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DEPARTMENT OF ENERGY
IDAHO OPERATIONS OFFICE

USER-COUPLED CONFIRMATION DRILLING PROGRAM
SCAP NO. DE-SC07-801D12139

VOLUME I

TECHNICAL PROPOSAL

WINE VALLEY INN

A MINERAL WATER SPA AND MOTEL
CALISTOGA, CALIFORNIA

15 SEPTEMBER 1980

CONFIDENTIAL

VOLUME I - TECHNICAL PROPOSAL
SUBMITTED TO THE
DEPARTMENT OF ENERGY
IDAHO OPERATIONS OFFICE

USER-COUPLED CONFIRMATION DRILLING PROGRAM
SCAP No. DE-SC07-801D12139

Copy No. 1 of 10

Date of Submission September 15, 1980

Ms. Connie Wilson
Name of Organization (principal participant if a team of organizations)

Small Business (Woman - Owner)
Organizational Classifications

445 Whiskey Hill Road, Woodside, CA 94062
Address of Organization

Wine Valley Inn: A Mineral Water Spa & Motel
Title of Proposed Project

Maximum Funds Requested from DOE $120,200.00

Total Cost of Project Through Flow Testing $144, 240.00

Location of Site Silverado Trail & Lincoln Ave., Calistoga, CA

Proposed Project Duration 2 - 3 months

Proposed Starting Date As soon as feasible

Project Manager John Lewis

Position & Title Architect, Owner

Telephone (707) 829 - 2256

Permission for Outside Evaluation Yes XX No ___

This proposal is for drilling a(n)
Production Well XX Injection Well ___ Other ___

2. STATEMENT OF INTENT

A. The Wine Valley Inn is a proposed mineral water spa and motel located within the city limits of Calistoga, California. The city of Calistoga is in Napa County and lies in an active geothermal area, 20 miles south of the Geysers located in Northeast Sonoma County.

B. The geothermal fluid is proposed to handle all space heating and hot water requirements for the resort motel and support facilities as well as heating mineral baths and pools.

C. We anticipate that there will be no direct sale of energy to others.

SIGNED Ian Lewis.
Proposer

SIGNED Gustavo S. Wilson/J.L.
Potential User

3. SUMMARY

The Wine Valley Inn will be a mineral water spa and resort motel to be constructed in Calistoga, California. It is intended that the energy requirements for space heating, domestic water demand, and heating of pools and spas be achieved utilizing the geothermal resource.

We intend to use the resource in an efficient cascading arrangement. Each particular thermal energy demand will be aligned in a descending temperature sturcture. At this time we are investigating two alternatives. First, to pipe the geothermal resource up to a mechanical equipment building. Through the use of heat exchangers, we would transport the thermal energy to its end use. Second, we would drive a large casing (12 to 14 inches) and insert a heat exchanger in the ground. A transfer fluid would extract the thermal energy to the equipment building. Further testing of the geothermal resource is necessary to determine the most efficient and cost-effective method to employ. We believe many other small scale facilities will be able to utilize this data for their existing and proposed operations.

4. TABLE OF CONTENTS

Wine Valley Inn
Volume I
Technical Proposal

TABLE OF CONTENTS (CONTINUED)

PART 5A GENERAL DESCRIPTION

The Wine Valley Inn will be a quality, first class, 60 room country inn in Calistoga, California at the upper end of the Napa Valley wine country. It will consist of a mansion house which will include the reception area and office, manager's suite, and breakfast/social room downstairs and five guest rooms upstairs. The remaining 55 guest rooms will be in five two story detached buildings, with all but eight rooms interconnected with walkways and porches. Also included are laundry and storage facilities, large swimming pool, hot mineral water pool/jacuzzi with overhead gazebo, and an indoor spa. Each building will have wide porches which allow guests to sit outside their rooms and view the beauty of the surrounding hills and vineyards. The complex, on 1.6 acres, will be heavily landscaped with many trees, large lawn areas, and extensive planting of flowers and bushes. A second parcel adjacent to this one was purchased for future expansion.

The location is ideal, being situated at the intersection of the two main roads that run the length of the valley, Highway 29 and the Silverado Trail. It is 5 blocks from downtown Calistoga, giving guests a leisurely walk or a short ride into town to visit the shops and restaurants. The views from the inn are of nearby Mount St. Helena, the Palisades mountains, and the surrounding vineyards, creating a quiet, relaxing, and restful atmosphere for the guests.

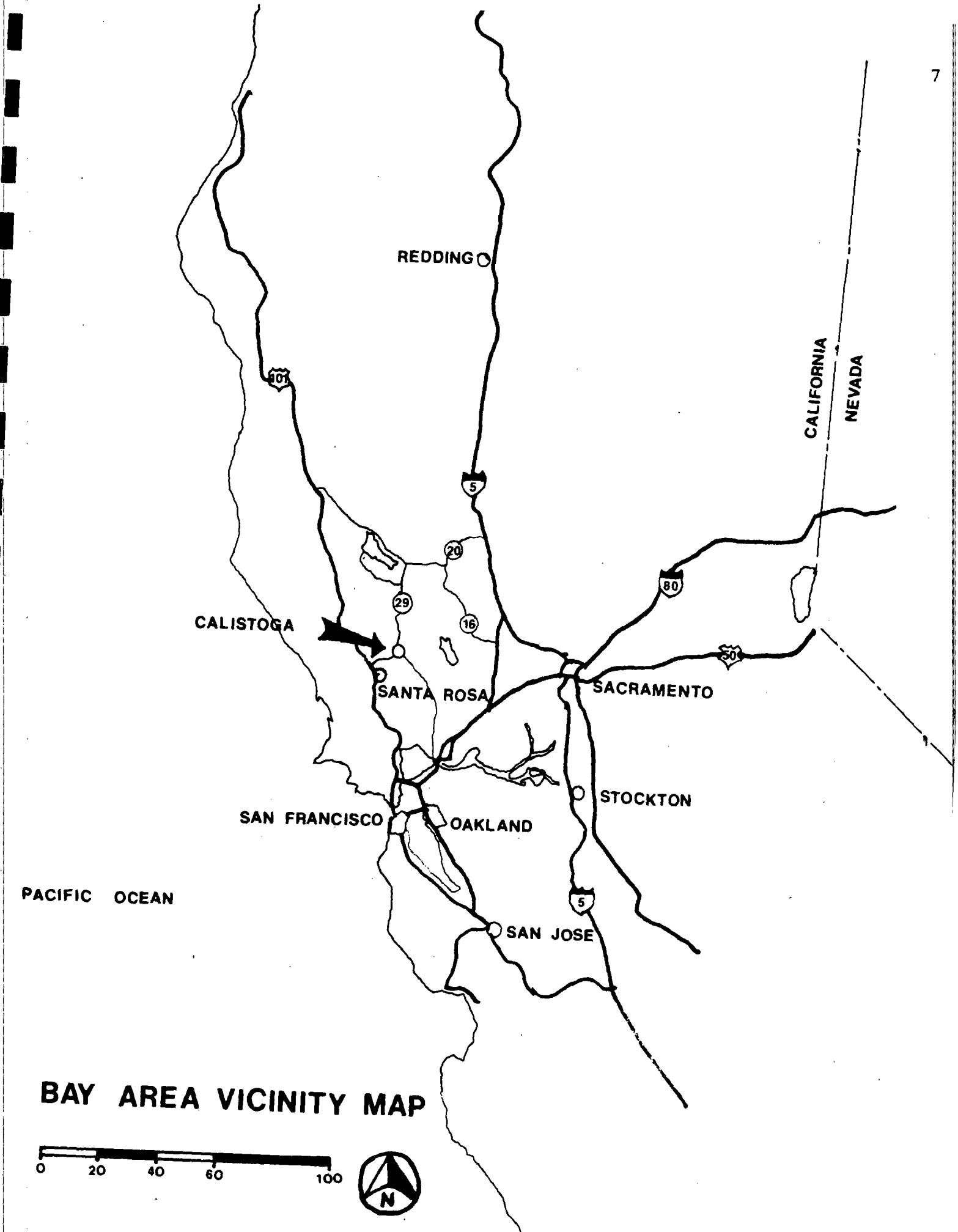
It is anticipated that the inn will become associated with the Best Western lodging chain.

The business which is backing this resort is owned by a woman, Ms. Connie Wilson. She believes that energy conservation is an important factor in this operation and other similar types as well. A lobby display will be installed for visitors and guests to see how the system works. Brochures will be printed and be given to the public at no charge.

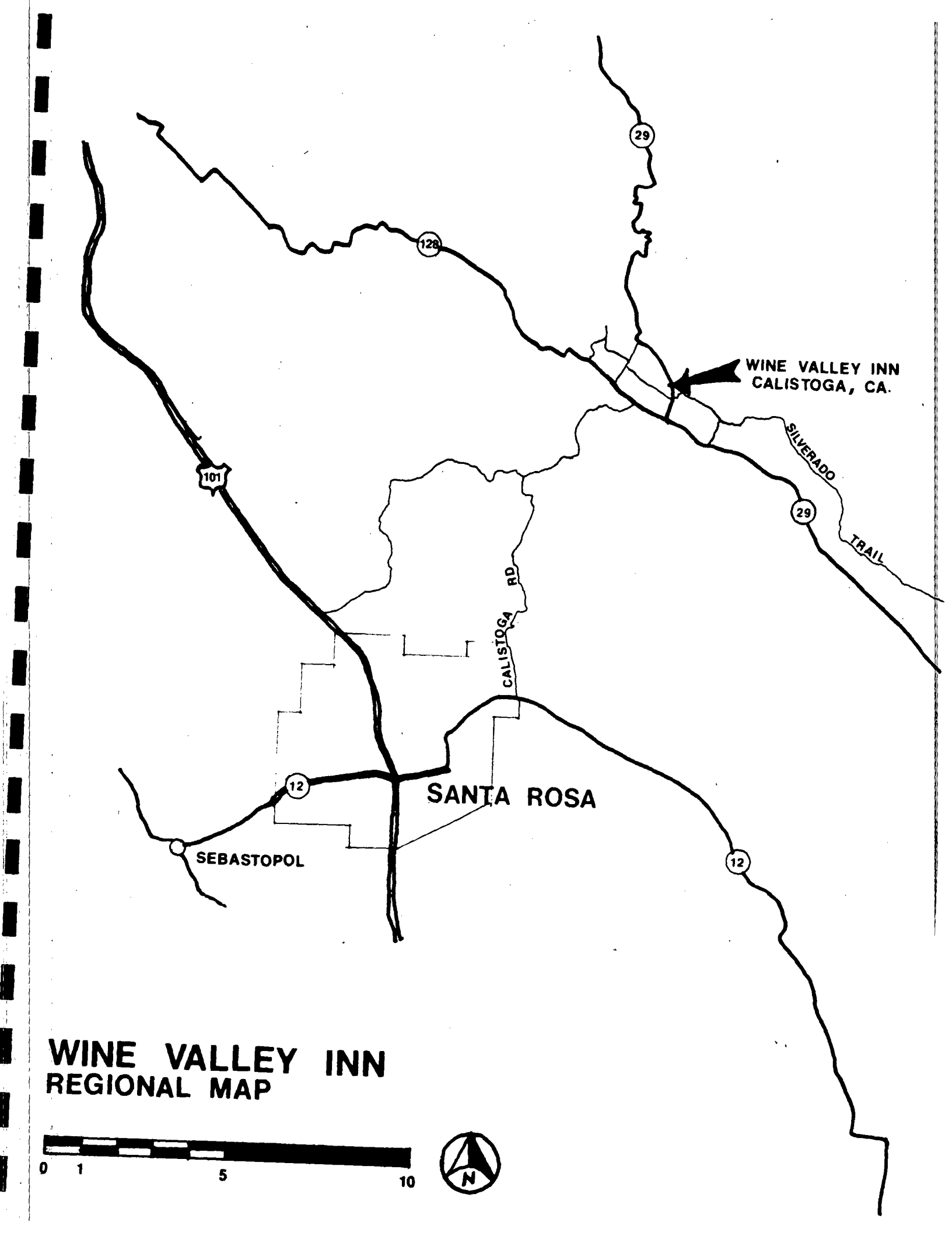
Presently, the owner at her expense, is having a test well drilled on the site. We will make the drilling logs available to DOE as soon as they are available.

Well testing will be completed in conformance with standards set by the State of California Division of Oil and Gas (DOG). We have talked with Mr. Ken Stelling, DOG District Geothermal Engineer and Ms. Linda Ferguson, DOG Energy and Mineral Resources Engineer, regarding our drilling, testing and end use potential. They have assured us that they will assist and advise us throughout the project.

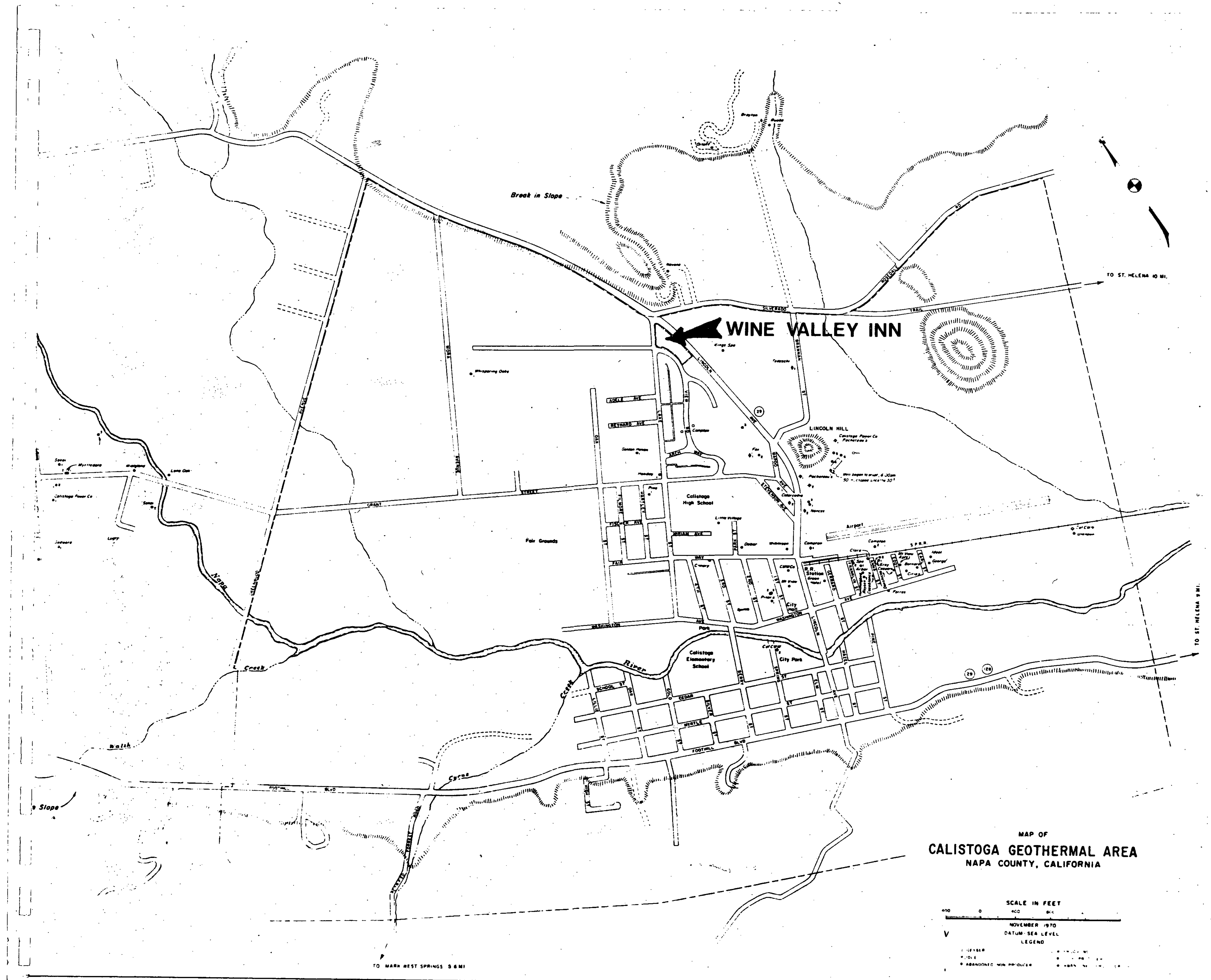
Everything regarding the project, including zoning approval, use-permits, architectural approval, density, traffic flow, water hook-up, survey reports, topographical plans, soils report and site planning has been completed and approved by the City of Calistoga. All that is needed are the contract documents for construction (working drawings and specifications) to obtain the building permit, and of course, the well drilling.



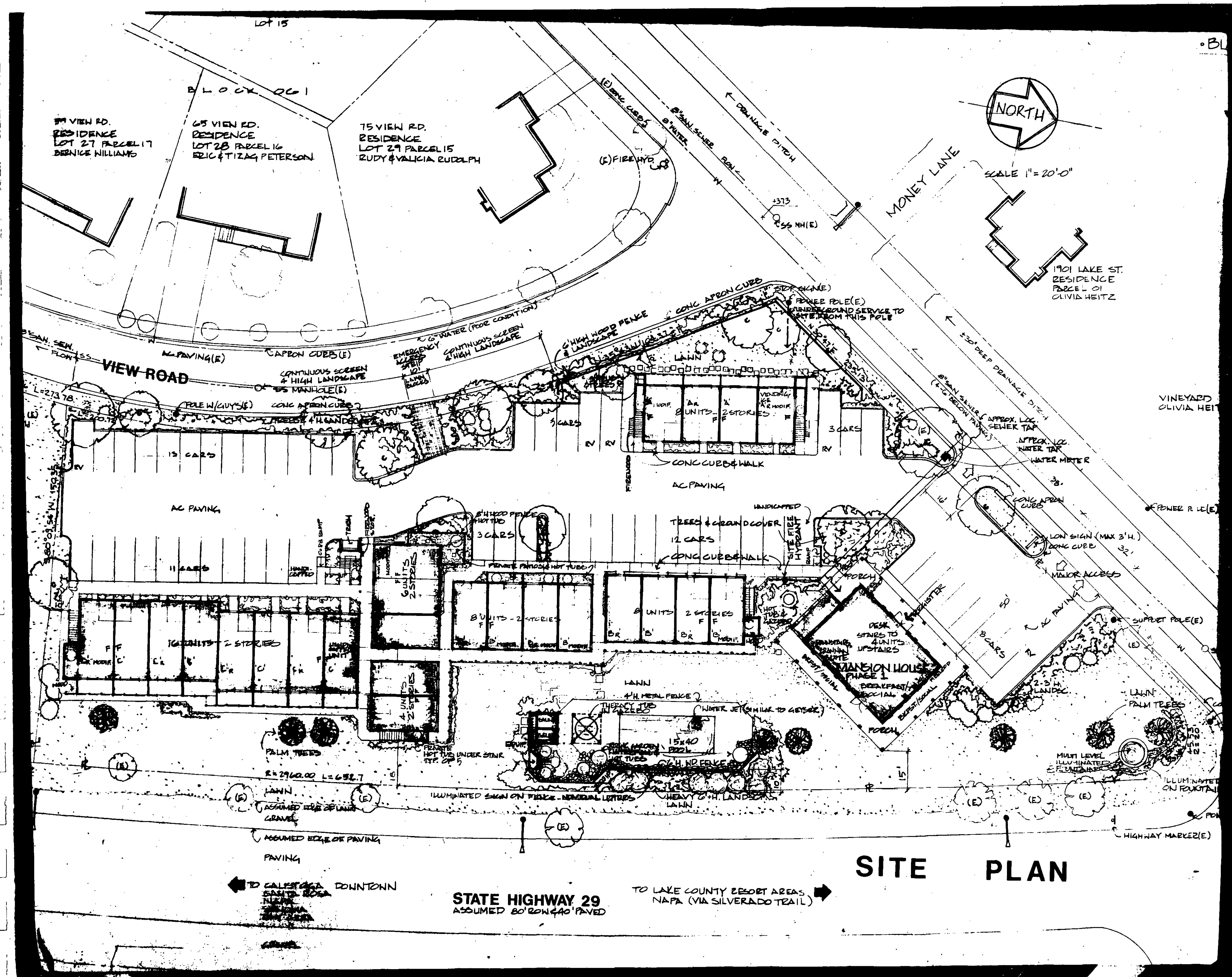
BAY AREA VICINITY MAP



WINE VALLEY INN
REGIONAL MAP



WINE VALLEY INN
Break in Slope
TO ST. HELENA 10 MI.
LINCOLN HILL
Calistoga High School
Fair Grounds
R.R. Station
Airport
Calistoga Elementary School
City Park
GRANT STREET
FOOTHILL BLVD
TO MARK WEST SPRINGS 5.6 MI
MAP OF
CALISTOGA GEOTHERMAL AREA
NAPA COUNTY, CALIFORNIA
SCALE IN FEET
NOVEMBER 1970
DATUM SEA LEVEL
LEGEND


LOT 15
75 VIEW RD.
RESIDENCE
LOT 29 PARCEL 15
RUDY & VALICIA RUDOLPH
NORTH
SCALE 1"=20'0"
MONEY LANE
1901 LAKE ST.
RESIDENCE
PARCEL 01
OLIVIA HEITZ
VIEW ROAD
VINEYARD
13 CARS
AC PAVING
11 CARS
3 CARS
12 CARS
8 CARS
CONC CURB & WALK
LAWN
MANSION HOUSE
PHASE 1
PORCH
MAJOR ACCESS
PALM TREES
HIGHWAY MARKER(E)
SITE PLAN
STATE HIGHWAY 29
ASSUMED 80' ROW & 40' PAVED
DOWNTOWN
TO LAKE COUNTY RESORT AREAS
NAPA (VIA SILVERADO TRAIL)

PART 5B

1. GEOLOGICAL DESCRIPTION

(i) REGIONAL

The project location is in Northern Napa Valley which is a district topographical basic consisting of a central valley floor with bordering foothills and mountains. Situated within the parallel to the California coastline. Mountain ranges surround the valley on three sides and include the Mayacmas Mountains to the north and unnamed sections of the Coast Ranges to the east and west. The bordering mountains are, for the most part, steep and brush covered. Peaks in the surrounding mountain ranges have elevations ranging from less than 1,000 feet to more than 4,000 feet.

The geologic formations in the project area were mapped by Weaver (1949), Taliaferro (1951), Kunkel and Upson (1960), and Koeing (1961,1963).

The floor of the Napa Valley consists of a relatively thin cover of alluvium of Quaternary age overlying a thick section of Sonoma Volcanics of Pliocene Age, consolidated sedimentary rocks of Cretaceous Age, sedimentary and metamorphic rocks of the Franciscan Formation, and ultra-basic plutonic rocks and serpentine of Jurassic Age. As shown on page 14 , the Sonoma Volcanics and the older sedimentary, metamorphic, and ultrabasic rocks crop out in Napa Valley and consitute the bedrock in the project area.

The geologic activities that have had the most direct bearing on the hydrologic system of present day Napa Valley began during the Miocene epoch. In early and middle Miocene time, the area now known as Napa Valley was part of a structural depression occupied by the Miocene Sea. During that time, severe erosion from land masses which bordered the sea caused thousands of feet of sediment to be deposited in the depression.

During late Miocene and early Pliocene time, a general uplift occurred and the Miocene Sea regressed. The Napa Valley area probably was above sea level during most of early Pliocene time and was modified by crustal movements, volcanic activity, and erosion. Large areas of the uplifted marine deposits were blanketed by pumice and volcanic ash or were covered by flows of basalt, andesite, and rhyolite. In quiet periods between the volcanic episodes, stream valleys and topographic depressions were partly filled with deposits of gravel, sand, and clay, and diatomaceous deposits were formed in fresh or brakish-

water lakes. In middle and late Pliocene time, volcanic activity increased and large areas were covered by pumic, welded tuff, and flows of primarily rhyolitic composition.

In early Pleistocene time the region was again uplifted and subjected to extensive erosion. During this time several oscillations of the sea level, accompanied by crustal movements, placed the land surface alternately above and below water. With each of these oscillations, the hydraulic gradients of streams draining the Napa Valley area were altered and readjusted. Stream channels shifted, gradients were changed, and sediments were deposited and eroded at varying rates. Hence, local deposits of early Quaternary Age in Napa Valley are highly variable with respect to their lithology, thickness, and hydrologic properties. In middle Pleistocene time a general downwarping of the Napa Valley and surrounding areas forced the streams draining the basin to make further adjustments.

The general topographic form of the present day Napa Valley area is the result of erosion and deposition that has taken place since the middle Pleistocene downwarping and the last great sea-level rise that occurred following the end of the last Ice Age.

For this report, the geologic units of the Napa Valley area have been divided into ultrabasic rocks of Jurassic Age; the Franciscan Formation and its metamorphic equivalents of Jurassic and Cretaceous Ages; consolidated sedimentary rocks of Cretaceous Age; Sonoma Volcanics of Pliocene Age; and alluvium of Quaternary Age. Page 14 shows the areal distribution and relative ages of the geologic units.

ULTRA BASIC ROCKS

The ultrabasic rocks of Jurassic Age include serpentine, perioditie, dunite, pyroxenite, and minor amounts of silica-carbonate rock derived from alternation of serpentine. The rocks occur as lenses, sheets, and irregularly-shaped masses within, or along, the boundaries of Jurassic equivalents of the Franciscan Formation. The serpentine masses probable were formed by alternation original igneous intrusive material. Chemical analyses of the serpentinized intrusions (Bailey, Irwin, and Jones, 1964) indicate that the rock is composed of almost equal parts of silica and magnesium with residual amounts of other rock-forming minerals.

FRANCISCAN FORMATION

The Franciscan Formation of Jurassic and Cretaceous Ages is a heterogeneous assemblage of graywacke, altered volcanic rocks and associated metamorphic rocks, shale , chert,

limestone, and conglomerate. In the Napa Valley area, the Franciscan Formation is chiefly consolidated graywacke and shale with minor amounts of greenstone, chert, and conglomerate. All of the units have been more or less metamorphosed and altered by pronounced changes in the physical and chemical environment in which the rocks originated.

Chemical analyses of the sandstone and shale of the Franciscan Formation (Bailey, Irwin, and Jones, 1964) indicate that silica and aluminum are the dominant constituents, followed by iron, magnesium, and calcium, respectively.

CONSOLIDATED SEDIMENTARY ROCKS OF CRETACEOUS AGE

The consolidated sedimentary rocks of Cretaceous Age are chiefly mudstone and siltstone with minor beds of thin-bedded sandstone. The rocks are well consolidated and poorly permeable.

SONOMA VOLCANICS

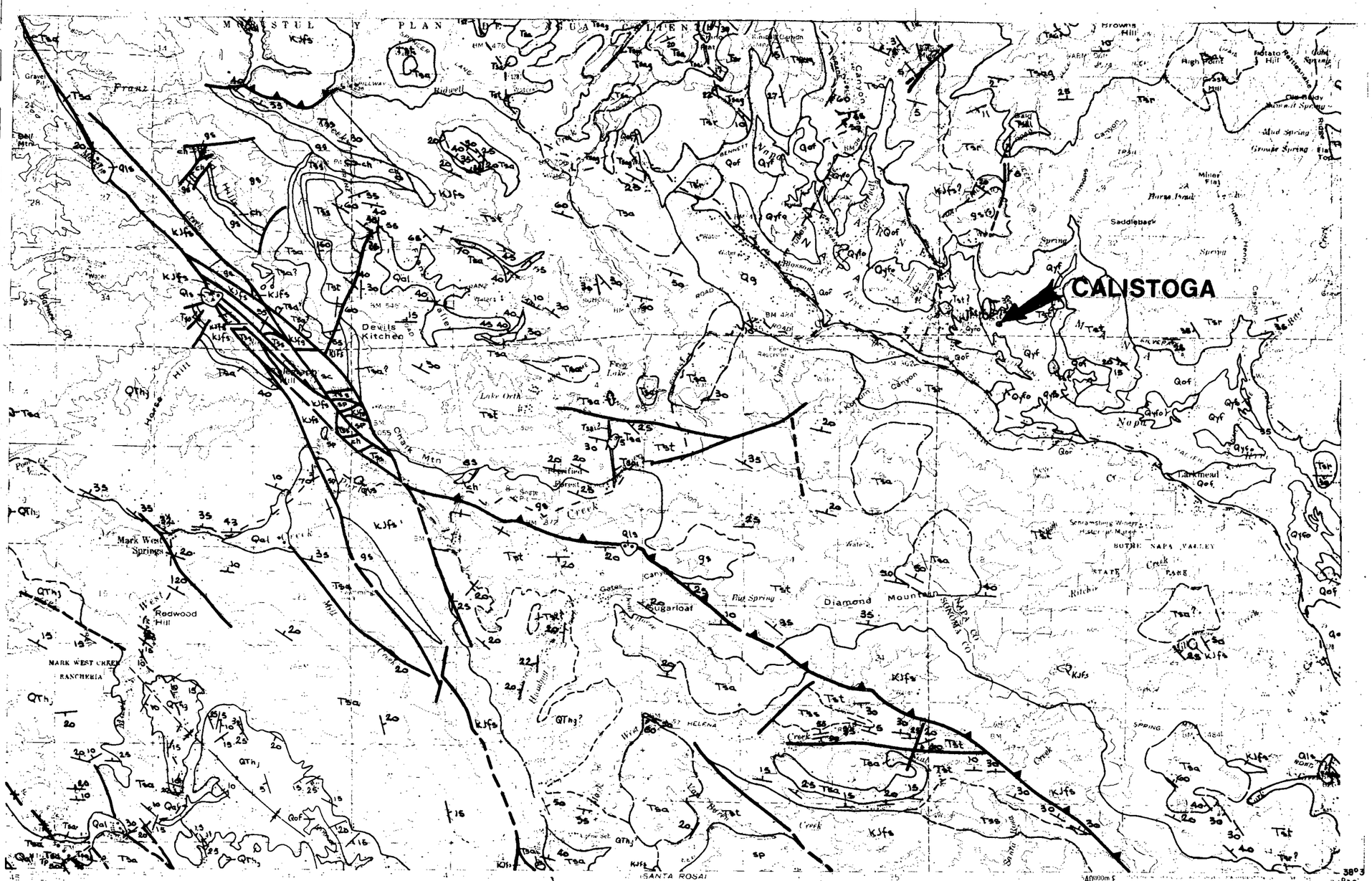
The Sonoma Volcanics constitute a thick and highly variable series of volcanic rocks including andesite, basalt, and minor rhyolite flows with interbedded and discontinuous layers of tuff, tuff breccia, agglomerate and scoria. Redeposited tuff and pumice, diatomite, diatomaceous mud, silt, snad, and gravel, and a prominent body of rhyolite flows and tuff with some obsidian and perlitic glass are also included in this group of rocks.

Redeposited, water-laid pyroclastic materials, diatomite, silt, sand and gravel are exposed in roadcuts along the Silverado Trail east and southeast of St. Helena. In the vicinity of Calistoga, prominent bodies of rhyolite and rhyolitic tuff have been altered by hydrothermal processes to a hard, dense, fine-grained rock. Thin section and x-ray diffraction analyses indicate that the altered rhyolitic rocks now consist mostly of quartz and kaolinitic and montmorillonitic clays.

ALLUVIUM

In this report, deposits described as alluvium or as the alluvial aquifer, include the older alluvium, terrace deposits, older alluvial-fan deposits, and younger alluvium as mapped and described by Kunkel and Upson (1960).

The alluvium underlies and forms the floor of the Napa Valley and consists mostly of lenticular, unconsolidated, poorly sorted, and imperfectly bedded deposits of gravel, sand, silt, and clay. Individual lenses of gravel, sand and clay generally are not more than 10 feet thick but may extend laterally over large areas.



