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SITE-SPECIFIC LEGAL AND INSTITUTIONAL ANALYSIS
OF THE BARRIERS TO GEOTHERMAL HYDROTHERMAL COMMERCIALIZATION
PRESENT AT TARGET PROSPECTS
IN THE FIVE PACIFIC RIM STATES

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CHAPTER I — Introduction: The Need For Analytic Specificity
As Support To Hydrothermal Geothermal
Resource Commercialization

As the path of U.S. hydrothermal geothermal resources growth has slowly wound forward from research, development and the sorting out of large land packages to commercial utilization, so has the focus of the Federal Geothermal Energy Program progressed from broad based, generic technological initiatives to more particularized, site-specific applications. Accordingly, the program emphasis given to non-technical, legal and institutional barrier analysis has increased.

Concurrently, the internal dynamic of that crucial program element has swung away from generic land, tax and financing problems to impediments arising from the peculiar institutional and statutory frameworks encompassing each target commercialization "prospect".

A close examination of the various structural reorganizations within the relevant (NSF-ERDA-DOE) Federal geothermal unit itself highlights this progressive sharpening of focus. The Division of Geothermal Energy (DGE) was initially structured into Policy, Resource and Technology components. This pattern was altered several years ago to bring into being "Mission Teams", each with specific "Regional" responsibilities. This "Regional Team" concept was itself reworked early in 1978 to better reflect the realities of the always changing geothermal scene. Finally, the drive to "commercialize" the hydrothermal

portion of the resource base led DOE to the creation of a distinct geothermal office in another, less R & D-oriented assistant secretariat — Resource Applications. There the focus would be on accelerating the commercial adoption of hydrothermal geothermal systems by overseeing and "managing" all Federal programs impacting that goal — particularly those of the Department of Energy itself.

The successful fulfillment of the "lead" role given to the new "Geothermal Resource Manager's Office" can only come about as the result of a detailed understanding by that office of the precise commercialization problems present at each of those "prospects" already identified by the private sector. Neither a feasible "commercialization" strategy nor an effective DOE tactical presence can be constructed in the absence of a thorough perception of the developmental facts of each individual system and the statutory, administrative and institutional setting in which each must function. One must always bear in mind that the oft-noted "site-dependent" characteristic of a geothermal system applies to its legal/institutional context with as much impact as it does to the ultimate "performance" of its reservoir.

Therefore the goal of this Report to the Geothermal Resource Manager's Office is to lay out, for each of the most highly regarded target electric "prospects" in the five "Pacific Rim" states,^{1/} the specifics of permitting process,

land access, power plant siting, water law and other legal or institutional barriers or conflicts. The list of target areas is taken from those set out in the August 1978 compilation of the Mitre Corporation.^{2/} The opinions and judgments expressed throughout are, of course, those of the author and do not necessarily represent the views or feelings of the U.S. Department of Energy - Assistant Secretary for Resource Applications, Geothermal Resource Manager's Office.

FOOTNOTES

CHAPTER I

1/ California, Hawaii, Alaska, Washington and Oregon.

2/ Site-Specific Analysis of Geothermal Development -
Data Files of Prospective Sites - Vol. II (Mitre Corp.,
Aug. 1978) HCP/T4014-01/2 (prepared under
Contract No. EC-77-C-01-4014).

CHAPTER II — California Prospects:

The State of California has the largest and richest selection of commercial electric geothermal prospects in the United States. This chapter will therefore focus, seriatim, on each of the following:

- (1) The Geysers (steam field and hot water field)
- (2) Glass Mountain
- (3) Lassen
- (4) Surprise Valley
- (5) Mono-Long Valley
- (6) Coso H.S.
- (7) Randsburg
- (8) Salton Sea
- (9) Brawley
- (10) Heber
- (11) East Mesa

The prospects have been grouped into four distinct "areas of interest", (A through D), with (1) being "The Geysers" (A); (2), (3) and (4) the "Northeast" (B); (5), (6) and (7) the "Eastern" (C) and (8), (9), (10) and (11) the "Imperial Valley" (D).

(A) The Geysers:

As the only productive geothermal resources system presently operating in the U.S., The Geysers is about to enter into its third decade of production.

Present capacity, including P.G. and E. Units 12, 13, 14 and 15 (all about to commence operation or already on-line) is approximately 900 net megawatts. This is roughly the size of one large nuclear-fired powerplant. Total generating (busbar) cost to P.G. and E. this year is slightly over 17 mills per kilowatt hour, making geothermal the cheapest non-hydro source in its large (12,000 megawatt) operating system.

Four additional units (P.G and E. Units 16 and 17, Northern California Power Agency No. 2, and California Department of Water Resources Bottle Rock), totalling 365 additional megawatts, are about to emerge from the California Energy Commission's siting review process.^{1/} At least ten more powerplants are in the advanced planning stages of the three named utilities, as well as other electric systems.^{2/} They will enter the review process shortly. The total electric generating capacity of The Geysers steam field is estimated to range from 1600 to 3500 megawatts by the State Energy Commission staff.^{3/} Private industry estimates tend toward the mid-range of those figures. The main hurdles to realizing that potential are a resolution to the hydrogen sulfide (H₂S) emissions controversy and the need for streamlining well siting and attendant EIR preparation procedures.

(a) Hydrogen Sulfide (H₂S) Emissions:

With the exception of D.W.R.'s proposed Bottle Rock plant and P.G. and E.'s proposed Unit 16, all of the

existing and applied for capacity at The Geysers steam field has been located in the northern portion of Sonoma County.^{4/} Due to prevailing coastal wind patterns, however, the brunt of the resulting H₂S emissions have fallen on neighboring Lake County. As field capacity increased, so did the emissions. The result was an ongoing violation of the State Air Resources Board's health-based H₂S standard (3 parts per billion). Worse, even when the standard itself was not being breached, the Lake County Air Pollution Control Officer^{5/} was nonetheless bombarded with citizen complaints over the disturbing ("rotten eggs") smell of the legally allowable emissions.^{6/} To further complicate the situation, precise monitoring of the emissions, i.e., "tracing" them to their source, was until recently rendered impossible by the tricky terrain and wind currents of the area and the lack of monitoring stations.

