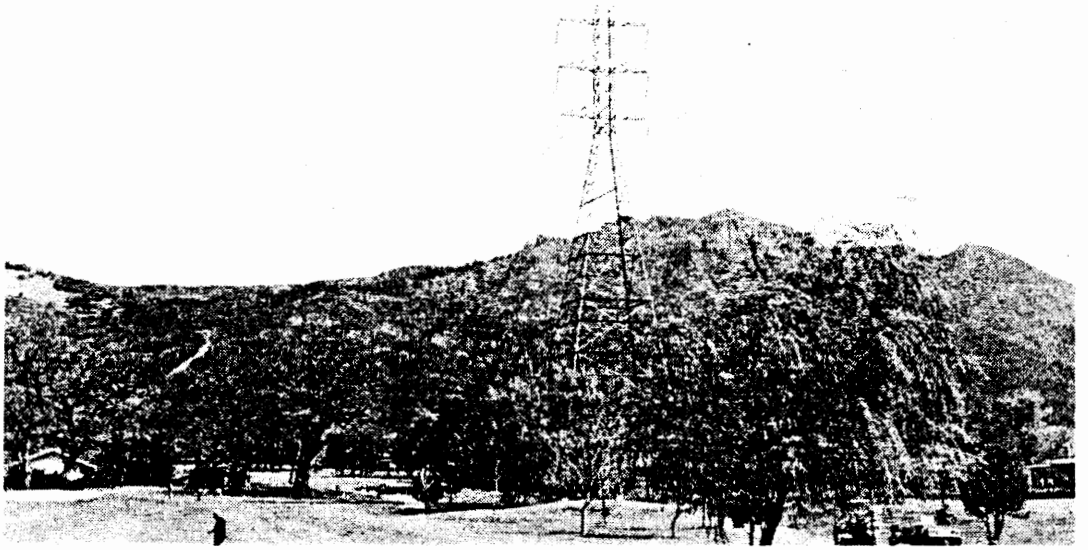


Existing view of golf course, Mt. Hood and Fulton-Lakeville 230 kV transmission line from Oakmont Inn.

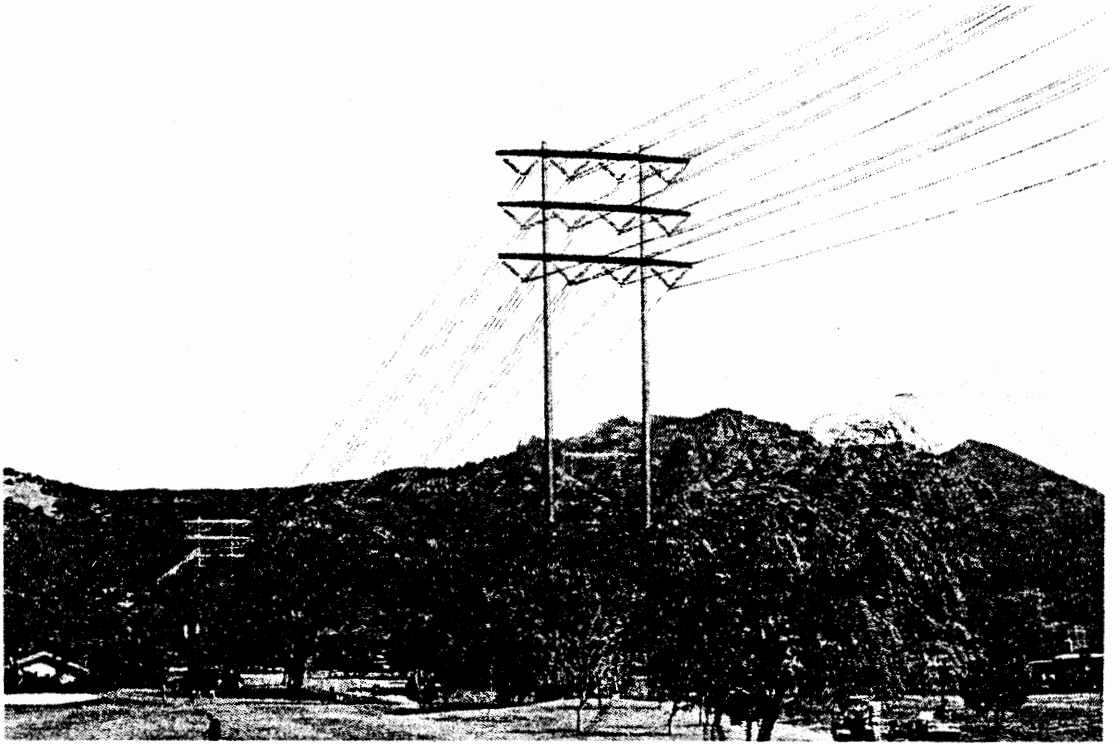


View from Oakmont Inn with proposed alignment graphically depicted.

FIGURE S

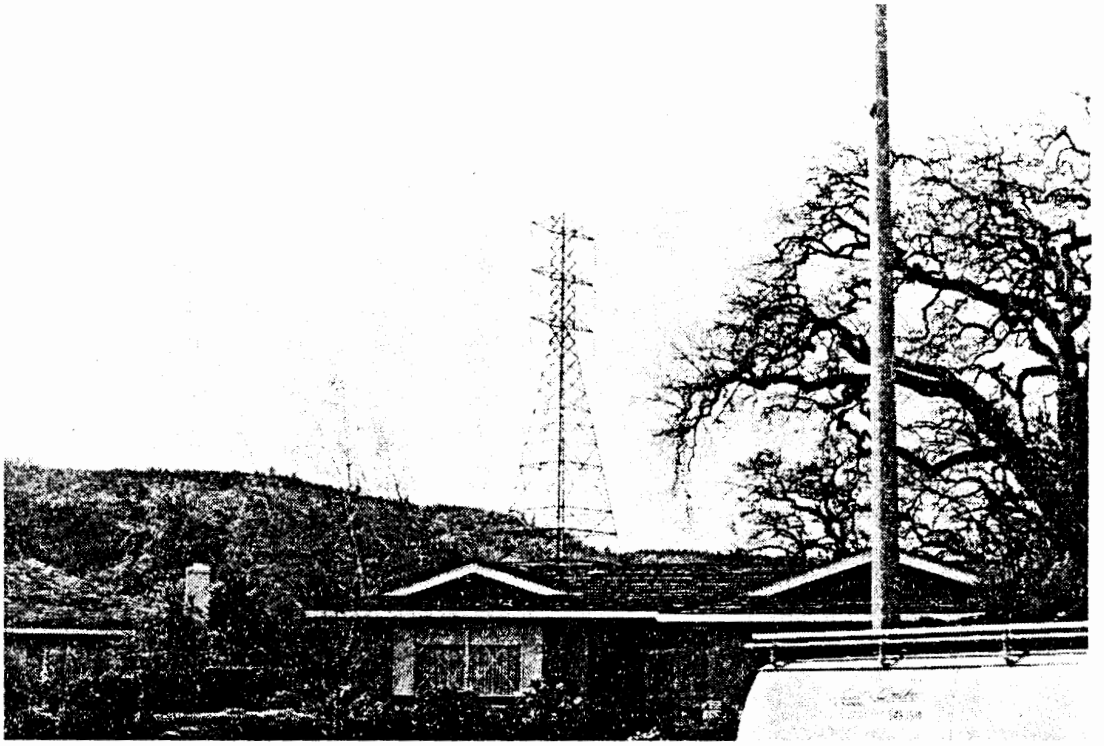


View of existing transmission line tower from Oakmont golf course.

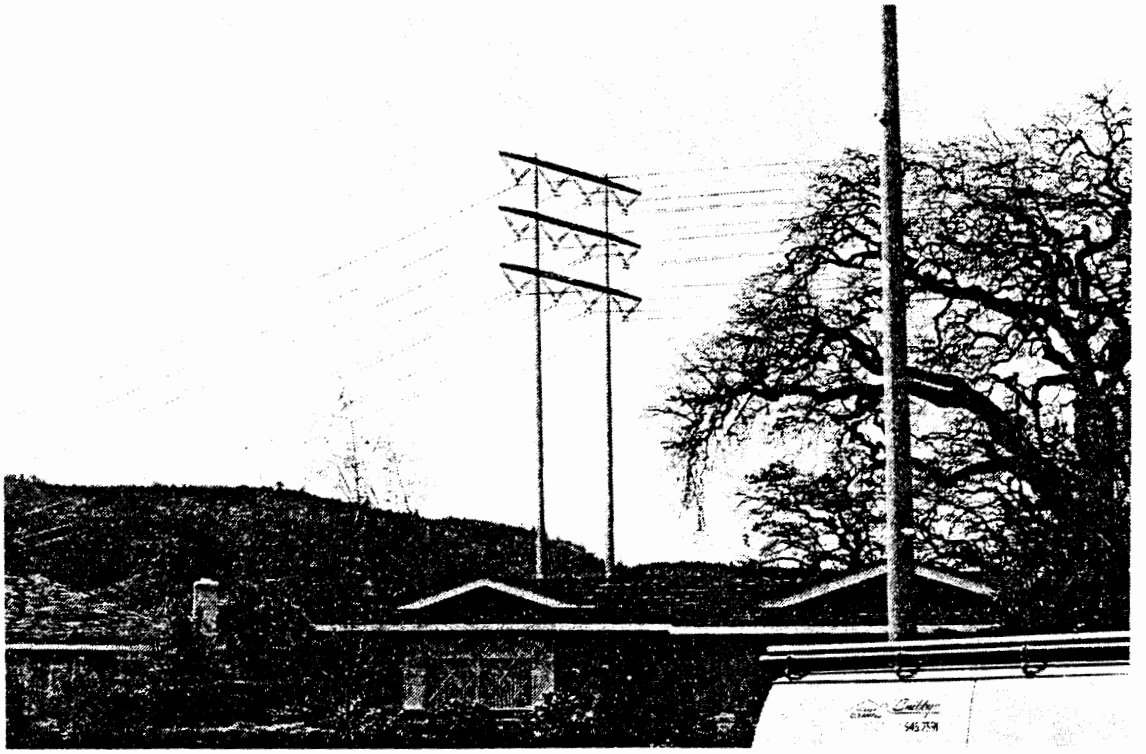


Simulated view of proposed transmission line tower from the golf course.

FIGURE T



View of existing transmission line tower from a nearby Oakmont residential street.



Simulated view of proposed transmission line tower 106.

FIGURE U

Finding

201. Undergrounding across the Valley of the Moon-Oakmont will eliminate serious added incremental visual, social and land use impacts of the consolidated 4 circuit transmission line.

5. Public Health and Safety

Electromagnetic fields would be almost completely shielded by undergrounding the transmission line. (RT 9,237:17-22) The virtual elimination of electromagnetic fields above ground eliminates induced current in large metallic, ungrounded conductors such as automobiles.

Undergrounding eliminates audible noise from transmission line corona.

Undergrounding eliminates the hazard of aircraft collision with transmission towers or conductors.

Finding

202. There are more health and safety benefits to undergrounding the transmission line than using the PG&E proposed consolidated 4 circuit transmission line.

6. Reliability

The 4 circuit tubular transmission towers proposed for Valley of the Moon-Oakmont have not been used previously by PG&E. (RT 14,083:4-11) PG&E has proposed to use 4 circuit tubular towers instead of 4 circuit lattice towers in order to mitigate visual impacts. (RT 12,897:2-8) The proposed tubular 4 circuit tubular towers have adequate design criteria. However, according to the testimony of the Office of the State Architect, a determination of whether the tubular towers will stand cannot be made in the absence of detailed design drawings. (RT 8,656:10-20)

Just as it is imprudent to rely upon an untried and unproven alternative underground technology for all of the Geysers generation (RT 14,047:1-8) (see PART FOUR, Alternative Undergrounding Technologies), an untried and unproven tubular tower design must be approched with caution since all the Geysers generation would be placed on those tubular towers. In addition, placement of these towers is proposed for a densely populated residential area.

The specific design drawings which would permit a determination of the structural fitness of the new 4 circuit tubular towers are not in the record. The ability to realize the design criteria in specific design drawings is, for the purpose of this record, only a potential.

Conventional high pressure oil filled pipe undergrounding technology has been in service for 50 years. PG&E has not had a failure in its underground transmission system. (RT 13,976:8-11; 14,044:10-13) Repair of underground transmission facilities is more difficult than repair of overhead transmission lines. (RT 14,047:4-6)

Finding

203. Given the history of service of high pressure oil filled pipe undergrounding technology, and the undemonstrated reliability of the tubular 4 circuit transmission towers, undergrounding the transmission line across the Valley of the Moon-Oakmont has greater proven reliability.

7. Ability to be Integrated with Existing System

Findings

204. High pressure oil filled pipe undergrounding such as would be used in Oakmont is used in other portions of PG&E's 230 kV transmission system and integrates well with the overhead transmission system.

205. Even if sized for the anticipated level of Geysers generation, and not the thermal capacity of the overhead transmission system, the underground transmission system can be adequately integrated with the existing transmission facilities.

8. Indirect or Consequential Impacts

Finding

206. Undergrounding does not alter the termination of the proposed transmission line at Lakeville nor the necessity for subsequent system development to Sobrante.

9. Time

Finding

207. Undergrounding through the Valley of the Moon-Oakmont will not cause any delay in constructing the proposed Castle Rock Juntion-Lakeville transmission line.

10. Acceptable Engineering Practice

Finding

208. Undergrounding the proposed transmission line or the proposed and existing transmission lines can be performed in accordance with accepted engineering practices.

11. Suitable Site

Findings

209. Since the Valley of the Moon-Oakmont is generally flat terrain it is ideally suited to undergrounding. (RT 11,965:12-15)

210. The hill at the south end of the Valley of the Moon-Oakmont crossing will adequately accommodate both the underground system and the transition station.

211. The PG&E right-of-way across the Valley of the Moon-Oakmont is adequate for undergrounding both the proposed and existing transmission lines. (RT 12,036:4-12,037:20)

12. Commercially Available Technology

Finding

212. High pressure oil filled pipe undergrounding technology is commercially available.

"On Balance" Evaluation

The benefits of undergrounding are that it will conform to local land use plans, will alleviate visual impacts, will eliminate electromagnetic fields, will eliminate corona noise and the hazard of aircraft collision, and that it has been demonstrated to be reliable.

The disadvantages of undergrounding are the environmental and visual impacts of creating the transition station sites, which can be mitigated by erosion control measures and revegetation; increased capital cost, which nonetheless has a negligible impact, if any, upon PG&E's ratepayers; and increased maintenance costs.

Circuit consolidation, an overhead transmission alternative, would have transmission capacity comparable to the four circuit configuration and would be on a double circuit transmission tower to minimize incremental visual imapcts. Such consolidation would cost more than twice as much as undergrounding the proposed and existing transmission lines and not have nearly comparable visual benefits.

Undergrounding through the Valley of the Moon-Oakmont represents a transmission alternative available at reasonable added cost which is consistent with the City and County general plans and which will avoid serious, unmitigatable visual, land use, and social impacts.

Findings

213. On balance, it is more prudent and feasible to underground the proposed Castle Rock Junction-Lakeville transmission line in the 1.2 mile Valley of the Moon-Oakmont crossing.

214. Undergrounding the Fulton-Ignacio 230 kV DCTL, a pre-existing use, would conform PG&E's proposal with the City of Santa Rosa General Plan and the Sonoma County General Plan.

D. Reconstruction Alternatives

There are three types of reconstruction considered under the category of "Reconstruction Alternatives".

Reconstruction Alternative No. 1

The first reconstruction alternative is mentioned in the testimony of PG&E witness Lai. (RT 12,096-12,098)

To avoid building the PG&E proposed Castle Rock Junction-Lakeville transmission line to meet anticipated increases in generation the following permanent modifications could be made to existing facilities:

1. Install a 230/115 kV, 134 MVA transformer bank at Fulton.
2. Reconstruct the Fulton-Santa Rosa 115 kV DCTL for two 715 kcmil aluminum conductors per phase.
3. Reconductor the Santa Rosa-Lakeville 115 kV line with 715 kcmil aluminum conductors.
4. Reconductor the Fulton-Fulton Junction-Vaca-Dixon 115 kV DCTL with 715 kcmil aluminum conductors.
5. Reconstruct the Fulton-Ignacio 230 kV DCTL for two 2,300 kcmil aluminum conductors per phase and loop both circuits into the Lakeville substation.
6. Add a second 1,113 kcmil conductor in the Ignacio-American Canyon Junction 230 kV DCTL section.
7. Construct a 230 kV DCTL with two 2,300 kcmil aluminum conductors per phase from American Canyon Junction to Sobrante.
8. Construct a 230 kV DCTL with two 2,300 kcmil aluminum conductors per phase from Castle Rock Junction to Fulton. (RT 12,096:20-12,097:12)

Reconstruction Alternative No. 2

Secondly, the Committee asked the parties to examine a 3 or 4 bundled 2,300 kcmil 230 kV DCTL to be reconstructed in place of the existing 230 kV Castle Rock Junction-Fulton-Ignacio transmission line, with undergrounding in portions of Larkfield and Wikiup.

The Committee's request was made in the light of testimony that bundling with 3 or 4 conductors creates additional current carrying capacity of 150 percent and 200 percent, respectively, over the proposed 2 conductor bundle configuration. (RT 13,705:1-16) In addition, a 3 or 4 conductor bundle creates lower excess transmission energy losses. (RT 13,689:20-13,690:7)

Furthermore, there was testimony that the planning which went into the design of the existing Castle Rock Junction-Fulton/Ignacio caused the upper portion of the line (Castle Rock Junction-Fulton) to have 331 MW of greater transmitting capacity than the lower portion of the line (Fulton-Ignacio). (RT 12,093:25-12,094:3)

The timing for the need for the proposed transmission line, the potential for and amount of curtailment, and the amount of excess transmission energy losses are all determined by the undersized lower portion of the existing Castle Rock Junction-Fulton-Ignacio transmission line. The clear message from such consequences is that had comparable capacities on the upper and lower portions been designed into the existing Castle Rock Junction-Fulton-Ignacio transmission line some of the immediate problems associated with the adding of generation in The Geysers would have been postponed or avoided.

Therefore, the Commission Committee asked the parties to examine an extra-capacity reconstruction alternative that would have more than the transmission capacity of the existing and proposed transmission lines to anticipate future potential generation additions, thereby postponing or eliminating the

need for a third Geysers 230 kV transmission outlet (Castle Rock Junction-Vaca-Dixon at $50 million) (RT 13,782:8-13) and reducing excess transmission energy losses during its period of operation.

Reconstruction Alternative No. 2 would require replacing all existing 297 transmission towers with larger and somewhat more massive transmission towers. (RT 13,716:2-9)

Reconstruction Alternative No. 3

The third and last reconstruction alternative considered by the Commission Committee was the consolidation of the 4 Oakmont circuits (2 existing and 2 new) into 2 circuits that could then be placed upon transmission towers of dimensions comparable to those now found in Oakmont.

The only practicable way to accomplish the circuit consolidation would be to install 230 kV switching stations north and south of Oakmont with a double circuit transmission line with 3 conductor bundles on towers slightly larger than the existing towers. (RT 11,946:8-16)

1. National, State, or Local Law or Declared Policy

Reconstruction Alternative No. 1 would obviate the necessity for constructing the proposed Castle Rock Junction-Lakeville transmission line. (RT 12,096: 18-12,097:12) There is no evidence in the record as to whether Reconstruction Alternative No. 1 would conform to local land use plans.

Reconstruction Alternative No. 2 would accomplish every policy goal of Sonoma County Resolutions Nos. 63138 and 63494 (RT 10,517; 10,518), except undergrounding through the Valley of the Moon-Oakmont. In the Valley of

the Moon-Oakmont, Reconstruction Alternative No. 2 would be placed on double circuit transmission towers similar to, but higher and heavier than, the existing towers and would use 18 or 24 conductors instead of 6 conductors. The Reconstruction Alternative would probably not conform to the City of Santa Rosa General Plan, although its nonconformity would probably be less than the proposed 4 circuit transmission line.

Reconstruction Alternative No. 3 crosses the Valley of the Moon-Oakmont with a double circuit transmission line with 3 bundled conductors per phase. The Reconstruction Alternative would probably not conform to the City of Santa Rosa General Plan, although its nonconformity would probably be less than the proposed 4 circuit transmission line.

Finding

215. The Reconstruction Alternatives are comparable to or better than the PG&E proposed transmission line insofaras conformity to local land use plans.

2. Economic Impacts

Reconstruction Alternative No. 1 would cost considerably more than PG&E's proposed transmission line. (RT 12,097:13-15)

However, one individual element of this Reconstruction Alternative, specifically reconstruction of the Fulton-Ignacio 230 kV DCTL, could be performed in time to avoid generation curtailment in 1984. (RT 12,495-6) At a capital cost of approximately $12 million, with some curtailment costs during the summer of 1983 (600 MW for 200 hours) of approximately $5 million, and with temporary construction techniques (shoo-flys) at a cost

of $6 million, reconstruction of the Fulton-Ignacio DCTL at a cumulative cost of $23 million avoids potential second year generation curtailment costing $45 million and is therefore cost effective. (RT 12,496) Reconstruction of the Fulton-Ignacio transmission line is within the jurisdiction of the California Public Utilities Commission.

The construction and operating costs ($/1983) for the Reconstruction Alternative No. 2 are:

	PG&E's Proposal 2-2,300 kcmil Cond./Phase	Reconstruction Alternative No. 2 3-2,300 kcmil Cond./Phase	Reconstruction Alternative No. 2 4-2,300 kcmil Cond./Phase
Capital Cost of Transmission Facilities	70,840,000	137,250,000	153,580,000
Difference	-	[+66,410,000]	[+82,740,000]
Levelized Annual Revenue Requirements of Transmission Facilities	12,920,000	26,020,000	27,910,000
Difference	-	[+12,100,000]	[+14,990,000]

Between the 2,000 megawatt Geysers generation level and the 2,668 megawatt generation level, both the cost of the PG&E proposal and the Reconstruction Alternative No. 2 have to be increased by the cost of rebuilding the transmission line from Lakeville to Vaca-Dixon (RT 13,785:1-7) at a cost of $41-45 million. (RT 13,774-5)

Although PG&E asserts that the Reconstruction Alternative No. 2 forces reconstruction of associated 115 kV transmission lines (RT 13,664:8-10), PG&E also testified that the overload conditions on those 115 kV transmission

lines are independent of the Reconstruction Alternative No. 2 and would occur whether the proposed transmission line was constructed by 1984 (RT 13,708:13-25) or the Reconstruction Alternative No. 2 was built. (RT 13,711:22-24)

The Reconstruction Alternative No. 2 creates fewer excess transmission energy losses than the PG&E proposal. (RT 13,689:20-13,690:1) However, in PG&E's opinion, the savings in excess transmission energy losses for the Reconstruction Alternative No. 2 is not compensated by the additional costs of construction. (RT 13,705:14-20)

According to PG&E, Reconstruction Alternative No. 2 could not be in operation until June 1986 (RT 13,717:5-10; 14,666:19), leading to two-year generation curtailment costs of $226 million. (RT 13,689) The Commission staff calculated a one year delay with curtailment costs of $50-95 million and excess transmission energy losses of $66 million. (RT 13,772:13-13,773:5)

Reconstruction Alternative No. 3 would cost well over $20 million, or more than twice the cost of undergrounding through the Valley of the Moon-Oakmont crossing. (RT 11,94:14-12)

Findings

216. Reconstruction Alternative No. 1 costs more than construction of the proposed Castle Rock Junction-Lakeville transmission line.

