



Environmental Consultants

F I N A L

AN ENVIRONMENTAL IMPACT REPORT

FOR

ORIGINAL
LIBRARY COPY
DO NOT REMOVE

The Geothermal Leasehold of
Union Oil Company at The Geysers,
Sonoma County, California

ORIGINAL
LIBRARY COPY
DO NOT REMOVE

Persons responsible for
preparing this report:

Dr. James A. Neilson: Ecologist, Botanist
Dr. Samuel Bamberg: Ecologist, Botanist
Dr. W. James Barry: Soil Scientist, Ecologist
Dr. David Fredrickson: Anthropologist
Dr. Philip Leitner: Animal Ecologist
Dr. R. D. Reinhardt: Environmental Analysis
Systems
Dr. Edgar R. Stephens: Air Chemist
Dr. David Storm: Engineering
Mr. James E. Koenig, PhD.: Geothermal
Geologist
Mr. R. J. Bernard, M.A.: Historian
Mr. Lauren R. Elliott, M.A.: Land Use Planning
Mr. Rodger Greensfelder, M.S.: Geology
Ms. D. K. McQuaid, M.S.: Animal Ecologist,
Logistics
Ms. S. MacDonald: Graphic Artist
Mr. Robert O. Schultz, M.S.: Resource
Management Systems

Submitted:
February, 1975

James E. Koenig

Resumes and qualifications of the above personnel are
on file and available for public review at the
Sonoma County Planning Office.

TABLE OF CONTENTS FOR ENVIRONMENTAL IMPACT REPORT

	<u>PAGE NUMBER</u>
<u>COMMENTS AND RESPONSES</u>	
The Frontispiece Collage	1-2
So. Co. Planning Dept. Comments on Draft EIR	3
U.S. Dept. of Interior Fish & Wildlife Service comments	4
Public Utilities Commission Receipt of Draft EIR	5
Calif. Regional Water Quality Control Board Review comments on EIR	6
Comments from Division of Forestry on EIR	7
U.S. Dept. of the Interior comments on EIR and Attachment A	8-9
Ecoview Responses to comments of the Union Leasehold EIR	10
Department of Fish and Game EIR comments and Inadequacies of the Report	11-12
Ecoview Responses to Department of Fish and Game comments	13-14
Sierra Club Review of EIR and Addendum	15-16
Ecoview Responses to Sierra Club comments	17-18
Summary Statement on EIR by Vane E. Suter	19
Statement by Joel Robinson Regarding Draft EIR	20-28
Ecoview Responses to comments by Joel Robinson	29-33
So. Co. Water Agency Memorandum Regarding EIR	34-35
Ecoview Response to So. Co. Water Agency comments	36-37
PG&E comments on EIR	38-48
Ecoview Response to PG&E comments	49-59
Comments & Questions - Marilyn Goode, respondent	60-61
Ecoview Response to Comments & Questions - Marilyn Goode, respondent	62
State Lands comments on EIR	63
Ecoview Response to State Lands comments	64
Transcript of Oral Comments at Public Hearing on Draft EIR	65-104
Ecoview Supplement to Responses to comments on the Public Hearing for EIR	105-107
Statement of B.C. McCabe before the Environmental Control Commission	108-109
Ecoview Responses to Unanswered Oral Comments made at the Public Hearing	110

Environmental Department
Document Cataloguing System
Coding Sheet

TITLE SEARCH

BARBARA L. STAGG

To be completed by Librarian:

Ctlg. No.: _____

Location: _____

Ctlg. Date: _____

Submitted by: _____

JUL 28 1987

Date: _____

Approved by: _____

Date: _____

Title: _____

*A Draft Environmental Impact
Report for The Brotherhood
Seaschold of Union Oil Company
at The Geopos, Sonoma County,
California*

Author 1: _____

Author 2: _____

Publisher: _____

Publ. No.: _____

Publ. Date: _____

Area 1: _____

Sub-Area 1a: _____

Sub-Area 1b: _____

Area 2: _____

Sub-Area 2a: _____

Sub-Area 2b: _____

°Subject 1: _____

°Sub-Subject 1a: _____

Sub-Subject 1b: _____

Subject 2: _____

Sub-Subject 2a: _____

Sub-Subject 2b: _____

°This must have an entry. Use General if necessary.

SONOMA COUNTY PLANNING DEPARTMENT

COUNTY ADMINISTRATION BUILDING - 2555 MENDOCINO AVENUE
SANTA ROSA, CALIFORNIA 95401 - PHONE 707 527-2412

GEORGE KOVATCH, PLANNING DIRECTOR

July 21, 1975

GDC #35-18

GDC #36-18

NOTICE OF DETERMINATION

CERTIFICATION OF UNION OIL LEASEHOLD EIR

Northern Sonoma County Air Pollution Control District

Responsible Department

AUTHORITY TO CONSTRUCT - two geothermal steam wells
GDC 35-18 (Application #74-29) - UNION OIL COMPANY
GDC 36-18 (Application #74-44) - UNION OIL COMPANY

Name of Project BOTH WELLS FOR PG&E UNIT #12 ON EXISTING DRILL P
GDC 35-18: 1820' N and 3275' E of the SW corner of Sec. 18, T11N,
R8W, M.D. B&M, The Geysers, Sonoma County, CA
GDC 36-18: 1750' N and 3175' E of the SW corner of Sec. 18, T11N,
R8W, M.D. B&M, The Geysers, Sonoma County, CA

Location

Michael W. Tolmasoff
821 No. Cloverdale Blvd,
Cloverdale, CA 95425

707

894-3861

Contact Person	Area Code	Phone	Extension
----------------	-----------	-------	-----------

The NORTHERN SONOMA COUNTY AIR POLLUTION CONTROL DIST. of the County of Sonoma,
on JULY 16, 1975, took the following action concerning the
above project:

1. Determined to ~~(XXXXXX)XXXXXXX~~ (approve with conditions), and
2. Determined that the project ~~(will)~~ (will not) have a significant adverse effect on the environment.

An Environmental Impact Report (has) ~~(has)~~ been prepared pursuant to the provisions of the California Environmental Quality Act of 1970, as amended.

JULY 21, 1975

Date



Michael W. Tolmasoff

Air Pollution Control Officer

SONOMA COUNTY PLANNING DEPARTMENT

COUNTY ADMINISTRATION BUILDING - 2555 MENDOCINO AVENUE
SANTA ROSA, CALIFORNIA 95401 - PHONE 707 527-2412

GEORGE KOVATCH, PLANNING DIRECTOR

July 21, 1975

GDC #35-18

GDC #36-18

NOTICE OF DETERMINATION

CERTIFICATION OF UNION OIL LEASEHOLD EIR

Northern Sonoma County Air Pollution Control District

Responsible Department

AUTHORITY TO CONSTRUCT - two geothermal steam wells
GDC 35-18 (Application #74-29) - UNION OIL COMPANY
GDC 36-18 (Application #74-44) - UNION OIL COMPANY

Name of Project

BOTH WELLS FOR PG&E UNIT #12 ON EXISTING DRILL PA

GDC 35-18: 1820' N and 3275' E of the SW corner of Sec. 18, T11N,
R8W, M.D. B&M, The Geysers, Sonoma County, CA

GDC 36-18: 1750' N and 3175' E of the SW corner of Sec. 18, T11N,
R8W, M.D. B&M, The Geysers, Sonoma County, CA

Location

Michael W. Tolmasoff
821 No. Cloverdale Blvd,
Cloverdale, CA 95425

707

894-3861

Contact Person

Area Code

Phone

Extension

The NORTHERN SONOMA COUNTY AIR POLLUTION CONTROL DIST. of the County of Sonoma,

on JULY 16, 1975, took the following action concerning the
above project:

1. Determined to (~~XXXXXXXXXXXXXXXXXXXX~~) (approve with conditions), and
2. Determined that the project (~~will~~) (will not) have a significant adverse effect on the environment.

An Environmental Impact Report (has) (~~XXXXXXXX~~) been prepared pursuant to the provisions of the California Environmental Quality Act of 1970, as amended.

JULY 21, 1975

Date


Michael W. Tolmasoff

Air Pollution Control Officer

SONOMA COUNTY PLANNING DEPARTMENT

COUNTY ADMINISTRATION BUILDING

2555 MENDOCINO AVENUE

SANTA ROSA, CALIFORNIA 95401

PHONE 707 527-2412

GEORGE KOVATCH, PLANNING DIRECTOR

April 10, 1975

(Date)

TO:

State of California
The Resources Agency
SECRETARY FOR RESOURCES
1416 Ninth Street, Room 1311
Sacramento, California 95814

NOTICE OF COMPLETION

DRAFT ENVIRONMENTAL IMPACT REPORT

Responsible Agency		Division	
Northern Sonoma County Air Pollution Control District			
Project Title			
2 geothermal steam wells GDC 35-18 and GDC 36-18 UNION OIL COMPANY			
Address		City	County
Northern Sonoma County Air Pollution Control District 821 N. Cloverdale Blvd.		Cloverdale	Sonoma
Contact Person		Area Code	Phone
Mr. Michael W. Tolmasoff		707	894-3861

PROJECT DESCRIPTION OF NATURE, PURPOSE, AND BENEFICIARIES

AUTHORITY TO CONSTRUCT one geothermal well GDC 35-18, Geysers geothermal area, approx. 1820' N and 3275' E of the SW corner of Section 18, T11N, R3W, M.D. B&M, The Geysers, Sonoma County, California. (Geysers Development Company). For PGandE Unit No. 12. On existing well pad.

AND

AUTHORITY TO CONSTRUCT one geothermal well GDC 36-18 Geysers geothermal area, approx. 1750' N and 3175' E of the SW corner of Section 18, T11N,

NOT WRITE IN THIS SPACE

**COMMENTS
AND
RESPONSES**



Environmental Consultants

The Frontispiece Collage

The collage was inserted at the beginning to illustrate a number of points that are discussed within the Union Oil report. They represent a series of impressions of activities, achievements and problems that characterize the field, particularly the older part. Other views of recent developments on this leasehold as well as others are to be found in other parts of this EIR, i.e., Figures V-2, V-3, X-1, and in the EIR for Squaw Creek development, Figures II-1 and III-6.

The following identifies both the picture and the context in its relationship to others in the collage as well as to the discussions in the report.

Reading clockwise beginning at the top right:

- (1) A general view of the cement storage and mixing area above Sulphur Bank--a neccessary adjunct to large scale geothermal drilling.
- (2) A sign at the Big Geysers resort.
- (3) A sign at the border of Union's leasehold. This and the sign lower center (physically located before the sign indicated in (2)) show better than any other method a resource conflict; one between a long established business and a relatively new industrial development. Both the disclaimer and the restriction of trespass by Union Oil illustrate at once an acknowledgement of the problem yet with little overt action by Union Oil to regulate trespass by anyone other than locking gates to the south. Union Oil further acknowledges that there is danger in the field but only common sense and discomfort would identify its source and intensity to the uninitiated.
- (4) A sign near the border of the leasehold that is one of the few overt indicators of PG&E's presence.
- (5) An old style well head of a type no longer used by Union Oil Co.
- (6) A drill rig in operation.
- (7) A section of the old field showing numerous pipe lines and soil disturbance that have not healed in the several years since installation.
- (8) An identification sign indicating a little known participant in geothermal development at The Geysers, as well as a reinforcement that the area is restricted and private property.
- (9) Another view of the old field looking up Big Sulphur Canyon showing power units and pipe lines as well as unhealed construction scars that are still causing sedimentation in the stream below.
- (10) Earth moving equipment constructing a drill pad.
- (11) Another view of the old field illustrating the point sources of steam emissions over the landscape.

Reading center, top to bottom:

- (12) An acknowledgement of a noise hazard that is part of safety precautions



Environmental Consultants

practiced in the field. (We did notice that on the site where this sign was located such hearing protection was not worn by persons in the area.)

- (13) A blown out well showing the diffuseness of emissions and the hazard to the curious now protected by a fence.
- (14) A building housing what is left of one of the original generators operated at the resort to supply electricity for its patrons. Included here as a matter of historical interest and to contrast modern plants.
- (15) A sign showing a disclaimer for activities at the resort area and the impish challenge and invitation of the resort owner.

On the whole, the collage portrays impressions of a developing industry and some of the promises and problems created in its wake.

Taken as a whole it illustrates the clutter and price exacted on the land by industrial development that was done with little advance planning or little concern for consequences beyond the immediate end of production activity, until forced to change. It is recognized that an infant industry does make errors in judgment and direction. There is no reason, however, to perpetuate, reinforce, or repeat past errors. It is also clear that improvements have and are being made. It is to the correction of the ugly and to the avoidance of the unnecessary negative implications of geothermal development that this environmental assessment has been dedicated.

Before we rush headlong into extension of the field, a careful look into the real costs of what is being done should be made. The 2 1/2 years of ECOVIEW's observations are not a sufficiently long time to develop and evaluate data to predict potential outcome of subtle effects. The correction of obvious faults and unnecessary impacts should be done immediately and with vigor by concerted efforts from the industry, public agencies and the public in general.

SONOMA COUNTY PLANNING DEPARTMENT

COUNTY ADMINISTRATION BUILDING - 2555 MENDOCINO AVENUE
SANTA ROSA, CALIFORNIA 95401 - PHONE 707 527-2412

GEORGE L KOVATCH, PLANNING DIRECTOR

Union Oil
Permitted E!
4-10-75

ENVIRONMENTAL IMPACT REPORT REFERRAL

___ Health Department
___ Road Department

___ BCDC

___ ABAG

___ Coastal Commission

___ Other *LAFCO*

Mr. David A. Dorfman
LAFCO - Executive Office
2230 Professional Drive
Santa Rosa, CA 95401

___ Regional Water Quality Control Board

___ State Division of Highways

___ State Department of Fish and Game

___ State Division of Forestry

___ Soil Conservation Service

~~SONOMA COUNTY~~

~~PLANNING DEPT.~~

We are referring the enclosed draft environmental impact report to your agency for review and comment in accordance with the State Guidelines for Implementation of the California Environmental Quality Act of 1970 and Sonoma County Ordinance 1628.

Your comments should be returned to the Planning Department for inclusion in the final EIR. The State Guidelines recommend that: "Reviewers should focus on the sufficiency of the EIR in discussing possible impacts upon the environment, ways in which adverse effects might be minimized, and alternatives to the project, in light of the intent of the Act to provide decision-makers with useful information about such factors."

The draft EIR, agency comments, public comments and consultant responses shall together constitute the final EIR to be considered by the appropriate Board at public hearing.

If we are not in receipt of your agency's comments by the below listed date, it will be assumed that your agency has no comment to make.

Comments should be received by: *May 9, 1975.*

Public Hearing is scheduled for: *May 16, 1975 at 1:30 pm*

Hearing Body: *Air Pollution Control Officer*

Please return the draft EIR to this office together with your comments as it will be needed for final processing.

NO
COMMENTS
David A. Dorfman
5/16
re Mike

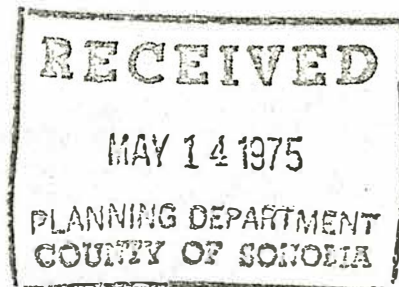


United States Department of the Interior

FISH AND WILDLIFE SERVICE
GEOTHERMAL ENVIRONMENTAL OFFICE
2800 Cottage Way, Room E-2720
Sacramento, California 95825

May 13, 1975

Mr. George Kovatch,
Planning Director
Sonoma County Planning Department
County Administration Building
2555 Mendocino Avenue
Santa Rosa, California 95401



Dear Mr. Kovatch:

As I discussed with you and Tom Cordell by phone, should your agency desire the official review and comments of the U.S. Fish and Wildlife Service or the U.S. Department of the Interior on a particular project you should send 7 copies of the EIS to Mr. Bruce Blanchard, Director, Office of Environmental Project Review, Department of the Interior, Washington, D.C.

While the California Department of Fish and Game will comment on the Union Oil Leasehold EIR, I would like to take this opportunity to point out an item of mutual concern. In 1974 there were about 50 known nesting American Peregrine falcons (Falco peregrinus anatum) in the United States. Nine of these pairs were in California and three pairs are suspected to have been in the Geysers.

The American Peregrine falcon is listed as an "endangered" species by both the California Fish and Game Commission and the Department of the Interior. It is fully protected under the Endangered Species Act of 1973 (Public Law 93-205; 87 Statute 884). The California Department of Fish and Game is presently determining nesting locations and success in the Geysers vicinity. My personal recommendation is that no construction or drilling take place in

SONOMA COUNTY
PLANNING DEPT.

OFFICIAL
FILE COPY



DO NOT REMOVE
Save Energy and You Serve America!

*cc Jon Nelson - Spilled
5/14/75 wn*

Mr. George Kovatch

-3-

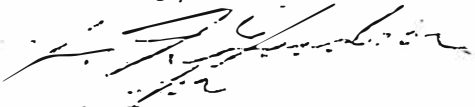
May 9, 1975

2. Studies on the effects of steam discharge on the vegetation of the area have been made and the extent of this problem has been determined. The need for this research is stated on page 45 of the draft EIR.
3. Studies on the effects of geothermal development on runoff, erosion, and ecosystem fertility have been made to determine reasonable mitigation measures. This is proposed on page 60.
4. Adequate mitigation is developed for adverse biological impacts.
5. A master plan for field development has been prepared as stated on page 16. This plan should include the results of studies on steam discharge and erosion, appropriate mitigation measures, and preservation of unique natural areas within the leasehold.
6. A protective zone for the historical peregrine falcon nesting area should be identified. As indicated in the report, a portion of the leasehold is within a peregrine falcon nesting area on Cobb Mountain. The American peregrine falcon is listed as "endangered" by the California Fish and Game Commission and the Secretary of the U. S. Department of the Interior.

We are not certain of the actual size and conformation of the protective zones that are needed to protect the remaining birds and their nesting habitat. Field studies are now being conducted to determine these areas. Since it may be some time before these studies are completed, for the interim we recommend that additional geothermal development not be permitted within Sections 16, 17, and 21 of T 11N, R 8W, Mt. Diablo Base and Meridian.

Thank you for the opportunity to review and comment on this draft EIR. Please let us know when the final EIR is available for review.

Sincerely,


J. C. Fraser
Regional Manager
Region III



YDC
ADDRESS ALL COMMUNICATIONS
TO THE COMMISSION
CALIFORNIA STATE BUILDING
SAN FRANCISCO, CALIFORNIA 94102
TELEPHONE: (415) 557. 3938

Public Utilities Commission
STATE OF CALIFORNIA

May 6, 1975

FILE NO. A-53465
A-54201

Sonoma County Planning Department
2555 Mendocino Avenue
Santa Rosa, California 95401

Attention: Mr. George Kovatch
Planning Director

Gentlemen:

This acknowledges receipt of "A Draft Environmental Impact Report for the Geothermal Leasehold of Union Oil Company at The Geysers, Sonoma County, California", issued by the Northern Sonoma County Air Pollution Control District in its lead agency capacity for leasehold development and geothermal well drilling. In accordance with the July, 1974 agreement that was accepted by Messrs. Prentice Fish and Tom Cordill as representatives for Sonoma County, Pacific Gas and Electric Company (PGandE) has submitted your report as a proposed late filed exhibit No. 36 in this Commission's proceeding on PGandE's application for Geysers Unit No. 12 (A-53465). It is anticipated that your report, the comments on your report, and your final Environmental Impact Report will constitute the necessary additional evidence to allow A-53465 to be submitted to this Commission for its decision.

An analagous circumstance is expected for PGandE's application for Geysers Unit 14 (A-54201), except that the Commission staff's draft EIR when issued, will reference your report and subsequent documents.

Very truly yours,

PUBLIC UTILITIES COMMISSION

By *William R. Johnson*

WILLIAM R. JOHNSON, Secretary

cc: Mr. Prentice A. Fish, Deputy County Counsel
✓ Mr. Tom Cordill, Planning Department
Mr. Michael W. Tolmasoff, Air Pollution Control Officer
Mr. Philip A. Crane, Jr., Pacific Gas and Electric Company

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD—
NORTH COAST REGION1000 CODDINGTON TOWN CENTER
SANTA ROSA, CALIFORNIA 95401
Phone: 707—545-2620SONOMA COUNTY
PLANNING DEPT.OFFICIAL
FILE COPY
DO NOT REMOVE

April 18, 1975

Sonoma County Planning Commission
2555 Mendocino Avenue
Santa Rosa, CA 95401

Gentlemen:

We have reviewed the EIR for the Geothermal Leasehold of Union Oil Company at the Geysers. We believe water quality concerns were adequately documented in the report.

As was mentioned in the report, our agency prohibits any discharge of condensate to surface waters. We also regulate the disposal of waste drillings by issuance of Waste Discharge Requirements. These requirements set standards for sump construction and implement a notification program of waste discharged to the sumps. A copy of Waste Discharge Requirements already issued to a sump belonging to Union Oil Company is enclosed.

The problem of condensate spillages continues to be an area of great concern, and we are awaiting the results of Union Oil Company's studies on this subject.

Any efforts undertaken to create a more comprehensive monitoring program are welcomed by this agency. We would hope that pre- and post-development conditions could be monitored to give all involved a better grasp of the effect of geothermal drilling on water quality.

We are returning under separate cover copy No. 29 of the EIR as requested.

Sincerely,

David M. Snetsinger
Sanitary Engineering Associate

Enclosure

cc Jim Nelson
5/12/75

RECEIVED

APR 21 1975

PLANNING DEPARTMENT
COUNTY OF SONOMA

Sonoma Ranger Unit
2560 West College Avenue
Santa Rosa, CA 95401

SONOMA COUNTY
PLANNING DEPT.

Edmund G. Brown Jr.
RONALD REAGAN, Governor



OFFICIAL
FILE COPY
DO NOT

May 14, 1975

George Kovatch, Planning Director
Sonoma County Planning Department
2555 Mendocino Avenue
Santa Rosa, CA 95401

RECEIVED

MAY 14 1975

PLANNING DEPARTMENT
COUNTY OF SONOMA

Dear Mr. Kovatch:

In reviewing the Environmental Impact analysis for the Union Oil Company lease holdings at the Geysers, California Division of Forestry would offer the following comments.

A fire occurring in these proposed fields would most likely have the largest impact on the water quality. It is true that Range Improvement burns have been conducted in this area, however, these are done under controlled circumstances and a wild fire starting on a bad fire weather day would have the potential of spreading and doing great damage beyond the immediate area. This area also has approximately a 35 to 40 minute response time for the nearest California Division of Forestry crews.

With these things in mind and prior to the issuance of and condition of the Use Permit, it is recommended that a detailed written fire plan be prepared by the applicant and approved by the California Division of Forestry. This plan should include, but not be limited to the following considerations:

1. Fireproofing of work sites
2. Fireproofing of access roads
3. Fire Prevention measures when welding or working with other fire causing activities
4. The designation of responsibilities for persons to have patrol or inspecting status for enforcement of fire safe rules
5. Disposal procedures for flammable materials (State and County fire laws and Air Pollution regulations would have to be complied with).
6. Manpower, fire tools and fire equipment availability if a fire should start (include water availability and source)
7. Communication procedures for contact with fire officials.

cc Jim Nelson
Sp 5/14/75
mike 5/16

8. Manpower organizational chart for the lease holding area
9. Road system map with provisions for supplying data to fire officials as to new roads accessibility, locked gates, etc.

With the potential of a fire occurring in a given area only being increased by the addition of men and equipment, it is hoped that these few things can and will reduce that potential and in the event of one occurring keep the size minimal.

Very truly yours,

FRANK E. CROSSFIELD
State Forest Ranger IV

by GERALD R. MURPHY
Fire Prevention Supervisor

GRM/eb



UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
Area Geothermal Supervisor
Conservation Division
345 Middlefield Road
Menlo Park, California 94025

1242
RECEIVED

MAY 14 1975

**PLANNING DEPARTMENT
COUNTY OF SONOMA**

SONOMA COUNTY May 12, 1975

Mr. George Kovatch, Planning Department
Sonoma County Planning Department
County Administration Building
255 Mendocino Avenue
Santa Rosa, California

**PLANNING DEPT.
OFFICIAL
FILE COPY**

Dear Mr. Kovatch:

Thank you for inviting our review and comment on the "Final
Environmental Impact Report for the Geothermal Leasehold of Union
Oil Company at the Geysers, Sonoma County, California", prepared
by Ecoview. As the subject area is in close proximity to Federal
leases, we maintain close and continuous interest in all phases
of geothermal activity treated in the EIR.

As suggested in your circular, we are confining our comments to
the technical sufficiency of the EIR and avoiding comments on format,
style or typographical errors. Our comments are enclosed as Attach-
ment A. We hope the comments will be of value in the compilation
of the final EIR.

We would appreciate a copy of the final EIR for our reference as it
would be of value in developing the format and criteria for the
"Environmental Analyses" which will be prepared by this office in
consideration of Plans of Operation on Federal geothermal leases.

We would be grateful if you would address this office directly in
any future geothermal correspondence to the USGS, Area Geothermal
Supervisor.

Reid T. Stone
Reid T. Stone
Area Geothermal Supervisor

Enclosure: Attach. A

*cc Jim Nelson
Sp 10/14
Mike 5/16*

LDC

Township 11 N., R. 8 W., W 1/2 of section 16 and the NW 1/4 of section 21, Sonoma County, during the period of February 1 to September 1 annually. Consequently, all proposed developments in that particular area should be so stipulated. More precise information concerning the status of the falcons can be obtained from the District III Office of California Department of Fish and Game, Yountville.

The few remaining falcons in California are in a precarious position. Expected drilling and construction noises within the area described could result in an irretrievable decline in the total population of birds in California and the nation.

I am returning the EIR's as you requested. I strongly suggest you provide the California Department of Fish and Game the opportunity to review this report and all future EIR's if you have not done so.

Sincerely,

William M. Spaulding
W.M. Spaulding, Jr.
Geothermal Advisor

Attachment: cpes #36, 41, Happy Jack #10 & #11 wells;
Pacific Energy Corp. #7379, Sects. 14 & 15; Burmah Oil & Gas Co. #776
Domenichelli #1 well

cc: Director, CDF&G, Sacramento, CA
Reg. Mgr., CDF&G, Reg. III, Yountville, CA

ATTACHMENT A

U. S. GEOLOGICAL SURVEY
CONSERVATION DIVISION
OFFICE OF THE AREA GEOTHERMAL SUPERVISOR

REVIEW COMMENTS

on

A DRAFT ENVIRONMENTAL IMPACT REPORT

for

The Geothermal Leasehold of
Union Oil Company at the Geysers,
Sonoma County, California

GENERAL COMMENT - This office considers that most, if not all, geothermal exploration and development at the Geysers may be successfully implemented without serious adverse impact to the environment. In general, we concur with the statement on page 78 of the EIR, "...that many environmental problems could be avoided or at least reduced to acceptable levels if greater care is taken in the planning, engineering, and construction phases of the field development process".

Most of the mitigating measures suggested or recommended in the EIR can be implemented through the application of existing State and County regulations. It would be appropriate to include, perhaps as an appendix, an outline of the applicable regulations, standards and agencies responsible for their enforcement.

Page 1, Paragraph 3 - The reference to "promiscuous raw steam discharge on a KGRA wide basis" seems to imply that such discharge would be an inevitable result of geothermal resource development in the area. This is not the case as discharges are, with few exceptions, controlled within established, acceptable rates or levels. The use of the term "promiscuous" seems to set a negative nonobjective viewpoint for the reader. Objectivity might be restored by substituting "...possibly large quantities of ..." for "promiscuous".

Page 21, Paragraph 2 - It should be further emphasized that in common geothermal drilling practice, as contrasted with conventional oil and gas drilling, toxic mud additives such as chromate salts are seldom, if ever, employed.

B/D

Page 46, Paragraph 2 - It is unclear whether the "1.22 mg/m³ and "9 mg/m³" refers to micrograms or milligrams. In conventional usage, "mg" indicates milligrams, but in this context, "micrograms" seems intended. This should be clarified.

Page 65, Toxic Substances - It would be appropriate to include comprehensive tables of base line data indicating the natural concentrations of any toxic substances existing in this environment, with special reference to dissolved heavy metals in the liquid phase (surface water and ground water). Without adequate baseline data, further discussion of the impacts or hazards of toxic substances borders on futility.

Page 87, Drainage Criteria - An additional criterion (j) might be included: where embankment fills may blanket the discharge points of ephemeral springs, the base of the fill should be provided with a permeable toe drain. The same criterion should apply to well pads and sumps.

Page 192, Soils - The table which summarizes the suitability of soil types for certain applications should be supported by a tabulation of engineering properties such as Atterberg Limits and compaction data, if available.

Page 272 et. seq. - Carrying Capacity - The "carrying capacity" concept and generalized model are developed at considerable length but seem to present no relevant conclusions to the subject. Although it highlights topics for which more detailed information is required, the detail of exposition of the concept is not commensurate with its contribution to the EIR.



Environmental Consultants

Responses to Comments of the Union Leasehold EIR.

LAFCO - no response necessary

U.S. Dept. of Interior - Fish and Wildlife Service -
no response necessary

Public Utilities Commission - no response necessary

California Regional Water Quality Control Board -
no response necessary

California State Division of Forestry - no response
necessary

Responses to U.S. Dept. of Interior Geological Survey - from Reid Stone.

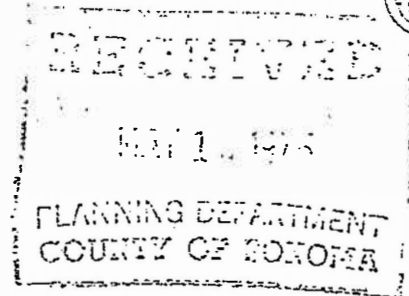
1. General Comment - no response necessary.
2. Page 1, par. 3. - We agree the word "promiscuous" was ill advised. Please substitute "large quantities of raw steam . . ." . We are not in agreement, however, with the statement in the comments " . . . within established, acceptable rates or levels." The established technique of bypassing generators appears to be the result of inadequate equipment or procedures. Its acceptability is open to question on various grounds from various points of view--one of the more critical is ambient air quality.
3. Page 21, par. 2. No response necessary.
4. Page 46, par. 2. Micrograms was intended. The symbol " μ " was misinterpreted by the typist.
5. Page 65. Toxic Substances. Such base line data are gradually being accumulated but are too scarce and diffuse to establish reasonable natural concentrations. Cf. Neilson et al. 1974a, pp. 116-130.
6. Page 87. Drainage criteria. No response necessary. An acceptable addition, although it was included in other EIR's.
7. Page 192. Soils. The reference given is Soil Survey of Sonoma County, California; Miller, V. C. USDA May 1972, and a complete table of engineering properties is compiled there.
8. Page 272 et. seq. Carrying Capacity. The introduction of this concept is all that was intended and all that we had time to do. Since this is an "open-ended" EIR, subsequent EIRs may deal with its implementation, especially at the KGRA or regional level.