Over two years ago, the Lake Co. Air Pollution Control District (A.P.C.D.) stated that it would probably not be able to issue permits for any Lake County-sited plants until the situation was remedied.^{7/} To those well-versed in the history and status of California powerplant siting law, this was an ominous threat, one which could bring future development of the Geysers field to a virtual standstill. In a forthcoming Report

to the Geothermal Resource Manager's Office,^{8/} the author sets forth the background of California's now decade-old powerplant siting conflict. It is a struggle carried on between the local A.P.C.D.s and the relevant State-level plant siting body (first the P.U.C. and now the Energy Commission). There is no need to repeat that tale here. Suffice it to say that the non-acquiescence of the Lake County A.P.C.D. to Energy Commission siting approval of any geothermal powerplant application now in process will result in a prolonged legal struggle whose outcome is at best uncertain. The onset of that litigation would mean a de facto moratorium on further development until the Courts settled the issue.

Two years ago, the State geothermal Resources Task Force^{9/} directed the State Air Resources Board (ARB) to take up the matter and resolve it administratively.^{10/} The ARB promulgated, after public hearings, a "Model Control Strategy For Hydrogen Sulfide Emissions".^{11/} Though the A.P.C.D.s, and not the ARB, are statutorily authorized to regulate emissions from stationary sources⁽¹²⁾ (including powerplants), both the Lake and No. Sonoma A.P.C.D.s "adopted" the ARB's "Model" as their own. This was an enormous plus for geothermal, since the "Model" attempts to allow growth in Geysers capacity up to 4,000 megawatt level while gradually attaining the

state H₂S standard.^{13/}

Unfortunately, however, the A.P.C.D.s have several other arrows in their permitting quiver. Of particular interest is one marked "New Source Review" (NSR).

Though the ARB has also issued a "Model Rule" for this process,^{14/} at present the No. Sonoma and Lake County A.P.C.D.s have their own, stricter versions. Though the Geysers units presently being brought on-line or sited will probably be able to meet the emissions reductions required by the "Model Control Strategy" with the use of the so-called "Stretford Process", it is possible that the higher (99% +) reductions that Lake and No. Sonoma will be requiring for siting clearance under NSR will be beyond their reach. If that situation indeed comes to pass, and the relevant A.P.C.D. refuses to issue a power-plant operating permit, then the Energy Commission will have to make a tough decision — face a de facto end to expansion of The Geysers or try to exercise its hitherto unproven statutory authority to override the local decision in the "public interest".^{15/} The latter choice will undoubtedly entail a bitter court fight, one which may not be successful from the Commission's, and geothermal's, standpoint.^{16/}

expansion of power

It is always possible, of course, that this issue is one in which advancing technology will bail out the

legal analysts. If the Stretford Process, (aided perhaps by the addition of hydrogen peroxide in the condensate stream of the powerplant cooling towers) can achieve the 99% + emissions reductions required by A.P.C.D. New Source Review, then this key legal/institutional "problem" will cease to exist. Since P.G. and E.'s Unit 15, the first plant to employ that particular process, has just begun to operate, we do not yet know the outer limits of its effectiveness. Yet another technological development - the "upstream" process developed by EIC Corporation for DGE, ^{HAS BEEN} will soon be tested on a "pilot plant" basis. ^{These} Dramatically successful in earlier laboratory tests, this system could also provide a non-legal answer to this large legal and institutional question.

It is possible, of course, that the California Legislature could amend the Energy Commission's enabling statute ^{17/} to more clearly define its "override" authority. Given the clout of the states powerful counties (of which the A.P.C.D.'s are a part) this seems highly improbable, however. During the last legislative session, in fact, the trend was clearly in the opposite direction. Statutes were enacted authorizing the counties to take over the Commission's siting authority over geothermal plants. ^{18/}

(b) Well Permitting/EIR Preparation:

A recurring problem at The Geysers has been the sluggishness of the county and state well permitting processes.^{19/} Both Sonoma and Lake, following the lead of the state's oil-rich counties, have required a "conditional use permit" for each exploratory or developmental well. This requirement was even applied to wells drilled on Federal land within their boundaries. The issuing of these permits also triggered the environmental reporting strictures of the California Environmental Quality Act (CEQA). Public hearings and internecine struggles between the County Planning Departments and Boards of Supervisors served to extend time frames beyond the point of developer exhaustion. Consulting firms selected by the county prepared the environmental documents (EIRs), all at the expense of the applicant. Usually, this EIR was written for the entire fuel cycle — an exercise in speculation and futility that at once heightened fears of total impact on exploratory plays that never worked out and also served to further elongate the time frame for EIR preparation.

Once the county gauntlet had been run, there were still A.P.C.D., Regional Water Quality Board and State Division of Oil & Gas (D.O.G.) permits to obtain. But the counties were the real problem.

Two years ago the State Geothermal Resources Task Force took note of the dilemma and recommended several actions.^{20/} Last year the state Legislature added its own twist to the solution, replacing the county as "lead agency" for "exploratory projects"^{21/} with D.O.G. and limiting the latter to a total of 135 days for permit issuance.^{22/} The county was then given a total of 180 days to follow-up,^{23/} presumably on a D.O.G.-drafted EIR. Hopefully, the county and state processes would overlap. That has not yet been the case but implementation of the 1978 enactment is still in its infancy and should improve.

A 1977 State Court of Appeals decision had made the legislative reform possible by negating the need for a "full field" EIR on initial exploratory wells.^{24/} Thus the roughly four months allowed for D.O.G. to assemble a document covering only the possible exploratory impacts became feasible.

On the issue of county use permits for wells located on Federal land, a Federal District Court decision, currently on appeal to the Ninth Circuit, has held the procedure unconstitutional.^{25/} However BLM is inserting a stipulation into all its geothermal leases of mineral-severed land which requires the obtaining of "all state and local permits".^{26/} "Developmental" wells are still within the leadership purview of the county, but the local

agencies are now limited to one year for deliberation.^{27/}
Better still, only one permit may be required, by both
the county and D.O.G.,^{28/} for the entire developmental
process.

The problem now however is not only one of implementation. Statutory time limits can not, and do not require a favorable decision. Unlike the powerplant siting process, where there is at least the statutory possibility of an Energy Commission override, Geysers well-siting, and therefore development, can clearly be blocked by the counties. In Lake County, situs of roughly two-thirds of The Geysers-Calistoga KGRA as well as portions of four others,^{29/} preservation of a relaxed life style through tight, anti-geothermal land use restrictions is a real possibility. To date, neither the G.R.I.P.S.^{30/} program nor the studies conducted by Lawrence Livermore Laboratory for D.O.E. have been able to provide data sufficient to lead Lake towards a positive, pro-geothermal planning position. There are those who suspect that no amount or kind of data will do so. If the spectre of a Lake County-led slowdown becomes a reality, none of the outlying KGRAs, including the hot water portions of The Geysers, will be developed to their fullest potential.