217. Reconstruction of the Fulton-Ignacio 230 kV DCTL would avoid potential second year generation curtailment and is cost effective.

218. Reconstruction Alternative No. 2, a 3 or 4 bundle 2,300 kcmil 230 kV DCTL, costs at least twice as much as the proposed transmission line.

219. The Reconstruction Alternative No. 2 would cause a minimum of one and possibly two years of generation curtailment and consequently excess transmission energy losses.

3. Environmental Impacts

There is no evidence in the record concerning the environmental impacts of Reconstruction Alternative No. 1.

Reconstruction Alternative No. 2 would duplicate the route of the existing transmission line. However, to avoid significant generation curtailment or costly construction techniques, the reconstructed transmission line would be built parallel to the existing transmission line, which would be removed later. (RT 13,716:11-26)

Therefore, there would be similar environmental impacts from what would amount to a parallel right-of-way virtually identical to the proposed transmission line, except within the Fulton L.

Reconstruction Alternative No. 3 would have tower footings located at approximately the same intervals as the PG&E proposed transmission line, with similar environmental impacts.

Finding

220. The environmental impacts of Reconstruction Alternatives Nos. 2 and 3 are similar to the environmental impacts of PG&E's proposed transmission line.

4. Social and Community Impacts

There is no evidence in the record concerning the social and community impacts of Reconstruction Alternative No. 1.

Reconstruction Alternative No. 2 would eliminate the visual impacts of parallel transmission lines in the PG&E proposal. There would be fewer

adverse visual impacts with Reconstruction Alternative No. 2 by virtue of undergrounding in Wikiup-West Larkfield but only marginal lessening of the visual impacts expected from a 4 circuit transmission line in Valley of the Moon-Oakmont.

Reconstruction Alternative No. 3 would marginally lessen the visual impacts of the 4 circuit transmission line crossing of Valley of the Moon-Oakmont.

Finding

221. Reconstruction Alternatives Nos. 2 and 3 slightly improve the visual impacts that occur with the PG&E proposed transmission line.

5. Public Health and Safety

There is no evidence in the record concerning this criterion for any of the Reconstruction Alternatives.

6. Reliability

Reconstruction Alternative No. 1 would cause problems maintaining service during the period of reconstruction (RT 12,097:18-20) and thereafter operate the reconstructed system frequently at maximum load or overload conditions. (RT 12,133-12,142)

Staff testified that the Reconstruction Alternative No. 2 would not meet the single line outage criteria. (RT 13,769:18-19) If one circuit of the Reconstruction Alternative No. 2 became inoperative, approximately half of The Geysers transmission capacity would be lost to the PG&E system, compared to one-quarter with the PG&E proposed transmission line. (RT 13,688:11-18) Other means of reducing excess transmission energy losses

are installation of a 230 kV DCTL from Castle Rock Junction to Vaca-Dixon or bundling the proposed Castle Rock Junction to Lakeville transmission line. (RT 13,782:22-13,783:2) The cost of constructing a 230 kV DCTL from Castle Rock Junction to Vaca-Dixon and the proposed transmission line is less than the Reconstruction Alternative No. 2.

It is important to point out that PG&E current collector system connections at the Castle Rock Junction are not switched. Therefore, the outage of one circuit causes the loss of the corresponding generating facilities on that particular leg of the collector system until the outage is repaired. (RT 12,115) (See Figure V)

Reconstruction Alternative No. 3, because of its similarity to Reconstruction Alternative No. 2 at the Valley of the Moon-Oakmont crossing, would not meet the single line outage criteria. (RT 13,769:18-19)

Even with the switching stations required for circuit consolidation, a significant amount of Geysers generation would be lost in the event of a single line outage given the double circuit configuration. (RT 12,294: 15-22; 12,445:4-7)

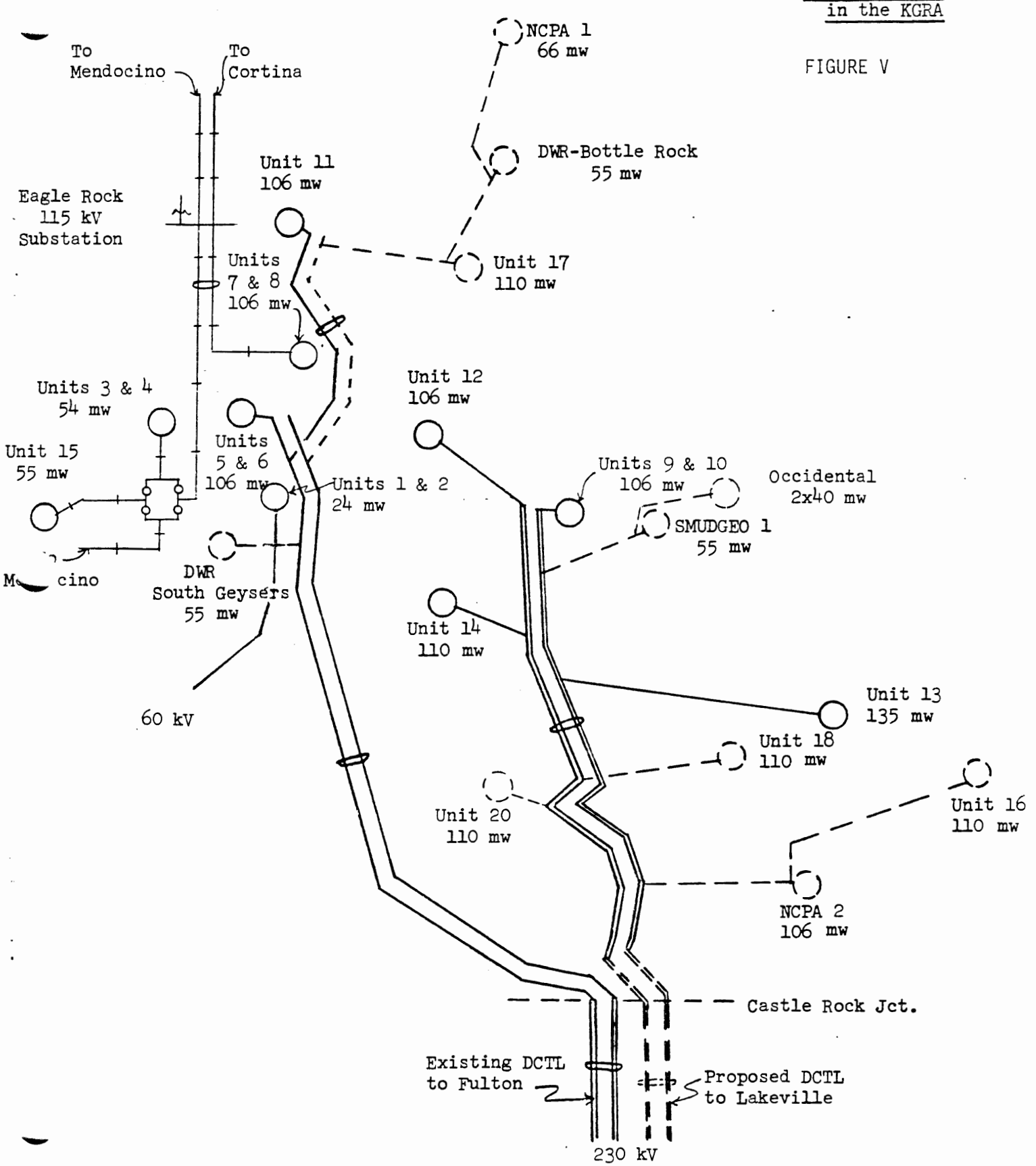
Findings

222. None of the Reconstruction Alternatives are as reliable as PG&E's proposed transmission line.

223. The existing collector system at Castle Rock Junction is incapable of switching generation on the collector system to operating transmission lines in the event of circuit outage.

Existing and Future
Geysers Units
in the KGRA

FIGURE V



7. Ability to be Integrated with Existing System

Reconstruction Alternative No. 1 modifies the existing transmission line and therefore can be said to integrate with the existing system.

Although PG&E asserts that the Reconstruction Alternative No. 2 forces reconstruction of associated 115 kV transmission lines (RT 13,664:8-10), PG&E also testified that the overload conditions on those 115 kV transmission lines are independent of the Reconstruction Alternative No. 2 and would occur whether the proposed transmission line was constructed by 1984 (RT 13,708: 13-25) or the Reconstruction Alternative No. 2 was built. (RT 13,711:22-25)

Reconstruction Alternative No. 2 would nonetheless cause unbalanced loading at a 2,000 MW Geysers generation level which would not optimize the use of existing facilities. (RT 13,789:24-26) Due to the looping of one circuit to the Fulton Substation, Reconstruction Alternative No. 2 has a greater reactive requirement which results in a reduction of real system generation capability and undesirable system voltage reductions. (RT 13,770:1-6)

There is not evidence in the record concerning the Reconstruction Alternative No. 3 other than the necessity of two switching stations and 3 bundled conductors.

Findings

224. Reconstruction Alternative No. 1 integrates with the existing system.

225. Reconstruction Alternative No. 2 does not integrate with the existing system.

8. Indirect or Consequential Impacts

There is no evidence in the record concerning the indirect or consequential impacts of Reconstruction Alternatives Nos. 1 and 3.

If Geysers generation exceeds 2,600 MW, the Reconstruction Alternative No. 2 as well as the proposed transmission line would require system modification from Lakeville to Vaca-Dixon. (RT 13,785:1-7)

Finding

226. There is no evidentiary basis to compare the Reconstruction Alternatives with PG&E's proposed transmission line on the basis of indirect or consequential impacts.

9. Time

Reconstruction Alternative No. 1 cannot be completed before the summer of 1985. (RT 12,097:15-16)

According to PG&E, Reconstruction Alternative No. 2 could not be in operation until June 1986 (RT 13,666:19; 13,717:5-10), leading to two-year generation curtailment costs of $226 million. (RT 13,668) The Commission staff calculated a one year delay with curtailment costs of $50-95 million and excess transmission energy losses of $66 million. (RT 13,772:13-13,773:5)

There is no evidence in the record concerning the time for completion of Reconstruction Alternative No. 3.

Findings

227. Reconstruction Alternative No. 1 cannot be completed before the summer of 1985.

228. Reconstruction Alternative No. 2 cannot be completed until one to two years after the PG&E proposed transmission line.

10. Acceptable Engineering Practice

There is no evidence in the record concerning the conformity of Reconstruction Alternative Nos. 1 or 2 to acceptable engineering practice.

Finding

229. There is an insufficient evidentiary basis to compare the Reconstruction Alternatives with PG&E's proposed transmission line on the basis of conformity to engineering practices.

11. Suitable Site

Each of the Reconstruction Alternatives traverses an existing transmission line route.

Finding

230. Each Reconstruction Alternative is located on a suitable site.

12. Commercially Available Technology

Finding

231. The transmission towers, conductors and related components are commercially available.

"On Balance" Evaluation

The Reconstruction Alternatives are significantly more costly, less reliable, and would not be able to commence operation until significantly later than the PG&E proposed transmission line. The social and community benefits are of marginal benefit over existing conditions and do not warrant the signficant costs. On that basis, the Reconstruction Alternatives are not more prudent and feasible.

Reconstruction of the Fulton-Ignacio 230 kV DCTL would increase capacity, reduce excess transmission losses, and is cost beneficial. Reconstruction of the Fulton-Igancio 230 kV DCTL would eliminate the undersizing of the existing transmission facility in comparison to the Castle Rock Junction-Fulton 230 kV DCTL. PG&E should seriously consider such reconstruction irrespective of the disposition of the proposed transmission line proceeding.

Finding

232. The Reconstruction Alternatives (Nos. 1, 2 and 3) are not more prudent and feasible than PG&E's proposed transmission line.

E. Alternative Undergrounding Technology

Mr. Paul F. Pugh and Associated Professional Engineers placed material in the record concerning an underground transmission cable system that purported to be more energy conserving than conventional, high pressure oil filled undergrounding technology. Based on this material, the Committee asked PG&E and the Staff to address the use of such an alternative undergrounding technology.

The Pugh alternative undergrounding technology utilizes polyethylene gas pipe in which is placed pressurized SF_6 gas (sulfur hexaflouride) with a continuous crepe paper spacer surrounding an aluminum wrapped 4,700 kcmil aluminum conductor. (RT 13,831-33)

1. National, State, or Local Law or Declared Policy

An energy conserving underground transmission technology, whether more conserving than overhead transmission or conventional high pressure oil filled pipe would be in accordance with the State's policy of maximizing the utilization of geothermally generated electricity. (1981 Biennial Report).

Finding

233. The purported energy savings of the alternative undergrounding technology have not been shown to be cost beneficial in relation to overhead transmission. (RT 14,047:22-24)

2. Economic Impacts

By Mr. Pugh's initial calculations, the cost of undergrounding with this alternative technology in Oakmont is $4.5 million for Oakmont. (RT 13,834)

By taking into account the reduction of excess transmission energy losses by operating the underground system at close to ambient temperature, Mr. Pugh calculated that the alternate technology would reduce the payback period to 19.9 years. (RT 13,386)

However, the factual assumptions that Mr. Pugh obtained about the configuration of the proposed line were incorrect. (RT 13,937:5-6) When Mr. Pugh's calculations were renumbered to account for the actual proposal, the payback period increased to 49 years, the estimated life of the underground transmission line. (RT 13,949:7) The amount of energy savings were consequently reduced from $74 million to $1.8 million. (RT 13,957:16-21) Based upon the foregoing changes, the alternative undergrounding technology is uneconomic. (RT 13,950:1-7)

Finding

234. In its present design, the alternative undergrounding technology is uneconomic.

3. Environmental Impacts

As presently designed, the alternative underground technology would terminate on either end of the system by connecting to a transmission tower. (RT 13,838) As a result, less area would be required for transition than with a conventional termination station.

For other environmental impacts, see PART FOUR, Undergrounding Oakmont.

4. Social and Community Impacts

See PART FOUR, Undergrounding Oakmont.

5. Public Health and Safety

The termination design does not conform to accepted industry standards for safety. (RT 14,051:24-26; 14,052:3-6)

For other matters related to this criterion, see PART FOUR, Undergrounding Oakmont.

Finding

235. The undergrounding alternative technology does not meet accepted industry standards for safety. (RT 14,051:24-14,052:6)

6. Reliability

Findings

236. The alternative undergrounding technology has not been tested by an independent certified laboratory at transmission voltages, nor has it undergone a demonstration period.

237. There would be large scale, extended generation should the underground portion of the alternative undergrounding technology fail while in service. (RT 14,047:1-6)

7. Ability to be Integrated with Existing System

Finding

238. With the present termination designs and lack of testing at transmission voltages, there is no demonstrated ability of the alternative undergrounding technology to integrate with the existing system.

8. Indirect or Consequential Impacts

There is no evidence in the record concerning this criterion.

9. Time

Finding

239. It is questionable whether the necessary manufacturing facilities could be made ready for a commercial installation such as the Castle Rock Junction-Lakeville transmission line especially in the time frame necessary to preclude further excess transmission line losses and probable generation curtailment. (RT 14,047:12-16)

10. Acceptable Engineering Practice

Finding

240. The termination design is not in conformity with accepted industry standards for safe and reliable transmission system operation. (RT 14,051:14-16)

11. Suitable Site

Finding

241. The right-of-way requirements for the alternative undergrounding technology would differ very little from those for conventional undergrounding (RT 14,045:2-4) for which the Oakmont right-of-way is adequate.

12. Commercially Available Technology

Finding

242. The alternative undergrounding technology is not commercially available. (RT 14,047:10-16)

"On Balance" Evaluation

With the consideration to be given undergrounding as a manner of complying with local land use plans, it was appropriate for the Commission to examine energy saving or cost saving underground technology.

The alternative undergrounding technology considered here in its present design is not economic to construct. Furthermore, such an untested technology is not appropriate for transmitting a significant portion of the Geysers generation. Lastly, the system itself would not likely be available for installation on the same schedule as the entire Castle Rock Junction-Lakeville transmission line.

Finding

243. There is not now a more prudent and feasible alternative undergrounding technology.

F. The Tulucay (West and East) and Vaca-Dixon Alternatives

In addition to Castle Rock Junction-Lakeville, three alternative routes, Tulucay West, Tulucay East, and Vaca-Dixon, were considered during the Notice of Intention. Tulucay West was found acceptable, Tulucay East and Vaca-Dixon were found conditionally acceptable. (NOI Final Report, page 3)

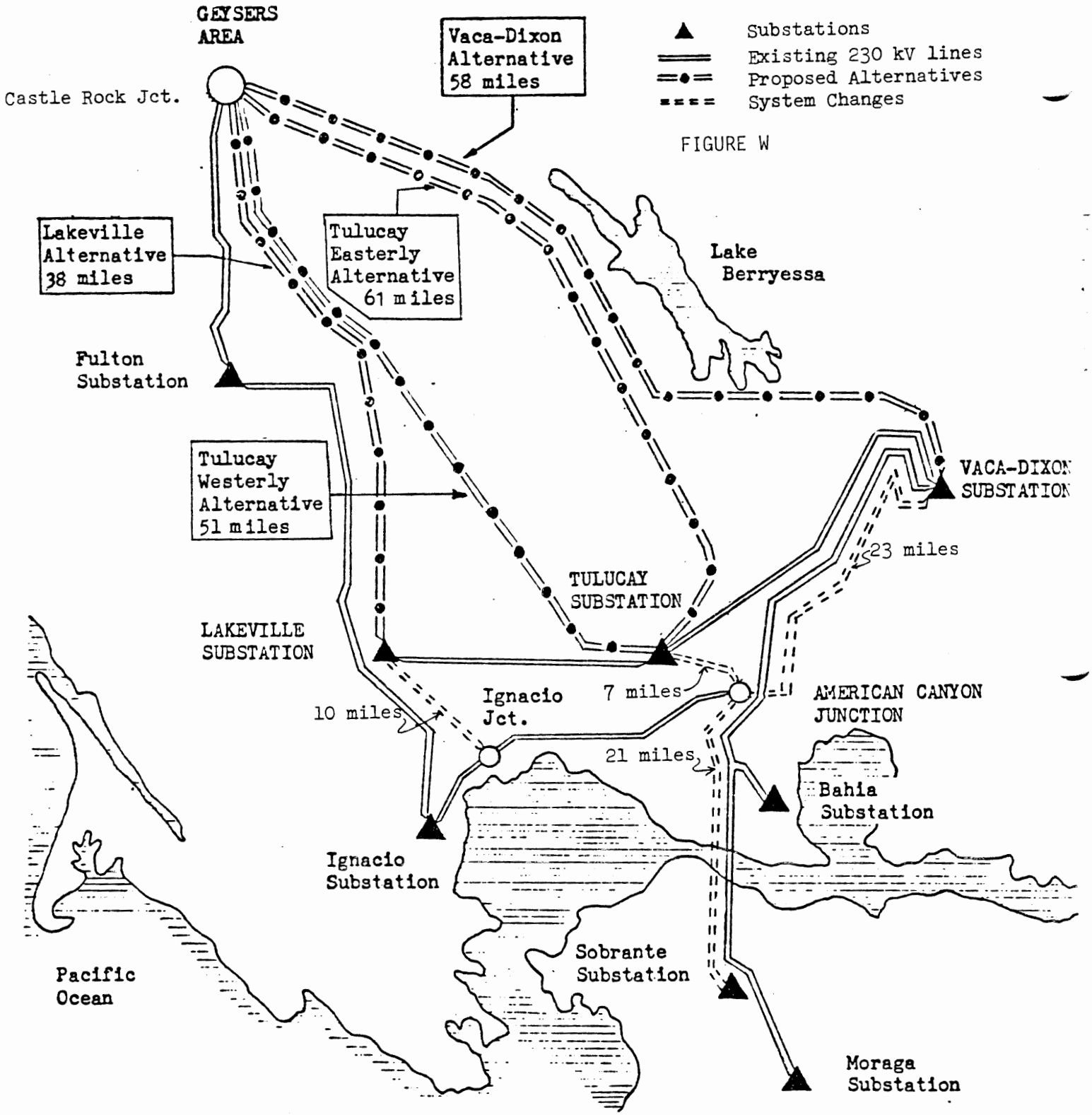
The Tulucay West Alternative is identical to the proposed Lakeville route for the first 21 miles from Castle Rock Junction. The corridor is approximately 51 miles long in total. The alternative transmission line would parallel existing transmission lines for 16 miles.

The Tulucay East route is the longest of the alternative corridors, running for approximately 61 miles. The line would require a new corridor except for the last 8 miles where it would parallel existing transmission lines.

The Vaca-Dixon route is the second longest of the alternative corridors, running for approximately 58 miles. The line would require a new corridor except for a 4 mile section where it would parallel existing transmission lines. This route is identical to the Tulucay East route for the first 44 miles from Castle Rock.

The Tulucay East Alternative is 61 miles long and is routed through the foothills north and east of the Napa Valley to the Tulucay substation.

The PG&E proposed Castle Rock Junction-Lakeville transmission line and the Tulucay West, Tulucay East and Vaca-Dixon alternatives are shown in Figure W.


GEYSERS AREA
Castle Rock Jct.
Vaca-Dixon Alternative 58 miles
Substations
Existing 230 kV lines
Proposed Alternatives
System Changes
FIGURE W
Lakeville Alternative 38 miles
Tulucay Easterly Alternative 61 miles
Lake Berryessa
Fulton Substation
Tulucay Westerly Alternative 51 miles
VACA-DIXON SUBSTATION
23 miles
TULUCAY SUBSTATION
LAKEVILLE SUBSTATION
10 miles
Ignacio Jct.
7 miles
AMERICAN CANYON JUNCTION
21 miles
Bahia Substation
Ignacio Substation
Sobrante Substation
Pacific Ocean
Moraga Substation

1. National, State or Local Laws or Declared Policy

There is no newly addressed evidence in this AFC record concerning conformity to local land use plans for the Tulucay West, Tulucay East, or Vaca-Dixon alternatives which would permit a comparison with the Castle Rock Junction-Lakeville proposal which does not conform to local land use plans.