GEOLOGIC MAP OF CALISTOGA 15' QUADRANGLE

AFTER K. F. FOX, JR. ET AL (1973)

QUATERNARY

Pleistocene and Holocene

Qal | Qf | Qt | Qoal } Qyf | Qyfo | Qb | Qbm ; Qof ; Qodf

Surficial deposits

Qal, alluvium, sand, silt, clay, and gravel
Qf, fan deposits; gravel, sand, silt, and clay
Qt, terrace deposits; gravel, sand, silt, and clay
Qoal, older alluvium; sand, silt, clay, and gravel
Qyf, alluvial fan deposits grading headward to terrace deposits incised in unit Qof; consist of moderately sorted fine sand and silt, with gravel becoming more abundant toward fan heads
Qyfo, fluvial deposits at the outer edge of alluvial fans (Qyf); forms levees between basin deposits (Qb); characterized by fine, but variable, grain size; composed mainly of fine sand, silt, and silty clay
Qb, interfluvial marsh-like basin deposits; mainly poorly sorted dark clay and silty clay, both rich in organic matter
Qbm, bay mud
Qof, alluvial fan deposits bordering uplands; heads of fans incised by channels partly filled by terraced deposits of younger alluvium (Qb, Qyfo, and Qyf); outer margins of fans overlapped by younger alluvial deposits (Qb, Qyfo, and Qyf); also includes deposits on stream terraces in narrow canyons cut into uplands; mainly deeply weathered poorly sorted coarse sand and gravel
Qodf, alluvial fan deposits, moderately to highly dissected; consist of coarse to very coarse, highly weathered gravels

Qls | Qlsa | Qlsr | Qlso

Landslide deposits

Qls, landslide, undifferentiated
Qlsa, landslide, composed of andesitic and tuffaceous rocks derived mainly from Tsa
Qlsr, landslide, composed of rhyolitic rock derived from unit Tsri or unit Tsr
Qlso, older landslide(?), composed of irregular zones of fragmental older rock and areas of older rock with complex internal structure

Qr | Qg

Older surficial deposits

Qr, deposits of unconsolidated tuff, volcanic gravel containing large angular blocks of rhyolite derived from units Tsri; locally stratified
Qg, gravel deposits, poorly bedded

Qclt | Qob

Volcanic rocks of Clear Lake area

Qclt, tuff
Qob, olivine basalt

TERTIARY (?) AND QUATERNARY

Pliocene (?) and Pleistocene

QThg

Huichica (Pleistocene) and Glen Ellen (Pliocene(?) and Pleistocene) Formations

Fluviatile gravel, sand, silt, and clay; locally contains much interbedded tuff

QTc

Cache Formation (Pliocene or Pleistocene) of Anderson (1936)

Sand, silt, clay, and gravel; locally tuffaceous near top, with intercalated diatomite

TERTIARY

Pliocene

Tm

Merced(?) Formation

Massive fine-grained sandstone and siltstone with some pebbly layers, rare marine molluscan molds

Tp

Petaluma Formation

Claystone and siltstone with thick lenses of sandstone and pebble conglomerate, thin interbeds of tuff and tuffaceous siltstone, locally with thick beds of diatomite; contains fresh-water and brackish-water mollusks and rare mammalian remains; composed principally of material derived from the Franciscan assemblage with locally common pebbles of laminated siliceous shale, but commonly contains significant admixture of detritus derived from the Sonoma Volcanics and possibly from the Tolay Volcanics of Morse and Bailey (1935)

Relative age between units and groups of units is unknown

SONOMA VOLCANICS

Tsr | Tsri | Tsrs | Tsrp | Tsrb

Rhyolitic rocks

Tsr, rhyolitic lava flows, locally contains intercalated rhyolitic tuff
Tsri, rhyolitic plugs, dikes; may be in part extrusive
Tsrs, soda rhyolite flows; may be in part intrusive
Tsrp, perlitic rhyolite; includes flows and plugs
Tsrb, rhyolitic breccia

Tsa | Tsai | Tsfd

Basaltic, andesitic, and dacitic rocks

Tsa, andesitic to basalitic lava flows
Tsai, andesitic to dacitic plugs, or intrusive complex (area of abundant small plugs or dikes not separately mapped)
Tsfd, basaltic or andesitic lava flows, thinly interlayered with diatomite and unconsolidated fine-grained sedimentary rocks (present 4 miles west of Sonoma)

Tst | Tswt | Tstx | Tsag | Tslt | Tsft

Tuff and agglomerate

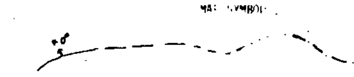
Tst, pumicitic ash-flow tuff, locally welded or partly welded; with intercalated bedded agglomeritic tuff, andesitic or basaltic lava flows, tuff breccia, bedded tuff, and pumicitic tuff
Tswt, welded ash-flow tuff, subordinate unwelded or partly welded ash-flow tuff
Tstx, tuff(?), welded, massive, hard, xenolithic (northeast of Napa)
Tsag, agglomerate; with volcanic breccia, tuff breccia
Tslt, tuff breccia; intercalated agglomerate, tuff
Tsft, tuff, similar to Tst; thinly interlayered with basaltic or andesitic lava flows

Tss | Tssd

Sedimentary deposits

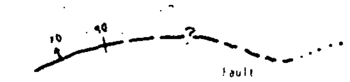
Tss, sedimentary deposits; unconsolidated interbedded and intertonguing tuffaceous sand, silt, volcanic gravel; bedded tuff, clay, diatomite
Tssd, diatomite, with interbedded sand, gravel, and tuff

MAP SYMBOLS



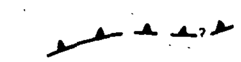
Contact

Long dashed where uncertain, short dashed where gradational, dotted where concealed, dot-dashed where intergonguing (shown diagrammatically), direction and inclination of dip shown by arrow



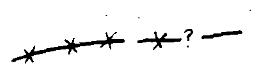
Fault

Long dashed where approximately located, short dashed where uncertain, queried where doubtful, dotted where concealed, arrow shows direction and amount of dip where inclined, crossbar where vertical



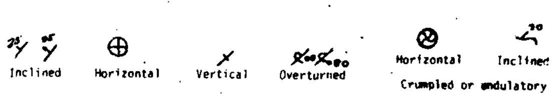
Thrust fault

Dashed where approximately located, queried where doubtful. Sawteeth on upper plate



Active fault

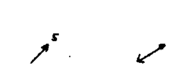
Trace of recently active fault, dashed where uncertain, queried where doubtful. Indicated by topographic features which are inferred to be the product of fault displacement of the ground surface



Strike and dip of bedding

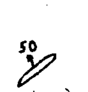
Ball on dip bar indicates that direction of top of beds known from sedimentary structures

Strike and dip of flow banding



Flow lineation

May be combined with other symbols



Dike

Arrow shows direction and amount of dip where known

Miocene

Miocene (?)

Eocene

Tn

Neroly (?) Sandstone

Coarse-grained bluish-gray sandstone with minor tuffaceous sandstone, shale, and pebbly sandstone

Tms

Sandstone, siltstone, and shale

Medium- to fine-grained white sandstone, siltstone, and sandy shale. Mapped as Monterey Shale by Weaver (1949)

Ts

San Ramon Sandstone

Medium-grained, bluish-gray to light-brown sandstone

Td

Domengine Sandstone

Brown feldspathic quartz sandstone with minor thin mudstone interbeds

Tv

Vacaville Shale of Merriam and Turner (1937)

Brown and gray shale and arenaceous mudstone; glauconitic horizon at top in Vacaville area

GREAT VALLEY [illegible]

CRETACEOUS

Kv

Venado Sandstone of [illegible] 1943)

Massive, medium- to coarse-grained, [illegible] bedded lithic feldspathic wacke

JURASSIC AND CRETACEOUS

KJgvs

KJgvm

KJsp

Middle part of Great Valley sequence

- KJgvs, sandstone with minor mudstone and shale
- KJgvm, mudstone and siltstone with minor thin-bedded sandstone
- KJsp, sedimentary serpentine member, queried where identification uncertain

JURASSIC

Jk

Jsp

Knoxville Formation

- Jk, massive clayey siltstone
- Jsp, sedimentary serpentine within Knoxville Formation; queried where identification uncertain

IGNEOUS ROCKS LOCALLY PRESENT, PROBABLY AT BASE OF GREAT VALLEY [illegible]

Jv

Basaltic pillow lava and breccia

[illegible] AN ASSEMBLAGE

KJfm | KJfs

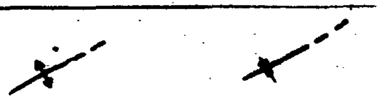
Sedimentary, igneous, and metamorphic rocks

- KJfm, chiefly metagraywacke with minor metagreenstone and metachert; metagraywacke contains no detrital potassium feldspar
- KJfs, sheared shale and sandstone that contains generally resistant masses of chert, "high-grade" metamorphic rock, variably shattered sandstone and greenstone, metagreenstone, and generally less resistant serpentinite (see table below for lithologies and map symbols); masses range in length from less than one foot to greater than 5 miles and constitute a variable, generally unknown proportion of the unit. Dominantly pervasively sheared Knoxville shale in Pope Canyon area

[illegible] Discrete Masses

Serpentinite, including [illegible] ultramafic masses. Occurs as [illegible], sheets, and irregularly shaped masses, largely within and along boundaries of KJfs.	
Chert, including metachert. Shown to scale where possible, smaller masses omitted	ch
Greenstone, including pillow lava, volcanic breccia, tuff, minor intrusive varieties, and metagreenstone. Shown to scale where possible, smaller masses omitted	gs
Silica-carbonate rock. Shown to scale where possible, smaller masses omitted	sc
"High-grade" metamorphic rock, chiefly gneissic, including glaucophane schist, eclogite, and amphibolite	m
Mafic intrusive rocks, chiefly fine- to coarse-grained gabbro and diorite	mi

JURASSIC AND CRETACEOUS



Anticline

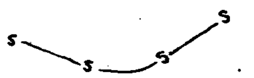
Syncline

Fold axes

Dashed where approximately located

Landslide deposit

Arrows show general direction of movement. Many additional landslides exist; areas not mapped as landslide deposits are not necessarily stable bedrock



Northern limit of mapped area

The floor of the Napa Valley is formed mainly by the flood plains and channels of the Napa River and its tributaries. Mechanical analyses by Carpenter and Cosby (1938) show that flood-plain materials consist mostly of silt and clay with a small percentage of gravel and sand. Channel deposits were shown to consist mostly of sand and gravel.

(ii) HYDROTHERMAL MANIFESTATIONS

Geothermal activity, in the form of "geyser"wells, hot springs, and wells that discharge warm to hot water, occurs at many places in the project area. Ground water associated with geothermal activity is termed "hydrothermal" because the water temperature is unusually high. A standard definition (White, 1957) is used in this report and states that water at a temperature of 5° C. or more above the mean annual temperature of the surrounding environment is considered hydrothermal. Thus, for the project area, a well or spring containing water at a temperature equal to, or greater than, 20.5° c. (69° F.) is said to yield hydrothermal water.

The first geysering well drilled in Calistoga circa 1865 is at the present day location of Pacheteaus resort. At the turn of the century, a number of hot water wells were drilled including what is now called "Old Faithful Geyser of California" and which erupts every 30 to 40 minutes. In recent history, there were bubbling springs at Pacheteaus, but concurrent with increased drilling, the springs dried up in the 1920's.

In 1927 Allen and Day write that 13 geysering hot wells had been dirlled in Calistoga and all by three were capped. Their report was titled:"Steam Wells and Other Thermal Activity at 'The Geysers'"; California, Carnegie Institute of Washington Publication No. 328. Only recently (in 1973 mentioned report) have the wells been logged and tested for their temperature, depth, flow and geochemical composition. This study is in the process of completion by Les Youngs, Geologist/Geophysicist, of the California Division of Mines and Geology (C.D.M.G.). It is presently unavailable to the public, but will be published and made available in November-December of 1980.

Some temperatures, depths and flow rates of wells close to the project area were obtained and appear in Figure ( ).

Three particularyly deep wells at Pacheteaus are believed to produce 250,000 gallons of fluid at 273° F. However, more shallow wells as page 22 shows, produce more modest rates of flow.

In discussions with Les Youngs of C.D.M.G., it was apparent

EXPLANATION

QUATERNARY

Pleistocene and Holocene

Qal

Alluvium

Unconsolidated clay, silt, sand, and gravel. Underlies the alluvial plain in Napa Valley. Yields large to medium quantities of water to wells

TERTIARY

Pliocene

Tsv

Sonoma Volcanics, undifferentiated

Mainly tuff, pumice, scoria, tuff breccia, agglomerate and flows of andesite and basalt. In the vicinity of St. Helena and Calistoga banded rhyolitic flows, welded rhyolitic tuff, hydrothermally altered volcanic rocks and, in places, a basal layer of perlitic obsidian occur. Along the east side of the valley between Yountville and St. Helena, fine-grained massive beds of diatomite and diatomaceous tuff, lenses of sand, and beds of gravel are interbedded with the volcanics. The scoriacious units and pumice layers commonly yield water freely to wells. The diatomaceous beds, sand lenses, and gravel beds yield small quantities of water to wells. Except where highly fractured, other rocks yield little or no water to wells

CRETACEOUS

Lower Cretaceous

Ku

Consolidated sedimentary rocks, undifferentiated

Mudstone and siltstone with minor beds of thin-bedded sandstone. Generally non-water-bearing; locally yield small quantities of water from fractures and weathered zones

JURASSIC AND CRETACEOUS

Upper Jurassic and Lower Cretaceous

KJf

Franciscan Formation

Shale and sandstone that contain masses of chert, greenstone, and serpentine, and related metamorphic rocks. Generally non-water-bearing; locally yields small quantities of water from fractures and from deeply weathered zones

Jurassic

Jsp

Ultrabasic rocks

Lenses, sheets, and irregularly shaped masses of serpentine, dunite, peridotite, and pyroxenite, and minor amounts of silica carbonate rock derived from alteration of serpentine. Generally non-water-bearing; locally yield small to moderate quantities of water from shear zones in serpentine

Fault

Dashed where approximately located; dotted where concealed

Contact between geologic units

◐ A1

Water well that yields hydrothermal water
Number (*20.5°*) indicates water temperature, °C

● B3

Water well that yields mixed cation bicarbonate water

Water is associated with alluvial deposits and detrital material; occurs throughout Napa Valley; low SAR and RSC values and low to moderate hardness; excellent quality for most domestic and agricultural purposes

◆ D1

Water well that yields sodium chloride water

Water is associated with a hot-water-dominated thermal system of volcanic origin; occurs in the vicinity of Calistoga and Oakville; has moderate to nigh SAR and RSC values and boron content; low to moderate hardness; generally unsuitable for irrigation purposes; adequate for most domestic purposes

■ G3

Water well that yields magnesium bicarbonate water

Water is associated with serpentine and ultrabasic rocks; low SAR and RSC values; moderate to high hardness; generally suitable for agricultural and domestic uses

▲ C1

Water well that yields sodium bicarbonate water

Water is associated with Franciscan Formation and Cretaceous sedimentary rocks; moderate to high SAR and RSC values; low to moderate hardness; low to moderate boron concentrations; marginally adequate for domestic and most agricultural purposes

✕ 1

Water-quality sampling site on Napa River. Number refers to the sampling site in tables 5 and 6

there has been no surface evidence of hydrothermal alteration since the 1920's.

(iii) SUBSURFACE INFORMATION

The only subsurface information currently available from geologic logs on drilling reports were submitted to the California Department of Water Resources and are confidential and not available to the public. Les Youngs of C.D.M.G. has examined 225 reports, but found all geolocigal data to be inadequately reported and to have little scientific value. There has been no valid geological correlation by staff of C.D.M.G. or any other public body. C.D.M.G. does plan to drill 6 wells in September of 1980 in Calistoga and that data will be made available to the public sometime this fall, 1980.

(iv) GEO. INFORMATION

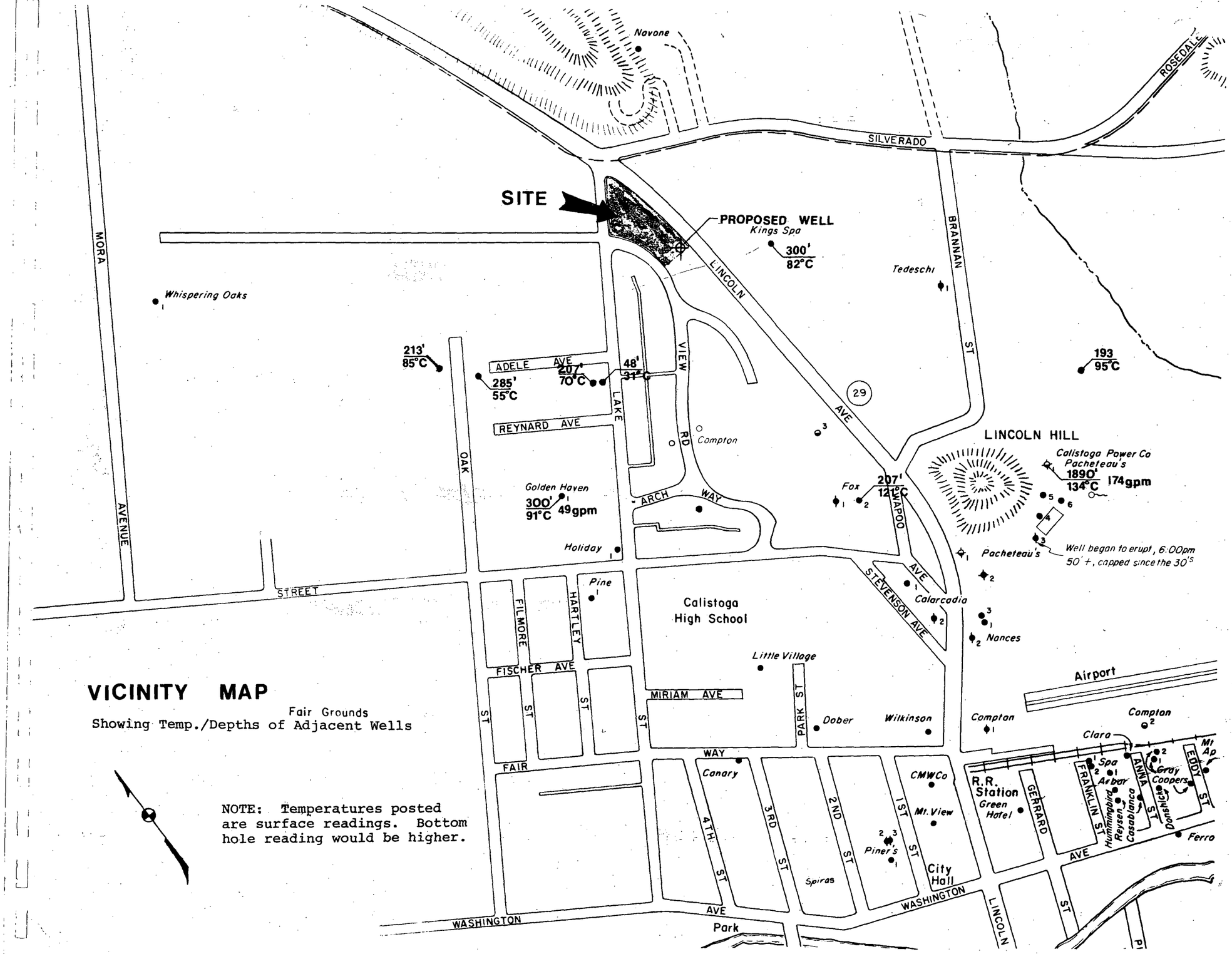
The only known research report that explores the geological, geochemical, geophysical and hydrological factors as they relate to the resource in Calistoga is being written by Les Youngs of the California Division of Mines and Geology, C.D.M.G. This report for the U.S. Department of Energy's Geothermal Energy Division Office in Oakland, California, as previously mentioned will not be available until later in the year.

Sections 5B-1. (i and v) refer to some geological and hydrological factors.

Tentative conclusions as to the origins of geothermal activity involve deep faults that are responsible for super heated water and vapor which rises toward the surface, meets an impervious layer and spreads out, creating a mushroom effect. Hence, wells near the center of this hypothetical mushroom encounter ever increasing temperatures while wells at the fringes may drill through and beyond the resource. Pacheteaus, a hot spring resort, appears to be one area of ever increasing temperatures. Wells drilled near this area would seem to have stronger chances of success. The project drill site is 1600 feet from Pacheteaus primary wells.

(v) NEGATIVE INFORMATION

There are no non-thermal springs in the near vicinity of Calistoga. According to a 1973 report by Robert E. Faye in Ground-Water Hydrology of Northern Napa Valley, California, "drillers' logs indicate that "cool" water occurs at shallow depth throughout most of the Calistoga area; however, at depths ranging from 50 to 100 feet below land surface drillers generally encounter confined, hydrothermal water."



VICINITY MAP

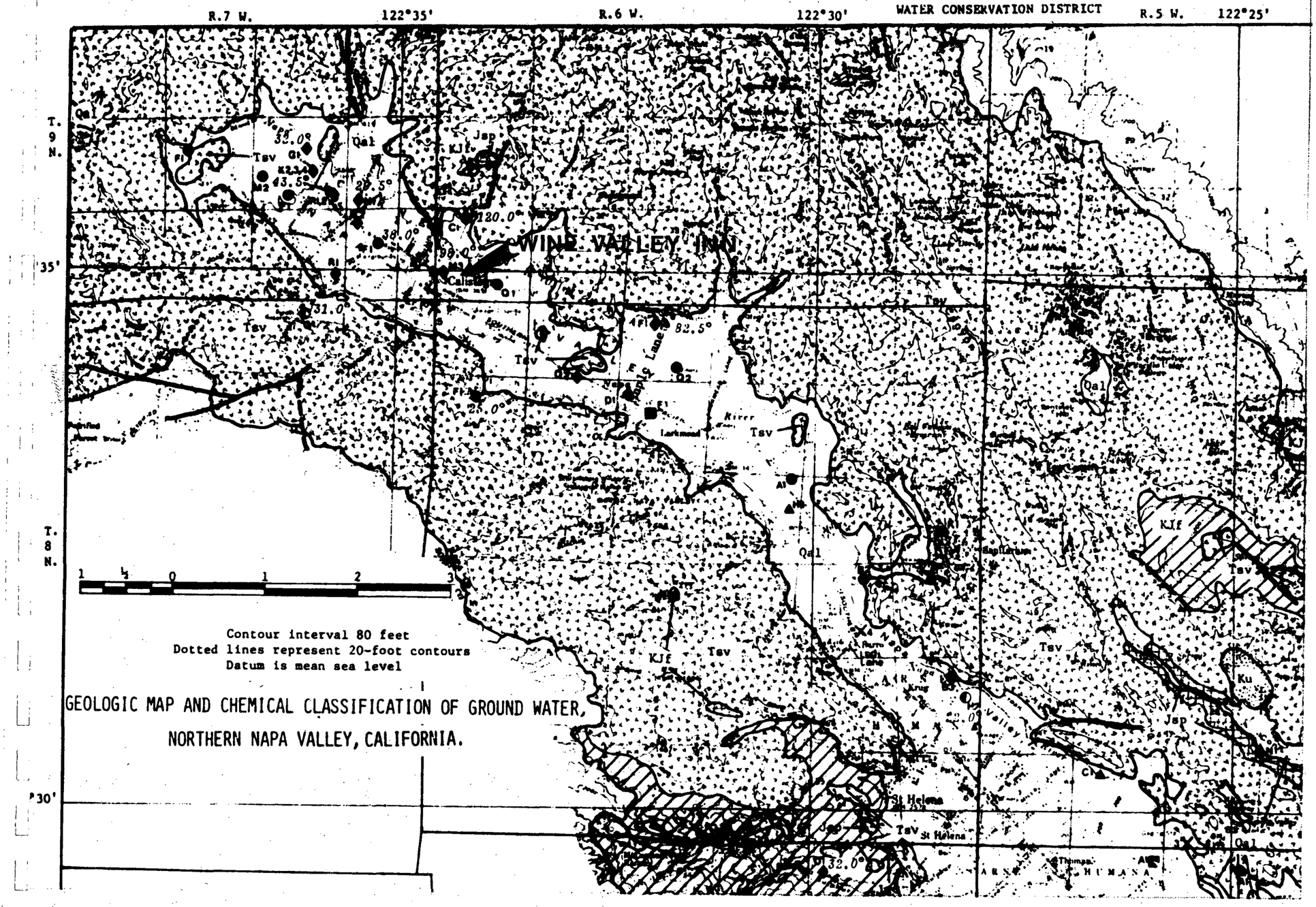
Fair Grounds

Showing Temp./Depths of Adjacent Wells

NOTE: Temperatures posted are surface readings. Bottom hole reading would be higher.

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

Prepared in cooperation with the
NAPA COUNTY FLOOD CONTROL AND
WATER CONSERVATION DISTRICT



Contour interval 80 feet
Dotted lines represent 20-foot contours
Datum is mean sea level

GEOLOGIC MAP AND CHEMICAL CLASSIFICATION OF GROUND WATER, NORTHERN NAPA VALLEY, CALIFORNIA.

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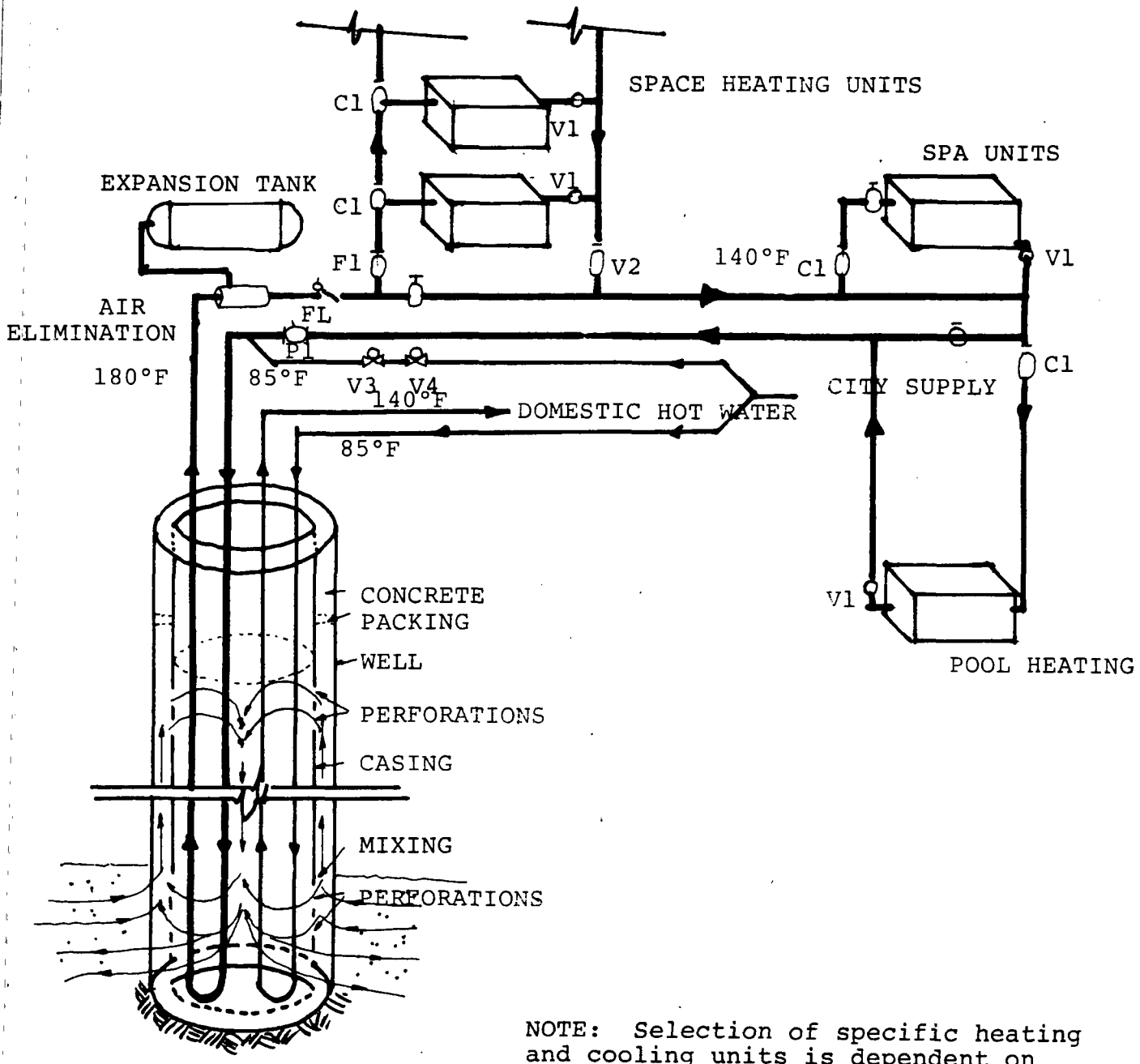


NOTE: Selection of specific heating and cooling units is dependent on composition of well.
See PART 5B.2v

C1	THERMOSTAT OR MANUALLY CONTROLLED VALVE
F1	FLOW CONTROL VALVE
P1	CIRCULATING PUMP
V1	BALANCING VALVE
V2	CHECK VALVE
V3	PRESSURE RELIEF VALVE
V4	PRESSURE REDUCING VALVE

FLOW RATES:

Space heating inlet temp. 180°F:	17.87gpm
Domestic hot water inlet temp. 140°F:	4.69gpm
Spa heating inlet temp. 140°F:	8.46gpm
Pool heating inlet temp. 140°F:	27.64gpm
Total Project Flow Rates Required:	58.66gpm

RESOURCE SCHEMATIC
USING DOWNHOLE HEAT EXCHANGER

PART 5B

2. END USE FOR HYDROTHERMAL FLUIDS

(i) PROCESS SCHEMATICS

We have reviewed the design schematic of the mechanical system with mechanical engineer consultant, Mr. Paul Larkin. We are considering placing a heat exchanger in the geothermal resource. A transfer fluid would be pumped through this exchanger and then to the end use equipment, such as: domestic hot water system, space heating equipment, pool and spa equipment.

A final decision will be made on the exact type of mechanical equipment based on the mineral content, temperatures and flow rates from the wells.

(ii) ENERGY REQUIREMENTS

The building will be designed to exceed ASHRAE Standards and the California Energy Conservation Standards for Non-Residential Buildings.

Preliminary Energy Demand Estimates are noted below:

1. Space Heating:

a) Typical Unit:

Upper: 5877 BTU/Hr x 29	170,433 BTU/HR
Lower: 4889 BTU/HR x 26	127,114 BTU/HR
End Walls: 894 BTU/HR x 17	15,198 BTU/HR
Subtotal, Guest Rooms:	312,745
x 1.15 Safety Factor	
x 1.15 Losses:	413,605 BTU/HR

x 8076 HRS/YR = 3340 x 10^6 BTU/YR

ANNUAL $\frac{413,605 \times 24 \times 2918}{42^{\circ} \text{ F DELTA T}} \equiv 690 \times 10^6$ BTU/YR.

b) Main Building: 43,974

x 1.15 x 1.15= 57,919 BTU/HR

x 8076 HRS/YR = 4.6^8 BTU/YR

ANNUAL: $\frac{57,919 \times 24 \times 2918}{42^{\circ} \text{ F DELTA T}} = 96.6 \times 10^6$ BTU/YR.

c) Total Space Heating:

HOURLY: 471,524 BTU/HR.

x 8076 HR/YR = 3808×10^6 BTU/YR.

