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**REGULATORY ASPECTS OF GEOTHERMAL ENERGY DEVELOPMENT IN THE
SALTON SEA/IMPERIAL VALLEY AREA**

Kathy Tonnessen

April, 1975

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REGULATORY ASPECTS OF GEOTHERMAL ENERGY DEVELOPMENT IN THE
SALTON SEA/IMPERIAL VALLEY AREA*

Kathy Tonnessen

Regulatory aspects of geothermal development must be addressed as a prelude to further LLL experimental activity in the Imperial Valley. Use of presently existing wells for turbine testing or the drilling of a well exclusively for that purpose will require an understanding of the legal/regulatory mechanism relating to those laws and agencies which govern the licensing, zoning and environmental assessment processes.

Geothermal energy development is still in the early growth stages as a technology. Due to a characteristic lag time in the evolution of the legislative machinery to deal with such new developments, the field of geothermal regulation is still in even earlier stages of development. A comparison of state laws⁽¹⁾ indicates that California -- and more specifically, the County of Imperial -- is perhaps the most progressive in this area, attacking the problem early (1965) and attempting to establish a regulatory program within an existing governmental body, the Division of Oil and Gas.^{(2), (3)}

The existence of three separate regulatory levels, Federal, State and County, would tend to make it difficult to devise a comprehensive and organized set of regulations. These different levels of regulation, along with the irregular nature of land ownership, are impediments to the organization and coordination of existing geothermal regulations.

The following analysis will consider the existing Federal, State, and County regulations and regulatory agencies. Intergovernmental cooperation in this field will be discussed along with a summary of existing problems and recommendations for their mitigation.

*Work performed under the auspices of the U. S. Energy Research and Development Administration.

AGENCIES INVOLVED IN GEOTHERMAL REGULATION

A. FEDERAL AGENCIES

1. Department of the Interior

- a. Bureau of Land Management
- b. Bureau of Sport Fisheries & Wildlife

Contact: George Nielson,
Sacramento, California

- c. Bureau of Reclamation

Contact: Andy Peck, Boulder City,
Nevada

- d. U. S. Geological Survey

Contacts: P. J. Muffler, Menlo
Park, California

Reid Stone, Menlo Park,
California

Involved in the leasing of Federal lands for geothermal development and has exclusive regulations of activity on those leased lands.

Presently involved in geothermal development at the East Mesa anomaly, Imperial Valley, particularly regarding the feasibility of desalinization of geothermal brines.

Has done extensive investigation of the geothermal brines in the Salton Sea area. Responsible for definition of geothermal reserves.

Lead responsibilities for leasing of Federally-owned lands.

2. Environmental Protection Agency

Contact: P. DiFalco, San Francisco,
California

Responsibility for the enforcement of NEPA (National Environmental Policy Act), which requires the preparation of an environmental impact statement for a significant Federal action. Also approves State water and air quality standards.

B. STATE AGENCIES

1. Resources Agency:

- a. Department of Conservation,
Division of Oil & Gas

Contact: David Anderson,
Sacramento, California

Donald Lande, Long Beach,
California

Regulatory power over the development of geothermal resources in the State of California.⁽⁴⁾

- b. Regional Water Quality Control Board, Colorado River Basin, Indio, California

Contact: J. Harry Hanson and
Cliff Van Bessin,
Engineers

Regulates the water quality within the Colorado River Basin and implements water quality standards approved by the EPA in accordance with the Federal Water Pollution Control Act. A permit must be obtained from this agency for any method planned for brine disposal.

- c. Department of Fish and Game

Protection of fish and game within the State; administration of State wildlife and waterfowl refuges (Wister Unit on the southeastern bank of Salton Sea); involvement in maintaining the quality of the Salton Sea in order to preserve the sport fishery.

- d. Imperial County Air Pollution Control District

Administers the EPA-approved state standards for allowable emissions. Should be consulted regarding possible point source pollution from a geothermal plant.

- e. State Lands Commission

Empowered under the Geothermal Resources Act of 1967 to lease state owned land for geothermal exploration and development.

2. Geothermal Resources Board

Administrative/advisory body created under geothermal regulations to designate state lands as geothermal resource areas and to regulate development on those lands.

3. Imperial Irrigation District

State agency empowered to regulate the irrigation system in the Imperial Valley, including amount and quality of water from the Colorado River run-off and maintenance of ditches and canals. Can provide detailed information on salinity and quality of Salton Sea surface waters.