2. Economic Impacts

The construction and operating cost ($/1982) of the proposed transmission line and the Tulucay West, Tulucay East, and Vaca-Dixon alternatives are:

	Lakeville (proposed) I	Tulucay West Alternative II	Tulucay East Alternative III	Vaca-Dixon Alternative IV
Capital Cost of Transmission Facilities	70,840	75,620	81,840	84,660
Levelized Annual Revenue Requirement	12,920	13,870	14,990	15,350
Yearly Value of Excess Transmission Losses	-	- 4,320	- 1,630	- 840
NET YEARLY COST (RT 12,100:14-22)	$ 12,920	$ 9,550	$ 13,360	$ 16,190

There is the potential for generation curtailment costing $111,200,000 assuming a 17 month delay beyond the presently scheduled operation date of June 1984 due to regulatory proceedings and transmission line surveying and design. (12,101:1-4)

Findings

244. PG&E's proposed Castle Rock Junction-Lakeville transmission line has a lower capital cost than Tulucay West, Tulucay East, or Vaca-Dixon.

245. Tulucay West has a lower net yearly cost than PG&E's proposed transmission line due to excess transmission energy loss savings.

246. There is the potential for generation curtailment, costing as much as $111.2 million due to an additonal 17 month period to certify, design and construct the Tulucay West, Tulucay East or Vaca Dixon alternatives.

3. Environmental Impacts

Staff consultants conducted a corridor evaluation study, examining four potential corridors: Castle Rock Junction to Lakeville (I), Castle Rock Junction to Tulucay West (II), Castle Rock Junction to Tulucay East (III), and Castle Rock Junction to Vaca-Dixon (IV). This comparative corridor evaluation establishes the relative degree of environmental constraints that exist among each of the corridors, considering only those constraints that could not be mitigated by alignment adjustments.

As depicted on the Corridor Evaluation Matrix (Figure X), six evaluation categories were selected, i.e., visual, land use, geology, wildlife, vegetation, soils. A variety of evaluation factors were used to determine the constraints within these evaluation categories. The numbers appearing in each of the columns represent a mile or portion of a mile along that corridor in which one of the environmental constraints is found. Within each evaluation category there may be a number of overlapping constraints which add up to a greater constraint mileage than the actual length of the corridor. A constraint is reflected only in a linear dimension along the

FIGURE X

CORRIDOR EVALUATION MATRIX

Evaluation Catagory	Evaluation Factor	Corridor: I	II	III	IV
Visual Quality	New Non-Parallel Corridor	13.5	38.5	59	60
	Corridor with Parallel T.C.	30.5	18	11.5	22.5
	V.Q.E.A. in or near Non-Parallel Corridor	4	14.75	23.5	18.75
	V.Q.E.A. in or near Corridor with Parallel T.C.	7.5	3.75	7.5	7
	Subtotal	55.5	75.0	101.45	108.25
Land Use	Existing Outdoor Recreation Area	0	1.75	1.25	0
	Proposed Outdoor Recreation Area	0	3.25	16.5	11.5
	Existing and Proposed Reservoir	3.0	3.0	1	1
	Existing Urban Residential	0	0	0	0
	Existing Rural Residential	3.0	3.25	1	5.5
	Airports and Vortac Stations	1	0	3	4
	Zoning and Plan Designation	*	*	*	*
	Subtotal	7	11.25	22.75	22.0
Geology	Fault Ground Rupture	18.5	11.0	7.5	6.5
	Liquefaction	0	2	1	0
	Slope Instability	19.5	19.0	17.0	19.5
	Subtotal	38.0	32.0	25.5	26.0
Wildlife	Peregrine Falcon Habitat	0	0	2	2
	Peregrine Falcon Foraging	0	0	3	3
	All Other Rare and Endangered Species	0	0	0	0
	Nesting Sites	0	0	0	0
	Seasonal Waterfowl	0	1	0	10
	Riparian and Marsh	0	0	0	4.5
	Wildlife Refuges	0	0	0	0
	Stream Crossings	19	27	19	20
	Subtotal	19	28	24	39.5
Vegetation	Rare and Endangered Species	2	1	10	10
Soils	Highly Erodible Soils	32.0	50.5	65.0	57.5
	High Revegetation Difficulty	4.5	4.5	34.5	24.0
	Sub-total	36.5	55.0	99.5	81.5
	Total	158.0	203.25	297.5	301.25

corridor and does not reflect the total area of the environmental occurrence within or beyond that corridor. (RT 12,812:5-17) An assumption, implicit in the analysis, is that all environmental constraints are of equal importance. (RT 12,753 - 12,770)

The following three categories were not considered: the probability of seismic occurrence, archaeologic-ethnographic resources, and designated city and county land use plans and policies. (RT 12,793:16-21; 12,795:1-5; 12,796: 12-15)

Specific information with regard to environmental constraints and particular impacts was available for the Lakeville corridor; however, the same level of detail was unavailable for the Tulucay West, Tulucay East, and Vaca-Dixon corridors. (RT 12,802:1-11) Therefore, for purposes of constructing the matrix, only items supported by equal levels of information and sensitivity were included as evaluation categories and/or factors to permit a comparable analysis for all corridors. (RT 12,803:5-8)

Therefore, specific, known impacts on the Lakeville corridor were not evaluated against constraint miles in the alternative corridors. Rather, the specific impacts were generalized to a "constraint" level of analysis.

Notwithstanding the total constraint miles shown on the Corridor Evaluation Matrix the Staff witnesses concluded:

(1) The Castle Rock to Lakeville corridor has the least number of total constraint miles relative to the other three corridors.

(2) The Castle Rock to Tulucay West corridor, while significantly better than either Tulucay East or Vaca-Dixon in terms of constraint miles,

was found to exhibit a significantly higher total number of constraint miles than the Castle Rock to Lakeville corridor.

(3) The Castle Rock to Tulucay East corridor was found to be the worst of the alternatives when measured in terms of constraint miles.

(4) The Castle Rock to Vaca-Dixon corridor was found to be better than the Tulucay East Alternative and worse than either Tulucay West or the Castle Rock to Lakeville corridor. (RT 12,758 - 12,760)

The witnesses concluded that there are no more prudent or feasible alternatives to the proposed Castle Rock to Lakeville corridor, which emerges as the least environmentally constrained from their analysis. (RT 12,778)

Biology

PG&E's witness ranked the four alternative transmission line corridors on the basis of types and qualities of habitat, relative levels of human intrusion, and the potential for harmful impact due to transmission line construction (RT 11,535:3-5): Castle Rock Junction-Lakeville, Castle Rock Junction-Tulucay West and lastly, Castle Rock Junction-Tulucay East and Castle Rock Junction-Vaca-Dixon. The witness did not conduct a site-specific biological resource inventory for any of the alternatives other than the Castle Rock to Lakeville alignment. (RT 11,749:3-5) Site-specific information obtained on the Castle Rock to Lakeville route includes actual locations of tower placements and footings, access roads and spur roads. (RT 11,748:22-24)

Since more than one potential alignment exists in each of the four corridors (RT 11,742:5-14), the corridor in which a greater potential for biological impacts exists could actually have fewer biological impacts based on the final construction alignment. (RT 11,738:5-9)

Biological resources along the Vaca-Dixon and Tulucay East corridors are similar, but information was inadequate to differentiate between the two routes based on the occurrence of such resources. (RT 11,535:5-13) Potentially harmful impacts would be greater along the Vaca-Dixon and Tulucay East corridors than they would be in the Lakeville or Tulucay West corridors.

The construction of a transmission line in the Tulucay West Corridor was considered to have a greater potential for harmful impacts to biological resources than would construction along the Castle Rock to Lakeville route for those portions of the corridors that do not have a common alignment. (RT 11,535:13-18)

Geology

PG&E's geologic assessment of the four corridors included an analysis of regional geology, seismicity, and potential hazards within the corridors. A preliminary geologic field examination was undertaken for the four corridors and subsequently a more detailed field investigation was made of the Castle Rock to Lakeville route. (RT 11,867:7-12) Inspection included the full width of each corridor, encompassing at least a mile, and beyond that extent for any geologic features that might impact upon the corridors. (RT 11,868:6-10)

All four corridors traverse steep, hilly terrain and areas of unstable slopes. The potential geologic hazards along the Tulucay East, Tulucay West and Vaca-Dixon corridors are associated with landslides. (RT 11,857: 14-17; 11,860:1-5; 11,859:4-8) The Lakeville alignment crosses the

Mayacama and Rogers Creek faults, the Tulucay West crosses the Mayacama fault, and the Tulucay East crosses the Green Valley fault. None of the geologic hazards are severe enough to preclude locating a transmission line within any of these corridors. (RT 11,860:21-11:861:3)

The preliminary corridor review assessed potential hazards, whereas actual hazards or the absence of them have been determined during the site-specific review of the Castle Rock to Lakeville alignment. (RT 11,876:25-11,877:5)

In the absence of unavoidable geological hazards, a shorter route is geologically preferable, as the number of towers and access roads are reduced. (RT 11,888:3-21) As a result of the existing alignment the Castle Rock to Lakeville corridor would require construction of fewer towers and access roads than the other alternatives. (RT 11,892:8-19)

The preliminary corridor review assessed potential hazards, whereas actual hazards or the absence of them have been determined during the site-specific review of the Castle Rock to Lakeville alignment. (RT 11,876:25-11,877:5)

During the site specific review, each tower site was evaluated on the 11 mile nonparallel section. (RT 11,868:11-16) On the basis of the site-specific evaluation and the shorter corridor length, the PG&E witness concludes that the Castle Rock Junction to Lakeville corridor is preferable, although all the routes are feasible and the transmission line can be constructed in any of the corridors with very careful placement of the towers. (RT 11,872:16-17; 11,879:8-10)

Cultural Resources

PG&E's witness on cultural resources conducted an intense field investigation along the Castle Rock Junction to Lakeville route and sensitivity analysis of the other three alternatives, based upon published and archival data. Except for that portion of Tulucay West which is common to the Castle Rock Junction to Lakeville route, no field surveys were conducted of the Tulucay West, Tulucay East, or Vaca-Dixon corridors. (RT 12,681:4-8) While the archaeological sensitivity varied within each of the four corridors, no one corridor appeared to have archaeological resources of such significance that selection of that corridor should be eliminated. (RT 12,681: 10-14)

The ten prehistoric sites, four historic sites, one Native American ethnobotanical site, and seven segments of rock fences discovered during field surveys conducted on the Castle Rock Junction to Lakeville route, can be either avoided or protected from significant impact by the proper implementation of impact mitigation measures. (RT 12,686:5-12) The witness states his belief that similar avoidance or protection would be feasible if field surveys were conducted on the other alternative corridors. (RT 12,687:1-7; 12,711:22-12,712:5)

Although the witness testified that direct comparison of the intensively-studied Castle Rock Junction to Lakeville route with the three alternatives could be misleading, it was concluded that a shorter route is preferable to a longer route, in the absence of data obtained from ground surveys. (RT 12,685: 7-21) Therefore, the witness ranked the four corridors in the following order, with the most preferred first:

Castle Rock to Lakeville (38 miles), Tulucay West (51 miles), Vaca-Dixon (58 miles), Tulucay East (61 miles).

In summary, PG&E witnesses for biology, geology and cultural resources conclude that the Castle Rock Junction to Lakeville corridor is preferable, based upon a site-specific evaluation of that alignment and general reconnaissance of the three other alternative corridors. Although information is available in greater detail for the Castle Rock Junction to Lakeville corridor than for any of the alternative corridors, the PG&E witnesses suggested, however, that acceptable alignments could be found within each of the alternative corridors in order to avoid geologically hazardous areas, and cultural or environmental resource areas. (RT 11,860:25-11,861:3; 11,742:10-13; 12,686:26-12,687:7)

Discussion

The foregoing comparisons of the specific Castle Rock Junction-Lakeville alignment with the Tulucay and Vaca-Dixon corridor alternatives suffer from the same analytical problem encountered by the Commission on the Chalk Mountain Alternative, namely comparing discernible impacts against a corridor-wide potential for impact avoidance.

The analyses have attempted to equalize the evaluation, essentially by generalizing known impacts on the proposed route.

While the Commission has used the witnesses' analyses in comparing the alternatives and on that basis finds that the proposed transmission line has the fewest environmental constraints, the Commission gives less relative weight to this criterion given the inherent weakness in these comparative methods.

4. Social and Community Impacts

The Corridor Evaluation Matrix used herein includes visual and land use impacts, one aspect of Social and Community Impacts.

There is no newly adduced evidence in this AFC record other than those two portions of the Corridor Evaluation Matrix which pertain to Social and Community Impacts on the Tulucay West, Tulucay East and Vaca-Dixon alternatives.

Finding

247. Based upon the Corridor Evaluation Matrix, PG&E's proposed Lakeville transmission line has the fewest visual and land use constraint miles, compared to Tulucay West, Tulucay East, and Vaca-Dixon.

5. Public Health and Safety

There is no newly adduced evidence in this AFC record pertaining to Public Health and Safety for the Tulucay West, Tulucay East or Vaca-Dixon alternatives.

6. Reliability

Finding

248. Based upon the geologic evaluation of the Corridor Evaluation Matrix and the similarity of the transmission towers, the Tulucay West, Tulucay East, and Vaca-Dixon alternatives are comparable to the Castle Rock Junction-Lakeville proposal.

7. Ability to be Integrated With Existing System

Findings

249. The Castle Rock Junction-Lakeville proposal, the Tulucay West, Tulucay East and the Vaca-Dixon alternatives are equally acceptable points of junction with PG&E's interconnected transmission system. (RT 12,100: 4-5)

250. The Lakeville, Tulucay, and Vaca-Dixon substations are interconnected by the Vaca-Dixon-Lakeville 230 kV DCTL. (RT 12,099:14-16)

251. The proposed Castle Rock Junction-Lakeville transmission line makes the best use of the existing 230 kV transmission system between Lakeville, Vaca-Dixon, Ignacio, and Sobrante substations (RT 12,101,15-17; 12,102: 3-15; 12,336), provides support to Sonoma and Marin counties' load centers (RT 12,101:24-26; 12,291:5-19), and is the best combination with regard to costs and system planning. (RT 12,102:1-2)

8. Indirect or Consequential Impacts

Finding

252. There is no newly adduced evidence in the AFC record pertaining to Indirect or Consequential Impacts for the Tulucay West, Tulucay East, and Vaca-Dixon alternatives.

9. Time

Finding

253. The Tulucay West, Tulucay East, and Vaca-Dixon alternatives will each take at least 17 months more to complete because of the additional time needed to prepare and submit a new Application for Certification, complete the certification process and to survey and design the route. (RT 11,947:8-12)

10. Acceptable Engineering Practices

Finding

254. The 230 kV Tulucay West, Tulucay East, and Vaca-Dixon transmission line alternatives use the same components (except 4 circuit transmission towers) as the proposed 230 kV Castle Rock Junction-Lakeville transmission line.

11. Suitable Site

Finding

255. Based upon the geologic evaluation of the Corridor Evaluation Matrix the Tulucay West, Tulucay East, and Vaca-Dixon alternatives are comparable to the Castle Rock Junction-Lakeville proposal.

12. Commercially Available Technology

Finding

256. The transmission line towers, conductors and other components for the Tulucay West, Tulucay East, and Vaca-Dixon alternatives are commercially available.

"On Balance" Evaluation

The Tulucay East and Vaca-Dixon Alternatives have no significant advantages in comparison to the proposed Castle Rock Junction-Lakeville transmission line, but they do have a significant disadvantage due to higher capital cost and delay in commencement of operation that would lead to generation curtailment.

While Tulucay West does have a yearly cost advantage, that cost factor cannot predominate this evaluation. PG&E's selection of the Lakeville route in filing an Application for Certification, instead of Tulucay West, was made on the basis of the permissible exercise of the Applicant's transmission planning judgment. Therefore, the Tulucay West alternative fairly bears the added costs of potential generation curtailment, design and construction.

Finding

257. The Tulucay and Vaca-Dixon alternatives are not more prudent and feasible than the proposed Castle Rock Junction-Lakeville transmission line.

G. Fulton L-Sonoma County Alternative

The Fulton L alternative is the transmission line alternative which the Sonoma County Board of Supervisors determined to conform to the County General Plan. (Resolutions 63138, RT 10,517; Resolution 63494)

Generally, the Fulton L avoids the 11 mile nonparallel section of the PG&E proposed transmission line by paralleling the Castle Rock Junction-Fulton 230 kV transmission line, undergrounding in Wikiup, Larkfield, Valley of the Moon-Oakmont, and consolidating the proposed and existing transmission lines through Annadel State Park and other sensitive areas.

The Fulton L would include:

- Construction of a double circuit tower line parallel to the existing Castle Rock Junction-Fulton 230 kV transmission line from Castle Rock Junction to Wikiup near the Fulton substation.
- Undergrounding the proposed and existing 230 kV circuits through Wikiup and West Larkfield. (2.6 miles)
- Construction of a double circuit tower line parallel to the existing 230 kV, 115 KV and 60 kV transmission lines for 1.0 miles east of the undergrounding section.
- Consolidation of the proposed 230 kV circuits, the existing Fulton Junction-Fulton 115 kV circuits on common 6 circuit towers between Wallace Road and Calistoga Road (3.8 miles).
- Construction of a double circuit tower line parallel to existing lines from Calistoga Road to Lakeville except for undergrounding the Valley of the Moon-Oakmont and consolidating the Annadel crossings.
- Undergrounding the Valley of the Moon-Oakmont-Wild Oak (1.9 miles) and consolidation of the four circuits on 4 lattice towers through Annadel State Park and Bennett Valley to Sonoma Mountain Road (No. 2) near Coopers Grove. (4.1 miles)

  (RT 11,944:9-11,945:3; 11,945:18-26)

The Fulton L route is 43.6 miles long, or 5.6 miles longer than the PG&E proposed Castle Rock Junction-Lakeville transmission line. (RT 11,945:4-5)

See Figures Y and Z.

1. National, State, or Local Law or Declared Policy

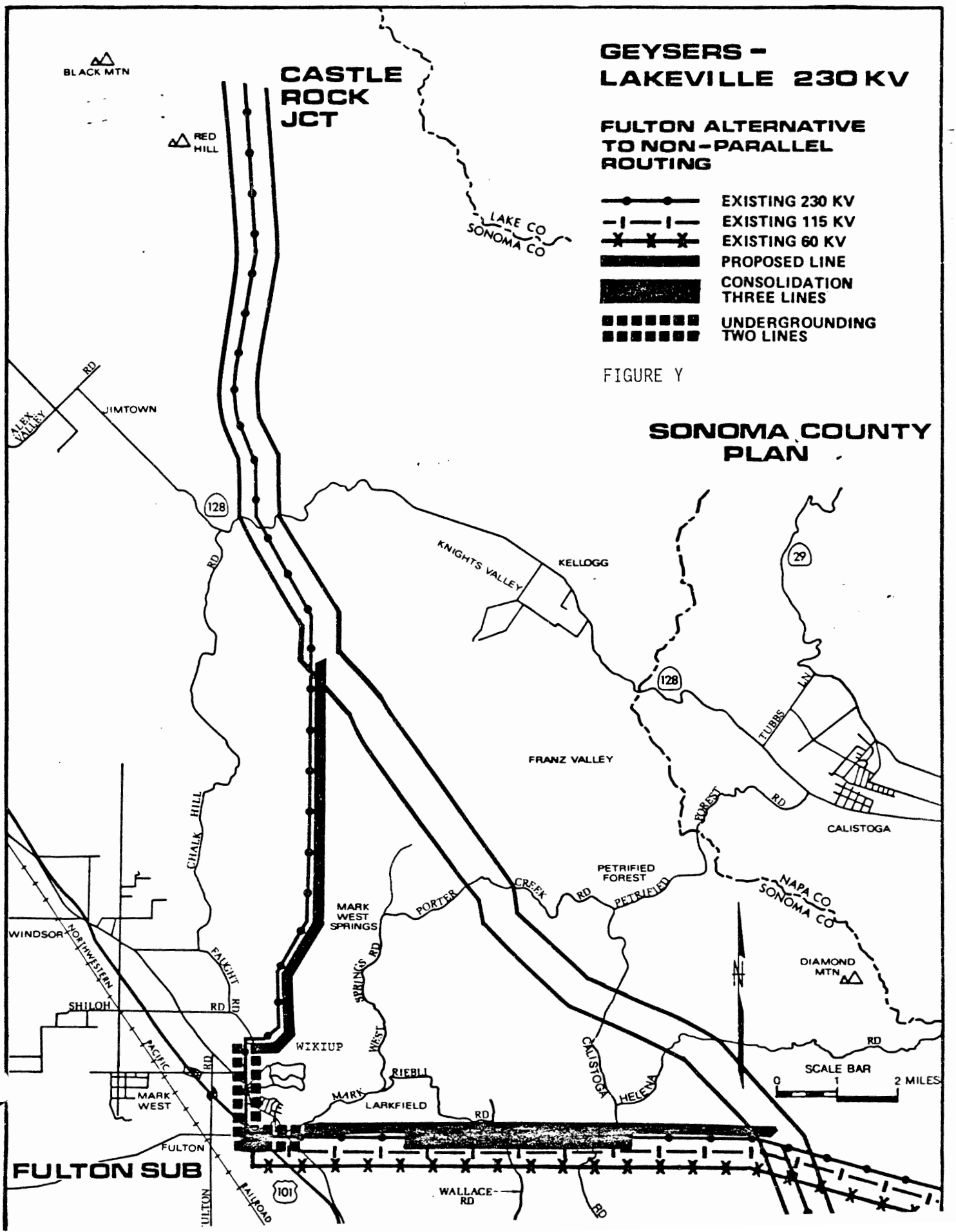
By fulfilling the terms of Resolution 63138 and 63494, the Fulton L is superior to the proposed Castle Rock Junction-Lakeville transmission line which does not conform to local land use plans.