It is possible that Lake County's political mix will change as geothermal tax dollars and Federal geothermal

land revenues^{31/} begin to flow. Remember that Lake has heretofore had no geothermal-driven cash flow and yet has been forced to bear geothermal H₂S emissions drifting in from tax-paying development in Sonoma County.

The Technical Advisory Committee to the State Geothermal Resources Board (GRB-TAC) recently approved draft legislation that would rebate about two-thirds of the State's 50% share of Federal geothermal revenues to the "counties of origin". Draft legislation would up this to 80%.^{32/} In the future, that will increasingly mean large, positive geothermal cash flows to Lake County. In a county of small population (6,000) and a low operating budget (\$15,000,000/yr) that could make for a marked difference in attitude.

In addition, Lake County will not lose any of the revenues from the new Federal "Payments In Lieu of Taxes" program to local governments as a result of its receiving Federal geothermal monies.^{33/} There was a "set-off" included in that legislation for oil and gas revenues,^{34/} but not for those from geothermal.

(B) The Northeast Region of California: Surprise Valley,
Glass Mountain, Lassen & Beckworth Peak:

The name of the game in these three Northeastern California KGRA's is "U.S. Forest Service". The three areas total 184,590

acres. More than 121,093 acres — or two thirds — are under Federal control. Almost all of that land is under the aegis of the Forest Service. In the Glass Mountain KGRA it's close to 100% (97%), and 69% in the Lassen KGRA.

(1) Surprise Valley:

Only in the Surprise Valley area (including Susanville) is there appreciable non-Federal (and Federal non-Forest Service) land. There the majority (53%) of the surface is in non-Federal (mostly private) hands. Unsurprisingly (no pun intended) the Surprise Valley KGRA has seen the bulk of the heretofore skimpy deep drilling in the Northeast. Nearly a dozen deep holes had been bottomed by the beginning of 1977, when further drilling ceased to await access to the non-BLM Federal lands. Potential of this KGRA is generally tabbed at 2,000 MWe but insufficient confirmatory drilling and heretofore unsatisfactory Federal land access make that figure somewhat more speculative than estimates in other California Regions. Geo-products Inc. has set up a direct use/tomato growing operation here and will eventually be partners with DWR in a woodchip-geothermal powerplant.

(2) Glass Mountain:

The Glass Mountain area (directly west of Surprise Valley) is the site of yet another pending Forest Service Land Use Plan (LUP). That document was scheduled to come out early

this year. It is still "in progress". The follow-up, geothermal-specific Environmental Assessment (EA) should also be completed by early next summer. BLM has not yet put the area down for a lease sale date, and D.O.E.-supported estimates of its potential are a meagre 50 MWe.^{35/} No less than 62 non-competitive applications have been pending on over 100,000 Forest Service-administered acres for several years now however, evincing a high-level ranking by industry. If Mono-Long Valley's saga is any indicator, the applicants (and D.O.E.) ought not hold their breath.

(3) Lassen:

Again the Forest Service is the key player. Their land holdings are south of the off-limits (to geothermal) National Park of the same name. Much of the KGRA buffers the Park and a large amount of that acreage was included in the Service's just completed R.A.R.E. II wilderness program. Some of it is being recommended for "further planning".^{36/} Based on this land use situation, it is difficult to account for the inclusion of Lassen on BLM's 1980 lease sale schedule, or on D.O.E.'s list of priority prospects. In addition, only two deep wells have been drilled (on private land), both unsuccessful.^{37/} Even the Mitre projections list a total potential of only 100 MWe.^{38/} A Forest Service EA should be finalized within the next two months.

(4) Other Northeastern Prospects:

Beckwourth Peak, Wendel-Amedee, Upper Pit River and Honey

Lake are four other areas of some promise in this Region. Most are located on BLM-managed Federal land. With the exception of Wendel, all have had Final BLM E.A.R.s prepared on them in the past year. Only Beckwourth Peak is set for competitive leasing — and that late next year. Assuming it, or the others, can survive the Forest Service's R.A.R.E. II review and BLM's wilderness program, there may be a "sleeper" at one of these prospects.

(C) Eastern Region of California: Mono-Long Valley,
Coso and Randsburg

This area, in which we have included the Mono-Long Valley, Coso H.S. and Randsburg KGRAs, is a crucial one in the geothermal commercialization picture.

(1) Mono-Long Valley:

Always considered on a par with The Geysers or Imperial Valley as a commercial prospect, the struggle to gain geothermal access to any portion of this enormous (455,000 acre) KGRA has been going on for nearly two decades.

This past May the Forest Service, which controls 288,406 acres of the KGRA through the Inyo National Forest, published the Final "ES" on its Land Use Plan (LUP) for the key "Mammoth-Mono Planning Unit" (MMPU) of that forest. ^{39/} The document, six years in the making, set up a "Geothermal Management Zone" of over 158,300 acres

as an overlay to several of the regular "Management Zones" in the Planning Unit.^{40/} The Service will now consider on what terms it will allow geothermal leasing. This process will take place under the aegis of the geothermal-specific "EA" (Environmental Analysis) it has already begun preparing. Given the heavy recreational (skiing) and wildlife (fishing) interests in the area,^{41/} the Service is expected to require the inclusion of many restrictive stipulations in any Mono-area BLM geothermal leases. Those familiar with the Service's deliberations on the subject are not optimistic. Below (in Chapter IV) we discuss other Forest Service "decisions" on whether or not to allow geothermal leasing within their units. The pattern has been uniformly negative.

The author has for several years advocated repeal of the Steam Act requirement of Forest Service consent to geothermal leasing.^{42/} The statutory provision in question is in excess of the traditional "comment" role reserved by statute to the Service in the issuance of oil, gas and coal leases.^{43/} Surely no case can be made that development of geothermal resources presents a more severe environmental threat to the Service's statutory surface management responsibilities (timber, grazing, wildlife, watershed and recreation) than does development of those fossil fuels. The statutory discrimination against geothermal

contained in the Steam Act is therefore unwarranted and should be repealed. The positive impact of that action will be felt in Mono-Long Valley, as well as throughout the aforementioned Northeast Region, heavily bound by Forest Service non-energy prerogatives.

(2) Coso H.S.:

This highly-prized area is, fortunately, not under the control of the Forest Service. But other Federal agencies have assumed their role all too well. The U.S. Navy and BLM — the two surface managers — haggled for several years before finally signing an inter-agency Memorandum of Understanding (MOU) in 1977.^{44/} Under its terms, the Navy will conduct its own proprietary development (on lands it acquired directly) beginning later this year under contract with a private firm.