ANNUAL: 786.6×10^6 BTU/YR.

2. Hot Tubs: 2-12' DIA. = 226 SQ. FT.

EVAP: 40786 BTU/HR.

SENSIBLE: 56,952 BTU/HR. @ 42° DELTA T

TOTAL: 97,738 x 1.15 x 1.15 = 129,259 BTU/HR.

x 8076 HR/YR = 1044×10^6 BTU/YR.

ANNUAL: $40,786 \times 807 + \frac{56,952 \times 24 \times 2918}{42^{\circ}}$

x 1.15 x 1.15 = 561×10^6 BTU/YR.

3. Pool: 25' x 50'

1405×10^6 BTU/YR. x 1.32 = 1855×10^6 BTU/YR.

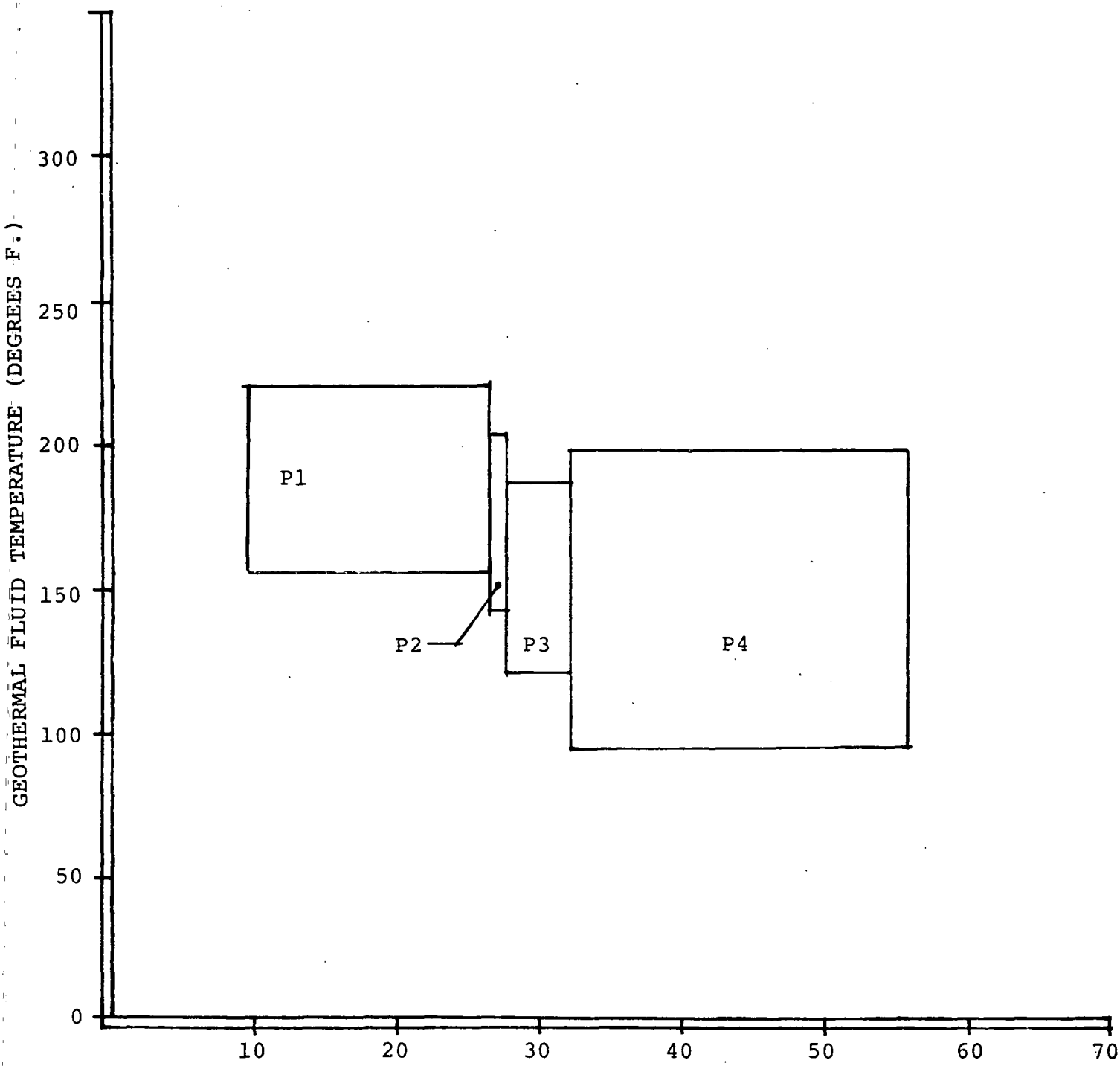
HOURLY: 320,000 x 1.32 = 422,400 BTU/HR

x 8076 HR/YR. = 3411×10^6 BTU/YR.

4. Domestic Hot Water:

385×10^6 BTU/YR x 1.32 = 772.2×10^6 BTU/YR

Figure 75% Occupancy = 579×10^6 BTU/YR.



P1 = Space Heating
P2 = Domestic Hot Water
P3 = Spa Heating
P4 = Pool Heating

ENERGY REQUIREMENTS GRAPH

5. As shown on the Energy Requirements Graph, 180°F is the inlet temperature for space heating. The flow rate would be 17.87gpm.

   With an inlet temperature of 140°F, domestic hot water, spa heating and pool heating would have flow rates of 4.69gpm, 8.46gpm and 27.64gpm respectively.

   The total flow rate required will be 58.66.

(iii) PREDICTED UTILIZATION FACTOR

	ACTUAL ANNUAL UTILIZATION	ANNUAL CAPACITY	UTILIZATION FACTOR
SPACE HEATING	787×10^6 BTU	3808×10^6 BTU	.21
HOT TUBS	561	1044	.54
POOL	1855	3411	.54
DOMESTIC HOT WATER	579	772	.75
TOTAL	3782×10^6 BTU	9035×10^6 BTU	.42

(iv) PREDICTED AVERAGE GROSS ANNUAL ENERGY CONSUMPTION (BTU/YR) THAT WILL BE MET THROUGH THE USE OF HYDROTHERMAL ENERGY.

We expect that the geothermal resource will meet 90 percent of the space heating needs, domestic hot water demand and hot tub and pool requirements. This would be 9035×10^6 equals 8131.5×10^6 BTU. The gross energy consumption, including all of the thermal energy demand noted above, in addition to lighting and ancillary uses in the "housekeeping" units cannot be estimated accurately at this time. The unknown factors include occupancy rate, user habits, etc.

PART 5 - B.3. FINANCIAL FEASIBILITY

The following data was prepared by the Owner. We believe it defines the financial structure for this project. We could not obtain in time, all of the applicable tax rates, however, we will forward this information as soon as it is available.

The type of business ia a small business - woman owned.

1. Construction of 55 units including pools, spa, parking landscaping, and reception building.

Buildings per drawings	$1,100.000.00
Room Furnishings @ $2,500.00 per unit	137,500.00
Signs and Franchise	10,000.00
Architectural Fees	25,000.00
Interest on Construction Loan 14% for 8 months	60,000.00
Development Fees	50,000.00
Land Costs	280,000.00
$1,000,000.00 Stand by Loan Fee	50,000.00
	$1,712,500.00

2. Cash Investment

Total Projected Cost of Project		$1,712,500.00
Cash Required in Project		
Down Payment on Land	$100,000.00	
Operating Reserve	100,000.00	
Cash in Construction	250,000.00	
Total Cash		450,000.00
First Deed of Trust (Savings & Loan)		1,082,500.00
Second Deed of Trust (Real Estate)		180,000.00
Total Projected Cost		$1,712,500.00

3. Debt Service

First Deed of Trust	$1,082,500.00 @ 14%	$ 151,550.00
Second Deed of Trust	$180,000.00 @ 11%	19,800.00
Total Debt Service		$ 171,350.00

4. Projected Return

Assume average room rate of $35.00 per day

	60% Occupancy Rate	70% Occupancy Rate
Gross Income	$421,575.00	$491,837.50
Operating Expenses	252,945.00(60%)	295,102.50(60%)
Net Income	168,630.00	196,735.00
Debt Service	171,350.00	171,350.00
Cash Flow	(2,720.00)	25,385.00

Assume average room rate of $40.00 per day

	60% Occupancy Rate	70% Occupancy Rate
Cash Flow	$ 21,370.00	$ 53,490.00

PART 5C LOCAL AND REGIONAL ENERGY NEEDS

In a report performed under U.S. DOE Grant No. DE-FG03-80RA50128 entitled, "Commercial Uses of Geothermal Heat", is an article which specifically addresses the regional energy needs. The title of the report is: Geothermal Direct Heat Development Projects In California:Boom Or Bust? We contacted the Author's office, Ms. Syd Willard, at the California Energy Commission. Mr. Justin Tierney, who is Ms. Willard's Assistant in charge of Commercialization and Marketing of Geothermal Energy, indicated we may use the article in this proposal.

We call attention to the Author's statement regarding the feasibility of utilizing geothermal energy on a widespread scale. "A basic problem remains, though, that despite the technical feasibility of using geothermal direct heat applications, key decision-makers, corporate planners, and commercial investors are not yet convinced of the reliability of the resource itself and the price which can be projected per unit of geothermally-provided energy."

GEOTHERMAL DIRECT HEAT DEVELOPMENT PROJECTS IN CALIFORNIA: BOOM OR BUST?

Syd Willard

California Energy Commission
Sacramento, CA 95825

ABSTRACT

Interest in California in the use of geothermal energy for direct heat applications has increased since 1976, as a result of expanded federal interest and support, and the increasing costs of conventional energy sources. California has abundant geothermal resources which have been primarily investigated for electricity generation potential, but with both industrial and developer interest on the rise, the prospect for increased levels of utilization of lower temperature geothermal resources is looking brighter. As the cost of conventional energy sources continues to escalate, the direct use option will continue to look promising, as an energy source capable of displacing conventional fossil fuels and electricity. However, forecasts for high levels of geothermal direct use must be tempered with resource assessment/confirmation activities and consideration of the economic, environmental, and political climates, before firm commitments are made.

INTRODUCTION

The use of geothermal energy in California for electricity generation is substantial. The Pacific Gas and Electric Company has 663 MW of capacity on-line, and plans to expand that capacity to over 900 MW by the end of 1980. Plans by PG&E, the Northern California Power Association, Sacramento Municipal Utility District, and the California Department of Water Resources call for a total of almost 1,700 MW at The Geysers by 1985. Development elsewhere in the State could add another 600 MW, in the same time period. It comes as no surprise, then, that geothermal energy usually is associated with the generation of electricity in California, since the bulk of the development to date has been oriented toward generation of electricity.

Despite the level of development of the State's geothermal resources for electricity generation, California lags behind other Western States in the use of geothermal energy for direct heat applications. Many reasons for this exist, including, California's mild climate, the remote nature of many of the State's hot water resources, the historical availability of economical fossil fuels and electricity, the reluctance of developers and utilities to invest in an energy source whose economics and long-term productivity are unproven, the lack of recognition and understanding of geothermal direct heat potentials, and the strong influence of the environmental preservationists. California geothermal direct heat utilization actually suffers as a result of the availability of other energy sources: solar, wind, biomass, and conventional energy sources such as oil, natural gas, and hydro-power. Before 1976, direct use of geothermal resources in California was the result of individual initiative--channeling hot water from a spring or artesian well to heat a pool or a house, provide year-round watering for stock, and to provide heat for several small greenhouse operations.

With the advent of the Department of Energy's Program Research and Development Announcement for Engineering and Economic Feasibility Studies for Direct Applications of Geothermal Energy, direct heat development began to generate some interest, albeit modest. Several generations of federally funded feasibility studies have now taken place, as well as two rounds of federally funded demonstration projects. It is now time to analyze the impact of direct utilization of geothermal resources in California, and the prognosis for the future.

CALIFORNIA'S GEOTHERMAL RESOURCES

The estimated geothermal potential of California is quite large, with only a small fraction of the potential confirmed by drilling and reservoir analysis. Hundreds of thermal springs and wells are scattered throughout the State, in 34 out of California's 58 counties. The California

Division of Mines and Geology, through the Department of Energy's State-Coupled Resource Assessment Program, is cataloguing the various water well, oil, gas, and geothermal records in the State, in an effort to determine subsurface heat measurements, bottom hole temperatures, and anomalously warm water. However, there is not yet a comprehensive or firm estimate of the magnitude of the State's direct heat geothermal resources. Even the USGS Circular 790 essentially apologizes for the lack of resource data available:

> "Current knowledge does not allow quantifying the recoverable energy for low temperature waters....The investigations that will eventually quantify and evaluate sources of low-temperature energy have barely begun in most of the promising areas of the country, and data currently available from these studies do not afford a basis for quantitive evaluation. This assessment....relies almost entirely on recent compilations of data by numerous individuals and agencies, [and] the assessment is not necessarily consistent in its approach. It is most certainly not complete".[1]

It is no wonder that direct heat uses in the State are not widespread. It will take more wells and experience with long-term productivity before sufficient understanding and confidence is developed by the potential users. (Solar energy enthusiasts, on the other hand, do not have the same fears about nor the requirement to prove the long term productivity of their resource).

CALIFORNIA'S ENERGY PICTURE

The California Energy Commission projects that the annual growth in electricity demand will not exceed two percent per year (California Energy Commission, 1979). Inherent in this demand projection is increased reliance on conservation, efficiency improvements, and accelerated uses of indigenous resources such as solar, geothermal, wind and biomass energy, and cogeneration. Although continued use of conventional fuel sources is expected to be central to California's energy picture through the year 2000, the staff projects that the use of alternative resources should be dramatically accelerated. This definitely includes the use of geothermal energy for space heating and cooling of residential and commercial buildings, process heat requirements for industry, and agricultural applications. The Energy Commission's 1979 Biennial Report made demand projections for the various market sectors using a traditional conventional outlook, and a scenario based on increased uses of alternative resources (see Table 1).

A market survey performed for the Energy Commission by Science Applications, Inc. (SAI) estimated that 56 trillion Btu's of 1980 energy demand could be displaced by using geothermal resources for industrial and commercial applications (market potential). SAI (Larson, 1980) projected that the market penetration for the industrial and commercial sectors in California could be as follows:

Year	Industrial Sector (Trillion Btu's)	Commercial Sector (Trillion Btu's)
1985	4.0	1.5
1990	12.0	4.0
1995	26.0	9.0
2000	38.0	15.0

Table 1. ENERGY CONSUMPTION IN 1978 AND 2000

Consumption (Trillion Btu)

Sector	1978	2000	
		Conventional Outlook	Alternative Resources
Residential*	836	995	908
Commercial*	464	609	571
Industrial*	1,067	1,435	1,168
Transportation	2,466	3,125	2,691
Agriculture*	93	102	100
Nonfuel Energy	160	380	380
TOTAL	5,086	6,646	5,818

(California Energy Commission, 1979)

[1]USGS Cir. 790, 1978, p.86.

Although these projections are admittedly conservative, there are a number of actions that need to take place to even realize these comparatively modest levels of use:

(1) Resources must be confirmed and proven capable of long-term productivity.

(2) Federal and State incentives must be implemented to provide low interest loans for direct heat projects, to provide tax credits and streamlined loan guarantees, and to support exploratory and confirmation drilling in areas likely to undergo development for direct utilization.

(3) Developer exploratory interest for resources suitable for direct heat applications must be heightened.

DIRECT HEAT DEVELOPMENT IN CALIFORNIA

Until 1976, utilization of geothermal energy for direct heat applications in California was confined to isolated uses of thermal springs and artesian wells for heating individual buildings and pools, a few small greenhouses, and providing year-round ice-free water for stock. In 1976 the federal government embarked on a program to study the engineering and economic feasibility of direct applications of geothermal energy. The first PRDA (Program Research and Development Announcement) resulted in five studies specifically for California sites out of a total of 18 projects and another four studies had particular emphasis or relevance for California (see Table 2). The next generation of federally sponsored feasibility studies in 1977 resulted in only six awards, two which were in California.

Table 2. CALIFORNIA DIRECT HEAT ENGINEERING AND ECONOMIC FEASIBILITY STUDIES

	Contractor	Location	Application
PRDA-1 (18 total)	Ben Holt Co.	Mammoth Lakes Village	district heating
	International Engineering Co.	Lake County	agribusiness
	Geonomics, Inc.	Lake County	agribusiness
	Westec Services, Inc.	El Centro	industrial processing
	City of Desert Hot Springs	Desert Hot Springs	agribusiness, space conditioning
	Aerojet Energy Conversion Co.	Generic Study	geothermal absorption refrig. for food processing industries
	TRW, Inc.	Generic Study focussed on Holly sugar factory in Brawley, CA	use of geothermal heat of sugar refining
	The Futures Group	Generic Study	use of geothermal heat for crop drying
	CLR Consortium	Northern CA & Nevada	controlled environment livestock production system
PRDA -2 (6 total)	Aerojet Energy Conversion Co.	Susanville	district heating and agribusiness
	Westec Service, Inc.	El Centro	space heat & cool;agribusiness
PRDA -3 (11 total)	Westec Services, Inc.	Bishop	tungsten metal processing
	Burns & Roe	El Centro	corn milling

Table 3. CALIFORNIA DIRECT HEAT DEMONSTRATION PROJECTS

	Contractor	Location	Application
PON-1	none		
PON-2	City of El Centro	El Centro	heating and cooling community center
	Aquafarms International Inc.	Mecca	aquaculture
	TRW, Inc.	Brawley	sugar beet processing
	Geothermal Power Co.	Kelley Hot Springs	pork feed lot operation
	City of Susanville	Susanville	district heating
Cal.Energy Commission (1978-1979)	Ben Holt Co.	Mammoth Lakes Village	building heating and snow melting

The federal government next initiated a modest program designed to support demonstration projects ("field experiments") for direct heat. The first PON solicitation (Program Opportunity Notice) in 1977 resulted in selection of eight projects---4 in South Dakota, 1 in Oregon, and one each in Texas and Utah. To some observors, the absence of California projects was conspicuous. The demonstration projects began in 1978, resulting in selection of 15 projects, with 5 in California; 2 each in Idaho, Utah and Nevada; and one each in Oregon, Texas, Montana, and Colorado (see Table 3).

In 1979, DOE requested additional feasibility studies and funded 11 projects, with 2 in California. A fourth generation of PRDAs is currently in the works, and it is hoped that these projects (after 35 previous feasibility analyses, and 22 demonstration projects in various stages of environmental review, resource confirmation, and construction) will focus on the critical question: When will (not can) geothermal resources be able to provide reliable and cost-effective energy for industrial, commercial, agricultural, and residential energy needs?

The federal government's program of feasibility studies and demonstration projects has been of tremendous help in providing a basis for technological and economic projections and comparisons. Federal tax and economic incentives are also resulting in more serious consideration being given to direct uses of geothermal energy. A basic problem remains, though, that despite the technical feasibility of using geothermal direct heat applications, key decisionmakers, corporate planners, and commercial investors are not yet convinced of the reliability of the resource itself, and the price which can be projected per unit of geothermally-provided energy.

The Energy Commission has undertaken an independent approach to the commercialization of direct uses of geothermal energy, while closely coordinating efforts with the federal government and its contractors. In 1976-77 the Commission administered a technical assistance grant from the Economic Development Administration to study the economic use of low temperature geothermal resources in Lassen and Modoc Counties, California. The study identified five direct heat applications with particular promise for the region--greenhouse heating, kiln drying of lumber, onion dehydration, feedlots, and aquaculture. Each of these applications has been the subject of subsequent detailed federal scrutiny and support.

In 1977, the Energy Commission supported a pilot-scale project which provided actual geothermal heating for a hardware store, and snow-melting on an adjacent walkway. The heating system employed a fresh water closed loop system, using pre-existing production and injection wells at the Casa Diablo thermal area near Mammoth Lakes Village. The project resulted in 5 months of system operation, and confirmation of technical feasibility for a scaled-up version of district heating.

The Commission then performed a market survey to establish (estimate) the potential for direct uses of geothermal energy in California. The survey entailed administration of a questionnaire to California businesses and industries to determine their energy requirements and attitudes about direct utilization of geothermal energy. On-site interviews were conducted and valuable contacts were established. Finally, the Commission is following up the results of the market survey by undertaking a case study approach to the development of implementation planning guides for businesses industry. Contracts with the potential energy consumer will be developed, and the State will cooperate in the investigation of using geothermal energy for specific representative businesses and industries. Information gathered during these projects will be used to develop generic guides for the representative market sectors. These guides will be suitable for presentation to corporate policy makers, boards of directors, and energy managers, and will help provide a basis of information upon which to base decisions to use geothermal direct heat applications.

STATUS: BOOM OR BUST?

Even though California has perhaps over half of the Nation's geothermal resources, and ten percent of the Nation's population, the State is not the leader in the utilization of geothermal energy for direct heat applications. Progress is being made, and with the escalating price of oil and gas, and increased emphasis on energy independence, one should be able to expect a greater level of reliance on geothermal direct heat over the next two decades. Several critical issues, however, must be addressed before we break out of our cautious treadmill:

1. Confirmation of geothermal resources near regions of energy demand
2. Acceptance of geothermal energy by the business community
3. Institution of strong Federal and State incentive provisions via low interest loans, tax credits, and government support
4. Streamlining of environmental procedures, in order to encourage expanded use of this comparatively low-impact energy source
5. Development of strong Federal, State, and local policies encouraging direct utilization of geothermal energy

REFERENCES

California Energy Commission, 1979, Biennial report: Sacramento, California, 67 p.

Larson, Tod C., 1980, Market survey for direct utilization of geothermal energy in California, draft final report: California Energy Commission, 57 p.

Sammel, E.A., 1978, Occurrence of low-temperature geothermal waters in the United States, in Muffler, L.J.P., ed., Assessment of geothermal resources of the United States - 1978: USGS Cir. 790, p.86-131.

U.S. Department of Energy, 1978, Engineering and economic studies for direct applications of geothermal energy: DOE Program Research and Development Announcement PRDA-03-79-ET-27004, 46 p.

U.S. Department of Energy, 1980, Geothermal direct heat applications program summary: El Centro, California, 267 p.

VTN-CSL Associates, 1977, Economic study of low temperature geothermal energy in Lassen and Modoc Counties, California: California Energy Commission and California Division of Oil and Gas, 87 p.

PART 6A.1 STATEMENT OF WORK

The overall program for this work will be completed in ten (10) tasks. Close coordination of the team members will be required throughout each individual phase and throughout the overall program.

TASK 1 - FINANCIAL

This phase will begin upon receipt of P.O.E. Award. Subcontracts will be let as required. The primary tasks in this phase are:

- Confirm all financial arrangements.
- Set up management procedure and budget/accounting procedures.
- Team review and finalizing time schedule.

TASK 2 - ENVIRONMENTAL/INSTITUTIONAL

During this phase, we shall submit an Environmental Report in accordance with DOE guidelines. Site-specific information will be detailed. Other primary tasks include:

- Provide and coordinate all information to local and state agencies such as the City of Calistoga, Napa County, State Department of Oil and Gas, State Department of Mines and Geology, Energy Extension Service and the Energy Commission's Office of Geothermal Energy.
- Obtain all required permits, leases, and other documentation in order to complete the geothermal project. If requested, provide DOE copies of documentation pertaining to the acquisition of the rights to the geothermal resource.

TASK 3 - EXPLORATION AND BIDDING

Exploration work is not necessary because a drill site can be reliably selected without the use of surface or shallow hole exploration; furthermore, sufficient exploration by California Office of Mines and Geology has already been completed. The contact person at the office is:

- Mr. Les Youngs, Geologist/Geophysicist
  CA. Division of Mines and Geology
  2815 "O" Street
  Sacramento, CA 95816
  1·916·322·8078

Bids for drilling into the thermal gradients will be obtained. Tasks for this work include:

- Prepare bid specifications and submit to DOE review.

- Obtain bids and award subcontract.
- Drill thermal gradient wells in accordance with the bid specifications.
- Obtain thermal gradient and lithology logs during drilling and continue gradient monitoring during the period of temperature stabilization subsequent to drilling.

We shall, with the support of appropriate consultants:

- Evaluate the data and other available assessment data, in order to define the hydrological and geological features of the resource with emphasis on resource location and depth. These data shall be provided to DOE as soon as it is acquired in order to minimize the time required for DOE review.
- Within ten (10) working days of the completion of this task, DOE and the participant shall discuss and review the data. A mutual written agreement between DOE and the participant will be reached concerning the need for additional data prior to proceeding with the next task.

TASK 4 - DRILLING AND LOGGING

We shall, with appropriate consultants:

- Provide for necessary drilling supervision services.
- Update the preliminary Drilling Program which will include well location, drilling techniques, well and wellhead design, anticipated rig type, drilling fluid program, logging requirements, etc. Temporary requirements, such as equipment storage areas, noise abatement, blowout prevention, utility services, and other standard well drilling practices, will be considered and addressed in the drilling plan. DOE will be advised of the contents of the Drilling Program during its preparation.
- Prepare the bid specifications and submit the Drilling Program and specification to DOE for review and approval. Within ten (10) working days, DOE shall indicate concurrence or request modifications to the specification and/or program.

We shall, with support from appropriate consultants:

- Issue the drilling specification to drilling companies for bid.
- Review the well bids and inspect, if necessary, the bidders' drilling equipment. We shall select a drilling subcontractor, with DOE concurrence. The proposed drilling subcontract shall be submitted for

DOE review and approval. Within ten (10) working days, DOE shall indicate approval or request modifications to the subcontract.

- Supervise the drilling of the production well, in accordance with the detailed Drilling Program and specifications. Periodically, we and DOE shall confer, so that decisions concerning the drilling operation can be made in a timely manner.
- Collect fluid samples, cutting samples, well logs, bottom hole and gradient temperature data and perform all other tests consistent with industry practice and the Drilling Program. Strata suitable for reinjection will be noted during drilling.
- All data concerning the well shall be forwarded to DOE as soon as they are acquired in order to minimize the time required for DOE review.
- Within ten (10) working days or the completion of the well, we and DOE shall discuss and review the data. A mutual written agreement between us will be reached prior to proceeding with the next task.

TASK 5 - FLOW TESTING

We shall, with the support from appropriate consultants:

- Provide the necessary flow testing services.
- Update the flow test plan and submit it to DOE for review and approval. Within fifteen (15) working days DOE shall indicate concurrence or request modifications to the plan.

We shall, with the support from appropriate consultants:

- Carry out a comprehensive well and reservoir test program.
- Assimilate the test data during the well test and estimate reservoir yield and production life.
- The well testing and other available data shall be prepared and presented to DOE.
- Within ten (10) working days, we and Doe shall discuss and review the well test results.
- A mutual, written agreement between DOE and us must be reached to determine a future course of action.

TASK 6 - INJECTION WELL

We shall essentially follow the steps as noted in TASK 5. At this time we are not certain if an injection will be necessary for our requirements. Depending upon the thermal and mineral characteristics of the geothermal resource, we may insert heat exchangers in the wells instead of pumping the resource to the surface.

TASK 7 - DETERMINATION OF COST SHARE

We and DOE shall review all test results and costs and determine the DOE and participant cost shares. The basis for the determination of the cost shares shall be the variable cost share plan contained in Section B of the Cooperative Agreement. Modifications to the cost share plan may be negotiated if necessary.

TASK 8 - PROJECT MANAGEMENT

We shall manage the project in a prudent manner consistent with successfully completing the Statement of Work. Management controls shall include technical assessment, budget assessment and schedule assessment. Approval authority will be the basis for much of the project management. Project costs, scheduling and reports will be the responsibility of the Project Manager, John Lewis.

In addition to close general coordination with DOE, we shall make immediate and full disclosure of problem areas to DOE, if necessary, so that timely corrective action may be taken with DOE support.

TASK 9 - REPORTING

The reports identified on the attached DOE Form CR-537, Reporting Requirements Checklist, will be submitted as required.

TASK 10 - DISSEMINATION OF INFORMATION

Throughout the project we shall prepare press releases, business and technical articles for trade journals. DOE concurrence shall be obtained on all information prepared for public release, prior to the release of this information.

We shall design and erect a job sign in good taste and of appropriate construction at the facility, which will define the project objective and parties to the project.

With regard to written and oral public information, we shall:

- Include appropriate recognition of the roles of the principal parties involved in work performed under this Agreement.
- Avoid statements or implications that the Department of Energy endorses any process or product arising out of the contract, without advance approval of the Contracting Officer.
- We shall prepare a slide show for use by State and Local officials and the Energy Extension Service.
- A brochure shall be developed and distributed describing the system.

- A geothermal system display shall be installed in the lobby for public awareness.
- We shall provide DOE one copy of news releases, information folders, brochures, advertisements, technical papers, and magazine or newspaper articles pertaining to work performed under the Agreement.
- We shall advise the Contracting Officer of news media or public reactions to work performed under the Agreement.

TASK 11 - DOE CONFERENCES

Occassionally, we shall attend geothermal technology conferences at DOE's request. Participation in these conferences shall be reimbursed by DOE, if prior written approval has been obtained.

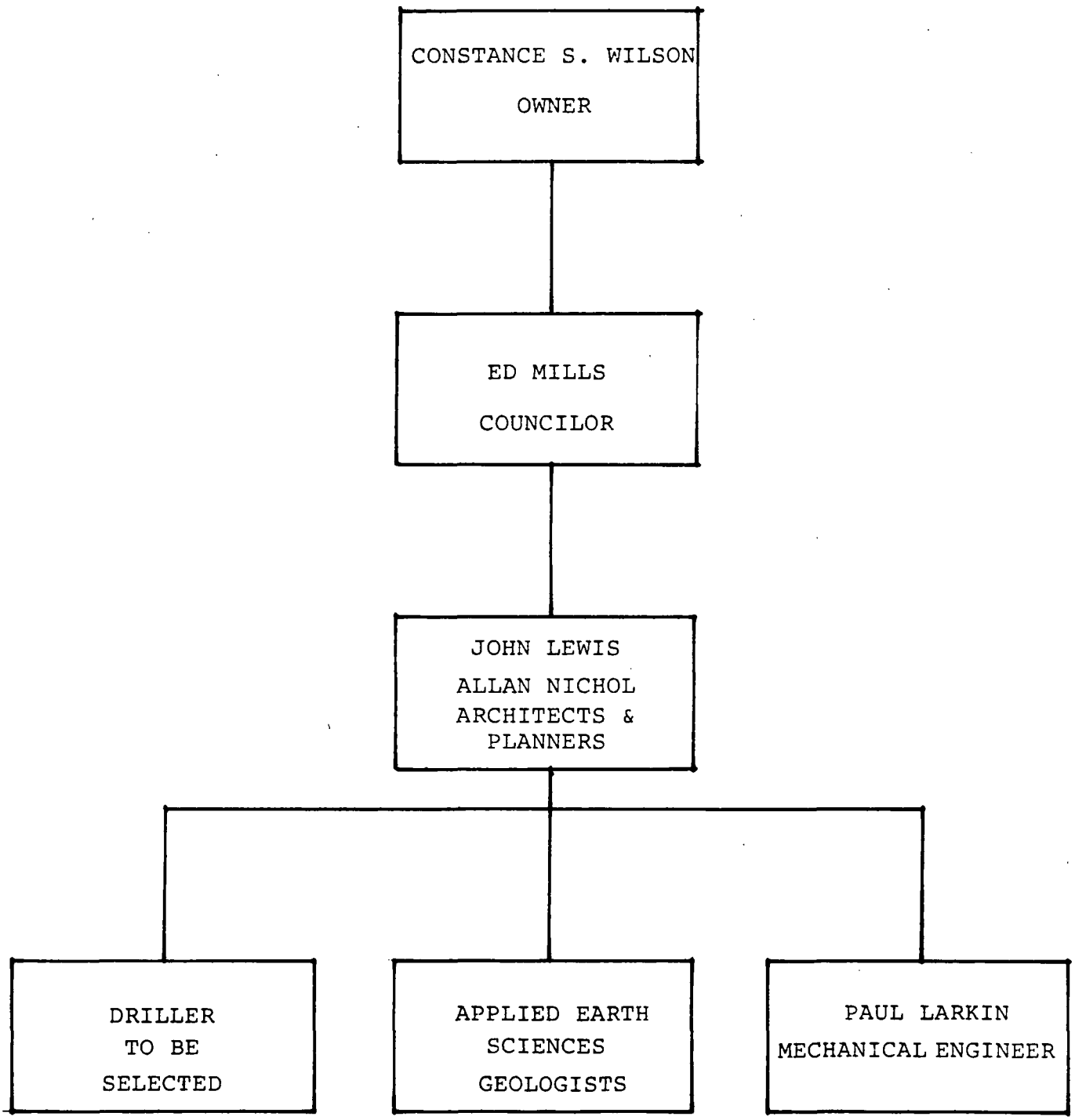


TABLE OF ORGANIZATION

PART 6A.3 CONSULTANTS AND CONTRACTORS

The owner, Ms. Connie Wilson, has contracted with Lewis and Nichol, Architects, to manage the project. Mr. John Lewis, Architect, has been designated the Contract Manager. The primary functions of the Architect will be to manage the contract, report to DOE and the owner, and information dissemination.