2. Economic Impacts

The construction and operating costs ($/1983) of the Fulton L-Sonoma County Plan are:

	Lakeville (proposed)	Fulton (only)	Sonoma County Plan (Fulton L, Underground Valley of the Moon and Consolidation)
Capital Cost of Transmission Facilities	70,840,000	103,918,000	approx. 125,328,000
Difference		[+33,078,000]	[+54,538,000]
Levelized Annual Revenue Requirement	12,920,000	18,951,000	approx. 22,856,000
Difference		[+6,031,000]	[+9,936,000]
Yearly Value of Excess Transmission Losses	-0-	1,373,000	approx. 1,802,000
NET YEARLY COST (RT 12,123; 12,126)	$ 12,920,000	$ 20,324,000	$ 24,658,000

The cost of potential generation curtailment for a 17 month regulatory and design delay would be $111.2 million. (RT 11,947:8-12)


GEYSERS – LAKEVILLE 230 KV
FULTON ALTERNATIVE TO NON-PARALLEL ROUTING
EXISTING 230 KV
EXISTING 115 KV
EXISTING 60 KV
PROPOSED LINE
CONSOLIDATION THREE LINES
UNDERGROUNDING TWO LINES
FIGURE Y
SONOMA COUNTY PLAN
CASTLE ROCK JCT
BLACK MTN
RED HILL
LAKE CO
SONOMA CO
ALEX VALLEY RD
JIMTOWN
128
KNIGHTS VALLEY
KELLOGG
29
TUBBS LN
FRANZ VALLEY
FOREST RD
CALISTOGA
CHALK HILL RD
PETRIFIED FOREST
PETRIFIED CREEK RD
NAPA CO
SONOMA CO
MARK WEST SPRINGS
PORTER CREEK RD
WINDSOR
NORTHWESTERN PACIFIC RAILROAD
FAIRGHT RD
SHILOH RD
DIAMOND MTN
WIKIUP
WEST SPRINGS RD
RIEBLI RD
MARK WEST
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FULTON SUB
FULTON RD
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WALLACE RD

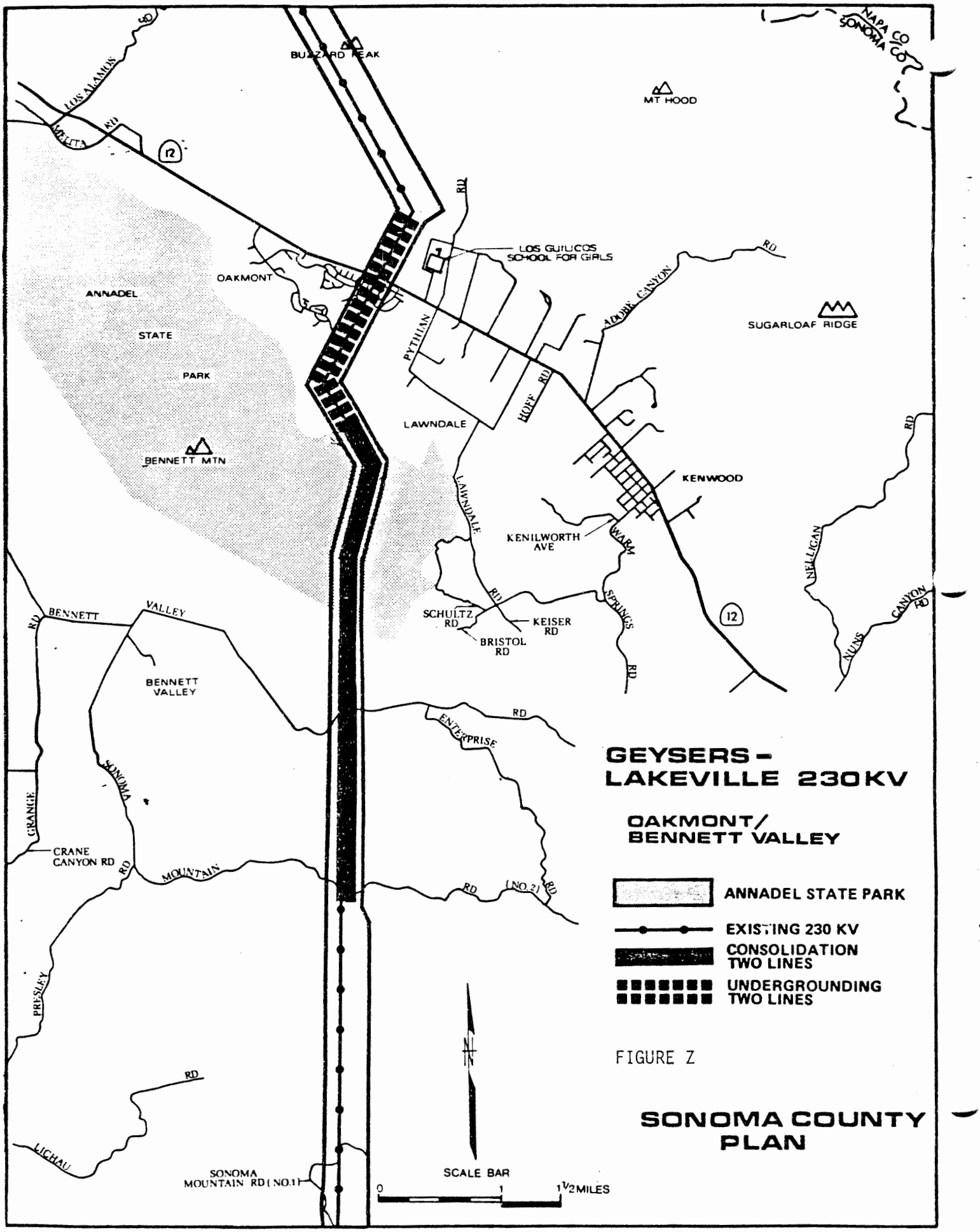

FIGURE Z

SONOMA COUNTY PLAN

3. Environmental Impacts

Biology

The Fulton L traverses habitat types similar to the nonparallel section of the PG&E proposed transmission line, and would therefore have similar impacts to biological resources. (RT 11,536:4-10; 11,743:17-21; 11,767: 24-11,768:6)

Geology

The Fulton L would traverse some of the same geologic formations as the nonparallel section of the PG&E proposed transmission line. Although the potential geologic hazards along the Fulton L appear to be greater than along the nonparallel section, the existing transmission line on the Fulton L which spans active faults and potentially active landslides has performed adequately. (RT 11,861:17-23)

Archaeology

There is a general absence of field survey data for the area of the Fulton L. (RT 12,684:13-14) Whether significant cultural resources are situated along the Fulton L is unknown. (RT 12,687:23-25) However, the valley and foothill portions of the Fulton L appear archaeologically sensitive and some of these sensitive areas are within the underground section. (RT 12,684:14-18)

The vicinity of Mark West Creek, its past meander zone, and the transition between the valley and the hill are especially sensitive areas. (RT 12,684:18-20)

Since extensive alluvial deposits in the vicinity increase the likelihood that buried sites could be present, overhead transmission in the Fulton L or the nonparallel transmission route is preferable to undergrounding the Fulton L. (RT 12,684:26-12,685:4; 12,687:23-12,688:9)

Findings

258. The Fulton L and 11 mile nonparallel section of the PG&E proposed transmission line are comparable on a biological and geological evaluation.

259. The Fulton L has the potential for more adverse archaeological impacts.

4. Social and Community Impacts

Findings

260. The existing Castle Rock Junction-Fulton 230 kV DCTL traverses a populated section of Wikiup and West Larkfield creating a visual impact that would be alleviated by undergrounding.

261. Similarly, the undergrounding of the Valley of the Moon-Oakmont would alleviate the visual impact of the proposed consolidated 4 circuit transmission line. (See Undergrounding Oakmont)

5. Public Health and Safety

See Undergrounding Oakmont, Public Health and Safety.

6. Reliability

See Undergrounding Oakmont, Reliability.

7. Ability to be Integrated with Existing System

Finding

262. There is no electrical reason for the new 230 kV Geysers transmission outlet to be routed through the Fulton substation. (RT 12,103:3-4)

8. Indirect or Consequential Impacts

There is no evidence in the record concerning indirect or consequential impacts from the Fulton L-Sonoma County Plan.

9. Time

Finding

263. The Fulton L-Sonoma County Plan will take at least 17 months longer to complete than the PG&E proposed transmission line because of additional time needed to prepare and submit a new Application for Certification, complete the certification process, and to survey and design the route. (RT 11,947:7-12)

10. Acceptable Engineering Practice

Finding

264. The Fulton L-Sonoma County Plan can be constructed in accordance with accepted engineering practices.

11. Suitable Site

Finding

265. The Fulton L-Sonoma County Plan traverses an existing and suitable transmission line route.

12. Commercially Available Technology

Finding

266. All of the transmission towers, conductors, transition station components, and undergrounding systems are commercially available.

"On Balance" Evaluation

The advantages of the Fulton L-Sonoma County Plan are its conformity to local land use plans and reduction of visual impacts. Its disadvantages are added cost ($33-54 million more) and time of operation, which significantly outweigh its benefits.

Finding

267. The Fulton L-Sonoma County Plan is not more prudent and feasible than the proposed transmission line.

H. The 500 kV Vaca-Dixon Alternative

The 500 kV DCTL alternative traverses the Castle Rock Junction-Vaca-Dixon alternative corridor to terminate at the Vaca-Dixon substation which has 230 kV and 500 kV facilities.

1. National, State or Local Laws or Declared Policy

There is no newly adduced evidence in this AFC record concerning the conformity of the Castle Rock Junction to Vaca-Dixon corridor to local land use plans.

As a general rule, 500 kV transmission lines have greater excess transmission energy loss savings for long distance bulk power transmission and are therefore more energy conserving. (RT 12,105:10-11; 12,424:15-23) However, a 500 kV transmission line from Castle Rock Junction to Vaca-Dixon is such a short length that the termination energy losses from stepping the voltage up from 230 kV to 500 kV at Castle Rock Junction and back down from 500 kV to 230 kV at Vaca-Dixon are greater than the excess transmission energy loss savings from the use of a 500 kV transmission line. (RT 12,424:25-12,425:14)

Finding

268. To the extent that the termination energy losses exceed the excess transmission energy loss savings for the 500 kV DCTL, the 500 kV Vaca-Dixon DCTL is inconsistent with the State's policy maximizing the utilization of geothermal generational resources. (1981 Biennial Report)

2. Economic Impacts

The construction and operating costs ($/1983) of the 500 kV DCTL alternative are:

	Lakeville (Proposed)	Vaca-Dixon 500 kV DCTL
Capital Cost of Transmission Facilities	70,840,000	143,130,000
Difference		[+72,290,000]
Levelized Annual Revenue Requirement	12,920,000	27,120,000
Difference		[+14,200,000]
Yearly Value of Excess Transmission Losses	-0-	-10,390,000
NET YEARLY COST (RT 12,104:25-12,105:24)	$ 12,920,000	$ 16,730,000

A single circuit 500 kV transmission line would have a capital cost of over one half of a 500 kV double circuit transmission line. (RT 12,298:13-25)

The cost of potential generation curtailment for an 18 month regulatory and design delay would be $124.7 million. (RT 12,106)

Findings

269. The 500 kV Vaca-Dixon double circuit transmission line is almost twice the capital cost of the proposed transmission line.

270. A single circuit 500 kV Vaca-Dixon transmission line is more than half the cost of a 500 kV double circuit transmission line.

271. The generation curtailment from an additional 18 months to certify, design and construct the 500 kV Vaca-Dixon DCTL would cost as much as $124 million.

3. Environmental Impacts

A 500 kV DCTL requires a wider right-of-way than a 230 kV DCTL. (RT 12,448:12)

Refer to the Environmental Impact discussion of the Tulucay-Vaca-Dixon Alternative section herein for the comparison of environmental impacts between Castle Rock Junction to Vaca-Dixon and Castle Rock Junction to Lakeville.

Findings

272. The 500 kV DCTL requires a larger right-of-way than a 230 kV DCTL.

273. The Vaca-Dixon corridor has more environmental constraint miles than the PG&E proposed transmission corridor.

4. Social and Community Impacts

There is no evidence in the record concerning Social and Community Impacts from the 500 kV Castle Rock Junction-Vaca-Dixon DCTL.

5. Public Health and Safety

A 500 kV transmission line will emit a stronger electromagnetic field under similar circumstances than a 230 kV transmission line.

There is no other evidence in the record concerning Public Health and Safety of the 500 kV Castle Rock Junction-Vaca-Dixon transmission line.

6. Reliability

A 500 kV transmission system is as reliable as a 230 kV transmission system.

In this instance, a single circuit 500 kV Castle Rock Junction-Vaca-Dixon transmission line would not meet the single line outage criteria, with or without a switching station at Castle Rock Junction. (RT 12,294:15-22; 12,445:4-7; 12,449:3-4)

Neither the existing Castle Rock Junction-Fulton 230 kV DCTL nor the proposed Castle Rock Junction-Lakeville 230 kV DCTL meet criteria for maximum generation capacity under normal and emergency line loading conditions or for maximum generation capacity from the source area (The Geysers) during any anticipated system loading condition, but remain marginally acceptable since a single line outage would result in the loss of only approximately 25 percent of maximum generation. (RT 12,447:14-12,449:1)

With the installation of a switching station at Castle Rock Junction, all transmission criteria would be met for either a 230 kV or 500 kV DCTL. (RT 12,449:8-11)

Findings

274. The proposed transmission line, in conjunction with the existing transmission line, is more reliable than the 500 kV Vaca-Dixon transmission line in conjunction with the existing transmission line.

275. The installation of a switching station at Castle Rock Junction would render any transmission outlet therefrom more reliable.

7. Ability to be Integrated with Existing System

The 500 kV Castle Rock Junction-Vaca-Dixon DCTL would require the construction of a 230 kV to 500 kV substation with a 1,000 MW transformer capacity at Castle Rock Junction and either (1) a 500 kV transmission line from Vaca-Dixon to Tesla with an additional 500/230 kV, 1,000 MW transformer bank at Tesla, or (2) an additional 500/230 kV, 1,000 MW transformer bank at

Vaca-Dixon with a 230 kV DCTL from Vaca-Dixon to Sobrante. (RT 12,105:3-9)

The added costs for the 230/500 kV transformer bank at Castle Rock Junction and the 500/230 kV transformer bank at Vaca-Dixon are approximately $50.5 million in comparison with the 230 kV Castle Rock Junction-Vaca-Dixon DCTL alternative. (RT 12,180) The 230 kV Castle Rock Junction-Vaca-Dixon alternative, infra, also requires a 230 kV DCTL from Vaca-Dixon to Sobrante.

Generally, since the bulk of PG&E's major transmission is 230 kV, it is not useful to step up and then step down original 230 kV transmission. (RT 12,404:17-12,405:11)

Finding

276. The 500 kV Vaca-Dixon DCTL would require the installation of more 500/230 kV transformer capacity to the PG&E system, which is primarily a 230 kV transmission system.

8. Indirect or Consequential Impacts

See Integrate with Existing Facilities.

9. Time

The 500 kV Castle Rock Junction-Vaca-Dixon DCTL would be delayed 18 months after the date estimated for operation of the Castle Rock Junction-Lakeville 230 kV DCTL due to the time necessary for regulatory review, surveying and designing the route. (RT 12,106:1-2)

Finding

277. The 500 kV Vaca-Dixon DCTL would require an additional 18 months more than the proposed transmission line to undergo regulatory review and route survey and design.

10. Acceptable Engineering Practice

Finding

278. A 500 kV DCTL can be constructed in accordance with accepted engineering practices.

11. Suitable Site

Finding

279. A 500 kV DCTL can be constructed within the Castle Rock Junction-Vaca-Dixon corridor.

12. Commercially Available Technology

Finding

280. The 500 kV transmission facilities are commercially available.

	NATIONAL, STATE OR LOCAL LAW OR DECLARED POLICY	ECONOMIC IMPACTS	ENVIRONMENTAL IMPACTS	SOCIAL AND COMMUNITY IMPACTS	PUBLIC HEALTH AND SAFETY	RELIABILITY	ABILITY TO BE INTEGRATED WITH EXISTING SYSTEM	INDIRECT OR CONSEQUENTIAL IMPACTS	TIME	ACCEPTABLE ENGINEERING PRACTICE	SUITABLE SITE	COMMERCIALLY AVAILABLE TECHNOLOGY	MORE PRUDENT AND FEASIBLE
PG&E PROPOSAL													
CHALK MOUNTAIN	=	=	=	=	=	=	=	=	=	=	=	=	NO
RECONSTRUCTION	= or +	-	=	+	*	-	= or -	*	-	*	=	=	NO
UNDERGROUND TECHNOLOGY	-	-	= or -	+	-	-	-	*	-	-	=	-	NO
UNDERGROUNDING THROUGH OAKMONT	+	-	-	+	+	+	=	=	=	=	=	=	YES
NOI													
1) VACA-DIXON	*	-	-	-	*	=	-	*	-	=	=	=	NO
2) TULUCAY EAST	*	-	-	-	*	=	-	*	-	=	=	=	NO
TULUCAY WEST	*	-	-	-	*	=	-	*	-	=	=	=	NO
3) FULTON L	+	-	=	+	+	= or -	-	*	-	=	=	=	NO
4) 500 kV	-	-	-	*	*	=	-	*	-	=	=	=	NO

* INSUFFICIENT RECORD TO MAKE A FINDING

IV. FINDINGS PURSUANT TO PUBLIC RESOURCES CODE SECTION 25525

281. There are not more prudent and feasible means to achieve the public convenience and necessity than the PG&E proposed Castle Rock Junction to Lakeville transmission line, except the partial modification thereof by undergrounding across the Valley of the Moon and Oakmont.

V. CONDITIONS FOR CERTIFICATION PURSUANT TO PUBLIC RESOURCES CODE SECTION 25525

(mmm) PG&E shall underground the proposed Castle Rock Junction to Lakeville 230 kV double circuit transmission line for 1.2 miles across the Valley of the Moon and Oakmont (approximately towers 103-107).

(nnn) PG&E is authorized by this certification to underground the existing Fulton to Ignacio 230 kV double circuit transmission line in conjunction with the undergrounding of the Castle Rock Junction to Lakeville 230 kV double circuit transmission line in order to comply with the General Plan of the City of Santa Rosa and the General Plan of the County of Sonoma.

(ooo) PG&E shall perform a cost benefit analysis for the sizing of underground conductors to minimize excess transmission energy losses to the extent economically beneficial. The underground facility shall not exceed the thermal capacity of the overhead Castle Rock Junction-Lakeville transmission line.

(ppp) PG&E shall revegetate around the transition station sites to control erosion and to create visual screening.

(qqq) --DELETED--

(rrr) The following parcels, within the right-of-way of the PG&E proposed transmission line, are subject to new and extraordinary impacts by the presence of the transmission line, and the owners thereof shall be compensated therefor to the extent permitted by law:

Assessor's Parcel No. 79-02-31
Assessor's Parcel No. 28-05-17
Assessor's Parcel No. 28-05-02
Assessor's Parcel No. 28-06-17
Assessor's Parcel No. 28-06-29
Assessor's Parcel No. 28-06-16

(sss) No less than 6 months prior to the commencement of construction of any of towers 55, 56, 57, or 58, PG&E shall monitor the water quality of Loch Haven Lake for sedimentation and report its findings to the Commission. Following the first significant rain following construction of towers 55, 56, 57 or 58, PG&E shall monitor the water quality of Loch Haven Lake for sedimentation every two months for a period of 8 months, at which time, monitoring and reporting may be continued for a period agreed to by PG&E and the CEC staff, or in the absence of such agreement and upon submission to the Commission itself, for a period as directed by the Commission. In the event the construction of towers 55, 56, 57 or 58 causes significant sedimentation of Loch Haven Lake, PG&E shall undertake remedial measures as agreed to by PG&E and the CEC staff or as determined by the Commission in the event of a dispute.

(ttt) To avoid or reduce curtailment of Geysers generation, PG&E shall implement a program of dynamic thermal loading on the existing Geysers transmission facilities beginning the summer of 1983 and continuing until the Castle Rock Junction-Lakeville 230 kV transmission line is placed in service.

(uuu) PG&E shall inform the California Public Utilities Commission (CPUC) of this Commission's findings concerning the reconstruction of the existing Fulton-Ignacio 230 kV double circuit transmission line and shall inform both this Commission and the CPUC of the feasibility of such reconstruction prior to the summer of 1983.

(vvv) To avoid visual impacts and removal of a significant amount of vegetation, towers 75 and 76 shall be placed as proposed by PG&E and shall not be relocated easterly, down the ridge.

(www) PG&E may construct lattice or tubular towers for towers 54 to 61, inclusive. If towers 55 through 58 are lattice towers, PG&E shall construct such towers by helicopter. PG&E shall avoid the nesting areas of the eagle population in the vicinity of towers 54 to 61 in the placement of the transmission line.

(xxx) In the event that access roads around and near Loch Haven Lake are used to construct either tubular towers or lattice towers, PG&E shall comply with the terms of, and perform all the acts required of it as enumerated in Sections 13-18, inclusive, of the COMPLIANCE PLAN FOR PG&E'S GEYSERS UNIT 16, attached hereto as Appendix A and incorporated by reference herein.

(yyy) For all conditions in this Decision, for which a verification procedure is not provided in the COMPLIANCE PLAN FOR PG&E'S GEYSERS UNIT 16, PG&E shall provide the CEC with an annual statement verifying compliance with said conditions, until all conditions have been met.

PART FIVE--MISCELLANEOUS FINDINGS

I. RATE IMPACTS

Finding

282. The relatively low cost of Geysers Unit 16 and the proposed 230 kV Castle Rock Junction-Lakeville transmission line, 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.

II. DEVELOPMENT RIGHTS

Finding

283. The Applicant will construct and operate Geysers Unit 16 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, except the widening of the right-of-way through Wild Oak. (See PART THREE, Public Health and Safety, Electromagnetic Fields)

III. LOAD MANAGEMENT STANDARDS

Finding

284. At this time, PG&E is in compliance with the Commission's adopted load management standards, Title 20, California Administrative Code, section 1621.

IV. OPERATION STANDARDS

Finding

285. No standards of efficiency for operation of the facility have been adopted by the Commission pursuant to Public Resources Code section 25402(d).

V. ENVIRONMENTAL IMPACT REPORT

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 and confirmed to exist by this Decision. There are no specific economic, social, or other considerations which make infeasible the mitigation measures identified in the Final Environmental Impact Report and confirmed as warranted by this Decision. The conditions enumerated in this Decision mitigate all the identified and confirmed significant environmental impacts.

Findings

28&. The project, by itself, will not result in significant adverse impacts if mitigated as provided herein.

28'. 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.

PART SIX--CONCLUSIONS

Conclusions

1. The provision of Public Resources Code section 25524, requiring an affirmative showing of conformity to the forecast, has been met.

2. With the application of the mitigation measures herein the proposed Geysers Unit 16 and the proposed 230 kV transmission tap line can be constructed and operated to comply with all applicable federal, state, regional, and local laws, regulations and standards.

3. With the application of the mitigation measures herein the proposed 230 kV Castle Rock Junction-Lakeville transmission line will comply with all applicable federal, state, regional, and local laws, regulations and standards, except the General Plan of the City of Santa Rosa, the General Plan of the County of Sonoma, the Franz Valley Specific Plan, the North Sonoma Valley Specific Plan, the Bennett Valley Specific Plan and the Sonoma Mountain Specific Plan.