BLM has contracted with a consulting firm (Rockwell International) to do a full EIS on the acreage not under Navy control (i.e., on the public, "withdrawn" lands). The beginning of 1981 should see a BLM Coso lease sale on this acreage.

The only real problem involves Native-American religious concerns over the area surrounding the hot springs themselves. It has been nominated to the National Register of Historic Places by the State of California's Historic Preservation Officer. Though the Navy has agreed

not to develop the 1½ square area in closest proximity to the springs themselves, each session of the State Legislature sees the introduction of new "hot springs-protection" legislation.^{45/} The author seriously doubts that any of these bills will ever pass but the threat is always there.

(3) Randsburg:

Like Coso, Randsburg (to the South) is within BLM's "California Desert Conservation Area" (CDCA) — a mandate of the above noted FLPMA of 1976.^{46/} Unlike Coso, however, geothermal development near this old mining town north of San Bernardino may be hamstrung by another of that statute's Federal land use program — BLM's wilderness review.^{47/} The Final Wilderness Study Inventory for the CDCA was published this past March.^{48/} It surrounded and often blanketed the Randsburg geothermal prospect with "wilderness study areas". No permanent buildings are allowed in these areas and exploratory hole requests will be examined on a case-by-case basis.^{49/} Private developers and the California State Lands Commission are considering lawsuits. If they fail to do so, or are not successful in attempts to modify the March document, Randsburg may join the growing list of geothermal prospects eliminated by Federal land use planning.

(4) Other Eastern Prospects:

There has been some talk^{50/} of Bodie and Saline Valley (both between Coso and Randsburg) as prospects, but as yet there has been no leasing or drilling in either. Both also suffered in the CDCA Wilderness Inventory.

(D) Imperial Valley Region: Salton Sea, Heber, Brawley and East Mesa

This Southeastern California desert area is by far the Nation's best known hydrothermal prospect and the prime vehicle for near-term commercialization. It contains no less than four outstanding prospects — Salton Sea (Niland); Brawley; Heber and East Mesa. Several others — South Brawley, Westmoreland, North Salton Sea, Ford Dry Lake, Dunes, Glamis and Anza are also believed to be commercial, though only the first three have had any deep hole exploration. Long term Imperial Valley potential is in the 4,000 to 6,000 MWe range.

(1) Salton Sea:

There is no question that this area has the heat. Both surface estimates and tests conducted as part of the G.L.E.F.^{51/} research place it in the 350 C range. As with all the key Imperial Valley areas except East Mesa, the land is mostly private (some state) so neither BLM nor the Forest Service can "hang up" development with LUP and Wilderness review processes. The entire Valley,

moreover, can be classed as a "mature province", test wells having been drilled as far back as the 1920's.^{52/}

Two Salton Sea-Niland power plants are on the boards at present: (1) Magma Power has a 50 MWe double flash plant to be built by Morrison-Knudsen and be on line in 1982; (2) Union Oil Company and So. California Edison will build a 10 MWe flash plant on Southern Pacific Land Company acreage. The San Diego Gas & Electric/D.O.E. "loop" tests are also continuing. At this point the brine scaling problem appears to be under control. Magma Power, at least, is also encouraged by the reduction in non-condensable gas content. It was the resolution of this problem which led it to move ahead with a demonstration-sized plant, rather than a pilot facility. Clearly Union and Edison are a bit less optimistic.

The remaining problems confronting this lead area are: (a) cooling water availability^{53/}; (b) maintaining wildlife habitat in the sea itself; (c) county permitting and (d) transmission capacity for later generating plants.

(a) & (b): It appears that the agricultural waste water which now flows into (and is progressively destroying) the Salton Sea will be the major cooling water source. This will also alleviate environmental concerns over the bird and fish populations that use the Sea. Studies by Lawrence Livermore, VTN and the State Department of Water

Resources have identified the roughly one million acre-feet/year which collects in the Valley's agricultural drainage ditches as the best source. About one quarter of this total (225,000 acre-ft.) would support 2,000 MWe of geothermal capacity (500 MWe each at Salton Sea, Heber, Brawley and East Mesa). Further CEC-funded studies are underway to specify diversion methods and precise paths to each of the four major anomalies.

(c): The dearth of Federal land in the Valley has put the permitting burden on Imperial County itself. Funded by NSF and ERDA (DGE), they prepared a Geothermal Element to the County General Plan.^{54/} The Element, and the "Master (Programmatic) EIR" which accompanied it, set up "overlay" geothermal zoning at each of the four lead areas. An anomaly-specific EIR will be prepared for each. Heber's is almost ready. The others will follow soon. No further well by well "use permits"/EIRs will then be necessary.

(d): C.E.C. and D.O.E. have co-funded the "Imperial Valley Action Plan" (I.V.A.P.) and the "Imperial Valley Geothermal Planning Project Committee"^{55/} to coordinate county-wide planning. The group has focused on adequate transmission corridors as a key limiting factor. Both RARE II and the BLM's C.D.C.A. Wilderness Inventory have raised serious questions of land access for corridors.

If these can be resolved, S.D.G. & E. will build a line across the Valley from the Arizona border. That line, and additions to it in the same corridor, will provide an outlet for all expected Valley geothermal capacity. Thus Federal land use planning is a problem for Salton Sea even though the KGRA itself is mostly on private land.

(2) Heber:

Heber is a "moderate temperature" resource - i.e., about 185 C.. Several plants are projected, mostly between Chevron and So. California Edison, with the first on line by 1982. All are flash types, due mainly to D.O.E. failure to fund the EPRI/SDG & E-led consortium of utilities wishing to build a binary cycle demonstration plant here. Not only will ultimate resource recovery suffer from continuous, widespread use of this system (at Heber-level temperatures most of the resource disappears when flashed) but land subsidence becomes a real possibility.^{56/} In Imperial Valley, subsidence could become the same threat that H₂S poses in The Geysers. A binary cycle demonstration at Heber or a comparable site is crucial to the near and mid-term commercialization potential of the Imperial Valley.

(3) Brawley:

Union and So. California Edison will go with a 10 MWe pilot plant on this anomaly, beginning next year. The

reservoir is slightly hotter than Heber (@ 200 C) and the same concerns over subsidence, etc. prevail.

(4) East Mesa:

This KGRA is slightly cooler than Heber (at roughly 175 — 180 C.). It is also the only Valley area with extensive Federal land. Early (1974) Federal leases and low salinity have, however, culminated in two 10 MWe pilot powerplants. One is binary cycle (Magma); the other flash (Republic). The lands between these two plays have recently been leased^{57/} and are believed commercial as well.^{58/}

(5) Other Valley Prospects:

South Brawley is the site of a recent discovery well drilled by McCulloch Geothermal. Confirmation drilling is now taking place.