C. COUNTY AGENCIES

1. Imperial County Department of Public Works

Contact: C. D. Mitchell, Planning Commissioner
D. E. Pierson, Director,
El Centro, California

Regulates geothermal development within Imperial County. List of regulations available - complements State regulation. Requires tie-in to county-wide bench mark network to monitor subsidence.

FEDERAL REGULATION

In general, Federal agencies are confined to regulation of geothermal development on Federally-owned lands only. This is an exclusive right, with State and County regulations not enforceable on these designated Federal lands. The Geological Survey is the lead agency for leasing on Federally-owned lands under the Geothermal Steam Act. The Environmental Protection Agency has jurisdiction over environmental impact assessment of a Federal agency's project on State or private land, and also over the formulation of State air and water quality standards to be enforced within the states in compliance with the Clean Air Act and the Federal Water Pollution Control Act.^(1,7a) Private lessees of Federal land will be required to comply with state and local regulations, although management remains with the Federal agencies.

Leasing of Federal Lands

The Geothermal Steam Act of 1970 has evolved into a complex regulatory scheme with the Department of the Interior as the lead agency.^(5d,7a,8) Under this legislation state and local governments cannot directly control, authorize or withhold authorization for geothermal development on Federal land. A presidential order and rules and regulations have been published in the Federal Register to establish the guidelines for this leasing program.^(5i,6c,7a) Known Geothermal Resource Areas (KGRA), as designated by the U. S. Geological Survey, may be leased through competitive bidding, with the Federal government reserving the right to make regulations involving prospecting, drilling, development and environmental protection. Lease nominations are made to the Bureau of Reclamation (which grants prospecting licenses) and are then referred

to the U. S. Geological Survey for classification. Further review of the lease is made by: Bureau of Sport Fisheries and Wildlife, Bureau of Reclamation, Forest Service of the Department of Agriculture and the Federal Power Commission (involved with the regulation of any geothermal installation which sells electrical power via Interstate Commerce). This progression of agency jurisdiction through the stages of prospecting, drilling, developing and production can be traced on a government organization chart (Fig. 1) designed by D. N. Anderson, of the California Division of Oil and Gas.^(5a) The promulgated rules and regulations for the Federal leasing program include some particular measures aimed at environmental protection, in addition to the usual requirement for an Environmental Impact Statement. The areas of surface management considered in these rules are:

- a) pesticides and herbicides
- b) water pollution
- c) air pollution
- d) erosion control
- e) noise control
- f) land subsidence and seismic activity
- g) aesthetics
- h) fish and wildlife
- i) antiquities and historical sites
- j) restoration

Environmental Impact Statements

The National Environmental Protection Act (NEPA), administered by the Environmental Protection Agency, requires that for any major federal action an Environmental Impact Statement (EIS) be prepared by the department involved in order to present the possible adverse effects that the project may have on the environment. Section 102(2)(c) specifies that the following aspects of the proposed project be considered and then comments be solicited from interested parties regarding the advisability of the project.⁽⁹⁾

- 1) environmental impact
- 2) mitigating measures
- 3) adverse effects which cannot be avoided
- 4) relationship between short-term uses and maintenance and enhancement of long-term productivity
- 5) irreversible or irretrievable commitment of resources
- 6) alternatives to the planned action

If it is determined by the lead agency, after such an environmental assessment, that there will be no potential significant environmental impacts as a result of the proposed development then a "negative declaration" may be filed in lieu of an EIS.⁽¹⁰⁾ These procedures for the preparation of an EIS or a negative declaration must be in accordance with guidelines set down by the Council on Environmental Quality (CEQ) and under the supervision of the U.S.G.S.

The fact that LLL's energy program is currently being funded by ERDA would make this regulation applicable in the case of geothermal energy development in the Salton Sea/Imperial Valley. Even if such a project were to be located on state or private land, it would still comprise a "federal action" with ERDA as a lead agency. It would then have to be determined by agency counsel if the planned action was actually "major," requiring the filing of an EIS.

Air and Water Quality Standards

The Environmental Protection Agency was created with the mandate to administer national air and water quality standards,^(5d,5f,11) to be established by the states. These standards must be observed by the Department of the Interior in regulation of the leased geothermal tracts. Imperial County state water quality standards are administered by the Colorado River Basin Regional Water Quality Control Board, and air standards are policed by the Imperial County Air Pollution Control District. These State agencies actually implement the federally-approved standards.