DEPARTMENT OF FISH AND GAME

Post Office Box 47

Yountville, California 94599

May 9, 1975



Mr. George Kovatch, Planning Director
Sonoma County Planning Department
2555 Mendocino Avenue
Santa Rosa, California 95401

Dear Mr. Kovatch:

We have reviewed the draft EIR, "The Geothermal Leasehold of Union Oil Company at the Geysers, Sonoma County, California," as transmitted with your letter of April 10, 1975. We find that although there are some important inadequacies, it is generally well done. The section, "Wetland and Riparian Classification System for Environmental Analysis," is particularly commendable. We support the recommendations in the report for monitoring programs and more detailed studies.

Inadequacies of the Report

We find that the report is inadequate as follows:

1. The proposed project is stated to be development of the 9,000 acre leasehold for geothermal. However, of new proposals, the report discusses only Units 12 and 14 and their supply fields. These areas comprise only a portion of the total leasehold. There is no description of other potential projects or of additional wells that will be needed to supply existing power units.
2. There is no discussion of the "No project" alternative, as required by CEQA and California Administrative Code Section 51543 (d), Title 14, Division 6, Guidelines for Implementation of the California Environmental Quality Act of 1970.
3. Another alternative that should be discussed is concentrating development in the area of Units 1 through 8.
4. Figure IV-1, p. 30 a, shows substantial unmitigated biological impacts. We believe that CEQA requires that mitigation measures be developed. We recommend purchase and development of wildlife habitat in areas not subject to geothermal or other activities in conflict with wildlife. The unmitigated habitat losses of 50-50% are unacceptable. This loss may be higher if effects of steam discharge are adverse.

This figure also indicates that leasehold development will have minor relation to aquatic resources. We believe that the impacts will be substantial and that this should be indicated.

cc Jim Wilson Spilkel
5/13/75

5. The section on growth-inducing impact should indicate that project approval will result in further proposals for geothermal development in adjacent areas.
6. Contingency plans for potential sump spills, condensate spills, and blow-outs should be developed.
7. Whether or not project installations will be built to resist earthquakes should be indicated.
8. Section 2, "Fauna," should discuss the important fisheries resources of Big Sulphur Creek.
9. Areas with critical wildlife habitat types, such as nest trees, den trees and snags, waterholes, seeps, springs, meadow areas, oak stands, riparian vegetation, and isolated associations of mixed forest species should be identified and these areas should be avoided by the development.

Comments on Units 12 and 14

The report indicates that installation of Units 12 and 14 and their supply fields will cause substantial environmental problems. These are as follows:

1. The sites are in areas of "high" or "very high" sensitivity as stated on pages 27 and 28.
2. The power plant sites will be on landslide areas.
3. Drill pads are proposed on spring areas or in active landslides.
4. Fill slopes of Unit 12 will cause extensive stream sedimentation.
5. Steam discharges may alter humidities and thus destroy extensive areas of vegetation. If this occurs, there will be substantial losses in the wildlife that these areas support.
6. The development will conflict with proposed alternative of use of the Little Geysers and Big Sulphur Creek as a unique area for natural history studies.
7. There will be substantial unmitigated adverse biological impacts.

Conclusion

We recommend that geothermal development not proceed in the subject leasehold until the following conditions are met:

1. Potential adverse environmental problems with installation of Units 12 and 14 have been resolved.

May 9, 1975

2. Studies on the effects of steam discharge on the vegetation of the area have been made and the extent of this problem has been determined. The need for this research is stated on page 45 of the draft EIR.
3. Studies on the effects of geothermal development on runoff, erosion, and ecosystem fertility have been made to determine reasonable mitigation measures. This is proposed on page 60.
4. Adequate mitigation is developed for adverse biological impacts.
5. A master plan for field development has been prepared as stated on page 16. This plan should include the results of studies on steam discharge and erosion, appropriate mitigation measures, and preservation of unique natural areas within the leasehold.
6. A protective zone for the historical peregrine falcon nesting area should be identified. As indicated in the report, a portion of the leasehold is within a peregrine falcon nesting area on Cobb Mountain. The American peregrine falcon is listed as "endangered" by the California Fish and Game Commission and the Secretary of the U. S. Department of the Interior.

We are not certain of the actual size and conformation of the protective zones that are needed to protect the remaining birds and their nesting habitat. Field studies are now being conducted to determine these areas. Since it may be some time before these studies are completed, for the interim we recommend that additional geothermal development not be permitted within Sections 16, 17, and 21 of T 11N, R 8W, Mt. Diablo Base and Meridian.

Thank you for the opportunity to review and comment on this draft EIR. Please let us know when the final EIR is available for review.

Sincerely,



J. C. Fraser
Regional Manager
Region III



Environmental Consultants

Responses to Dept. of Fish and Game Comments on the Draft EIR Union Oil Big Sulphur Creek, May 9, 1975.

Re: Inadequacies of the Report.

1. There were no new proposals presented to the planning department except those for field supply for Units #12 and #14, which were the reason for the EIR preparation. In spite of repeated requests made by us to Union Oil Company and inquiries of submittals to the planning department, it was not until February 1975 (nearly a full year after the signing of the contract for the EIR that the supply fields for Units #12 and #14) were submitted to the county environmental coordinator, who then immediately forwarded them to us for review.

Since no specific proposal for other areas were forthcoming, only land sensitivity was stressed; the implications for these areas can only be surmised by Union's performance on existing and proposed well sites.

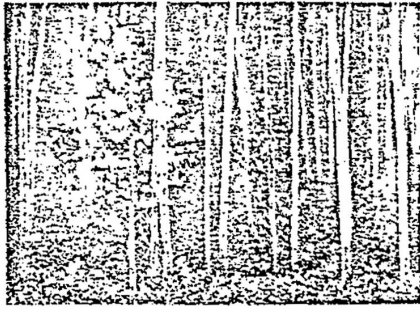
2. The "no project" alternative would simply mean cessation of all existing production and development activity, and since Sonoma County has designated the area for geothermal development such an alternative is scarcely realistic.
3. There are a vast permutation of alternatives, but only those considered to be most realistic were advanced. Why development should be limited to Units #1 through #8 when the majority of the impact of primary concern to wildlife in the area has been sustained for Units #9, 10, and 11 is not clear to us.
4. 1st paragraph - no response necessary.
2nd paragraph - When probability is combined with mitigations suggested in the EIR the magnitude is relatively minor but nonetheless important.
5. The concept of incremental growth project per project has already been set forth many times in this EIR and previous EIR's on geothermal proposals.
6. Several immediate procedures following discovery of spills or blowouts are in operation by Union Oil Company management as a matter of administrative order, dated March 1974, by Mr. Vane Suter. These are made after the fact and generally the county and several other agencies are not included as a matter of course. Appropriate agencies either required by law or deemed useful by Union Oil Company are the ones notified.



Environmental Consultants

7. A certain safety factor is engineered into all installations that accommodate the direct impact of a tremor; however, no installation built on a potential landslide area can withstand an earthquake generated landslide of anything but the most limited scope.
8. These elements were discussed as adequately as current data were available to us at the time of the preparation of that section in late 1974. There are two studies, one by PG&E and one by Union Oil, which are now presumably available to the public. No information was afforded us by Union Oil even though such information was requested verbally.
9. These areas are for the most part included in land sensitivity Classes 4 and 5. It is not practical for us to identify each den tree or nest tree on 9000 acres. We have indicated those areas that we deem very important for wildlife habitat which should in our opinion be excluded from drilling.

No additional responses are deemed necessary at this time.



by Ansel Adams in *This is the American Earth*

SONOMA COUNTY RECEIVED
PLANNING DEPT MAY 22 1975
OFFICIAL PLANNING DEPARTMENT
COUNTY OF SONOMA
PIERRE CLUB Mails Tower San Francisco 94104
DO NOT REMOVE
22 May 1975

A REVIEW OF "A DRAFT ENVIRONMENTAL IMPACT REPORT FOR THE GEOTHERMAL LEASEHOLD OF UNION OIL COMPANY AT THE GEYSERS, SONOMA COUNTY, CALIFORNIA", Ecoview Environmental Consultants, February 1975

We wish first of all to commend Ecoview and the County of Sonoma for the excellent work and sound conclusions presented in this report. In our opinion it provides a much needed overview assessment and data base for site specific evaluations within the leasehold and for the on-going determination of cumulative effects, in conjunction with the monitoring program which this report itself proposes. It is our position that future projects within the leasehold should be subject to specific analyses supplementary to the work here presented, and that these should be processed as incremental additions to the present report. The parameters of study for site specific and project specific analysis should, in our opinion, be:

- 1) Land sensitivity class determination and specification with a specification and quantification (when appropriate) of sensitivity factors;
- 2) Geological hazards and slope stability;
- 3) Erosion potential;
- 4) Anticipated effects of local hydrology;
- 5) Local biological communities and specific botanical and faunal species which may be significantly affected;
- 6) Micro-climatic factors;
- 7) Archaeological resources;
- 8) Visual and audial exposure.

We offer the following comments relating to particular points in this report.

1. The organization of the report could be considerably improved. In several cases the same environmental parameters or same order of impact are discussed in different parts of the report, making their integration or interrelation difficult.
2. The composite sensitivity map (p. 27) is difficult to read. The map would also be much more useful if the individual sensitivity factors and their overlap were shown on the map.
3. A map should be included which shows all existing wells by name and number in relation to slope and to landslide conditions.
4. The grading permit mentioned on page 15 is not a grading permit in the strict sense, requiring County engineering supervision and control of work done. We believe that a grading ordinance effecting such controls should be enacted by the County.

5. Visual, audial and odoral aesthetic degradation should be added as section "I" on page 75 under adverse impacts that cannot be avoided.
6. The Irreversible Changes section on page 76 should be re-organized and re-written. The changes discussed as "inevitable" (subsection A) are themselves technologically dependent to a considerable degree. If directional drilling were advanced to the point that all supply wells for each power plant could be drilled from a single, relatively confined and environmentally selected operational area, many of the presently inevitable changes could be greatly reduced.
7. Several additional causes of past environmental problems should be added to the three mentioned at the top of page 82. These are improper siting, mud spills, condensate spills, uncontrolled noise, uncontrolled emissions.
8. Who is to pay for and who is to administer the comprehensive ecosystem and multi-resource management program proposed on page 112?
9. Who is to administer the monitoring program discussed in pages 101 to 109?
10. Consideration should be given to the establishment of a program utilizing stereo-paired photography (minimum 1" = 1000 ft) for base-line data and future monitoring. This would provide accurate and comprehensive information in the matters of slope movement, topographical alteration, vegetation removal, and project and road site location and their interrelation.
11. The Alternatives to the Proposed Action Section (pages 143 to 153) does not discuss alternatives and does not seem to us to fulfil the requirements of the CEQA Guidelines. We enthusiastically endorse the proposed protection of the areas of natural value which are discussed. We are especially concerned for the protection and preservation of the Little Geysers from geothermal operations. We believe, however, that these matters should be discussed in another context and that the following alternatives to the proposed action should be discussed here: a) continued development at the present pace under present technology; b) a reduced pace of development or a moratorium on development until technological advance allows development with much reduced impact on the land, air, water and biological communities; c) a program of field development and reservoir management aimed at full and rapid resource extraction from the field; d) a program of field development and reservoir management aimed at the prolongation of field life; e) no further development; f) alternate uses of the resource in addition to or apart from electric power production.
11. Population density data relating to at least selected faunal species should be presented as a data base for future monitoring of the effects of leasehold operations not only on individual species but on the ecosystem as a whole.
12. Solid waste disposal has been a problem in The Geysers area. This should be discussed and recommendations should be made for mitigation.

Submitted by

Hamilton Hess, Chairman
Geothermal Task Force, NCRCC
Sierra Club



SIERRA CLUB

Mills Tower, San Francisco 94104

29 May 1975

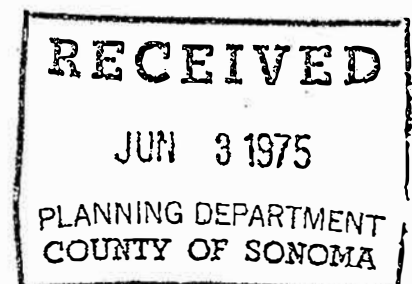
by Ansel Adams in *This is the American Earth*

Addendum to Sierra Club review of "A Draft Environmental Impact Report for the Geothermal Leasehold of Union Oil Company at The Geysers, Sonoma County, California"

We enclose a copy of the relevant portion of reconnaissance Photointerpretation Map of Landslides in Parts of the Hopland, Kelseyville and Lower Lake 15-Minute Quadrangles, Sonoma County, California" by Virgil A. Frizzell, Jr., 1974 (U.S.G.S. Miscellaneous Field Studies Map MF - 594). While acknowledging that mapping by photointerpretation methods alone does not substitute for on-site investigation, the author asserts that "this map identifies areas susceptible to landslide activity that should be carefully studied before any site development". The potentially unstable areas identified on the map are far more numerous and extensive than those identified on the geological map included in the Union Oil Company leasehold report. (facing page 175). We are aware that the leasehold EIR map is based on field study as well as on previous mapping and photointerpretation, and assume that Mr. Frizzell's work and his conclusions are known to its authors, but we include it in our comments to stress our concern with slope stability in The Geysers area. We urge that site-specific slope stability analysis be undertaken by professional consultants retained by the County in relation to all future well site, power plant or road construction proposals on the leasehold.

Hamilton Hess, Chairman
Geothermal Task Force
Northern California Regional
Conservation Committee

SONOMA COUNTY
PLANNING DEPT.
OFFICIAL
FILE COPY
DO NOT REMOVE





Environmental Consultants

RESPONSES TO COMMENTS BY SIERRA CLUB
REGARDING UNION OIL LEASEHOLD EIR:
MR. HESS REVIEWER

1. Re: report organization, etc. The organization of the report is in accordance with the format directed by the Planning Department.
 2. Re: sensitivity map. We have experimented with composite lines as derived from overlays of all maps and criteria that enter into the resultant sensitivity map. It becomes unintelligible and relatively meaningless. The reader must choose an area or point then refer to subsequent maps to derive the governing or composite sensitivity factor.
 3. This can be done by either sketching in landslide areas on Figures II-2, II-3 and II-4, or superimposing the DOG well location map over the geology map furnished. Full scale 1:500 maps are available from the County Planning Department if desired.
 4. No response necessary.
 5. Re: additions to Section I, p. 75. The reason they do not appear in that section is that they can be avoided, but there is so far no vehicle available to public agencies to bring mitigations about.
 6. Re: irreversible changes. We agree with your reasoning but nonetheless they are inevitable and irreversible changes that cannot be avoided.
 7. Re: additional problems. The additions are reasonable and acceptable.
 8. Re: financial responsibility and administration of land management programs. There are several options that could be applied. Three are suggested below:
 - (a) Voluntary land owner-developer-county participation. This option has been offered to a few land holders in Lake County, but it is too early to assess its acceptability.
 - (b) County or state leadership in setting up a management district similar to the Soil and Water Conservation District of Lake County, but with more of a mandatory participation within watersheds. The latter can be accomplished through existing legal means. The cost is contributed by developer assessment, royalty assessment and tax revenues on an equal basis.
 - (c) Placing the land under public ownership or quasi-public management and taxing operations to pay for costs incurred.
- The important aspect is that management is not unilateral or unidirectional.
9. Re: administration of monitoring programs. At the present time, there is no agency, local, state, or federal, that is organized to do it. At this point we tend to favor a regional agency for the whole Geysers-Clear Lake KGRA and its recent extensions, jointly set up by the counties and supported through local, state and federal agencies on a sharing arrangement proportional to the lands administered by each agency.



Environmental Consultants

10. We completely agree and the idea should be extended to include a comprehensive mapping program on a contour scale of 5 to 10 ft superimposed over aerial photographs on a scale of 1"=400' as a prerequisite to environmental assessment.
11. Re: alternatives to the proposed project. The placement of the section referred to in the second sentence was a real problem to us, inasmuch as the project basically involved the supply fields for Units 12 and 14, and only an assumed project could be detected in other areas. Therefore the alternate uses for those portions of the leasehold apply to assumed projects.

In regard to the topics suggested in the balance of the paragraph, we have discussed all suggested topics except "C" in other EIRs of this series and those discussions apply equally to this leasehold. Some topics are also discussed under other headings.

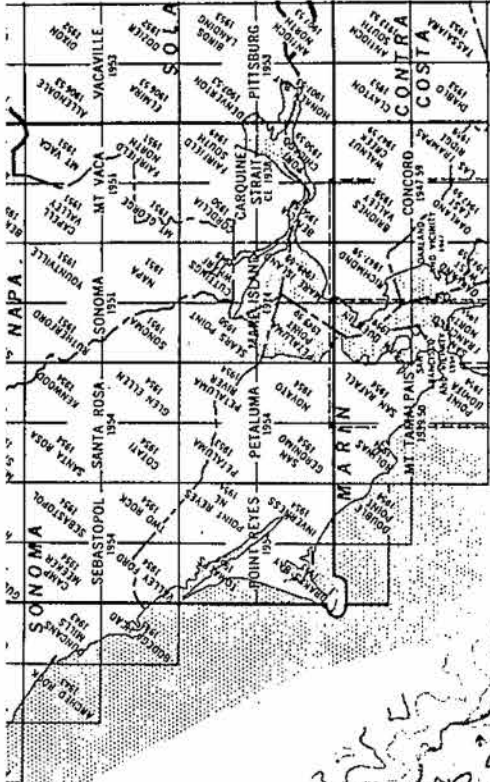
We believe that the time has come now to collate all assembled EIRs and prepare a master EIR in a form originally intended by the Planning Department. We should point out that the original estimate to provide the data base we now have was about 5 years. We have come that distance in a little over 2 1/2 years.

12. Re: population density of animal populations. We agree that such information may be useful to some entities, however, our estimate of the time and cost to directly acquire such information exceeded its decision-making value, therefore, as in the hydrology problem, we chose to approach the problem in a preventive context leaving the determination of the actual numbers and their behavior to the proposed monitoring program and to the State Department of Fish and Game.
13. Re: solid wastes. This topic has been discussed at length in earlier EIRs of the series under soils and water quality topics.

Addendum to Comments:

Frizzel's map was prepared by aerial photographs. The one prepared by ECOVIEW was prepared from aerial photographs and field reconnaissance, and therefore differences will occur where field observations do not verify photography.

Also, Frizzel's map was issued after the field work was completed in 1974, although advance information was available to our consultant. The qualifications and uses to which the map is to be put is clearly stated at its top.



INDEX TO TOPOGRAPHIC MAPS

Landslide deposits mapped in 1972 and 1973



#75-1
BDC

SUMMARY STATEMENT ON UNION OIL LEASEHOLD EIR

May 16, 1975

By
Vane E. Suter
District Manager
Geothermal Division
Union Oil Co. of California

Union Oil Co. paid for this Leasehold Environmental Impact Report on November 21, 1973, by a check to the Northern Sonoma County Air Pollution Control District. At that time, the report was promised to be delivered in July, 1974, which was to be 8 months after payment. But, instead of taking 8 months to prepare, the EIR was not delivered until April, 1975, or 17 months after payment. Because of this delay, Union has suffered considerably.

While waiting for the Leasehold EIR, Union was required to pay for 3 additional interim EIR's in order to be able to continue our ongoing drilling program. On numerous occasions, our drilling schedule had to be changed because permits to drill certain wells could not be obtained for lack of this Leasehold EIR. We would much prefer to base the decision on where to drill the next 1/2 million dollar well on sound management principles, and engineering and geologic information, rather than having to drill in the only place that a permit can be obtained at the time.

Therefore, we are very anxious to get this Leasehold EIR into its final form as soon as possible. I hope we won't get involved in a long series of hearings, with extended time delays in between hearings, and I hope this Draft EIR won't be sent back to the authors for a time consuming revision. I also hope that the Lead Agency can provide a timely response if there are any significant environmental points raised in the review process.

There is also another reason why we would like to get this Leasehold EIR finalized as soon as possible. The Public Utility Commission is holding up approval to build Power Plant #12 while waiting for the certification of this Leasehold EIR. And, as soon as Power Plant #12 is completed, we can reduce our imports of high priced foreign oil by a million bbls/year.

In closing - I would like to quote from CEQA Guidelines:

Section 15054 - Timely Compliance

"Public Agencies should carry out their responsibilities for preparing and reviewing EIR's within a reasonable period of time. The requirement for the preparation of an EIR should not cause undue delays in the processing of applications for permits or other entitlements to use."

I hope the preparation of this Final Leasehold EIR will not be the cause of any further undue delays.

STATEMENT BY JOEL ROBINSON - UNION OIL COMPANY
REGARDING DRAFT EIR ON GEYSERS LEASEHOLD

MAY 16, 1975

SANTA ROSA

Good afternoon ladies and gentlemen, my name is Joel Robinson. I am an Environmental Engineer for the Environmental Science Department of Union Oil Company of California, located in Los Angeles.

My job requires me to review and comment on numerous environmental impact reports on a wide variety of projects. I have witnessed the steady improvement of quality of EIR's in California. Impact statements prepared under CEQA guidelines have matured greatly in the 2-1/2 years they have been applied to private projects. Format has become standardized, and objectivity has been a sought-after goal. Conclusions in any "quasi-scientific" document such as EIR's have been rigorously extracted from existing facts, and rarely have editorial and unsubstantiated comments insidiously crept into EIR's. Unfortunately, although this draft EIR has compiled many useful data, it has not upheld the standards of performance expected for such reports. It continuously relapses into biased, inflammatory and unsubstantiated statements, and relies heavily upon conjecture, opinion and limited data to predict impacts of the project. This draft EIR is fraught with gross inaccuracies, internal inconsistencies, redundancy, excess verbiage and confusing methodologies of little or no use to decision makers. The intricate matrices of this draft EIR are subjective and misleading, at best.

Page Two

It is truly unfortunate that so many myths must be perpetuated in the form of this draft EIR, especially about an energy source which, in the introduction, the author admits creates relatively low levels of pollution, particularly when compared to competing forms of energy production. However, I emphasize Mr. Suter's comments that we must have no more undue delay. As dissatisfied as we are with the organization, content, and tone of this draft EIR, it is our hope that the final EIR will be forthcoming very soon.

In an effort to add some clarity and perspective to the final EIR, we offer the attached package of comments for inclusion in it. These comments are offered to correct some of the grossest and most misleading statements made in this draft EIR. It is impossible to address every point, so only some of the major subjects are addressed.

DRAFT COMMENTS - GEYSERS LEASEHOLD EIR

llage -

Not representative of the project, establishes a strong visual misconception for those report readers who have not had the opportunity to see the project first hand.

COMMENTS

<u>c.</u>	<u>Page</u>	<u>PP</u>
	1	3

There is no "prodigious waste of thermal energy" or "promiscuous raw steam discharge" in Union Oil's leasehold at the Geysers. Steam quality is jealously guarded from the steam reservoir to the power plant by engineered well completion practices and meticulous insulation of steam transmission lines. The condensing turbine power conversion process is as efficient as modern technology can design. Cooling tower heat losses are low quality, less than 130°F., and have little practical application at the Geysers. The quantity of high quality energy required to utilize this low energy source may exceed the benefit. Steam discharges are commensurate with the "state of the art" and process cycle requirements and are not promiscuous.

The questions raised in this section are related to

<u>Sec.</u>	<u>Page</u>	<u>PP</u>
I	1	3

continued

a metaphysical discussion of basic science and engineering for the use and conversion efficiencies for all forms of energy, including hydroelectric, fossil fuel, nuclear, solar, oil shale, wind, waves, etc. This rhetoric is beyond the scope of one environmental impact analysis for one specific project, and serves no purpose other than to confuse the reader.

Throughout the report are references to the KGRA (Known Geothermal Resource Area). These areas are located throughout the Western United States and may or may not contain useable or viable resources. Any references to the KGRA should be qualified as to intention and location, keeping the fact separate that this is an EIR for Union Oil's leasehold and operations in Sonoma County and not for the entire KGRA.

IIA	12	3
-----	----	---

The definition of an exploratory well is incorrect. Refer to title 14, Div. 2, Chapter 4, Subchapter 4, State-wide Geothermal Regulations, Section 1920.1(e):

(e) Exploratory well means a well drilled for the discovery and/or evaluation of geothermal resources beyond the established limits of a designated geothermal field.

(f) Geothermal field means an area designated by the supervisor.

<u>c.</u>	<u>Page</u>	<u>PP</u>
IB	13	3

The overall replacement well density is not usually one per six acres. Some early wells drilled in the shallow part of the field were drilled on about six acre spacing. However, well interference tests have indicated that this close spacing is not necessary for resource recovery and is not economical. The maximum well density in newly developed portions of the field is not expected to exceed one well per 20 acres.

Each well does not tend to require its own pad, sump, access road and steam transmission line. Multiple well pads, up to 6 wells per pad, are being used where feasible.

The comment related to apparent divergencies in field development policies between developers is inappropriate. This is an EIR for Union's leasehold.

IB2	15	2
-----	----	---

Grading permits are not required by Sonoma County. Union's operation at the Geysers are exempted from grading permits by Chapter 70, Section 7003, Subitems 1, 4 & 5 of the Uniform Building Code.

<u>Sec.</u>	<u>Page</u>	<u>PP</u>	
IIB2	15	3	Drill pad site plan is not a condition of Union Oil's permit in Sonoma County.
IIB2	15	4	Union has not drilled any geothermal wells where all wastes were containerized and hauled to an off premise certified disposal site.
			The disposal wells in which some excess liquids from the drilling operation are injected are not maintained solely for that purpose. They also are used for the disposal of condensate from the cooling towers.
IIB2	21	2	Air drilled portion of hole usually requires 10-15 days instead of 3 days.
IIB3	22	4	The steam pressure and temperature in transmission lines is approximately 150 psig. and 360°F. respectively.
IIB3	22	5	Line size ranges from 10" to 42". Back pressure control bends should read back pressure control valves.
IIC1	24	3	Condensate is injected into disposal wells completed for that purpose.
IID	25	2	Thirty years is the minimum life based on reservoir material-balance and pressure decline curves. Well spacing and unit density is designed to deplete the reserves in this period of time. Field is in early stage of development. Therefore, experience factor is

	<u>Page</u>	<u>PP</u>	
D	25	2	minimal. Prediction accuracy is good enough to
continued			justify capital expenditures and will improve
			with time. Life of field may be extended by
			recharge or secondary means.
D	25	2	The adjective describing the life of the field
			must reflect the perspective of the evaluator.
			Any individual living in a dark, cold room would
			not consider 30 years of heat and light a relatively
			short period.
I	27	All	This section is based on the author's own perceptions
			of the sensitivity of the land, and not on any
			uniformly accepted method. It does little to put
			sensitivity into perspective. For example, riparian
			areas <u>are not</u> generally endangered in California,
			and in particular, there is little evidence that
			riparian areas have been significantly affected by
			geothermal development, either in the immediate
			Geysers area or upstream or downstream. Additionally,
			it is inconceivable that 70 to 75% of the project
			land area could be classified as unusually sensitive
			or hazardous. Years of successful and safe operations
			demonstrate this.
A	29	All	This page and figure are of little value to decision

Sec. Page PP

IVA 29 All

continued

IVA 31 3

makers. It solely reflects the opinion of the author and has little substantiation in fact.

Ecoview's claim that intense topographic modifications will occur within the designated field is incorrect. A topographic map made after the completion of development of an area, superimposed over the original map would show only minor change.

It should be noted that most of the impacts of land disturbance during construction are mitigated by Union's construction techniques and revegetation programs. These programs in themselves may enhance the stability, desirability and food supply for wildlife.

Union cannot confirm Ecoview's estimate of 20-35% surface disturbance in the Unit 11 area. Union's calculations, using aerial photographs and site plans, are as follows:

<u>ITEM</u>		<u>DISTURBED AREA (ACRES)</u>
Roads	6.8 miles	30
Pipelines	1.5 miles	6
Locations (11) and P.G.&E. Plant		<u>78</u>
Total Disturbed Area		114
Percent Area Disturbed $114/700 \times 100 = 16\%$		

Page PP

A 31 3 More than half of this area has already been
continued revegetated with grasses. In addition several sites
have room for the drilling of make-up wells with no
future disturbance to the area.

A 32 1 The probability of increasing well density to one
well per 6 acres in newly developed areas is very
remote. A quick review of numbers will show the
fallacy of this possibility. A 700 acre drainage
area is required to supply a 100 MW generating unit.
A density of one well per 6 acres would require
117 wells. This is more than the total number of
wells completed in the Geysers project to date,
which generates in excess of 500 MW. See comments
relative to Section II, Page 13, Paragraph 3.

A 32 3c See Environmental Data Statement for Pads.
CMNC12-31.6 & 34.3. All pads will be evaluated for
stability prior to and during construction. It
should be noted that ancient landslide deposits
are not necessarily unstable. Engineering studies
of several such deposits at the Geysers have shown
them to be stable.

A 33 2 Ecoview's claim that sedimentation impact will be
very severe during the construction phase of unit

Sec.	Page	PP
IVA	33	2

continued

12 is unsubstantiated. There will be some sedimentation, but it cannot be categorized as very severe compared to the sedimentation load caused by natural sedimentation in the Sulphur Creek Basin and rated on an area basis.

IVA	33	4
-----	----	---

Refer to comments made on Squaw Creek EIR. Data concerning plant damage are inconclusive that cooling tower discharge has resulted in any significant damage to nearby flora. Some existing data indicate damage due to natural causes.

IVA	38	7
-----	----	---

Author should not state personal preferences regarding land classification. There is no reason for this area to be set aside as a natural wildlife preserve.

This is privately owned land and its purchase by the public for conservation would require another entire EIR. Refer to Union's comments on Section III, Page 27 and Table IV-3.

IVB	39	5
-----	----	---

This entire section confuses the reader and is highly subjective.

IVB	40	5
-----	----	---

This paragraph implies that development of known resources should be delayed until all possible unknown resources are identified. This is impossible to implement and is contrary to the needs of mankind. We also object to the author's attempts to pillory

c.	Page	PP
VB	40	5

industry with statements such as: "to spotlight those resources being lost through inept management or wanton destruction of supporting but apparently valueless ecosystem elements (especially regarding value in the economic sense as industry is prone to do)". Union has taken care to employ technology which will minimize its effects on other resources which the author chooses to label "valueless". We are continually striving to improve our operations clearly because we recognize the value of the other resources.