Westmoreland is the site of another commercial discovery (by Republic and Mapco) and a D.O.E. loan guarantee, with another flash plant the ultimate target.

The others named have not yet been tested (though North Salton Sea has one dry hole).

FOOTNOTES

CHAPTER II

- 1/ CAL. PUB. RES. Code 25500 et. seq..
- 2/ Including the Sacramento Municipal Utility District (S.M.U.D.).
- 3/ Draft Geothermal Section, C.E.C.R &D. Report (C.E.C., May 4, 1979) at pg. 1.
- 4/ The Bottle Rock and Unit 16 facilities are proposed for sites in Lake County's Cobb Valley.
- 5/ ^{Bob Reynolds}
Now Bob Reynolds, formerly Fayne Tucker.
- 6/ Testimony of Fayne Tucker to State Geothermal Resources Task Force, Spring 1977.
- 7/ id.
- 8/ See McNamara,
(J.M. Energy Consultants, Inc. Rpt. No. 1016 (Sept., 1979))
- 9/ Established by Stats. 1976, Ch. 958.
- 10/ See Exec. Summary - Report of The State Geothermal Resources Task Force (Dec. 29, 1977) at p. 7.
- 11/ See McNamara, op. cit., for a discussion of its parameters.
- 12/ ibid., at pp.
- 13/ id.
- 14/ Based on the one used by the South Coast Air Quality Management District.

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15/ See McNamara, op. cit.,

16/ ibid.

17/ Warren-Alquist Act, Stats. 1974, Ch.

18/ See A.B. 2644 (Goggin) (Stats 1978, Ch. 1271).

19/ See McNamara, op. cit., for a full discussion of both the problem and the possible evolution of its solution. See also McNamara, "Can We Burn The Paper Mountain?" 2 Geothermal Resources Council Transactions 431 (1978).

20/ See McNamara, op. cit., at pp.

21/ A.B. 2644 (Goggin), stats. 1978, Ch. 1271. The latter were defined as not more than six wells.

22/ id., amending CAL. PUB. RES. CODE 3415.5.

23/ id.

24/ Lake County Energy Council v. County of Lake, 70 CA 3d 851, 139 CAL Rptr. 176 (CA1, 1977).

25/ Gulf Oil v. Ventura Co.

26/ A.B. 2644, op. cit.,

27/ id.

28/ See, e.g., Lease CA 5632 and CA 5633.

29/ Witter Springs, Little Horse Mtn., Knoxville and Lovelady Ridge.

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30/

"Geothermal Resources Impact Projection Study", or G.R.I.P.S. is a "joint powers agency" made up of Sonoma, Lake, Napa and Mendocino counties.

31/

§317 of the Federal Land Policy and Management Act of 1976 set up a 50% return of bonuses, rentals and royalties from geothermal activity on Federal lands to the State, with direction to pass the money through to the counties of origin. See also 31 U.S.C. §§ 1601-1607, "Payments To Local Governments For Entitlements Lands" noted below at fn. 34.

32/

See A.B. 1905 (Bosco).

33/

P.L. 94-565, Oct. 20, 1976, 31 U.S.C. 1601-1607.

34/

31 U.S.C. 1604.

35/

Mitre Corp. op. cit., at p. VI - 1.

36/

Final EIS - R.A.R.E. II Program (FS, Jan. 1979).

37/

At Kelley Hot Springs.

38/

Mitre Corp. HCP/T4014-01/2, op. cit., at p. VIII - 1 through 7.

39/

Final Environmental Statement, Land Management Plan For The Mammoth-Mono Planning Unit, U.S.D.A. - Forest Service May 19, 1979 (Final ES 05-04-78-07). The "MMPU" covers 444,744 acres itself and overlaps virtually the entire KGRA.

40/

ibid., at p. 77.

41/

The skiing issue and geothermal development ranked first and second in volume of comments received, ibid at iii.

42/

See McNamara "How Geothermal Resources Got Lost In The Woods", 11 Nat. Res. Law. 325 (1978). The subsection in question is found at 30 U.S.C. 1014(b).

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43/

See McNamara, op. cit., for a full discussion of the distinction, and see also Chevron Oil 241 IBLA 159 (Interior Board of Land Appeals 1976) wherein Forest Service resistance to a proposed BLM oil and gas lease was set aside and the respective "roles" of the two agencies delineated.

44/

See the Final Coso Programmatic EIS - (U.S. Naval China Weapons Center - May 1979) at Vol. II, Appendix A.

45/

A.B. 2009 is the latest. See McNamara, California Rpt., op. cit., for the details.

46/

P.L. 94-579 (Oct. 21, 1976) Title VI, 601 et. seq., established the C.D.C.A. and required preparation of an LUP on it by 10/1/80. See 43 U.S.C. 1781 et. seq..

47/

P.L. 94-579, Title VI, §603.

48/

Fed. Reg.

49/

For a full discussion of the problem see McNamara, "Federal Land Use Planning and Geothermal Resources Development In The U.S.: An Unfolding History", Geothermal Resources Council Special Report No. 6 (May 1979).

50/

JPL, Analysis of Requirements For Accelerating The Development of Geothermal Energy Resources In Calif. (JPL 77-63, Nov. 5, 1977).

51/

"Geothermal Loop Experimental Facility" at Niland.

52/

Rudolph Birsic, "The Geothermal Story".

53/

Waste Heat Rejection From Geothermal Power Plants: Review of Data Base and Methodology, R.W. Beck Co. (March 1978), prepared for E.P.R.I. and C.E.C..

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54/

See Geothermal Element-Imperial County California
(NSF-ERDA Grant AER 75-08793), adopted 11/22/77 by
the Board of Supervisors.

55/

The county, C.E.C., D.O.E., B.L.M., U.S.G.S., D.O.G.,
S.D.G. & E., E.P.R.I. and Chevron are members.

56/

Wairekei, N.Zealand has had extensive subsidence with the
use of flash technology.

57/

March 15, 1979. Republic and Union were high bidders.

58/

They contain the Bureau of Reclamation wells.

CHAPTER III — Hawaii and Alaska Prospects: Puna, Lualualei

These two relatively isolated states are treated as one due to the unique nature of their problems and the limited number of known prospects in each.

(A) Hawaii:

The entire state is loaded with commercial potential. The Puna (Big Island) discovery well is the hottest ever tapped (650 C.) and a D.O.E.-funded well-head turbine is being installed. The outer boundaries of the Puna discovery have not even been delineated. Other systems are believed present on the Big Island as well.