Federal Geothermal Activities

The Bureau of Reclamation is currently involved in a geothermal development project on Federal land in the eastern part of Imperial County in the East Mesa anomaly.^(1,12) In accordance with Federal regulations, an environmental impact report for the proposed electrical generation and desalinization pilot plant was filed and comments received before the exploratory wells were drilled.⁽¹²⁾ The Federal Government claims exclusive jurisdiction over operations on Federal land.^(7a) While operations are usually conducted in accordance with local regulations, this is not mandatory.^(5d) In one instance, California Division of Oil & Gas comments about possible deficiencies in blowout prevention equipment at East Mesa were met with the statement that jurisdiction rested with the Bureau of Reclamation.⁽¹³⁾ In comments made a part of the covering Environmental Impact Statement for East Mesa, Imperial County's Public Works Department requested⁽¹⁴⁾ that the Bureau of Reclamation adhere to county regulations; it is understood that in general this has been done, but that there are detail variations.

STATE REGULATION

"It is hereby found and determined that the people of the State of California have a direct and primary interest in the development of geothermal resources, and that the State of California, through the authority vested in the State Oil and Gas Supervisor, should exercise its power and jurisdiction to require that wells for the discovery and production of geothermal resources be drilled, operated, maintained and abandoned in such manner as to safeguard life, health, property and the public welfare, and to encourage maximum economic recovery." (California Public Resources Code, Chapter 4, Article 3700.)

In 1965 the State of California began to devise regulations^(3,4,5d,5i) for the orderly development of a significant geothermal resource. These regulations were supplemented by an administrative law addition which empowered the State Lands Commission to release state lands situated within designated State Geothermal Resource Areas (GRA's) for lease by private developers. California has used its existing administrative structure: operational regulations are promulgated by the Division of

Oil and Gas, while the State Lands Commission handles leases on state lands. Additionally, an advisory board--the Geothermal Resources Board--has been created.

Regulation of geothermal resources on state and private lands within California has been preempted by the state government, with powers delegated to certain agencies. Consultation with local officials regarding planning, zoning and regulatory ordinances is encouraged.

State Resources Agency

This agency is concerned with all aspects of resource development and conservation within the state of California. A number of departments and divisions within the Resources Agency have been given the task of formulating detailed geothermal policy and regulations.

Division of Oil and Gas

The responsibility for the regulation of the technical aspects of geothermal development has been delegated to the Division of Oil and Gas, a part of the Department of Conservation. Detailed regulations are published in the Public Resources Code.⁽⁴⁾ A group within the division, headed by the State Geothermal Officer, is concerned exclusively with geothermal operations. The Division is not concerned with questions of land use and surface environmental regulation; these are the province of other state officials and the county where development is contemplated.

Although exclusive authority over operations on Federal lands is claimed by the Federal government, the Division of Oil and Gas takes an active interest in such operations. Continuing efforts are being made to secure compliance with state rules.⁽¹³⁾

State Lands Commission

The Division of Oil and Gas is not the only state agency concerned with geothermal activities. Bonding, licensing, and authorization is not a one-step process in the state; these processes vary, depending on the nature of the land ownership--whether it is Federal, state, or private--and the stage of development.

For initial prospecting for a potential resource on state land, a provisional permit can be granted by the State Lands Commission.^(5d,15) The first such permits were issued in 1961. The commission also oversees the leasing of state lands, and is likewise concerned with the ultimate production and utilization of the resource. The Commission also requires the preparation of a Monthly Geothermal Energy report from developers holding geothermal leases.

As part of a cooperative, interactive network of state agencies, the Lands Commission is required to notify the appropriate Regional Water Quality Control Board, the Department of Water Resources, and the Department of Fish and Game that a geothermal prospecting development license has been issued, so that adequate environmental protection measures can be taken.⁽¹⁵⁾

Geothermal Resources Board

The Geothermal Resources Board, created by the Geothermal Resources Act of 1968, has two major responsibilities: the classification of tracts of state lands as Geothermal Resource Areas (GRA), and the specifications for regulation of activities on state lands. As stated previously, operations on state lands are regulated exclusively by the state.