<u>Sec.</u>	<u>Pg.</u>	<u>PP</u>	Throughout this report the author alludes to future work ;
IVB	42	1	plans to be proposed. An EIR should only address
			the proposed project utilizing existing data and should
			not address future studies and should not generate
			management plans.
VA	43-45	All	Ecoviews concern for climate modification by the Geysers
			Project has no objectivity and has completely lost the
			perspective of man's influence over nature. A simple
			case in point is that surface evaporation from Clear
			Lake over a period of one year is approximately 10
			times the total geothermal emissions from the Geysers
			over the same time period. Total natural emissions
			would also include plant transpiration which is consi-
			derable.

CLEAR LAKE EVAPORATION

<u>MONTH</u>	<u>AVG. PAN EVAPORATION* (inches)</u>	<u>AVG. LAKE EVAPORATION (Lbs x 10¹⁰)</u>
Jan.	1.00**	.6
Feb.	1.00**	.6
Mar.	2.72	1.7
Apr.	5.68	3.6
May	6.67	4.2
June	8.62	5.5
July	11.64	7.5
Aug.	10.23	6.5
Sep.	7.64	4.8
Oct.	3.84	2.4
Nov.	1.90	1.2
Dec.	1.25	.8
TOTAL	62.19	39.4

* USWB Records - Clear Lake Dam

** Information Missing Estimate

Clear Lake Surface Area 40,000 Acres (Lake Co. Flood Control) Pan Coefficient 0.70 (for USWB Class A Pan)

Equation:

$$62.19 \frac{\text{lb}}{\text{hr}} \times \frac{1 \text{ ft}}{12 \text{ in}} \times .70 \text{ pan coef} \times 43560 \text{ ft}^2 \times 62.4 \frac{\text{lb}}{\text{ft}^3} \times$$

$$40,000 \frac{\text{acre}}{\text{Lake}} = 39.4 \times 10^{10} \frac{\text{lb}}{\text{lake yr.}}$$

Geysers Project Emission

$$6,000,000 \frac{\text{lb}}{\text{hr}} \times .80 \text{ evap} \times 24 \frac{\text{hr}}{\text{day}} \times 365 \frac{\text{day}}{\text{yr}} = 4.2 \times 10^{10} \frac{\text{lb}}{\text{yr}}$$

<u>Sec.</u>	<u>Pg</u>	<u>PP</u>	
VB	46	All	This entire section is predicated on "worst cast" analysis, and does not consider recent developments or even current knowledge of emissions. Field emissions average near 200 ppm. Calculations reveal that this would reduce sulphur emissions by approximately one-half of that reported in this draft EIR. Nor does the author take into account any of the H₂S abatement efforts made by either Union or PG&E such as retrofit of existing plants, new plant emission requirements, shortened and contained well testing procedures, vent gas gathering systems, shutting-in of blowouts, and others. The author notes that Geysers-produced sulphur will "contribute materially to the haze component of the Central Valley during the summer". There is no evidence of this; in fact, evidence is generally toward the contrary conclusion.
VD	51	3	Graywacke is normally considered as sound and durable rock. In such cases, and upon recommendation of a competent geologist or soil's engineer, cut slopes steeper than 1.5:1 can be successfully employed to minimize surface disturbance.
VF	57		There are no intentional man-made discharges to Sulphur Creek. There are numerous naturally-occurring discharges of thermal waters from hot springs and fumero] to the creek which carry a variety of constituents to to the Creek. The California Regional Water Quality

Sec. Pg PP

VF 57 (con't) Control Board, North Coast Region, i.e. correspondence dated December 16, 1974, has found that there are no deleterious regular discharges from operations, and California Department of Fish and Game studies, as well as our own studies, have indicated that the pollutants noted in the EIR occur naturally, and that the low population of steelhead near the Geysers operations is due to natural chemicals and naturally high temperature of the creek water.

VF 59 3 Considerable effort has been made to minimize the possibility of future condensate spills. This effort includes the replacement of fiberglass line with steel and installation of abnormal liquid level alarms on all settling ponds.

VI 62-66 This entire section is conjecture; nowhere does the author give supporting data for his conclusions of adverse effects of geothermal development on fauna. The author even states that there are no data currently available on the uptake of toxic substances by wildlife.

There are no known records of any "bird kill" and very few of "fish kill". The fish kills occurred from accidental releases of material, not from normal operations. However, it should be remembered that the California Department of Fish and Game purposely poisoned this drainage in the 1950's and wiped out almost the entire aquatic population in the name of game management.

Sec.	Pg	PP
------	----	----

VI	62-66 (con't)	
----	------------------	--

The fact that fish have returned to the Creek (even during the period of regular condensate discharge to Big Sulphur Creek which terminated in 1968) demonstrates the relatively low effect of these "toxic" substances.

All evidence gathered on the effect on fauna of intermittent noise at the Geysers indicate that either the fauna is unaffected or has adapted to it.

VJ	66	2
----	----	---

All field notes related to the archaeological resources should be made a part of this EIR. These notes should contain the exact location, size and description of what was found, and an estimate of what might be expected to be found upon further studies and its relative value.

VK	72	2
----	----	---

Happy Jack's grave is next to the settling pond at Unit 5 & 6 and is not in the Unit 12 steam supply area.

VID	74	5
-----	----	---

The concern about sedimentation caused by the geothermal operations is magnified completely out of perspective when dealing with an area fraught with large-scale natural mass wastage. There have been historically, and are at present, numerous active landslides directly into Sulphur Creek in areas undisturbed by man. To keep things in proper perspective, comparisons must be made of man caused versus natural sedimentation loads.

VIII B	84	4
--------	----	---

Practice has shown that 2:1 fill slopes provide necessary stability protection.

<u>Sec.</u>	<u>Pg</u>	<u>PP</u>	
VIIIIB 85	5		Design storm frequencies depend on consequences of failure and should be chosen on a case-by-case basis.
VIIIIB 87	5		It does not make sense to prohibit a disposal sump for an exploratory well and then approve sumps for successive wells. Perhaps the writer does not understand the nature of an exploratory well.
VIIIIB 88	2		Practice has shown that most soils stand very well at 2:1 and that cuts in bedrock often stand well at slopes much greater than 2:1.
VIIIIB 89	5		Writer suggestion that construction be curtailed for seven months of the year (September 25 to May 1) seems extreme. There are years, as in this last year, when the period between September 25 to January 1 has been relatively dry. The above restriction would have robbed an operator of a valuable three months for no apparent reason. Logic needs to be applied to grading time which includes weather forecasts, nature and duration of job and soil moisture content.
VIIIIC 94	3		There is absolutely no conclusive evidence that the Happy Jack Well No. 7 Blowout was caused by earth movement.
VIIIIC 95	2		Current practices of the Division of Oil & Gas include a geologic inspection and approval of well site stability before a permit is issued.

<u>Sec.</u>	<u>Pg</u>	<u>PP</u>	
VIIIE	101	All	Many of the monitoring programs suggested by the author have been or are being performed by operators at the Geysers. Others, such as a comprehensive H ₂ S monitoring program, are near initiation. It appears that the author is aware of very few of these programs.
IX	112	All	Long term land management of private property should be the prerogative of the property owners. Refer to Union's comments on Sec. 3, Page 27, and Section IVA, page 38.
X	148	7	Again Ecoview has failed to recognize private property rights by alleging that the Little Geysers area can be salvaged for public use and enjoyment.
XIB2	169	2	It should be noted that the ambient standards for H ₂ S emission are based on nuisance values which is .03 ppm or the threshold of smell. H ₂ S does not become a health threat until the concentration exceeds 10 ppm. The emission problem related to the Geothermal operation is a nuisance rather than a health threat. The highest ambient concentration of H ₂ S ever measured at the Geyser was many times less than the TLV.

End

Responses to Union Oil Company's Comments by Mr. Robinson, May 16, 1975.

Page 1. Collage.

Please see ECOVIEW's comments regarding the collage. The page will be removed to the beginning of the data section and the pictures identified. If the picture appears to be offensive to some persons it lies in the preconditioning and value judgment of the person interpreting the scenes. All items are part and parcel of the field as it may present itself to the casual observer.

Page 2. Section 1, par. 3.

The word "promiscuous" was perhaps a poor choice of words to convey the meaning that venting occurs all along the gathering lines, at the wellhead and at the plant. When all steam is accounted for there is a prodigious waste of heat energy. If indeed the "state of the art" and process cycle requirements contribute to this waste then there is good reason to rapidly improve "the art" and the system to avoid such discharges that cause environmental concern before there is much more development.

Since PG&E disclaims responsibility (cf. comments and responses, page 10 re: p. 92 Suggested Procedures, par. 5), it appears to be the steam developer's responsibility to reduce or eliminate by-passing loss, etc. Once this is accomplished, then losses at the cooling tower, which is PG&E's responsibility, may be dealt with to make it environmentally tolerable.

The second paragraph deals in generalities and personal bias of the same sort he is vehemently criticizing ECOVIEW of saying.

The third paragraph is apparently designed to further confuse the reader. The Geysers steam field is a part of the original Geysers-Clear Lake KGRA as outlined in Neilson et al., 1974a, p. 2.

pg. 12 Section 11A, par. 3.

The designation of an exploratory well was obtained from DOG personnel, and the one given is apparently determined on a practical basis.

Page 3. pg. 13 Section 11B, par. 3.
No response necessary.

pg. 15 Section 11B2, par. 2.

According to our information grading permits for The Geysers are a part of the Building Code, and issued as a ministerial discretion. This is apparently the case in Union's lease permit.

pg. 15 Section 11B2, par. 3.
No response necessary.

pg. 15 Section 11B2, par. 4.
No response necessary.

pg. 21 Section 11B2, par. 2.
No response necessary.

pg. 22 Section 11B3, par. 4.
No response necessary.

pg. 22 Section 11B3, par. 5.
No response necessary.

pg. 24 Section 11C1, par. 3.
No response necessary.

pg. 25 Section 11D, par. 2. =
No response necessary.

Page 5. pg. 25 Section 11D, par. 2.
Irrelevant.

pg. 27 Section 111, all.
Regrettably there is no uniformly accepted method of
evaluating land sensitivity.
For riparian responses, cf. PG&E, page 2. We could add
also Thompson, Kenneth, 1961, Riparian Forests of the
Sacramento Valley, California. Annals of Assn. of American
Geographies, 51:294-315.
Heubelmans, Martin, 1974. The River Killers, cf. Chap. 7.
Stackpole Company, Harrisburg, Penn.
On the basis of criteria applied 75% is quite conceivable
and in some judgments may be conservative.

pg. 29 Section IVA, all.
This comment is the opinion of the reviewer and has little
substantiation in fact.

Page 6. pg. 31 Section IVA, par. 3.
The findings of the EIR do not support the comments
suggested.

Page 7. pg. 32 Section IVA, par. 1.
The six acre figure referred to target density, not neces-
sarily well pad density. However, there is no assurance
that the final replacement well density, depth, etc., may
not approach this figure.

pg. 32 Section IVA, 3c
No response necessary.

- Page 8. pg. 32 Section IVA, par. 2.
On the basis of the Unit #11 evaluation, our observations appear to be valid, although no factual measurements before or after construction are available.
- pg. 37 Section IVA, par. 4.
What data and under what circumstances?
- pg. 38 Section IVA, par. 7.
The comments are irrelevant to the point. They are not personal preferences.
- pg. 39 Section IVB, par. 5.
No response necessary.
- Page 9. pg. 40 Section IVB, par. 5.
No response necessary.
- Pages
10-11. pg. 42 Section IVB, par. 1.
This is a staged EIR for Northern Sonoma County. The EIR addresses itself to both problems; i.e., Union's and the KGRA.
- pgs. 43-45 Section VA, all.
No response necessary.
- Page 12. pg. 46 Section VB, all.
If the mitigations suggested are successful our position will change. At the present time abatement measures are relatively insignificant.
- pg. 51 Section VD, par. 3.
No response necessary.
- pg. 57 Section VF
It is true no intentional discharges are permitted. Unintentional ones can, do, and will recur. Until it is clearly established that such occurrences do not cause an adverse impact, no amount of discussion or legislation will remove the potential problem.
- Page 13. pg. 59 Section VF, par. 3.
No response necessary.
- pgs. 62-66 Section VI
Cf. responses to PG&E comments, page 7, on this subject.
- Page 14. pg. 66 Section VJ, par.
The county needs to establish policy on this matter. As a rule details of sites are not made public to protect them from vandalism. We believe that each action should have a grading permit in which archaeological data are reviewed or inspected.

- pg. 72 Section VK2
No response necessary.
- pg. 74 Section VID, par. 5
These are the purpose of our projected analyses of hydrology and sediment production. We welcome support that these distinctions should be made, but the cost of obtaining reliable data is high!
- pg. 84 Section VIIIB
No response necessary.
- Page 15. pg. 85 Section VIIIB, par. 5.
This is a minimum standard of performance and the engineer in charge needs to exercise his professional judgment.
- pg. 87 Section VIIIB, par. 5.
The implication is that perhaps the site is too small for an adequate sump in the exploratory phase (using our definition of an exploratory well), or the impact may be reduced until steam is proven.
- pg. 88 Section VIIIB, par. 2.
The key word is "most" - which soils? There is evidence that several soils, particularly Suther and Yorktown, do not stand at 2:1.
- pg. 89 Section VIII, par. 5.
Regrettably, forecasts of both weather and construction time are not correct so that avoidable problems occur.
- pg. 94 Section VIIIC, par. 3,
Mr. Suter's comments to the Lake County Planning Dept. during the Phelps well hearing do not bear this out???
- pg. 95 Section VIIIC, par. 2.
This inspection occurs after the well conductor tubing is set according to Mr. Schrecongost of the DOG.
- Page 16. pg. 101 Section VIIIE, all.
We are aware of the monitoring activities. However, we are also acutely aware of inadequacies of most of these programs, some of which we have pointed out. Note also that many monitoring programs and much research would be unnecessary if all emissions were contained.
- pg. 112 Section IX, all.
Not where it affects the public interest. As you are already aware there is an increasing trend to limit certain types of land use. On the other hand our suggestions may well be to the owner's benefit in the long haul.

pg. 148 Section X, par. 7.
See response above.

pg. 169 Section XIB2, par. 2
No response necessary.

2204

RECEIVED
MAY 8 1975
PLANNING DEPARTMENT
COUNTY OF SONOMA

SONOMA COUNTY WATER AGENCY
PLANNING DEPT
MEMORANDUM

OFFICIAL

TO: Mr. Tom Cordill
Sonoma Co. Planning Dept. DATE: May 6, 1975

FILE COPY

FROM: W. R. Stillman DO NOT REMOVE 3-1

SUBJECT: Union Oil Company Geothermal Leasehold E.I.R.

We have reviewed the subject E.I.R. as to the comments made regarding the hydrologic impacts on the project and the impacts of the project on the hydrologic cycle. Although there are many specific items on which we could comment, we will confine our comments to what we feel are the substantive issues of primary importance.

Time after time throughout the report the authors state that there is insufficient data to accurately predict rainfall, streamflow, and the resultant erosion potential. We believe the authors have imposed a standard of precision for rainfall and streamflow data which is in excess of that needed for adequate estimation of proper mitigating measures. The authors' statements about the lack of rainfall and stream gaging data could easily be repeated about almost any remote area in the state. In fact, the lack of reliable long-term data is the rule anywhere, not the exception.

Our point here is that hydraulic engineers and soils engineers have always had to work with limited data, yet they are able to design cuts, fills, roads and other earthworks which have a high factor of reliability. There is a vast storehouse of technical expertise available in the procedures and standards of such agencies as the Soil Conservation Service, State of California Resources Agency, U. S. Division of Forestry and many other public or private sources. Man has been in the process of modifying the surface of the earth for centuries. Fortunately, the last few decades have also seen the emergence of the technical expertise to allow most of the earth modification to be done in a safe manner. We would hasten to agree that it is difficult to get adequate regulatory control of most projects and that the present practices at The Geysers is a good example of lack of application of good drainage and earthwork practices. The E.I.R. fails to propose positive mitigation procedures.

If there were no rainfall or streamflow data within 20 miles or more of this site, a competent hydraulics engineer could provide reasonable guidelines for use of the site based on basic design criteria data such that there would be a low risk of failure. The problems of erosion, slippage and failure at The Geysers is not from a lack of basic data, it is simply from a lack of application of good hydraulic and soils engineering and from poor construction practices. There is no need to start by collecting masses of raw data. There is no need to "re-invent the wheel" in the area of hydrologic and hydraulic engineering.

cc Jim Neuman
5/12/75
wn
nls 5/1

Hd

SONOMA COUNTY WATER AGENCY

Mr. Tom Cordill
Sonoma Co. Planning Dept.

May 6, 1975
Page 2

We do not question that there may be a legitimate need to study and monitor any phenomenon related to steam wells, i.e. steam and condensate and also all pollutants associated directly therewith. But roads, pads, and most other surface activities are not in any way unusual when one considers the vast amount of knowledge available through scientific and engineering endeavor as well as simple common sense experience regarding either natural or man induced modification of the earth's surface.

The E.I.R. states that there are obvious severe impacts on the surface of the earth affecting a broad spectrum including streams (erosion and siltation), plant life, wildlife, aesthetics, etc. The E.I.R. states that mitigation measures are needed. The E.I.R. should go on to recommend that mitigation should be by application of the best technical knowledge in the particular area requiring mitigation and leave the details of such mitigation to experts in the area of concern.

We feel it is incorrect for the authors to attempt to specify in detail what the mitigation measures should be. There should be no reason for the authors to propose arbitrary standards for grading and filling. There is real danger that these suggested standards will not be adequate for all sites. Each segment of the project should be subject to hydraulic and soils engineering analysis and correct construction procedures followed by safe practices for use of the site based on the actual hydraulic and soils characteristics found applicable to the specific site. It is questionable whether the E.I.R. is the proper place for the development of arbitrary standards, particularly when the authors have previously stated that there is insufficient data on which to make a decision.

The cost to take the necessary mitigation measures should be no problem. It is almost certainly less costly to the owners to provide soil stability and good drainage than is their ultimate cost of sump failures, drill pad failures and steam well blowouts, not counting the intangible losses to the environment from such failures. The public agencies who have authority to regulate the drilling and associated activity should be urged to exercise their control. The E.I.R. should have a section which deals with who has control, what are the controls, and how should they be applied.

In the past we have been critical of the authors' writing style. While it is much improved over prior reports, we still find it difficult to understand. On hydrologic and hydraulic subjects, the authors are like kittens chasing their tails and getting nowhere. To us the drainage and erosion problems are obvious, the need for solution is obvious and also the solution is obvious, yet the authors fail to adequately or clearly deal with the subject. In addition, the authors have a proclivity, a nusus to use nubilous and nugatory words which are obfuscativ and catachrestic. Their behomithic tome is a noesis for ossification of a repletion of pedantic ostentatiousness. With

. EDC

SONOMA COUNTY WATER AGENCY

Mr. Tom Cordill
Sonoma Co. Planning Dept.

May 6, 1975
Page 3

animadversion, we objurgate and oppugn such pejorative paronymositic pedagogy. Simply stated, they use complicated words when simple words would do. That single problem significantly detracts from the usefulness of the E.I.R and should be mitigated. The average citizen, the decision maker, the project owner and even experts on the various subjects covered will find it difficult or impossible to understand.

This memo may seem overly critical, but please understand that our concern is that the E.I.R. could be so much more effective in the area of drainage, erosion, siltation, soils instability and other water related problems. We do not question the apparent credentials of the authors, only that they have missed an opportunity to effectively deal with the problems and have failed to clearly propose effective mitigation measures, how such measures can be accomplished, what authority exists for such mitigation, and which agencies are or should be responsible. Thank you for the opportunity to review and comment. If we can be of assistance in any way regarding this matter, please give us a call.

WRS/lw

Attachment (E.I.R.)



Environmental Consultants

Response to Sonoma County Water Agency comments on Union Oil Leasehold
EIR--Mr. William Stillman.

Page 1, par. 1. No response necessary.

par. 2. We agree - no response necessary.

par. 3. There are two responses to this paragraph:

1. We agree that engineers have the expertise; however, the conditions that are evident in much of the old field at The Geysers, i.e., prior to 1972, are the result of the developer's unwillingness to properly engineer roads and pads. We hasten to say that they may have deemed it unnecessary, but nonetheless a great deal depended on the intuitive judgment of bulldozer operators, rather than careful engineering and planning.
2. The whole effort of erecting minimum standards of performance and specific mitigations is a positive mitigation. Such engineering and most of the general suggestions for mitigation were actually done at the Horner #1 well in Lake County, and at Geyser Gun Club #3, and several well pads since then. Our observation and monitoring of these sites prompted changes in our original format over the 8 months of observation. It became obvious to us that better communication, possibly enforcement, and greater participation of others than just civil engineers were necessary to protect water quality and other affected elements of the environment.

par. 4. We could not agree more and we urge that such soils and hydrologies engineering should be applied. Nevertheless those engineers apparently need better data than the 10 to 25% error inherent in the system employed by the Water Agency. The problem also arises, and justly so, that more stringent enforcement must be backed up by reliable data, hence we do not concur with the second to last sentence. The last sentence is neither appropriate to the question nor applicable to the context.

Page 2. par. 1. In spite of what Mr. Stillman says, we have been attacked for bringing in data from other portions of the Coast Range because it was "not applicable" to The Geysers area. Furthermore we can assure the Water Agency that if the scientific and engineering knowledge as well as common sense had been applied we would not have felt compelled to suggest that standards of performance be promulgated.

par. 2. Most development companies for economical reasons avoid hiring such expertise until they are forced into it by the failure of performance. Often because of narrow fields of interest, many persons, firms or agencies do not know they have a problem to deal with.



Environmental Consultants

par. 3. In our judgment the standards of performance are neither arbitrary nor binding. If they were there would be no necessity of insisting that a civil, and a soils engineer be involved.

par. 4. The cost generally is not assumed by the company until it threatens production, public image, or profits, unless imposed by outside influences. We have repeatedly implied that public agencies need to exercise greater control; however, more often than not the devices, authority or personnel are not available to them.

par. 5. These comments are not germane to the questions raised.

Page 3. par. 2. For all the apparent concern regarding the inadequacies of the EIR in hydrology there appear no specific methodologies or mitigations that are offered to clarify the intent and concepts intimated in the comments.

22c

Pacific Gas and Electric Company

Comments on

Environmental Impact Analysis

The Geothermal Leasehold of
Union Oil Company at The Geysers
Sonoma County, California

May 9, 1975

922

Title Page

The list of persons responsible for preparing the report does not include qualifications.

Page 1, Introduction, paragraph 1

"It meets or exceeds the requirements of the NEPA and CEPA as modified December 17, 1973."

CEPA does not exist. Ecoview's report meets the requirements of CEQA (California Environmental Quality Act). CEQA itself was not amended on December 17, 1973, but the State Resources Agency Guidelines were amended on that date.

Page 1, Introduction, paragraph 3

"The questions are, 'Is geothermal generation clean enough to warrant promiscuous raw steam discharge on a KGRA wide basis?' and 'Is it wise to waste heat energy at rates now released, using current techniques?' While ECOVIEW is presently not in a position to supply answers to these questions, ..."

Ecoview has answered the basic questions raised here. The first question, the area-wide effect of the release of steam is covered in numerous sections where Ecoview describes the chemical content of the steam and describes its impact on the surrounding environment. The second question, waste heat recovery, is also dealt with by Ecoview in its descriptions of alternate uses of geothermal energy. The power plants and steam suppliers at The Geysers employ the most efficient techniques known to convert geothermal energy to electrical energy.

Page 10, Table II-1

The generating capacities shown in the table are gross ratings. The net ratings are as follows:

<u>Units</u>	<u>Megawatts</u>
1 and 2	24 MW
3 and 4	54 MW
5 and 6	106 MW
7 and 8	106 MW
9 and 10	106 MW
11	106 MW

12

106 MW.

14

110 MW.

The column headed "Actual Average Monthly Production (MW hr)" should include the dates over which these figures were averaged.

Page 24, Generating System

"(1) the generator"

This should read "the turbine-generator."

"Noncondensable gases are removed from the condensers and released directly to the air. An additional system is being developed to "scrub" such gases free of hydrogen sulfide."

Noncondensable gases from Units 1-10 are presently released to the atmosphere. PGandE, under agreement with the Northern Sonoma County Air Pollution Control District (NSCAPCD) will begin installing hydrogen sulfide abatement equipment in 1979 and complete the retrofit program by the end of 1980. See Table 2. Units 11 through 15 will have abatement equipment at the start of commercial operation.

Page 25, Projected Field Life

"Actual information regarding field life is vague and unproven. The 30 - 50 year figure appears to be a paper figure designed for tax purposes and industry regulation rather than field data."

The estimate of 30 to 50 years field life is indeed based on test data from the field. The estimate is made by extrapolating the decline in field pressure. Since the steam wells at The Geysers are at the beginning of their decline curves, more exact projections are not possible at this time.

"Field life may be much longer ..."

"This potentially relatively short period ..."

These statements are contradictory.

Page 27, Land Sensitivity, paragraph 2

"ECOVIEW's treatment of the riparian areas (Section XII.A:251), is based on the concept that this habitat is generally endangered throughout California,"

4

The basis for this statement is not given. This and the other criteria used to develop the land sensitivity map appear to be quite arbitrary.

"CLASS 1: ... revegetative capability high;"

It should be noted that the vegetative criteria for determining land sensitivity is in conflict with the constraints listed on page 93. The land sensitivity classifications assume that land with a high revegetative capability is least sensitive to development. The constraints listed on page 93 list a "tentative value order of plant community types." It begins with grassland or ruderal as "most expendable" and ends with forest communities. Since forests usually develop in areas with high revegetative capability, the standards are in conflict.

Page 30, Figure IV - 1

The impacts shown under Physical Factors, items 5, 6, and 7, for Power Houses should be classified as mitigated. Mitigation measures for soil erosion, compaction, and hydrology characters are described in the Environmental Data Statements for Units 12 and 14.

Page 33, Impacts for Unit 12, paragraph 1

"While the site appears able to sustain the installation of the unit, the extension fill slopes resulting from the site preparation will cause considerable sedimentation in the nearby intermittent stream course."

Measures will be taken to mitigate erosion during site preparation. PGandE believes that it is incorrect to describe the sedimentation effects as "considerable." "Some" or "moderate" would be accurate adjectives.

Page 33, Impacts for Unit 12, paragraph 3

"This exposure can be expected to weaken or degrade the vegetation, and possibly, cause the eventual demise of these chaparral and early successional forest stands. It may directly affect plant successional sequences and biomass production."

There is no evidence that these impacts will occur. They may be postulated, but it is incorrect to state that they can be expected.

Page 35, Impacts for Unit 12, paragraph 1

"When reinforced by simultaneous discharges from other neighboring units, noise may have a negative impact on fauna."

This statement is inconsistent with the discussion on page 66, Noise. That section states "at present, however, preliminary observations have not provided any evidence of major effects" of noise upon fauna.

Page 37, Figure IV-3

The existing road and the proposed location of Unit 14 appear to be slightly misplaced on this map. Unit 14 should be shown approximately 500 feet to the north. The finished grade for this unit will be 1900 feet. This existing road is at or below the 1900-foot contour.

Page 38, Impacts for Unit 14

"(d) According to data collected by ECOVIEW, the proposed generating unit and/or its cooling tower lie either adjacent to or across a portion of a landslide area ..."

PGandE is aware of the landslide and has included it in the Amended Environmental Data Statement for Geysers Units 14 and 15. PGandE plans to excavate the landslide debris and then mix and recompact it with better quality material to insure site stability.

Page 38, Impacts for Unit 14, paragraph 3

"The proposed route of the powerline connecting to the existing power line (cf. Figure IV-3; and page following IV-12, Barron et al., 1973) follows the course of Big Sulphur Creek. ECOVIEW believes this to be a potential area of public significance as a natural wildlife preserve. Considerable thought should be given to possible conflicting land use proposals. Rerouting the line directly eastward may prove to be an acceptable alternative."

Ecoview does not state why they believe this area is a potential wildlife preserve. Rerouting the proposed transmission line directly to the east would have greater environmental impact. New access roads would have to be constructed. The proposed route follows a jeep trail. The areas on the east side of the creek are geologically unstable. A direct route east would cross the ridge and would have a greater visual impact than the proposed route.

"In general, the position of Unit #14 power plant does not appear to be in an appropriate position in relation to its supply field. It appears that other environmental questions prevail to suggest either relocation to the east side of Big Sulphur Creek and/or incorporation of the Unit #14 steam supply area into other prospective generator supply areas."

The proposed site is centrally located in the supply area designated by Union Oil Company. Figure 1 shows the supply areas and the alternative sites studied by PGandE. Table 1 discusses why sites on the east side of the creek were rejected in favor of the proposed site.

Ecoview does not state the "other environmental questions" that "suggest relocation." Presumably these are the landslide areas, the proximity to Big Sulphur Creek, the visual impacts, and the prevailing wind patterns.

PGandE considered the alternative sites shown in Figure 1 and found that each of the alternatives had similar problems. The sites considered on the east side of Big Sulphur Creek had more severe landslide potentials. The proximity to the creek, the visual impacts, and the prevailing wind patterns would not be appreciably better at the alternative sites. If Ecoview is aware of a specific site that fulfills engineering and environmental criteria, it should present a description of that site in the report.

Page 43, Climate, paragraph 1

"KGRA wide--affecting heat exchange capacities of moisture-laden air, icing characteristics and ultimately increased fog and haze potential;"

The potential change in wet bulb temperature is calculated to be less than 1.0 degrees Fahrenheit in winter and less than 0.2 degrees Fahrenheit in summer. These calculations assume an evaporation rate of 8×10^5 pounds of water per hour per 55 megawatt unit, 15 units, and an average ventilation rate of ten miles per hour in an air mass with a depth of 1500 feet.

Local area effects from steam wells and/or vented wells which may cause local fogs and steam downwash occur primarily during the wet season of November through March when storm systems periodically affect the area with high humidity, high wind speeds and precipitation. During the growing (dry) season of June through September the average wind speeds are on the order of ten miles per hour, which is generally not sufficient to cause aerodynamic downwash. As a result, the steam emitted is rapidly mixed throughout a deep layer with little significant modifications to the total moisture content of the atmosphere.