Lualualei Naval Ammunition Depot (on the West Side of Oahu) is a huge natural caldera which Navy sources believe dwarfs Coso H.S. in potential.

Maui is also believed to contain commercial reservoirs based on its geology. Thus at least three of Hawaii's six major islands (the three most populous) have high potential. But there are problems in Paradise. They include:

- (1) A keen Native Hawaiian drive for compensation and recognition. This consciousness is highest on Big Island near Puna, and the geothermal discovery may well have galvanized it;
- (2) A Lack of Adequate Markets and Supporting Infrastructure, particularly on Big Island. The highest demand is on Oahu, as is the only decent infrastructure;
- (3) A No-Growth/Slow-Growth sentiment among all

Hawaiians — Native or otherwise. This would make it extremely difficult to "bring in" the large, heavy industries that would be needed to fully utilize, e.g., the Puna discovery and/or the other Big Island plays that will follow it, and build up the infrastructure.

- (4) Serious catastrophe prospects, including tsunami (tidal waves) and volcanic eruptions;
- (5) Electric Utility Resistance to Navy/DOD proprietary geothermal development which will cost them their largest Oahu customer.

These problems must be dealt with in the order presented. The Native issue is the visible, and thus the cutting edge of the opposition, but the no-growth sentiment is extremely wide and deep. Recent tourist industry setbacks due to aviation fuel shortages, could, if continued, provide an opening for new, geothermal-powered industries on Big Island. Maui will be the last to develop due to its strong recreation-tourist bent. Near term development should, in fact, focus on Lualualei, closest to the only large demand center. The Navy has no BLM/Forest Service problems and Oahu has the bulk of the state's electrical demand, much of it DOD-related.^{1/}

(B) Alaska:

No commercial prospects are known as yet though much of the State has promise. The key to Alaska is the pending lock

up of 140 million acres (45% of the State's total) though the Alaskan Lands Bill. As discussed by the author in his Special Report to the Geothermal Resources Council,^{2/} access for future wide-scale geothermal exploration in Alaska must be made available. On-site geothermal use will free up much-needed oil, gas and coal for transport to the Lower 48.

Though Alaska is not a commercialization prospect today, and will not be until 2000 or so, it must be preserved for future exploration by the Geothermal Resource Manager and the relevant land management agencies.

FOOTNOTES

CHAPTER III

1/

For a full discussion of Hawaii's situation, see McNamara, "Legal and Institutional Barriers Confronting Geothermal Development In Hawaii (J.M. Energy Consultants, Inc. Oct. 1978).

2/

See McNamara, "Federal Land Use Planning," etc. (GRC Special Rpt. No. 6, May 1979).

CHAPTER IV — Oregon and Washington Prospects: Baker H.S.,
Mt. St. Helens, Mt. Hood, Alvord, Breitenbush,
and Vale

(A) Washington State suffers from a positive dearth of exploratory data. Though at least one prospect (Baker Hot Springs) has been identified and another — Mt. St. Helens — is the subject of a Forest Service E.S., any inclusion in the Mitre/D.O.E. list (Baker H.S. was present) seems more than a bit inexplicable. E.g., Mitre set the projected Busbar cost for Baker H.S. power at 76 mills/kwh^{1/} and even O.P.E.C.'s wildest dreams never foresaw that oil prices would have to be in the \$40/bbl range to make Baker H.S. competitive. There is no question that Washington State as a whole presents a large "target".^{2/} But it is simply not a commercial prospect area for electric hydrothermal systems at this time.

If there is such a "sleeper" commercial prospect in this State, it would appear to be in and around the Mt. St. Helens KGRA, located within the Gifford Pinchot National Forest of southern Washington. The KGRA itself is fairly small — 29,755 acres. But two other considerations must be taken into account: (1) U.S.G.S. classified the area as a KGRA due to its evidence of "recent volcanism" prior to any expression of developer interest^{3/}; (2) 136 non competitive lease applications covering some 326,312 acres have been filed on contiguous areas

within the Forest.^{4/} The overlap of some of these applications resulted in an increase in the KGRA-classified acreage from an original 17,622 acres.^{5/} Due to the inclusion of interstitial lands not yet applied for, the total area that has been under "study" by the Service for a leasing decision totalled some 486,656 acres.^{6/} Two separate "study areas" were carved out of that total, each to be the subject of a distinct Service Final E.S.. The first document issued covers roughly 300,000 acres and includes all of the designated KGRA acreage.

Although this first Gifford Pinchot Geothermal E.S. appears generally sympathetic to geothermal leasing, and makes the "basic assumption" that "geothermal leasing, exploration, development and production is a suitable and legitimate use of the land surface . . .",^{7/} the decisional "bottom line" is all too familiar to readers of Forest Service geothermal E.S.'s. As with previous Forest Service pre-leasing decisions, including that on the Santa Fe National Forest in New Mexico,^{8/} the result is full approval of leasing on only 105,526 acres, barely 35% of the total acreage under consideration.^{9/} Another 86,784 acres (29%) will "carry additional surface occupancy constraints"^{10/} (mostly no surface occupancy). 107,298 acres, the remaining 36% of the area, will flatly be "denied leasing approval"^{11/} by the Service under an exercise of their Steam Act-granted veto power, discussed above.^{12/}

The areas with "surface occupancy constraints" will be

"conditionally" usable for "access roads and transmission lines only."^{13/} Much of the leasing-denied 107,298 acres resulted from a Forest Service decision that, although they originally had only surface use limitations, they were more "than one-half mile from the nearest surface use leasing approved area"^{14/} and therefore "undevelopable for all practical purposes."^{15/}

It is this type of negative boot-strapping that the Service consistently employs to frustrate proposed geothermal leasing actions. A similar, "go slow", approach may be taken in the Inyo National Forest in California (Mammoth-Mono area) and the Targhee National Forest in Idaho (Island Park area). No geothermal-decision E.S. has yet been issued on the California prospect. But the "Island Park Geothermal Area" has been the subject of a "Draft E.S."^{16/} on 488,031 acres, including over 70,000 acres classified into two KGRAs. Though no "preferred alternative" has yet been put forward, four of the six options presented are heavily weighted against geothermal leasing. In addition, a tabular "Summary of The Evaluation of Alternatives"^{17/} leaves little doubt as to the outcome. The "environmental effects" scoreboard shows alternatives #3 and #5 as the least damaging to the environment. Not surprisingly, they would grant limited leasing access. The third alternative would allow leasing on 207,120 acres (42%), "defer" it on another 192,995 acres (40%) and deny it outright on the remaining 87,916 acres (18%). The fifth option differs only by allowing

on the 40% "deferred" in alternative 3, but with no surface occupancy restrictions applied to that acreage. If this path is chosen, the results will not differ materially from the final decision on the Gifford Pinchot.