4. The conditions and mitigation measures herein are all necessary and reasonable for public health and safety and environmental protection pursuant to Public Resources Code sections 25523(a) and 25535.

5. The proposed 230 kV Castle Rock Junction to Lakeville transmission line is required for the public convenience and necessity and, except as modified herein, there are not more prudent and feasible means of achieving such public convenience and necessity. The proposed 230 kV Castle Rock Junction to Lakeville transmission line is certifiable pursuant to the terms of Public Resources Code section 25525.

PART SEVEN--ORDER

1. PG&E's Application for Certification for Geysers Unit 16 is granted.

2. PG&E's Application for Certification is granted for a 230 kV tap line from Unit 16 via [redacted] NCPA No. 2.

3. PG&E's Application for Certification for Castle Rock Junction-Lakeville 230 kV double circuit transmission line is granted as modified herein. The undergrounding of 1.2 miles of the existing Fulton-Ignacio 230 kV double circuit transmission line in the Valley of the Moon-Oakmont crossing is authorized by this certification.

4. The Application for Certification is granted subject to the timely performance of all the conditions enumerated herein and expressly incorporated herein. The conditions herein and expressly incorporated herein constitute the entirety of conditions applicable hereto and are integrated and not severable. While PG&E may delegate the performance of any condition, PG&E's duty to perform all conditions is not delegable.

5. To protect the public health and safety, the Commission shall retain jurisdiction to impose mitigation measures in the event of unresoluble complaints of induced shock at the school bus turn-around at the intersection of Porter Creek Road and Franz Valley Road.

6. For purposes of reconsideration pursuant to Public Resources Code section 25530, this Decision is adopted when filed with the Commission Secretary.

   For purposes of Public Resources Code section 25531, this Decision is final (1) 30 days after it is adopted as provided hereinabove in the absence of the filing a petition for reconsideration or (2) upon the adoption and filing of an order upon reconsideration with the Commission Secretary.

7. The Executive Director of the Commission is directed to transmit a copy of this Decision and accompanying documents pursuant to Public Resources Code section 25537 and section 1768 of the Commission Regulations.

Dated: September 30, 1981

RUSSELL L. SCHWEICKART
Chairman

ARTURO GANDARA
Commissioner

C. SUZANNE REED
Commissioner

JAMES A. WALKER
Commissioner

EMILIO E. VARANINI, III
Commissioner

GEYSERS UNIT 16 COMPLIANCE PLAN
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Part III: TRANSMISSION LINE COMPLIANCE PLAN

GEYSERS UNIT 16 COMPLIANCE PLAN

PART I: Introduction and General Provisions

Section 25532 of the Public Resources Code provides that the California Energy Commission (CEC) shall establish a monitoring system to assure that any facility certified is constructed and operated in compliance with air and water quality, public health and safety, and other applicable regulations, guidelines, and conditions adopted or established by the Commission or specified in the written decision on the application. The following plan, formulated to satisfy that directive for the PG&E Geysers Unit 16 project, is divided into two major components: a Power Plant Compliance Plan and a Transmission Line Compliance Plan.

Significant features of the plan include:

- o Utilization of delegate agencies, where possible, to monitor specific elements of the compliance plan;
- o Compliance verification of each condition by a qualified professional;
- o Periodic compliance reports to be filed by PG&E;
- o An annual compliance report to be filed by PG&E; and
- o A dispute resolution procedure.

Delegate Agencies

The Warren-Alquist Act provides the CEC with exclusive siting authority for thermal power plants and related facilities. To the extent permitted by law, the CEC will delegate authority for compliance verification to various state and local agencies who have expertise in subject areas where specific requirements have been established as a condition of site certification. In the event that a delegate agency is unwilling or unable to participate in this program, the CEC will establish an alternative method of verification.

Verification of Compliance

Verification of compliance with the terms and conditions of certification shall be accomplished either by periodic compliance reports filed by PG&E, or by appropriate letters from delegate agencies verifying compliance, or by auditing project records, or by inspecting the power plant site and related facilities.

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Periodic Compliance Reports

Information required by the compliance plan to be submitted by PG&E to the CEC shall be filed as periodic compliance reports. These reports shall be filed at least once each quarter, numbered consecutively, and contain as a minimum:

- The current project construction or operating status;
- A listing of compliance plan requirements scheduled during the reporting period, with a corresponding description of the status of the requirement, i.e., completed, not started, or in progress;
- For those compliance plan requirements which PG&E had expected to satisfy during the reporting period but which were not satisfied, include a statement of how and when PG&E intends to satisfy the requirement;
- A listing of any minor changes to the compliance plan which have resulted from negotiations between PG&E and the CEC or its delegate agencies; and
- Notification of any filings made with other governmental agencies having permitting authority over any aspect of the project.

Annual Compliance Report

PG&E will submit an annual compliance report to the CEC which will contain the information required by the compliance plan to be filed on an annual basis. An explanation will be provided for any missing information, including an estimate as to when the information will be provided. The annual report shall summarize the primary compliance activities during the previous year.

Compliance Auditor

The CEC shall designate a Compliance Auditor for the PG&E Geysers Unit 16 project. The auditor will be responsible for implementing the approved compliance plan after certification, for maintaining the compliance record files, and for initiating the dispute resolution procedure.

All correspondence pertaining to Geysers Unit 16 compliance matters should be addressed as follows:

Compliance Auditor (79-AFC-5C)
California Energy Commission (MS 2000)
1111 Howe Avenue
Sacramento, CA 95825

Noncompliance

Any person or agency may file a complaint alleging noncompliance with the conditions of certification. Such a complaint will be subject to review by the CEC and can result in proceedings pursuant to Title 20, California Administrative Code Article 4, Sections 1230, et seq.

Enforcement

The Commission's legal authority to impose legal sanctions for noncompliance is specified in Title 20, CAC Section 1230, et seq. and PRC Sections 25531(c), 25532, 25534, and 25900, et seq. Moreover, delegate agencies as set forth in this document are authorized to take any action allowed by law in accordance with the delegate agencies' statutory authority, regulations, and administrative procedures, to ensure compliance with the terms and conditions of certification and applicable laws, ordinances, and standards.

CEC may exercise all administrative measures authorized by applicable law in the event of noncompliance.

Compliance Record

PG&E will maintain for the life of the project, files of all "As Built" documents referenced in this report. Staff of the CEC and delegate agencies will, upon reasonable notification, be given access to the files.

The CEC will maintain as a public record:

- All attestments to the fulfillment of legal requirements;
- All periodic and annual compliance reports filed by PG&E;
- All documents relative to complaints of noncompliance filed with the CEC; and
- All documents relative to this compliance plan brought before the Commission.

Confidential Information

Any information which PG&E deems proprietary shall be submitted to the Executive Director pursuant to 20 Cal. Admin. Code section 2505(d). Any information which is determined to be confidential shall be kept confidential, at the request of PG&E, as provided for in 20 Cal. Admin. Code section 2501 et seq.

Dispute Resolution Procedure

The following dispute resolution procedure is designed to resolve informally, when possible, disputes concerning interpretation of compliance with the requirements of The Geysers Unit 16 Compliance Plan. Either PG&E, the CEC, or any other party may initiate this procedure when time is critical in resolving a problem or when the alleged noncompliance does not appear significant enough to warrant a more formal investigation and proceeding.

The procedure is not intended to be a substitute for or prerequisite to the more formal complaint and investigation procedure specified in Title 20, California Administrative Code Sections 1230 et seq. Nor may the procedure be used to change the terms and conditions of certification as approved by the California Energy Commission.

The procedure encourages all parties involved in a dispute to discuss the matter and to reach an agreement resolving the dispute. If a matter cannot be resolved, then the matter must be referred to the Commission for consideration.

- Request for Informal Investigation--Any individual, group, or agency may request the CEC to conduct an informal investigation of an alleged non-compliance with the CEC's terms and conditions of certification for Geysers Unit 16. All requests for an informal investigation shall be made to the CEC Compliance Auditor by either telephone or letter.

  Upon receipt of a request for investigation, the compliance auditor shall promptly notify PGandE by telephone and subsequently by letter of the allegation. All known and relevant information of the alleged non-compliance shall be provided to PG&E and to the CEC staff. PG&E shall promptly investigate the matter and within seven working days shall provide a written report of the results of the investigation as well as all corrective measures undertaken to the compliance auditor and the person requesting such investigation, if known. If the exigencies of the non-compliance demand otherwise, the compliance auditor may request PG&E to provide an initial report within 48 hours by telephone, followed by a written report filed within seven days.

- Request for Informal Meeting--In the event that either the party requesting an investigation or the CEC staff is not satisfied with Applicant's report and investigation of the event, as well as the corrective measures undertaken, either may, by written request to the compliance auditor with a copy to the Applicant, request a meeting with Applicant. Such request shall be made within 14 days of the Applicant's filing of its written report as described above. Upon receipt of such a request, the compliance auditor shall:

  1. Immediately schedule a meeting with the requesting party and Applicant, to be held promptly at a mutually convenient time and place, as close to the location of the underlying event as possible.

  2. Secure the attendance of appropriate CEC staff and/or staff of any agency with general jurisdiction and expertise in the subject area of concern.

  3. Conduct such meeting in an informal and objective manner to encourage the voluntary settlement of any dispute in a manner which is fair and equitable to the interests of all parties.

  4. Promptly after the conclusion of such meeting prepare a memorandum which fairly and accurately sets forth the positions of all parties and any conclusions reached and distribute copies to all attendees.

- Request for Commission Hearing--If Applicant, CEC staff, or the party requesting an investigation is not satisfied with the results of said informal meeting, such party may, within ten (10) working days, request in writing a hearing before the Committee of the Commission designated for the hearing of such matters. The Committee shall, upon receipt of a

written request stating the basis of the dispute and the attempt at informal resolution thereof, grant a prompt hearing on the matter consistent with the requirements of noticing provisions and shall have authority to consider all relevant facts involved and make any appropriate orders consistent with its jurisdiction.

- Appeal From Committee to Commission--Pursuant to 20 Cal. Admin. Code section 1215, the Applicant, CEC staff, or the party requesting an investigation may request review of any committee order or decision.

- No less than sixty days prior to the construction of any certified facilities, PG&E shall notify each owner of property subject to an easement related to the AFC approval herein of the foregoing Dispute Resolution Procedure and of the provisions of Title 20, Cal. Admin. Code, section 1230.

PART II: GEYSERS UNIT 16 COMPLIANCE PLAN

Section 1. BIOLOGICAL RESOURCES

A. Applicable Laws, Ordinances, Standards, and Practices

- o Warren-Alquist Act, Public Resources Code, §§ 25003 and 25523.
- o Federal Endangered Species Act of 1973 and implementing regulations.
- o Ecological Reserve Act of 1963 and implementing regulations, Fish and Game Code, §§ 1580 through 1584.
- o California Species Preservation Act of 1970, Fish and Game Code, §§ 900 through 903.
- o California Endangered Species Act of 1970, Fish and Game Code, §§ 2050 through 2055.
- o Fully Protected Species Act, Fish and Game Code, §§ 3511, 4700, 5000, and 5515.
- o Fish and Wildlife Protection and Conservation, Fish and Game Code, §§ 1600 et seq.
- o Federal regulations implementing the Geothermal Steam Act of 1970 [30 USC 1001-1015 and CFR 270.34(k)].

B. Requirements

1-1. A PG&E biologist will be assigned to monitor construction activities as needed. The PG&E biologist will advise the supervising construction engineer as required of details concerning required mitigation prior to need for its implementation and shall advise the supervising construction engineer as necessary to ensure proper implementation of all mitigation measures. The supervising construction engineer will act on the advice of the assigned PG&E biologist to correct construction practices which are not in conformance with the compensation/mitigation plan or the terms and conditions of AFC approval to protect biological resources, including temporarily halting construction activities in sensitive areas until corrective action can be taken. If any specific mitigation measure or monitoring program is not implemented, is done incorrectly, or is determined to be substantially ineffective, PG&E, in consultation with CEC and California Department of Fish and Game (CDFandG), will take action to correct the problem.

Verification: PG&E shall inform the CEC and CDF&G as soon as possible, of difficulties pertaining to this requirement and PG&E shall submit within 30 days a written report describing the problem and corrective actions taken.

APPENDIX A

Compliance Plan
For
PG&E's Geysers Unit 16

PG&E shall submit a semiannual statement of progress to the CEC and CDFandG indicating the various phases of the mitigation/compensation program that have been completed and the progress of ongoing measures for a period of three years, at which time monitoring and reporting may be continued for a period agreed to by PG&E and the CEC staff, or in the absence of such agreement and upon submission to the Commission itself, for a period as directed by the Commission.

1-2. PG&E will implement the biological protection measures outlined in the NOI, pp. 23, 116-117, 156-161, Appendix D, Section 7, Appendix E, pp. E-54 to E-56, Appendix I, pp. 4-1 to 4-2; AFC, pp. 6-26, 6-30 to 6-32; and Responses to Data Requests of April 9, 1980, and April 30, 1980. These measures include:

- o The use of native species of shrubs and trees whenever possible for revegetation.
- o The construction of a retention barrier surrounding Unit 16 to contain accidental spills of condensate and chemicals in storage areas.
- o No construction within 500 feet of streams, in order to protect riparian areas, except in areas of creek crossings and fill areas as designated in construction plans or as required by the AFC approval.
- o The construction of the cooling tower for Unit 16 to meet a 0.002 percent drift design as an expected measure to reduce boron drift impacts on surrounding vegetation.
- o Evaluation of fish populations and stream sediments if a spill occurs at Unit 16.
- o Planning of construction to avoid mass grading during the months of December, January, and February. However, if weather conditions are favorable and PG&E desires to carry out operations during the wet season (November, December, January, February, and March), they will notify the Lake County Building Department and receive its concurrence. Extra effort to control erosion and sedimentation will be initiated during this time period, and these measures will be specified in the notification to the county. In addition, PG&E will notify the CEC and CDFandG of such construction activities and the erosion control measures to be implemented.
- o The use of temporary erosion control measures during construction.
- o The use of long-term erosion measures.
- o Revegetation will be used to control erosion, including punched straw seed bed preparation, hydroseeding, slope stepping, and, if necessary, establishment of an irrigation system for vegetation on cut and fill slopes and the sedimentation ponds. These efforts will be continued as needed for the duration of the project.

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- o Revegetation shall be performed at the beginning of or just prior to the wet season, October through April, to aid in seedling survival.

- o Construction of sedimentation ponds at the end of the power plant site drainage system and at the disposal fill area. These ponds will be maintained for the operational life of the power plant.

Verification: PG&E will submit semiannual compliance statements, verifying compliance of biological protection measures associated with power plant construction. These statements will be submitted to the California Department of Fish and Game and the CEC starting six months after the start of construction and continuing until one year after the start of commercial operations. Starting one year after commercial operation, annual compliance statements will be submitted to the CDFandG and the CEC for a period of three years, at which time, monitoring and reporting may be continued for a period agreed to by PG&E and the CEC staff, or in the absence of such agreement and upon submission to the Commission itself, for a period as directed by the Commission.

In the event of a spill at Unit 16, an early assessment by the PG&E biologist on the immediate effects to fish populations and other stream organisms will be made and reported to the CEC and CDFandG. This will be followed by submittal of a summary report within two weeks of the spill if adverse effects occurred to biological resources.

1-3. PG&E shall implement the measures in the Wildlife Mitigation Plan and Monitoring Program of March 30, 1980. These measures include:

- o Wildlife food plantings,

- o Wildlife ponds,

- o Snag development,

- o Prescribed burns, and

- o Nest boxes.

Verification: PG&E will include the progress of these measures in the semiannual compliance statements verifying compliance of biological protection measures associated with power plant construction. These statements will be submitted to the California Department of Fish and Game and the CEC starting six months after the start of construction and continuing until one year after the start of commercial operations. Starting one year after commercial operation begins, annual compliance statements will be submitted to the CDFandG and the CEC for a period of three years, at which time, monitoring and reporting may be continued for a period agreed to by PG&E and the CEC staff, or in the absence of such agreement and upon submission to the Commission itself, for a period as directed by the Commission.

PG&E shall also submit a report to the CDFandG and the CEC two years after the start of construction which will discuss (1) how the mitigation measures were implemented, (2) problems of implementation and how to avoid them, and (3) initial indications of the effectiveness of the mitigation measures. The PG&E shall submit another report to the CDFandG and the CEC five years after the start of construction which will present a detailed analysis of the effectiveness of the mitigation measures.

1-4. Deleted.

1-5. PG&E shall continue the aquatic biological resource studies in Bear Canyon Creek to monitor the effects of construction and operation of Unit 16. The studies will include water quality measurements, fisheries' populations studies, and sedimentation studies. The monitoring studies will include fish sampling to investigate rainbow trout spawning activity, and selected stream habitat parameters during the spring and summer, and quarterly sampling of streambed sediments. Further monitoring shall begin at the start of construction and continue with the same sampling frequency through the construction period and for a period of three years, at which time, monitoring and reporting may be continued for a period agreed to by PG&E and the CEC staff, or in the absence of such agreement and upon submission to the Commission itself, for a period as directed by the Commission. The details of the baseline study and the monitoring studies have been presented in the NOI, Appendix E, and AFC, Response 31, April 9, 1980. (This monitoring program will be superseded by the KGRA-ARM study now being developed by PG&E, CEC, and other concerned parties, at the time it is implemented).

Verification: PG&E will submit semiannual compliance statements verifying compliance of biological protection measures associated with power plant construction. These statements will be submitted to the California Department of Fish and Game and the CEC starting six months after the start of construction and continuing until one year after the start of commercial operations. Starting one year after commercial operation begins, annual compliance statements will be submitted to the CDFandG and the CEC for a period of three years, at which time, monitoring and reporting may be continued for a period agreed to by PG&E and the CEC staff, or in the absence of such agreement and upon submission to the Commission itself, for a period as directed by the Commission.

PG&E will also submit a report on the fisheries and stream sedimentation monitoring program to the CDFandG and the CEC five years after the start of commercial operation.

1-6. Plant species of special concern have been reported near the fill site area (AFC, Vol. I, pp. 6-32). A serpentine outcropping just above the western edge of the fillsite supports populations of jewelflower (Streptanthus breweri), Jepson's ceanothus (Ceanothus jepsonii), and cliffbrake (Onychium densum). PG&E shall place a fence, prior to the start of construction, around the vegetation on

the serpentine outcropping to help avoid accidental disturbance by construction activity.

Verification: PG&E shall notify the CDFandG and the CEC when the fence has been constructed. The protected area will be monitored by the designated biologist, and progress reports on the protected area will be included in the semiannual compliance statements verifying compliance of biological protection measures associated with power plant construction. These statements will be submitted to the California Department of Fish and Game and the CEC starting six months after the start of construction and continuing until one year after the start of commercial operations. Starting one year after commercial operation begins, annual compliance statements will be submitted to the CDFandG and the CEC for a period of three years, at which time, monitoring and reporting may be continued for a period agreed to by PG&E and the CEC staff, or in the absence of such agreement and upon submission to the Commission itself, for a period as directed by the Commission.

1-7. Deleted.

1-8. Visual assessment monitoring studies shall be conducted by PG&E in the vicinity of Unit 16 to determine low-level chronic visual drift effect on the forested area and on nearby plant communities of the endangered plant species, Steptanthus morrisonii complex. These studies will include:

- o Baseline studies of qualitative observations of the Streptanthus morrisonii communities for visible damage due to drift.
- o Baseline studies of qualitative observations performed in the forested areas to determine potential effects on the study area from drift.

Verification: PG&E shall provide an initial report to the CDFandG and the CEC describing the locations of this monitoring in relation to the Unit 16 power plant and the methods to be used in conducting the study. This report shall be submitted prior to the start of construction.

PG&E will also include the progress of these studies in the semiannual compliance statements verifying compliance of biological protection measures associated with power plant construction. These statements will be submitted to the California Department of Fish and Game and the CEC starting six months after the start of construction and continuing until one year after the start of commercial operations. Starting one year after commercial operation begins, annual compliance statements will be submitted to the CDFandG and the CEC for a period of three years, at which time, monitoring and reporting may be continued for a period agreed to by PG&E and the CEC staff, or in the absence of such agreement and upon submission to the Commission itself, for a period as directed by the Commission.

Detailed reports on the visual assessment monitoring study shall be submitted to the CDFandG and the CEC at two year intervals following the start of commercial operation for a period of four years, at which time, monitoring and reporting may be continued for a period agreed to by PG&E and the CEC staff, or in the absence of such agreement and upon submission to the Commission itself, for a period as directed by the Commission.

1-9. Deleted.

1-10. At the time the power plant is to be deactivated PG&E will include in the decommissioning plan a biological resources element identifying mitigation and compensation measures.

Verification: PG&E will submit the biological resources element of the decommissioning plan to the CEC and CDFandG for a determination of adequacy and acceptability.

Section 2. CIVIL ENGINEERING

A. Applicable Laws, Ordinances, Standards, and Practices

- o Uniform Building Code (1976 edition).
- o Standard Plans, State of California, Department of Transportation.
- o Lake County Ordinance 970.
- o American Concrete Institute (ACI) Standard 318-77, "Building Code Requirements for Reinforced Concrete."

B. Requirements

2-1. PG&E will submit two sets each of the final design grading plans, geotechnical investigation reports, specifications, and calculations to the Lake County Chief Building Official (CBO) for review at least 90 days prior to construction. PG&E's responsible civil engineer and PG&E's certified engineering geologist shall verify that the proposed grading plans, including accompanying reports, comply with the requirements set forth in the applicable laws, ordinances, and standards. PG&E will make in-lieu payments to Lake County equivalent to the fees listed in Chapter 70, Section 7007 of the UBC for review of the grading plans and calculations. The CBO shall check the plans, specifications, and calculations in accordance with the county's plan check procedures. If the plans do not comply with the UBC or pertinent laws, ordinances, or standards, the CBO shall notify PG&E's civil engineer within 30 days of submittal, identifying all discrepancies for correction. Within 60 days of the original submittal, PG&E shall submit revised plans rectifying all discrepancies. If the corrections are not acceptable and the requirements cannot be met, grading will not be allowed.

Verification: If the work described in the grading plans conforms to the requirements, the CBO shall return to PG&E one complete set of the submittals stamped and signed with his approval and shall issue an in-lieu grading permit. PG&E shall notify the CEC following receipt of the grading permit.