COMPARISON OF ALTERNATIVE SITES FOR UNIT 14

TABLE 1

DESCRIPTION	SITE 1	SITE 8	SITE 9	SITE 10	SITE 13	SITE 14
LOCATION	1100 FT. EAST & 400 FT. SOUTH OF NW CORNER SEC. 29 R&W, T11N. ALONG THE GEYSER ROAD	1700 FT. WEST & 500 FT. NORTH OF SE CORNER SEC. 19, R&W, T11N. SOUTH OF BIG SULPHUR CREEK	200 FT. WEST & 300 FT. NORTH OF SE CORNER SEC. 19, R&W, T11N. NORTH OF GEYSER ROAD.	1300 FT. WEST & 1100 FT. NORTH OF SE CORNER SEC. 19 R&W, T11N AGAINST AND WEST OF HOT SPRING CREEK	1800 FT. WEST & 2600 FT. NORTH OF SE CORNER SEC. 29 R&W, T11N.	250 FT. EAST & 2000 FT. NORTH OF SW CORNER SEC. 28 R&W, T11N.
ELEVATION	2230 FT.	1900 FT.	2000 FT.	1950 FT.	2400 FT.	2800 FT.
TOPOGRAPHY AND VEGETATION	A NARROW RIDGE WITH STEEP SLOPES AND SADDLE. SPARSE VEGETATION, MAINLY SCRUB BUSHES AND MANZANITAS	STEEP-SIDED RIDGE ON WEST, LESS STEEP SLOPES ON EAST. DENSE OAKS, CONIFERS AND SHRUBS.	RELATIVELY FLAT. THE AREA HAD A FOREST FIRE AND MANY FALLEN TREES EXIST ON THE SITE. THERE ARE NUMEROUS FAST GROWING CONIFER TREES AND SHRUBS.	RIDGE SPUR, PARTIALLY WOODED. INDICATIONS OF PAST FOREST FIRE. NEW VEGETATION GROWTH.	FAIRLY NARROW RIDGE SPUR AND STEEP SLOPES. SPARSE VEGETATION WITH SCRUB PINES AND SHRUBS.	RIDGE KNOLL WITH STEEP EASTERN AND SOUTHERN SIDES. CONIFERS ON RIDGE TOP, SCRUB OAKS AND SHRUBS, MAINLY ALONG THE SLOPES OF THE RIDGES.
ENVIRONMENTAL AND VISUAL IMPACT	VISUAL IMPACT IS MODERATE BECAUSE OF ITS ELEVATION AND THE SURROUNDING HIGHER RIDGES.	THE LOW ELEVATION WOULD PREVENT SILHOUETTE EFFECT AND OTHER VISUAL IMPACT.	TRACES OF ODOR FROM LEAKING HOT SPRINGS VISUAL IMPACT IS REDUCED BY THE BACKGROUND. LOW ELEVATION WILL REDUCE SILHOUETTE EFFECT.	THE SITE HAS GOOD BACKGROUND AND WILL NOT SILHOUETTE.	AFTER DEVELOPING, THE SITE WOULD HAVE A HIGH CUT SLOPE. MORE VISIBLE THAN OTHER SITES ALONG THE GEYSER ROAD.	VISUAL IMPACT IS MODERATE DUE TO BACKGROUND, AND WOULD NOT CREATE A SILHOUETTE.
ACCESSIBILITY	EXISTING 2.3 MILES OF UNIMPROVED ROAD WOULD REQUIRE GRADING, SURFACING AND SOME FILL.	EXISTING 1.5 MILES OF UNIMPROVED ROAD WOULD REQUIRE GRADING, SURFACING AND SOME FILL.	EXISTING 1.6 MILES OF UNIMPROVED ROAD WOULD REQUIRE GRADING, SURFACING AND SOME FILL.	EXISTING 1.8 MILES OF UNIMPROVED ROAD WOULD REQUIRE GRADING, SURFACING AND SOME FILL. 4 MILES OF NEW ACCESS ROAD WOULD BE REQUIRED.	EXISTING 2.6 MILES OF UNIMPROVED ROAD WOULD REQUIRE GRADING, SURFACING AND SOME FILL.	EXISTING 3.0 MILES OF UNIMPROVED ROAD WOULD REQUIRE GRADING AND SURFACING
GEOLOGY	PROBABLE FAULT TRAVERSES, RIDGE THROUGH A SADDLE SILICA CARBONATE ROCK AND FUMEROLE ACTIVITY IS EVIDENT. ERODED SLIDES ON RIDGE FLANKS.	STREAM CANYON WEST OF THE SITE CONTAINS OUTCROPS OF GRAYWACKE (SOME METAMORPHIC), DIPPING INTO HILL. EXPOSURES OF SERPENTINE & SCHIST AT NOSE OF THE SITE. MAJOR ROCKSLIDE IN THE NORTH PART AND LANDSLIDE IMMEDIATELY TO THE WEST.	LOCATED ON ANCIENT LANDSLIDE. DEBRIS RESTING ON POSSIBLE BURIED INCLIN IN PROBABLE FAULTED ZONE. HOT SPRINGS ON UPPER AREAS OF THE SITE. CLAYEY, ALTERED SATURATED SOIL ON SURFACE	LANDSCAPE DEPOSITS, COLLUVIUM AND SERPENTINE DEBRIS FLOWS. IN THE FLATTER AREA, BEDROCK IS HIGHLY VARIABLE AND HYDROTHERMALLY ALTERED. POSSIBLE HOT SPRINGS AT BASE OF SITE.	MAPPED FAULT EXTENDS TOWARDS SITE THRU A SADDLE. ERODED SLIDES ON EAST AND SOUTH SIDES. UNDERLYING BEDROCK INCLUDES GREENSTONE, SERPENTINE, SANDSTONE AND SCHIST.	OUTCROPS OF SERPENTINE BEDROCK. MAPPED FAULT FORMS EAST ESCARPMENT. GULLY AT NORTH PROBABLY CONTAINS A FAULT. NO APPARENT GEOLOGIC PROBLEMS.
FOUNDATION AND EXCAVATION CHARACTERISTICS	A STEEP HIGH CUT SLOPE LOCATED IN THE FAULT WOULD BE UNSTABLE. SOFT, ALTERED ROCK-CLAY FOUNDATION MATERIAL. STEAM LIKELY AT GRADE. SEISMIC SHAKE MAY TRIGGER SLIDE ON STREAM SIDE OF SITE.	BEDROCK FOR FOUNDATION IS RELATIVELY COMPETENT. ROCKSLIDE AND LANDSLIDE AREAS WOULD REQUIRE RECONSTRUCTION. STREAM CANYON ON WEST SIDE COULD SUPPORT FILL.	RELATIVE EASE WITH LOW CUT SLOPES. PROBABLE FUMEROLE NEAR GRADE. POOR FOUNDATION MATERIAL MAY NOT BE SUITABLE AS ADEQUATE SUPPORT.	MODERATELY HIGH CUT SLOPE WOULD BE REQUIRED. STEAM MAY BE ENCOUNTERED AT GRADE. SEISMIC SHAKING MAY TRIGGER MOVEMENT OF SOFT ALTERED MATERIAL.	STEEP, HIGH AND LONG CUT SLOPE WOULD BE NEEDED ALONG POSTULATED FAULT ZONE. OLD SLIDES MAY BE REACTIVATED BY SEISMIC SHAKING.	PROBABLY SOME HARD ROCK EXCAVATION, WITH VERY LIMITED BLASTING. NO CUT SLOPE.
REMARKS	FAULT POOR FOUNDATION MATERIAL, INSTABILITY NOT FEASIBLE	CENTRALLY LOCATED IN STEAM FIELD. ADEQUATE FLAT SPACE. FIRST CHOICE	UNSTABLE FOUNDATION CHARACTERISTICS LENDS SITE TO BE NOT FEASIBLE.	UNSTABLE FOUNDATION CHARACTERISTICS. SITE CONSIDERED NOT FEASIBLE.	GEOLOGY & CUT SLOPE LIMIT AREA. LOCATED OUTSIDE UNION OIL DEDICATED LEASE HOLD FOR THIS UNIT.	PROBABLY THE BEST SITE CONSIDERED. ADEQUATE FOR 2 UNITS. NOT SELECTED DUE TO LOCATION JUST OUTSIDE OF UNION OIL DEDICATED AREA.

7400C

TABLE 28

COMPARISON OF ALTERNATIVE SITES FOR UNIT 15

DESCRIPTION	SITE 1	SITE 2	SITE 3	SITE 4	SITE 5	SITE 6	SITE 7	SITE 8
LOCATION	1500 FT. WEST & 100 FT. SOUTH OF NE CORNER SEC. 23, R9W, T11N. ADJACENT TO HEALDSBURG-GEYSERS ROAD.	OUTSIDE PACIFIC ENERGY CORPORATION LEASEHOLD.	800 FT. SOUTH OF NE CORNER SEC. 23, R9W, T11N. UPSLOPE FROM SITE 1.	1300 FT. EAST & 600 FT. NORTH OF SW CORNER SEC. 14, R9W, T11N. ADJACENT TO UNIMPROVED ROAD TO HARNESS CAMP.	1400 FT. NORTH & 1100 FT. WEST OF SE CORNER SEC. 14, R9W, T11N. ADJACENT TO HEALDSBURG-GEYSERS ROAD.	2300 FT. WEST & 2800 FT. NORTH OF SE CORNER SEC. 14, R9W, T11N.	2000 FT. SOUTH & 2000 FT. EAST OF NW CORNER SEC. 14, R9W, T11N. NEAR BUCHMAN MINE.	1300 FT. NORTH & 800 FT. EAST OF SW CORNER SEC. 14, R9W, T11N. ADJACENT TO UNIMPROVED ROAD TO HARNESS CAMP.
ELEVATION	2560 FT.		2800 FT.	2551 FT.	2160 FT.	1720 FT.	1760 FT.	2400 FT.
TOPOGRAPHY & VEGETATION	PLATEAU OF MODERATE SLOPE. OPEN MEADOW USED FOR GRAZING. OAK-WOODLAND, MAINLY OAK & BIGGER PINES.		BROAD-CRESTED RIDGE WITH STEEP SLOPES. SOME CLEAR AREA, MOSTLY WOODED WITH PONDEROSA, OAK & MADRONE.	ROCKY KNOLL, USED FOR GRAZING. CLUSTER OF OAKS.	VERY NARROW, STEEP-SLOPED RAVINE. HEAVY COVER OF MAPLE, MANZANITA, OAK & BIGGER PINE.	LANDSLIDE AREA. GRASSY SLOPES.	ADJACENT TO SITE 6 LANDSLIDE AREA. OLD MINE SITE WITH MANY PITS, & A STEAM WELL.	LONG SADDLE AREA OF RIDGE. MOSTLY GRASSY.
ENVIRONMENTAL & VISUAL IMPACT	VISIBLE FROM HEALDSBURG-GEYSERS ROAD & SOME LONG-RANGE VIEWS FROM WEST.		SILHOUETTE EFFECT ON RIDGELINE. HIGHLY VISIBLE FROM ROAD & SURROUNDING AREA.	HIGH VISUAL IMPACT, ESPECIALLY FROM ROAD.	LONG-RANGE VIEW RESTRICTED. SHORT-RANGE VISUAL IMPACT FROM ROAD.	VISUAL IMPACT LIMITED TO GEYSERS POWER PLANT AREA.	SAME AS SITE 6.	SILHOUETTED, BUT LESS VISIBLE FROM SURROUNDING AREAS BECAUSE OF HIGHER GROUND TO EAST.
ACCESSIBILITY	SHORT NEW ACCESS ROAD APPROX. 700 FT. LONG WOULD REQUIRE SOME CUT SLOPES.		NEW ACCESS ROAD APPROX. 2500 FT. LONG WOULD REQUIRE SOME CUT SLOPES.	EXISTING UNIMPROVED ROAD APPROX. 2000 FT. LONG WOULD REQUIRE GRADING, SURFACING & SOME FILL.	NEW ACCESS ROAD APPROX. 700 FT. LONG WOULD REQUIRE CUT SLOPES.	EXISTING SIDE ROAD APPROX. 400 FT. LONG WOULD REQUIRE GRADING & SURFACING.	SAME AS SITE 6, EXCEPT APPROX. 1200 FT. LONG ROAD.	SAME AS SITE 4, EXCEPT APPROX. 3000 FT. LONG ROAD.
GEOLOGY	SERPENTINE BEDROCK OF VARIED CONSISTENCY, BOUNDED ON EAST BY FAULT ZONE. SPRINGS ISSUING FROM THIS ZONE. MAPPED FAULT ON SOUTH SIDE.		FRACTURED SANDSTONE WITH FEW SHALE INTERBEDS.	BISECTED BY MAPPED FAULT, WHICH IS CONTACT BETWEEN FINE GRAINED SANDSTONE & BLUE SCHIST. SCHIST GRADES TO GRAYWACKE AWAY FROM FAULT.	VERY NARROW, STEEP SANDSTONE RIDGE.	WITHIN QUATERNARY (RECENT?) LANDSLIDE. SCARP OF LANDSLIDE LOOKS FRESH & ACTIVE.	ADJACENT TO LANDSLIDE OF SITE 6. SLIDE RUBBLE DRAPE SOME AREAS RIDGE SPUR OF MINERALIZED GRAYWACKE. MANY MINE PITS.	SANDSTONE & SHALE WITH CLAYEY SHEAR ZONES AT MARGINS. STEEP SIDE SLOPES SHOW SOIL CREEP & LIMITED SLIDING.
FOUNDATION & EXCAVATION CHARACTERISTICS	CUT SLOPE IN OR NEAR FAULT ZONE MAY BEHAVE POORLY. PROBABLY COMMON EXCAVATION. FILL DISPOSAL DIFFICULT.		UNIFORM FOUNDATION MATERIAL OF MODERATE STRENGTH. HIGH WEST-FACING CUT SLOPE REQUIRED. 1:1 SLOPES LIKELY. PROBABLY COMMON EXCAVATION. FILL DISPOSAL DIFFICULT.	BLUE SCHIST WOULD REQUIRE BLASTING TO PRODUCE SOUND FOUNDATION. SANDSTONE ADEQUATE. CUT SLOPES LIMITED. FILL DISPOSAL ON SW FLANKS POSSIBLE.	STEEP CUT SLOPE FROM REQUIRED EXCAVATION WOULD THREATEN MAIN ROAD INTO GEYSERS. SANDSTONE BEDROCK ADEQUATE. FILL DISPOSAL IN DRAINAGEWAYS.	POOR FOUNDATION MATERIAL SUBJECT TO MOVEMENT DURING EARTHQUAKE, & POSSIBLE CREEP AT PRESENT. CUT SLOPE WOULD PROBABLY SLOUGH & CREEP. COMMON EXCAVATION. ROOM FOR FILL DISPOSAL.	EXTENSIVE GRADING TO REMOVE MINING DEBRIS. MINERALIZED BEDROCK OF VARIABLE FOUNDATION QUALITY. NEW CUT SLOPES DIFFICULT. COMMON EXCAVATION. ROOM FOR FILL DISPOSAL.	GROSS STABILITY OF RIDGE APPEARS ADEQUATE. PROBABLY COMMON EXCAVATION. CUT SLOPES REQUIRED. 2:1 SLOPE PROBABLE. FILL DISPOSAL ON SITE POSSIBLE, BUT DIFFICULT.
REMARKS	FAULTS LIMIT AREA AVAILABLE FOR UNIT.		SECOND CHOICE.	ENVIRONMENTAL RATING: POOR.	NO ROOM FOR FUTURE EXPANSION.	UNSTABLE FOUNDATION CHARACTERISTICS.	PROBABLE INSTABILITY.	FIRST CHOICE.

Page 43, Climate, paragraph 4

"While increased humidity may indeed reduce water stress in some species, as 'beneficial effect' presumably intimated in PG&E Units #12 and #14 Environmental Reports, incipient disease problems are apparently approaching the threshold levels. Under present field conditions and size, these problems cannot yet be considered a significant adverse effect. However, the addition of Power Units #11, #12, #14, and #15 may well exceed the threshold level as indicated by increased disease incidence."

There are no data to support the claim that incipient disease problems are approaching threshold nor that new units will exceed the threshold level. Page 45 states that heavy rains might be the cause of the diseases noted by Neilson et al.

Page 46, Air Quality, paragraph 1

"a total of 52.6 long tons of sulfur per day can be expected."

This projection is based upon 400 parts per million (ppm) average hydrogen sulfide content in the steam. Data shows that this is not the case. Four hundred ppm is the high value in the area of Units 3 and 4. All other estimates are less. See comments on page 167. The estimate for Unit 13 is as low as 50 to 70 ppm. For an average, 220 ppm would be more appropriate. It is calculated that Units 1-15 will have 33 long tons of hydrogen sulfide in the incoming steam and until abatement equipment is added, will emit 75 to 80 percent of that or approximately 27 long tons per day. This is significantly less than the value given by Ecoview.

Page 46, Air Quality, paragraph 2

"(This station was near the windward side of the field with respect to the prevailing winds during the six months of its operation--December to June.) Assuming this figure to be correct for the ten plants now in operation, comparable projection for a possible seven additional plants would be 488 nanograms/m³ or 1.22 mg/m³."

The dominant winds have a southerly component during much of the period between December and June. It could hardly be said that the station was on the "windward side" of these units. For material having a potential finite settling velocity, as sulfate aerosols may, linear extrapolation to include seven additional units is not realistic.

Page 46, Air Quality, paragraph 3

"This output of sulfur will contribute materially to the haze component of the Central Valley during summer."

The statement is without any documentation. The hilltops and cooling towers in The Geysers area are generally imbedded in or extend above the marine inversion. Therefore, emissions do not enter the planetary boundary layer in the Sacramento Valley. This separation of fair weather air masses is strongly supported by differences in dew point temperatures between The Geysers and the Central Valley.

Page 51, Landslide Potential, paragraph 3

"Cuts should be kept to a minimum; in greywacke they should not exceed 1.5:1 (horizontal to vertical)."

In some areas of The Geysers, PGandE's soils consultants have recommended maximum slopes of 1:1. PGandE agrees with the above statement if it is amended to include the words "unless recommended by geologists or soils engineers."

Page 54, Soils, paragraph 1

'When the soil mantle is disturbed, erosion rates may accelerate 10 to 1000 times. Road and pad construction have the most serious impact on the soil mantle. Wark and Keller (1963) found in grasslands and forest lands that exposure of the soil during the construction period can result in sediment production equal to 200 times that of undisturbed grassland to 2000 times that of undisturbed forested lands. ...'

Wark and Keller's research was done in entirely different soils and land use. Thus discussion is not germane to the special environmental characteristics at The Geysers.

Page 55, Table V-2

"Rating is on a scale from 1 (low soil impact) to 9 (very high impact)."

These ratings are highly subjective. One would expect that some of the soils on 0 to 15 slopes would have a low sensitivity to land use. Ecoview should fully describe its rating system.

Page 62, Fauna, Topographical Modifications, paragraph 1

"It is unlikely that the favorable edge effect, which increases the total carrying capacity for some species,

Data on population, employment, and taxable sales is available at the county level. Economic Sciences Corporation has developed a model using available data which predicts the economic impact of a proposed project quantitatively. Socio-economic data is also available in PGandE's environmental data statements.

Page 73, Adverse Environmental Effects, paragraph 1

"apparent increase in humidity that has caused increased disease incidence on native vegetation in some sectors of the field."

See comments on discussion on page 43, Climate.

Page 73, Adverse Environmental Effects, paragraph 2

"The discharge of hydrogen sulfide in emissions at The Geysers contributes an incremental increase in the presently undetermined magnitude of sulfur level in the Sacramento Valley."

See comments on the discussion on page 46, Air Quality, paragraph 3.

Page 73, Air Quality, paragraph 1

"The hydrogen sulfide component of noncondensable gases will continue to be released at its present rate for an indefinite period because the proposed ferrous iron scrubbing system tested by Pacific Gas and Electric Company over the last four years has not proven satisfactory."

The existing units at The Geysers are operating without hydrogen sulfide abatement equipment under a variance schedule from Sonoma County. Table 2 lists the various dates when the units will be backfitted. PGandE has an intensive research and development program involving numerous approaches for hydrogen sulfide removal.

Page 74, Air Quality, paragraph 2

"The real assessment of the effects of radon and its daughter products are seriously hampered by accurate detection equipment."

Accurate monitoring equipment is not a problem. PGandE and the steam suppliers are jointly sponsoring an extensive monitoring program by Lawrence Laboratories, of Livermore, California, and by LFE Environmental Laboratory of Richmond, California. The results of this program will be sent to the State Department of

TABLE 2

RETROFIT SCHEDULE FOR HYDROGEN SULFIDE ABATEMENT
OF GEYSERS UNITS

<u>Units</u>	<u>Megawatts</u>	<u>Scheduled Retrofit Date</u>
1	11	1/1/81
2	13	1/1/81
3	27	7/1/79
4	27	7/1/79
5	53	1/1/79
6	53	1/1/79
7	53	1/1/80
8	53	1/1/80
9	53	7/1/80
10	53	7/1/80
11	106	3/1/75*
12	106	6/1/77*
13	135	6/1/78*
14	110	9/1/77*
15	55	9/1/77*

*Will have abatement equipment when commercial operation begins.

construction. Criteria dictating species composition and site treatment will be individually specified for the various soils and vegetative cover type.

Native species of shrubs and trees will be used whenever possible, augmented with introduced species only when the introduced species are deemed more effective than the native. A combination of both will most likely be used. Programs will be established to monitor erosion. Appropriate action will be taken, if necessary.

C. Air Quality

1. Hydrogen Sulfide Abatement

PG&E has been investigating methods for the abatement of hydrogen sulfide emissions since 1971. These investigations included parametric evaluations, bench scale testing both in the laboratory and at The Geysers Power Plant, unit-scale tests at Units 1, 2, and 4 and the use of consulting chemical engineering firms.

Based on the results of these investigations and tests, Unit 13 will incorporate equipment to reduce hydrogen sulfide emissions to permissible levels.

PG&E's hydrogen sulfide emissions abatement investigations are continuing and improvements in equipment design, performance, and/or cost will be applied to Unit 13. Quarterly Progress Reports have been sent to the CPUC since late 1972. The most recent is included in this document as Appendix I.

PG&E will also install abatement equipment on the existing units at The Geysers Power Plant. Table 19 shows the retrofit schedule for the existing units.

2. Radon Abatement

PG&E will not know if radon abatement is necessary until the data from the radon monitoring program is analyzed and evaluated. See Appendices G and J. The California Department of Health will review the results of the radon monitoring program. If radon abatement is necessary, the hydrogen sulfide abatement program could assist in meeting regulations for radon emissions. The most probable plan for hydrogen sulfide control will route the ejector off-gas vent duct directly to the cooling tower. There, the ejector off-gases, after treatment for hydrogen sulfide, will ultimately be mixed with the air flow through the cooling tower. This will provide sufficient dilution so that the radon in the cooling tower exhaust measured at the fan stack outlet would be below 3.0 picocuries/liter, the State's allowable concentration above natural background.

Health, Radiologic Division, before the end of May, 1975, and will be available to the public.

Page 89, Suggested Criteria for General Construction, paragraph 1

"Only that portion of grading or construction involving soil disturbance that can be completed and adequately protected from soil erosion or solifluction should be permitted during any one construction season, i.e., - May 1 to October 1."

PGandE will not perform grading or other earthmoving activities during the rainy season. Since the dates of the rainy season vary from year to year, it seems advisable to tie the absence of construction activities to the actual occurrence of precipitation and moisture content of the soil. Ecoview's criteria permit only a four-month construction period, which is not practical.

"No grading should be permitted between September 25 and May 1,"

See comments on the discussion on page 89.

Page 90, Suggested Criteria for Revegetation, paragraph 1

"Native Plants should have preference over exotics for revegetation purposes (see Section VIII.D:97."

Native plantings have not been very successful at The Geysers. See Ecoview's discussion on page 97. PGandE believes that nonnative vegetation can be replanted with more success.

Page 91, Field Development, paragraph 2

"If current methods of power generation continue to be used, then generator sites usually should be located on the highest available terrain in the steam supply area."

PGandE does not concur with the philosophy of ridgetop siting. The policy is to avoid ridge crest sites as much as possible because of their extreme visual impact. The experience at Units 7 and 8 is that such sites tend to be quite windy. Under such conditions, instead of rising quickly to the upper air currents, the cooling tower plume tends to be driven down to the ground.

Page 92, Suggested Procedures, paragraph 5

"This should contain a provision for the containment, collection, and diversion into a condenser and hydrogen sulfide scrubber of 'raw steam', i.e., steam plus

contaminants produced during well standby periods and during normal operations of energy conversion."

PGandE has investigated a steam bypass system which would be used during venting. This system is described in the Amended Environmental Data Statement for Geysers Units 14 and 15. It has been decided that such a system is not warranted since only five percent of the steam produced at The Geysers is vented at the plant.

Page 92, Suggested Procedures

"This final plan should be reviewed on the ground by an independent examining board composed of a geological engineer, a civil engineer, an ecologist, a soils engineer, and a geologist of the D.O.G. (or U.S.G.S. in the case of federal lands). The plan should also be reviewed by enforcement personnel of the Water Quality Control Board, and the Air Pollution Control District."

PGandE believes that the procedure proposed is unnecessary because the applicable lead agency should be able to make the necessary determination. In addition, the proposal would provide another source of delay. The procedures contemplated by CEQA and the guidelines appear adequate to protect the environment. The appointment of an independent examining board is not authorized by CEQA and would appear to impinge upon the authority of the lead agency in a manner not contemplated by CEQA.

Page 102, Monitoring Programs, paragraph 1

"the immediate requirements for a monitoring program are categorized into the following:

- (1) Air quality
- (2) Water quality
- (3) Aesthetic quality, including audio, visual, and odor components
- (4) Hazard and safety, particularly of the physical environment, both geological and pedological
- (5) Ecosystem disturbance, particularly the biological elements
- (6) Economic or social disturbance"

All of these impacts are presently being monitored at The Geysers. PGandE has monitored the air quality, water quality, odor (hydrogen sulfide emissions), and geologic hazards. A network of strain gauges and piezometers are installed at The

Geyers. USGS is monitoring subsidence and seismic activity in the steam field.

A new area-wide air monitoring program conducted by Stanford Research Institute will be initiated by PGandE and the steam suppliers with the prior approval of local Air Pollution Control Districts. The program will collect sufficient meteorological data to enable accurate modeling of the dispersion of hydrogen sulfide and sulfur dioxide.

Radon is being monitored by Lawrence Livermore Laboratory and LFE Environmental. Ecoview's numerous environmental reports constitute a monitoring system in themselves. This summer, Lake County will conduct a survey which should provide more information about any economic and social disturbance.

Page 103, Air Quality, paragraph 4

"Until proven inadequate, a 15 to 20 station network, consisting of at least three continuous operating base stations monitoring the full spectrum of weather data (i.e., wind speed and direction, relative humidity, albedo, incoming radiation, precipitation, temperature), should be installed in the existing Geysers field."

Three wind speed and direction stations in The Geysers field are not sufficient to construct accurate wind patterns, even if supplemented with 15 to 20 subsidiary stations for intermittent recordings.

Page 104, Air Quality, paragraph 2

"When necessary measurements should be intensified to detect dispersal patterns under diverse weather patterns, including summer inversion and stagnant air masses."

The assumption of a summer inversion with the associated intensified measurement program is presented without acknowledging the previous requirement of determining dispersal patterns from climatic data.

Page 104, Air Quality, paragraph 3

"The tenure of base stations should be long enough to encompass several years of diverse weather patterns."

The recommended tenure of base stations is at least 10 years for conventional climatology data including precipitation, temperature, etc. For micro and mesoscale measurements where the wavelengths of desired parameters are in terms of minutes to

produced per year, not per day. See page 166: "In one year this would be about 27,000 metric tons of sulfur dioxide." The figure should be on the order of 17,800 metric tons of hydrogen sulfide per year. Approximately 27 metric tons of hydrogen sulfide are emitted per day.

"Hydrogen sulfide is very toxic, and though easily detected, concentrations cannot be distinguished by smell."

Hydrogen sulfide is toxic only in large quantities. The concentrations at which the gas is toxic should be given.

Page 158, Weather Pattern, paragraph 2

"Shultz et al. (1966) has established a summer air flow pattern that occurs about 40% of the time."

An air flow pattern that only occurs 40 or 45 percent of the time (page 158 is inconsistent with page 159) during the summer months is not a complete representation of the air flow patterns. The inclusion of other air flow patterns would give a more balanced description.

Page 159, Figure XI-1

"air circulation patterns"

The circulation patterns presented are typical of what would be expected in a valley floor because of differential surface heating of valley walls. As can be seen in the figures, no attempts are made to extrapolate the phenomena into the mountain ranges on either side. The wind speeds shown are less than average for July, since the average wind speed at Sacramento during July is 10 miles per hour.

Page 161, Figure XI-2

Figure XI-2 does not summarize average, low, and high precipitation values. This figure may be invalid because the length of record and the time periods are not specified. Rainfall is a climatological parameter requiring several years of record to obtain a stable value.

Page 163, Potential Evapotranspiration

"While no temperature data exist for The Geysers area,
..."

At least one year of temperature data was available from the Northern Sonoma County Air Pollution District at the start of this draft report.

Page 166, Air Quality, paragraph 1

"Table XI-2 is based on steam containing 400 parts per million of hydrogen sulfide by weight."

This figure is extremely high if it is meant to represent the field as a whole. Table XI-3 uses 278 ppm as an average value. This figure was used in PGandE and Union Oil reports in 1972. The most current average figure is 220 ppm. See comments on page 168.

Page 167, Table XI-2

"Assumptions: ...400 ppm (by weight) of hydrogen sulfide in steam."

The assumption of 400 ppm is unnecessary. The following table shows the hydrogen sulfide emissions in metric tons per day. The figures are based on the actual analysis of the steam for each unit, taken, in part, on Ecoview's Table XI-3. The dates under the heading "Year to be fitted with scrubbers" are also incorrect. The correct variance schedule is also shown.

Table 3

Unit	Date equipped with abatement system	Hydrogen Sulfide emissions* metric tons per day	
		Without abatement equipment	Cumulative
1	1/ 1/81	0.24	0.24
2		0.39	0.63
3	7/ 1/79	2.34	2.97
4		2.67	5.64
5	1/ 1/79	2.24	7.88
6		2.08	9.96
7	1/ 1/80	2.58	12.54
8		2.76	15.30
9	7/ 1/80	2.76	18.06
10		2.76	20.82
11	5/31/75	5.50	26.32

*These figures are based on the assumption that there is no natural oxidation of sulfur in the steam.

It should also be noted that excessive steam pressure is not a problem at Geysers units. Steam is vented only during short-term outages.

Page 168, Table XI-3

The estimate of 278 ppm average hydrogen sulfide emission need not be made. The actual figures are shown below:

Table 4

Unit	Hydrogen Sulfide Concentrations ppm (wt.)
7	230
8	160
9	110
10	109
11	110

The average hydrogen sulfide emissions for Units 1-11 is 220 ppm.

Pages 169-170, Hydrogen Sulfide, paragraph 2

"The first stage of oxidation would probably produce sulfur dioxide since this is the next stable compound in the oxidation sequence."

Ecoview has repeatedly presented the subject of sulfur dioxide throughout their discussions. To date, no one can accurately state that sulfur dioxide is a problem at The Geysers. Ambient measurements of sulfur dioxide within the last year have shown no instantaneous concentrations of sulfur dioxide greater than .025 ppm, even in areas of much higher sulfur dioxide concentration. This is far below the state's ambient standard of .10 ppm averaged over 24 hours.

"sulfuric acid can be a major contributor to acid rain."