Regional Water Quality Control Board

The Colorado River Basin Regional Water Quality Control Board, with headquarters at Indio, regulates the method of waste water discharge from geothermal activities in the Imperial Valley.^(1,5d) In specific previous cases, the Board has prohibited the uncontrolled release of geothermal waste waters into the New and Alamo Rivers or into the Salton Sea.⁽¹⁷⁾

Air Pollution Control Board

The Imperial County Air Pollution Control District is concerned with the administration of Federally-approved standards for emissions from a stationary source.^(5d) Each geothermal development on state or private land will be monitored, and must receive a permit to discharge any gaseous emissions into the atmosphere.

Department of Fish and Game

The Department of Fish and Game has a State 5500-acre wildlife refuge in the Salton Sea area. This Department is concerned particularly with the protection of migrating waterfowl which frequent the banks of the Salton Sea. The Department also performs the function of preventing avian destruction of the Imperial Valley croplands by maintaining abundant food supplies for migrating and resident ducks, geese and shorebirds.⁽¹⁸⁾

Subcommittee on Geothermal Resources of the Joint Legislative Committee on Public Domain

Under the chairmanship of Ralph Dills, California State Senator, this legislative body has held a series of public hearings concerned with the development of geothermal resources within the state in an attempt to gain insight into the problem and to solicit recommendations for necessary

legislation in this field. The Subcommittee's efforts to 1973 have included the following proposed new legislation:⁽¹⁶⁾

- Senate Bill 563 - would require that the value of geothermal resources not be included in the value of the land for taxation purposes until there has been demonstrated cash flow as result of commercial development (in committee).
- Senate Bill 564 - would have provided a 22% depletion allowance for development of geothermal resources (dropped).
- Senate Bill 577 - called for a schedule of rapid amortization of the cost of public utility facilities utilizing geothermal resources (dropped).
- Senate Bill 883 - would allow the Public Utilities Commission to authorize consideration of research and development expenses by electrical, gas, heat and telephone corporations for rate setting purposes (signed into law, Oct. 1973).
- Senate Bill 1319 - directs the Secretary of the Resources Agency to study the use and conservation of energy resources. (Passed by Senate, in Assembly Committee.)

California Environmental Impact Reports

Modeled after NEPA, the California Environmental Quality Act (CEQA) requires the preparation of an Environmental Impact Report (EIR) for any major state action which would have a significant effect upon the environment.^(7b,9) An EIR differs from a Federal Environmental Impact Statement in requiring the discussion of an additional topic: "growth inducing impact"

of the proposed project. For a project situated on state lands, the EIR is to be prepared by the State Lands Commission, while the county government is responsible for the filing of an EIR concerning private land. The issue of whether or not CEQA applied to projects which were private in nature on private land was answered by the California Supreme Court in Friends of Mammoth et al versus Mono County Board of Supervisors, and again in Assembly Bill 889 which extended the provisions of CEQA to encompass any major project on state or private lands which required state licensing of any kind.^(7b)

To end the confusion and uncertainty which resulted from this ruling, the state issued a series of administrative guidelines designed to specify the exceptions to this ruling - with special reference to what constitutes a "major" action with "significant" effects. The directive issued by the State Resources Agency^(7b) includes the following exempt categories:

- 1) normal operation,
- 2) repair,
- 3) maintenance,
- 4) minor alteration of existing structures,
- 5) additions of less than 2,500 square feet,
- 6) replacement or reconstruction of existing structures,
- 7) new construction of small structures (one family house),
- 8) minor land alterations,
- 9) grading of slopes less than 10%

In the event that a proposed action is not considered to be "significant" in its impact upon the environment, a "negative declaration" may be filed with the County Clerk and the public given the opportunity to respond to it.^(7b,9)

The detailed guidelines for the preparation of an EIR cover many of the questions left vague by directives for Federal Impact Statements. Included in an EIR must be an assessment of the physical, resource, socio-economic, economic and cultural-aesthetic impacts of the proposed project.^(7b) The format of the report should follow the prepared outline:

- 1) description of the project
- 2) map of the area (topographic)
- 3) objectives
- 4) engineering proposals
- 5) description of the environment
- 6) environmental impact
 - a) planning
 - b) acquisition
 - c) development
 - d) operation