2-2. PG&E shall prepare and submit one copy each of the following to the Lake County CBO:

- o A summary of Soils Compaction Tests.
- o A Soils Grading Report signed by a civil engineer.
- o A Geologic Grading Report signed by a registered geologist or a certified engineering geologist.
- o "As-Built" grading drawings. (PG&E's responsible civil engineer shall certify on the "As-Built" drawings that all site earthwork was done in accordance with the approved final

earthwork was done in accordance with the approved final grading plan, including subsequent change orders, and satisfies the design intent.)

- o A statement indicating compliance and site approval signed by a civil engineer, and certified engineering geologist.

- o A monthly summary of construction progress.

Verification: All submittals listed above, except construction progress, shall be submitted by PG&E within 180 days after completion of site preparation. These will be deemed approved by the CBO unless PG&E is notified otherwise within 60 days of receipt of such plans and documents by the CBO. Construction progress reports shall be submitted monthly until the unit has started commercial operation.

2-3. PG&E shall comply with the recomendations for cut and fillslopes as given in the September 1978 report by Harlan and Associates, "Detailed Geotechnical Investigation--Geysers Power Plant Unit 16," provided conditions are substantially similar to those reported in the Harlan report.

Verification: PG&E shall verify compliance by means of the grading reports submitted to the Lake County CBO.

2-4. PG&E shall ensure that appropriate erosion control mitigation measures are implemented when stabilizing the cut and fill slopes in the Bear Canyon Creek watershed.

Verification: PG&E's biologist and environmental horticulturist, in coordination with the responsible civil engineer, shall review the mitigation measures, as necessary, with the CDFandG. The biologist and horticulturist shall be available during construction.

2-5. PG&E shall comply with the recommendations set forth in the Harlan report for development of the Big Injun Mine disposal site, provided conditions are similar to those reported in the Harlan report.

Verification: PG&E shall verify compliance by means of the grading reports submitted to the Lake County CBO.

2-6. The retaining walls at the south and northeast parts of the site shall be constructed as either a crib wall, or reinforced earth, or equivalent measures yielding the same result. In either case, a professional engineer, using accepted engineering practice, shall design the wall to withstand sliding or overturning from seismic-induced or other forces. The retaining walls shall be designed with a minimum static factor of safety of 2.0 and a minimum pseudo static factor of safety of 1.3 when using an effective horizontal acceleration of 0.2g.

Verification: PG&E shall submit final design drawings and calculations signed by a registered civil engineer to the Lake County CBO for review in accordance with the county's plan check at least 30 days before construction of the walls. If the CBO finds that the final plans and calculations do not comply with the applicable laws, ordinances, standards, and conditions of certification, the CBO shall notify the PG&E civil engineer of the discrepancies within 10 days. PG&E will rectify the discrepancies and shall submit any revised plans or calculations within 20 days of original submittal. If no further revisions are warranted, the CBO shall issue an in-lieu building permit for the retaining walls within 30 days of initial submittal. "As-Built" documents will be submitted to the CBO within 180 days following construction. PG&E shall notify the CEC following receipt of the building permit.

2-7. On-site inspections shall be performed in accordance with Chapter 3, Section 305 of the UBC.

Verification: Inspection shall be done by the Lake County CBO or his agent. Special and continuous inspections may be delegated by the CBO to PG&E as provided in Section 305, Chapter 3 of the UBC. If the inspector finds that the work is not being done in accordance with the approved plans, the discrepancies shall be reported immediately in writing to the CBO, the CEC, and PG&E's responsible civil engineer.

Section 3. CULTURAL RESOURCES

A. Applicable Laws, Ordinances, Standards, and Practices

- National Historic Preservation Act (Amendments 1980) and implementing federal regulations (16 USC 470 *et seq.* and 36 CFR 800 *et seq.*).
- Native American Historical, Cultural, and Sacred Sites, Public Resources Code Section 5097.9 *et seq.*

B. Requirements

3-1. PG&E shall have a qualified archaeologist available during the stripping of vegetation and topsoil from the plant site to advise PG&E's General Construction Department of the significance of any cultural resources which may be discovered. The archaeologist shall conform to on-site safety procedures, as directed by the resident engineer.

Verification: PG&E will provide the CEC with a statement verifying compliance at least 30 days prior to ground disturbance.

3-2. If cultural resources are discovered during land alteration activities, operations in the potentially impacted area shall cease until the archaeologist evaluates the significance of the resources.

Verification: If construction activities threaten to impact a significant cultural resource, PG&E shall notify the CEC within 24 hours. PG&E and the CEC staff shall meet within two working days to discuss PG&E's proposed mitigation measures. If agreement is reached, PG&E will take appropriate measures and resume construction. If agreement cannot be reached within one week following PG&E's notice to the CEC, the matter shall be considered under the provisions of the Dispute Resolution Procedures. Construction activity in the potentially impacted area shall remain stopped pending resolution of the matter.

Section 4. GEOTECHNICAL

A. Applicable Laws, Ordinances, Standards, and Practices

- o Uniform Building Code, Chapter 70 (1976 edition).
- o Business and Professions Code, Section 7835.
- o Lake County Ordinance 970.

B. Requirements

4-1. PG&E shall assign a qualified geotechnical engineer to monitor compliance with design intent in geotechnical matters, to provide consultation during the design and construction of the project, to make professional geotechnical judgments related to actual site design conditions, and to recommend field changes to the responsible civil engineer and the Construction Department.

Verification: Deleted.

4-2. PG&E shall assign to the project a certified engineering geologist who will be present as needed during all phases of site excavation and grading to evaluate site geologic conditions and geologic safety. If a registered geologist is assigned to be present at the construction site, his or her supervising certified engineering geologist shall be responsible for all evaluations and decisions regarding site geologic conditions and geologic safety.

Verification: Deleted.

4-3. PG&E shall submit the following documents to the Lake County CBO:

- o Two sets of an Engineering Geology Report and Soils Engineering Report prepared by Harlan and Associates, "Detailed Geotechnical Investigation--The Geysers Power Plant Unit 16," dated September 1978.
- o A Soils Grading Report.
- o A Geologic Grading Report prepared and signed by a certified engineering geologist.
- o Final Reports.

Verification: The final reports, including the Soils Grading Report and the Geologic Grading Report, will be submitted within 180 days after completion of the rough grading. A supplementary report will be submitted after completion of excavation of all foundations and finish grading. These reports will be deemed approved by the CBO unless PG&E is notified otherwise within 60 days of receipt of such reports by the CBO.

4-4. PG&E shall ensure that the nature of the bedrock at the proposed cooling tower location and its suitability as foundation material will be carefully inspected and reported by a certified engineering geologist as recommended in the September 1978 geotechnical report by Harlan and Associates.

Verification: Information shall be included in reports filed with the Lake County CBO.

4-5. PG&E shall ensure that the nature of the bedrock below the landslide material and its suitability as foundation material for the wall shall be carefully investigated and reported by an engineering geologist during excavation as required by Chapter 70, UBC.

Verification: Information shall be included in reports filed with the Lake County CBO.

4-6. PG&E shall ensure that the character of the rock exposed in the cut slope and at its base shall be carefully investigated and reported by a certified engineering geologist during excavation as required by Chapter 70, UBC.

Verification: Information shall be included in reports filed with the Lake County CBO.

4-7. If geologic conditions do not differ substantially from those conditions represented by the Harlan report, PG&E shall implement the report's recommended mitigation measures for adverse geologic conditions.

Verification: PG&E's certified engineering geologist shall verify compliance with the Harlan report's recommended mitigation measures.

4-8. PG&E shall immediately report to the Lake County CBO and the CEC any geologic conditions which deviate from those predicted in the Harlan report sufficient to warrant substantial changes in design of site earthwork, Big Injun Mine disposal site, power plant facilities, or site viability.

Verification: Discovery of adverse site geologic conditions which will warrant only minor changes in facility design will be reflected in the "As-Built" grading plan and Geologic Grading Report. If, however, a geologic condition is discovered which is more adverse than that predicted in the Harlan report and which will require substantial change in design, PG&E's responsible civil engineer or geotechnical engineers will notify the Lake County CBO and the CEC of all such substantial design changes. PG&E may proceed at its own risk with earthwork and construction (other than than required for safety) or any other implementation of an unapproved mitigation plan prior to notifying the CBO. If the CBO finds PG&E's new or revised plan to be unacceptable, PG&E may be required to dismantle any such work before proceeding with the approved mitigation plan.

If the CBO refuses to approve the revised plans, the matter shall be considered under the provisions of the Dispute Resolution Procedures.

4-9. PG&E shall ensure that geologic records of site inspections, especially detailed logs of excavated surfaces, will be prepared during site preparation and submitted to the CEC upon request.

Verification: PG&E shall notify the CEC of the availability of geologic records of site inspections.

4-10. PG&E shall comply with the engineering recommendations for development of the Big Injun Mine disposal site as set forth in the Harlan report, unless conditions differ substantially from those reported in the Harlan report.

Verification: PG&E's certified engineering geologist shall verify, by means of "as-built" plans, compliance with the engineering recommendations for development of the Big Injun Mine disposal site."

Section 5. NOISE

A. Applicable Laws, Ordinances, Standards, and Practices

- o Occupational Health and Safety Act of 1970 (29 CFR 1910 et seq.).
- o Title 8, California Administrative Code, Article 105.
- o Noise Element of the General Plan for Lake County, California.

B. Requirements

5-1. PG&E shall ensure that off-site noise related to construction activities does not exceed 55 dBA L_{dn}, as measured at the nearest sensitive receptor. In the event PG&E receives public complaints of the noise due to construction, PG&E shall, within two working days, conduct an investigation to determine the extent of the problem. PG&E shall take reasonable measures to resolve the complaints and to report those measures to the complainant.

Verification: PG&E shall develop and submit to the Lake County Air Pollution Control District a procedure for handling public complaints. The Lake County APCD will notify PG&E and the CEC when they have an acceptable plan.

5-2. If requested by the Lake County Air Pollution Control District, PG&E shall conduct noise surveys at the sensitive receptors registering 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 circumstances similar to those when the complaints were perceived. The survey should be reported in terms of the L_x and L_{eq} levels (x=10, 50, and 90). Based on this survey, PG&E shall identify and implement feasible mitigation measures necessary to assure compliance with the county standards.

Verification: Within 120 days, PG&E shall notify the Lake County Air Pollution Control District of the survey results, the mitigation measures applied to resolve the problem, and the results of these efforts. Lake County shall advise the CEC of any continuing noncompliance conditions.

5-3. Within 90 days after the plant reaches its rated power generation capacity and construction is complete, PG&E shall conduct a noise survey at the nearest sensitive receptor and at 500 feet from the generating station. The survey will cover a 24-hour period with results reported in terms of L_x (x=10, 50, and 90), L_{eq} and L_{dn} levels.

PG&E shall prepare a report of the survey that will be used to determine the plant's conformance with county standards. In the event that county standards are being exceeded, the report shall also contain a mitigation plan and a schedule to correct the noncompliance.

No future noise surveys of off-site operational noise are required unless the public registers complaints or the noise from the project is suspected of increasing due to a change in the operation of the facility.

Verification: Within 30 days of the noise survey, PGandE shall submit its report to the Lake County Air Pollution Control District.

5-4. Within 180 days after the start of commercial operation, PG&E shall prepare a noise survey report for the noise-hazardous areas in the facility. The survey shall be conducted by an acoustician in accordance with the provisions of 8 CAC, Article 105. The survey results will be used to determine the magnitude of employee noise exposure. If employee complaints of excessive noise arise during the life of the project, Cal/DOSH, Department of Industrial Relations, shall make a compliance determination.

Verification: PG&E shall notify Cal/DOSH and the CEC of the availabilility of the report.

Section 6. PUBLIC HEALTH

A. Applicable Laws, Ordinances, Standards, and Practices

- Health and Safety Code Section 25607.
- Health and Safety Code Section 25100.
- Title 22, California Administrative Code, §§ 60102 et seq.

B. Requirements

6-1. PG&E shall quarterly sample and analyze radon-222 concentrations in noncondensible gases entering the power plant in incoming steam line, vent off-gas line, or H_2S abatement off-gas line. This sampling program will comply with the most recent California Department of Health Services, Radiologic Health Service (CDHS/RHS) requirements for radon-222 monitoring and reporting.

In addition, this radon-222 steam monitoring program will be conducted quarterly for a period of two (2) years after the scheduled date of commercial operation and annually thereafter. If monitoring results indicate that the radon-222 release from Unit 16 is well within applicable standards, the monitoring program may be modified, reduced in scope, or eliminated provided PG&E obtains the permission of CDHS/RHS. As new information and techniques become available, with concurrence of PG&E and CDHS/RHS, changes may be made to the program or the methods employed in monitoring radon-222.

Verification: During the first year of commercial operation, PG&E shall provide CDHS/RHS with the results of the quarterly sampling within 30 days of the end of the quarter. After the first year of commercial operation, PG&E shall provide CDHS/RHS with an annual report summarizing quarterly sampling results. The annual report will comply in format and content with the most recent CDHS/RHS reporting requirements.

6-2. If the radon-222 concentration exceeds 3.0 picocuries per liter (pCi/l) in the cooling tower exhaust, PG&E must inform the CDHS/RHS with a special report.

Verification: PG&E shall provide a written report to CDHS/RHS of sample results within 30 days of confirming an exceedance of 3.0 pCi/l radon-222 in the cooling tower exhaust.

6-3. If the radon-222 concentrations exceed 6.0 pCi/l in the cooling tower exhaust, PG&E shall notify the CDHS/RHS and the CEC by telegram or telephone upon confirmation of the sample result. Confirmation includes reanalyzing the sample by PG&E or another qualified laboratory. The confirmation procedures used shall be the same as the routine analysis, but may include sending samples to CDHS/RHS or other qualified laboratories for analysis. Sample result confirmation must be accomplished in the quickest manner possible and should take less than five calendar days.

Verification: PG&E shall notify CDHS/RHS and the CEC within 24 hours of confirming the sample results. PG&E shall provide a special report to CDHS/RHS and the CEC outlining corrective actions taken.

6-4. PG&E shall perform a quarterly steam analysis for ammonia, arsenic, mercury, and boron. The quarterly steam analysis program, developed in consultation with CDHS, shall commence within 45 days after commercial operation of Unit 16 and shall run for one year. At the end of one year, the results will be analyzed to determine if additional monitoring is necessary. The conditions for continuation of the quarterly steam analysis are specified in the Public Health Findings 17d-17f of the "Joint Prehearing Conference Statement of the Applicant and Staff of the California Energy Commission," dated July 2, 1980.

Verification: PG&E shall submit a written report to CDHS within 30 days of the analysis.

6-5. PG&E shall prepare a sampling plan for establishing baseline ambient concentrations of mercury, arsenic, ammonia, and vanadium. PG&E shall consult the California Air Resources Board (CARB) and CDHS in developing the sampling plan and shall submit the plan to those agencies for review.

Verification: PG&E shall deliver the sampling plan to CARB and CDHS at least 60 days prior to initiating the sample collections.

6-6. Deleted.

6-7. PG&E shall monitor or participate in the monitoring of ambient concentrations of mercury, arsenic, ammonia, vanadium, radon-222 and its daughters, and silica at the Anderson Springs Recreation Center. Sampling shall be conducted for one year prior to and one year after the date of commercial operation.

Verification: PG&E shall provide CDHS and the CEC with a written report providing baseline ambient concentration measurements no later than the start of commercial operations.

6-8. The CEC shall arrange meetings with PG&E, CARB, CDHS, and other interested parties for determining significant ambient concentration guidelines for use in The Geysers Unit 16 monitoring program for mercury, arsenic, ammonia, and vanadium.

Verification: The CEC shall notify PGandE, CARB, CDHS, and other interested parties of a tentative meeting date, location, and agenda.

Section 7. STRUCTURAL ENGINEERING

A. Applicable Laws, Ordinances, Standards, and Practices

- Uniform Building Code (1976 edition), excepting Section 2312. (NOTE: The UBC 1976 is adopted by Title 24 California Administrative Code as the minimum legal state building standard and by Lake County ordinance.)

- American Society of Mechanical Engineers' Boiler and Pressure Vessel Code (ASME BPV Code). (NOTE: The ASME BPV Code is adopted by Title 8 California Administrative Code.)

- American National Standards Institute (ANSI), "B 31.1 Power Piping Code" (ANSI B 31.1).

- American Concrete Institute (ACI), "Building Code Requirements for Reinforced Concrete" (ACI 318-77).

- ACI, "Building Code Requirements for Structural Plain Concrete" (ACI 322-72).

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

- American Institute of Steel Construction (AISC), "Specification for the Design, Fabrication, and Erection of Structural Steel for Buildings," November 1978.

- AISC, "Commentary on the Specification for the Design, Fabrication, and Erection of Structural Steel for Buildings."

- AISC, "Specification for Structural Joints Using ASTM 325 or A490 Bolts," April 1978.

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

- Steel Joint Institute, "Standard Specifications and Load Tables."

- American Welding Society, "Structural Welding Code AWS D.1.1-79."

- National Design Specifications for Stress-grade Lumber and Fastenings 1977."

- American Association of State Highway and Transportation Officials, "Standard Specifications for Highway Bridge," 1977 edition.

- The standards listed in the AFC Appendix B, excepting Section 3.3, 5.3.4, 6.1.3, 6.3.1.4, and Appendix D to Appendix B, Section 2.04.

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

- o Lake County Ordinance 970.

In addition, the following standards shall be used as guides only:

- o Seismic Safety Commission, Policy on "Locating, Designing, and Operating Critical Facilities and Lifeline Facilities," 1978.
- o Joint Committee on Seismic Safety, "Final Report to the Legislature, State of California," 1974 (CDMG SP No. 45).
- o "Earthquake Design Criteria for Structures," G.W. Housner and P.C. Jennings, EERL 77-06, 1978.
- o Applied Technology Council, "Tentative Provisions for the Development of Seismic Regulations for Buildings," ATC 3-06, 1978.

B. Requirements

7-1. PG&E shall design and construct Unit 16 and its related facilities consistent with applicable laws, ordinances, standards, and practices, and with the information, criteria, and methods set forth in the following documents:

- o Geysers Unit 16 AFC, Sections 4.2.3.2 ("Structures") and 4.2.3.4 ("Seismic Design"), and Appendix B and its appendices, entitled "Civil Design Criteria and Guidelines for Geysers Geothermal Projects Beginning with Unit 16" (revised January 1979 edition).
- o "Applicant's Response to Staff's First Set of Additional Information Requests," April 9, 1980, 79-AFC-5.
- o "Response to CEC Staff's Second Set of Additional Data Requests," April 30, 1980, 79-AFC-5.
- o "Uniform Probability Response Spectra for The Geysers Units 16 and 18 Sites," Report No. 01-3170-1067, January 1980, Keith Feibusch Associates, Engineers.

Verification: At least 120 days prior to the intended start of construction, PG&E will submit 2 sets each of final design plans, specifications, and calculations for each structure or structure foundation to the Lake County CBO. PG&E shall make in-lieu payments to Lake County equivalent to the fees set forth in Chapter 3, Section 303 of the UBC 1976 for review and to obtain an in-lieu building permit for each submittal. The CBO will review the plans in consultation with the CEC. If the CBO discovers nonconformance with the stated requirements, he will notify PG&E's responsible civil engineer within 45 days of the initial submittal date and will return that portion of the plans to PG&E for correction. PG&E's responsible civil engineer will resubmit the corrected plans within 75 days of initial submittal. The CBO will return one complete set of submittals stamped and signed with his approval to PG&E within 120 days of initial submittal, provided the plans comply with the stated requirements.

7-2. PG&E shall prepare and submit one set of the following documents to the Lake County CBO within 180 days after completion of construction. These documents will be reviewed by the CBO, who shall notify PG&E of his approval or disapproval of the documents within 60 days of receipt.

- o A statement indicating compliance and site approval signed by PG&E's responsible civil engineer.
- o "As-Built" drawings for the construction of civil and architectural work (changes approved by the CBO will be identified on the "As-Built" drawings.)
- o Summary of concrete strength tests.
- o Copies of concrete pour sign-off sheets.
- o Bolt torque inspection reports.
- o Field weld inspection sheets.

Verification: PG&E shall notify the CEC following the submittal of these documents to the Lake County CBO.

7-3. In the case of discrepancies between the design criteria contained in the applicable laws, ordinances, standards, practices, or conditions of certification, PG&E shall use the most conservative design criteria in the final design of the facility.

PG&E will use the static equivalent lateral force method of analysis for seismic critical structures and equipment. For critical structures other than the cooling tower, the base shear coefficient shall be the higher of:

a. 0.2W, or

b. Formula 14-1, UBC 1976, with I=1.0 and Ts=0.5 seconds (T determined from a "lumped mass" model), or

c. Formula 4-1, ATC 3-06 with effective ground acceleration of Aa=0.4g.

PG&E shall design and construct Unit 16 so that the critical facility structures and components will be able to withstand a seismic event having a 10 percent probability of being exceeded during the plant design life, using the combined sources response spectrum set forth in Keith Feisbusch Associates, Engineers' Report No. 01-3170-1067, with minor damage and no structural collapse. (The design life is 40 years for structures and 30 years for equipment. Critical facility structures are those structures and components essential to continue power generation, or whose replacement cost or replacement time is excessive.)

The H_2S (Stretford) abatement system will be included in the list of Critical Structures and Components for Unit 16.

For anchorage of critical equipment, PG&E shall use ATC-3-06, equation 8.2 with a value of 1.0 for the coefficient "P." In any event, the anchorage criteria shall be consistent with other design and performance criteria.

PG&E shall design and construct all noncritical structures and anchors for noncritical equipment using seismic design criteria specified in UBC 1976 with a base shear coefficient of not less than 0.2W.

PG&E shall use UBC 1976, in conjunction with explicable laws, standards, ordinances, and practices, for nonseismic structural design.

Verification: PG&E shall prepare and submit final design plans, specifications, and calculations incorporating the above design criteria. PG&E's responsible civil engineer shall verify compliance with this requirement in a submittal to the Lake County CBO and the CEC.

7-4. PG&E shall keep the Lake County CBO and the CEC informed regarding the status of construction.

Verification: PG&E shall submit a monthly construction progress report to the Lake County CBO and the CEC.

7-5. PG&E shall notify the Lake County CBO and the CEC of substantial design changes to the final plans as required by UBC Section 302. "Substantial changes" include all changes requiring an alteration in design concept and preparation of new design plans consistent with the AFC conditions of certification. Minor changes shall be reflected in the "As-Built" drawings submitted after construction.

Verification: PG&E shall submit two sets of the revised drawings, specifications, and calculations to the Lake County CBO for review. The CBO will review these plans, in consultation with the CEC, on an expedited basis. The CBO will return one set of submittals stamped and signed with his approval to PG&E, provided the plans comply with the stated requirements.