In conjunction with sulfur dioxide, the subject of acid rain is raised by Ecoview. With the absence of sulfur dioxide, little acid rain should be expected. The possible formation of sulfate aerosols is mentioned. Again the lack of sulfur dioxide precludes this as a significant problem.

Page 171, Hydrogen Sulfide Effects on Vegetation

"It is also known (unpublished data) that reduction of crop yields of citrus, alfalfa, and cotton can be correlated with increasing sulfur dioxide levels when compared to pre-smog yields, according to Dr. Thompson."

This is a confusing sentence. It infers smog consists of sulfur dioxide.

Page 172, Aerosols, paragraph 1

"In April and May of 1972, a limited test for aerosols was made to determine the concentration of selected elements on an east-west transect across The Geysers field. ... the striking increases of contaminating elements clearly indicate the principal source of sulfur and other elements to be from The Geysers."

No effort is made to show what actual concentrations were measured and the significance of the measurements taken. The limited amount of data presented for analysis can not be used to state, "... the striking increases of contaminating elements clearly indicate the principal source of sulfur and other elements to be from The Geysers." It is believed that the ordinate scale of the graphs on Figure XI-3a is in nanograms per cubic meter (10^{-9} g/m³). Ambient air suspended particulate

standards are expressed in micrograms per cubic meter (10^{-6} g/m³). The 24-hour standard for total suspended particulate matter is 60 micrograms per cubic meter.

Page 173, Figure XI-3a

Figure XI-3a is deficient in that dates and sampler locations are not identified. Meteorological data from Units 7 and 8 were likely available for the sample period.

Page 174, Radio Activity [sic], paragraph 2

"The oxidation of hydrogen sulfide to produce, first, sulfur dioxide and later sulfate aerosol is slow enough so that the effects should be assessed on a regional, continental, or even global scale."

The summary of concern of sulfur dioxide on a regional, continental, or global scale is overstated. About 220×10^6 tons of sulfur are emitted to the atmosphere annually (on a global basis) of which about 150×10^6 comes from natural sources. Of this, 100×10^6 tons per year are emitted naturally as hydrogen sulfide. The Geysers' potential contribution to the total sulfur emissions is less than 0.007 percent, well within the uncertainty of natural emission estimates.

Page 198, Hydrology, paragraph 2

"PG&E's weather monitoring station at Units #7 & #8 have been recording measurements, but these data are not available to us."

The PG&E weather data from Units 7 and 8 are available through the Northern Sonoma County Air Pollution District.

Page 242, Geothermal History, paragraph 3

"the wells with their nearly full venting of steam were added to the curiosities of the area. Apparently their addition to the noise and odor of the area began to detract from the resort atmosphere and visitors dwindled to a small but steady family clientele."

These sentences imply that geothermal development and venting of steam is responsible for the decline of the resort. The decline of the resort predated the industrial development at The Geysers. Many resort areas failed during the 1940's and 1950's, including the Russian River area and the Clear Lake area. The opening up of highways to the Sierra Nevadas would seem to be more responsible for the decline than the development of the geothermal industry.



Environmental Consultants

RESPONSES TO COMMENTS OF PG&E

Page 1. Title page.--Complete resumes of persons responsible for preparing the report are on file with the Sonoma County Planning Department.

pg. 1. Introduction - par. 1.

No response necessary.

pg. 1. Introduction - par. 3.

No response necessary.

pg. 10. Table II-1.

This table was prepared by Mr. Anthony Chasteen, an engineer of Union Oil Company.

See excerpt of letter on the last page of this group of responses.

Page 2. pg. 24. Generating System
No response necessary.

pg. 25. Projected Field Life.

Please refer to page 4, last paragraph of comments to this EIR by Mr. Joel Robinson of Union Oil Company. Since it is agreed more exact projections are not possible at this time the modifiers "may" and "potential" used in our discussions are neither contradictory nor without purpose in the context of the discussion.

pg. 27. Land Sensitivity - par. 2. Riparian habitats as endangered.
This concept is supported by:

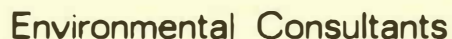
Neilson et al., 1972: The Walnut Creek Drainage: An Environmental Inventory. 2 vols.

The Resources Agency, 1965. The California Fish and Wildlife Plan, pp.

Part 2 of the comment "revegetative capability."

We mean precisely what we wrote. The obvious ineffectiveness of the shrub plantings over the disturbed areas of the leasehold indicate that revegetation measures need to be adapted closely to the ecological environment created by disturbance. Some success has been realized with introduced annual grasses that are widespread in the area. This is to be expected because such grasslands of this area are naturally developed and maintained under disturbance and low moisture conditions.

Forest communities may eventually regenerate themselves but when these types that occur in this portion of the Mayacmas range are disturbed, the resulting seedling habitat is so different that regeneration is not accomplished except



There are three major purposes of revegetation: a) water quality (hence soil stability), maintenance, b) wildlife habitat restoration, and c) cosmetic or aesthetic. Water quality control in particular must be vigorously pursued in the very early stages of development in order to minimize the impact.

pg. 33 Impacts Unit #12, par. 1.
Our position should not be altered for the same reasons
as the response to the preceding comment.
Impacts for Unit #12, par. 3.
The condition of the vegetation just north and northeast
of Unit #7&8 after only two years of operation strongly
supports our contention that the phenomena can be expected.

pg. 38 Impacts for Unit #14, par. 3.

- a) cf. section "C-Big Sulphur Creek," page 151.
- b) PG&E do not state the reasons for the "greater environmental impact. The proposed route is considerably longer than the direct connection to the east. The existing



Environmental Consultants

line traverses much more difficult terrain, therefore the problem of access is not germane. In regard to visual impact the construction of a longer line in a wildlands or sanctuary would be the greater, particularly when the other line boldly crosses the landscape already modified by field development.

Page 5. pg. 39 Impacts for Unit #14, par. 4.

The comparison of alternative sites table points directly to the heart of the controversy and the principal reason for our approach to environmental problems using land capability. It also raises the question of property lines dictating the course of development. PG&E consultants have indicated site #14 as the best site considered (which may also indicate that some potential sites were not considered) but was rejected because the land was not leased by Union Oil.

The purpose of land sensitivity (closely allied to land capability) is to indicate the degree of environmental acceptance of a proposed project (in this case Class 4). While the proposed site may be the best alternative of those considered, it also can be reasoned that it may not be good enough, particularly in view of air quality, the landslide, the transmission line requirements, its proximity to areas of potential value to the general public, etc.

It is our contention that the best possible site be chosen that: 1) is geologically stable beyond reasonable question, 2) is proximal to its supply field, and 3) affords the least impact on air and water quality. We note that the last point could almost be eliminated if emissions were contained and reinjected or otherwise acceptably disposed of.

If such sites are not available and PG&E consultants seem to indicate they are not available to Union's operation, then the logical alternative to the dilemma is not to permit further development until a satisfactory field development plan can afford the essential requirements. If this requires crossing property boundaries, then the legal rights and requirements need to be examined and developed.

pg. 43 Climate

At the present time the PG&E argument may be true. However, at a full and potentially wide dispersion of the producing field or fields, these considerations may not hold. At present there are insufficient data to prove or disprove the question. The obvious mitigation is to avoid the problem completely and reduce emissions by containment. In the case of the field as a whole, the majority of H₂S, noise and related problems would largely be eliminated and save the public large sums to carry on research and monitoring programs that could be avoided by industry action.



Environmental Consultants

Page 6. pg. 43 Climate, par. 8.

The majority of vegetation about both units #12 and #14 is evergreen, and subject to prolonged exposure to increased humidity suggested in the previous comment by PG&E, and possibly cumulative damage not readily evidenced in deciduous or annual vegetation.

The incidence of disease is clearly greater in the areas pointed out in the Squaw Creek EIR in the vicinity of units #7&8 and #9&10. Several of the shrubby plants photographed in April 1974 have succumbed and other branches and limbs have died back to the trunk. This whole question needs immediate and careful field study by competent pathologists over 2 full seasons at least.

pg. 46 Air Quality, par. 1.

PG&E's figures are less. It is our contention that 27 long tons is quite significant.

pg. 46 Air Quality, par. 2.

The key word in the comment is "may," and therefore does not invalidate the extrapolation. Again, the lack of monitoring data is severely hindering the ability to obtain rational decisions.

Page 7. pg. 46 Air Quality, par. 3.

Because of the lack of definitive data regarding inversion, wind patterns, etc., neither contention can be authoritatively defended. Certainly, if the H₂S was being adequately dispersed in these upper levels, no traces could be detected in the Cobb and Colloymi valleys. The Clear Lake Basin will undoubtedly be affected more directly.

pg. 51 Landslide Potential, par. 3.

No response necessary.

pg. 54 Soils, par. 1.

The principals are the same, and differ only in degree. It has not been established by data at The Geysers the magnitude and direction of that degree.

pg. 55 Table V-2.

The basic source of this scale is found in the Timber Quality Act. Title 14 California Administrative Code Division 2 Chapter 2 Subchapter 1. This is further revised in the Resource Agency's Resource Management and Protection Manual, Dept. of Parks and Recreation. In preparation.

pg. 62 (Fauna) Topographic Modifications, par. 1.
Statement that the "edge effect" can only provide minor compensation for loss of habitat is labeled "speculative."

The original statement is not speculative but is a generalization based upon extensive on-site observations of developed areas within the leasehold.

The concept of "edge," of course, refers to the ecotone or transition zone between two plant communities. Wildlife biologists since Aldo Leopold back in 1933 have emphasized that edges are good for wildlife. This favorable "edge effect" really involves two phenomena: 1) an increase in species diversity since species specialized for each of the two communities occur in the ecotone, and 2) an increase in carrying capacity for those species requiring both kinds of habitat.

The effect of construction of roads, drill pads, etc., is usually to replace woody perennial vegetation with bare subsoil, not with a contrasting type of natural vegetation such as grassland. An "edge" is created, but it is essentially a contrast between the original plant cover and none at all. In some areas and to a limited extent, herbaceous vegetation (weeds and grasses) becomes established but it is generally low and sparse in development.

As for the two aspects of "edge effect," there appears to be no increase in species diversity because the disturbed areas do not provide enough cover for even grassland species to become established. Since the open habitat created by construction usually supports minimal vegetation, an increase in carrying capacity for "edge" species is usually minimal too. Undoubtedly there may be some minor benefit for seed-eating birds and for deer and brush rabbits that utilize green herbaceous growth in the spring, but there is no evidence that this represents more than a very small compensation for the permanent loss of large areas of natural habitat.

Page 8. pg. 64 (Fauna) Topographic Modifications, par. 1.
The critical question here is not the capability of wild-life species to cross roads and pipelines, but rather the frequency with which some may actually do it. Certainly the majority of species on the leasehold not only can but do cross these corridors regularly. However, certain small mammals, especially those of chaparral or woodland, may be reluctant to cross open spaces.

There is apparently only one published account of a study designed to investigate this possibility: Oxley, D. J., Fenton, M. B., and Carmody, G. R. The Effects of Roads on Populations of Small Mammals. J. Appl. Ecol., 11:51-59, 1974. This research was conducted in forested areas of eastern Canada, but the two main species there (white-footed mouse and Eastern chipmunk) have close relatives in The Geysers (deer mouse, brush mouse, and Sonoma chipmunk). The results of this study indicate clearly that even narrow gravel roads act as barriers restricting animal movement. An extensive system of cleared corridors thus could have exactly the impact suggested, that is, dividing continuous brush or woodland habitat into smaller isolated or semi-isolated parcels (for certain species at least).

Whether this actually happens at The Geysers is not proved, of course, and only trapping studies can confirm or deny the possibility. Extensively documented recent advances in ecological theory indicate a definite relationship between decreasing size of habitat patches and declining species diversity within such patches (MacArthur, R. H. and Wilson, E. O. The Theory of Island Biogeography. Princeton Univ. Press, 1967.) There is a potential, therefore, for the elimination of animal species if their habitat is carved up into small patches. Hence the suggestion that research into the subject may be warranted.

pg. 65 Toxic Substances, par. 2.
Attempts to confirm reports of bird mortality were made through the California Department of Fish and Game (Allan Buckmann and John Emig) and the Sierra Club (Hamilton Hess). Neither organization has substantiated records of such an occurrence.

Therefore the reference to bird mortality should be deleted from the draft EIR and the statement be changed to read, "Isolated and confirmed instances of fish kills from ingestion of toxins . . ." etc.

- Page 8. pg. 72 Socio Economic, par. 1.
The data specified are available and there are several models for some kinds of analyses which were beyond the capabilities of our budget. The quality and extent of those data were still not (in our opinion) sufficient to make an adequate assessment of these parameters.

Only one PG&E EIR (Unit #13) has any socio economic data that is germane to the real problem. The complications that make such a study extremely difficult are outlined in Section XIII of this report, on page 289.
- Page 9. pg. 73 Adverse Environmental Effects, par. 1.
Our response is identical to that referenced.

pg. 73 Adverse Environmental Effects, par. 2.
Our response is identical to that referenced.

pg. 73. Air Quality, par. 1.
No response necessary

pg. 74 Air Quality, par. 2.
No response necessary.
- Page 10. pg. 89 Suggested Criteria for General Construction, par. 1.
The reason for the dates is prompted by the continual pressure by developers to do grading in the field when subject to heavy spring or early fall rains. Time and again unnecessary erosion has occurred because activity was started too early or continued too late. Because of this lack of responsibility by various developers--not necessarily limited to Union Oil--the dates seem advisable. The probability of heavy rains that tend to be damaging to water quality is low in this part of California.

pg. 90 Revegetation, par. 1.
This is because proper techniques and an understanding of the ecological tolerance of many of the plants used was not evidenced. Read pages 97 through 101.

pg. 91 Field Development, par. 2.
The same winds that occur on ridge tops draw the rising air continuing emissions. If emissions were contained then the location of the plant could then be arranged to afford more efficient field operation, etc. Also a greater weight could then be given to visual impact.

pg. 92 Suggested Procedures, par. 5.
It is essential that all emissions be included. The by-passing of turbine-generators during shut downs is the biggest loss of energy, resource, and air quality anywhere in the process. The two are closely related and are as



Environmental Consultants

much PG&E's problem as the steam supplier. The 5% figure is misleading and applies only to those periods when the plant is in operation. And many of these emissions are not muffled in any way.

- Page 11. pg. 92 Suggested Procedure
When it doesn't or can't, then the County Board of Supervisors must take action to protect the public interest.

Because these things were not done in past years, the variety of problems discussed in this EIR have occurred. If they hadn't, there would be no reason for environmental concern.
- pg. 102 Monitoring Programs, par. 1.
Some monitoring is being done but not on a scale or intensity that will lead to reasonable predictions of impacts if the field enlarges beyond its present boundaries.
- Page 12. pg. 103 Air Quality, par. 4.
Then whatever number is required should be used!
- pg. 104 Air Quality, par. 2.
It is axiomatic that such a sequence of information be obtained!
- pg. 104 Air Quality, par. 3.
On the contrary, the cycle of wet to dry years, and the incidence of the upper and lower ranges can scarcely be detected over 10 years.
- Page 13. pg. 111 Resource Depletion, par. 1.
Smaller units that can be installed or drill pads serving several wells are possible. Access roads would already be installed.
- pg. 138 Plant Operation, par. 1
No comment necessary.
- Page 14. pg. 139 Increased Efficiency, par. 1.
No comment necessary.
- pg. 151 Big Sulphur Creek
It is not necessarily species but the group of species that are found in these communities. These are listed in Appendix II.
- pg. 154 Climate, par. 1.
We are not projecting the Sacramento Valley circulation pattern into The Geysers. We are suggesting that if the wind movement patterns over The Geysers follow the mountain valleys into the Sacramento Valley as they appear to do, then mixing will occur.

pg. 154 Air Quality, par. 1.
The figure should be 37.0 metric tons per day multiplied by 365 = 13,505 tons per year. If this sulfur (atomic wt 32) is oxidized to sulfur dioxide (mol wt 64) you get the 27,010 tons/year emission of sulfur dioxide.

Response to last statement of comment:

"Large quantities" is a relative figure. H_2S is fatal at 600-700 ppm in one hour. Nat'l Inst. Occup. Safety and Hlth sets 20 ppm as the 24 hr exposure limit. California air quality standard is 30 parts/billion and the odor threshold is 3-5 parts per billion.

Page 15. pg. 158 Weather Pattern, par. 2.
The pattern indicated is the critical part of the overall air flow pattern, and the one that may prove of considerable importance. Because winds are slow, reaction time is high, and the opportunity for increased hazard to crops is greater.

pg. 159 Figure XI-1
See response above.

pg. 161 These are stable values. The tenure of the record used is as follows:

	<u>Station Record</u>	<u>Term of Records Used</u>
Middletown	1941 to present	23 years
Hobergs	1930 to present	42 years
Geysers	1939 to present	32 years
Helen Mine	1952 to ?	12 years
Anderson Springs	1962 to 1972	10 years

The average low and high values can be interpolated from Figure XI-3; that is why that figure was included.

pg. 163 Potential Evapotranspiration
The construction of the graph requires rainfall and temperature data for stations of record for identical periods. A single year's record is insufficient to make these appraisals.

Page 16. pg. 166 Air Quality, par. 1.
Perhaps 400 ppm is high. If 278 ppm is used emissions are 25.7 tons of sulfur per day, 9,385 tons per year, and if converted to SO_2 18,772 tons/yr.
Without much improved data, whose figures can be termed reliable?

pg. 167 Table XI-2.
This is the same question as the preceding one. Perhaps 278 or 220 ppm in the stream are better figures, but who do we believe? The developing companies would have it as low as possible.

Page 17. pg. 168 Table XI-3.
We fail to see where they get the figures in Table 4. We would stick with the 278 figure unless shown the source of this table.

Page 18. pgs.
169-170 Hydrogen Sulfide, par. 2.
We have seen no published SO_2 data on SO_2 . If they are as low as cited, the problem is nil, but Stephen's statements are accurate.

Regarding acid rain:

We have indicated that under present field conditions acid rain does not appear to exert an adverse impact. Our concern lies on full field development over a large portion of the KGRA when, and if SO_2 and SO_3 concentrations possibly could be increased several fold. The problem could be avoided completely by modifying field procedures and eliminating emissions.

pg. 171 Hydrogen Sulfide Effects on Vegetation, last par.
"Yields of citrus, alfalfa, and cotton can be correlated with increasing oxidant (not SO_2) levels." The last sentence could be strengthened by saying that H_2S if oxidized to SO_2 , and transported to the Sacramento Valley and mingled with existing oxidant levels could act synergetically to cause accentuated oxidant injury to crops.

pg. 172 Aerosols, par. 1.
No comment necessary.

Page 19. pg. 173 Figure XI-3a.
The information requested is found on the attached sheet which should become page 173a in the draft EIR.

pg. 174 Radio Activity, par. 3.
The comment is valid. Delete "continental or even global" from the sentence.

pg. 198 Hydrology, par. 2.
No comment necessary.

pg. 242 Geothermal History, par. 3.

The comment is quite valid and certainly no such implication was intended. However, there were several other causes of the decline of the local resorts, not the least of which were Sierran roads. A changing mobility and life style were also pertinent factors.

ECOVIEW appreciates the in depth comments of the EIR by PG&E personnel. Nevertheless there appear to be many unresolved questions and some statements in their comments need to be verified and their data base indicated.

Excerpt of letter from Union Oil Co., dated May 29, 1975, referring to PG&E comment on their page 1, re: page 10, Table II-1:

Dear Dr. Neilson:

This letter is in response to your phone call of May 28, 1975, regarding comments on Union's Leasehold EIR at The Geysers.

Table II-1 on Page 10

The column "Actual Average Monthly Production (MWHr)" was based on an approximate average load factor of 67%. The actual average load factor for Plants 1 thru 10 for 1974 was 67.90%. (Load factor is defined as actual MWHr produced divided by gross generating capacity.) The actual average load factor for each pair of plants may have been more or less than the average of 67.90% for all ten plants.

Very truly yours,

UNION OIL CO. OF CALIFORNIA



Vane E. Suter
District Manager

SONOMA COUNTY

PLANNING DEPT

OFFICIAL
FILE COPY

The Geothermal Leasehold
Company at the Geysers
Questions & Comments

DO NOT REMOVE

Pg 4 - What is being proposed to be removed?

Pg 11 - need for wells to be seen against land sensitivity map

Pg 13 - What areas on the Union oil leasehold

3rd paragraph can support 1 well per six acres

What would be the consequences of

Such dense development in terms of

land sensitivity etc? Note Pg (27/30) 70 to 75%

of land in unusual sensitive or hazard areas -

* Pg (15) - "Grading permits are required and the
2nd Para. proposed is reviewed by the County Engineer"
Is this permit procedure minimized or
decentralized? mitigation need for County Grading
Ordinance -

Pg 15 Bottom of page - where is the Class II-1

Sump on the leasehold - who approved it?

What about adequacy of sulphur disposal site + impact to

Also only on pg. 250 is the solid waste ^{environment} problem at the Geysers even touched on.

The EIR should address itself to this problem
and offer some mitigating suggestions -

Union oil has a dump area near Sulphur
Creek and a large area of junk down

below their main offices. Also Geysers resort
dump on S side of Sulphur Creek.

Pg 21 What is "Dyna drill" equipment?

Pg 22 Why are mufflers only installed in
some cases? d. . .

Pg 24. Transmission Systems -

The EIR should mention that EIR's are not required for 115 kV lines or for additions from 115 kV to 230 kV since they are then additions & not new lines - Thus PG & 2 starts with a 115 kV line and then adds the 230 kV line & no EIR is even required - The EIR falls between the cracks.

Field Life

Pg 25 Comments should be just left as unknown - on Field life - & some referred to already dropping pressures -

* Pg (27) Composite sensitivity map - not clear, difficult to read should use overlapping transparencies.

Pg 32 Can these Pad sites be prevented by any existing legal entity?

Pg 34
map.

a. Pad # CMHC 12-316

b. " " " 12-332

c. Pad # CMHC 12-31.8, CMHC 12-34.8

Pad # CMHC 12-33.2, " 12-32.3

All lie on landslides.

Pg 33 Is it wise to place Unit 12 on the present planned site?

a. because of extensive fill slopes

b. air quality - Stream drift on vegetation

Pg 35. Noise - need for mitigation so as to ~~mitigate~~ not further reduce environmental quality along big Sulphur Creek - noise in ~~area~~ ~~drainage~~ well exceeds what

of resource

5. Alternative resource use other than generating electricity - wood pulp, nursery, Household heating ch.

Pg 217 Fauna.

Appears to be no good population density studies done on Fauna - It has been two years since a proposal was brought up - There appears to be a real need for data on populations of aquatic insects in relation to streams in the leasehold.

To be able to understand the effects of siltation and condensate spills ch. on wildlife connected to riparian food chains.

Pg 153. Sonoma Co Parks + Recreation Dept have heard ^{slide} presentation asking for protection of the little Geyser area, old resort area + scenic parts of Big Sulphur Creek -

They have approved in concept such protection and have asked us to look into some historical designation for certain areas.

Pg 154. 27,000 metric tons of Sulphur a day for how many units.

Pg 171 - Air Quality -

What about the effect of H₂S on Conifers dying in San Gabriel mts in LA Basin.

Pg 172. The Ozone measurements now being taken.

Pg 230 a visual effects - Good description

Pg 290 - Good quote on commitment of 1st exploratory well.

① Question - not in EIR Well Casing Failure
How many wells are experiencing some sort of casing or structural failure & thus emitting more steam than the normal amount usually emitted at the well heads when not in use. Also how many wells have failures drilled since 1968. How many wells are not hooked up to generators & what is the schedule for hooking them up. In other words is there any reason to continue the wasteful practice of drilling wells that may not be hooked up for 2 to 10 years into the future.

② Calculations of resource waste & how to conserve the wasteful practices.

③ Need for a map showing name & position of
Pg 11. all wells & how they fit on the land sensitivity map. particularly landslides.



Environmental Consultants

RESPONSES TO COMMENTS ON UNION OIL'S LEASEHOLD EIR
Marilyn Goode, respondent.

Page 1.

Page 4: A large leasehold in Northern Napa County is being analyzed for potential geothermal drilling. A well site has been tentatively selected in Napa County in the Oat Hill area.

Page 11: No response necessary.

Page 13: Very little area can support such densities. Current Union Oil Co. field planning does not intend to use such a density, but such a density exists in the areas developed early in the history of the field by Magma Power and Thermal Power Companies.

Page 15.: Existing policy requires a permit which is issued by ministerial action only and requires no inspection or approved grading plan.

Page 15, bottom: Class II-1 sumps have been constructed at wells developed since the failure of the sump at Geothermal Kinetics #1 in 1973. Such requirements have been imposed by the North Coast Regional Water Quality Control Board.

The question regarding "sulphur disposal site" is not clear either to location or context identity. Union Oil Co. has a number of storage sites that are used for temporary storage of materials. In some cases these may appear to be waste. Union Oil does collect solid wastes in large containers; however, there is a large area, presumably an unused sump, on a pad below Units 9 and 10 which has been used to collect solid wastes. While there is considerable clutter in some areas, there is relatively little solid waste that has not been collected and removed to an approved solid waste disposal site.

Page 21: "Dyna-drill" equipment is a specially designed drill head that permits changes or control in the direction of a well bore.

Page 22: Only where noise has been a health factor are mufflers used, and these have been mostly experimental tests to determine the effectiveness of muffler systems. The cyclonic blooie line muffler used on the latter stages of drilling Geysers Gun Club #3 is the first practical blooie line muffler that holds promise for future wide application.

Page 2.

Page 24: No response necessary.

Page 25: No response necessary.

Page 27: The maps were designed as overlay transparencies, but the cost of providing such transparencies for each EIR was prohibitive. The original full-scale maps are in the possession of the Sonoma County Planning Dept.



Environmental Consultants
Union Leasehold EIR: Goode.

Page 32: ECOVIEW is in no position to answer this question. We feel that their use is injudicious but the final determination of use is up to political agencies.

Page 33: ECOVIEW has pointed out that the presently proposed site has significant field supply problems and environmental problems may also develop.

Page 35: This appears to be a comment by the respondent and does not require a response.

Page 3.

Page 154: The figure applies to all operational units.

Page 217: This is an opinion of the respondent and requires no response.

Page 153: No response necessary.

Page 171: There is no evidence that the problems on conifers in the L.A. Basin arise from H_2S . There is considerable smog damage evidenced there, however.

Page 4.

Page 172: No ozone measurements are taken, to our knowledge.

Page 250: No response necessary.

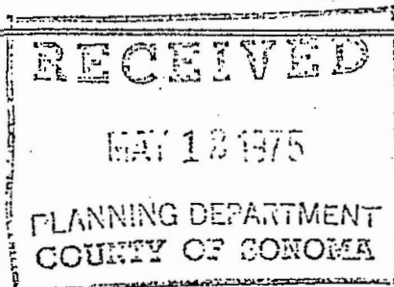
Page 290: No response necessary.

General questions:

1. "Some sort" of casing or structural failure includes all problems involved in drilling and maintenance. Four significant failures have been caused by landslides which have ruptured casing. Two have been controlled, one has just occurred, and one apparently has evaded control. No failures of consequence have occurred in wells that have the back strings drilled since late 1968.

These figures can be determined from information given in the EIR. The schedule for hooking up proven wells depends on the development of generation facilities.

Several of the remote wells have been drilled to fulfill lease commitments and to explore the potential of parts of the field. These practices are generally not particularly wasteful, nor do they impart significant impacts except on the site itself.

STATE LANDS COMMISSION
STATE LANDS DIVISION100 OCEANGATE — SUITE 300
LONG BEACH, CALIFORNIA 90802

File Ref.: W 9270

May 8, 1975

Sonoma County Planning Department
County Administration Building
2555 Mendocino Avenue
Santa Rosa, CA 95401

Dear Sirs:

The State Lands Division has reviewed the Draft Environmental Impact Report for Union Oil Company's geothermal leasehold in the Big Sulfur Creek drainage, Sonoma County, California, and wishes to comment as follows:

1. The report can only be considered as a Programmatic EIR. Necessarily, it should be supplemented in the future with specific data covering the impacts of individual wells. If this is not the plan, then specific drillsites should be covered in detail in this report. Each drillsite should be investigated for stability, and mitigation measures for each site should be discussed. All grading or earth work involved in site preparation and access road construction should also be discussed.

Previously, a number of drilling pads have been located upon landslide masses. Several well blowouts have occurred on these, and potentially others may occur. This has resulted in adverse environmental impacts which could have been avoided if serious planning had been undertaken prior to placement of drilling pads.

2. Landslide Potential (page 50) seems to underrate the significance of major landslides in the area. Elsewhere, the report identifies landslide areas and even identifies pads located on these landslides. However, the report fails to develop the impact this may have on the environment.
3. Some of the large foldout maps were difficult to use for review because of indistinct topography and lack of section lines or grid system, making location difficult. The Division suggests that section lines and topography be made more identifiable.

Thank you for the opportunity to comment.

Very truly yours,

A handwritten signature in dark ink, appearing to read "A. D. Willard by [unclear]".

A. D. WILLARD

Supervising Mineral Resources Engineer

RLM:CPP:lm

cc Jim Nelson
5/12/75
am



Environmental Consultants

RESPONSES TO COMMENTS ON THE UNION LEASEHOLD EIR IN THE BIG SULPHUR DRAINAGE MADE BY CALIFORNIA STATE LANDS DIVISION, Mr. A. D. Willard, respondent.

1. It is not completely clear to ECOVIEW to what extent or by what process specific sites will be reviewed, because the only agency controlling permits to construct is the Sonoma County Air Pollution Control District. There is still in effect a blanket use permit issued several years prior to the CEQA to Union Oil for geothermal development.

Regarding the location of wells on landslides, our concerns regarding these and the blowout problem appear to be well justified in the light of the blowout that occurred in April of 1975 at the Little Geysers. It appears that a concerted reevaluation of all wells located on unstable terrain should be undertaken by DOG (a) to ascertain whether casings are adequate, (b) to determine if tie-back strings should be installed to the surface, (c) to test the strength and condition of cement between the casing strings, and (d) to show cause why wells on precarious or uncertain sites should not be abandoned and filled according to prescribed abandonment procedures.

The adverse impacts that can occur are now very well illustrated at the several blowout sites. At the most recent site, the extensive grading, land and water disturbance necessary to affect so far only partial control is a high price to pay for the laissez-faire position of the DOG.

2. We have in this EIR, as well as all others where land stability is a question, strongly urged that no drilling take place on active landslide areas or on areas with a high landslide potential (cf. the Squaw Creek EIR for Union Oil, for areas where land stability is questionable). Our current practice in preparing EIRs is to mount a careful identification program (Burmah's Dominichelli and Wild Horse I). It was not possible under the budget restrictions of this EIR.
3. The full scale maps (1" = 500') can be obtained from the Sonoma County Planning Department. We apologize for the failure of clarity in the reductions that were in this EIR. Again, budget restrictions interfered with alternative methods.