(B) Oregon:

The tale in Oregon is dishearteningly simple. Like its geothermal and geographic partner — Northeastern California,^{18/} it is in the slow death grip of the Forest Service and to a far lesser extent BLM. Two prospects stick out nonetheless — Mt. Hood and Alvord. Also, Breitenbush, Belknap-Foley, Vale H.S. and Fremont all have real potential.

(1) Mt. Hood:

This prime geothermal prospect of at least 8,671 acres is within pipeline distance (40 miles) of the state's largest load center — Portland. Northwest Natural Gas Company is so excited about it that it has been drilling for several years to establish the first, (crucial to geothermal commercialization) "geothermal-for-natural-gas-substitution". Unfortunately, the prospect is totally within a National Forest. It is also adjacent to a National Park and already contains several large, pre-R.A.R.E. II Wilderness areas. There is also the Bull Run Watershed Reserve, which has even had Federal criminal statutes written specifically for its protection as a watershed source for Portland.^{19/} Mt. Hood

also has a few "further study" R.A.R.E. II areas thrown in for good measure.

Despite this bleak land-use framework, repeated attempts have been made to gain access to the geothermal resources beneath Mt. Hood. As of June, 1977, some 20 non-competitive lease applications covering roughly 36,000 acres had been filed. The only exploration within the area prior to that time was a cooperative, three-year public agency effort instituted in 1976 by the U.S.G.S., with E.R.D.A. (D.G.E.), Forest Service and Oregon Department of Geology assistance. As of September, 1977, the Forest Service approved the issuance of no surface occupancy leases (NSO) only in the Mt. Hood area.^{20/} As a result of this, the aforementioned Northwest Natural Gas Company's shallow hole drilling program has ensued beneath five Federal leases.^{21/} When the Final E.S. on the Land Management Plan for the Mt. Hood Planning Unit was subsequently completed, the total NSO restriction was lifted, and Northwest Natural Gas deepened several of its probe holes to 4,000 ft..^{22/} Remaining surface constraints "prohibit construction of any permanent facilities and require removal of all materials and restoration of the surface when drilling is completed."^{23/}

There were also a few leases issued on Mt. Hood without severe surface occupancy restraints. One of these

involved a lease to the owners of the private (though located on Forest Service land) Timberline Lodge in order to develop a space heating system for their complex. The Forest Service E.A.R. on that action took into account that the proposed "geothermal action will enhance the primary recreational use of the area."^{24/} The lease was therefore approved with minor stipulations only (concerning an archeological study and confinement of the geo-heating system to the lodge complex). The Service also noted the substantial savings in fuel oil cost and the "improvements in the environment" from the substitution of geo-heat for an annual use of 7,000 barrels of fuel oil.^{25/}

Unfortunately, their analyses of possible electric geothermal sites are not similarly sanguine. On balance, then, the Mt. Hood area seems available only for non-electric/direct use projects. Though this can not be scoffed at, Mt. Hood is not an electric commercialization target at this time. This is due in part to Forest Service (and others) concern over visual, watershed, wilderness and other surface values.

(2) Breitenbush:

To the south of Mt. Hood itself is the so-called "Breitenbush Geothermal Area" (B.G.A.), which lies within both the Mt. Hood and Willamette National Forests. Breitenbush

covers approximately 44,283 acres, including 13,445 acres classified as KGRA.^{26/} Once again, the Forest Service's final decision on geothermal leasing reflects an approach which the Service itself characterizes as "cautious."^{27/} This is due to its appraisal of "the high values and sensitivities of other resources in the area."^{28/} As with the final Gifford Pinchot and draft Targhee National Forest documents, a large portion of the acreage under study is "withheld from the lease offering".^{29/} This totals 39% of the possible geothermal land package. This serious constraint (denial of any leasing whatsoever) is justified to "protect soil, wildlife, recreation, visual and Wilderness [sic] values."^{30/}

In addition, what the Service classes as "Substantial Development Constraints,"^{31/} probably including an NSO restriction, will cover another 21,568 acres — 49% of the BGA. The remaining 5,400 acres, a paltry 12% of the original total, will be leased with "minimal" constraints.^{32/}

With 88% of the BGA, in effect, closed to development, one would expect to find a Forest Service statement decrying the degree of post-lease environmental protection offered by U.S.G.S. supervision of lessee operations under the applicable regulations and G.R.O. orders. That is not the case, however. When evaluating Alternative No. 2 ("Leasing Under No Controls Other Than Those Required By

Law Or Regulation") the Service brands that system, which follows N.E.P.A. and the Steam Act, as one providing "considerable environmental protection for soils, water, wildlife, timber and other National Forest values."^{33/}

This is nonetheless passed off as inadequate because its "emphasis would be on cosmetic and rehabilitative measures rather than the development control approach contemplated in the proposed action."^{34/} This attitude constitutes nothing less than Forest Service "agency elitism" and barely concealed mistrust of U.S.G.S. and BLM, the Interior Department agencies which would supervise all geothermal operations. It also ignores the fact that the Service would still maintain surface management control of areas within the lease but not committed to any Plan of Operations. It is this approach ("controls required by law and regulation") which should be the one acceptable to a Nation which desperately needs the secure, environmentally benign energy resources that geothermal can provide.

(3) Other Forest Service Areas:

Given their approach to the Breitenbush Geothermal Area, it is not pleasant to contemplate the forthcoming Willamette National Forest decision (F.E.S.) on the Belknap-Foley Geothermal area, which also overlaps the Deschutes National Forest boundary. That document is due this month.

The Deschutes N.F. also is preparing decisions on three other geothermal prospects within its boundaries - Ft. Rock (due next month); Sisters (same); and the much-sought Newberry Crater area.^{35/} The latter is not expected until the beginning of calendar year 1980.^{36/}

(4) Alvord:

Alvord is a real 175,000 acre plus "sleeper" on the geothermal commercialization scene. The main power lines to California run nearby and both preliminary estimates and preliminary shallow and deep hole data are encouraging. A 1976 lease sale saw bids much higher than anywhere outside The Geysers to that date, evincing high industry interest. Several high bids were nonetheless rejected by BLM. This slowed down development while bidder challenges were unsuccessfully brought to the Interior Board of Land Appeals.