7-6. Inspections shall be performed in accordance with Chapters 3 and 70 of the Uniform Building Code (1976 edition). The Lake County CBO may delegate responsibility for special and continuous inspections to PG&E as provided in Section 305, Chapter 3 of the UBC 1976.

Verification: PG&E shall notify the CEC if the Lake County CBO delegates responsibility for inspections to PG&E.

7-7. If PG&E proposes to use a design for the cooling tower other than that approved by the CEC for Geysers Unit 17, PG&E shall provide a cooling tower design using the following criteria:

a. Working stress criteria,

b. Equivalent lateral force static design, and

c. Spectral forces obtained from the combined sources response spectrum set forth in Keith Feibusch Associates Engineer's Report No. 01-3170-1067 for a 10 percent probability of exceedance event during the 40-year plant design life and a damping ratio of 7 percent.

PG&E shall also provide a design check for the cooling tower using the following criteria:

a. Ultimate strength criteria,

b. Dynamic analysis using conventionally acceptable methods, and

c. The combined sources response spectrum set forth in the Keith Feibusch Associates Engineer's Report No. 01-3170-1067 for a 5 percent probability of exceedance event during 30 years, and a damping ratio appropriate for the anticipated stress level.

Verification: 240 days prior to the start of construction of the cooling tower structure, PG&E shall submit for CEC staff review the dynamic analysis methods and models which will be used in the analysis. PG&E may proceed with the analysis unless notified otherwise by the Executive Director within 30 days of the receipt of the information. If the staff's concerns cannot be resolved, the matter shall be handled under the provisions of the Dispute Resolution Procedures.

One hundred and eighty days prior to the start of construction of the cooling tower design, PG&E shall submit a design check to the CEC which will be based upon:

a. Ultimate strength methods except with a 5 percent probability of being exceeded in 30 years,

b. The response spectrum as set forth in Keith Feibusch Associated Engineer's Report No. 01-3170-1067,

c. A damping ratio that is appropriate for the anticipated stress level, and

d. A dynamic analysis using conventionally acceptable methods.

The CEC shall verify that the stresses in the cooling tower structure are within ultimate limits. In the event that the stresses are not within ultimate limits, PG&E shall either make appropriate design modifications to increase the strength of the structure or perform a cost-benefit risk analysis to select an optimum design based on a lower criterion.

7-8. In the event that the Uniform Building Code (1979 edition) is adopted, prior to final plans approval, by either the state under Title 24 CAC or by Lake County ordinance, PG&E shall demonstrate that the facility design conforms with the requirements of UBC 1979.

Verification: PG&E shall submit final plans, specifications, and calculations that conform with the requirements of UBC 1979. In the event that final plans have been submitted for review prior to the adoption of UBC 1979, PG&E may file a statement by a responsible civil engineer verifying conformity of the submitted plans with UBC 1979.

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Section 8. SOILS

A. Applicable Laws, Ordinances, Standards, and Practices

- o Uniform Building Code (1976 edition).
- o Lake County Ordinance 970.
- o The Central Valley Regional Water Quality Control Board Basin Plan.

B. Requirements

8-1. The Water Quality Control Plan for this hydrologic basin contains water quality objectives for turbidity and sedimentation. PG&E shall ensure that the construction and operation of this geothermal plant does not promote turbidity or sediment loadings in quantities so as to create a nuisance or adversely affect beneficial uses of surface streams on or adjacent to the leasehold.

Verification: Prior to the start of site construction, PG&E shall file with the Central Valley Regional Water Quality Control Board and the CEC a statement identifying the methods to be utilized to comply with the above objectives and an updated construction schedule.

8-2. PG&E shall construct sedimentation basins at the beginning of major earth moving activities.

Verification: Construction of sedimentation basins shall be noted in the monthly construction progress reports filed with the Lake County CBO and the CEC.

8-3. PG&E shall annually measure the amount of sediment accumulated in the sedimentation basins. This information will be used to evaluate the success of the erosion control plan. The accumulated sediment will be estimated by adequate measuring techniques (e.g., staff gauge). Sediment quantities will be verified when sediment is removed. The sediment basins should not be fuller than 60 percent of actual capacity prior to each winter season. The basins will be cleaned as necessary.

Verification: The initial measurement shall be taken one year after the start of site preparation, and subsequent measurements shall be taken at one-year intervals thereafter. PG&E shall submit an annual written report to the Central Valley Regional Water Quality Control Board and the CEC beginning one year after the start of commercial operation and continuing for a period of three years, at which time, monitoring and reporting may be continued for a period agreed to by PG&E and the CEC staff, or in the absence of such agreement and upon submission to the Commission itself, for a period as directed by the Commission. Included in each annual report will be a summary of required maintenance and repairs to the erosion control/sediment containment system.

Section 9. SAFETY

A. Applicable Laws, Ordinances, Standards, and Practices

- Title 8, California Administrative Code, §§ 3203 et seq.
- Title 8, California Administrative Code, Chapter 4.7, Groups 2 and 27.
- Uniform Building Code (1976 edition): Chapters 5, 20, 32, and 33.
- National Fire Protection Association (NFPA) Standards: 10, 13, 14 (Class II service), 19B, 20, 26, 27, 30, 70 (National Electric Code), 194, 196, 198, 214, and 231(a).
- Public Resources Code, Section 4291.
- Title 8, California Administrative Code, Section 5162.
- Title 8, California Administrative Code, Section 5179.
- Title 8, California Administrative Code, Section 5204.
- Title 8, California Administrative Code, Article 138.
- Title 8, California Administrative Code, Chapter 4.1.
- 49 CFR, Section 173.249.
- American Petroleum Institute (API) Standard 650.
- Manufacturing Chemists Association (MCA) Chemical Safety Data Sheet SD-53.
- Technical Information Document (TID)7024, Chapter 6.
- ATC-3-06, Section 8.3.

B. Requirements

9-1. PG&E shall implement an accident prevention program in accordance with Sections 3203 et seq. of Title 8, CAC relating to chemical handling and storage and provisions for hazardous materials and airborne contaminant exposure based on Section 5155, Title 8, CAC. PG&E shall request Cal/OSHA Consultation Service or the California Division of Occupational Safety and Health (Cal/DOSH) to review this accident prevention program.

Verification: PG&E shall obtain a letter from either the Cal/OSHA Consultation Service or Cal/DOSH verifying compliance with the requirements of Section 3203, Title 8, CAC. Notification of this verification shall be filed with the CEC not later than 150 days prior to commencing of operation of Unit 16.

9-2. On-site worker safety inspections shall be conducted by the California Division of Occupational Safety and Health (Cal/DOSH) during construction and operation of the facility or when an employee complaint has been received. Cal/DOSH shall notify the CEC in writing in the event of a violation that could involve DOSH action affecting the construction or operation schedule.

Verification: PG&E shall note any Cal/DOSH inspections in its periodic compliance reports.

9-3. PG&E shall certify that design and construction are in reasonable conformance with applicable fire safety codes and standards listed.

Verification: PG&E shall submit such certification to the CEC from a registered fire protection engineer in a compliance report prior to commercial operation.

9-4. PG&E shall satisfy the following conditions contained in a letter, dated March 19, 1980, from the California Department of Forestry to the CEC:

- o Consideration for interior fire prevention and suppression to meet NFPA standards.
- o Consideration for exterior (wildland) fire prevention and suppression.
- o Consideration for access of heavy fire suppression vehicles (engines, transports, dozers).
- o Plan for emergency rescue and medical needs.

Verification: PG&E shall submit a letter from a registered fire protection engineer to the California Department of Forestry verifying that the conditions have been met. The letter will be included in a compliance report submitted at the completion of project construction.

9-5. PG&E shall comply with the handling procedures for hydrogen peroxide as specified in Title 8 CAC Section 5204.

Verification: PG&E shall submit a letter, signed by the Plant Superintendent and verifying compliance, to Cal/OSHA within 30 days after commercial operation.

9-6. PG&E shall comply with the storage procedures for hydrogen peroxide as specified in Title 8, CAC, Section 5179.

Verification: PG&E shall submit a letter, signed by a registered mechanical engineer and verifying compliance, to Cal/DOSH no later than 30 days before commercial operation.

9-7. PG&E shall comply with the handling and transportation procedures for caustic materials as specified in 49 CFR Section 173.249 and Title 8, CAC, Section 5162.

Verification: PG&E shall submit a letter, signed by the Plant Superintendent and verifying compliance, to Cal/DOSH within 30 days after commercial operation.

9-8. PG&E shall comply with the handling and storage procedures for hydrogen gas as specified in Title 8, CAC, Article 138.

Verification: PG&E shall submit a letter, signed by the Plant Superintendent and verifying compliance, to Cal/DOSH within 30 days after commercial operation.

9-9. PG&E shall ensure that the Stretford system pressure vessels have been designed and fabricated in accordance with Title 8, CAC, Chapter 4.1 and TID 7024, Chapter 6, and anchored in accordance with ATC-3-06, Section 8.3.

Verification: PG&E shall submit a letter, signed by a registered mechanical engineer and verifying compliance, to Cal/DOSH no later than 30 days before commercial operation. In addition, the Division of Industrial Safety shall verify compliance through an on-site inspection.

9-10. PG&E shall ensure that the Stretford system tanks have been designed and fabricated in accordance with API Standard 650; Title 8 CAC Chapter 4; and TID 7024, Chapter 6; and anchored in accordance with ATC-3-06, Section 8.3.

Verification: PG&E shall submit a letter, signed by a registered mechanical engineer and verifying compliance, to the Lake County Building Inspector no later than 30 days before commercial operation. In addition, the Division of Industrial Safety shall verify compliance through on-site inspection.

9-11. PG&E shall ensure that the hydrogen peroxide tanks have been designed and fabricated in accordance with MCA Chemical Safety Data Sheet SD-53 and TID 7024, Chapter 6, and anchored in accordance with ATC-3-06, Section 8.3.

Verification: PG&E shall submit a letter, signed by a registered mechanical engineer and verifying compliance, to the Lake County Building Inspector no later than 30 days before commercial operation. In addition, the Division of Industrial Safety shall verify compliance through an on-site inspection.

9-12. PG&E shall ensure that certified code papers for the facility's pressure vessels are available for review at the plant site.

Verification: PG&E shall notify the Division of Industrial Safety, the Lake County Building Inspector, and the CEC of the availability of the documents no later than 30 days before commercial operation.

Section 10. SOLID WASTE MANAGEMENT

A. Applicable Laws, Ordinances, Standards, and Practices

- o Water Code, Section 13260.
- o Title 22, California Administrative Code, Division 4, Chapter 30.
- o Title 24, California Administrative Code, Subchapter 15.
- o Health and Safety Code, Division 20, Chapter 6.5.

B. Requirements

10-1. PG&E shall ensure that any hazardous waste hauler employed has a certificate of registration from the California Department of Health Services, Hazardous Materials Management Section.

Verification: PG&E shall keep a letter on file verifying that hazardous waste haulers have DOHS certificates of registration.

10-2. The Stretford process wastes include elemental sulfur and the Stretford purge stream. PG&E shall ensure that elemental sulfur is stored in a steam coil heated tank and removed periodically to be sold or to be disposed at a site approved for such wastes. PG&E shall ensure that the Stretford purge stream is either pumped into the overflow structure of the cooling tower basin for reinjection into the steam reservoir or trucked to an approved disposal site.

Any sludge which accumulates in the cooling tower will be vacuumed off and hauled by a registered hazardous waste hauler to an approved disposal site.

Verification: PG&E shall submit final design plans and "As Built" drawings to the Lake County CBO incorporating these design features. In addition, PG&E shall each month submit completed hazardous waste manifests to DOHS in compliance with Section 66475 of Title 22, CAC.

10-3. PG&E shall ensure that hazardous wastes are taken to a facility permitted by DOHS to accept such wastes. (PG&E has indicated its intention to dispose of wastes generated by Geysers Unit 16 at either the Middletown or Kelseyville approved sites.)

Verification: PG&E shall notify the CEC, DOHS, and Solid Waste Management Board of the selected disposal site. Any notice of change in disposal sites will be submitted as changes occur.

10-4. If a secondary treatment system is used to abate H_2S emissions, the plant may produce additional hazardous wastes. To ensure that these wastes are properly disposed, PG&E shall submit its secondary abatement waste disposal plans, if secondary abatement is required, to the CEC for review.

Verification: The plans shall be submitted as soon as PG&E determines secondary abatement is required, but not later than 120 days prior to operation of the secondary abatement system.

10-5. If hazardous wastes, including Stretford sulfur effluent, are stored on site for more than 60 days, PG&E shall obtain a determination from the DOHS that the requirements of a Hazardous Waste Facility Permit have been satisfied.

Verification: PG&E shall notify the CEC if it files an in-lieu application with DOHS for the operation of a Hazardous Waste Facility.

Section 11. WATER QUALITY, HYDROLOGY, AND WATER RESOURCES

A. Applicable Laws, Ordinances, Standards, and Practices

- Title 23, California Administrative Code, Chapter 3, Subchapters 3, 13, and 15.
- Title 23, California Administrative Code, Sections 13260, 13262.
- Water Quality Control Plan, Sacramento River Basin (5A).
- California Water Code, Part 2, Division 2.

B. Requirements

11-1. Deleted.

11-2. PG&E shall comply with the "Emergency Accidental Spill and Discharge Control Plan and Procedures, Geysers Power Plant" (revised February 15, 1980).

Verification: Verification procedures are identified in the document.

11-3. PG&E shall conduct an appropriate independent water quality and aquatic biology monitoring program in the Bear Canyon Creek, Hot Springs Creek, Anderson Creek, and their influenced tributaries. If the cooperative Geysers KGRA-ARM program is implemented and operational, PG&E shall substitute the joint monitoring program for its independent monitoring program.

Verification: PG&E shall develop and submit a water quality and aquatic biology monitoring program to the CVRWQCB for review and approval at least 90 days before the start of construction. PG&E shall notify the CEC of the CVRWQCB's approval of the monitoring program.

11-4. If PG&E employs a hydrogen peroxide secondary H_2S abatement system, PG&E shall ensure that the hydrogen peroxide and catalyst will be stored within the bermed area of the plant site. Any other chemicals which may be used in an alternative secondary abatement system shall be stored within the bermed area of the plant site.

Verification: The storage facilities for any chemicals stored for the secondary abatement system will be reflected in the final design plans and "As-Built" drawings submitted to the Lake County CBO.

11-5. To prevent spills of Stretford process material from leaving the immediate vicinity, PG&E shall surround the H_2S abatement process area with an impermeable concrete barrier. Spilled Stretford process material will drain to a sump where it will be pumped to a chemical storage tank for reuse in the Stretford process or for disposal off site at an approved Class II-1 solid waste disposal site.

Verification: PG&E shall submit final design plans and "As-Built" drawings to the Lake County CBO incorporating this design requirement.

11-6. To prevent spills of condensate and other materials from leaving the site, PG&E shall construct an impermeable concrete or asphaltic concrete retention barrier around the plant. PG&E shall also pave the site, except the switchyard, with two inches of asphaltic concrete and attain a permeability of at least 1×10^{-6} cm/sec. As a result of this construction, the paved area of the plant site will serve as a spill retention basin.

The proposed retention basin is designed to retain the maximum condensate spill expected to occur before plant personnel can correct the cause of the spill. In addition, the design will accommodate the runoff from a 30 minute 100-year storm.

Should a spill of condensate or other materials occur, the spill would flow to a 1,000 gallon, concrete-lined catch basin located at the lowest point on the plant site. The catch basin shall be equipped with a 100 gallon per minute pump to return spilled material to the cooling tower basin for reinjection. If a spill occurs which is larger than the capacity of the pump, PG&E plant personnel shall use a portable pump to remove excess material.

Alarm systems will notify plant operators when a spill has occurred and when the catch basin pump has started. PG&E plant personnel shall respond to the alarms within 30 minutes and take measures necessary to correct the problem.

Verification: PG&E shall submit final design plans and "As Built" drawings to the Lake County CBO incorporating this design requirement and verification of the 1×10^{-6} cm/sec permeability of the pad layer. In addition, the Plant Superintendent shall file a statement with the CVRWQCB and the CEC at the start of the operations verifying that plant personnel are trained and prepared to handle spills.

11-7. PG&E shall ensure that rainwater entering the Stretford process area will not enter surface water or groundwater. The rainwater shall be used in the Stretford process or pumped to the cooling tower overflow structure.

The steam condensate from the plant shall be used for cooling water, with any excess reinjected into the geothermal reservoir.

Verification: PG&E shall submit final design plans and "As-Built" drawings to the Lake County CBO incorporating this rainwater collection and routing design requirement.

11-8. To minimize the potential adverse impacts of storm runoff on the quality of Bear Canyon and Anderson Creek below the confluence with Bear Canyon Creek, PG&E shall return plant site runoff resulting

from the first significant storm to the cooling tower basin for subsequent injection into the geothermal reservoir. Other storm runoff will be disposed in the same manner. When the capacity of the return system is exceeded and a spill has not occurred, runoff may, if necessary, be released from the site through a manually controlled valve. Under such conditions, the impacts on water quality should be minimal due to material dilution from heavy rainfall.

If storm runoff is released from the power plant site, PG&E shall satisfy the Basin (5A) Plan intent and any applicable requirements of the CVRWQCB.

Verification: PG&E shall submit final design plans and "As-Built" drawings to the Lake County CBO incorporating this design requirement. In addition, PG&E shall notify the CEC when the CVRWQCB has approved PG&E's plan.

11-9. PG&E shall dispose of domestic waste water by injection into the steam supplier's reinjection system. The waste will be treated in a septic tank to remove solids, and discharged to the reinjection line at a point between the condensate surge pond and the reinjection well.

Verification: PG&E shall obtain an in-lieu sanitation permit in accordance with Lake County ordinance and shall provide final design plans and "As-Built" drawings to the Lake County CBO incorporating this design requirement for the domestic waste disposal system.

11-10. PG&E will utilize condensed steam for cooling water purposes, acquire an outside source for freshwater supplies, and utilize annually an estimated 3.6 million gallons (12 acre feet) of water for construction.

Verification: PG&E will submit to the CEC documentation showing:

a. The source and amount of cooling tower basin start-up water, and

b. The source, means (appropriation, purchase), and amount of fresh water supply.

Under certain conditions, PG&E or its contractor may need to acquire permits or waivers.

This information shall be submitted prior to the commencement of power plant or transmission line switchyard construction.

Section 12. AIR QUALITY

A. Applicable Laws, Ordinances, Standards, and Practices

- o Lake County Air Pollution Control District Rules, including Rules 411, 412, 421.2-A, 430, 510, 602, 602.1, 604, and 605.
- o Clear Air Act and implementing federal regulations.
- o California Health and Safety Code and implementing state regulations.

B. Requirements

12-1. PG&E shall comply with the requirements specified in the Lake County Air Pollution Control District document entitled, "Settlement of the Parties Regarding Petition for Review of Determination of Compliance," dated December 22, 1980.

Verification: The Lake County Air Pollution Control Officer shall annually send PG&E a letter verifying the status of PG&E's compliance with the conditions of the Determination of Compliance. Disputes as to the status of compliance with the DOC conditions shall be addressed initially to the LCAPCD, pursuant to its rules and regulations, and thereafter to the CEC.

12-2. PG&E shall obtain LCAPCD Hearing Board and CEC approval before using any equipment other than the hydrogen peroxide/catalyst and Stretford/surface condenser system as proposed in the AFC to control H_2S emissions (re: DOC Conditions 3, 4, and 5).

Verification: PG&E shall obtain separate letters from the LCAPCO and the CEC Executive Director stating that the use of an alternative H_2S emissions abatement system satisfies the requirements of DOC Conditions 1 and 2.

12-3. PG&E shall submit approved-for-construction drawings of the power plant secondary H_2S control system to the CEC only if requested by the CEC.

Verification: If requested, plans shall be submitted by PG&E to the CEC at least 30 days prior to commencing construction of the system.

12-4. PG&E shall ensure that the detailed plan for testing the performance of The Geysers Unit 16 emissions abatement system at normal full load operation includes the following test parameters: (1) the test data shall reflect a minimum of 30 days (not necessarily consecutive days) operation at a minimum of 80 percent of the gross electricity generating capacity, and (2) in the event that at least 30 days of qualifying data could not be obtained during the 90-day test period specified in the Determination of Compliance, PG&E shall continue to collect test data until the required information has been obtained. (The application for a Permit to Operate shall be filed as specified

in DOC Condition 13 and need only include the results of the performance test conducted during the initial 90 days of commercial operation.) (Re: DOC Conditions 12 and 13.)

Verification: PG&E shall provide the CEC with a copy of the detailed plan submitted to the LCAPCO for review and approval. In addition, if the test period extends beyond the initial 90 days after commercial operation, PG&E shall file a supplementary report with the CEC and the LCAPCO which reflects all the results of the performance test.

12-5. Deleted.

12-6. The ARB and the LCAPCO shall approve the frequency, method of collection, and the testing methods for the operation of the monitoring station to be located at the Anderson Springs Recreation Center (re: DOC Condition 11C).

Verification: PG&E shall obtain separate letters from the ARB and the LCAPCO approving the frequency, method of collection, and the testing methods for the operation of the monitoring station.

PART III: Transmission Line Compliance Plan

Section 13. BIOLOGICAL RESOURCES

A. Applicable Laws, Ordinances, Standards, and Practices

- o Executive Order 11990, Protection of Wetlands (42 FR 26951; May 25, 1977).
- o Endangered Species Act of 1973 and implementing federal regulations (16 USCA 1531 et seq.; 50 CFR part 17).
- o Rivers and Harbor Act of 1899 (33 USCA 403).
- o Ecological Reserve Act of 1968 and implementing state regulations (Fish and Game Code, Sections 1580 - 1584; 14 California Administrative Code, Section 670.5).
- o California Species Preservation Act of 1970 (Fish and Game Code, Sections 900-903).
- o Endangered Species Act of 1970 (Fish and Game Code, Sections 2050 - 2055).
- o Fully Protected Species (Fish and Game Code, Sections 3511, 4700, 5050, and 5515).
- o Fish and Wildlife Protection and Conservation (Fish and Game Code, Sections 1600 et seq.).
- o Public Resources Code, Sections 4292 - 4296.
- o 14 California Administrative Code, Sections 1254 and 1256.
- o California Environmental Quality Act (Public Resources Code, Sections 21000 et seq.).

B. Requirements

13-1. A PG&E biologist will be assigned to monitor construction activities as needed. The PG&E biologist will advise the supervising construction engineer as required of details concerning required mitigation prior to need for its implementation and shall advise the supervising construction engineer as necessary to ensure proper implementation of all mitigation measures. The supervising construction engineer will act on the advice of the assigned PG&E biologist to correct construction practices which are not in conformance with the compensation/mitigation plan or the terms and conditions of AFC approval to protect biological resources, including temporary halting of construction activities in sensitive areas until corrective action can be taken. If any specific mitigation measure or monitoring program is not implemented, is done incorrectly, or is determined to be substantially ineffective, PG&E, in consultation with CEC and CDFandG, will take action to correct the problem.