TRANSCRIPT OF ORAL COMMENTS AT THE PUBLIC HEARING
ON THE DRAFT ENVIRONMENTAL IMPACT REPORT FOR THE
GEOTHERMAL LEASEHOLD OF UNION OIL COMPANY AT THE
GEYSERS, SONOMA COUNTY, CALIFORNIA.

(May 16, 1975)

Lead Agency: Northern Sonoma County Air
Pollution Control District

Presided By: Michael W. Tolmasoff,
Air Pollution Control Officer

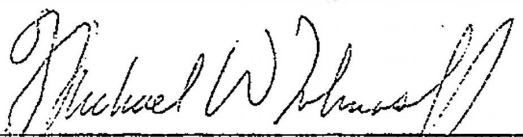


NORTHERN SONOMA COUNTY AIR POLLUTION CONTROL DISTRICT

321 No. Cloverdale Blvd., Cloverdale, CA 95425
(707)894-3861

June 13, 1975

I certify the foregoing account of the events that transpired May 16, 1975, at the public hearing for the Draft Environmental Impact Report, entitled "The Geothermal Leasehold of Union Oil Company at the Geysers, Sonoma County, California"; that I, as the Northern Sonoma County Air Pollution Control Officer, presided over this hearing; and that this account was accurately transcribed and correctly typed to the best of my knowledge.


MICHAEL W. TOLMASOFF
Air Pollution Control Officer

Meeting convened at 1:35 p.m. in the Planning Commission Meeting Room on May 16, 1975.

SPEAKERS were as follows:

- 1) Vane Suter, Union Oil Company
- 2) Joel Robinson, Union Oil Company
- 3) Vincent MacKenzie, State Public Utilities Commission
- 4) John Enig, Department of Fish and Game
- 5) Dr. James Neilson, Consultant (EcoView)
- 6) Mr. B. C. McCabe, Magma Power Company
- 7) Marilyn Goode, Sonoma County Tomorrow and speaking for Sierra Club Task Force
- 8) Mrs. Faye Dewey, local resident
- 9) Mrs. Maria Monser, local resident
- 10) John B. Gibson, PG&E
- 11) Ted E. Wilmsen, Magma Power Company
- 12) C. R. Thompson, University of California, Riverside
- 13) Tony Cerar, local resident

Michael Tolmasoff: The meeting for the Union Oil Geothermal Leasehold is now open. According to the Northern Sonoma County Air Pollution Control District Rules and Regulations, the Hearing Notices were posted and distributed for comments as to any ^{deficiencies} ~~efficiencies~~ that are found in this Draft Environmental Impact Report.

I would like to begin by saying we would like to receive all our comments first and when that seems to be finished we will talk about any of our written comments that we have received, we have received a number of comments from the Division of Forestry, Department of Interior, etc. So we may begin with our oral comments. Who wants to go first? Vane Suter. We have asked, for the purpose of the tape, that each person give their name for the comments that will be on the tape.

Vane Suter: I have signed in on the sheet. Is that the word? Okay. My name is Vane Suter and I am the District Manager for Union Oil Company Geothermal Division here in Santa Rosa. I have some very brief comments to make at the beginning and I would like to introduce one other speaker who has an equally brief comment to make and we have some written comments which we will submit. At this time we do not wish to or intend to read those comments. This should take just a few minutes.

I like to recall a little bit of the history on this Environmental Impact Report. Union Oil Company paid for this Leasehold Environmental Impact Report on November 21, 1973, by a check to the Northern Sonoma

County Air Pollution Control District. At that time the report was found to be delivered in July 1974, which was to be about eight (8) months after payment. But instead of taking eight (8) months to prepare this Environmental Impact Report was not delivered until April 1975 or seventeen (17) months after payment. And because of this delay Union has suffered considerably.

While waiting for this Leasehold EIR that we are hearing today, Union was required to pay for three additional interim Environmental Impact Reports in order to be able to continue our ongoing billing program. On numerous occasions, our drilling schedule had to be changed because permits to drill certain wells could not be obtained because this Environmental Impact Report did not exist; and of course, we would much prefer to base our decision on where to drill our next half a million dollar well on sound management principles and on engineering and geologic information, rather than having to decide where we are going to drill, based on where can we get a permit at this particular time.

So for those reasons, we are very anxious to get this Leasehold Environmental Impact Report into its final form as soon as possible. And I hope that we won't get involved into a long series of hearings, with extended time delays between the hearings, and I hope that this Draft EIR won't be sent back to the authors for a time consuming revision. And I also hope that the Lead Agency can provide timely responses if there are any significant environmental points raised in this review process.

There is also another reason why we would like to get this Environmental Impact Report finalized as soon as possible. And that is, the fact the Public Utility Commission is holding up approval to build power plant 12 while awaiting certification of this EIR.

We are very anxious to build power plant 12, because as soon as we can get it on the line we will be able to reduce our imports of high priced foreign oil by a million barrels a year from the output of one power plant. One other point I would like to make, and I would like to quote from a section CEQA Guidelines, section 15054 - TIMELY COMPLIANCE - "Public Agencies should carry out their responsibilities for preparing and reviewing EIR's within a reasonable period of time. The requirements for the preparation of an EIR should not cause undue delays in the processing of applications for permits or other entitlements to use".

I certainly hope that the preparation of this Final Leasehold EIR will not be the cause of any further undue delays.

At this time I would like to introduce Mr. Joel Robinson, who is from our Environmental Science Department...(inaudible, muffled on the tape).

Joel Robinson: Good afternoon. My name is Joel Robinson and I am an Environmental Engineer with the Environmental Science Department of Union Oil Company. Our office is located in Los Angeles.

My job requires me to review and comment on numerous Environmental

Impact Reports on a wide variety of projects. I have witnessed the steady improvement of quality of EIR's in California. Impact statements prepared under CEQA guidelines have matured greatly in the 2½ years they have been applied to private projects. Format has become standardized, and objectivity has been a sought-after goal. Conclusions in any quasi-scientific document such as EIR's, have been rigorously extracted from existing facts, and rarely have editorial and unsubstantiated comments insidiously crept into EIR's. Unfortunately, although this draft EIR has compiled many useful data, it has not upheld the standards of performance expected for such reports. It continuously relapses into biased, inflammatory and unsubstantiated statements, and relies heavily upon conjecture, opinion and limited data to predict impacts of the project. This draft EIR is fraught with gross inaccuracies, internal inconsistencies, redundancy, excess verbiage and confusing methodologies of little or not use to decision makers. The intricate matrices of this draft EIR are subjective and misleading, at best.

It is truly unfortunate that so many myths must be perpetuated in the form of this draft EIR, especially about an energy source which, in the introduction, the author admits creates relatively low levels of pollution, particularly when compared to competing forms of energy production. However, I emphasize Mr. Suter's comments that we must have no more undue delay. As dissatisfied as we are with the organization, content, and tone of this Draft EIR, it is our hope that the final EIR will be forthcoming very soon.

In an effort to add some clarity and perspective to the final EIR, we offer the attached package of comments for inclusion in it. These comments are offered to correct some of the grossest and most misleading statements made in this Draft EIR. It is impossible to address every point, so only some of the major subjects are addressed.....(inaudible, muffled on the tape).

Michael Tolmasoff: In the...as to the verbal comment:....
(inaudible, muffled on the tape). We will enter this into the record. So lets continue on with the oral comments.. Who would like to go next?

Vincent MacKenzie: This is a statement of the California Public Utilities Commission on the Draft Environmental Impact Report...

Michael Tolmasoff: Could you mention your name for us?

Vincent MacKenzie: (Inaudible, muffled on tape)... The State Public Utilities Commission and its Staff have chosen not to file formal comments under CEQA and the Guidelines on the Draft EIR before the District prepared by EcoView on the basis that this EIR, with all comments, will be introduced into evidence and thereby incorporated into the formal Commission record in the existing proceeding entitled Application 53465, relating to the application by Pacific Gas and Electric Company for a certificate of public convenience and necessity to construct and operate a

power plant and attendant transmission facilities known as Geysers Unit No. 12.

Following submission and incorporation of your EIR into the PUC formal record, it will be considered by the Commission in its deliberation of PG&E's application to construct and operate the power plant and attendant facilities.

It will be the Commission Hearing Officer or Hearing Examiner's obligation to consider and evaluate the total environmental impact from this project in his compilation of a Commission Final EIR, later regarded as Geysers Unit No. 12. The Commission itself then will adopt a Final EIR in its decision on whether to grant a requested certificate of public convenience necessity.

Finally, the Public Utilities Commission and Sonoma County are breaking new ground in coordinating and implementing the EIR process in this matter. Certainly CEQA and the Guidelines did not offer clarity on what was required of each agency.

The Commission trusts the District and the County will proceed in as expeditious a manner as possible on this matter in order that the project can be passed upon at the earliest possible date. Commission urges the District and the County to make available to PG&E at the earliest date possible in addition to the Draft EIR, which has already been submitted, all comments thereto, the responses to the comments and a record of today's

proceeding. Upon submission to the Commission, it can then proceed with its Final EIR.

May I conclude by asking that whatever formal transcription is made today, that is put into writing form, that the Commission would like to have a copy of it so that it can be reduced to transcript and be introduced into our proceeding as an exhibit. Thank you.

Michael Tolmasoff: Thank you Mr. MacKenzie. If I may interject at this point. This meeting is being held to ascertain the completeness of the Draft Environmental Impact Report and I would think it would be expeditious, especially since I have heard so much interest in trying to get this Draft completed as soon as possible, that we try to keep our remarks more or less to the problems or inadequacies that are found in the EIR; if you can. I believe you are finished Mr. MacKenzie? Okay; I believe we are ready for our next oral comment.

John Emig: My name is John Emig. I am with the Department of Fish and Game. We previously submitted our comments in a letter to Mr. George Kovatch in the Planning Department of Sonoma County. Today I would like to reaffirm some of the comments that we made in that letter.

The major concern with the project is that with the Environmental

Impact Report, it does not discuss specific new projects other than Units 12 and 14 and their supply fields. The report does provide an overview of the areas natural resources and concerns. However, we feel that a report such as this should plan for specific projects and reflect the need to preserve the resources of the area. The Unit 12 and 14 projects and their supply field were apparently planned without concern for the natural sensitivities of the area, as indicated by the environmental problems associated with their proposed installations. These problems are stated in the report and are reviewed again in our letter of May 9. We believe the plan for other geothermal development should be included in this report and that these and the plans for Units 12 and 14 should incorporate measures for the preservation of natural resources, particularly fish and wildlife.

Another major concern of ours with this report, is that the discussion of alternatives is insufficient to comply with the California Environmental Quality Act in the State Guidelines. We believe that the proposal for the exclusion of development along Big Sulfur Creek in the Little Geysers Area in view of the Peregrine Falcon nest site on Cobb Mountain is very commendable. However, consideration of other possible modifications of leasehold development, including no project, is necessary to comply with the law. In regard to midigation, we believe that CEQA requires midigation for the wildlife loss that will occur on the extensive area cleared for geothermal operation. The report discusses these losses but indicates that no midiga-

tion is provided. We believe that appropriate midigation would be purchase of reservation and development of wildlife habitat in other areas. This would be in addition to such areas as discussed in the section on alternatives. Further midigation in the developed area could be achieved by identification of critical habitat types in planning of the operations to avoid these habitat types.

A third problem we had with the Impact Report is that the fisheries resources in Big Sulfur Creek are not adequately discussed. The steelhead and resident trout in this stream are particularly important, in that their habitat and forest needs should be considered. The measures proposed for maintenance of water quality will help to maintain these resources; however, the problem of condensate spills and other spills of hazardous materials can result in substantial impact and this requires consideration. We believe that accidental discharges are likely because of the steep, unstable terrain of the area and that preventative measures and contingency plans should be developed and presented in the Impact Report.

In conclusion, we believe that installation of Units 12 and 14 and their supply fields, should not proceed until the adverse environmental impacts, as described in the Environmental Impact Report, have been resolved. We believe that studies on the effects of steam discharge, on erosion and on the necessary protective zone for the Cobb Mountain Peregrine Falcon nest

site should be made and these results should be included in the Final EIR. The Final EIR should also include other mitigation measures for adverse biological impacts. Furthermore, this Final EIR should include the master plan for field development showing the specific projects proposed in the areas other than those already present or in...as Units 12 and 14.

Michael Tolmasoff: I believe that when you refer to a master plan of all the development that will be in that leasehold, I have some doubts in my mind about that, if Union Oil or any of the other steam producers really know where all the power plants and all the wells are going to be, transmission lines. As Mr. Neilson pointed out in his EIR, that he felt that Unit 12 wasn't sufficiently placed because it was too close to a mountainside and hydrogen sulfide may affect it. I even heard other things that possibly the site may be changed to avoid problems, maybe coming closer to other steam fields so that steam could be shared in case the plant was down. So there is a lot of things still going on, I don't see how anyone could nail it down exactly as to where everything is going to go.

John Emig: Yes, but isn't that the purpose of writing the Environmental Impact Report for a leasehold. Shouldn't the project be planned and the Impact Report developed around the project, showing how the planning was done, so environmental needs can be considered.

Michael Tolmasoff: Well, I don't think you can plan where you can get enough sufficiency of steam. If one knew where that was, that means they would have to be ten wells along or whatever it is to come to that point. At this standpoint, maybe someone from Union Oil can answer that, I don't want to make this a discussion here and I think we should try and correct the EIR; but I want to make corrections that need to be made and not necessarily....to me that sounds like speculation.

John Emig: I would like to refer to page 11 of the Impact Report. There's a map which shows the wells scattered virtually all over the leasehold, producing wells. So it would seem to me, based on this area that is known to be productive, a plan could be developed.

Michael Tolmasoff: Well, I have marked on my figure 11, all the wells that were completed, yet, were idle and I only see about, maybe two dozen at the most and some of them are so scattered that I don't know if they would want a power plant in that area. Now, I'm just going from my own observation from my own reading. I may be incorrect, but.... Does the consultant have any comments on that?

Tom Cordill: Mr. Chairman. If I may respond instead of Dr. Neilson, since this involves principally a matter of procedure under CEQA, in terms of providing environmental data before a public decisions are made. Possibly I can simplify the question. Since I don't want to break my neck, can I come up to the podium?

Michael Tolmasoff: Go ahead.

Tom Cordill: The first adequate response to the concerns of an official game release concerns are also shared by others. It is the fact that no Environmental Impact Report cannot be legally required by public agency. Until that agency has before it a discretionary report of some sort on which to act. The Environmental Impact Report in that case is called a Project Report or Project EIR. It addresses all of the items specified in order, as to discovery of environmental consequences on the proposed action. It indicates on geothermal development, as in other cases where you have projects which have not been identified in terms of their location and type. We do a preliminary assessment of the area in which these projects will occur. This environmental assessment provides base data as to the consequences of man population in the areas designated in the EIR, on the map. What we do is term these capability areas or sensitivity areas. In the EIR prepared for the geothermal development, there is a classification system of ratings from one to five. The rating five is the most sensitive, in other words, almost anything you do has some consequence in that area.

Then after the Environmental Impact Report for large area is certified and a permit is issued for one particular project or development within that area as the first of the permits to be issued. From the application to the agency for subsequent development within the area...(inaudible)...covered by an EIR.

An addenda is prepared, which evaluates the specifics of the location and consequences of the particular actions that are applied for on that specific permit. In this way, we are meeting legally, we feel, requirements of CEQA. We are providing adequate information as to the environmental consequences of projects uphold by the agencies. And we are trying continuously to improve mitigations to reduce those adverse impacts. Now this appears to be both within the law and of common sense, an adequate way in which to meet the requirements of an environmental evaluation. The argument, which is a valid one is a basic question as to whether the area should be at all ~~utilized for geothermal development~~, isn't this a proper use.

The property in question in the KGRA is shown on the Zoning Maps of the County as being ~~classified as~~ geothermal development with a use permit.

Now, ..(inaudible) upon the County, and I'm assuming adopted by the Board of Supervisors, after adequate plans, can change these rules and regulations. But until that time when such changes are made the proper use of the property is pledged in terms of the issuance of individual permits by development and there sought by the applicant.

Michael Tolmasoff: I believe, Mr. Emig, that you had three questions. First of all, you were saying that the EIR did not cover other power plants that would be in the area of concern. Now, Tom Cordill and I have discussed before this particular

question and we have decided upon this procedure. I know we could get into this big hangup about base projects and stuff like that, but we have looked at it and its in one sense a phase project and in another sense its not a phase project. Its a gray area and we decided that its not a phase project as far as a series of power plants are concerned.

John Emig: By not a phase project, are you referring to development on a leasehold itself? Or is this a geothermal operation?

Michael Tolmasoff: The phase project as far as a CEQA is concerned, is saying that if there is going to be sequential steps to reaching a certain point then an overall EIR should be prepared for the entire sequential project. But we just don't view this as an entire sequential project, as far as one plant going after another. Because of the areas in there, you just can't do that.

John Emig: In this case, if you began though, with one well and it proved successful, then there would be others proposed in that area.

Michael Tolmasoff: But you were addressing yourself to other power plants. You were saying the other power complexes within here, and then we should address ourselves to all the other ones adding per item. I don't know how far you want to go, thirty years in advance. I don't think we can do that.

John Emig: That mistake was made because this is preported to be a Leasehold EIR and as such, it should discuss all potential projects in that area.

Michael Tolmasoff: I think that this thing is of general nature enough that it would include other power plants, although not sites specific as to the actual.....I mean, if you want to get down to it, this particular square meter is going to be impacted by some project. No, they haven't studied that particular square meter or hexameter, whatever they want to call it. But in general the EIR is...tries to address itself to that kind of operation.

John Emig: Is it proposed then, to provide Impact Reports on further power plants in their supply fields that may be developed on this leasehold?

Michael Tolmasoff: Okay, from this standpoint, lets say another power plant or.....we are going to get into an area where it seems that there is feasibility of a power plant; even as those wells are being drilled, we will be looking at the sites specifically. And if it does come up to a point where it looks like there might be a power plant, well then we can go ahead and we could look at the more specific area in question. But, nobody knows....unless, I mean, I just had a meeting with the steam producers Monday, and I asked them, "Do you know where the development is going to go from where it is now?". And they said, "Gees, we wish we had a crystall ball, cause we could

probably sell it and we could tell everyone where." I just don't think they have it.

John Emig: Yes, well.... I feel that these things should be considered, that the production complex that's going to be placed on one area should be considered before allowing new....development in that particular area, whether its exploration or what.

Michael Tolmasoff: The only question that I have in my mind, Mr. Emig, is the last question where you felt that there is not enough information on the fishery resources. I'm a little bit at lost as to what you mean, how detailed information do you want? Do you want fish count per hundred meters or whats adequate? I'm trying to figure that out.

John Emig: (Inaudible, not near the microphone).

Michael Tolmasoff: Well, if the Department of Fish and Game has information about specifically, what kind of fish count they had, maybe five, ten years ago, I'm sure that would be helpful to this Environmental Impact Report. Do you have that...such information as specific fish counts and things like that?

John Emig: Yes, we do.

Michael Tolmasoff: The consultant, I think; Mr. Neilson....

Dr. Neilson: (Inaudible, not near the microphone).

Tom Cordill: Mr. Chairman, can I ask Dr. Neilson to come up to the podium?

Michael Tolmasoff: Dr. Neilson, Please sign in.

Dr. Neilson: Okay. James Neilson, with EcoView. Because of the nature of the succession of EIR's we have attempted to bring forth that data which we felt appropriate as it appeared. The studies to which he referred, were requested at the time that those sections were written. They were finalized, I think, in November and these data were not released to us until the first of the year or well after the first of the year, those sections in the final type. I believe that these points raised by Mr. Emig on this particular question, are adequately dealt with up to that point in the specific report I would hope would be available to us, so that they could be included in the Final EIR.

Michael Tolmasoff: I think that we have covered the areas that Mr. Emig has discussed. I think that we should move on now and get some more oral comments. Who wants to be next? Is this meeting over with? Okay, Marilyn Coode will be next. Your name?

B. C. McCabe: My name is B. C. McCabe. I generally make an address extemporaneously but today on account of my remarks, I want to be accurately quoted. I am the President of Magma Power Company. Our company drilled the first commercial geothermal

well in the Geysers in December 1954.

As a result of this pioneering effort, the Magma-Thermal-Union Oil Project has been developed to its present state. Approximately \$130,000,000 has been spent on drilling and installation of power plants by PG&E since 1955. A goodly portion of this capital expenditure has flowed into the pockets of many segments of the local citizens. For the year 1975, Sonoma County will collect in total taxes from the Project and PG&E, approximately \$2,750,000. It is estimated the collection of taxes of the Project, and other geothermal related activities in the County, will be about 8% of the total of all the property taxes levied. I am sure all tax payers of the County (if they had the knowledge of same) would recognize what this development means to them financially. Conversion of this inaccessible and marginal back country into a tremendous wealth producing asset warrants enthusiastic support and cooperation by every thinking person of this County.

Development is now being impeded, hindered and delayed by various regulatory agencies costing great sums of money borne by the operators of the Project and the general public. The priceless element of the time seems to be value not understood. "Manana" is the motto of the day for definitive decisions, coupled with suggestions that further studies precede positive action. Frustration overcomes the constructive developer.

I have read the environmental report prepared by EcoView of the holdings of the Project at the Geysers. It cost \$50,000, of which we paid \$12,500. I am informed we are advised by some of the authorities of this County that it was expedient that this firm of environmentalists be employed for this job. The many doctors who were engaged in the preparation of this report convinces me that their practical knowledge is overshadowed by the theoretical.

The report contains many statements where the authors, by the thinking habits of their occupations, have exaggerated theoretical factors that are remotely associated with sound environmental appraisal. The report also suggests, which of course is the inherent business policy of environmental firms, that further studies be made, entailing additional expense and time.

Typical of these uncertain areas in the matter of air pollution by expulsion into the air of H_2S . I recognize the quality standards set by the Air Pollution Control Authority, but there are two divergent schools of thought, each sponsored by experts, as to this problem. From empirical evidence I favor the conclusion that H_2S , if not concentrated, is beneficial rather than detrimental to man, beasts, fish and plant life. It is known that one single large volcanic eruption will expell into the atmosphere more H_2S than mankind expells for quite a period of time. All H_2S expelled into the atmosphere is returned to the earth's surface by rainfall, which in turn supplies the land

with a priceless ingredient for plant growth. To be sure, certain sensitive people H₂S is malodorous, but it is my contention that at the Geysers, in the degree of air pollution that is prevalent there, it in no way constitutes a health hazard.

To the present excessive legal and accounting.....there now must be added another non-productive expense, occasioned by a new priesthood - the professional environmental firms. The more complex the report, the more expensive the coverage, the greater the bill.

I am aware of the statutory requirements that your Commission follow the letter of the law. The present legislation affords some flexibility as to its interpretations. We have found this to be the governing policies in other Commissions.

In the future, speaking for Magma Power Company, we will vigorously contest the necessity of preparing an Environmental Impact Report as comprehensive and as expensive as the one under present consideration. In any County in which we intend to operate for a specific Project we will submit an environmental report complying with the requirements of existing law. If there are valid rejections to this report as submitted it can be amended or enlarged.

From experience we know that in many places in the United States we are rewarded by active cooperation on the part of the regula-

tory agencies in recognition of our constructive endeavors. For the good of the unemployed labor, reduction of the welfare rolls, and for developing a new source energy, it is a responsibility within the scope of your Commission, to get this show on the road. The voices of the "doers" should attract your ears rather than the critical and vocal segment of our society that "spin not neither do they weave".

I just listened to the testimony of the Fish and Game representative. I infer, sometimes, that certain amount of recommendation in a area like the Geysers, be converted back to a wilderness, so it would be provided of fish and game reserve.

Tom Cordill: Mr. Chairman, I wonder if we can ask Mr. McCabe for a copy of his comments.

Michael Tolmasoff: Mr. McCabe, you'll send us a copy of that. If I may go back over...I believe you were commenting in general about the consultants being general. If we could have more specific comments on various sections of the EIR, I think that we could improve this document to everyone's satisfaction, rather than trying to say that, well, they are being to general or theoretical or whatever. I really would like to get more down to specifics. If one does want to make a general statement, I would like to request that they make it brief. I know that its been a long time in the preparation of this EIR and I'm sure that

that in the interest that has been expressed here, we do want to move this thing along as quickly as practical. So I believe lets move on to our next oral commentor, Miss Marilyn Goode. Or shall I say Ms? Marilyn.

Marilyn Goode: Marilyn. I'm speaking for the Sierra Club Geothermal Task Force today. And I want to make one general comment. I had hoped, I felt a comment on just the whole procedure before the Northern Air Pollution Control Board and I certainly have felt that a hearing that's as important as this, when PG&E does come up to variance to other body, the Commission. What do you call it? The five gentlemen who are appointed by the two Board of Supervisors; it seems to bad that they are not here to hear the discussion and to be in on the ground floor of some decisions that later on when PG&E comes to ask for variances that they have not heard this. And I think it really should be essential that those who are making those...that it would be better for you to make the decision on the variance then to have the five member board that only appears for variance procedures. It seems that they are not really, unless they do an awful lot of homework and read all these EIR's in detail and listen to tapes, that they are going to be missing a lot of the discussion that is important.

Michael Tolmasoff: I wish there was something more compelling in my rules and regulations which would have them do that. But unfortunately, its not written that way.

Marilyn Goode: But, you are redoing those rules and regulations. Is that not the case?

Michael Tolmasoff: We are making some alterations, yes.

Marilyn Goode: Then such an alteration could be done perhaps?

Michael Tolmasoff: If it were, it would have to be some time in the future.

Marilyn Goode: Nothing against you, Mr. Tolmasoff, but I do feel that sometimes the others should be there. I have some specific things, I'm not going to go into all of them, but I will start in detail. On page 11 - I guess that's a map of the wells.

Michael Tolmasoff: Distribution of existing wells as of January 1975.

Marilyn Goode: It would be very helpful, I think, for us who are trying to know where, to have the numbers of the wells, the names of the wells, DX such and such, to have those on the wells and also to have a land sensitivity...have against the land sensitivity area, particularly the geological areas, so you would know if they, indeed, are near faults or landslides; this could be more specific.

Michael Tolmasoff: Are you talking about this one specific map

or are you talking about most of the maps in general?

Marilyn Goode: Well, I'm talking particularly about this one because it shows where the wells are and I would like to haveknow where the wells are when I look at the map and then be able to figure out where the slides are and where the highly sensitive areas are.

On page 13 - I had a question in which...just which areas of the Union Oil Leasehold do support one well per six acres?

And what would be the consequences of such dense development in terms of land sensitivity?

Michael Tolmasoff: This is the third paragraph?

Marilyn Goode: Yes, right. I think...I guess I would like further discussion. Dr. Neilson talks about the one well per six acres and the clustering of wells and I wondered what this would do if map that sort of thing all over the 8,000 acre Leasehold, what you'd come up with in terms of....particularly I find that you are drilling wells 20 acres apart and eventually you may be filling in much more densely. And I think that this kind of overall map should be seen so you have an idea of what's going to happen to the terrain if the maximum development took place. And I find that that map should be clearly planned out, so you have an idea of what would happen in the future.

Michael Tolmasoff: I guess really, maybe, there are two questions. First of all, how I guess Dr. Neilson is referring to well density of six per acre, doesn't mean there's going to be six...I'm sorry, one well per six acres doesn't mean there is going to be a corresponding number of wells throughout the geothermal area. I'm assuming that it doesn't mean that.

Dr. Neilson: This refers to the target area...(inaudible, not near the microphone).

Michael Tolmasoff: So this is a maximum density.

Tom Cordill: Mr. Chairman, on the comment. I'm Tom Cordill.

Dr. Neilson is the density you talk about, element density including replacemtn filling wells?

Dr. Neilson: Inaudible.

Michael Tolmasoff: Mr. Suter would you like to answer that question?

Vane Suter: I think that if we try to answer these questions one at a time, we are going to be here all day. I'm not prepared to listen to comments and than provide the answers at the end. We have in our written comments addressed ourselves to this particular question of drilling one well per six acres, our final statement includes the makeup wells...(inaudible, not near the

microphone).

Michael Tolmasoff: When in the context that Marilyn Goode had asked the question, she wanted to know what kind of impact this would have on the entire development?

Vane Suter: I would be happy to listen to her comments and answer them, but I...

Michael Tolmasoff: Alright, we will so note the comment that Marilyn Goode has made and then I guess we will all have to try and answer the question or the consultant.

Marilyn Goode: I have a lot of questions and some of these questions I would hope that Mr. Neilson wants to sit up where he can answer along the line or maybe these could be answered along the Final Draft EIR. Its certainly reassuring, though, that if the answers aren't too long, to have them answered here at the hearing because at times, I know, in the past I've had questions and they have never gotten into Final EIR's. You never really know what...you never get the questions answered. But I'll go on.

On page 15 - the grading permits are required and the proposal is reviewed by the County Engineer. This I think...anybody looking at this would assume than that there is no problems and that grading permits are issued. My feeling is that these

permits are issued on ministerial or is that correct, Tom?
Or are they discretionary?

Michael Tolmasoff: I think that she was addressing you Tom.
Yes, Tom, why don't you answer that question.

Tom Cordill: Grading permits are ministerial, Mr. Chairman.

Marilyn Goode: And I suppose as a midigation, we...Sierra Club would like to see that this permit procedure be a discretionary one, which would acquire a county-wide ordinance on grading. We feel this is really one of the most essential midigations that could be made in the Geyser geothermal fields, that the problems that...here in the EIR when the roads and sumps are already in, it seems to be absolutely in opposition to CEQA's standards that the point of having EIR's is to try to get the damage reports done.

Michael Tolmasoff: Okay, for the completeness of the EIR then, you are suggesting that one of the midigation elements should be inacting some sort of grading ordinance.

Marilyn Goode: Right. On page 15 - the bottom of the page, it talks about Class II-1 sumps on the leasehold. I see nowhere in the EIR, where it tells where this sump is and if it is there now, nor any discussion about it.

Michael Tolmasoff: Okay, I guess the consultant will have to try and locate that, if it is on the leasehold, I'm not sure.

Marilyn Goode: There is also no discussion about the proposed sulfur disposal site, though it seems in my memory it...

Michael Tolmasoff: This is on page 15?

Marilyn Goode: This is on page 15 where there is a brief..... it says briefly that there is going to...that there is a Class II sump. Instead of having to truck it down to Benicia, that there will be a site somewhere up at the Geysers for Class II disposal site. So I think we would like to know where that is and if its been approved and a little more detail about it.

Tom Cordill: Mr. Chairman, maybe we can save time. May I respond to the last two questions?

Michael Tolmasoff: Alright, go ahead Tom.