Worse, a Sierra Club lawsuit challenging the sale in the absence of a full EIS was not resolved by the Ninth Circuit until last summer.^{37/} Both of these legal challenges deterred BLM from further Alvord-area lease sales during the pendency of the litigation.

There is also believed to be some previously unsuspected mineral-severed lands in the KGRA and unraveling the land ownership situation has done its share to slow down Alvord as well.

The BLM wilderness review program has entered the picture also. An area near Alvord saw an "accelerated" wilderness inventory due to a Pacific Power & Light transmission corridor application. Many "study areas" were identified and the line blocked.

With all of the formal legal challenges seemingly ironed out, full scale BLM leasing should resume as quickly as possible. Only 31,000 Federal acres have been offered to date. With no Forest Service consent or large surface environmental problems to deter them, the BLM, prodded by the Geothermal Resource Manager, should conduct an accelerated wilderness review of the entire Alvord KGRA and subsequently schedule it for early offering.

(5) Vale H.S.:

Though Union Oil (holder of several BLM leases at Vale) and others think highly of Vale, it can not be considered a viable prospect at this time. It is a small (23,000 acre) prospect, but it is certainly worth exploring due to its geologic/hydrologic similarity to Alvord and several southern Idaho areas.

F O O T N O T E S

CHAPTER IV

1/ Mitre, op. cit., at p. XIV - 7.

2/ See McNamara, The Legal and Institutional Problems Confronting Geothermal Development In Washington and Oregon (JM Energy Consultants, Inc., Oct. 1, 1978).

3/ Final Environmental Statement, Geothermal Leasing And Development - Gifford Pinchot National Forest, U.S.D.A.-Forest Service, May 15, 1979 (U.S.D.A.-FS-R6-FES-(Adm.) 79-1), at p. 1, cited hereinafter as "Pinchot ES".

4/ id.

5/ ibid., at p. 2.

6/ ibid., at p. 26, Table 1.

7/ ibid., at p. 29.

8/ See McNamara, op. cit, at fn. 42 for an analysis of that decision.

9/ Pinchot ES, at "Preferred Alternative", at p. 231

10/ id.

11/ id.

12/ See Chapter II, Section C, above

13/ Pinchot ES, at p. 232

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14/ ibid., at p. 233.

15/ ibid., at p. 232.

16/ Draft Environmental Statement, Island Park Geothermal Area,
U.S.D.A.-Forest Service, March 21, 1979 (DES 01-15-79-02).

17/ ibid., at p. 112, Table 36.

18/ See Chapter II, Section B, above.

19/ Former 18 USC 1862 provides for a \$500.00 fine, six months imprisonment for anyone grazing cattle in the Bull Run area. Sen. Hatfield sponsored (S.1647, 95th Cong.) special legislation allowing geothermal exploration for six months only. 18 USC 1862 was repealed as a result of his actions by Act, Nov. 23, 1977, P.L. 95-200 §3, 91 Stat. 1428.

20/ Final Environmental Analysis Report, Proposed Leasing of
Geothermal Resource With Nonsurface Occupancy Restrictions,
U.S.D.A.-Forest Service, Sept. 1977 (EAR 8300 (2800)).

21/ The leases in question are OR-13993, OR-13994, OR-14203, OR-14202, and OR-15503.

22/ Plan of Operation submitted to U.S.G.S. on April 20, 1978.

23/ Press Release, U.S.G.S., June 21, 1978.

24/ Final Environmental Analysis Report, Timberline Lodge
Proposal To Lease, U.S.D.A.-Forest Service, June 23, 1977.

25/ ibid, at p. 14.

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26/

Final Environmental Statement, Geothermal Development Breitenbush Area, U.S.D.A.-Forest Service Jan. 10, 1978 (U.S.D.A.-FS-R6-FES (Adm. 77-3), at p. iv., hereinafter cited as "Breitenbush ES".

27/

id.

28/

id.

29/

id.

30/

id.

31/

Breitenbush ES at p. 2.

32/

id.

33/

ibid., at p. 158 (emphasis supplied).

34/

id., (emphasis supplied).

35/

Telephone conversation between the author and Hal Sigwourth, Deschutes N.F.

36/

id.

37/

Sierra Club v. Hathaway, 579 F. 2d 1162 (CA 9, 1978).

CHAPTER V — Summary and Conclusions:

(1) There is no doubt that the five Pacific Rim states present an enormous geothermal commercialization target to the Geothermal Resource Manager.

(2) The prospects within the five-state region could add roughly 4,000 megawatts of electric capacity in the next decade (by 1990). This total includes an additional 1,000 megawatts at The Geysers; 2,000 megawatts in the Imperial Valley (500 each at Salton Sea, Heber, Brawley and East Mesa, with the first two named possibly accounting for a bit more and the latter two a bit less than half); 500 megawatts between Randsburg and Coso; and 500 megawatts spread among the heavily Forest Service-controlled areas (Mono-Long Valley, Lassen, Glass Mountain, Beckwourth Peak, Mt. Hood, Breitenbush, and Mt. St. Helens).

(3) The major legal and institutional hurdles to this achievement are:

- (a) Forest Service reluctance to release adequate portions of lands under their control for geothermal leasing and exploration. This impacts heavily in Oregon and the Northeast and Eastern California sub-regions. The suggested reform is abolition of the veto power over geothermal leasing granted to the Service by 30 USC §1014(b).

- (b) H₂S emissions problems at The Geysers. As noted, this may be ameliorated by the performance of the surface condenser/Stretford/hydrogen peroxide system planned for all proposed units and now in use on Unit 15. Alternatively, the EIC Corporation "upstream" process, soon to be tested, could alleviate the problem. If both of these technologies can not meet the 99% + requirements of the local A.P.C.D.s, some sort of Federal pre-emption may be required. The author does not believe that existing state law and political balances will successfully allow either Air Resources Board or Energy Commission override of a negative A.P.C.D. decision.
- (c) A binary cycle generating plant must be successfully demonstrated at the 50-55 MWe level. This is required to preserve the crucial Imperial Valley province from subsidence and/or severe water requirements. A binary demonstration would also push many utilities "over the line" and into geothermal.
- (d) BLM's wilderness review program poses a grave threat to several key prospects in the region. These include Alvord (Ore.) and Randsburg (Eastern Calif.). In addition, future trans-

mission corridors from other geothermal areas could be blocked by the designation of "wilderness study areas" when BLM makes its final inventory decisions in September, 1980. I believe that the Geothermal Resource Manager must move to alert BLM to any possible conflicts well in advance of that date and press them for a pro-geothermal decision. The exact corridor routes to be preserved will be delineated in a later report under this contract.