Applied Earth Sciences Incorporated will be the Geological concern responsible for well testing, well cuttings, daily drilling reports, test data and logs. They will report to the Program Manager.

Mr. Paul Larkin and Mr. Leonard Fisher are Mechanical Engineers who will be responsible for design integration of the HVAC System, working drawing and specification preparation, system checkout and reporting.

SCHEDULE AND COST SUMMARY

TASK	COST	SCHEDULE	
		START DATE	END DATE
1. Financial	N/A	12/1/80	12/8/80
2. Environmental and Institutional	$16,200.	12/8/80	1/5/81
3. Exploration (site has been chosen)	N/A	N/A	N/A
4. Drilling and Logging	$75,700.	1/12/81	3/2/81
5. Flow Testing	$11,400.	1/19/81	3/9/81
6. Injection Well (if necessary)	$10,600.	1/12/81	3/2/81
7. Determination of Cost Share	N/A	3/16/81	3/30/81
8. Project Management	$ 3,300.	12/1/81	(end of project)
9. Reporting	$ 3,000.	(per requirements of Form CR-537)	
10. Dissemination of Information	N/A	N/A	
11. DOE Conferences:	(reimbursable as requested)		

MILESTONE SUMMARY

MILESTONE NO.	COMPLETION DATE
1. Financial	12/8/80
2. Environmental	1/5/81
3. Exploration	N/A
4. Drill site selection	3/2/81
5. Flow Test	3/9/81
6. Drilling	3/2/81
7. Cost Share	3/30/81

PART 6 - B.2.

The following resumes are included in this proposal:

1. Applied Earth Sciences, Inc.
   6090 Fredericks Road
   Sebastopol, CA 95472
   (A Minority Owned Business)

2. John T. Lewis, Architect
   Lewis & Nichol, Architects and Planners
   876 Gravenstein Highway
   Sebastopol, CA 95472
   (707) 829 - 2256

3. Allan Nichol, Architect
   Lewis & Nichol, Architects and Planners
   876 Gravenstein Highway
   Sebastopol, CA 95472
   (707) 829 - 2256

4. Paul Larkin, Mechanical Engineer
   1286 Sexton Road
   Sebastopol, CA 95472
   (707) 823 - 1168

5. Leonard A. Fisher, Mechanical Engineer
   3841 25th Street
   San Francisco, CA 94114
   (415) 282 - 1827

PART 6 - B.2. (CONTINUED)

Persons who will work on the project but for whom no funds are requested include:

1. Mr. Les Youngs, Geologist/Geophysicist
   California Division of Mines and Geology
   Capacity: Advisory Role

2. Mr. Justin Tierney, Program Manager
   California Energy Commission/Geothermal Energy Commercialization and Marketing
   Capacity: Advisory Role

3. Mr. Robert Van Horn, Executive Director
   G.R.I.P.S. Commission (Geothermal Research, Information and Planning Services for Lake, Mendocino, Napa, and Sonoma Counties)
   Capacity: Advisory Role

4. Mr. Kenneth Sterling, Geothermal District Engineer
   California Division Oil and Gas
   Capacity: Advisory Role

5. Mr. Edward Mills, Attorney
   601 California Street
   San Francisco, CA 94108

SUMMARY DESCRIPTION

Firm:	Applied Earth Sciences, Inc.
Address:	6090 Fredericks Road, Sebastopol, CA 95472
Telephone:	(707) 823-4082
Principals:	Naohiko Noguchi, Richard A. Holsinger, and Rogers E. Johnson
Consultants:	Gerald E. Weber and William R. Cotton
Personnel:	Three Certified Engineering Geologists One Registered Geologist One Registered Soil Engineer Three Staff Geologists
Services:	Engineering Geology Geologic Hazards Seismic Safety Foundation Engineering Soil and Rock Mechanics Soil and Rock Dynamics Waste Disposal Engineering Geologic and Engineering Research
History:	Established in Sebastopol in 1978

INTRODUCTION

Applied Earth Sciences is a California corporation comprised of consulting engineering geologists and geotechnical engineers. This firm qualifies under the Federal Guidelines as a minority business enterprise.

We at AES offer specialized consulting services in engineering geology and geotechnical engineering. This brochure summarizes the technical capabilities of our staff in these areas.

We can offer personalized services with a high professional standard. Our effort is focused on providing accurate data and practical recommendations within strict time and budgetary constraints.

Our staff has been associated with California's leading consulting firms, and we have extensive knowledge of the geology and geotechnical problems in this area. On projects with unusual technical complexities, we can extend our capabilities through professional affiliations with leading specialists in academic and consulting fields.

MAJOR TECHNICAL CAPABILITIES

GEOLOGY, ENGINEERING GEOLOGY, AND GEOPHYSICS

Geotechnical investigations often require evaluation of such geologic hazards as active faults, landslides, and expansive soils for practical site development. AES provides a full range of geotechnical services from initial reconnaissance of the site to final development design.

A rapid, accurate, yet relatively inexpensive evaluation of large areas for planning and development purposes can be achieved through photogeology and field reconnaissance. This relatively small investment in preliminary studies of geology, soils, and hydrology provides valuable returns. Early recognition and avoidance of geologically hazardous conditions permits rational project planning and results in design and construction cost savings.

Our senior staff has mapped landslides and other surficial features totaling approximately 2,117 square miles (or 1,354,900 acres), including 193 square miles of Geysers-Calistoga and adjoining Known Geothermal Resources Area (KGRA). The 193 square miles represents approximately 30 percent of the total KGRAs.

Typical Applications

- Land-use planning and development studies
- Geologic hazards evaluations
- Landslide and slope stability evaluations
- Rock rippability and soil over burden thickness determination
- Source area and quantity and quality of construction materials evaluations
- Alquist-Priolo Special Studies

ENVIRONMENTAL GEOLOGY AND IMPACT ASSESSMENT

Our staff has extensive experience in assessing the geotechnical and hydrologic aspects of the environment. Working as members of multidisciplinary teams, we provide data about the following elements of environmental assessments and EIR/EISs:

Typical Elements

- Landform and topography
- Geologic hazards
- Seismicity
- Soils
- Hydrology: groundwater and surface water
- Mineral resources

GEOTECHNICAL ENGINEERING

Geotechnical engineering is a related discipline which is applied to various phases of project design and construction. AES engineers have experience in providing design criteria for foundations and earthworks for projects ranging from a single residential structure to nuclear power plants.

Typical Services

- Subsurface exploration, sampling, and field testing
- Laboratory soil and rock testing
- Recommendation of foundation design criteria and alternate foundation schemes
- Design criteria for site grading
- Design criteria for dewatering, shoring and bracing
- Design criteria for retaining walls, tie-backs, underground pipelines and other special structures.

SOIL DYNAMICS, EARTHQUAKE ENGINEERING AND SEISMOLOGY

AES assesses design earthquake ground motions for existing and proposed structures and evaluates the effects of seismic shaking on foundation materials and earth embankments.

Typical Applications

- Earthquake magnitude and recurrence-frequency estimates on active faults
- Design earthquake evaluation
- Ground response analysis
- Development of seismic design criteria
- Ground failure potential analyses
- Evaluation of liquefaction
- Development of structural potential design response spectra
- Soil/structure interaction analyses
- Machine foundation vibration

GROUNDWATER AND SURFACE WATER HYDROLOGY

AES provides groundwater and surface water assessment for resources development, pollution control, and management purposes.

Typical Services

- Location of groundwater resources by geologic study, subsurface, and geophysical exploration
- Groundwater studies: pollution control, drawdown, subsidence, and recharge

WASTE DISPOSAL ENGINEERING

To meet the ever-increasing volume of waste disposal problems, AES provides a complete service from the initial site selection and feasibility study to providing criteria for safety terminating the site.

Typical Services

- Feasibility study
- Site investigation
- Design criteria (control of leachate and gasses)
- Water and air quality and health hazards control
- Upgrading of existing landfills
- Termination criteria

EARTHWORK INSPECTION, CONSULTATION, AND TESTING

AES provides geotechnical engineering observation, consultation, and testing during the construction of foundations and earthworks.

Typical Inspections and Consultations

- Plan and specification review
- Construction monitoring
- Analysis of seepage and underpinning problems
- Locating and evaluating earth construction materials (borrow areas)
- Planning for disposal of construction waste
- Appraisal of stability of excavation walls
- Trenches, piers, pile-driving, and site grading
- Field density and moisture testing

NAOHIKO NOGUCHI

Principal
Chief Engineering Geologist

REGISTRATION

Registered Geologist and Certified Engineering Geologist in California and Oregon.

EDUCATION

M.S., Earth Sciences: University of California, Santa Cruz, 1972.
B.A., Geology: California State University, San Francisco, 1969.
B.S., Science-Business: California State University, San Francisco, 1965.

PROFESSIONAL HISTORY

Applied Earth Sciences, Sebastopol, California; Principal, Chief Engineering Geologist, 1978-date.
Logistics International Consultants, San Francisco, California; Chief Engineering Geologist, 1977-1978.
Cooper-Clark and Associates, Novato and Palo Alto, California; Staff Engineering Geologist and Project Engineering Geologist, 1972-1977.
Glaciological and Arctic Sciences Institute, Juneau, Alaska; Fellow of the National Science Foundation, 1969.

REPRESENTATIVE EXPERIENCE

Mr. Noguchi has 9 years experience in the fields of environmental and engineering geology. He has a broad spectrum of geotechnical and geoplanning experience with various public agencies and private industries including geothermal development. His responsibilities include project planning on both site specific and regional levels, aerial photographic interpretation and field geologic mapping, seismic safety analysis, slope stability analysis, and surface and groundwater evaluation.

For LOGISTICS INTERNATIONAL CONSULTANTS, Mr. Noguchi was the project manager of the geologic portion of the Richmond Tunnel Sewer Project. This included subsurface drilling and logging, using rock-coring equipment, aerial photographic interpretation, geologic mapping, rock joint and fracture mapping, and preparation of the geologic report with recommendations for assessing possible tunnel conditions.

For COOPER-CLARK AND ASSOCIATES, Mr. Noguchi organized and conducted a broad spectrum of geotechnical and geoplanning investigations for various public agencies and private industries. His responsibilities included project planning, aerial photographic interpretation, and field investigation -- specifically, mapping bedrock geology and surficial deposits, locating active and/or potentially active faults, performing slope stability analysis, recommendations for grading criteria for cut and fill slopes, evaluating ground and surface water, and mapping landslides of a regional scale from aerial photographs and limited field work.

NAOHIKO NOGUCHI

REPRESENTATIVE EXPERIENCE, continued

For the GLACIOLOGICAL AND ARCTIC SCIENCES INSTITUTE, Mr. Noguchi's duties included seismic profiling of glacier, measurement of glacier flow, and precision survey work.

TEACHING EXPERIENCE

University of California, Santa Cruz; Teaching Assistant, 1969-1970.

SELECTED PROJECTS

- Preliminary Landslide Maps--Investigation and delineation of landslides by analyzing aerial photographs of over 1,400 square miles in portions of Lake, Sonoma, Napa, and Solano Counties, California.
- Regional Landslide Investigation--Consisting of identifying delineation, classifying known and suspected areas of instability in the 439 square miles of Santa Cruz County, California.
- Hospital Seismic/Geologic Studies--Evaluation of the Healdsburg/Rodgers Creek Fault in Sonoma County, California.
- Feasibility study for waste water disposal system--Irrigation and percoration system for the North Marin County Municipal Water District, Marin County, California.

PUBLICATIONS

"Reconnaissance Photo Interpretation Map of Landslide in 24 Selected 7.5 Minute Quandrangles in Lake, Napa, Sonoma, and Solano Counties, California," U. S. Geological Survey Open File Map 76-74, 1976. (Co-author)

"Regional Landslide Map, Geysers -- Cow Mountain Study Areas, Mendocino, Lake, and Sonoma Counties, California," U.S. Bureau of Land Management, 1976. (Co-author)

"Preliminary Map of Landslide Deposits in Santa Cruz County, California," U. S. Geological Survey, and County of Santa Cruz, 1974. (Co-author)

"Quantitative Geomorphology and Relative Rate of Erosion, Pescadero Creek Basin, San Mateo County, California," M.S. Thesis, University of California, Santa Cruz, 1972.

PROFESSIONAL AFFILIATIONS AND HONORS

Association of Engineering Geologists
Geological Society of America
Landslide Society of Japan
Chancellor's Patented Fund for Graduate Research, University of California, Santa Cruz
Out-of-State Tuition Fellowship, University of California, Santa Cruz

RICHARD A. HOLSINGER

Principal
Chief Geotechnical Engineer

REGISTRATION

Registered Civil Engineer in California

EDUCATION

M.S., Soil Mechanics: University of California, Berkeley, 1974.
B.S., Civil Engineering: University of California, Berkeley, 1973.

PROFESSIONAL HISTORY

Applied Earth Sciences, Sebastopol, California; Principal, Chief Geotechnical Engineer, 1978-date.
Holsinger & Associates, Oakland, California; Chief Engineer, 1978.
Woodward-Clyde Consultants, San Francisco, California; Senior Staff Engineer 1975 1976.
Lowney/Kaldveer Associates, Palo Alto, California; Staff Engineer, 1974.

REPRESENTATIVE EXPERIENCE

Mr. Holsinger has experience with a wide range of geotechnical services including site selection studies, field explorations, laboratory testing programs, engineering analysis, construction consultation; as well as landslide evaluations, settlement investigations, erosion control, and soil stabilization.

For WOODWARD-CLYDE CONSULTANTS, Mr. Holsinger conducted a wide variety of geotechnical investigations, applying the principles of soil mechanics to the solution of engineering problems. These applications included: slope stability of natural and fill embankments, foundation recommendations for both lightly and heavily loaded structures, embankment erosion control, engineering evaluations of groundwater seepage together with control measures, and geotechncal field explorations for major structures including earth dams. Mr. Holsinger also contributed to the geotechnical investigation and foundation engineering for a proposed nuclear power plant.

Mr. Holsinger was a major contributor to several geotechnical aspects of the trans-Alaska pipeline project. These aspects included evaluation of thaw plug stability in slopes undergoing thaw, the effects of arching on differential settlements, evaluation of test data from long-term pile loads tests in permafrost soils, evaluation of creep strength of frozen soils by laboratory tests, evaluation of a soil-bentonite pond liner for emergency oil containment at the Valdez terminal, evaluation of the thermal energy content of frozen soils by laboratory tests, and the preparation of a manual for Trans-Alaska pipeline geotechnical surveillance.

RICHARD A. HOLSINGER

REPRESENTATIVE EXPERIENCE, continued

For LOWNEY/KALDVEER ASSOCIATES, Mr. Holsinger conducted subsurface investigations and foundation analysis for a variety of proposed structures. He also conducted a seismic response analysis for a major industrial complex near San Jose, California.

Between 1962 and 1979, Mr. Holsinger gained diversified experience in the construction industry. Working initially as a carpenter, he developed practical expertise in many phases of construction, from foundation forming through all aspects of wood framing to finished carpentry. Later, he held responsible positions in surveying and layout work, scheduling, cost estimating, and construction supervision.

TEACHING EXPERIENCE

Chabot College, Hayward: Instructor, Soils Laboratory, 1978-date.

SELECTED PROJECTS

- Alyeska Special Studies--State-of-the-art analytical and laboratory studies in frozen soil mechanics for Alyeska Pipeline Service Company.
- Poison Basin Uranium Tailings Dam--Geotechnical investigations and site selection studies for Urangesellschaft, USA, Inc.
- Product Storage Bins--Geotechnical investigation and foundation recommendations for 15,000-ton storage bins, Allied Chemical Corporation.
- Hospital Additions--Geotechnical investigation and foundation recommendations for Community Psychiatric Services, Santa Ana, California.
- Barge Assembly Area--Geotechnical feasibility evaluation including field investigation and design recommendations, Kaiser Steel Corporation.
- Petroleum Storage Tanks--Geotechnical investigation and foundation recommendations for Union Oil Company.
- Chemical Plan Additions--Geotechnical investigation and foundation for recommendations for Stauffer Chemical Company.

PROFESSIONAL AFFILIATIONS AND HONORS

Member, Structural Engineers Association of Northern California
Member, East Bay Structural Engineers Society
Phi Beta Kappa - Honorary Fraternity for the Liberal Arts and Sciences
Tau Beta Pi - Honorary Engineering Fraternity
Meritorious Achievement Award, American Society for Testing and Materials

ROGERS E. JOHNSON

Principal
Senior Engineering Geologist

REGISTRATION

Registered Geologist and Certified Engineering Geologist in California and Oregon.

EDUCATION

Ph.D. Candidate, Applied Earth Sciences: University of California, Santa Cruz.
B.A., Geology: California State University, San Francisco, 1969.

PROFESSIONAL HISTORY

Applied Earth Sciences, Sebastopol, California; Principal, Senior Engineering Geologist, 1979-date.
R. E. Johnson, Santa Cruz, California; Consulting Geologist, 1974-1979.
Western Continental, Santa Cruz, California; Chief Engineering Geologist, 1975-1977.
R. E. Johnson, Santa Cruz, California; Project Engineering Geologist, 1973-1975.
Gribaldo, Jones & Associates, Mt. View, California; Geologist, 1969-1970.
Shannon & Wilson, Inc., Burlingame, California; Field Engineer, 1967-1968.
Hawke Engineers, San Francisco; Field Engineer, 1965-1966.
U.S. Army, Construction Engineering Branch, Thailand; Terrain Analyst, 1963-1965.

REPRESENTATIVE EXPERIENCE

Mr. Johnson has 13 years experience in engineering, geology, and soil engineering. He is familiar with soil mechanics testing procedures and soils sampling, hydrologic monitoring, and instrumentation including slope stability monitoring. His specialties include coastal processes land use studies in seismic hazard zones, and evaluation of geologic and hydrologic hazards.

During the last six years, Mr. Johnson has been preparing geologic and hydrologic reports related to various geologic hazards.

For GRIBALDO, JONES & ASSOCIATES, Mr. Johnson primarily did field work on earthfill projects. He did occasional geologic reconnaissance and earth stabilty monitoring.

For SHANNON & WILSON, INC, Mr. Johnson spent approximately 50% of his time in the field logging soil investigation borings, installing and monitoring ground stability equipment, and doing geologic reconnaissance. The remainder of his time was spent in a soil mechanics laboratory where all the routine soil tests were performed.

For HAWKE ENGINEERS, Mr. Johnson was in charge of the soils laboratory where all soils tests were performed. His office work included engineering calculations on foundation design and ground stability. His field work involved logging soil investigation borings, caisson inspection, fill control, concrete inspection, etc.

ROGERS E. JOHNSON

REPRESENTATIVE EXPERIENCE, continued

For the U.S. ARMY, CONSTRUCTION ENGINEERING BRANCH, Mr. Johnson was in charge of the Quality Control Section of a Construction Battalion that was building an asphaltic concrete highway. He performed soils tests and conducted explorations for road materials.

REPRESENTATIVE GROUNDWATER RESOURCES RELATED PROJECTS

- Salt water intrusion and evaluation of groundwater resources for a 700-acre Forest Meadow Residential Development, along Santa Cruz coastal area, Santa Cruz County, California.

- Groundwater resources evaluation for a 400-acre Hanuman Fellowship retreat, Santa Cruz County, California.

TEACHING EXPERIENCE

University of California, Santa Cruz: Teaching Assistant and Research Assistantship, 1971-1973.

University of California, Santa Cruz: Teaching Fellow, 1973.

PUBLICATIONS

"Coastal Erosion, Santa Cruz County," California Division of Mines and Geology, California Geology, Volume 32, pp. 67-76, 1979. (Co-author)

"Effects of the Santa Cruz Yacht Harbor on Coastal Processes of Northern Monterey Bay, California," Environmental Geology, Volume 1, pp. 299-312, 1976. (Co-author)

"Effects of the Santa Cruz Yacht Harbor on Coastal Processes in the Santa Cruz Area, California," Abs. 9th Congress, International Union of Quanternary Research, Christchurch, New Zealand, December 1973.

"Primary Fabrics of some Lapili Tuff and their Use in Aiding Determination in Deformed Volcanic Clastic Rocks," Geological Society of America, Abs. with Programs, Cordilleran Section, pp. 248-249, 1972. (Co-author)

PROFESSIONAL AFFILIATIONS AND HONORS

Geological Society of America
Chancellor's Patented Fund for Graduate Research, University of California, Santa Cruz

GERALD E. WEBER

Consulting Geologist

REGISTRATION

Registered Geologist in California

EDUCATION

Ph.D. Candidate, Geology: University of California, Santa Cruz.
M.A., Geology: University of Texas, Austin, 1968
B.A., Geology: University of California, Riverside, 1962

PROFESSIONAL HISTORY

Applied Earth Sciences, Sebastopol, California; Consulting Geologist, 1978-date.
U.S. Geological Survey, Pacific Environmental Branch, Menlo Park, California, Geologist, 1971-date.
Self-employed Geologic Consultant, 1966-1968, 1972-1978.
Ferguson & Bosworth Oil Exploration, Petroleum Geologist, 1968-1970.
Union Oil Company of California, Petroleum Geologist, 1964-1966.

REPRESENTATIVE EXPERIENCE

Mr. Weber has over 18 years experience as a geologist. He has a strong, overall background with emphasis on petroleum geology, environmental geology, and Pleistocene Geology. His experience includes: extensive surface and subsurface studies as a petroleum geologist in California and the Rocky Mountains; use and interpretation of reflection and refraction seismic data, gravity studies and electrical resistivity, sonic, and other types of well-logging techniques; geologic field mapping with an emphasis toward fault mapping and studies of Pleistocene stratigraphy; three years as geologic advisor to the Santa Cruz County Planning Department and acting county geologist.

Mr. Weber's work with the U. S. GEOLOGICAL SURVEY was on the San Francisco Bay Regional Study and consisted of extensive fault mapping and studies of Quaternary stratigraphy and soils in coastal San Mateo County and along the southern portion of the San Francisco Bay. The coastal work has been primarily concerned with coastal erosion rates and studies of marine terrain deformation along the San Gregorio fault zone. He is presently working on two contracts with the U. S. Geological Survey to study recurrence intervals along the San Gregorio fault zone and also the San Simeon fault zone in San Luis Obispo County.

As a SELF-EMPLOYED CONSULTING PETROLEUM GEOLOGIST, Mr. Weber has prepared reports on the petroleum potential of the Santa Cruz Mountains, and Eastern Utah, and has carried out regional subsurface studies in the San Joaquin and Sacramento Valleys and the Ventura Basin.

REPRESENTATIVE EXPERIENCE, continued

For FERGUSON & BOSWORTH OIL EXPLORATION, Mr. Weber performed surface and subsurface regional exploration studies in California Tertiary basins and the Rocky Mountains.

For UNION OIL COMPANY OF CALIFORNIA, Mr. Weber worked as a petroleum geologist, conducting subsurface regional exploratory studies and detailed developmental studies for secondary recovery operations. He has prepared detailed geologic reports on the Cymric, Northern Midway-Sunset, and Southern Kern River oilfields. Field work included mapping portions of the west side of the southern San Joaquin Valley and the southern flank of the Ventura Basin.

TEACHING

De Anza College: Instructor, 1977-1979.
University of California, Santa Cruz: Instructor, 1975, 1979.
University of California, Santa Cruz: Teaching Fellow, 1972-1974.
University of California, Santa Cruz: Teaching Assistant, 1971.
University of Texas, Austin: Teaching and Laboratory Assistant, 1962-1964.
University of California, Riverside: Teaching, Field, and Laboratory Assistant, 1958-1962.

PUBLICATIONS

"Coastal Tectonics and Coastal Geologic Hazards in Santa Cruz and San Mateo Counties," Field Trip Guide, Geological Society of America, Cordilleran Section, 1979. (Co-author)

"Recurrence Intervals for Surface Faulting Along the Frijoles Fault and the Ano Nuevo Thrust Fault of the San Gregorio Fault Zone, San Mateo County, California," Geological Society of America, Abs. with Programs, Cordilleran Section, pp. 134, 1979. (Co-author)

"Changes in Beach Sediment Supply and Coastal Erosion Rates Near Ano Nuevo, San Mateo County, California," Geological Society of America, Abs. with Programs, Cordilleran Section, pp. 134, 1979.

"Subsurface Facies Variations in the Metralla Sandstone Member of the Tejon Formation in the Wheeler Ridge and North Tejon Oil Fields, Kern County, California. In sedimentary Facies Changes in Tertiary Rocks: California Transverse and Southern Coast Ranges," Guidebook for SEPM Field Trip 2, Annual Meeting, pp. 34-39, 1973.

"Holocene Movement on the San Gregorio Fault Zone near Ano Nuevo, San Mateo County, California," Geological Society of America, Abs. of Programs, Vol. 6, No. 3, pp. 273, 1974. (Co-author)

"Late Pleistocene Coastal Tectonics, Half Moon Bay, California," Geological Society of America, Abs. with Programs, Vol. 7, No. 3, pp. 338, February 1975. (Co-author)

GERALD E. WEBER

PUBLICATIONS, continued

"Late Pleistocene and Holocene Tectonics of the San Gregorio Fault Zone between Moss Beach and Point Ano Nuevo, San Mateo County, California," Abs. for Geological Society of America Cordilleran Section Meeting (April 5-7). Paper for Symposium on San Gregorio-Hosgri Fault System, 1977. (Co-author)

"Long Range Study of Intertidal Zone Erosion Rates in San Mateo and Santa Cruz Counties, California," pp. 84-86.

"Marine Terrace Deformation: San Mateo and Santa Cruz Counties," pp. 114-121. (Co-author)

"Seismic Refraction Studies and Techniques," pp. 114-121. (Co-author)

(Three above articles published in Progress Report on the U.S.G.S. Quaternary Studies in the San Francisco Bay Area. Guidebook for Friends of the Pleistocene Convention, October 6-8, 1972.)

PROFESSIONAL AFFILIATIONS AND HONORS

American Geological Institute
Geological Society of America
Society of Economic Paleontologists and Mineralogists
Dissertation Year Teaching Fellow, University of California, Santa Cruz
George Coates Scholarship for Thesis Research
Hewett Club (Geology Club, UCR) award to outstanding senior in earth sciences

WILLIAM R. COTTON

Consulting Engineering Geologist

REGISTRATION

Registered Geologist and Certified Engineering Geologist in California.

EDUCATION

M.S., Geology: San Jose State University, San Jose, California, 1967.
B.A., Geology: San Jose State University, San Jose, California, 1962.

PROFESSIONAL HISTORY

Applied Earth Sciences, Sebastopol, California; Consulting Engineering Geologist, 1979.
William Cotton & Associates, Inc., Los Gatos, California; President, 1964-date.
Cities of Saratoga, Cupertino, Los Altos Hills, Portola Valley, Woodside, and South San Francisco, California; Geologic Consultant.
U.S. Geological Survey Branch of Western Environmental Geology, Menlo Park, California; Geologist, 1970-1972.

REPRESENTATIVE EXPERIENCE

Mr. Cotton has over 15 years experience in the fields of engineering geology and environmental earth science. His work with clients has included federal, state, county and city agencies, and private corporations and individuals from a widespread area of California.

As president of WILLIAM COTTON & ASSOCIATES, INC., Mr. Cotton has done diverse geological studies involving seismic hazards, landslides and slope stability problems, sanitary landfill and waste disposal sites, road alignments, reservoir sites, quarry and rippability studies.

He has done surface and subsurface geological mapping of major faults in California, including the San Andreas, Sargent-Berrocal, Seal Cove, Calaveras, Pilarcitos, Hayward, White Wolf, Pleito, Whittier, San Fernando, and San Jacinto fault zones.

He has been involved with projects relating geologic factors to urban planning for general plan studies including seismic safety elements, environmental impact reports, regional geologic studies and microzonation studies relating geologic hazard zoning to urban development.

Mr. Cotton has had experience in all phases of residential development in urban and hillside areas from preliminary feasibility studies through general plan analysis and review, in-grading inspections and the preparation of final as-built geologic maps and reports for the hillside communities of SARATOGA, CUPERTINO, LOS ALTOS HILLS, PORTOLA, WOODSIDE, and SOUTH SAN FRANCISCO.

WILLIAM R. COTTON

REPRESENTATIVE EXPERIENCE, continued

Mr. Cotton has done geologic review of applications for subdivisions, site development (grading) and building permits, and analysis of the geologic and soils reports and Environmental Impact Reports supporting these proposals. He has provided geologic input to develop and upgrade zoning ordinances and other regulatory codes needed to protect the towns from losses due primarily to slope instabilities (landslides) and earthquake-generating fault systems. Mr Cotton has provided staff recommendations to the City Planning Commissions and City Councils in matters relating to land utilization and planning. He has also administered the city mapping program and developed geologic hazard maps for planning purposes.

For the U.S. GEOLOGICAL SURVEY BRANCH OF WESTERN ENVIRONMENTAL GEOLOGY, Menlo Park, California. Mr. Cotton did studies related to the collection of basic geologic data for the San Francisco Bay Region Environment and Resources Planning Study. His field area included the central part of the Diablo Range, Santa Clara and Alameda Counties, California. His principal assignments included: regional geologic mapping and subdivision of the Franciscan Complex; delineation of landslide deposits and areas of potentially unstable slopes; and detailed descriptions of the engineering properties of the bedrock materials of the Franciscan Complex.

TEACHING EXPERIENCE

De Anza College, Cupertino, California: Full-time Instructor, 1970-date.
Pasadena City College, Pasadena, California: Full-time Instructor, 1964-1970.
Los Angeles State University, Los Angeles, California: Part-time Instructor, 1961-1970.
San Jose State University, San Jose, California: Part-time Instructor, 1961-1970.