Tom Cordill: The sump referred to in the EIR is the sump on the drill pad and every drill pad requires such a sump to be located and constructed according to our quality control discharge standards. There is no Class II dump operated for general area anywhere located in the Geysers at the present time.

Marilyn Goode: It seems to me that I have heard that there is one planned for the area and I want....

Tom Cordill: Mr. Chairman, one hears many things, but what we are addressing is the content of the EIR, its accuracy, its substance and its comprehensiveness.

Marilyn Goode: I guess what I'm saying is that there should be more discussion on waste disposal, so we would know...if its going to be...because there are plenty of times when there is a need to truck this out and if they are not taking this to Benicia, where are they taking it? So, I think I like to feel that that would be covered. There was also the real problem of solid waste disposal...was not discussed in this EIR. There was a very brief discussion on page 250, on what's happening up by the Socrates Mine. There was a picture of the garbage there, but there's no discussion about where Union Oil has a collection of junk and stuff below its main offices. And also the Geyser Resort put its solid waste down on the south side of Big Sulfur Creek. I certainly think that there should be some discussion of what's to do with solid waste up at the Geyser area.

Michael Tolmasoff: I would presume that as the development does get larger, you might suspect there would be a larger generation of solid waste and that somehow that might have to be taken care of. I don't know if that can be taken care of with present

methods now or maybe something special will have to be implemented...I don't know.

Marilyn Goode: Well, it seems to me that there should be something in the EIR about where this is going to take place, because what's....its one of the things that has been ignored up there.

Michael Tolmasoff: Okay, we will note that then.

Marilyn Goode: On page 22 - why are mufflers only installed in some cases?

Michael Tolmasoff: What section, I mean, page 22 what part?

Marilyn Goode: I don't know. Somewhere on that page. I'm sorry I didn't put the...

Michael Tolmasoff: Well, go ahead.

Marilyn Goode: So, I suppose our comment is that we would like to see mufflers on all cases of the midigation and not on some cases.

Michael Tolmasoff: Oh, I see, this is on page 22, under "D", WELL CLEAN-OUT AND TESTING. It says, "When a steam reservoir or bearing fractures and penetrates" etc., it says, "Mufflers are installed in some cases". Maybe we can clarify that.....

maybe by the consultant. Okay.

Marilyn Goode: On page 24 - under TRANSMISSION SYSTEMS, the EIR should mention that EIR's are not required for 115 kilovolt lines, since they are then additions and not new lines. Thus, PG&E starts with a 115 kilovolt lines and then adds the 230 kilovolts lines and no EIR is ever required. The EIR falls between the cracks in this particular area and since...without the transmission lines it seems to me there should be some... some way to get into the planning of where new transmission lines are going to go. And its really not something that Sonoma County is required to do with, its something PUC has charge of. And in their rules there is this place where it falls between the lines or cracks, whatever you want to call it. So we would just like to point that out and maybe have that included in this overall EIR. I don't want to drag this out too long, I'll skip some of these things and it can just be...

Michael Tolmasoff: Well, if you think its an assialant point that you should bring up, I think that you should clear the boards and say it.

Marilyn Goode: --Alright,-- Page 25 on FIELD LIFE, it seems to me that it would be just as well to say that field life is unknown, which it appears to be.

On page 27 - I thought the composite sensitivity map is really

very difficult to read and we really couldn't understand what was happening, were it very well... I know it's expensive to get some kind of overlapping transparency, but somehow that should be a clear document, because it's really the most important, practically the most important map that you have to look at that says wherefore these activities should and should not go on.

Michael Tolmasoff: Marilyn, in this regard, I think if one takes the time, as I did, that you could outline where all the various section lines are and you could really locate these things.

Marilyn Goode: Yah, I could see that you could color it yourself but I wondered where places here, where a whole lot of sensitivities get thrown into one lump. And its confusing and not very clear and whether you can do that for a \$100,000 to do it in a EIR, instead of \$50,000, I don't know. Its unclear.

Michael Tolmasoff: Maybe a \$100,000 EIR might take thirty-four (34) months instead of seventeen (17).

Marilyn Goode: I appreciate that. On page 32 - there's talks about various pads that have problems...

Michael Tolmasoff: What page again?

Marilyn Goode: On page 32. And on map 43, I'm sorry, map on page 34, shows a list of pads planned for development that have various problems attached to them. And I guess what we wondered...what was what with the existing entities could take action to prevent these from being...if the Division of Oil and Gas, which apparently is not doing its job, doesn't do its job, I wonder if there is any other that can force them to do it.

Michael Tolmasoff: Marilyn, I'm trying to look at this as to the completeness of an Environmental Impact Report.

Marilyn Goode: Well, alright, I guess what I really was wondering is how to midigate that or how to...I guess I'm being vague, lets go on. It seems to us on page 35 the noise, the need for midigation of noise in Big Sulfur Creek, we are concerned that if development goes the way it has on Squaw Creek, with all the mufflers and things going in the direction of the creek, pointing into the canyon that there is a very strong buildup of noise and that somehow there really should be some discussion of how to midigate that, if there is a some buildup on Squaw Creek or Big Sulfur Creek.

Michael Tolmasoff: Alright, then we should address ourselves to the midigation section of discussing the possible way of reducing noise levels from drilling operations, etc. Okay, lets go on then.

Marilyn Goode: On page 75 - under ADVERSE ENVIRONMENTAL EFFECTS, WHICH CANNOT BE AVOIDED, I'd like you to add another letter, add another "H" and "I". And then add VISUAL and ODORAL to that list of EFFECTS, WHICH CANNOT BE AVOIDED.

Michael Tolmasoff: I think the ODORAL, isn't that mentioned in the AIR QUALITY. Maybe we should, under that section, add a section "I" about audio sounds. Okay, go on.

Marilyn Goode: On page 82 - under JUSTIFICATION, we will.... there is a quote that says, "Limited appreciation of the... in effects of environmental consequences, precipitated by the projects development". And we would like to add our examples of this, which would be improper siting, which compensates for all control noise, with few emissions.

Michael Tolmasoff: And its under JUSTIFICATION?

Marilyn Goode: Right. And under number three, in which there is...(inaudible)...around it. And there's three..... On page..

Michael Tolmasoff: I think I'm going to have to take a little time to study that, but I think we can do that later.

Marilyn Goode: Alright. On page one two, in the relationships between local short term uses of man's environment...

Michael Tolmasoff: What page was that again?

Marilyn Goode: Page 112 - and then there is Roman Numerial IX.

"Relation between local short term uses of man's environment and the maintenance enhanced in well term productivity", it needs some more base line data. Particularly, biological bodies andanyway, what we would really like more aerial concentrates, aerial photos taken on a yearly basis of the Geyser area for monitoring purposes, that we feel that there is a real need for some kind of a continual surveillance of what's going on in the way of ... if they know what project that we want to place and roads are going in where they shouldn't, and this kind in the short term activity up there with geothermal, to try to protect the long term.....

Michael Tolmasoff: Well, if I remember right, somewhere in this report, they had mentioned that there is a lot of other things besides plants and animals and so on and so forth, that should be... that we should obtain base line data on. So I do think, that has really more or less been covered. I couldn't find out the exact page for you, but I have read it.

Marilyn Goode: Well, I can see that the animals and things... but I guess that this would be more of a topography, you know, looking at large, you could see what's happening with landslides and things. It would be an aerial, broad area thing rather than

specific,...(tape change)... or another house on your land.
There is some kind of surveillance that goes on, I think...

Michael Tolmasoff: Is the mic alright?

Marilyn Goode: Yes, I think so. Alright. I think that there is some sorts of surveillances that go on now and it seems to me it would be one of...a quick way to get an overall view of, not geothermal, but other lands uses, like timber resources and things. To have a monitoring that could be done from the air.

Michael Tolmasoff: So you are suggesting this as a midigation type of thing to have aerial monitoring to make sure that whoever is involved is doing everything legally.

Marilyn Goode: Right. You know, instead of having Mr. Harris run up...it takes him..

Michael Tolmasoff: This is would be an additional check to what most agencies already do, right?

Marilyn Goode: Right. Well, originally the Board of Supervisors, you know, had specified wanting some kind of monitoring done by the County itself, by the Planning Department specifically. And this has never really gotten off the ground. For just a short time someone from Jim Neilson's office was doing it when they

were up there, but there's still no sort of broad, you know, someone looking for a specific thing, a more generalized, which would fall in under planning of land use monitoring.

Michael Tolmasoff: Well this seems....I think this seems like a worthy idea of mentioning in the mitigations. I don't know if its already been mentioned.

Audience: (Inaudible, not next to microphone).

Michael Tolmasoff: Okay,--lets continue.

Marilyn Goode: Alright. Under ALTERNATIVES TO PROPOSED ACTION, we were really pleased to see that the Little Geyser area and the very unique part of Big Sulfur Creek going from the old resort up to near the Little Geyser area, they've set aside as a...as some sort of a ecological preserve and....

Michael Tolmasoff: You mean the bird sanctuary or other areas?

Marilyn Goode: No, we're talking about the creek itself. Big Sulfur Creek has a very unique waterfall in there and there's water eagles and its a lovely spot. And I think the whole feeling of setting that spot...area aside is important. In fact, I went before the Parks and Recreation, at this time last year, talking to them mainly about historical preservation for the Old Geyser Resort area. With the remaining fumerols that are

still going there and for the Little Geyser area as being set aside as unique natural areas... something that the County should support. And they did go on record as being interested and giving support and haven't done anything since. But I do feel that this is something that is very good in the EIR. On the other hand, we didn't feel this fell completely under ALTERNATIVES TO PROPOSED ACTION and that....I think this is covered in other EIR's and this is where it gets confusing. But we did want to list a number of things we felt that were a real alternative to proposed action. One would be continuing development in the present technology with good mitigation and enforcement measures. Two, I have these written down, maybe I should just give them or do you want me to read them.

Michael Tolmasoff: I think it would best if we could get these in written form, so the consultant can go over them, point by point and we can address ourselves to it, whether its going to cover it or not cover it, so on and so forth.

Marilyn Goode: Well, that's what you know, it gets confusing when you're dealing with four or five other EIR's previous to this one. I'll say one thing was left out and one thing was added on, but we do want to support this proposal first, setting aside those three areas....listed under that category.

Under FAUNA - it appears that the no good population density studies done on FAUNA, has been two years since (this is on

page 217), it appears...it has been two years since the proposal has been brought up. It appears we really need some data on population of aquatic insects in relation to streams in the leasehold. And to be able to understand the effects of siltation and condensate spills on wildlife connected to riparian food chains. So, I think we would like to see more detail...with comments that they're having done. I don't mean that they all have to be completely incorporated into the EIR, but a feeling that there is indeed been a study of aquatic life in the creek because that gives you an indication of how healthy the creeks are...

Michael Tolmasoff: You mean aquatic life other than fish?

Marilyn Goode: Right, you know that fish are eating on something.

Michael Tolmasoff: I think they mentioned something about Red-bellied Noots in here.

Marilyn Goode: Well, I don't mean Red-bellied....I mean much smaller things, like how many moths and flies, you know, things that are small that fish live on and that were the basics of a food chain and that...long before the fish may die, these things may be...killed off in....you know, you need to know the creek is in good shape so when the leasehold...the new development along these creeks...that you need to have an idea of how they were before the development takes place.

Michael Tolmasoff: Then, lets make sure that I get this right that this general section here, that FAUNA is under, is under the general category of the present condition of the leasehold area. And you are saying that they have not addressed themselves to some sort of function or a, not function but some area that has not been covered which you believe is insects as related to the food for the fish chain or fish.

Marilyn Goode: Yah, fish, right. Really, an aquatic study aquatic fauna, is the smaller things that are in the streams. Maybe there has been one, I...

Michael Tolmasoff: Well, at this point I'm just wondering how far someone could consider fauna, I mean, I don't want to run around counting ant hills. You know if that's going to...

Marilyn Goode: That's part of the food chain and there's, you know, the raccoon lives on the fish and the fish live on something, you get down to tiny little things and if you don't know what's happening with the tiny little things, it might take you a while to know something to do with the fish and what you have to do to go after the tiny little things that all this is based on, like the plankton in the sea and the whale that lives on it.

Michael Tolmasoff: Well, sometimes, Marilyn, not to beat this point to death, but I think in scientific communities sometimes you can look at one population as it is and you could extrapolate backwards to get an estimate of what kind of other elements exist

in the foods or not. I don't know, maybe I'm talking over my head. That's why I don't think its necessary that one actually have to do an ant hill count or something like that.

Marilyn Goode: Well, I think you just should have an idea of what's going on there before development takes place. Because the only way you're going to be able to measure what indeed has happened to the various populations of animals in the areas, if you don't do that.

Michael Tolmasoff: What if we are to look at this particular point you brought up, would the survey have to be over the entire leasehold?

Marilyn Goode: No, I think you do spot checks on certain areas.

Michael Tolmasoff: -I mean, if this were done, would you come back and say, "Well, you didn't pick the right spot".

Marilyn Goode: No, I don't think I would. I would just be saying that we should try to get as much base line data on an area before you allow development so you have an idea. Like we never really took a good test of what was happening in the way of hydrogen sulfide emissions from a natural fumerols before things were developed, so now its hard to figure out, but we've sort of made some figures, but it would have been much nicer if twenty years, if we had the equipment, we would have measured

how much natural emissions there were, and you would know exactly how much that was so then, now you'll know much total emissions is from man made activity. And this the kind of thing ...and I'm not trying to, you know, I don't want to knit-pick and I don't want to say you need to cover all nine thousand acres doing a transit study on it all. But you need to have some idea of what's there in various,....

Michael Tolmasoff: Well, if I'm going to consider this... there must be...I understand the species of insects are way more than there's ever even fauna. I just don't know where to go. I mean, we could spend years looking at that.

Marilyn Goode: I'm just asking if any of these studies have been done. I think Mr. Neilson is saying, "Yes, they have been..." (inaudible, tape fades out).

Dr. Neilson: (Inaudible)...very mild studies on the fishery projects that they have found...that they cover part of this, but it has not been published for public release as yet according to Joel, and I hope that that report will be available as (inaudible).

Michael Tolmasoff: Maybe I should talk to Joel about...I mean, I don't want to get hung up on something like this, but I do want to at least be fair and at least we have covered this. I'm really kind of....

Tom Cordill: Mr. Chairman, may I request that in order to get the discussion on the tape that everyone speak into a microphone, particularly Dr. Neilson, who's voice is soft and is impossible to pick up where he is now.

Michael Tolmasoff: Okay, if there are any further comments in response to a question or so on and so forth. Maybe we can move a speaker closer to the other end here. I think we have a portable one here Tom..

Dr. Neilson: In response to this last series of remarks, I think, you heard the ~~Mr. McCabe~~ say what was paid for this EIR, we didn't cover the expenses that we had incurred in any event, to produce what we ~~did~~. The problem as we have outlined it is simply, you have to draw some line somewhere on what you observe and in this instance we attempt to use those indicators, species or phenomenon that are easily apparent.

Michael Tolmasoff: In other words, a representative type of species.

Dr. Neilson: A representative type of thing; however, we attempt to pay particular attention to those known rare and endangered species that are of concern to the general public and evaluate those conditions and habitats of which those are found. One of the questions along that line was proposed by the Department of Fish and Game to identify the nest trees and

dens and snag areas and so on that are important to wildlife. In general, we have done this and those things that are most important, we have already identified. But to examine every tree and every small patch of grass on nine thousand acres within the seventeen (17) months that was involved in this study is virtually impossible and not of any real value...

Michael Tolmasoff: Is this, I mean, outside of your own consulting firm. Is this common practice to include studies of nature that Marilyn Goode answered or...asked?

Dr. Neilson: Unless they are specifically contracted for, no. As a general rule, at the outset of any directive to discuss most EIR's, yes, there is an area in which there is...it is known beforehand data, than it must be generated. But to generate this kind of thing and particularly of the sort that she was referring to, takes several years to do a decent job. Basically, we have recommended this kind of thing or suggested it, I should say, in the monitoring problem that we have already indicated that is vital to this area, assuming that there are no significant changes in the way in which the power transformation is occurred.

Michael Tolmasoff: Okay Jim, I think that we have the scope of the question in better perspective. Okay, lets continue.

Marilyn Goode: I have a question. Is the monitoring going on, now?

Dr. Neilson: Monitoring is undertaken by a variety of entities, multiply on a spot, basis or...and we have outlined what some of these things are. There are several data stations...maintained by PG&E for various purposes, but the scope and density of these monitoring stations, we are alerted to as not being adequate to generate the information that may be necessary. Again, this is a long term project and upon which requires a great deal of money. And I understand that PG&E has now going forward with their air quality monitoring program that they have Maybe their representative would like to comment.

Michael Tolmasoff: Jim, just a real quick question. I know that it was pretty well covered about bird counts and varieties found and so forth. Could one observe a decline in the bird count, if the number of insects for some reason the population of insects was decreased, so that you could indirectly you could tell how lower insects count would affect other species?

Dr. Neilson: Probably not. Birds are highly mobil and they simply move to greener pastures essentially. And they may decline in an area but to be able to state that they...the birds themselves has declined is something that requires a very broad study over many areas, to see what areas have an increase and which have decreases and even then its extremely difficult to ascertain specifically why these things happen.

Michael Tolmasoff: If there is a fish count decrease would that

be a way of indicating that the food chain has decreased or maybe there is some other impact or would it be able to decipher about the insect type density of population?

Dr. Neilson: It depends a great deal on the species on which you are referring to. And those that migrate...there are many many areas...problems that arise throughout their life history.

Michael Tolmasoff: But could you tell from data that you have obtained on fish, that would hopefully be in here.

Dr. Neilson: No.

Marilyn Goode: Mainly, I think you could tell the general health of the stream, by just taking random samplings of...if you know what was there before it was touched, then if suddenly you take another check and you find you're missing a whole lot of...variety of organs that you might then have got something there is a problem in that stream.

Dr. Neilson: This would be try, but perhaps John would to estimate the cost of what your monitoring system... I have no idea of what the cost, the monitoring program costs. I would like to point out that this would probably be very useful in assessing these...(inaudible). You inferred that the fish population could determine the status of other of the insect

perhaps by the fish population. I'd like to point out that the fish population could increase or decrease because of other factors and the availability of...(inaudible). So for instance, low level pollutants or sedimentation could adversely effect the population. So that I would support the need for some studies on population in the streams.

Marilyn Goode: Basically, its like the canary in the mine that there are certain organisms who may be more effected more quickly by excessive sentimentation, so you have some readings before you wipe out the whole fish population you would know you have some problems. I think that we have labored it long enough. Lets go on.

Michael Tolmasoff: Okay, lets go on.

Marilyn Goode: Another map that I would like to see, would be a map of all the wells that have, well, maybe not a map, but maybe a list of wells that have had some casing failure or some malfunction that is producing more hydrogen sulfide into the atmosphere, more emissions....that should normally be if the wells were functioning properly. And I wrote that to the Division of Oil and Gas and they couldn't give us and I wondered if there was something that we could get ahold of? If Mr. Neilson would comment on that?

Michael Tolmasoff: Well, I think that we should make sure exactly what the question is.

Marilyn Goode: The question is, a list of all the wells that are having problems up there or have had problems and also the dates on them, so that you know that if they are before 1968 or whenever the upgrade of the standards, that if you are having problems up there.

Michael Tolmasoff: What kind of problems are you talking about, casing failure or exactly what?

Marilyn Goode: Casing failures. some kind of mechanical failures within the wells, like Rorabaugh 5 has a problem. Say, you begin to get an idea of what the problems are and how many there are right now on the Union Oil Leasehold.

Michael Tolmasoff: I think that might be a little bit difficult because I know that there are mechanical problems going up there all the time.

Marilyn Goode: I'm talking about major ones. I'm talking about ones that are prolonged problems, problems that have been there maybe, six months. Things that are...you know, not being corrected, so you begin to get an idea of what needs to be corrected and whether...problems in the field.

Michael Tolmasoff: I'm just trying to see in my mind exactly what the answer should be...if...if it should be answered. I think a prolonged problem, I think that that's very ambiguous.

Marilyn Goode: Well, I think when you have an idea of how, you know, how much further you want to go. There are lots and lots of failures going on right now, then you'd say maybe the technology isn't here, its one of the midigation alternatives to the project and you wouldn't go on. But this is something, it seems to me, very unclear to us as to how many wells are really now functioning for a fair length of time. If is something that I felt that should have been included somewhere..

Michael Tolmasoff: Okay, we'll consider this. Go on. I think that we could probably figure this one out. Lets go on to the next problem.

Marilyn Goode: Okay. On page 171 - under AIR QUALITY, I wonder if in any....I know that PG&E has replied on this thing, that's there no real significant....there no proof that there's plants suffering stress from excess humity and I wondered if there is any of the effects....could be compared to what's going on in

~~the San Gabriel Mountains in the LA basin, which is primarily~~
I think conifers dying from smog problems. But if there is any correlation to what may be happening up the Geysers....there appears to be an argument of whether there is proof or no proof on the vegetation. Is there any correlation to that at all?

Michael Tolmasoff: Well, Marilyn, first of all, if you are talking about H₂S effects on vegetation. I read through this section myself and it appears that it quite general in nature. I don't know what you're commenting on, are you commenting on the speculation....

Marilyn Goode: I'm mainly commenting I guess on PG&E's comment that there is no proof that there is any problem, which I suppose is outside of the realm of this discussion today. Alright. I'm going to leave you with this because I think I've run it into the ground. Basically, we'd like to support the EIR as being good and generally, we have not, we feel that some of the organizational factors can be improved upon but we know that there were lots of people doing different parts of it and its hard to kind of correlate this, but there is some very good things in this EIR.

Michael Tolmasoff: Thank you, Marilyn. I would like to reiterate that the purpose of this meeting is to hear remarks about the adequacies about...of this Draft Environmental Impact Analysis and that we should continue in that same spirit in trying to correct any deficiencies that one has found.

Tony Cerar: Tony Cerar is my name and I happen to be one of the residents up there. The inadequacy of this EIR is that there is nothing about noise or noise control up there. And its the hell on earth that we are getting there. These people have absolutely

no respect for us from the very beginning. from Mr. McCabe on, about noise control. Especially around plant 3 and 4, 5 and 6 and so forth.

Michael Tolmasoff: Are you talking only about the drilling or..

Tony Cerar: I'm talking about the noise from the wells or from the plants, like when the plant 3 and 4 go down, they have inadequate mufflers...never did have and we have moaned for years or cried about this and their engineer put their mufflers over closer, pointing right over at Mrs. Dewey's place, instead of putting something further away. And now they have two new mufflers sitting on the ground up there that've been sending up for two full months without even being set up or anything like that and we were...every two or three weeks these plants go down and we've got hell on earth up there....in the vicinity of 80 to 90 decibels across the canyon, about three thousand feet away as to where we live and all that. There is a whole lot of things that could have been done about noise control, even in blowing the well straight in the air. If they are capable of building a derrick that they can erect up in the air 80 or 90 or 120 feet or better they could have built a vertical muffler to do the same thing.

Michael Tolmasoff: Okay, you are suggesting that....

Tony Cerar: I know what I'm talking about, I've worked around this. Before any of these people here had anything to do with geothermal drilling.

Michael Tolmasoff: I would like to say again that this meeting is...really we want to address to this Environmental Impact Report and talk objectively and to enter comments. If one feels the midigation segment of this Environmental Impact Statement is incomplete in that more should be done about the sound, so on and so forth, I believe that we should address ourselves to that and so on and so forth.

Faye Dewey: This is Faye Dewey, 12500 Geyser Road.

Michael Tolmasoff: Did you sign in Mrs. Dewey?

Faye Dewey: Yes. It seems like that's all we have is...they think its a big joke, that's it's a laughing matter with noise. There's nothing in that impact report about noise. And that is our biggest problem. Goodness sakes! We never know...they have nine units up there, ten units and out of those ten units there are always at all times, one to maybe, three or four units down for repairs. So on three and four pipeline, I have asked for five years to get some mufflers on there that aren't worn out. No, nothing has ever been done. I've talked to Dr. (inaudible) and he said that it would be taken of and it hasn't been. We never know when the units are going to blow off. If they keep

those blasted things running two weeks we're darn lucky. And then all that...a couple of nights ago, they tripped off at three o'clock in the morning, it was like an earthquake there. And all that power is going to those worn out mufflers and everything shivers and shakes, its just like an earthquake. And we listen to that for hours. Then, if the unit doesn't get going again...and when they get ready to start up, rolling again, we blow all over the...maybe six or eight or ten wells. All that dirt is going out into the atmosphere and here we are getting all that dust and sneezing your head off and so forth. They have taken.....over in my front yard. When they are blowing those wells there have been anywhere from 80 to 90 db and I'll tell you, you listen to that for anywhere from six to ten hours, you're ready to climb up the walls. And I've asked these people, I've pleaded with them. If they had mufflers on them that aren't all worn out, then I'm told that it's hard to get anything now. Well, why is it? It wasn't five years ago. But we never do. -The only relief we get...

Michael Tolmasoff: Mrs. Dewey, excuse me a minute. This is a hearing on an Environmental Impact Report and whether it is adequate or inadequate and this is not a sounding board for problems I have no control of up there.

Faye Dewey: That's what I'm saying, it isn't adequate. We've got to get something for noise. Heavens! When they blow those wells and blow them and blow them every day and then they have

...of course, we have that beautiful rotten egg smell too. That's all I have to say, but I don't think that anything should be excepted unless we get something done about noise. And I thank you.

Michael Tolmasoff: Thank you Mrs. Dewey.

Maria Monser: My name is Maria Monser and I live at the levee, 700 Geysers Road. Mr. Tolmasoff, I have here, I unfortunately didn't bring the completed work of this, but I have kept a diary concerning the breakdowns when units were being repaired, when it was quiet, when it was peaceful and when it was noisy. Now, this idea of the ERI seems to be very clear but it is completely inadequate in certain respects because it doesn't really go into any kind of sound continuing devices, mufflers and whatever. And it's very easy in a scientific and very detached manner to sight things about this thing. But, I think Mrs. Dewey and I, shouldn't...will be excused for our volatile comments because we live there, this is our home. We have seen the whole thing developed the way it has. And another comment that I would like to make about the wildlife, the birds and all the animals there, I'm kind of a nature buff, and I spend an enormous time watching birds, making (inaudible)...and I'm very close to those birds and I think that there could have and should have been a great deal more comment about these things. Now, I'll give you one small example, there were formally were droves and herds of wild pig in the canyon. I haven't even seen one wild pig in the last

three years. So, I think, a little more careful and if I could be of any help in any way of doing this, I certainly would because I have lots of time because of...I'm trying to write and it's very difficult to do with that kind of noise. so I would to be glad to help since I know that canyon like I know the palm of my hand. Any assistance that I can offer at any time on these things that I really know something about...(inaudible). If you would like to have a copy of this....run down on when the plants are rolling or not. I'm sure this is open for discussion with PG&E and they can have a copy if they like and discuss if this is properly and objectively done.

Michael Tolmasoff: Well, I think its a fair question that we should....I know that Dr. Neilson has mentioned before that there is noise...I'm just looking through the index here and I didn't find anything specifically addressed to noise. Did you include a discussion of down time on the power plants and the muffling of the steam when the power plants trip off?

Dr. Neilson: I believe, if I'm not mistaken and I could be because we've done so many of these in parts and pieces, that ...right off hand, but I believe that was discussed in part....

not specifically down time but when the unit is down there is so much venting and this leads to noise. On a couple of occasions we have gotten...found readings on this but they are spot checks. They are definitely high depending on the position you are and the distance you are from the unit. But these records

are...we simply did not ask PG&E for their down time. Perhaps they'd be kind enough to supply it to us now, since the question has been raised. We have dealt with this problem in general terms and not specific ones because down time covers a whole series of things and some of them are scheduled down times, others are for particular problems that are solved over a short period of time and so on. And there are also problems with the operation of the field involved in it. We have discussed those areas in which muffling devices have been investigated by Union Oil. We have reported on these, but what has been done about it on the field-wide basis or what is contemplated would have to be answered by Union Oil Company.

Michael Tolmasoff: I think its fair that at least we consider the question of how much down time there has been and possible impacts of noise and to mention it in the Environmental Impact Report because it is something that does exist up there and as the system expands it will possibly increase the general noise level up there. I think that we have to go back and specifically review the other EIR's that would, I believe, were referred to, although I don't find anything on page 250, which is referred to as WET LAND CONCENTRATION. Two-fifty what? I believe in view of the strongest of the questions up here, maybe, we could expand that slightly to include some of these. However, we should take that into consideration.

Maria Monser: Mr. Tolmasoff, I would like to ask another question, since we have this body of such learned gentlemen here.

Michael Tolmasoff: If it addresses to the EIR, whether it is the inadequacy of it, sure.

Maria Monser: Yah, yah. I wonder why it considered, I don't know recall what page that was on or the thing about it, what the noise level. I think that was decided on, perhaps Mr. Cordill could assist us in this. Do you recall, Mr. Cordill, what the db was supposed to be the last time I think we had some discussion about this? Suppose to be 57 was it? Do you recall?

Michael Tolmasoff: I'm not quite sure of the question.

Tom Cordill: I think I understand the question Mr. Chairman. I think Mrs. Monser is referring to the decibel level allowed under the use permit issued by the County on wells in the area recently and that decibel level on the use permit has been established as sixty-five decibels maximum at the property line of any residential use which is occupied.

Maria Monser: Thank you. I'm sorry I couldn't remember that.

Michael Tolmasoff: I believe then, if that is what is an element of an use permit possibly you can take action other than at this particular meeting. I don't know, I'm not a legal council.

Maria Monser: Well, thank you very much.

Vane Suter: I'm Vane Suter again. I'd like to respond to all the comments about noise and I'm kind of and I'm not sure if this is really, reason or objective to decide if this EIR is adequate or not.

Michael Tolmasoff: If you could make it brief, go ahead.

Vane Suter: Okay. Mrs. Dewey made the comment that it is no joke and it certainly isn't any joke. We take our noise problem seriously and we are concerned about being a good neighbor. In fact, it is one of Union Oil's policies to be a good neighbor with all of our operations that we have everywhere in the country. Well, Mrs. Dewey gives us calls on the telephone quite frequently when our operations get noisy. It's our policy to respond, to go to the location of any kind of complaint and in this particular case we have responded many times, gone to Mrs. Dewey's place with a sound meter, measured the sound level, recorded it on a form with the date, time, sound level, who reported it and so forth. And I have gone through that folder several times in the past, I have seen one or two decibels readings above 65, 67 or 68, I'm not sure, I'd don't know, I don't have the folder with me. Most of those readings are below 65 decibels, but I was very surprised to hear the reading of 80 or 90 decibels, and those documents are available. Well, let me continue. I'll I'm saying is that we are aware that the problem exists and we do

respond and have identified the magnitude of the problem. We have planned for some time to replace the mufflers at power plant 3 and 4. At one point in time, we thought that we had a better system of muffling than the mufflers we are using, a system called drag valves. We got involved in testing drag valves and we're trying to decide whether to put the new drag valves or new type mufflers to replace the ones at 3 and 4. But, we've finally given up the drag valves and gone back to the old mufflers. The mufflers are on the site. Is that correct Olin? The valves are not there, as soon as the valves are there we will install the mufflers. My point is that we are not insensitive to the noise problem. We are aware of the requirements in a use permit. I think generally, we have met the requirements. Sometimes we have exceeded them. I think that when we get our mufflers on we will be in complete compliance, which is our distinction to do so.