The biologist shall visit sensitive biological resource areas along the transmission route before construction activities begin in order to identify specific sensitive areas and to develop appropriate mitigation measures. PG&E shall ensure that the CEC is notified of these mitigation measures.

Verification: PG&E shall inform the CEC by telephone, as soon as possible, of difficulties pertaining to this requirement, and shall follow with a written report within 10 days to describe the problem and corrective actions taken.

PG&E will also prepare semiannual compliance statements verifying compliance of biological protection measures associated with transmission line construction that have been completed and the progress of ongoing measures. These statements will be submitted to the California Department of Fish and Game and the CEC starting six months after the start of construction and continuing until completion of construction activities. Following completion of construction activities, annual compliance statements will be submitted to the CDFandG and the CEC for a period of three years, at which time, monitoring and reporting may be continued for a period agreed to by PG&E and the CEC staff, or in the absence of such agreement and upon submission to the Commission itself, for a period as directed by the Commission.

13-2. PG&E shall implement the proposed mitigation measures identified in the AFC, Vol. II, Table II. 6-2, pp. II-11 to II-68, and Appendix J; the measures provided in response to Question 35 of the CEC staff's "First Set of Informational Requests."

PG&E shall also implement the following additional mitigation measures.

- Maintenance of cleared rights-of-way and necessary roads shall be accomplished without the use of herbicides. Such clearing shall be done with hand labor or light mechanical labor and shall include only those individual plants which pose threats to the energized line or required access.

- Upon the agreement of the owner(s) of the subject property, travel on the access roads during and after construction shall be controlled.

- Revegetation will be monitored for success. If necessary, additional revegetation measures will be undertaken to assure adequate erosion control.

- Steep slopes which have been bared (e.g., road cuts) shall be revegetated to ensure adequate short-term erosion control.

- A revegetation expert shall be consulted for areas of extreme steepness, rockiness, or high erosion hazard, and his or her recommendations will be incorporated into the revegetation plan.

- Special revegetation efforts shall be made in areas of serpentine chaparral and at rare plant locations. These efforts shall include attempts to reestablish the native vegetation, including transplants of local species (such as Sonoma sage) integrated with seeding efforts.

- Revegetation shall be carried out at the beginning of or just prior to the wet season (October to April) to aid in seedling survival.

- Areas of flat terrain and low erosion hazard should be left for natural recolonization by the surrounding species.

- Topping or trimming will be used to the extent possible instead of removing whole trees. Spur roads in heavily wooded areas which can be retired from service after construction will be reseeded with herbaceous species and/or tree seedlings using native species where feasible.

- Transmission lines shall be routed below ridge lines wherever possible in areas of peregrine falcon foraging in order to minimize potential collisions.

- Construction activities near rare, endangered, or sensitive wildlife species habitats or nest sites shall be conducted from June 15 to February 1 in order to reduce possible disturbance impacts and nest abandonment.

- Monitoring studies will be initiated upon completion of construction to document and verify the effects in sensitive areas (riparian, meadows, serpentine outcrops, chaparral, marsh) and to assure adequate erosion control in revegetated areas.

Verification: PG&E will prepare semiannual compliance statements verifying compliance of biological protection measures associated with transmission line construction that have been completed and the progress of ongoing measures. These statements will be submitted to the California Department of Fish and Game and the CEC starting six months after the start of construction and continuing for a period of three years, at which time, monitoring may be continued for a period agreed to by PG&E and the CEC staff, or in the absence of such agreement and upon submission to the Commission itself, for a period as directed by the Commission.

Section 14. CULTURAL RESOURCES

A. Applicable Laws, Ordinances, Standards, and Practices

- o National Historic Preservation Act of 1966 and implementing Federal regulations (16USC 470 et seq; 36 CFR 800 et seq.).
- o Public Resources Code, Sections 5097.9 et seq.

B. Requirements

14-1. PG&E shall designate an archaeological consultant who will be available prior to and during the construction activities for The Geysers Unit 16 transmission line.

Verification: PG&E shall submit a statement to the CEC indicating that an archaeolgical consultant will be available prior to the start of construction activities.

14-2. To mitigate possible adverse impacts upon identified archaeological sites, PG&E shall comply with the following mitigation measures and such other measures as may be necessary in the judgement of PG&E's archaeological consultant:

- o Site CA-SON-850--PG&E shall protect the site by minimizing further disturbance. A permanent fence shall be constructed parallel to both sides of the existing access road for a reasonable distance agreed upon by PG&E and the archaeological consultant, provided the property owner agrees. The fence shall be posted with trespass warnings. If the property owner is unwilling to allow construction of the fence, PG&E shall conduct a subsurface investigation and data recovery program. This two-phase program shall include: (1) site testing through excavation to assess the depth, the full nature of the site contents, and the physical integrity of the archaeological resources (additional significance evaluations can be determined at that time); and (2) recovery of an acceptable percentage of the existing archaeological data. This program shall be planned, supervised, and conducted by a qualified archaeologist in cooperation with local California Native American groups.

- o Site CA-SON-926--PG&E shall ensure avoidance of the archaeological resource by having PG&E engineers and an archaeological consultant flag the boundaries of the site and reexamine the location of the resource. If the archaeological consultant verifies that no adverse impacts to the site will result from any construction or maintenance activities, then no further action will be required. If such avoidance is not possible, PG&E shall conduct a two-phase subsurface investigation and data recovery program as previously described.

- o Site CA-SON-995--PG&E's archaeological consultant shall accomplish a detailed site investigation prior to the start of construction. The investigation shall include a complete and systematic exploration of the surface occurrence of "parent obsidian" and related lithic materials.

- o Site CA-SON-1200--PG&E shall ensure that no grading of the access road occurs in the site vicinity.

- o Site CA-SON-1208--PG&E shall ensure that no grading of the access road occurs in the site vicinity.

  Verification: PG&E shall submit to the CEC a statement verifying compliance with the mitigation measures for the identified archaeological sites. This statement shall be filed prior to the start of construction.

14-3. To mitigate possible adverse impacts upon identified historical resources, PG&E shall comply with the following mitigation measures and such other measures as may be necessary in the judgment of PG&E's archaeological consultant:

- o CA-SON-1210H--PG&E shall ensure that construction personnel are instructed not to disturb the site, particularly when manuevering vehicles or equipment in the area.

- o Duerson Cabin--This is an old woodcutter's cabin located adjacent to the transmission line right-of-way between towers No. 134 and No. 134A. Although not eligible for inclusion on the National Register, the cabin is of regional significance with respect to early building techniques and potential information about turn of the century land use patterns in Sonoma County. PG&E shall ensure that construction and maintenance crews are instructed not to disturb the cabin or its contents.

- o Rock fence segments--Rock fence segments constructed during the late 1800s are located near tower Nos. 86, 102, 119, 134A, and 135. Although not eligible for inclusion on the National Register, these rock fences are of regional significance as being representative of the period when Spanish land grants were sold to private owners. PG&E shall ensure that the rock fence segments are flagged and that construction crews are instructed to avoid such areas.

  Verification: PG&E shall submit to the CEC a statement from the designated archaeological consultant verifying compliance with the mitigation measures for these historical sites. If, for any reason, the identified mitigation measures cannot be implemented, the archaeological consultant may develop other mitigation measures.

14-4. If PG&E's construction activities threaten to impact a significant cultural resource, PG&E shall provide the CEC with a proposed mitigation plan. When agreement is reached on a mitigation plan, PG&E shall implement the plan and may proceed with construction.

Verification: PG&E shall notify the CEC the next working day following the discovery of a significant cultural resource. PG&E and the CEC shall meet to discuss the proposed mitigation plan within two working days after submission of the plan by PG&E. Construction activity in the potentially impacted area shall cease until mitigation measures have been developed. If agreement cannot be reached on a mitigation plan, the matter shall be handled under the provisions of the Dispute Resolution Procedures.

Section 15. GEOTECHNICAL/STRUCTURAL ENGINEERING

A. Applicable Laws, Ordinances, Standards, and Other Criteria

- Uniform Building Code (1976 edition), Chapter 70 (Incorporated by reference in Title 24, California Administrative Code, in Sonoma County Code by County Ordinance 2395, and in Lake County Code by County Ordinance 970).

- California Public Utilities Commission General Order 95.

- Geysers Unit 16 AFC, Volume II, Section 11.4.2.1 (Seismic Design of Towers); Section 11.4.2.2 (Oakmont Liquefaction Potential); Section 11.4.4 (Substation); 11.5.3 (General Methods); Section 11.5.4 (Specialized Contruction Practices); 11.6.3.2 (Discussion of Specific Line Sections); Appendix E ("Road Construction" portion); Appendix J (Graphic Summary); and Appendix K (Seismic Analysis of Transmission Towers for the Castle Rock Junction-Lakeville Transmission Lines).

B. Requirements

15-1. PG&E shall obtain in-lieu grading permits as deemed necessary and appropriate by the Chief Building Officials of Lake County and of Sonoma County.

Verification: PG&E shall submit to the responsible county CBO any grading permit information (such as grading plans, soils engineering reports, or engineering geology reports) required by the CBO in order to obtain an in-lieu grading permit. PG&E shall, in periodic compliance reports to CEC, state (a) the date and type of grading permit information filed with each CBO, (b) the date and work location of any in-lieu grading permit obtained, and (c) the location at which copies of the filed grading permit information is stored. Upon request, CEC may review any grading permit information.

15-2. PG&E shall ensure that a certified engineering geologist shall screen all proposed sites for towers, underground lines, and access roads. In addition, the engineering geologist shall conduct detailed site-specific investigations in areas which are susceptible to fault ground rupture, slope instability, and adverse foundation conditions (settlement, liquefaction, and soil erosion, expansion, or compaction). The geologist shall provide information and recommendations to the engineer responsible for selecting appropriate mitigation measures.

Verification: PG&E shall provide the CEC with a statement verifying compliance with this requirement.

15-3. PG&E shall ensure that no new transmission towers are sited within 15 meters of a trace of any Quaternary fault unless (a) overriding environmental, engineering, or economic factors dictate otherwise, and (b) there is no evidence indicating that Holocene movement has occurred along the fault.

Verification: PG&E shall submit a statement to the CEC justifying the siting of any new transmission towers within 15 meters of a trace of a Quaternary fault. The statement shall include verification by a certified engineering geologist that there is no known evidence indicating that Holocene movement has occurred along the fault.

15-4. PG&E shall ensure that no new underground transmission lines shall be sited within 200 meters of a trace of any Quaternary fault unless either (a) overriding environmental, engineering, or economic factors dictate otherwise, and (b) there is evidence indicating no Holocene movement has occurred along the fault. (Holocene fault traces shall be assumed to underlie the proposed facilities unless detailed, site-specific geologic investigations demonstrate otherwise.)

Verification: PG&E shall submit a statement to the CEC justifying the siting of any underground transmission lines within 200 meters of a trace of a Quaternary fault. The statement shall include verification by a certified engineering geologist that there is evidence indicating no Holocene movement has occurred along the fault.

15-5. PG&E shall ensure that new underground transmission lines, towers, and access roads shall not be built on active landslides.

Verification: PG&E shall submit a statement to the CEC from a certified engineering geologist verifying compliance.

15-6. PG&E shall ensure that new underground transmission lines, and towers shall not be constructed in areas of significant slope instability (including seismically induced instability) unless overriding environmental, engineering, or economic factors dictate otherwise. Where practicable, these facilities shall be sited to avoid areas of moderate slope instability. Where avoidance of areas of significant instability is not possible or where avoidance of areas of moderate instability is not practicable, PG&E shall ensure tower foundations and underground transmission lines are specially designed on the basis of detailed site investigations to provide a cost-effective level of protection.

Verification: PG&E shall submit a statement to the CEC justifying the construction of these facilities in any areas of significant or moderate slope instability. The justification shall include reference to the special design features intended to provide a cost-effective level of protection. PG&E shall also identify the location of the detailed site investigation reports and shall make such reports available to the CEC upon request.

15-7. PG&E shall ensure that access roads are not constructed in areas of significant slope instability (including seismically induced instability) unless overriding environmental, engineering, or economic factors dictate otherwise. To minimize cutting of access roads in areas of significant slope instability, PG&E shall ensure that helicopter or gin pole methods are used wherever feasible to construct transmission towers.

Verification: PG&E shall submit a statement to the CEC justifying construction of access roads in areas of significant slope instability. This statement shall include a discussion of the factors related to the consideration and rejection of alternatives to construction. The statement shall also include a statement of the measures taken to maximize slope instability and to minimize erosion.

15-8. PG&E shall ensure that access roads are constructed to avoid areas of moderate slope instability where practicable. New access roads should be kept to the minimum length practicable and shall be designed to maximize slope stability and to minimize erosion. Existing access roads shall be used wherever feasible.

Verification: PG&E shall submit a statement to the CEC explaining measures taken to maximize slope stability and to minimize erosion for any access roads constructed in areas of moderate slope instability.

15-9. PG&E shall ensure that new underground transmission lines are not sited in areas of moderate to high liquefaction potential unless overriding environmental, engineering, or economic factors dictate otherwise. Where avoidance is not practicable, foundations shall be designed on the basis of detailed site-specific investigations to provide a cost-effective level of protection.

Verification: PG&E shall submit to the CEC a statement justifying the construction of any underground transmission lines in areas of moderate to high liquefaction potential and explaining the special design features intended to provide a cost-effective level of protection. PG&E shall also identify the location of the detailed site investigation reports and shall make such reports available to the CEC upon request.

15-10. Deleted.

15-11. Deleted.

15-12. PG&E shall design the tubular steel towers if selected for the West Porter Creek area (towers 54 - 61) to satisfy or exceed both the requirements of California Public Utilities Commission General Order 95 and all pertinent conditions of the certification.

Verification: At least 120 days prior to intended construction start date, PG&E shall submit the following to CEC and, if requested, to the Sonoma County CBO: (a) two sets of proposed final plans, specifications, and design calculations, and (b) an affidavit from the responsible licensed structural engineer affirming that, to his personal knowledge, the proposed final tubular tower design complies with the design criteria and methods set forth in or required by the CEC decision.

CEC will review the proposed tower design to determine its compliance with the criteria in the CEC decision. PG&E may deem the

proposed design acceptable to CEC unless notified otherwise within 60 days following receipt of all documents by the CEC.

15-13. PG&E shall not proceed with the construction of any tower or foundation which is not in conformance with approved design criteria.

Verification: At least 25 days prior to the start of any construction not in conformance with the approved design criteria, PG&E shall notify the CEC, and provide a statement justifying the nonconformance. The CEC shall notify PG&E when such a change is approved within 20 days of receipt of notice and statement from PG&E.

15-14. PG&E shall construct the transmission facilities and associated earthwork in conformance with the approved design criteria and all conditions of certification for The Geysers Unit 16 project.

Verification: Within 180 days following construction, PG&E shall submit a statement certifying that the transmission line has been constructed in accordance with design criteria and all pertinent conditions of certification.

15-15. The as-graded and as-built plans shall be maintained as permanent records by PG&E.

Verification: PG&E shall identify the person or office to contact for CEC examination of such records.

15-16. If notified by either a responsible CBO or by CEC that any proposed design plans or specifications or any substantial revisions thereof are not acceptable, PG&E shall not proceed with any construction based on such plans and specifications.

Verification: Upon notification that the original design plans are unacceptable, PG&E shall prepare and submit revised design plans to the responsible CBO or CEC. In its periodic compliance reports to the CEC, PG&E shall indicate any dates of construction shutdown resulting from the nonacceptance of original design plans and specifications.

Section 16. SAFETY AND NUISANCE EFFECTS

A. Applicable Laws, Ordinances, Standards, and Practices

- 49 USC 1348 and 14 CFR, Part 77.13.
- Title 21, California Administrative Code, Sections 3500 et seq.
- Public Utilities Code, Sections 21656 et seq.
- Streets and Highways Code, Chapter 3, Article 2, Section 670.
- City of Santa Rosa Ordinance 1555.
- Sonoma County General Plan Noise Element.
- Lake County General Plan Noise Element.
- Title 8, California Administrative Code, Sections 5095 - 5099.
- PUC General Order 95.
- Title 8, California Administrative Code, Articles 85 and 87.
- Title 8, California Administrative Code, Chapter 4, Subchapters 4 and 7.
- 14 California Administrative Code, Sections 1254 and 1256.
- Public Resources Code, Sections 4292 - 4296.
- Health and Safety Code, Sections 39500 et seq.
- Title 17, California Administrative Code, Sections 70200 et seq.
- 40 CFR, Part 50.
- 47 CFR, Part 15.25.
- 49 USCA 1348 and 14 CFR, Part 77.
- Public Utilities Code Sections 21656 et seq.
- 21 Calif. Admin. Code Sections 3500 et seq.
- Federal Occupational Safety and Health Act of 1970 and implementing federal regulations (29 USCA 655 et seq.; 29 CFR 1910 et seq.
- 49 CFR, Part 15.25.

B. Requirements

16-1. PG&E shall file a "Notice of Construction or Alteration" form with the Federal Aviation Administration if it is anticipated that construction would result in a transmission line tower or any appurtenances being more than 200 feet in height above the ground level per 14 CFR, Part 77.13.

Verification: PG&E shall notify the CEC of any such filing and shall forward a copy to the CEC upon request of the CEC.

16-2. PG&E shall maintain the vegetation clearance for conductors and structures on the transmission lines in accordance with Title 14, California Administrative Code, Sections 1250 - 1258 and Public Resources Code, Sections 4292 - 4296.

Verification: Within 120 days after completion of construction, PG&E shall submit a statement to the California Department of Forestry and the CEC that the transmission line has been constructed in accordance with applicable requirements. PG&E shall also inspect the transmission line annually to ensure that the line maintains required clearances during the fire season. In the event that noncompliance is determined by the CDF, the CDF shall require PG&E to take measures necessary to correct the noncompliance. If PG&E's corrective measures are unsatisfactory in the opinion of the CDF, the CDF shall inform the CEC and shall recommend a course of action.

16-3. PG&E shall ensure that, regardless of location or ownership, all ungrounded metallic fences longer than 150 feet within the right-of-way shall be grounded following the procedures outlined in The Geysers Unit 16 SEI and The Geysers Unit 16 AFC, Vol. II, Appendix C.

Verification: Prior to operation of the transmission line, PG&E shall file a statement verifying compliance.

16-4. In the event of complaints regarding induced currents from vehicles, portable objects, large metallic roofs, fences, gutters, or other objects, PG&E shall investigate and take all reasonable measures at its own expense to correct the problem for valid complaints, provided that: (a) the object is located outside the right-of-way, or (b) the object is within the right-of-way and existed prior to right-of-way acquisition.

For objects constructed, installed, or otherwise placed within the right-of-way after right-of-way acquisition, PG&E shall notify the owner of the object that it should be grounded. In this case, grounding is the responsibility of the property owner. PG&E shall advise the property owner of this responsibility in writing prior to signing the right-of-way agreement.

Verification: PG&E shall provide a statement in the first annual compliance report verifying compliance.

16-5. PG&E shall ensure that the design and construction of the transmission line satisfies or exceeds both the requirements of PUC General Order 95 and the terms and conditions of CEC certification. PG&E shall receive CEC approval prior to filing a request with the PUC for a waiver of General Order 95 requirements. PG&E shall also receive CEC approval for significant modifications in transmission line design as certified.

Verification: Within 180 days following completion of the transmission line, PG&E shall submit to the CEC a statement which verifies compliance with the requirements of PUC General Order 95 and with the terms and conditions of CEC certification. The statement shall note any waivers granted by the PUC for General Order 95 requirements.

16-6. On-site worker safety inspections shall be conducted by the California Division of Occupational Safety and Health (Cal/DOSH) during construction and operation of the transmission line or when an employee complaint has been received. Cal/DOSH shall notify the CEC in writing in the event of a violation that could involve DOSH actions affecting the transmission line construction or operation schedule.

Verification: PG&E shall note any Cal/DOSH inspections in its periodic compliance reports.

16-7. PG&E shall make every reasonable effort to locate and correct, on a case-by-case basis, all causes of radio interference and television interference attributed to the transmission line facilities, including, if necessary, the modification of receivers or the furnishing and installation of antennas. In addition, PG&E shall take reasonable care to prevent the conductors from being scratched or abraded.

Verification: PG&E shall identify the number and type of RI/TVI complaints and corrective actions taken in the first annual compliance report to the CEC. Subsequent reports are not required unless requested by the CEC.

16-8. Deleted.

Section 17. LAND USE

A. Applicable Laws, Ordinances, Standards, and Practices

- o Public Resources Code, Section 25527.
- o Sonoma County General Plan.
- o City of Santa Rosa General Plan.

B. Requirements

17-1. PG&E shall comply with the mitigation measures identified in the Memorandum of Understanding between PG&E and the State Department of Parks and Recreation, dated January 1980 (Geysers Unit 16 AFC, Vol. II, Appendix F).

Verification: PG&E shall obtain a letter from the State Department of Parks and Recreation verifying that the identified mitigation measures have been implemented and shall so inform the CEC in a periodic compliance report.

17-2. Prior to the commencement of construction in Annadel State Park, PG&E shall contact the District Superintendent of the California State Department of Parks and Recreation, District II, Santa Rosa, or his designated alternate.

Verification: PG&E shall verify the contact in a periodic compliance report to the CEC.

17-3. PG&E shall design, construct, operate, and maintain the transmission line through the Annadel State Park in accordance with the PG&E/DPR Memorandum of Understanding.

Verification: No more than 180 days after the end of construction, PG&E shall submit a statement verifying that the line has been designed and constructed in accordance with the Memorandum of Understanding. PG&E shall also provide a statement from a responsible individual that the line is being operated and maintained in accordance with the Memorandum of Understanding.

Section 18. WATER QUALITY, HYDROLOGY, AND WATER RESOURCES

A. Applicable Laws, Ordinances, Standards, and Practices

- Title 23, California Administrative Code, Chapter 3, Subchapters 3, 13, and 15.
- Water Quality Control Plan, Sacramento River Basin (5A).
- California Water Code, Part 2, Division 2.

B. Requirements

18-1. PG&E shall provide the CEC with a report identifying the source, estimated amount, and schedule of use for water to be used in constructing the transmission line switchyard facility.

Verification: PG&E shall submit this report to the CEC at least 90 days prior to construction. PG&E shall file a supplementary report with the CEC if the actual water usage exceeded the estimated usage by more than 25 percent.