PUBLICATIONS

"Shear Couple Tectonics and the Sargent-Berrocal Fault System in Northern California," California Division of Mines and Geology, Special Report 140 (in press). (Co-author)

"Recurrence Intervals for Surface Faulting Along the Frijoles Fault and the Ano Nuevo Thrust Fault of the San Gregorio Fault Zone, San Mateo County, California," Geological Society of America, Abs. with Programs, Cordilleran Section, p. 134 1979. (Co-author)

"Shear Couple Tectonics and the San Andreas Fault," Geological Society of America, Abs. with Programs, Cordilleran Section, p. 83, 1979. (Co-author)

"Analysis of Active Thrust-faulting of the White Wolf Fault, Kern County, California," Abs., Cordilleran Meeting Geological Society of America; Sacramento, California, 1977. (Co-author)

PUBLICATIONS, continued

"Paleolandsliding on the San Francisco Peninsula: A Modern Engineering Problem," Abs., Cordilleran Section Meeting, Geological Society of America; Las Vegas, Nevada, 1974. (Co-author)

"Postdiction of Urban Geologic Problems: A Case Study," Abs., Cordilleran Section Meeting Geological Society of America; Portland, Oregon, 1973. (Co-author)

"Preliminary Geologic Map of the Franciscan Rocks in the Central Part of the Diablo Range, Santa Clara and Alameda Counties, California; Basic Data Contribution 39 (Map MF-343); San Francisco Bay Region Environment and Resources Planning Study, U.S. Geological Survey, Menlo Park, California, 1972.

"Stability Relations of Jadeite Pyroxene in Franciscan Metagraywackes near San Jose, California," American Journal of Science, Vol. 271, November, 1971. (Co-author)

"Franciscan Stratigraphy of the Northwestern Portion of the Diablo Range, Central California," Abs., Cordilleran Section Meeting, Geological Society of America; Riverside, California, 1971. (Co-author)

"Jadeite Pyroxene in Franciscan Metagraywackes near San Jose, California," Abs., Annual Meeting, Geological Society of America; Milwaukee, Wisconsin, 1970. (Co-author)

"Inverted Metamorphic Mineral Zones in Franciscan Metagraywackes of the Diablo Range, Northern California," Cordilleran Section Meeting, Geological Society of America; Eugene, Oregon, 1969. (Co-author)

"Jadeite - Lawsonite - Bearing Metagraywackes of the Franciscan near Mount Hamilton, California," Abs., Cordilleran Section Meeting, Geological Society of America; Fresno, California, 1965. (Co-author)

PROFESSIONAL AFFILIATIONS AND HONORS

Association of Engineering Geologists
Earthquake Engineering Research Institute
Geological Society of America
Seismological Society of America
National Association of Geology Teachers

JOHN M. COYLE

Staff Geologist

EDUCATION

M.S., Geology: San Jose State University, in progress, San Jose, California.
B.A., Geology: Environmental Studies (minor), San Jose State University, San Jose, California.

PROFESSIONAL HISTORY

Applied Earth Sciences, Inc., Sebastopol, California; Staff Geologist, 1979.
William Cotton and Associates, Los Gatos, California; Staff Geologist, 1976-1979.
U. S. Geological Survey, Branch of Western Environmental Geology, Menlo Park, California; Staff Geologist, 1974-1976.
Simpson Timber Company, Klamath Forestry Section, Klamath, California; Staff Geologist, 1973-1974.
Leighton and Associates, Irvine, California; Geologic Aide, 1969, 1971-1972.

REPRESENTATIVE EXPERIENCE

Mr. Coyle has experience in the field of engineering geology and environmental earth science, including geologic hazard mapping, aerial slope stability studies, and aerial photographic reconnaissance to study slope forming processes.

For WILLIAM COTTON AND ASSOCIATES, Mr. Coyle's principal assignments include geologic mapping of bedrock and surficial deposits for a variety of urban projects, from single residential parcels to geologic hazard mapping for local communities. He has also done surface and subsurface exploration along the San Andreas, Sargent-Berrocal and Hayward Fault systems.

For the U.S. GEOLOGICAL SURVEY, Mr. Coyle's responsibilities included aerial photography reconnaissance, detailed photo-interpretative analysis of landslide deposits and slope processes, and field evaluation of aerial photographic work. His principal projects include an Aerial Slope Stability Study in Marin County, California, and an Environmental Geology Folio for Washoe County, Nevada which in addition to photo-interpretive mapping involved collection of subsurface data by gravimeter and description of lithologic properties of bedrock and surficial deposits.

For SIMPSON TIMBER COMPANY, Mr. Coyle did reconnaissance mappings of landslide deposits in the Blue Creek and Bear Creek areas near Klamath, California.

For LEIGHTON AND ASSOCIATES, Mr. Coyle worked with staff geologists on a variety of engineering geologic projects, including trenching of fault systems, detailed surface mapping.

TEACHING EXPERIENCE

San Jose State University, San Jose, California: Lecturer, 1979.

WILLIAM WARD

Staff Geologist

EDUCATION

B.S., Geology: Sonoma State University, Rohnert Park, California, 1978.

PROFESSIONAL HISTORY

Applied Earth Sciences, Sebastopol, California; Staff Geologist, 1979.
Sonoma State University Foundation, Inc., Rohnert Park, California; Staff Geologist, 1978-1979.
California Division of Mines and Geology, Santa Rosa, California; Staff Geologist, 1978.

REPRESENTATIVE EXPERIENCE

Mr. Ward has field and laboratory experience including geologic hazard studies, soils sampling and analysis, preparation of geologic maps and writing reports. His studies have included localities in the California Coast Ranges, Geysers Geothermal Area, Clear Lake Volcanics, Sierra Nevada, and the Basin and Range Province of eastern California and southern Nevada.

For SONOMA STATE UNIVERSITY FOUNDATION, INC., Mr. Ward performed field and laboratory work involving paleontological studies in the Geysers Geothermal Area, Sonoma and Lake Counties, California. Samples were collected in the field, thin sections were prepared and analyzed in the laboratory, and written reports were submitted to the California Department of Water Resources and Northern California Power Agency.

For the CALIFORNIA DIVISION OF MINES AND GEOLOGY, Mr. Ward engaged in field and laboratory work associated with the preparation of a geologic map, and a geologic hazards interpretive map of an area near Healdsburg, California. The study delineated zones of potential fault rupture hazard, relative slope stability, and accelerated erosion.

PUBLICATIONS

"Geology and Geologic Hazards of the Chalk Hill Road Study Area, Sonoma County, California," 1979, Geological Society of America, Abstracts with Programs, V. 11, No. 3. (Co-author)

"Paleontological Resource Investigations in the Rorabaugh Leasehold Portion of the Geysers Region, Sonoma County, California," 1979, prepared for Energy Division, Department of Water Resources, Sacramento, California. (Co-author)

WILLIAM WARD

PUBLICATIONS, continued

"Paleontological Resources Investigations in the Northern California Power Agency Transmission Line Corridor, The Geysers Region, Lake and Sonoma Counties, California," 1978, prepared for Northern California Power Agency. (Co-author)

"Environmental Geologic Analysis of the Chalk Hill Road Study Area," 1979, California Division of Mines and Geology Open File Report (in preparation).

PROFESSIONAL AFFILIATIONS AND HONORS

Geological Society of America
American Association of Petroleum Geologists

ALAN O. ALLWARDT

Staff Geologist

EDUCATION

M.S., Earth Sciences: University of California, Santa Cruz, 1979.
B.S., Earth Sciences: University of California, Santa Cruz, 1974.

PROFESSIONAL HISTORY

Applied Earth Sciences, Inc., Sebastopol, California; staff geologist, 1980.
Rogers E. Johnson & Associates, Santa Cruz, California; staff geologist, 1980.
Geological Research Group, Los Alamos Scientific Laboratories, Los Alamos, New Mexico; visiting staff member, 1979.
U.S. Geological Survey, Branch of Western Environmental Geology, Menlo Park, California; Physical Science Technician, 1975.
Department of Public Works, Humboldt County, California; Student Professional Worker, 1974.

REPRESENTATIVE EXPERIENCE

Mr. Allwardt has considerable experience in detailed and reconnaissance geologic mapping and aerial photographic interpretation including work in Franciscan terrane in Humboldt County.

For APPLIED EARTH SCIENCES, INC., and ROGERS E. JOHNSON & ASSOCIATES, Mr. Allwardt has performed landslide mapping from aerial photograph interpretation and detailed field study.

For LOS ALAMOS SCIENTIFIC LABORATORY, Mr. Allwardt helped develop a conceptual framework for the study of environmental factors influencing sulfur content of coal seams.

For the U.S. GEOLOGICAL SURVEY, Mr. Allwardt assisted Dr. Denis E. Marchand in the mapping of Quaternary units, northeastern San Joaquin Valley, California using aerial photographic interpretation, soil map interpretation, and field mapping.

For the HUMBOLDT COUNTY DEPARTMENT OF PUBLIC WORKS, Mr. Allwardt (with Harvey Kelsey) completed geologic and slope classification maps of the Van Duzen River Basin using field mapping and aerial photographic interpretation.

As a graduate student, Mr. Allwardt spent two field seasons mapping the structural geology of trench deposits in Kodiak, Alaska.

ALAN O. ALLWARDT

PUBLICATIONS

Moore, J.C., and Allwardt, A.O., 1980, Deformation of a Tertiary accretionary complex, Kodiak Islands, Alaska: Journal of Geophysical Research (in press).

Marchand, D.E., and Allwardt, A.O., 1979, Late Cenezoic stratigraphic units northeastern San Joaquin Valley, California: U.S. Geological Survey Bull. (in press).

Moore, J.C., and Allwardt, A.O., 1978, Progressive deformation in a Tertiary subduction zone, Kodiak Islands, Alaska: EDS v. 59 no. 12, p 1184.

Kelsey, H.M., and Allwardt, A.O., 1975, Geologic and slope classification maps of the Van Duzen River Basin in the Van Duzen River Basin Environmental Atlas, California Department of Water Resources, Northern District.

Hein, J.R., Allwardt, A.O., and Griggs, G.B., 1974, The occurrence of glauconite in Monterey Bay, California, diversity, origin, and sedimentary environmental significance: Journal of Sedimentary Petrology v. 44, p. 562-571.

RESUME OF

JOHN TERRENCE LEWIS

7829 Anthony Street
Sebastopol, Ca. 95472
Telephone: (707)829-2511

OBJECTIVES

To continue in the field of Architecture specializing in Energy Conservation.

AREAS OF KNOWLEDGE AND EXPERIENCE

Overall program development, budgets, scheduling, program management.

Client space needs, site selection, analysis, estimating, presentations, drafting, specification writing, building code analysis, equipment and furnishings selection.

Mechanical, structural and electrical design and working drawings.

Bid analysis, contract administration, on-site job supervision, shop drawing approvals, final inspections.

Solar energy and energy conservation design.

PERSONAL

Birthday: January 4, 1948
Height: 5'9" (175.26 cm)
Weight: 165 pounds (74.84 kg)
Health: Excellent
Marital Status: Single

EDUCATION

Kent State University
Kent, Ohio
5-year Program
Degree: Bachelor of Architecture/1971

REFERENCES

Mr. Robert Judd, Director
Governor's Office of Appropriate Technology
1530 Tenth Street
Sacramento, California 95814
Telephone: 1-916-322-9654

Mr. William F. Raidt, Engineer
Construction Section Head
Ohio Department of Natural Resources
Office of the Chief Engineer
Fountain Square Building D-2
Columbus, Ohio 43224
Telephone: 1-614-466-2860

Mr. George Acock, Architect/Contractor
Acock & White Architects/Planners
140 East Town Street
Columbus, Ohio 43215
Telephone: 1-614-228-1586

MEMBERSHIP

N.C.A.R.B. Registration
Architectural Registration in Ohio
Architectural Registration in California
International Solar Energy Society
Northern California Solar Energy Assoc.
Ohio Solar Energy Association

EXPERIENCE

May 1979 to January 1980

Governor's Office of Appropriate Technology/Design Team
1530 Tenth Street
Sacramento, California 95814

Position: Architect

Earnings: $1,960/month

Responsibilities: Project evaluation and technical assistance to State agencies and local governments. Budget analysis. Management of consultants. Graphic presentations.

Achievements: Technical jurist for the State-wide Passive Design competition.

Co-writer for a $10 million commercial/residential complex. RFP for the Capital Area Development Agency (CADA).

Designer for an urban infill project stressing innovative energy conservation and passive solar techniques.

Panelist on The Housing and Community Development's State-wide Rehabilitation Building Code.

Project manager of a solar hot water commission involving fifteen low-income houses in the City of Oakland involving programming and bid documents.

Project manager of a contract involving the California Energy Commission and the California Conservation Corps to instrument a commercial scale greenhouse to verify the thermal performance of a convective flow rock bed heat storage system.

September 1978 to April 1979

Program for Energy Research, Education and Public Service
The Ohio State University
111 Oxley Hall, 1212 Neil Avenue
Columbus, Ohio 43210

Position: Graduate Research Assistance/Architect

Earnings: $475/month

Responsibilities: Independent research study to complete Master's program.

Achievements: Initiation of an urban energy Laboratory. Phase I included coordinating activities of: The Olentangy Management Company, which has agreed to lease two urban houses for solar retrofit and energy conservation construction and testing; the neighborhood groups, the Ohio State University, the Labor Unions, and the City and State Offices.

Teaching a passive solar energy course.

Putting together a bid proposal to hold the National Passive Solar Conference at Ohio State University and investigating sources of seed monies.

March 1974 to
August 1978

Ohio Department of Natural Resources
Office of the Chief Engineer
Fountain Square
Columbus, Ohio 43224

Position: Architect

Earnings: $20,800 Salary

Responsibilities: Prepare park development plans, scheduling, sequence preliminary designs, cost estimates, working drawings, and specifications, monitored project construction progress and acted as liason between contractor and State. Coordinated aspects of project and arbitrated problems between contractor and State. Reviewed change orders and pay orders.

Achievements: Successfully lowered construction cost of comfort stations (latrines) resulting in 35%-55% savings. Completed three complete park campgrounds including ancillary facilities such as park offices, check-in stations, maintenance buildings and bath houses.

Served on a design review panel at the request of the U.S. Army Corp of Engineers for a five-million dollar industrialized building program covering four states.

Investigated the possibilities of utilizing active and passive solar energy systems and energy conservation techniques within the entire department.

Presentations were made to all park managers at a State-wide meeting held in March, 1978, at the Mohican Lodge.

Three maintenance buildings were designed and constructed utilizing active and passive solar energy techniques. One of the projects, the Buck Creek Maintenance Complex, won a State-wide award.

Three separate studies involving construction of a lodge, 100 or more guest rooms, swimming pools, meeting rooms, cabins and ancillary facilities were completed. One of the lodge proposals, the Deer Creek Lodge, was funded and will be opened in October 1980. Estimated cost is approximately $15 million.

The Deer Creek Lodge study included a proposal to the U.S. Department of Energy involving a hot water solar initiative for hotel/motel installations. The proposal received the second largest funding grant for that program.

Lecture on the utilization of solar energy in the state and local parks at the State of Indiana, Parks and Recreations Department, 5-State Annual Meeting, Pokagon, Indiana. Afterwards, the Board extended an invitation to help organize a three-day energy conference for park personnel.

June 1971 to
February 1974

Acock and White Architects and Planners
140 East Town Street
Columbus, Ohio 43215

Position: Architect and Carpenter

Earnings: $10,400 annual salary

Responsibilities: Design, Design Development, working drawings, cost estimates and specifications as related to residential, apartments and commercial buildings, including client contact, model making, perspectives, presentations and slide shows. As a carpenter and job foreman, responsibilities included supervision of construction crew building three homes ranging in cost from $45,000 to $110,000.

Achievements: Design and construction of Senator John Glenn's home. Presentation of work by Mr. George Acock at Columbus, Ohio Chapter AIA meeting.

Summer of 1966 & 1967	Hal Mar Stone Quarry Williamsport, Ohio
Position:	Rock Crusher Operator
Earnings:	$1.80 per hour
Responsibilities:	Operation and maintenance of limestone crushing equipment and high lift operator.

CONFERENCES

Energy Responsive Buildings
California Council AIA
September 8, 9 & 10, 1979
Stanford Sierra Lodge, California

Third National Passive Conference
January, 1979
San Jose, California

U.S. Department of Energy
Region 5 Consumers Review Panel
June 26, 1978

Second National Passive Solar Conference
March, 1978
Philadelphia, Pennsylvania

D.O.E. Solar Heating/Cooling Demonstration Program
Contractor's three-day review
December 5-7, 1977
New Orleans, Louisiana

1977 International Solar Energy Society
Four-day conference
Winnepeg, Canada

1976 International Solar Energy
Conference at U.C.L.A.

Dayton University
4-day Solar Energy Design Workshop
November 8-11, 1976

OUTSIDE ACTIVITIES

Lecture on Passive Solar Greenhouses
3-day Energy Conservation Fair
Licking County Joint Vocational School
Newark, Ohio

Energy Consultant to Acock & White, AIA for the National Headquarters for the Limited Stores.

Energy Grant writer and researcher on the HUD Cycle 4, H-8300 Residential Solar Demonstration Program for Acock and White, AIA

Testified as an expert witness before the Ohio Senate Subcommittee on Energy on 2/28/78 regarding the pending Solar Legislation; and afterwards helped to rewrite the bills.

Energy talk
at the Dublin Sertoma Club
Dulin, Ohio

Active in giving talks on Architecture and Energy Conservation to interested civic groups.

Solar Energy Presentation at the Ohio State University School of Architecture
Three-day seminar
Fawcett Center for Tomorrow
Columbus, Ohio

Energy Conservation Techniques
at the Great Lakes Park Insitutute
Pokagon, Indiana, 1978

Solar Energy Presentation at the:
1st Annual Ohio Solar Energy Conference
Columbus, Ohio

2nd Annual Ohio Solar Energy Conference
Columbus, Ohio

PERSONAL INTEREST

Photography, Running, Back-packing, Skiing, Reading, Racquetball and Furniture Restoration.

RESUME OF: ALLAN NICHOL

16700 Fitzpatrick Ln.
Occidental, CA 95465
Telephone: (707)823-1585

PERSONAL:

Birthday: 16 January 1945
Height: 6'
Weight: 160 lbs.
Health: Excellant
Marital Status: Married w/two children

EDUCATION:

'63-'65 Iowa State University, Ames Iowa. Majored in Architecture
'65-'68 B.A., University of Oklahoma, Norman, Oklahoma. Majored in Architecture and political science.

MEMPERSHIP:

NCARB Registration
Architectural Registration in California
Member, American Institute of Architects

EXPERIENCE:

'78 to '80	Private Architectural Practice
Summer/Fall of '79	Construction of own residence.
'70 to '78	Employed by T. Larson Bowler, Architect - P.O. Box 127, Bodega Bay, California. Involvement in all phases of architectural practice. Design of many well publicized coastal residences.
'75 to '76	Member of City of Cotati Planning Commission and Chairman of Design Review Committee.
'69	Employed by Vosbeck, Vosbeck, Kendrick and Redinger, Architects Alexandria, VA.
'68	Vista Volunteer in Nikolai, Alaska, a remote Athapaskan Indian Village. Community Development.

EXPERIENCE: continued

Summer '67	Intern for Senator George McGovern, Washington D.C.
Summer '66	Goldminer @ Homestake Goldmine Lead, South Dakota. Worked at 3750' below surface.

RESUME OF: PAUL LARKIN, Mechanical & Solar Consulting Engineer

7202 Bodega Avenue
Sebastopol, CA. 95472
Telephone: (707)823-0474

EMPLOYMENT HISTORY:

January 1978 to present	CONSULTING MECHANICAL ENGINEER - Providing design and consulting services in the following main areas: Active and passive solar space heating and cooling systems, solar water and pool heating systems, conventional heating, ventilating and air conditioning systems, plumbing and piping systems, energy conservation and audits, state and federal building energy conservation requirements, and alternatives energy applications.
July 1976 to March 1979	SENIOR MECHANICAL ENGINEER - Ecodyne Cooling Products Division, Cooling tower manufacturers. Design projects included fan drive systems, heat exchangers, water distribution systems, mechanical equipment supports, static and dynamic structural design and analysis using Finite Element computer programs. BASIC and FORTRAN programming.
April 1974 to July 1976	MECHANICAL ENGINEER - International Engineering Co., San Francisco, Consulting Engineers. Work included: design and analysis of HVAC systems, piping systems, pumping arrangements and pump selection, water treatment systems; stress and strain analysis of railroad car components; proposal writing, cost estimating, project engineering; computer application and programming in BASIC, FORTRAN, APL.
March 1970 to April 1974	PRODUCT DESIGN ENGINEER - Prescolite, a Division of U.S. Industries, manufacturer of lighting equipment. In charge of product development projects, including optical design and parts design. Also handled field problems and applications, working with customers and inspection authorities.

EMPLOYEMENT HISTORY: continued

TESTING AND STANDARDS ENGINEER - Prescolite. In charge of photometric, temperature, and environmental testing, and obtaining U.L. approvals. Generated technical information on products. Member of U.L. committee on standards. Supervised two testing assistants.

EDUCATION:

BACHELOR OF SCIENCE IN ENGINEERING Mechanical Major - University of Santa Clara, 1969. Emphasis in fluid mechanics and thermo-dynamics. California State Scholarship. Extension courses in HVAC, solar heating and illumination at San Francisco State University and University of California Extension.

PROFESSIONAL REGISTRATION:

Registered Mechanical Engineer State of California

PROFESSIONAL SOCIETIES:

ASME, CSPE, Northern California Colar Energy Association

LEONARD A. FISHER
Registered Professional Engineer
3841 - 25th Street
San Francisco, California 94114
(415) 282-1827

SUMMARY OF EXPERIENCE

Ten years of experience in the analyses, conceptual through final design, and management of engineering projects including: thermal power and process cycles; energy use, conservation, and recovery systems; integrated multiple use applications of heat, particularly geothermal heat; cost estimation; pumping and piping systems; and facilities design.

Extensive background in technical writing involving preparation of proposals, feasibility studies, design criteria, specifications, procedures, test reports, and technical publications.

Significant recent experience in business development work in the energy field.

EDUCATION

BS, Engineering, California Institute of Technology, 1966
MSME, Thermosciences, Stanford University, 1967
MSME, Product Design, Stanford University, 1969

AWARDS

National Science Foundation Graduate Fellow, 1966-1968

Project Manager for the first prize winning project in the 1979 Engineering Excellence Awards Competition of the Consulting Engineers Association of California: "Systems and Energy Engineering, Mountain Home Geothermal Project"

Invited participant in U.S. Department of Energy sponsored workshop on "Direct Utilization of Geothermal Energy: Development of Four Educational Reports," February 1979

PUBLICATIONS

"Slurry System Economic Parameters," co-authored with Fred L. Smith and Sam F. Fogleman, Hydrotransport 4, Alberta, Canada, 1976

Author or co-author of four papers and three reports on multiple direct use applications of geothermal energy, 1977-1979. Among the subjects were the Total Energy Recovery System for Agribusiness (TERSA) and the Mountain Home Geothermal Project, an integrated livestock meat and feed production facility.

LEONARD A. FISHER
Registered Professional Engineer

EMPLOYMENT HISTORY

Present: LAFCO Energy Systems Engineering; San Francisco, CA
LAFCO was established in August 1979 to provide independent consulting services in thermal and mechanical energy systems engineering in areas including: energy generation; energy use and conservation; waste heat recovery; conversion of wastes to fuels, fertilizers, and feeds; integrated energy systems for agribusiness; and new energy technology development. The following services are provided in these areas: proposal preparation; engineering/economic feasibility studies; conceptual, preliminary, and final design; cost estimation; and field engineering services.

1974-1979: International Engineering Co., Inc.; San Francisco, CA
Studies, design, and management of mechanical systems work including: geothermal power plants and gathering systems; direct uses of geothermal energy for agriculture, food processing and space conditioning; energy applications of biomass; hybrid and wood fired power cycles; solar systems; facilities design; and piping and pumping systems. Wrote design criteria and specifications for hydroelectric power plant equipment. Responsible for departmental computer work and business development activities in the energy field.

1974: L.K. Comstock Engineering Co.; San Francisco, CA
Design of piping, plumbing, and cable systems for deep sea oil drilling rigs and for process plants.

1972-1973: United Technology Center; Sunnyvale, CA
Design and development of rocket nozzle, insulation, and mechanical support equipment. Other responsibilities included parametric studies, computerization of design techniques, and test report writing.

1970-1971: Self-employed; Portola Valley, CA
Design and marketing of consumer products; consulting work included laboratory layouts and dynamic studies.

1969-1970: Raychem Corporation; Menlo Park, CA
Design and development of equipment for cryogenic products handling and product identification; field engineering work including test reports.

PART 6B.2v ENERGY SYSTEM COMPONENTS

A. Heat Exhangers:

A critical component in any geothermal application is the heat exchanger. Because of their extremely corrosive characteristics and high temperature, geothermal fluids must be isolated from the end use components. In this application, downhole heat exchangers will be used to extract geothermal heat using clean, secondary water, rather than pumping geothermal water to surface heat exchangers and components. In addition to offering economic advantages, this method isolates the corrosion and scale problems in the geothermal well.

The downhole heat exchangers will be designed with materials with proven resistance to the corrosive environment of the geothermal wells. In addition, the heat exchangers will be accessible for periodic cleaning, de-scaling and replacement. Iron or stainless steel pipe are the most likely materials. Further research will be done to optimize a cost effective and reliable design for the condition inherent in this application.

B. Heat System:

Typical motel-type fan coil units will provide heating and cooling from hot and chilled water piping. Control valves, pumps, expansion tanks, etc., will be installed using conventional components and materials, to provide a complete system.

C. Air Conditioning:

Being investigated are geothermally powered, centrally located absorption chillers which will provide chilled water to the individual fan coil units. Absorption chillers are available which use heated water in the 160° to 200° degree range. The air conditioning system will include all auxiliary equipment, such as pumps, cooling towers, and controls to provide a complete system. In addition, storage tanks may be required to smooth out surges in the geothermally heated fluid temperatures.

D. Pool and Spas:

Pool and spa water will be heated in shell and tube heat exchangers. These will be connected in series with filters and recirculating pumps for each application.

E. Hot Water System:

In addition to downhole heat exchanger, components will include insulated storage tanks, recirculating pumps, pressure relief valves, controls, etc., as used in conventional hot water heating and distribution systems.

F. End Uses:

Geothermal heat will be used in five applications in this project: space heating, air conditioning, domestic hot water heating, pool heating, and spa ("hot tub") heating.

For space heating, air conditioning, spa and pool heating, clean, secondary water will be heated in a downhole heat exchanger and circulated to the loads in a closed loop. Circulating pumps will carry water to the heating loop and/or chillers, spa and pool heat exchangers in sequence, so that water is used and heat extracted at successively lower temperatures for each load. The water is then returned to the downhole heat exchanger to extract more geothermal heat.

The space heating system will serve all guest rooms and other buildings and will be a hot water system with individual fan coils in each room. Conventional products will be used; no special materials or considerations are imposed since the geothermal water will be confined to the well and secondary water will be circulated for space heating.

Air conditioning for all buildings will be accomplished by piping chilled water to the fan coil units from geothermally-powered absorption chillers.

The swimming pool and spas provided for the guests will also be heated geothermally, using heat exchangers to extract heat from the circulating secondary water which in turn is heated in the downhole heat exchanger. The pool, approximately 25 by 50 feet, will be maintained at 80°F and the two large spas, each about twelve feet in diameter will be maintained at approximately 105°F.

Domestic hot water for all guest rooms and utility purposes will be heated geothermally, in a separate downhole heat exchanger. A conventional back-up system will be provided, and a circulating hot water system be installed to serve all buildings.

(vi) EXISTING ENERGY SYSTEM

No existing systems exist at this time.

(vii) FLUID DISPOSAL

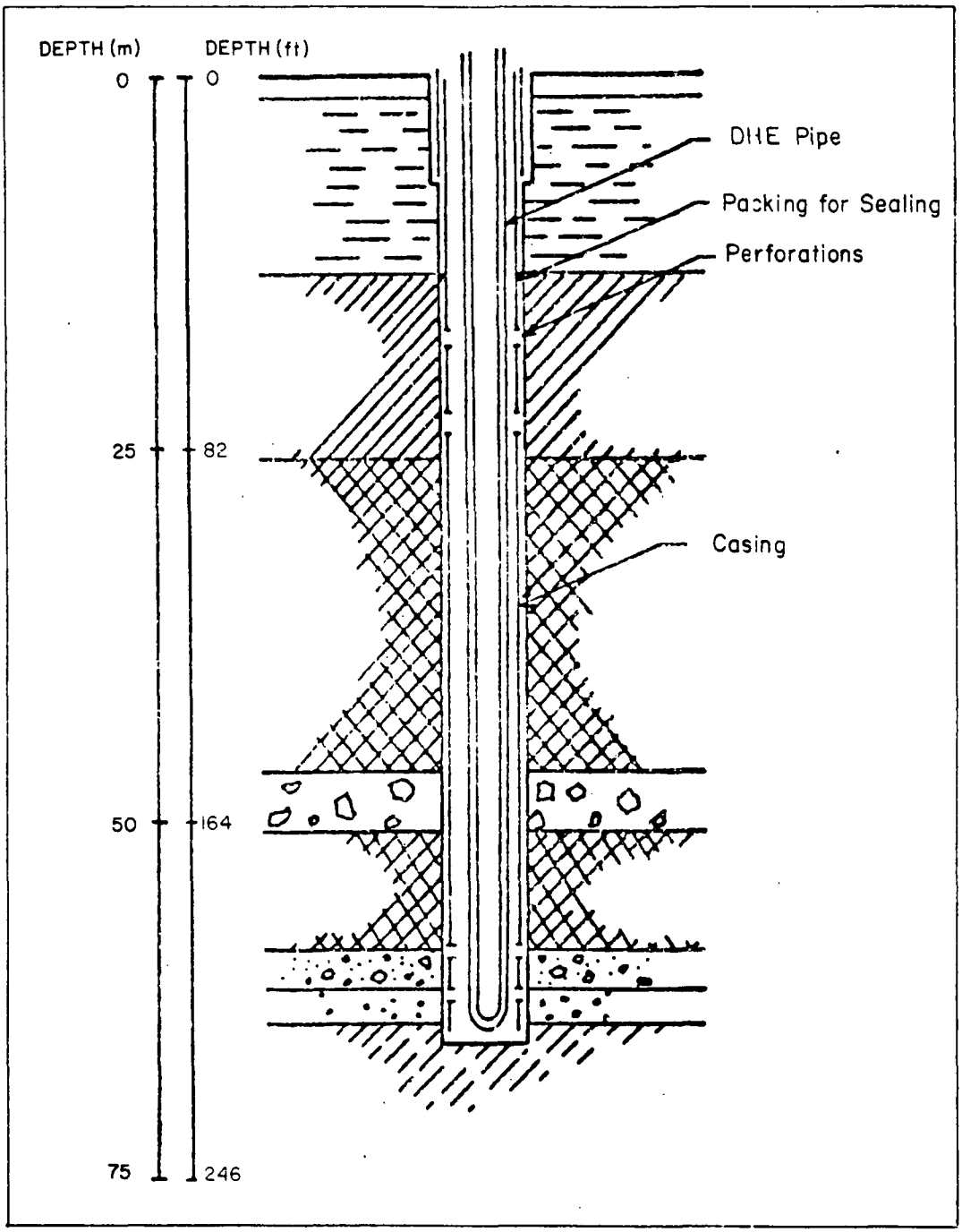
We will not be pumping the resource out of the ground, and will therefore have no disposal problem.