Michael Tolmasoff: These mufflers and valves, do...are they an additional expense over your normal procedure for muffling or venting the steam?

Vane Suter: Yes, the mufflers cost money.

Michael Tolmasoff: I mean is it normal just to install mufflers on venting steam or you just putting.....

Vane Suter: These are mufflers at power plant 3 and 4, for when

the power plant goes down and when the steam is vented at the power plant, trying to decide whether or not to be considering the walls or not. The power plant (inaudible)...

Michael Tolmasoff: Are you trying to just install mufflers at Units 3 and 4 just because of the particular noise problem in the area.

Vane Suter: Well, 3 and 4 was built a long time ago and the mufflers that were installed at the time it was built are not as good as mufflers that are presently available. So we are replacing... planning to replace the old mufflers with better mufflers.

Michael Tolmasoff: Okay, look, rather than turn this meeting into an exchange of...of information that is not really related to checking the adequacy of this Draft EIR, I believe in the interest of this meeting we should, again, only address ourselves to things which don't seem to be covered adequately in the EIR. So, if we have any more oral comments, I would appreciate it if you would come forward.

John Gibson: I'm John Gibson, Assistant General Counsel at PG&E. I want to be sure...we sent in nineteen pages of written comments dated May 9, I want to be sure those have been received.

Michael Tolmasoff: Yes, we received them.

John Gibson: So far we have nothing to add to those comments, what we have heard today. I would like to support Mr. Suter's comment about the need for expeditious treatment of this EIR from this day forward. Thank you.

Michael Tolmasoff: Do we have any additional oral comments?

Ted Wilmsen: My name is Ted Wilmsen. I'm Operations Supervisor for Magma Power Company located at the Geysers. I'd like to make a quick general statement and then come to a couple of specifics that have been raised. If the objective of EcoView's Environmental Impact Analysis was to recommend an endless stream of additional study programs, then they have certainly succeeded in their objective. They have recommended a minimum of fifty additional study programs, which range all the way from what is the effect of noise on fauna to studies on determining whether dark spots on the ground are created by indian campfires or by tree stumps burned in past forest fires. It is easy to forecast a zero unemployment rate among the professional studiers. It is also easy to forecast the continued development would become uneconomical if all the recommended studies aren't issued. One must remember that the goose that lays the golden egg ceases to function with a broken neck. For this project, the continued functioning it requires an accurate and objective EIR. Instead of that, the Draft EIR is filled with personal biases and slanted viewpoints. A collage of pictures on the reports second page is a pictorial example of slanted viewpoints... Anyone having visited

the Geysers would agree that this collage is a very unfair representation of the Geysers aesthetics. Much time, effort, and expense has been and will be spent for the projects general appearance. A collage of this nature is a slap in the face for all persons involved in the project. I am very sorry to say that this collage only sets the stage for the rest of the report.

(TAPE CHANGE)

(RECESS)

Michael Tolmasoff: If we can be seated we can begin the hearing again. Okay, the hearing is starting. I will open the floor up once again for oral comments. I believe we will have a continuation by Mr. Wilmsen.

Ted Wilmsen: I'll just kind of wind things up and get on to a couple of points. This Draft EIR was initiated 18 months ago and delivery of it was promised for last summer: it is now nearly summer a year later, and the time delay has caused major problems. Future development depends on having an improved EIR. If it were not for this additional time delay involved, my recommendation would be to throw this report out and start from scratch. My only hope now is that the additional material presented at this hearing will turn this Draft EIR into a workable and objective EIR.

Now we've had a few comments, of course, on what needs to be added

to the EIR to make it complete. I think that a few of these things are a little bit far fetched. When we talk about having a mosquito count or insect count on the entire creek or spot creeks or anything. Here we're are talking about looking at the minute mosquito population or anything else. Man has been trying to develop insecticides or anything else to kill mosquitos or anything else and we have been failing for a long time. Now if somebody can come up with a formula that we somehow are suppose to get at the Geysers to kill all the insect population, I'd like to talk to them and we'll go into business. Now this is foolish to think that we are going to kill all the mosquitos with anything or let all the insects in there, when its not only the water they're breeding on, its everywhere. The fish in there, just yesterday I was looking in the creek, there's lots of fish inside that creek. Yet the Fish and Game Department prior to this has said, "Gees, there's no fish in there". Two weeks ago we see in the paper MASSIVE FISH KILL ON BIG SULFUR CREEK. Wait a minute! The Fish and Game said there weren't any fish in Big Sulfur Creek. How can you have a massive fish kill? Now, we have a lot of misleading information coming into this. But I think that looking for mosquito counts or insect counts on here is getting awfully darn picky for any broad environmental group as talking about a leasehold covering thousands of acres.

Michael Tolmasoff: One second, I want to make a comment. Possibly we should take into consideration that it seems probable

that there might not be a tremendous decrease in the insect population and that possibly the question may not be answered about, or at least obtained base information on that.

Ted Wilmsen: Alright. Now, I would think that to have insect populations dying, that would mean that you would have to have water pollution taking place. Well, water quality is being monitored and that's the job of the Water Quality Control Board. Monthly samples are taken, high-low samples are taken checking the water out. Now to go in and look at the water is a much simpler and realistic way of trying to determine whether its still going to breed insects, whether that's good or bad, I don't know.

Its many times stated in the EIR about the recreational value of the Geysers, and yet we've got to remember that this is private property, which the recreational value is for the private landowner and we are still going that private property is something that we do hold in the United States. Now to come in there and constantly keep saying that the recreational value will be disturbed in the Geysers, is like saying the recreational value of yours and my house is been disturbed because I put my house there. Now, wait a minute? That's my property and that's the same thing with the landowners. Now, the project does not own land up there; it is independent landowners who have leased the geothermal to us; they are the ones who should decide as to what the recreational value of their property is and not someone else coming in and saying that its up to some Board to determine

whose recreation it is... It isn't, that's already been determined. There's...the same thing goes on aesthetics views. If you go into aesthetics in the EIR and they constantly talk about certain, particular places. They talk about Dianna Rock up there, that this area shouldn't have a plant up there: it disturbs the aesthetics. The aesthetics from where? You can't see Dianna Rock from the County road. You have to go up on private property where some landowner, if he looks from that private property and looks across, now that's going to disturb his view. But if the private property owner says, "I want my view disturbed because I'd like to have some revenue. Instead of paying property taxes on this thing all my life, I'd like to make some income on it". The same as anyone owning a lot here, that wants to put up an apartment, a business or anything else. You can't continually go along on just paying taxes. So the object in the EIR of talking about aesthetics, recreational value and many points on private property is a ridiculous topic. Unless, you are advocating that these places be bought by the public, at public expense and turned into a park. Yet, that's not what is really being said. There is no major push saying that all of Squaw Creek, all of Sulfur Creek should be purchased and turned into a park. And I don't think that these are proper in an EIR, talking about these things on private property.

Michael Tolmasoff: Well. I believe, aesthetics is a very ambiguous step...there is probably a very ambiguous step... for it. I didn't really glean out the feeling that it was

for a specific use...he was just pointing it out, nothing more than that.

Ted Wilmsen: No, its a definite mention in there that Dianna Rock, the single rock precipice sitting up, will be the aesthetics will be detracted by having plant or this or that there. It all depends on what you...your point of view. Whether you think that a plant looks better than a rock or a rock looks better than a plant. To each his own.

~~Condensate discharges were mentioned on-line breakages and this~~
~~and that. It something that should be pointed out that in the~~
past there have been certain breaks. These lines either already
have been or are in the process of being changed from fiberglass
lines to steel lines.

~~Michael Tolmasoff~~: When you are referring to the word lines...

Ted Wilmsen: Pipelines.

Michael Tolmasoff: Pipelines. What pipelines?

~~Ted Wilmsen~~: These are condensate discharge lines that go from
the condensate reservoirs to the reinjection wells, that pass
discharges that have taken place because of breaks in the line
or on fiberglass lines where there was either deterioration or
like a water-hammer effect of a shock which couldn't be handled
by that. They are all being switched over or are in the process
of being converted over. These are the things that shouldn't

have to be worried about in the future.

Michael Tolmasoff: I'd like to try and locate that more specifically in the EIR.

Ted Wilmsen: It was mentioned by someone, I guess, by the Sierra Club representative, that this was not covered in the EIR about condensate discharges that will possibly take place that it wasn't adequately covered. Well, I think that it is adequately covered by saying that steel lines do not rupture.

Michael Tolmasoff: Okay.

Ted Wilmsen: Noise levels. Well, I think Vane has covered that quite well that we are certainly very concerned about it and we are....we have spent and will be spending time and effort on this and the noise level across the canyon of 80 or 90 decibels is ridiculous.

Tom Cordill: Mr. Chairman I suggest that the proper order of business is to address the Chairman...(inaudible).

Michael Tolmasoff: Tom, I agree with you; however, I've mentioned many, many times that we should just talk strictly about the EIR. But everyone wants to deviate from it. Please let's try and keep our language in appropriate lines. Okay, are there anymore oral comments on the accuracy of this Draft EIR?

Tony Cerar: About that noise level deal, we've had that registered by State Industrial Accident Commission as 87 decibels way back in 1960's...late 60's, somewhere in there at Mrs. Deweys' place. Their own men have come over and recorded 80 decibels out by Mrs. Deweys' mailbox with Union Oil's own decibel meter. They ought to live with that. That was in daytime, it varies between night and morning and atmospheric conditions and all.

Michael Tolmasoff: Okay. I guess this is going to be the last call. Anymore oral comments before we discuss the written comments received by the Air Pollution Control District in the Planning Department. Mr. Neilson.

Dr. Neilson: There are several points that I would like to make with regard to...

Michael Tolmasoff: Dr. Neilson, I'm not sure that we are picking you up.

(MICROPHONE TROUBLE)

Michael Tolmasoff: Well, why don't you use the podium then.

Tom Cordill: Mr. Chairman, may I make a suggestion before Dr. Neilson approaches. I suggest that the comments from the consultant at the present time be limited to his written comments

ideas out, well then I think this will go a little bit more smoothly.

Michael Tolmasoff: Is there one more oral comment?

C. R. Thomson: Ray Thompson. I'm with the University of California at Riverside. I'm in the Air Pollution Research Center and I would like to say that I feel that the statements as drawn up on air quality has reasonably completely caused with the girth of information that's available on the effects of hydrogen sulfide (inaudible) as far as plants are concerned there has been about two high-level short term fumigations that have been recorded in the literature and these tests tell you what happened with low-level long term effects. Thanks to Mr. Cordill, we and some of the other people that have lobbied for us, we do have a grant from the National Science Foundation in which we will look at naive species, at some of the crop plants, like alfalfa and grapes and some tests to do with actual fumigation studies, but we think at realistic levels that will attempt to save. If you have so much sulfide on a given plant at a given time, you'll get this effect. I don't think that we know too much about the levels in the area, unfortunately. I've done some consulting for paper mills and there is definitely effects of sulfide from the hydrogen sulfide emissions and (inaudible). So that this a problem, that vegetation has been injured. As far as people are concerned, we can smell so

little of this, about three parts per billion that anything that stinks is bad and whether or not the levels we have there are injurious is a matter for study. We...as I say, the studythere is one other point that if the hydrogen sulfide is oxidized as indicated....(new tape)...

...or even the Middletown area and in the Central Valley there is enough ozone that this could react in a synergistic matter with the ozone already present, and we could see a significant injury to vegetation but that is a out where we stand at the present time.

Michael Tolmasoff: Is there anything else on the Environmental statement that is possibly incorrect?

C. R. Thompson: I feel that what is in there is a reasonable statement of where we stand at the present time.

Michael Tolmasoff: Fine. Anymore comments? If there are no more comments, I would like to note at this time that the Northern Sonoma County Air Pollution Control District in the Planning Department has received written comments. Therefore, at this time I would like to enter into the record the agencies and so on and so forth that have submitted these written comments. Now we will go in chronological order: On May 6, 1975, we have received from Sonoma County Water Agency comments on the Union Oil Company Geothermal Resources Environmental Impact Report; On May 9, we have received comments on the same draft Environmental Impact Report from Pacific Gas and Electric Company and it is quite a substantial document; On May 12,

1975, we received from the United States Department of Interior the geological survey comments on the draft Environmental Impact Report; May 13, 1975, we received from the United States Department of Interior, Fish and Wildlife Service, comments on the draft Environmental Impact Report; May 14, we received from the Department of Conservation, Division of Forestry, comments on the draft Environmental Impact Report; and today we received from Union Oil Company comments on the Draft Environmental Impact Report at this meeting.

These comments on the Draft Environmental Impact Report will be available for anyone to look at, I believe, at the Planning Department here as well as the Northern Sonoma County Air Pollution Control District at reasonable business hours and hopefully in a short time from the oral comments we have received and the written comments we have received the consultant and myself will get-together and well answer all germane questions to the Environmental Impact Report; and hopefully, can finalize this if possible, which may hold us up if there is some information which we cannot obtain for some reason that we feel is necessary and we would notify whoever it is that is concerned. I think specifically, information on down-time with some of the power plants, so we can get a handle on the approximate percentage of time that the residents in the local area are experiencing to put it in the Environmental Impact Report and possibly another bit of information which is what kind of wells are up there as far as the casing standards are concerned. Perhaps we would need information about that to complete the Environmental Impact Report. Are there any comments?

Audience(?): I did not hear you call out the thing that had been sent by the Department of Fish and Game. Is that so?

Michael Tolmasoff: I believe I did.

Audience(?): (Inaudible).

Michael Tolmasoff: This one I have on the letterhead is dated May 13.

Audience(?): Yes, alright.

Audience(?): Mr. Tolmasoff, the Public Utilities Commission Office sent a letter on May 6, to the Sonoma County Planning Department, which would not be classified as comments, but that would be communications in response to the defeat of the last EIR.

Michael Tolmasoff: Yes, I did receive it, but it was of a very general nature. I excluded it just for this particular subject I was talking about. Dr. Neilson?

Dr. Neilson: Mike, could I request that the Sierra Club's comments
.....(inaudible, not near the microphone).

Michael Tolmasoff: Could you come over to the microphone, please?

Tom Cordill: Gentlemen, I can anticipate Dr. Neilson's request...

Michael Tolmasoff: Lets, let Dr. Neilson speak.

Dr. Neilson: Since the Sierra Club's comments and questions... specific questions were extensive, I think it would be extremely helpful if they would submit theirs in ~~w~~riting also, to facilitate the speed by which we can answer these and collate them in with other questions that bare on the same subject.

Michael Tolmasoff: I believe that if Marilyn Goode has a copy with her, that we could probably photocopy that today if it is in readable condition.

Tom Cordill: Mr. Chairman.

Michael Tolmasoff: - Yes?

Marilyn Goode: (Inaudible, not near the microphone).

Michael Tolmasoff: Well, excuse me, it would be better if we could address any questions or responses to the Chairman and I could more or less coordinate this meeting a little bit better. First of all, I am addressing a question to Marilyn Goode. If you are representing...

Marilyn Goode: (Inaudible, not near the microphone).

Michael Tolmasoff: If you would give it to me first and I will

give it to Dr. Neilson, so that I have an official record through my office. Tom, do you have anything to add now?

Tom Cordill: My comments are immaterial and irrelevant at the moment, Mr. Chairman.

Tony Cerar: Is the State or the Northern Sonoma County Air Pollution District going to carry on or carry on any tests on that obnoxious gases up there in any way. We've got a problem right in our backyard within the past winter or two with both Pacific Energy's wells and what's coming across the canyon. My wife's been grieving to blow these wells on certain times... and so forth and Pacific Energy is way violating and so forth. and there is a terrific amount of hydrogen sulfide gas coming up out our way that last winter...

Michael Tolmasoff: Excuse me, but this is not irrelevant to the Environmental Impact Report and if you want...after the meeting we can discuss this. Now after the meeting I could tell you lots of things....

Tony Cerar: Now wait a minute...because PG&E is....

Michael Tolmasoff: Sir, if you will continue on this same thing, I will have to excuse you.

Tony Cerar: Yes, but I am talking about....

Michael Tolmasoff: Please only address yourself to this Environmental Impact Report. That is what this meeting is about, otherwise we could give everyone boxing gloves and everyone could go to it. But this is not how this meeting is going to be. It is to address yourself to the Environmental Impact Report as to its adequacy. If you want to talk about problems that you are having then we can discuss them after the meeting.

Tony Cerar: Now I asked you if this was being monitored up there. Can we depend on industry to monitor itself. We were just called liars by industry about noise levels.

Michael Tolmasoff: Are there any further comments on this meeting?

Tony Cerar: Is the Air Pollution District monitoring this?

Michael Tolmasoff: Sir, will you please sit down because you are not addressing yourself to the Environmental Impact Report and whether its adequacy. You are talking about something in the future or something that should be going on right now. Now, if you can tie this in with the Environmental Impact Report, then go ahead, we will let you speak.

Tony Cerar: I thought that the report was the basis for future action.

Michael Tolmasoff: No, it is not. The Environmental Impact Report is trying to report what would happen for a specific project. They're trying to give a view of what the whole project is about, that is what they go through... They have suggested in here that a review and testing of the overall air quality in the area be performed. And there is a study which is just being initiated costing many hundreds of thousands of dollars....

Tony Cerar: By the Natural Science Foundation?

Michael Tolmasoff: That's among several agencies. Please.... we should refer ourselves to this Environmental Impact Report and we can discuss this after the meeting. I will tell you all about the details.

Tony Cerar: I'll see you later.

Michael Tolmasoff: Okay, I believe if there are again no more oral comments that I will close this meeting and if there are any ambiguities about what happens from now on, please speak and I'll answer that, but if not, I will close the meeting very soon. No comments. Okay, I as the Air Pollution Control Officer for Northern Sonoma County Air Pollution Control District, I'm calling this meeting closed.

(TIME ON THE RECORD IS INDICATED AS 4:12 p.m.)



Environmental Consultants

SUPPLEMENT TO RESPONSES TO COMMENTS ON THE PUBLIC HEARING
FOR THE EIR OF UNION OIL CO. LEASEHOLD
RE: PAGES 50-60 OF THE OFFICIAL TRANSCRIPT

ECOVUE has carefully reviewed the transcript of testimony at the public hearing in response to the request for correlation of excessive noise generation and steam bypass at the generator. A letter requesting specific information from Union Oil Company was forwarded; their reply, dated July 1, 1975, was received and reviewed; a summary of the review is presented below:

The following table reflects the plant shutdown frequency for the years 1973 and 1974. Determination of unit downtime of duration less than 24 hours would require a tedious review of operating records. Rather than attempting to break the downtime in to such fine increments of a few hours all unusual curtailments within a 24 hour period were totaled. This could imply that the unit was completely down for a few hours, or that the unit was running at a reduced load due to a minor malfunction or climatic condition. During these conditions a small amount of steam is usually vented. A duration of downtime of 1 to 4 days reflects that the unit was completely down due to abnormal conditions with the steam vented. A five to 10 day downtime duration also reflects an abnormal condition, but the wells are usually shut-in for a portion of this time. Downtime greater than ten days reflects routine maintenance with the wells shut-in.

GEYSERS GENERATING UNIT
DOWNTIME FREQUENCY

Years 1973 & 1974

Duration of Unit Downtime	Frequency of Unit Downtime by Unit Period 1-1-73 to 12-31-74									
	1	2	3	4	5	6	7	8	9*2	10*2
Less than 24 Hrs.*1	26	39	27	24	21	30	68	72	40	40
1 to 4 days	9	5	7	6	6	8	15	8	6	3
5 to 10 days	4	2	4	3	0	1	2	1	0	0
Longer Than 10 Days	1	1	2	4	2	2	1	3	1	1

*1 Unit may be running but at reduced load.

*2 Figures for Units 9 & 10 are for the year 1974 only.



Environmental Consultants

Adjusting the total frequencies of each class to an annual figure, the following might be expected:

Duration of downtime	Adjusted total annual downtime*: frequency	Probable # of point sources Units and/or wells **
1. Less than 24 hours	234	10
2. 1 to 4 days	43	10
3. 5 to 10 days	9	80
4. longer than 10 days	9	80

* doubling the listed figure for 9 and 10 and dividing by 2

** total # of wells on line = 70

Using this table as a base, we can expect that generating plants may be venting for periods of less than 24 hours, up to 234 days of each year. Actually the number will be somewhat less than that indicated because all the units shown are tandem units and the pair sometimes may be shut off simultaneously. While this increases the noise level, it reduces the frequency. 43 times each year, generating plants may be venting for periods of 1 to 4 days. Assuming the mode is equivalent to the mean, i.e., each down time will involve 2 days, 1 or more plants will be venting 86 days per year. 18 times per year (classes 3 and 4) venting will occur from a total of 80 point sources, assuming an average of 7 wells per plant (8 point sources per shut down), for periods of 1 to 4 days; in other words, ± 36 days each year, at least 8 point sources will be generating noise.

Translating to noise levels, from the first two classes, 10 point sources will generate from 90 to 110 dbA at ground level 50 ft from the muffler, 320 times each year. These generations may last from 1 to 4 days. 36 days each year, 8 point sources will be generating noise; 7 are unmuffled at levels of 120 (+ or - 15) dbA at 100 ft from the point source (Union Oil Co. measurements) and 1 through a muffler at about 85 to 90 dbA scale.

Other point sources include periodic well testing, line bleeds, blooie line discharges from drill rigs. On the average, there have been 5 drill rigs in continuous operation at The Geysers during 1974-75. Several methods have been tried to silence this source: circumferential water injection plus a sampler, and cyclonic mufflers of several designs. The effectiveness of the former are of the order of 85 to 118 dbA at 25 ft from the source, somewhat less for the latter (ECOVIEW's measurements).

Attention is directed to Union's Technical Memo CORR 74-165M of September 12, 1974. It will be noted that noise attenuation was less than 50% for some kinds of blooie line muffler techniques over 400 ft from the source; less than 5% of the dBA rating for drag valves against background noise between 80 and 90 dBA; 26% at about 60 ft for rock mufflers over wells.

ECOVIEW has measured background noises at 72 dBA at distances over 0.5 mi from Sulphur Bank and over 70 dBA at 500 ft from exhausting wells on Pacific Energy Corp.'s Rorabaugh development. Some of these effects are the result of compounding of sound waves by atmospheric conditions and terrain reverberations.

Clearly the background noise is well above the nuisance level at certain times at residences in the area and affects general background levels in Lake County. Without continuous monitoring at several points across the field, coupled with adequate climatic data, including direction and speed of wind movements over the whole field, and air temperatures at ground level and aloft, it is not possible to accurately assess the frequency and magnitude of noise levels that may affect residences in other parts of the KGRA as the field grows. At the present time: (1) it is doubtful if much of the background noise is necessary; (2) many sources can be controlled that are not controlled; and (3) the present County policy for acceptable noise levels of 65 dbA at property lines may be too high to permit the industry to develop beyond its present boundaries toward densely inhabited areas.

Attention is called to the section on steam bypass systems prepared by PG&E for Unit 12 EIR (Exhibit 31, late filed). Considering all aspects, the environmental improvement from noise, odor, and actual and possible effects from H₂S over a wide area, it appears to ECOVIEW consultants that the cost of including an auxiliary condenser coupled to the cooling tower at the plant is justified. In addition, as many emissions from well head to and including the plant as is technically feasible to gather in a collecting system and direct into the auxiliary condenser, should be an integral part of the improvement. If these measures are taken, it will nearly eliminate most of the established and potential adverse impacts of geothermal development, make it acceptable in areas where it may otherwise be restricted, and place it on an environmental par with the hydroelectric energy source.

Finally, attention is called to the request of Mrs. Goode for a review of significant casing failures. Union Oil Company has provided a response to this entitled "Environmentally Significant Casing Failures in Geothermal Wells at The Geysers." Earlier, Union Oil Co. permitted ECOVIEW to examine down hole records of all wells drilled up to July, 1974, which are on file at the DOG office in Woodland. While our examination of the records is confidential, it is very clear in the light of the experience at Union's well #GDC 65-28 that there are a large number of wells drilled before 1970 which are relatively large bore, and whose casings are not tied back to the surface. Many of these wells are located in areas where ground may be unstable. ECOVIEW urges that the DOG reexamine all casings schedules for all wells in the field and correlate these with a careful examination of existing and potential landslide areas (cf. Neilson, et al., 1975d, EIR for Domenichelli leasehold exploratory well #1 for Burmah Oil Co.) with the objective of improving the adequacy of casing strings, checking the integrity of cement bedding and insisting on tying back all strings to the surface. Consideration should be given to reducing all production casing bores to a maximum of 9 3/4 inches.

SONOMA COUNTY
PLANNING DEPARTMENT
OFFICIAL COPY
DO NOT REMOVE

Statement of E. C. McCabe
Before the County of Sonoma
Environmental Control Commission.

May 16, 1975

I am President of Magma Power Company.

Our company drilled the first commercial geothermal well
at The Geysers in December 1954.

As a result of this pioneering effort, the Magma-Thermal-

Union Oil Company Project has been developed to its present state. Approximately \$130,000,000 dollars have been spent on drilling and installation of power plants by P. G. and E. since 1955. A goodly portion of this capital expenditure has flowed into the pockets of many segments of the local citizens. For the year 1975 Sonoma County will collect in total taxes from the Project and P. G. and E. approximately \$2,750,000 dollars. It is estimated that the collection of taxes of the Project, and other geothermal related activities in the County, will be about 8% of the total of all property taxes levied. I am sure all tax payers of the County (if they had knowledge of same) would recognize what this development means to them financially. Conversion of this inaccessible and marginal back country into a tremendous wealth producing asset warrants enthusiastic support and cooperation by every thinking person of this County.

Development is now being impeded, hindered, and delayed by various regulatory agencies costing great sums of money borne by the operators of the Project and the general public. The priceless element of time seems to be a value not understood. "Manana" is the motto of the day for definitive decisions, coupled with suggestions that further studies precede positive action. Frustration overcomes the constructive developer.

RECEIVED

MAY 27 1975

PLANNING DEPARTMENT
COUNTY OF SONOMA

4DC

I have read the environmental report prepared by Ecoview of the holdings of the Project at The Geysers. It cost \$50,000, of which we paid \$12,500. I am informed that we were advised by some of the authorities of this County that it was expedient that this firm of environmentalists be employed for the job. The many doctors who were engaged in the preparation of this report convinces me that their practical knowledge is overshadowed by the theoretical.

The report contains many statements where the authors, by the thinking habits of their occupations, have exaggerated theoretical factors that are remotely associated with sound environmental appraisal. The report also suggests, which of course is the inherent business policy of environmental firms, that further studies be made, entailing additional expense and time.

Typical of such uncertain areas is the matter of air pollution by expulsion into the atmosphere of H_2S . I recognize the quality standards set by the Air Pollution Control Authority, but there are two divergent schools of thought, each sponsored by experts, as to this problem. From empirical evidence I favor the conclusion that H_2S , if not concentrated, is beneficial rather than detrimental to man, beasts, ^{fish} and plant life. It is known that one single large volcanic eruption will expell into the atmosphere more H_2S than mankind expells for quite a period of time. All H_2S expelled into the atmosphere is returned to the

JDC

earth's surface by rainfall, which in turn supplies the land with a priceless ingredient for plant growth. To be sure, to certain sensitive people H_2S is malodorous, but it is my contention that at The Geysers, in the degree of air pollution that is prevalent there, it in no way constitutes a health hazard.

To the present excessive legal and accounting costs there now must be added another non-productive expense, occasioned by a new priesthood - the professional environmental firms. The more complex the report, the more extensive the coverage, the greater the bill.

I am aware of the statutory requirements that your Commission follow the letter of the law. The present legislation affords some flexibility as to interpretation. We have found this to be the governing policy of other Commissions.

In the future we will vigorously contest the necessity of preparing an environmental impact report as comprehensive and as expensive as the one under present consideration. In any County in which we intend to operate for a specific Project we will submit an environmental report complying with the requirements of existing law. If there are valid objections to the report as submitted it can be amended or enlarged.

From experience we know that in many places in the United States we are rewarded by active cooperation on the part of the regulatory agencies in recognition for our

constructive endeavors. For the good of unemployed labor, reduction of the welfare rolls, and for developing a new source of energy, it is a responsibility of your Commission, within the scope of authority, to get the show on the road. The voices of the "doers" should attract your ears rather than the critical and vocal segment of our society that "spin not neither do they weave".

RESPONSES TO UNANSWERED ORAL COMMENTS MADE AT THE PUBLIC HEARING
MAY 16, 1975

The transcript of the hearing is the general reference.

Page 1. Mr. Vane Suter.

The details of the history have been studiously omitted, but in no way apply to the adequacy of the EIR.

Page 3. Mr. Joel Robinson.

These comments are answered in the responses to written comments.

Pages 5-7. Mr. Vincent MacKenzie.

These comments refer to the county's procedure and do not pertain to the adequacy of the EIR.

Pages 7-17. Mr. John Emig.

All comments are responded to either orally or in writing.

Pages 17-21. Mr. McCabe.

These are largely opinions of the speaker. Some of the statements regarding H₂S are errors in fact which are described in the various EIRs and/or the responses to their comments.

Pages 22-23. Mrs. Goode

These are mostly statements regarding policy or requests for information which were either answered at the hearing or in other sections of the comments except as follows:

- (1) Re: sump location. Sumps have been constructed in conjunction with each well pad prior to drilling. Since 1973, the North Coast Water Quality Control Board has specified that all geothermal sumps be constructed to conform to a Class II-1 standard and that there be no liquid discharges. The citation listed referred to the general procedure now being practiced at The Geysers. These sumps must be regraded and incorporated into the well pad site at the completion of drilling unless otherwise directed by the Board.

No action has been taken by appropriate county agencies regarding the solid waste materials noted up to the time of this hearing.

- (2) Re: well cleanout and testing. Blooie line mufflers have been used for some phases of well cleanout in the last 9 months.

Pages 50-60. Mr. Cerar et al.

Cf. letter to Union Oil Co., June 20, 1975. Union Oil's response to this request will form the basis for the request culminating from the discussion on the pages cited. There has been insufficient time for Union's response at this writing.

Pages 61-67. Mr. Wilmsen.

The comments are the opinions of the speaker and are largely unsubstantiated by factual data to support the claims made. The comments regarding insects refer to comments made by Mrs. Goode, not by ECOVIEW, hence are irrelevant to the EIR.