(viii) OTHER DATA

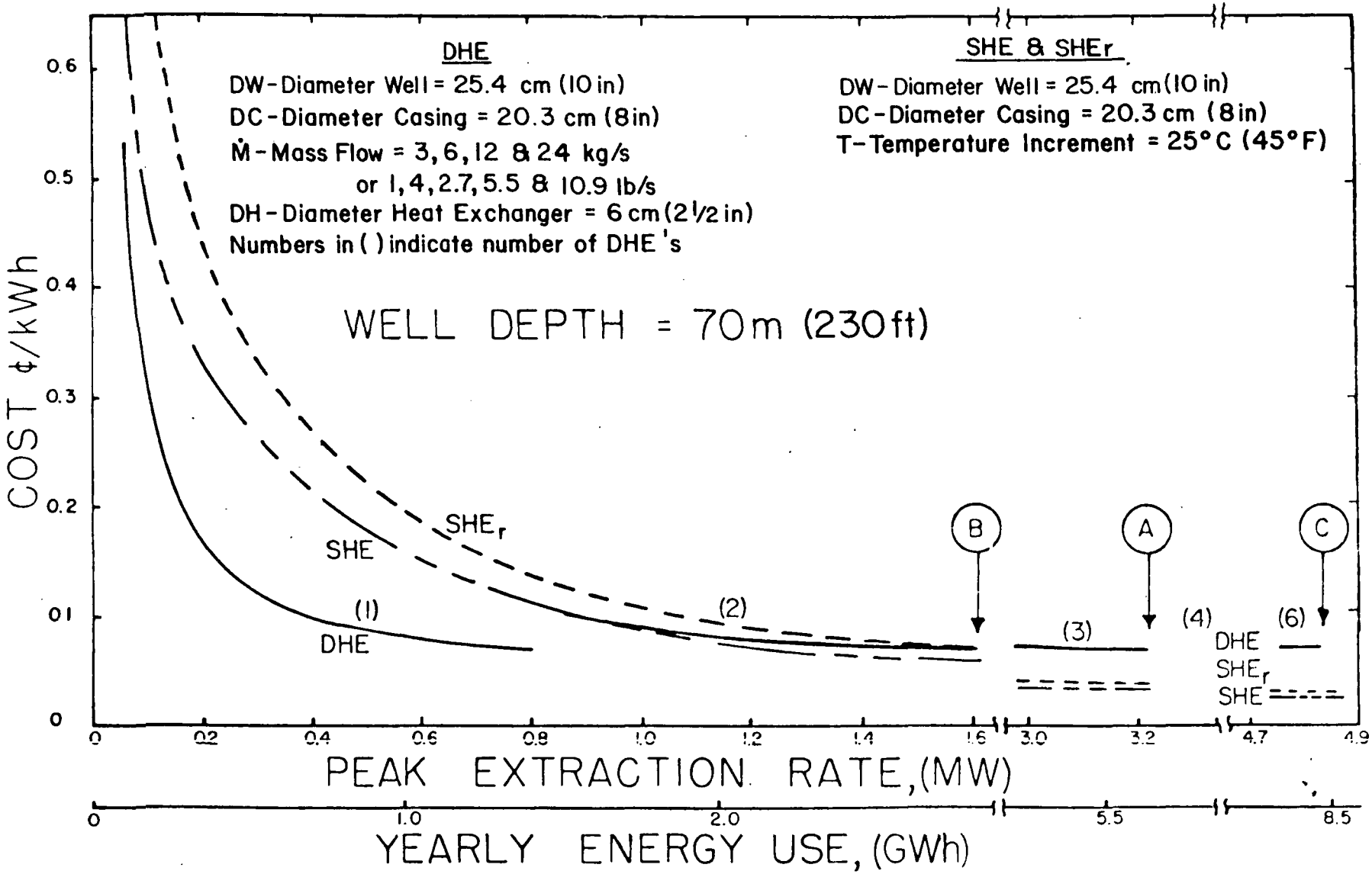
GEOTHERMAL RESOURCES COUNCIL

Special Report No. 7

Direct Utilization of Geothermal Energy: A Technical Handbook



Typical downhole heat-exchanger installation.



Unit energy costs for geothermal energy from downhole (DHE) and surface heat-exchange (SHE) systems for a well depth of 70 meters (230 ft). Points A, B and C indicate the limiting energy-extraction rates for the SHE and SHE_r (with reinjection) systems with well flows of 32 l/s (250 gpm) and 47 l/s (750 gpm) respectively at the temperature drop shown. (Note: 1¢/KW h = $2.93/million BTU = $2.78/GJ.), (GWh = Giga Watt hour)

PART 7 TECHNICAL PLANNING

A. Exploration Plan:

No exploration program is proposed because a drill site has been reliably selected without the use of surface or shallow hole exploration.

B. Preliminary Drilling Program:

No preliminary drilling program under this DOE proposal is anticipated. The final rig selection and bonehole configuration will be determined by the driller and the geologists, Applied Earth Sciences, Inc. We do anticipate using a truck-mounted rotary rig and using 13-3/8 inch threaded oil field casing.

All local, state and federal safety rules will be strictly adhered to. The state requirements for abandonment and/or completion are attached. At this time we believe we will insert a heat exchanger in the geothermal reservior instead of pumping the resource to the surface. A transfer fluid will be utilized to transport the thermal energy to the end use components.

C. Test Plan:

The geologists and geotechnical engineers at Applied Earth Sciences, Inc. have reviewed the well testing guidelines in Appendix G of the solicitation brochure. Due to a heavy work load we could not specify and include in this package our plans for testing. However, we will forward the information on test and data analysis procedures; types of instrumentation and their accuracy and all ther pertinent data relevant to well testing. It is our intent to comply fully with DOE requirements for measurements of flow rate, fluid (potentiometric) levels and temperature.

Flow Rate: Many geothermal reservoirs are comprised of fractured rock. Since this type of reservior does not conform to the assumptions demanded by standard analytical methods, we will carry out tests in fracture flow media above the rate at which the well might be used.

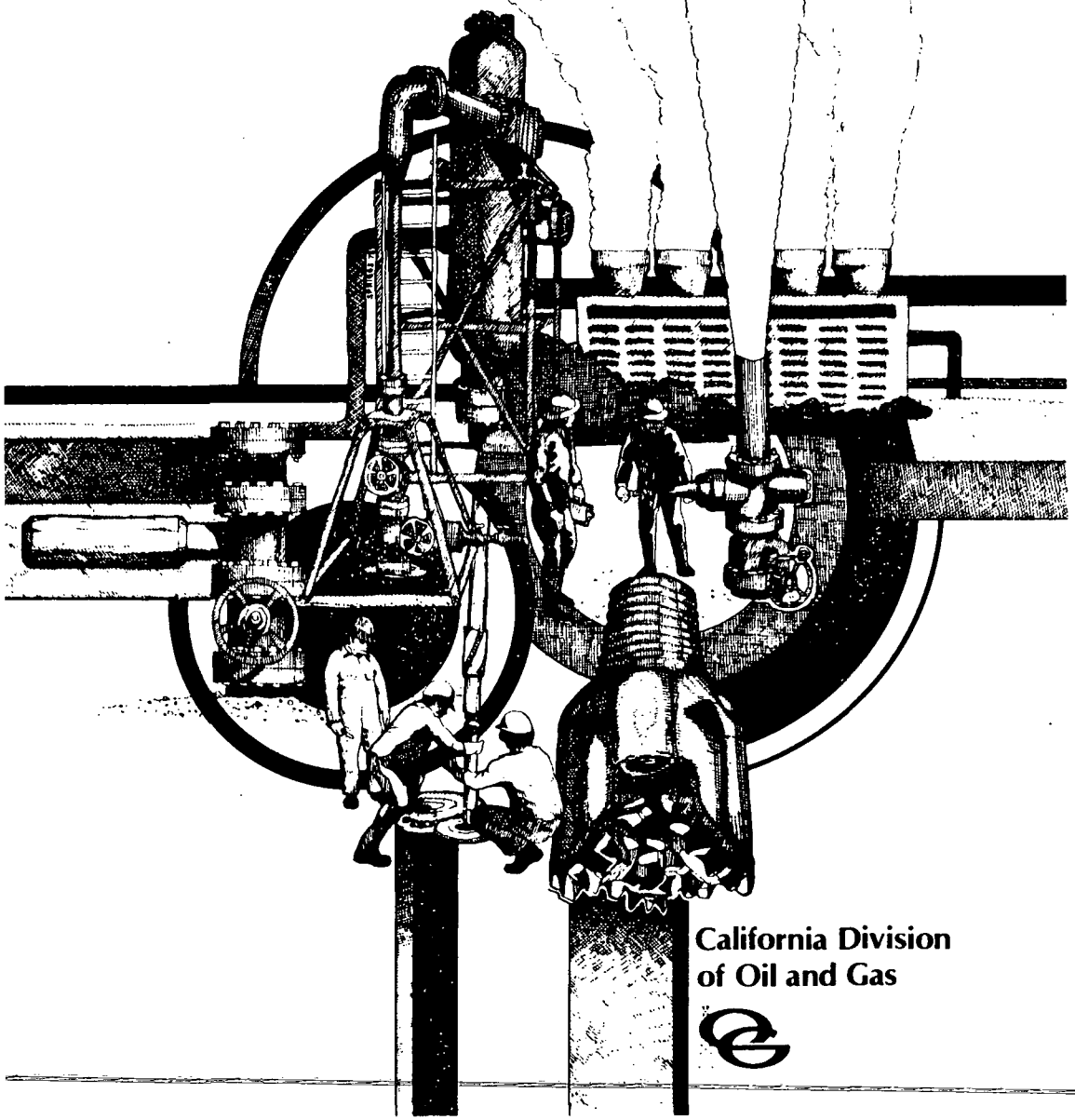
Flow rate will be controlled with ± 2% accuracy with resolution of ± 2.0 gpm.

Fluid (potentiometric) Levels: Free fluid levels will be measured to ± 0.1 ft. precision. Fluid pressures will be measured to ± 0.1 psi. Measurements will be recorded with a frequency of at least 20 readings distributed per logarithmic cycle of time. The measurements will be made during both drawdown and recovery segments of tests.

Temperature: Well head temperatures will be recorded during both the drawdown and recovery segments of each test with equivalent frequency to fluid (potentiometric) levels. Instruments used for temperature measurement should be calibrated to ± .5 degrees F. precision.

Publication No. PR7S

DRILLING AND OPERATING GEOTHERMAL WELLS IN CALIFORNIA



California Division
of Oil and Gas

CONTENTS

Pacific Gas and Electric Company power plant Units 3 and 4, together at photo right, in The Geysers Geothermal field. Other steam from wells. Mountainous terrain is typical of the field.

DRILLING AND OPERATING GEOTHERMAL WELLS IN CALIFORNIA

GEOTHERMAL OPERATORS

Geothermal operators working on state and private lands in California must comply with the requirements and procedures of the California Division of Oil and Gas* summarized in this publication. For additional information, refer to publications listed in this booklet or contact the Geothermal Unit headquarters office in Sacramento (Fig.1).

DEFINITIONS

Definitions for geothermal resources and geothermal well types are in Appendix A.

GEOTHERMAL UNIT, CALIFORNIA DIVISION OF OIL AND GAS

The Geothermal Unit of the California Division of Oil and Gas supervises the drilling, operation, maintenance, and abandonment of geothermal wells on state and private lands in California to:

1. Prevent, as far as possible, damage to life, health, property, and natural resources;
2. Prevent damage and waste of underground geothermal deposits;
3. Prevent loss of geothermal reservoir energy;
4. Prevent damage to underground and surface waters suitable for irrigation or domestic use;
5. Prevent other surface environmental damage, including subsidence;
6. Prevent conditions that may be hazardous to life; and
7. Encourage the wise development of geothermal resources through good conservation and engineering practices.

In addition, for purposes of the California Environmental Quality Act, the California Division of Oil and Gas is the lead agency for all geothermal exploratory projects.

*The division program for oil and gas is discussed in the publication, *Drilling and Operating Oil and Gas Wells in California.*

District offices

There are three geothermal district offices in California.

The Geothermal Officer manages the division Geothermal Unit from the headquarters-District G1 office in Sacramento. Office locations and district boundaries are shown on the map (Fig. 1).

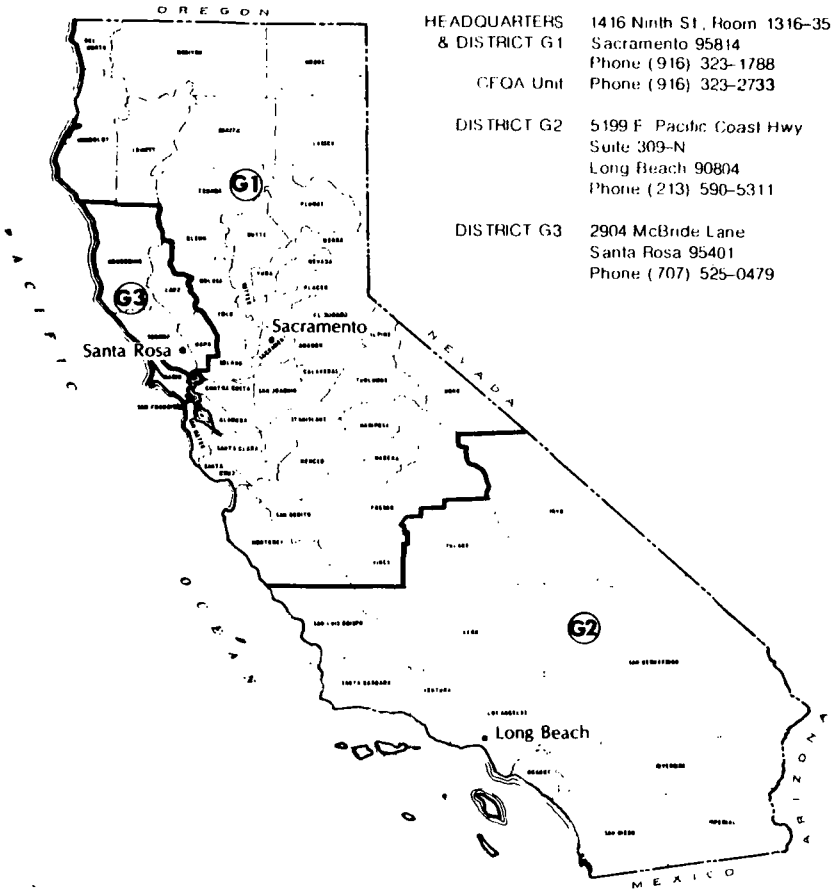
Responsibilities of the district offices

1. Process all well notices;
2. Carry out field testing and inspection of blowout prevention equipment, cementing and plugging operations, and water shutoff demonstrations;
3. Collect and file well records for activity in the district; and
4. Distribute forms required for geothermal operations.

Inquiries

Well Operations

Direct questions about well operations to the district office with jurisdiction over the area of proposed activity.



HEADQUARTERS & DISTRICT G1
1416 Ninth St., Room 1316-35
Sacramento 95814
Phone (916) 323-1788

CEQA Unit
Phone (916) 323-2733

DISTRICT G2
5199 E. Pacific Coast Hwy
Suite 309-N
Long Beach 90804
Phone (213) 590-5311

DISTRICT G3
2904 McBride Lane
Santa Rosa 95401
Phone (707) 525-0479

Figure 1. Geothermal district boundaries and offices, California Division of Oil and Gas.

Inquiries

Well Operations

Direct questions about well operations to the district office with jurisdiction over the area of proposed activity.

Potential productivity

Questions regarding potential productivity cannot be answered except to give locations of the nearest producing wells and references to known publications covering the area.

Potential productivity

Questions regarding potential productivity cannot be answered except to give locations of the nearest producing wells and references to known publications covering the area.

AGENT

Any person (operator) planning to drill a geothermal well, must designate an agent who resides in California and upon whom may be served all orders, notices, and processes of the supervisor or any court of law.

A person may appoint himself as agent. More than one agent may be appointed, each for a designated area, if desired.

NOTICE OF INTENTION TO DRILL, REWORK, OR ABANDON A WELL

Prior to drilling, reworking, or abandoning a geothermal well in California, a Notice of Intention for the proposed activity must be submitted to the appropriate district office and approval received.

A notice is required for prospect wells, development wells, temperature observation wells, low temperature wells, and water disposal wells.

FEES

Applicants who wish to drill a new well or redrill an abandoned well must submit, with the Notice of Intention, a fee based upon the depth and nature of the proposed drilling activity.

If there is some doubt as to whether the well will be drilled, applicants should request that the fee be held in the uncleared collections account so a refund may be made if the notice is cancelled later.

REPORT ON PROPOSED OPERATIONS

A Report on Proposed Operations (P-Report) is issued upon division approval of a Notice of Intention when the following conditions have been met:

1. The applicable requirements of the Public Resources Code and the California Environmental Quality Act.

4. The drilling fee has been paid.

Time limitation Approval is cancelled if operations do not begin within one year after receipt of the Report on Proposed Operations. Approval can be renewed by filing a Supplementary Notice within the one-year period.

Site inspection District staff may inspect a proposed well site before approval is granted.

Witnessing tests The division must be notified to witness or inspect all operations specified in the reply to a notice (P–Report). This may include tests or inspections of blowout prevention equipment, water shutoff capabilities, and plugging operations.

Changes A Supplementary Notice must be filed when a well operator intends to change any proposed well operation.

BONDS

An indemnity bond or a cash bond must accompany a Notice of Intention to drill a well. Bond amounts are based on well types and well depths.

A blanket bond in the amount of $100,000 may be filed to cover operations on one or more wells at any time.

Release Bonds are held for the life of the well and are released when the well(s) have been properly abandoned or another bond has been substituted for the original bond.

WELL NAME AND NUMBER

The well name and number are subject to the approval of the State Oil and Gas Supervisor and must not be changed without division approval.

WELL AND PROPERTY SALE OR TRANSFER

Former operator Operators who sell, transfer, or exchange the right to operate a well or wells must notify the division within 30 days after the transaction occurs.

New operator Thirty–day notification is also required from persons acquiring ownership or operation of any well, whether by purchase, transfer, exchange, or another method.

Bonds Within the 30–day period, the new operator must file with the supervisor an individual bond for each well acquired, or a blanket bond replacing the existing bond(s) on the well(s).

Original bonds from the former operator held by the division will not be released until those of the new operator have been received.

WELL RECORDS

Filed with the division True and reproducible copies of all electrical, physical, and chemical logs, tests, or surveys must be filed in duplicate with the appropriate district office within 60 days after a well has been completed, abandoned, or operations suspended.

In addition, the following records must be submitted: (1) Well Summary Report; (2) Well Log and Core Record; and (3) Well History describing all well operations during the drilling, plugging, or abandonment of a well.

Monthly Geothermal Resources Report The operator of any active or shut–in geothermal well must file a production statement with the supervisor on or before the 30th day of the month following the report month.

Monthly Injection Report – Geothermal The owner of any active or shut–in well in which injection has occurred must file an injection statement with the supervisor on or before the 30th day of the month following the report month.

Accessibility Some well records, including production reports, are open to public inspection at appropriate division offices. Some records are kept confidential for a limited period of time upon the operator's written request.

Confidential status may be granted for a period of five years from the date of production, injection, or abandonment, whichever occurs first. Upon documentation of extenuating circumstances, additional time may be granted.

OTHER AGENCIES

Operators should consider whether other agencies, such as the following, must approve a project.

City and County
Air Pollution Control Districts
Planning Departments

State
Department of Health
State Lands Commission
Water Resources Control Board

Federal
Department of Agriculture, Forest Service
Department of the Interior, Bureau of Land Management and U.S. Geological Survey

ADDITIONAL INFORMATION

New operator's kit

New operators may contact the Geothermal Unit, Sacramento office, to obtain a free kit of geothermal forms and laws, and photocopies of division administrative rules and regulations.

Administrative Rules and Regulations

Copies of the *Administrative Rules and Regulations of the California Division of Oil and Gas* (published under "Title 14, Division 2" of the California Administrative Code) that are not photocopied are available at a cost of $5.70 plus sales tax.

An amendment service costing $22.00 a year will supply all changes or amendments made during the subscription year. Ring binders may be purchased for $7.78 plus sales tax.

Payment must accompany every order. All prices are subject to change. Money orders or

Some division geothermal publications (available from any geothermal office)


PR2S *Publications of the California Division of Oil and Gas.* List of all division publications. Free. (This mailing list is used to announce all publication updates.)


PR06 *Annual Report of the State Oil and Gas Supervisor.* Summary of geothermal field operations. Free.


PRC02 *California Laws for Conservation of Geothermal Resources.* Free.


PR1S–1 *California Division of Oil and Gas Maps.* List and prices of available geothermal maps. Free.


TR02 *Geothermal Hotline.* International review of geothermal development and technology published four times a year. $3.00 a year.

Other publications

Administrative Rules and Regulations of the California Division of Oil and Gas. Regulations concerning the division are published under "Title 14, Division 2" of the California Administrative Code. Copies of this portion of the code are priced at $5.70 plus sales tax.

An amendment service costing $22.00 a year is available that supplies all changes or amendments made during the subscription year. Ring binders may be purchased for $7.78 plus sales tax.

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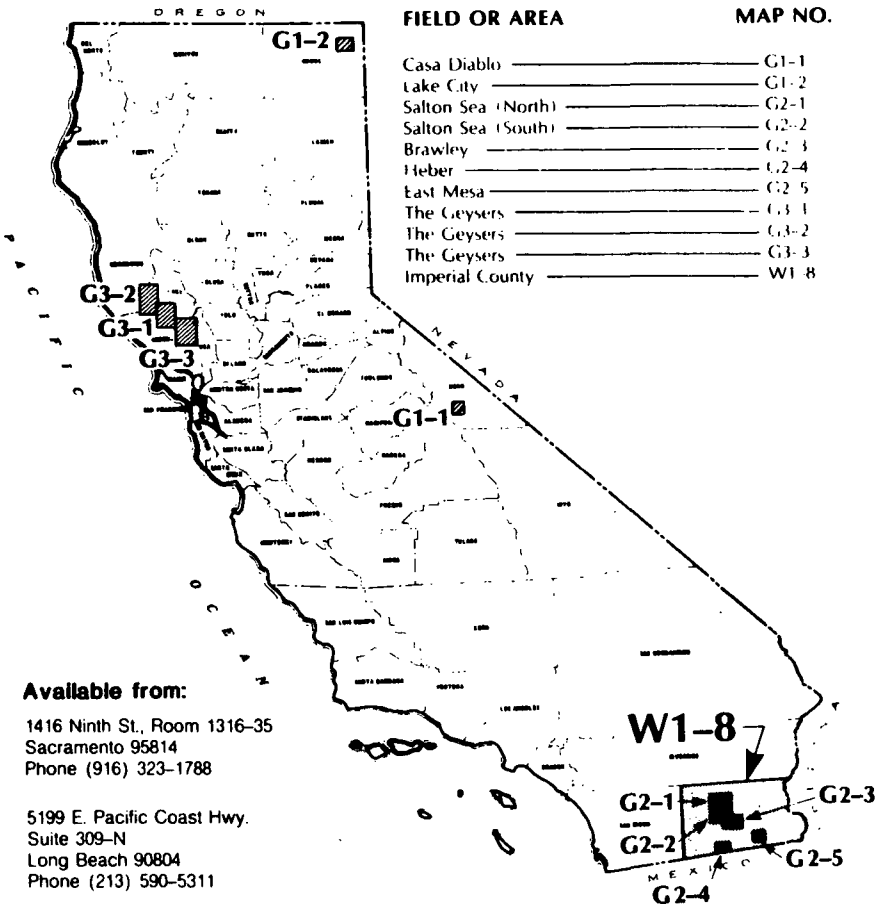
GEOTHERMAL MAPS



FIELD OR AREA	MAP NO.
Casa Diablo	G1-1
Lake City	G1-2
Salton Sea (North)	G2-1
Salton Sea (South)	G2-2
Brawley	G2-3
Heber	G2-4
East Mesa	G2-5
The Geysers	G3-1
The Geysers	G3-2
The Geysers	G3-3
Imperial County	W1-8

Available from:

1416 Ninth St., Room 1316–35
Sacramento 95814
Phone (916) 323–1788

5199 E. Pacific Coast Hwy.
Suite 309–N
Long Beach 90804
Phone (213) 590–5311

APPENDIX A

DEFINITIONS

(Section numbers, where indicated, refer to Chapter 4, Division 3, of the Public Resources Code.)

Geothermal resources ***(Section 3701)*** — "The natural heat of the earth. The energy, in whatever form, below the surface of the earth

Development well — A well drilled for commercial production of geothermal resources with the intended production interval inside the administrative boundary of an existing geothermal field, or within .8 kilometers (½ mile) of such a boundary.

Exploratory well — A well other than an observation or development well drilled for the discovery and/or evaluation of geothermal resources.

High–temperature well — A well drilled to produce geothermal resources with a temperature higher than the boiling point of water at the altitude of occurrence.

Injection well — A well drilled or converted for the specific use of injecting waste geothermal fluids for disposal or injecting geothermal fluids or other fluids for reservoir pressure maintenance or augmentation of reservoir fluids.

Low–temperature well ***(Section 3703.1)*** — " 'Low–temperature geothermal well' means a well drilled in a geothermal resource area for the purpose of producing geothermal resources, as defined in Section 6903, from which fluids can be produced which have value by virtue of the heat contained therein and have a temperature that is no more than the boiling point of water at the altitude of occurrence."

Observation well — A well drilled for temperature–monitoring purposes only.

PR7S (12–78–DWRR–750)

injecting geothermal fluids or other fluids for reservoir pressure maintenance or augmentation of reservoir fluids.

Low-temperature well
(Section 3703.1)

" 'Low-temperature geothermal well' means a well drilled in a geothermal resource area for the purpose of producing geothermal resources, as defined in Section 6903, from which fluids can be produced which have value by virtue of the heat contained therein and have a temperature that is no more than the boiling point of water at the altitude of occurrence."

Observation well

A well drilled for temperature-monitoring purposes only.

Article 8. Abandonment

1980. Objectives. The objectives of abandonment plugging are to block interzonal migration of fluids so as to:

(a) Prevent contamination of the fresh waters or other natural resources.

(b) Prevent damage to geothermal reservoirs.

(c) Prevent loss of reservoir energy.

(d) Protect integrity of reservoirs.

(e) Protect life, health, environment and property.

1981. General Requirements. The following are general requirements which are subject to review and modification for individual wells or field conditions. The division may require the witnessing of any or all of the field operations listed below.

(a) Notice of Intention to Abandon Geothermal Resources Well, is required for all wells.

(b) History of Geothermal Resources Well shall be filed within 60 days after completion of abandonment.

(c) The division's Report of Well Abandonment, will not be issued until all records have been filed and the site inspected for final cleanup by a division engineer.

(d) Subsequent to the abandonment of the hole, all casings shall be cut off at least 2 meters (6 feet) below the surface of the ground, all concrete cellars and other structures shall be removed, and the surface location restored, as near as practicable, to original conditions. The landowner has the option to assume legal responsibility for a well; however, to do so he must have legal clearance from the division.

(e) Good quality, heavy drilling fluid approved by the supervisor shall be used to replace any water in the hole and to fill all portions of the hole not plugged with cement.

(f) All cement plugs, with the possible exception of the surface plug, shall be pumped into the hole through drill pipe or tubing.

(g) All open annuli shall be filled solid with cement to the surface.

History: 1. Amendment of subsection (b) filed 12-3-76 as procedural and organizational; effective upon filing (Register 76, No. 49).

1981.1. Exploratory Well Requirements (no production casing).

(a) Base of fresh waters—a minimum of 30 meters (about 100 feet) of cement straddling the interface or transition zone whether behind casing or uncased.

(b) Shoe plug (all casing, including conductor pipe)—straddle with 30 meters (about 100 feet) of cement.

(c) Where the well has been drilled with air, a bridge plug shall be placed at the shoe of the surface casing and the bridge plug shall be capped with at least 60 meters (about 200 feet) of cement.

(d) Surface plug—15 meters (about 50 feet) minimum. May be either neat cement or concrete mix.

1981.2. Cased Wells. Cased exploratory, uncompleted development, former producing and injection wells.

(a) Geothermal zones—uncased or perforated. Cement plugs shall extend from the bottom of the zone or perforations to 30 meters (about 100 feet) over the top of the zone or perforations.

(b) Liners. Cement plugs shall be placed from 15 meters (about 50 feet) below to 15 meters above liner tops.

(c) Casing may be salvaged within protection, if first approved by the division. A minimum overlap of 15 meters (about 50 feet) is required.

(d) Casing stubs and laps. Cement plugs shall be placed, if possible, from 15 meters (about 50 feet) below to 15 meters above top of casing. If unable to enter stub or lap, 30 meters (about 100 feet) of cement shall be placed on the top of the stub or lap.

(e) Fish, collapsed pipe, etc. Cement plugs shall be squeezed, with the use of a retainer or bradenhead, with sufficient cement to fill across the production zone or perforations and to 30 meters (about 100 feet) above the zone or perforations.

(f) Base of fresh waters—a minimum of 30 meters (about 100 feet) of cement straddling the interface or transition zone, whether behind casing or uncased.

(g) Shoe plug (all casing, including conductor pipe)—straddle with 30 meters (about 100 feet) of cement.

(h) Where the well has been drilled with air, a bridge plug shall be placed at the shoe of the surface casing and the bridge plug shall be capped with at least 60 meters (about 200 feet) of cement.

(i) Surface plug—15 meters (about 50 feet) minimum. May be either neat cement or concrete mix.

PART 8 VARIABLE COST-SHARE PLAN

The proposer's cost-share percentages are based upon inlet temperatures to the mechanical equipment at each specific end-use. Inlet temperatures for space heating ideally should be approximately 105°-195°F. The domestic hot water equipment requires inlet temperatures around 140° to 150°F. The spa equipment will function best at inlet temperature between 110° to 130°F. And lastly, the pool heating will need inlet temperatures in the 90° to 110°F range.

We understand that DOE will initiate final negotiations for cost sharing based upon our plan. The engineering and economic calculation we utilized to formulate this plan are the result of preliminary calculations completed by our Mechanical Engineer, Mr. Paul Larkin. Between now and mid-November, more definitive calculations will have been completed. From this work, exact equipment sizes will have been specified and consequently more definitive cost-sharing figures will be available. At this point in time, our figures are based upon rules of thumb for equipment capacities and we will "sharpen our pencils" once Mr. Larkin has sized the equipment.

PART 8 VARIABLE COST SHARE PLAN

PROPOSER'S COST SHARE IN PER CENT (%) FOR CONDITIONS SHOWN

Water Quality Equal to or Below 20,000 ppm TDS

Pumping Depth Equal to or less than 400 feet

* = Desired Flow and Temperature Conditions

FLOW RATE (GALLONS PER MINUTE)

WELLHEAD TEMPERATURE IN DEGREES F.	BELOW 50	51-55	56-60	61-65	66-70	ABOVE 71
BELOW 110	10%	10%	10%	10%	10%	10%
111 - 125	10%	10%	10%	25%	25%	25%
126 - 140	25%	25%	25%	35%	40%	40%
141 - 155	35%	40%	45%	45%	50%	50%
156 - 170	50%	60%	60%	60%	65%	65%
171 - 185	65%	75%	75%	75%	75%	75%
ABOVE 186	75%	80%	80% *	80%	80%	80%

PART 9 INSTITUTIONAL CONSIDERATIONS

A. Site and Access:

A legal description of the site is attached at the end of this PART A. The owner has ownership of the property and therefore right of access. The right to use the geothermal resources passes with the land. All the necessary Local and State approvals have been obtained.

B. Environmental Issues:

Because we anticipate drilling a shallow well (200 to 300 feet), we do not plan to use drilling muds. Minimal dluid disposal will occur on the site. Restoration of the drill site will be completed when the landscaping is completed for the resort. The State and Local procedures for completion and/or abandonment will be strictly adhered to. We do not foresee any environmental issues arising out of this project.

C. Safety:

We do not envision any potential safety problems. All standard safety practices during drilling and testing will be enforced. The site is flat and somewhat void of trees or underbrush. Any drilling problems will be dealt with according to industry standards and Federal, State and Local ordinances.

D. Legal, Social or Institutional Issues:

There are such issues involving this project.

What are they?

Source of Data:

First American Title Company of Napa
Preliminary Report, Application No. 31995

The land referred to in this preliminary report is situated in the State of California, County of Napa, City of Calistoga, and is described as follows:

COMMENCING at the point formed by the intersection of the Southeastern line of Lake Street, and the Northeastern line of View Road, as shown on the map entitled, "Grand View Addition No. 2", filed March 2, 1951 in Book 5 of Maps at page 50 in the office of the County Recorder of said Napa County; running thence along the Eastern line of View Road, South 35° 43' East 104.37 feet and thence on a curve to the right with a radius of 325.00 feet and a central angle of 35° 23' 13" for a distance of 200.72 feet; thence North 80° 09' 54" East, 150.35 feet to the Western line of the State Highway leading from Calistoga to Middletown; thence Northerly along said Western line to the intersection thereof with the Southeastern line of Lake Street; thence Southwesterly, along said Southeastern line to the point of commencement.

PART 10 PROGRAM POLICY AND PREFERENCE FACTORS

The Wine Valley Inn is located within a two hour drive of the San Francisco Bay Area. There are numerous related businesses that cater to the year-round tourist audience. In addition, the economy of the Napa Valley is dominated by the wine industry. This region is considered one of the World's finest wine producing areas in the world. The business market is certain to continue growing. Further use of the geothermal resource is directly related to this continuing propulation growth.

If our well tests indicate that required temperatures (180°F) and flows (67gpm) for space heating are not encountered, then we can use the resource in a pre-heating application. The water temperatures required for the pool, spas and domestic hot water demand are such that pre-heating would save considerable conventional energy.

As we have noted, there is a planned cascaded end-use for the geothermal fluid; the temperatures required for each is noted in the Technical Volume - PART 5B.2.

This project will displace between 9.2 to 10.5 billion BTU's annually. The DOE dollars at risk are only $120,200 for a totally unsuccessful operation.

The total funds available for this project are in the range of two million dollars. We hope to hold the project in the 1.5 million dollar range.

APPENDIX A

LETTERS OF SUPPORT

CITY OF CALISTOGA

In Beautiful *Napa Valley*

CITY CLERK'S OFFICE (707) 942-5188
POLICE DEPARTMENT (707) 942-6262
PWD-CORP. YARD (707) 942-5150

CITY ADMINISTRATOR (707) 942-0556
PUBLIC WORKS DEPARTMENT (707) 942-5158
PLANNING DEPARTMENT (707) 942-6215

CALISTOGA, NAPA COUNTY, CA. 94515

August 22, 1980

Mr. Dennis E. McNulty
General Contractor
17706 Willow Creek Road
Occidental, CA 95465

Dear Dennis:

It is my understanding that you intend to apply for a Grant for the purpose of developing the hot water well located on the Wine Valley Inn project site. You indicated on August 19th that when the well is fully developed it would reduce the overall energy consumption of the whole Motel/Spa facility. The fact that the City approved the Project by granting a Use Permit is indicative of the support for the overall project. The proposal you have regarding the well will also be supportive primarily because of the concept of energy conservation. If this concept of energy conservation is successful it goes without saying it will be a tremendous asset to your project as well as the community.

The development of this well for energy conservation will require Use Permit action. However, if you document everything related to this well project, I believe we can just include it with the existing Use Permit file for Wine Valley Inn.

If I can be of further assistance, please do not hesitate to call.

Sincerely,

Victor Holanda

VICTOR HOLANDA
Planning Director

VH:mls

Calistoga Chamber of Commerce

CALISTOGA • • NAPA COUNTY • • CALIFORNIA 94515

February 1, 1979

Mr. Earl D. Brown
142 Bella Vista Avenue
Belvedere, California 94920

Dear Mr. Brown;

I am glad that the information that I gave you was of some help, as I told you before, we need a nice motel in that area of town. As you know, we have some nice motels, but they are not sufficient. We get many calls for accomodations, and we don't have a room available, so when I talked to you the last time, I was very glad to hear that you had something in mind.

I talked to some of the Resort owners, and discussed a few of the facts and they agree with me. If you are sure that you will get this project on the way, I am sure that it will be a profitable project. Also, if I may make a suggestions to you, I suggest that you will have to build more units and hot baths; in other words, a complete complex. And believe me, with the location that you have, you can't go wrong! I only wish I had the money to go in with you.

I hope you will start on this project in the near future.

Sincerely, your friend,

Greg Hernandez
President,
Calistoga Chamber of Commerce

"The Hot Springs of The West"

CALISTOGA STEAM RAILROAD

Silverado Trail at Brannan Street
Calistoga, California
Telephone: (707) 942-5353

March 19, 1979

Mrs. Diane Barrett, Chairperson
Calistoga Planning Commission
City Hall
Calistoga, CA 94515

Re: The Proposed Wine Valley Inn
Hiway 29 (Lincoln Avenue) at Lake Street
Calistoga
Applicant: Earl D. Brown

Dear Mrs. Barrett:

I am addressing this letter to you as a citizen, and as a former member of the Calistoga City Planning Commission, and more importantly as an individual who is very seriously concerned with the continued quality development of the business community of our city.

I have reviewed the preliminary plans of the proposed motel development which is to be built in two stages on the above referenced property. In the few short paragraphs which follow, I will attempt to communicate my feelings regarding this project in support of my overall opinion on the project.

Strictly from an appraisal standpoint, as an appraiser, the project, in my opinion, represents the highest and best use of the land. It will in no way detract from the downtown retail commercial area. To the contrary, the additional housing provided will be of benefit to all businesses in Calistoga. The continued broadening of the market and demand for restaurant and allied services and resultant upgrading process will be beneficial to not only the visitor to our community but to the local residents as well.

I have given consideration to any possible consequences of additional vehicular traffic in the area as a result of this development. The intersection of the Silverado Trail and Lake Street with Hiway 29 has not posed any traffic problems of my knowledge in the past. The volume of traffic occurring in this area would appear to be tolerable with no adverse effects by reason of this de-

velopment. The pattern of arrivals and departures to the facility even at its maximum development would be spread over many, many hours and would have a negligible effect upon existing traffic flow. I do not believe that this development would create additional traffic upon the local residential streets in the area, as it is the normal pattern of people not familiar with an area to stick to the major streets and highways. There would be little practical reason for an occupant of the proposed facility to use Lake Street for access to the restaurants and other downtown services of our community.

It is a generally recognized fact that there is a severe need for additional first class motel units on the northern end of the Napa Valley. It is true that in Napa there are many units now proposed or under construction, but this, in my opinion, does not alter the fact that many, many individuals who visit our valley might desire to remain within it for a night or two. In Calistoga itself, one only has to notice the No Vacancy signs on the various existing facilities throughout the summer and also through the weekends, being Thursdays, Fridays, Saturdays and often Sundays, in the off-season as well, to know that more units would be utilized. I have on many, many occasions throughout the year found myself on the telephone at the railroad trying to locate lodging for visitors to the railroad who would like to stay in our city for a night or two. Many communities would be envious of Calistoga's position. It does not make good economic sense to deny this quality tourist business.

In summary, let me say that I believe this to be an excellently conceived project for Calistoga. Its design concept is very favorable and I believe will provide an interesting introduction to our community from the north. I believe that the economic benefits to the community as a whole will be manifold. I would urge the Planning Commission's unqualified support of this project to our City Council.

Very sincerely yours,

Robert C. Maxfield, Owner
Calistoga Steam Railroad

cc: Earl D. Brown

STATE OF CALIFORNIA—RESOURCES AGENCY EDMUND G. BROWN JR., Governor

DEPARTMENT OF CONSERVATION
DIVISION OF OIL AND GAS
2904 McBRIDE LANE
SANTA ROSA, CALIFORNIA 95401
(707) 525-0479

September 4, 1980

Mr. John Lewis

Dear Mr. Lewis:

The Calistoga area has for many years produced a low-temperature geothermal resource. Currently within a quarter mile of parcel 11-062-04, there is a commercial operation using this resource.

Direct use of the geothermal energy in Calistoga is currently being studied. It has been determined the resource is at very shallow depths.

The Division of Oil & Gas would encourage the development of geothermal energy and would give any assistance to aid in the successful drilling of geothermal wells.

Sincerely,

K. F. Stelling

K. F. Stelling
Geothermal District Engineer

KFS:rw

023
copy 7

DEPARTMENT OF ENERGY
IDAHO OPERATIONS OFFICE

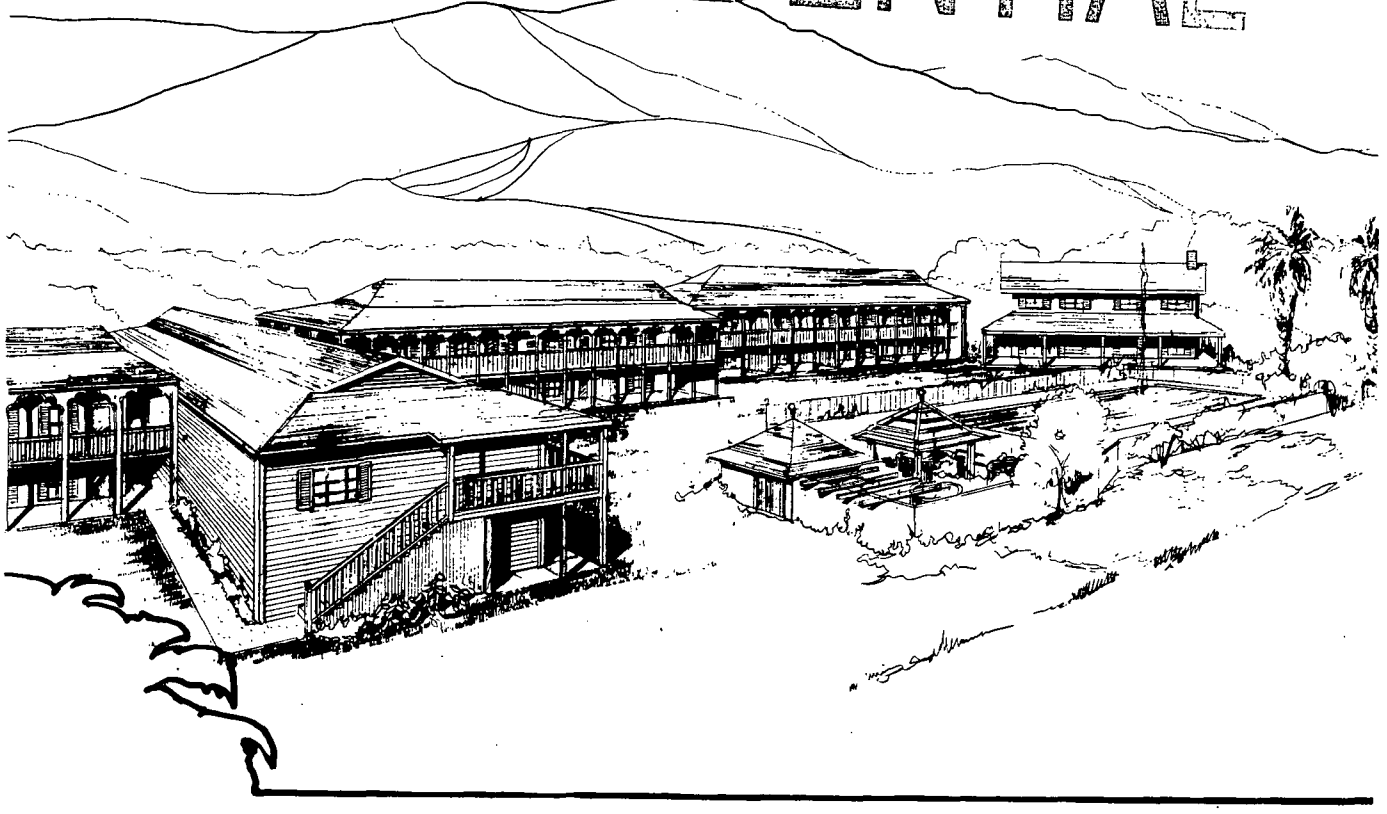
USER-COUPLED CONFIRMATION DRILLING PROGRAM
SCAP NO. DE-SC07-801D12139

VOLUME II BUSINESS PROPOSAL

WINE VALLEY INN

A MINERAL WATER SPA AND MOTEL
CALISTOGA, CALIFORNIA 15 SEPTEMBER 1980

CONFIDENTIAL



CONFIDENTIAL

VOLUME II - BUSINESS PROPOSAL
PROJECT PROPOSAL SUBMITTED TO THE
DEPARTMENT OF ENERGY
IDAHO OPERATIONS OFFICE

USER-COUPLED CONFIRMATION DRILLING PROGRAM
SCAP No. DE-SC07-801D12139

Copy No. 1 of 10

Date of Submission September 15, 1980

Ms. Connie Wilson
Name of Organization (principal participant if a team of organizations)

Small Business (Woman Owned)
Organizational Classification

445 Whiskey Hill Road, Woodside, CA 94062
Address of Organization

Wine Valley Inn: A Mineral Water Spa and Motel
Title of Proposed Project

Maximum Funds requested from DOE $120,200.00

Total Cost of Project Through Flow Testing $144,240.00

Location of Site Silverado Trail & Lincoln Ave., Calistoga, CA

Proposed Project Duration 2 - 3 months

Requested Starting Date As soon as feasible

Official Contact for Negotiations John Lewis

Position and Title Architect,

Telephone (707) 829 - 2256

Effective Period of Proposal 200 days

AUTHORIZED OFFICIAL

Signature John Lewis.

Name Typed John Lewis

Title Architect

Please check: Small Business XX Disadvantaged Business ___

(Woman-Owned) Other ___

2. TABLE OF CONTENTS

Wine Valley Inn
Volume I
Technical Proposal

CONFIDENTIAL

Part 3A

Appendix I

CONTRACT PRICING PROPOSAL (RESEARCH AND DEVELOPMENT)	Office of Management and Budget Approval No. 29-R0184
This form is for use when (i) submission of cost or pricing data (see FPR 1-3.807-3) is required and (ii) substitution for the Optional Form 59 is authorized by the contracting officer.	PAGE NO. / NO. OF PAGES

NAME OF OFFEROR	SUPPLIES AND/OR SERVICES TO BE FURNISHED
Ms. Connie Wilson	
HOME OFFICE ADDRESS 445 Whiskey Hill Road Woodside, CA 94062	
DIVISION(S) AND LOCATION(S) WHERE WORK IS TO BE PERFORMED Calistoga, California	TOTAL AMOUNT OF PROPOSAL $
GOV'T SOLICITATION NO.	

DETAIL DESCRIPTION OF COST ELEMENTS

1. DIRECT MATERIAL (Itemize on Exhibit A)			EST COST ($)	TOTAL EST COST	REFERENCE
a. PURCHASED PARTS					
b. SUBCONTRACTED ITEMS					
c. OTHER—(1) RAW MATERIAL					
(2) YOUR STANDARD COMMERCIAL ITEMS					
(3) INTERDIVISIONAL TRANSFERS (At other than cost)					
TOTAL DIRECT MATERIAL					
2. MATERIAL OVERHEAD (Rate %) (Base =)					
3. DIRECT LABOR (Specify)	ESTIMATED HOURS	RATE/HOUR	EST COST ($)		
TOTAL DIRECT LABOR					
4. LABOR OVERHEAD (Specify Department or Cost Center)	O.H. RATE	X BASE =	EST COST ($)		
TOTAL LABOR OVERHEAD					
5. SPECIAL TESTING (Including field work at Government installations)			EST COST ($)		
TOTAL SPECIAL TESTING					
6. SPECIAL EQUIPMENT (If direct charge) (Itemize on Exhibit A)					
7. TRAVEL (If direct charge) (Give details on attached Schedule)			EST COST ($)		
a. TRANSPORTATION					
b. PER DIEM OR SUBSISTENCE					
TOTAL TRAVEL					
8. CONSULTANTS (Identify—purpose—rate)			EST COST ($)		
Lewis & Nichol, Architects, Project Managers					
Lump Sum			14,975.		
Driller (to be selected)			97,700.		
Applied Earth Sciences, Geologists			7,525.		
TOTAL CONSULTANTS					
9. OTHER DIRECT COSTS (Itemize on Exhibit A)					
10. TOTAL DIRECT COST AND OVERHEAD					
11. GENERAL AND ADMINISTRATIVE EXPENSE (Rate % of cost element Nos.)					
12. ROYALTIES					
13. TOTAL ESTIMATED COST					120,200.
14. FEE OR PROFIT					
15. TOTAL ESTIMATED COST AND FEE OR PROFIT					120,200.

OPTIONAL FORM 60
October 1971
General Services Administration
FPR 1-16.806

CONFIDENTIAL

This proposal is submitted for use in connection with and in response to *(Describe RFP, etc.)*
USER- COUPLED DRILLING PROGRAM
SCAP-DE-Sco7-80ID12139
and reflects our best estimates as of this date, in accordance with the Instructions to Offerors and the Footnotes which follow.

TYPED NAME AND TITLE	SIGNATURE
JOHN LEWIS, ARCHITECT	

NAME OF FIRM	DATE OF SUBMISSION
LEWIS & NICHOL, ARCHITECTS & PLANNERS	9-15-80

EXHIBIT A—SUPPORTING SCHEDULE *(Specify. If more space is needed, use reverse)*

COST EL NO.	ITEM DESCRIPTION *(See footnote 5)*	EST COST *($)*
	LEWIS & NICHOL	
	DIRECT LABOR 299.5 HRS @ $50/HR.	14,975.
	DRILLER (TO BE SELECTED)	97,700.
	APPLIED EARTH SCIENCES, GEOLOGISTS	
	GEOLOGISTS (A MINORITY BUSINESS)	7,525
	215 HRS. @ $35/HR.	
	TOTAL:	$120,200.
	IF THE PROJECT IS COMPLETELY SUCCESSFUL	
	THE COST TO DOE WOULD BE $42,040.	

I. HAS ANY EXECUTIVE AGENCY OF THE UNITED STATES GOVERNMENT PERFORMED ANY REVIEW OF YOUR ACCOUNTS OR RECORDS IN CONNECTION WITH ANY OTHER GOVERNMENT PRIME CONTRACT OR SUBCONTRACT WITHIN THE PAST TWELVE MONTHS?
☐ YES ☒ NO *(If yes, identify below.)*

NAME AND ADDRESS OF REVIEWING OFFICE AND INDIVIDUAL | TELEPHONE NUMBER/EXTENSION

II. WILL YOU REQUIRE THE USE OF ANY GOVERNMENT PROPERTY IN THE PERFORMANCE OF THIS PROPOSED CONTRACT?
☐ YES ☒ NO *(If yes, identify on reverse or separate page)*

III. DO YOU REQUIRE GOVERNMENT CONTRACT FINANCING TO PERFORM THIS PROPOSED CONTRACT?
☐ YES ☒ NO *(If yes, identify.)*: ☐ ADVANCE PAYMENTS ☐ PROGRESS PAYMENTS OR ☐ GUARANTEED LOANS

IV. DO YOU NOW HOLD ANY CONTRACT *(Or, do you have any independently financed (IR&D) projects)* FOR THE SAME OR SIMILAR WORK CALLED FOR BY THIS PROPOSED CONTRACT?
☐ YES ☒ NO *(If yes, identify.)*:

V. DOES THIS COST SUMMARY CONFORM WITH THE COST PRINCIPLES SET FORTH IN AGENCY REGULATIONS?
☒ YES ☐ NO *(If no, explain on reverse or separate page)*

See Reverse for Instructions and Footnotes OPTIONAL FORM 60 (10-71)

2

The method of computation was based on an hourly rate with a 3.33 multiplier. The total number of estimated hours was 299.5. Included in the A/E estimate were the cost for printing, communication equipment, travel, supplies and general overhead. The work by Mr. Paul Larkin, the Mechanical Engineer, is included in the Lewis and Nichol fee.

Our budget summary by key tasks is noted on the attached form.

PART 4 PROJECT FINANCIAL PLAN

The non-DOE share of the project will be financed through private funds raised from investors as noted in PART 5A. The return on investment will be wholly dependent on the occupancy rate. Further discussion on this matter is in PART 5A.

If a completely successful well system is encountered, DOE's cost share will be 20% as noted in the variable cost-share plan. The cost to DOE would be $42,040.

The management procedure for the drilling program will be similar to that employed in similar building programs. This involves members of the A/E Staff and the Geologists.

Approval authority will be the basis for much of the project management. All phases must be approved by the Project Manager at the recommendation of his staff. The approval authority by the Project Manager continues through the construction phase. Control continues during actual construction as contractor's vouchers must be approved by the Project Manager. The owner, through the A/E, will constantly monitor construction progress. Their observations at the construction site will insure construction meeting design specifications set forth in the contract.

Management of the project through scheduling will also be employed. A general project schedule is included in this proposal. The general contractor will be required to provide a construction schedule that will be monitored by the A/E. Monthly status reports will be prepared by the A/E for owner review.

Project cost will be managed by the A/E's staff.

1. Construction of 55 units including pools, spa, parking landscaping, and reception building.

Buildings per drawings	$1,100.000.00
Room Furnishings @ $2,500.00 per unit	137,500.00
Signs and Franchise	10,000.00
Architectural Fees	25,000.00
Interest on Construction Loan 14% for 8 months	60,000.00
Development Fees	50,000.00
Land Costs	280,000.00
$1,000,000.00 Stand by Loan Fee	50,000.00
	$1,712,500.00

2. Cash Investment

Total Projected Cost of Project		$1,712,500.00
Cash Required in Project		
Down Payment on Land	$100,000.00	
Operating Reserve	100,000.00	
Cash in Construction	250,000.00	
Total Cash		450,000.00
First Deed of Trust (Savings & Loan)		1,082,500.00
Second Deed of Trust (Real Estate)		180,000.00
Total Projected Cost		$1,712,500.00

3. Debt Service

First Deed of Trust	$1,082,500.00 @ 14%	$ 151,550.00
Second Deed of Trust	$180,000.00 @ 11%	19,800.00
Total Debt Service		$ 171,350.00

4. Projected Return

Assume average room rate of $35.00 per day

	60% Occupancy Rate	70% Occupancy Rate
Gross Income	$421,575.00	$491,837.50
Operating Expenses	252,945.00(60%)	295,102.50(60%)
Net Income	168,630.00	196,735.00
Debt Service	171,350.00	171,350.00
Cash Flow	(2,720.00)	25,385.00

Assume average room rate of $40.00 per day

	60% Occupancy Rate	70% Occupancy Rate
Cash Flow	$ 21,370.00	$ 53,490.00

PART 5A. ORGANIZATIONAL INFORMATION

PROJECT INFORMATION

The Wine Valley Inn will be a quality, first class, 60 room country inn in Calistoga, California at the upper end of the Napa Valley wine country. It will consist of a mansion house which will include the reception area and office, manager's suite, and breakfast/social room downstairs and five guest rooms upstairs. The remaining 55 guest rooms will be in five two story detached buildings, with all but eight rooms interconnected with walkways and porches. Also included are laundry and storage facilities, large swimming pool, hot mineral water pool/jacuzzi with overhead gazebo, and an indoor spa. Each building will have wide porches which allow guests to sit outside their rooms and view the beauty of the surrounding hills and vineyards. The complex, on 1.6 acres, will be heavily landscaped with many trees, large lawn areas, and extensive planting of flowers and bushes. A second parcel adjacent to this one was purcheased for future expansion.

The location is ideal, being situated at the intersection of the two main roads that run the length of the valley, Highway 29 and the Silverado Trail. It is 5 blocks from downtown Calistoga, giving guests a leisurely walk or a short ride into town to visit the shops and restaurants, The views from the inn are of nearby Mount St. Helena, the Palisades mountains, and the surrounding vineyards, creating a quiet, relaxing, and restful atmosphere for the guests.

It is anticipated that the inn will become associated with the Best Western lodging chain.

ORGANIZATION INFORMATION

The ownership of the project, the inn itself and the land, is expected to be vested in the name of a California limited partnership, The Wine Valley Inn Associates.

The General Partner for the partnership will be responsible for arranging financing, approval of working drawings and final plans, seclection of the General Contractor, overseeing construction, selecting room furnishings, general room decor and landscaping, and negotiating with Best Western for the franchise.

Everything, including zoning, use-permit, architectural approval, density, traffic flow, water, survey, topographical, soils and site planning has been done. All that is needed is the working drawings to obtain the building permit.

CONSTRUCTION COSTS

The cost of construction and related expenses are illustrated on the following page. They are based upon two estimates received from the BDM Construction Company of Santa Rosa and C.O. Jones Construction Company of San Francisco. Both of these firms have reviewed the plans and the site and have had extensive discussions with the architect. Copies of their estimates are enclosed. In addition, we have discussed the project with Best Western International and Travelodge International. Both of these firms have considerable experience in the lodging industry and are quite familiar with motel construction costs and motel operating costs.

Motel construction, including earth work, plumbing, electrical, vertical construction, pools and spa, landscaping, paving and fees.	$ 1,075,000.
Room furnishings, including manager's quarters, laundry, and supplies.	180,000.
Architect fees	30,000.
Signs and franchise	10,000.
Project supervision	40,000.
Land	350,000.
Total Project Cost	$ 1,635,000.

FINANCIAL PROJECTIONS

A survey indicated that the eight older motels in Calistoga are averaging approximately $26 - $29 per room/day. The newer and nicer motels south of Calistoga are now averaging $52.41 per room/day. We believe we can price the rooms at the Wine Valley Inn to provide an average room rate of $35 per day on a year-round basis. After the inn has been open for perhaps a year, room rates should be adjusted to the $40 range, especially given the rate of inflation now prevailing and projected over the next three years.

The following table illustrates the gross income projection for different occupancy rates using the $35 and $40 room rates:

GROSS INCOME PROJECTION

Rooms	Available Nights	Average Room Rate	Occupancy	Gross Income $35 Rate	Gross Income $40 Rate
60	365	$35 / $40	80%	$613,000 /	$701,000
"	"	" "	75%	575,000 /	657,000
"	"	" "	70%	537,000 /	613,000
"	"	" "	65%	498,000 /	569,000
"	"	" "	60%	460,000 /	526,000
"	"	" "	55%	422,000 /	482,000
"	"	" "	50%	383,000 /	438,000

BREAK-EVEN ANALYSIS

The following break-even analysis uses these assumptions:

1. Cost of Project: $1,685,000.
2. Equity: $500,000, Cash Reserves: $70,000, Total: $570,000
3. Mortgage: $1,180,000 for 30 years at 11-3/4%.
   Debt Service: $143,000 per year.

Occupancy Rate	50%	60%	70%	80%
Gross Income	383,000	460,000	537,000	613,000
Operating Expense	230,000 (60%)	258,000 (56%)	279,000 (52%)	306,000 (50%)
Net Income	153,000	202,000	258,000	307,000
Debt Service	143,000	143,000	143,000	143,000
Cash Flow	$ 10,000	$ 59,000	$115,000	$164,000

The above analysis indicates that we will be able to break even at a 46% occupancy rate. This is a very low rate of occupancy, particularly for a first class facility. Occupancy rates for all hotels and motor hotels in the United States was 68% for 1977 - 1978. The feasibility study shows that the average year round occupancy for the existing motels in Calistoga is 74%.

We believe we can operate at the 55-60% occupancy rate in the first year of operation. This rate will continue to improve for the next three years as the Inn becomes established and develops a reputation for quality lodging and service.

The five year financial projections on the following page makes these assumptions:

1. First year occupancy equals 55% with $35 average room rate.

2. Second year occupancy equals 65% with $40 average room rate.

3. Occupancy rate increases by 5% per year and levels off at 75% in the fourth year.

4. Beginning in the third year room income and operating expenses are increased at the rate of inflation assumed to be 8% per year.

5. Beginning in the third year, replacement costs increase due to wear and tear on the room furnishings, building exterior, etc. Amount shown is estimated.

FIVE YEAR FINANCIAL PROJECTIONS

	Year 1	Year 2	Year 3	Year 4	Year 5
Occupancy Rate	55%	65%	70%	75%	75%
Avg. Room Rate	$35.00	$40.00	$43.20	$46.65	$50.40
Gross Income	422,000	569,000	662,000	766,000	828,000
Operating Expenses	245,000 (58%)	307,000 (54%)	332,000 (50%)	359,000 (47%)	388,000 (47%)
	117,000	262,000	330,000	407,000	440,000
Debt Service	143,000	143,000	143,000	143,000	143,000
Cash Flow	$34,000	$119,000	$187,000	$264.000	$297,000
Replacements	--	--	15,000	30,000	45,000
Net Cash Flow	$34,000	$119,000	$172,000	$234,000	$252,000

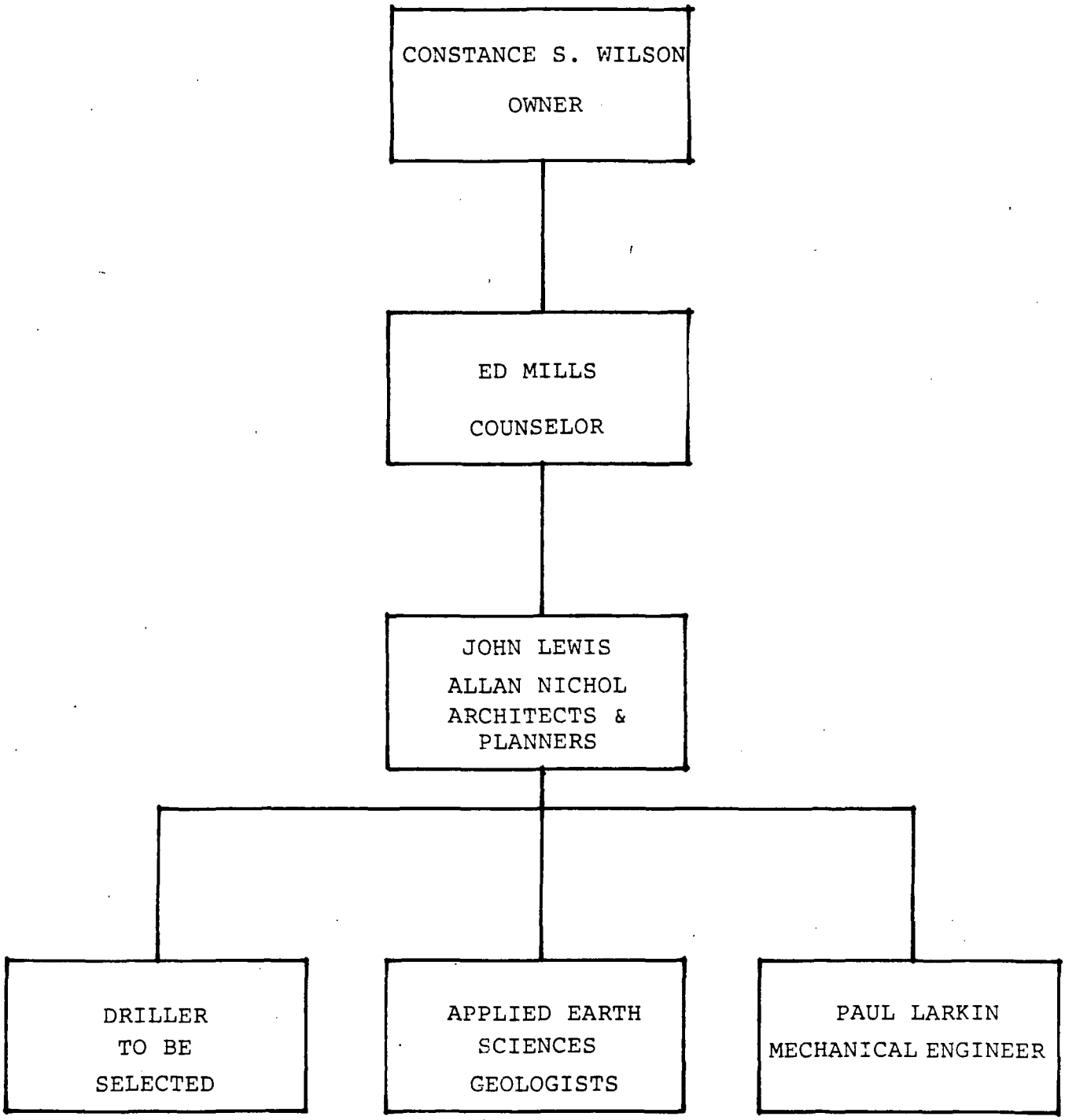


TABLE OF ORGANIZATION

5B PROPOSING ENTITY

The person responsible for this project is Ms. Connie Wilson. She operates a woman-owned small business which invests in projects of varying types. She has a working capital of $3-$4 million. Her Counselor, Mr. Ed Mills (1·415·986·4812), an attorney in a San Francisco Law Firm, evaluates all projects. Mr. Dennis McNulty (1·707·874·3077), a general contractor, has been chosen to manage the actual construction of the facility.

5C RECENT GOVERNMENT CONTRACTS

The , Ms. Connie Wilson, has not to date received any Government contracts. However, Mr. John Lewis has written two successful grants which are energy related.

FIRST GRANT

Sponsoring Agency: U.S.D.O.E.

Contractor: Ohio Dept. of Natural Resources

Program Title: Hot Water Initiating for Hotel/Motel Installations P.O.N. EG-77-N-03-1450

Amount of Contract: $180,000.

Mr. Lewis's former role in this contract was as Writer and Editor of the proposal, Solar Energy Systems Analysor and Assistant to the Program Manager. He left this project to join the Governor's Office of Appropriate Technology in California

SECOND GRANT

Sponsoring Agency: California Energy Extension Service

Contractor: Sun Rose Design Group

Program Title: Energy Audits & Counseling Cons-ruction Businesses

Amount of Contract: $25,500.

Mr. Lewis's former role in this contract was as Writer and Editor of the proposal as well as Program Manager of the project. He left this project to start his own business in Partnership with Mr. Allan Nichol, Architect.

FINANCIAL DATA REGARDING JOHN LEWIS & ALLAN NICHOL, ARCHITECTS & PLANNERS:

Messrs. Lewis and Nichol formed their partnership business in August of this year. Prior to that Mr. Lewis was employed by the California Governor's Office of Appropriate Technology at an annual salary of $23,500. Mr. Nichol's sole proprietorship business generated $21,000. annually.

SECTION 6a.

Appendix O

REPRESENTATIONS AND CERTIFICATIONS

[Instructions: Check or complete all appropriate boxes or blanks.]

The proposer makes the following representations and certifications:

1. CONTINGENT FEE

(a) It (XX) has, ( ) has not, employed or retained any company or person (other than a full-time bona fide employee working solely for the bidder) to solicit or secure this contract, and (b) it ( ) has, ( ) has not, paid or agreed to pay any company or person (other than a full-time bona fide employee working solely for the bidder) any fee, commission, percentage or brokerage fee, contingent upon or resulting from the award of this contract; and agrees to furnish information relating to (a) and (b) above as requested by the Contracting Officer. (For interpretation of the representation, including the term "bona fide employee," see Code of Federal Regulations, Title 41, Subpart 1-1.5.).

2. TYPE OF ORGANIZATION

It operates as an (XX) individual, ( ) partnership, ( ) joint venture, ( ) corporation, incorporated in State of California.

3. EQUAL OPPORTUNITY

It ( ) has, (XX) has not, participated in a previous contract or subcontract subject to the Equal Opportunity Clause herein, the clause originally contained in Section 301 of Executive Order No. 10925, or the clause contained in Section 201 of Executive Order No. 11114; it ( ) has, (XX) has not, filed all required compliance reports; and representations indicating submission or required compliance reports, signed by proposed subcontractors, will be obtained prior to subcontract awards.

4. AFFIRMATIVE ACTION COMPLIANCE PROGRAM

The offeror represents that (a) it ( ) has developed and has on file, ( ) has not developed and does not have on file, at each establishment an affirmative action program as required by the rules and regulations of the Secretary of Labor (41 CFR 60-1 and 60-2), or (b) (XX) has not previously had contracts subject to written affirmative action program requirements of the rules and regulations of the Secretary of Labor because (check as applicable):

XX offeror does not have 50 or more employees

XX offeror has not had a Government prime contract or subcontract of $50,000 or more.

5. EQUAL OPPORTUNITY COMPLIANCE

[Applicable to proposals exceeding $1,000,000]

The offeror represents -

a. That a full compliance review of the offeror's employment practices ( ) has, (XX) has not, been conducted by an agency of the Federal Government.

b. If a full compliance review has been conducted by an agency of the Federal Government, the most recent compliance review was conducted on _____ (Date) by _____ (Federal Agency).

c. The proposed first-tier subcontractors which will be awarded subcontracts of $1,000,000 or more are (Not Applicable).

Any offeror and his known first-tier subcontractors which will be awarded subcontracts of $1,000,000 or more will be subject to full, preaward equal opportunity compliance reviews before the award of the contract for the purpose of determining whether the proposer and his subcontractors are able to comply with the provisions of the Equal Opportunity article.

6. CERTIFICATION OF NONSEGREGATED FACILITIES

By the submission of this proposal, the offeror, applicant, or subcontractor certifies that it does not maintain or provide for its employees any segregated facilities at any of its establishments, and that it does not permit its employees to perform their services at any location, under its control, where segregated facilities are maintained. It certifies further that it will not maintain or provide for its employees any segregated facilities at any of its establishments, and that it will not permit its employees to perform their services at any location, under its control, where segregated facilities are maintained. The offeror, applicant, or subcontractor agrees that a breach of this certification is a violation of the Equal Opportunity clause in this contract. As used in this certification, the term "segregated facilities" means any waiting rooms, work areas, rest rooms and wash rooms, restaurants and other eating areas, time clocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees which are segregated by explicit directive or are in fact segregated on the basis of race, creed, color, or national origin, because of habit, local custom, or otherwise. It further agrees that (except where it

6. CERTIFICATION OF NONSEGREGATED FACILITIES (Cont'd)

has obtained identical certifications from proposed subcontractors for specific time periods) it will obtain identical certifications from proposed subcontractors prior to the award of subcontracts exceeding $10,000 which are not exempt from the provisions of the Equal Opportunity clause; that it will retain such certifications in its files; and that it will forward the following notice to such proposed subcontractors (except where the proposed subcontractors have submitted identical certifications for specific time periods):

NOTICE TO PROSPECTIVE SUBCONTRACTORS OF REQUIREMENT FOR CERTIFICATION OF NONSEGREGATED FACILITIES

A Certification of Nonsegregated Facilities must be submitted prior to the award of a subcontract exceeding $10,000 which is not exempt from the provisions of the Equal Opportunity clause. The certification may be submitted either for each subcontract or for all subcontracts during a period (i.e., quarterly, semi-annually, or annually).

7. PARENT COMPANY AND EMPLOYER IDENTIFICATION NUMBER

Each proposer shall furnish the following information by filling in the appropriate blocks:

a. Is the proposer owned or controlled by a parent company as described below? ( ) Yes (XX) No. (For the purpose of this proposal, a parent company is defined as one which either owns or controls the activities and basic business policies of the proposer. To own another company means the parent company must own at least a majority (more than 50 percent) of the voting rights in that company. To control another company, such ownership is not required; if another company is able to formulate, determine or veto basic business policy decisions of the proposer, such other company is considered the parent company of the proposer. This control may be exercised through the use of dominant minority voting rights, use of proxy voting, contractual arrangements, or otherwise.)

b. If the answer to a. above is "Yes", proposer shall insert in the space below the name and main office address of the parent company.

Name of Parent Company: _____

_____

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7. PARENT COMPANY AND EMPLOYER IDENTIFICATION NUMBER (Cont'd)

Main Office Address (No., Street, City, State and Zip Code)

(Not Applicable)

c. Proposer shall insert in the applicable space below, if it has no parent company, its own Employer's Identification Number (E.I. No.) (Federal Social Security Number used on Employer's Quarterly Federal Tax Return, U. S. Treasury Department Form 941), or if it has a parent company, the E.I. No. of its parent company.

Employer Identification Number of Parent Company: _____

8. DISCLOSURE STATEMENT - COST ACCOUNTING PRACTICES AND CERTIFICATION

Any contract in excess of $100,000 resulting from this solicitation except: (i) when the price negotiated is based on: (a) established catalog or market prices of commercial items sold in substantial quantities to the general public, or (b) prices set by law or regulations; (ii) contracts awarded to small business concerns (as defined in 1-701.1 of the Armed Services procurement regulations or FPR §1-1.701-1); or (iii) contracts which are otherwise exempt (see 4 CFR 331.30(b)) shall be subject to the requirements of the Cost Accounting Standards Board. Any offeror submitting a proposal, which, if accepted, will result in a contract subject to the requirements of the Cost Accounting Standards Board must, as a condition of contracting, submit a disclosure statment as required by regulations of the Board. The disclosure statement must be submitted as a part of the offeror's proposal under this solicitation (see (I), below) unless: (i) the offeror, together with all divisions, subsidiaries, and affiliates under common control, did not receive net awards exceeding the monetary exemption for disclosure as established by the Cost Accounting Standards Board (see (II), below); (ii) the offeror exceeded the monetary exemption in its cost accounting period immediately preceding the cost accounting period in which this proposal was submitted but, in accordance with the regulations of the Cost Accounting Standards Board, is not yet required to submit a disclosure statement (see (III), below); (iii) the offeror has already submitted a disclosure statement disclosing the practices used in connection with the pricing of this proposal

8. DISCLOSURE STATEMENT - COST ACCOUNTING PRACTICES AND CERTIFICATION (Cont'd)

(see (IV), below); or (iv) post-award submission has been authorized by the Contracting Officer. See 4 CFR 351.70 for submission of copy of disclosure statement to the Cost Accounting Standards Board.

CAUTION: A practice disclosed in a disclosure statement shall not, by virtue of such disclosure, be deemed to be a proper, approved, or agreed to practice for pricing proposals or accumulating and reporting contract performance cost data.

Check the appropriate box below. (Check Paragraph 9)

( ) I. CERTIFICATE OF CONCURRENT SUBMISSION OF DISCLOSURE STATEMENT(S)

The offeror hereby certifies that he has submitted, as a part of his proposal under this solicitation, copies of the disclosure statement(s) as follows: (i) original and one copy to the cognizant Contracting Officer (Administrative Contracting Officer (ACO), see DOD Directory of Contract Administration Components (DOD 4105.59H)); and (ii) one copy to the cognizant contract auditor.

Date of Disclosure Statement(s)	Name(s) and Address(es) of Cognizant Contracting Officer(s) Where Filed

The offeror further certifies that practices used in estimating costs in pricing this proposal are consistent with the cost accounting practices disclosed in the Disclosure Statement(s).

(XX) II. CERTIFICATE OF MONETARY EXEMPTION

The offeror hereby certifies that it, together with all divisions, subsidiaries, and affiliates under common control, did not receive net awards of negotiated national defense prime contracts and subcontracts subject to cost accounting standards totaling more than $10 million in its cost accounting period immediately preceding the period in which this proposal was submitted. The offeror further certifies that if its status changes prior to an award resulting from this proposal it will advise the Contracting Officer immediately.

CAUTION: Offerors who submitted a Disclosure Statement under the filing requirements previously established by the Cost Accounting Standards Board may claim this exemption only if the dollar volume of CAS covered national defense prime

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8. DISCLOSURE STATEMENT - COST ACCOUNTING PRACTICES AND CERTIFICATION (Cont'd)

contract and subcontract awards in their preceding cost accounting period did not exceed the $10 million threshold and the amount of this award will be less than $10 million. Such offerors will continue to be reponsible for maintaining the disclosure statement and following the disclosed practices on CAS covered prime contracts and subcontracts awarded during the period in which a disclosure statement was required.

( ) III. CERTIFICATE OF INTERIM EXEMPTION

The offeror hereby certifies that: (i) it first exceeded the monetary exemption for disclosure as defined in (II) above, in its cost accounting period immediately preceding the cost accounting period in which this proposal was submitted, and (ii) in accordance with the regulations of the Cost Accounting Standards Board (4 CFR 351.40(f)), it is not yet required to submit a disclosure statement. The offeror further certifies that if an award resulting from this proposal has not been made within 90 days after the end of that period, it will immediately submit a revised certificate to the Contracting Officer, in the form specified under (I), above or (IV), below, as appropriate, to verify its submission of a completed disclosure statement.

CAUTION: Offerors may not claim this exemption if they are currently required to disclose because they were awarded a CAS covered national defense prime contract or subcontract of $10 million or more in the current cost accounting period. Further, the exemption applies only in connection with proposals submitted prior to expiration of the 90-day period following the cost accounting period in which the monetary exemption was exceeded.

( ) IV. CERTIFICATE OF PREVIOUSLY SUBMITTED DISCLOSURE STATEMENT(S)

The offeror hereby certifies that the disclosure statement(s) was filed as follows:

Date of Disclosure Statement(s)	Name(s) and Address(es) of Cognizant Contracting Officer(s) Where Filed

The offeror further certifies that practices used in estimating costs in pricing this proposal are consistent with the cost accounting practices disclosed in the Disclosure Statement(s).

9. COST ACCOUNTING STANDARDS - EXEMPTIONS FOR CONTRACTS OF $500,000 OR LESS

If this proposal is expected to result in the award of a contract of $500,000 or less, the offeror shall indicate whether the exemption to the cost accounting standards clause under the provisions of 4 CFR 331.30(b)(8) is claimed. Failure to check the box below shall mean that the resultant contract is subject to the cost accounting standards clause or that the offeror elects to comply with such clause.

(XX) The offeror hereby claims an exemption from the Cost Accounting Standards clause under the provisions of 4 CFR 331.30(b)(8) and certifies that it has received notification of final acceptance of all deliverable items on (i) all prime contracts or subcontracts in excess of $500,000 which contain the Cost Accounting Standards clause, and (ii) all prime contracts or subcontracts of $500,000 or less awarded after January 1, 1975, which contain the Cost Accounting Standards clause. The offeror further certifies it will immediately notify the Contracting Officer in writing in the event it is awarded any other contract or subcontract containing the Cost Accounting Standards clause subsequent to the date of this certificate but prior to the date of any award resulting from this proposal.

10. COST ACCOUNTING STANDARDS ELIGIBILITY FOR MODIFIED CONTRACT COVERAGE

If the offeror is eligible to use the modified provisions of 4 CFR Part 332, and elects to do so, it shall indicate by checking the box below. Checking the box below shall mean that the resultant contract is subject to the Disclosure and Consistency of Cost Accounting Practices clause in lieu of the Cost Accounting Standards clause.

(XX) The offeror hereby claims an exemption from the Cost Accounting Standards clause under the provisions of 4 CFR 331.30(b)(2), and certifies that it is eligible for use of the Disclosure and Consistency of Cost Accounting Practices clause because (i) during its cost accounting period immediately preceding the period in which this proposal was submitted, it received less than $10 million in awards of CAS covered national defense prime contracts and subcontracts, and (ii) the sum of such awards equaled less than 10 percent of his total sales during that cost accounting period. The offeror further certifies that if its status changes prior to an award resulting from this proposal, it will advise the Contracting Officer immediately.

CAUTION: Offerors may not claim the above eligibility for modified contract coverage if this proposal is expected to result in the award of a contract of $10 million or more or if, during their current cost accounting period, they have been awarded a single CAS-covered national defense prime contract or subcontract of $10 million or more.

11. ADDITIONAL COST ACCOUNTING STANDARDS APPLICABLE TO EXISTING CONTRACTS

The offeror shall indicate below whether award of the contemplated contract would in accordance with paragraph (a)(3) of the Cost Accounting Standards clause, require a change in its established cost accounting practices affecting existing contracts and subcontracts.

( ) Yes (XX) No

NOTE: If the offeror has checked "yes" above, and is awarded the contemplated contract, it will be required to comply with the Administration of Cost Accounting Standards clause.

12. CLEAN AIR AND WATER CERTIFICATION (Not Applicable)

(Applicable if the bid or offer exceeds $100,000, or the Contracting Officer has determined that orders under an indefinite quantity contract in any year will exceed $100,000, or a facility to be used has been the subject of a conviction under the Clean Air Act (42 U.S.C. 1857c-8(c)(1)) or the Federal Water Pollution Control Act (33 U.S.C. 1319(c)) and is listed by EPA, or is not otherwise exempt.)

The bidder or offeror certifies as follows:

(a) Any facility to be utilized in the performance of this proposed contract has ( ), has not ( ), been listed on the Environmental Protection Agency List of Violating Facilities.

(b) It will promptly notify the Contracting Officer, prior to award, of the receipt of any communication from the Director, Office of Federal Activities, Environmental Protection Agency, indicating that any facility which it proposes to use for the performance of the contract is under consideration to be listed on the EPA List of Violating Facilities.

(c) It will include substantially this certification, including this paragraph (c), in every nonexempt subcontract.

13. SMALL AND SMALL DISADVANTAGED BUSINESS CERTIFICATION

(a) The bidder or offeror certifies that it is (XX) is not ( ) a small business concern as defined in accordance with Section 3 of the Small Business Act (15 U.S.C. 632).

(b) The bidder or offeror certifies that it is a small business [as set forth in (a) above] and is (XX) is not ( ) owned and controlled by socially and economically disadvantaged individuals. Such a firm is defined as one -

13. SMALL AND SMALL DISADVANTAGED BUSINESS CERTIFICATION (Cont'd)

(i) which is at least 51 per centum owned by one or more such individuals or, in the case of any publicly owned business, at least 51 per centum of the stock is owned by such individuals;

(ii) whose management and daily business operations are controlled by one or more such individuals; and

(iii) which certifies concerning said ownership and control in accordance with section (c) below.

(c) The bidder or offeror certifies that it is ( ) is not (XX) a minority individual(s) in accordance with (c)(i) below or that it is ( ) is not ( ) socially and economically disadvantaged in accord with section (c)(ii) or (c)(iii). Socially and economically disadvantaged individuals are defined as:

(i) United States citizens who are Black Americans, Hispanic Americans, Native Americans, or other specified minorities;

(ii) any other individual found to be disadvantaged pursuant to section 8(a) of the Small Business Act (15 U.S.C. 637); or

(iii) any other individual defined as socially, and economically disadvantaged, for purposes relating to other sections of the Small Business Act.

14. WOMAN-OWNED BUSINESS

Concern is (XX) is not ( ) a woman-owned business.

A woman-owned business is a business which is, at least, 51 percent owned, controlled, and operated by a woman or women. Controlled is defined as exercising the power to make policy decisions. Operated is defined as actively involved in the day-to-day management.

For the purposes of this definition, businesses which are publicly owned, joint stock associations, and business trusts are exempted. Exempted businesses may voluntarily represent that they are, or are not, woman-owned if this information is available.

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15. PERCENT OF FOREIGN CONTENT

The offeror/contractor will represent (as an estimate), immediately after the award of a contract, the percent of the foreign content of the item or service being procured expressed as a percent of the contract award price (accuracy within plus or minus 5 percent is acceptable).

NOTE: No solicitation may be properly considered without these representations and certifications, and no award may be made without this form being executed.

Signed by John Lewis.

John Lewis, Architect

(Title)

For Ms. Connie ~~Mills~~ WILSON
445 Whiskey Hill Road
Woodside, CA 94062

022879

SECTION 6B form 424

Appendix P

OMB Approval No. 29-R0218

FEDERAL ASSISTANCE

2. APPLICANT'S APPLICATION — a. NUMBER: | b. DATE (Year month day): 80 19 9/15

3. STATE APPLICATION IDENTIFIER — a. NUMBER: | b. DATE ASSIGNED (Year month day): 19

1. TYPE OF ACTION (Mark appropriate box)
- ☐ PREAPPLICATION
- ☒ APPLICATION
- ☐ NOTIFICATION OF INTENT (Opt.)
- ☐ REPORT OF FEDERAL ACTION

Leave Blank

SECTION I—APPLICANT/RECIPIENT DATA

4. LEGAL APPLICANT/RECIPIENT
- a. Applicant Name : Ms. Connie ~~Mills~~ WILSON
- b. Organization Unit :
- c. Street/P.O. Box : 445 Whiskey Hill Rd.
- d. City : Woodside — e. County :
- f. State : CA — g. ZIP Code: 94062
- h. Contact Person (Name & telephone No.) : John Lewis (707) 829-2256

5. FEDERAL EMPLOYER IDENTIFICATION NO.

6. PROGRAM (From Federal Catalog)
- a. NUMBER
- b. TITLE

7. TITLE AND DESCRIPTION OF APPLICANT'S PROJECT

Wine Valley Inn with Spa Facilities
Project involves funding for geo-thermal wells for energy requirement

8. TYPE OF APPLICANT/RECIPIENT
A–State; B–Interstate; C–Substate District; D–County; E–City; F–School District; G–Special Purpose District; H–Community Action Agency; I–Higher Educational Institution; J–Indian Tribe; K–Other (Specify): _____
Enter appropriate letter: K

9. TYPE OF ASSISTANCE
A–Basic Grant; B–Supplemental Grant; C–Loan; D–Insurance; E–Other
Enter appropriate letter(s): A

10. AREA OF PROJECT IMPACT (Names of cities, counties, States, etc.)
Northern California

11. ESTIMATED NUMBER OF PERSONS BENEFITING

12. TYPE OF APPLICATION
A–New; B–Renewal; C–Revision; D–Continuation; E–Augmentation
Enter appropriate letter: A

13. PROPOSED FUNDING

a. FEDERAL	$	.00
b. APPLICANT		.00
c. STATE		.00
d. LOCAL		.00
e. OTHER		.00
f. TOTAL	$	.00

14. CONGRESSIONAL DISTRICTS OF:
- a. APPLICANT
- b. PROJECT

15. TYPE OF CHANGE (For 12c or 12e)
A–Increase Dollars; B–Decrease Dollars; C–Increase Duration; D–Decrease Duration; E–Cancellation; F–Other (Specify): _____
Enter appropriate letter(s):

16. PROJECT START DATE (Year month day): 80 19 Nov.

17. PROJECT DURATION: 2-3 Months

18. ESTIMATED DATE TO BE SUBMITTED TO FEDERAL AGENCY (Year month day): 19

19. EXISTING FEDERAL IDENTIFICATION NUMBER

20. FEDERAL AGENCY TO RECEIVE REQUEST (Name, City, State, ZIP code)

21. REMARKS ADDED
☐ Yes ☒ No

SECTION II—CERTIFICATION

22. THE APPLICANT CERTIFIES THAT ▶

a. To the best of my knowledge and belief, data in this preapplication/application are true and correct, the document has been duly authorized by the governing body of the applicant and the applicant will comply with the attached assurances if the assistance is approved.

b. If required by OMB Circular A-95 this application was submitted, pursuant to instructions therein, to appropriate clearinghouses and all responses are attached:

	No response	Response attached
(1)	☐	☐
(2)	☐	☐
(3)	☐	☐

23. CERTIFYING REPRESENTATIVE
- a. TYPED NAME AND TITLE: John Lewis, Architect
- b. SIGNATURE
- c. DATE SIGNED (Year month day): 19

SECTION III—FEDERAL AGENCY ACTION

24. AGENCY NAME

25. APPLICATION RECEIVED (Year month day): 19

26. ORGANIZATIONAL UNIT

27. ADMINISTRATIVE OFFICE

28. FEDERAL APPLICATION IDENTIFICATION

29. ADDRESS

30. FEDERAL GRANT IDENTIFICATION

31. ACTION TAKEN
- ☐ a. AWARDED
- ☐ b. REJECTED
- ☐ c. RETURNED FOR AMENDMENT
- ☐ d. DEFERRED
- ☐ e. WITHDRAWN

32. FUNDING

a. FEDERAL	$	.00
b. APPLICANT		.00
c. STATE		.00
d. LOCAL		.00
e. OTHER		.00
f. TOTAL	$	.00

33. ACTION DATE ▶ (Year month day): 19

34. STARTING DATE (Year month day): 19

35. CONTACT FOR ADDITIONAL INFORMATION (Name and telephone number)

36. ENDING DATE (Year month day): 19

37. REMARKS ADDED
☐ Yes ☐ No

38. FEDERAL AGENCY A-95 ACTION

a. In taking above action, any comments received from clearinghouses were considered. If agency response is due under provisions of Part 1, OMB Circular A-95, it has been or is being made.

b. FEDERAL AGENCY A-95 OFFICIAL (Name and telephone no.)

424-101

STANDARD FORM 424 PAGE 1 (10-75)
Prescribed by GSA, Federal Management Circular 74-7

SECTION IV–REMARKS *(Please reference the proper item number from Sections I, II or III, if applicable)*

PART 7 COOPERATIVE AGREEMENT TERMS AND CONDITIONS

We have no exceptions to the sample agreement provisions.

CITY OF CALISTOGA

In Beautiful *Napa Valley*

CITY CLERK'S OFFICE (707) 942-5188
POLICE DEPARTMENT (707) 942-6262
PWD-CORP. YARD (707) 942-5150

CITY ADMINISTRATOR (707) 942-0556
PUBLIC WORKS DEPARTMENT (707) 942-5158
PLANNING DEPARTMENT (707) 942-6215

CALISTOGA, NAPA COUNTY, CA. 94515

August 22, 1980

Mr. Dennis E. McNulty
General Contractor
17706 Willow Creek Road
Occidental, CA 95465

Dear Dennis:

It is my understanding that you intend to apply for a Grant for the purpose of developing the hot water well located on the Wine Valley Inn project site. You indicated on August 19th that when the well is fully developed it would reduce the overall energy consumption of the whole Motel/Spa facility. The fact that the City approved the Project by granting a Use Permit is indicative of the support for the overall project. The proposal you have regarding the well will also be supportive primarily because of the concept of energy conservation. If this concept of energy conservation is successful it goes without saying it will be a tremendous asset to your project as well as the community.

The development of this well for energy conservation will require Use Permit action. However, if you document everything related to this well project, I believe we can just include it with the existing Use Permit file for Wine Valley Inn.

If I can be of further assistance, please do not hesitate to call.

Sincerely,

Victor Holanda

VICTOR HOLANDA
Planning Director

VH:mls

Calistoga Chamber of Commerce

CALISTOGA • • NAPA COUNTY • • CALIFORNIA 94515

February 1, 1979

Mr. Earl D. Brown
142 Bella Vista Avenue
Belvedere, California 94920

Dear Mr. Brown;

I am glad that the information that I gave you was of some help, as I told you before, we need a nice motel in that area of town. As you know, we have some nice motels, but they are not sufficient. We get many calls for accomodations, and we don't have a room available, so when I talked to you the last time, I was very glad to hear that you had something in mind.

I talked to some of the Resort owners, and discussed a few of the facts and they agree with me. If you are sure that you will get this project on the way, I am sure that it will be a profitable project. Also, if I may make a suggestions to you, I suggest that you will have to build more units and hot baths; in other words, a complete complex. And believe me, with the location that you have, you can't go wrong! I only wish I had the money to go in with you.

I hope you will start on this project in the near future.

Sincerely, your friend,

Greg C. Hernandez

Greg Hernandez
President,
Calistoga Chamber of Commerce

"The Hot Springs of The West"

CALISTOGA STEAM RAILROAD

Silverado Trail at Brannan Street
Calistoga, California

Telephone: (707) 942-5353

March 19, 1979

Mrs. Diane Barrett, Chairperson
Calistoga Planning Commission
City Hall
Calistoga, CA 94515

Re: The Proposed Wine Valley Inn
Hiway 29 (Lincoln Avenue) at Lake Street
Calistoga
Applicant: Earl D. Brown

Dear Mrs. Barrett:

I am addressing this letter to you as a citizen, and as a former member of the Calistoga City Planning Commission, and more importantly as an individual who is very seriously concerned with the continued quality development of the business community of our city.

I have reviewed the preliminary plans of the proposed motel development which is to be built in two stages on the above referenced property. In the few short paragraphs which follow, I will attempt to communicate my feelings regarding this project in support of my overall opinion on the project.

Strictly from an appraisal standpoint, as an appraiser, the project, in my opinion, represents the highest and best use of the land. It will in no way detract from the downtown retail commercial area. To the contrary, the additional housing provided will be of benefit to all businesses in Calistoga. The continued broadening of the market and demand for restaurant and allied services and resultant upgrading process will be beneficial to not only the visitor to our community but to the local residents as well.

I have given consideration to any possible consequences of additional vehicular traffic in the area as a result of this development. The intersection of the Silverado Trail and Lake Street with Hiway 29 has not posed any traffic problems of my knowledge in the past. The volume of traffic occurring in this area would appear to be tolerable with no adverse effects by reason of this de-

velopment. The pattern of arrivals and departures to the facility even at its maximum development would be spread over many, many hours and would have a negligible effect upon existing traffic flow. I do not believe that this development would create additional traffic upon the local residential streets in the area, as it is the normal pattern of people not familiar with an area to stick to the major streets and highways. There would be little practical reason for an occupant of the proposed facility to use Lake Street for access to the restaurants and other downtown services of our community.

It is a generally recognized fact that there is a severe need for additional first class motel units on the northern end of the Napa Valley. It is true that in Napa there are many units now proposed or under construction, but this, in my opinion, does not alter the fact that many, many individuals who visit our valley might desire to remain within it for a night or two. In Calistoga itself, one only has to notice the No Vacancy signs on the various existing facilities throughout the summer and also through the weekends, being Thursdays, Fridays, Saturdays and often Sundays, in the off-season as well, to know that more units would be utilized. I have on many, many occasions throughout the year found myself on the telephone at the railroad trying to locate lodging for visitors to the railroad who would like to stay in our city for a night or two. Many communities would be envious of Calistoga's position. It does not make good economic sense to deny this quality tourist business.

In summary, let me say that I believe this to be an excellently conceived project for Calistoga. Its design concept is very favorable and I believe will provide an interesting introduction to our community from the north. I believe that the economic benefits to the community as a whole will be manifold. I would urge the Planning Commission's unqualified support of this project to our City Council.

Very sincerely yours,

Robert C. Maxfield, Owner
Calistoga Steam Railroad

cc: Earl D. Brown

STATE OF CALIFORNIA—RESOURCES AGENCY EDMUND G. BROWN JR., Governor

DEPARTMENT OF CONSERVATION
DIVISION OF OIL AND GAS
2904 McBRIDE LANE
SANTA ROSA, CALIFORNIA 95401
(707) 525-0479

September 4, 1980

Mr. John Lewis

Dear Mr. Lewis:

The Calistoga area has for many years produced a low-temperature geothermal resource. Currently within a quarter mile of parcel 11-062-04, there is a commercial operation using this resource.

Direct use of the geothermal energy in Calistoga is currently being studied. It has been determined the resource is at very shallow depths.

The Division of Oil & Gas would encourage the development of geothermal energy and would give any assistance to aid in the successful drilling of geothermal wells.

Sincerely,

K. F. Stelling

K. F. Stelling
Geothermal District Engineer

KFS:rw