Imperial Irrigation District

This state agency was organized after the flooding of the Salton Sea in 1905-1907 to coordinate efforts toward development of an efficient irrigation system for the agricultural lands of the Imperial Valley. The District is concerned primarily with providing sufficient quantities of high quality irrigation water for the year-round agricultural activity in the Valley. It is also concerned with the maintenance of the mechanical systems of tile drains, canals and river systems running to the Salton Sea "sump." This agency is an excellent source of information and statistics on the nature of the water resource of the area - salinity measurements, rainfall, Salton Sea fluctuations, inflow and evaporation rates, as well as economic aspects of the agriculture of the Imperial Valley.^(19,20)

COUNTY REGULATION

"It is the intent of this policy to encourage exploration and development projects and to increase the store of knowledge surrounding this resource. It is also the intent of this policy that there be coordination of existing and anticipated data so that the end result may be General Planning that will provide for the optimum development of available resource."

-Terms, Conditions and Standards for
Geothermal Development, Imperial County⁽²¹⁾

Imperial County Department of Public Works

This Department has devised a set of regulations, issued in 1971, which will govern the development of geothermal resources in the county until a more comprehensive, general plan can be implemented. Entitled Terms, Conditions and Standards, this document was set forth in 1971 as a guide to the drilling, exploration and development of geothermal energy.⁽²¹⁾ Much of this regulation relies upon State authority, particularly in the enforcement of air and water pollution standards. The County is concerned with licensing procedures and various aspects of land use regulation.^(5d,19) Under the County regulations it is necessary to:

- 1) submit a definite proposal,
- 2) apply procedures and standards,
- 3) comply with all applicable Federal, State and local standards,
- 4) obtain a "Geothermal Production Project" permit before developmental drilling,
- 5) complete a licensed project within a specified time period,
- 6) put up adequate bonds and hold sufficient insurance,
- 7) tie into the County subsidence monitoring network,
- 8) mitigate air, water, noise pollution and electric interference,
- 9) comply with land use standards (regulating the acreage that can be developed within certain use areas),
- 10) have the program approved by the State Division of Oil and Gas,
- 11) have approval of both the Regional Water Quality Control Board and the Air Quality Control Board.

The evaluation of possible differential subsidence, which may accompany development of geothermal resources, has been considered by the officials of Imperial County. Now in existence is a complex subsidence measurement network of benchmarks, with a requirement that all geothermal developers tie into the system. This program has been jointly administered by the Department of Public Works with numerous other state, county and federal agencies.

County Land Use Planning

At the Imperial Valley/Salton Sea Hearings in 1970, County officials testified regarding the need for local control over all Federal, State and private lands within the county so that there might be a coordinated development of geothermal resources within the framework of planning, zoning and land use considerations.^(6b) The role of the county in the regulation of the geothermal resource was involved primarily with surface requirements. To this end the Imperial County is currently in the process of developing a General Plan for development of resources.^(5d) This plan may conflict with Federal project regulation by the Department of the Interior under the Geothermal Steam Act.^(7a)

PROBLEMS AND RECOMMENDATIONS

Because intensive development in the geothermal field is such a new development, there are only a few detailed regulatory programs. Many states have adapted oil and gas regulations to fit this new resource more or less successfully.

Fundamentally, geothermal regulatory problems fall into five basic categories:

- 1) Incentives to encourage development of the resource,
- 2) Definition of the resource,
- 3) Multiple-use development of geothermal fields,
- 4) Regulatory complexities,
- 5) Environmental and land-use concerns.

Following are detailed discussions of each of these problems, specifically as they apply to the systematic development of geothermal resources in the Salton Sea and Imperial Valley areas. Tentative recommendations for solutions are presented:

- 1) Development of incentives to encourage geothermal energy production on a commercial scale. One commonly used incentive has been the depletion allowance; a decision by the U.S. Tax Court (Reich et al vs. Commissioner of Internal Revenue^(5d,5i)) allowed a 22% depletion allowance at The Geysers, Northern California. The court held in this case that the steam was a gas and a non-renewable resource. It is not clear that this decision will apply to hot water systems, where the origin of the resource is not known. Legislative action would be necessary to establish the criteria for receiving such an allowance. Undoubtedly a depletion allowance would encourage increased exploration by industry, but the present legislative climate bodes ill for the future of depletion allowances in general. Other incentives thus should be considered.
- 2) Definition of the resource. There is considerable difference in legal characterization of geothermal resources. Different states have defined geothermal energy variously as minerals, steam, ground water, as a unique resource (legally, sui generis), and as a combination of some of these. Some states require approval of geothermal operations by more than one agency, primarily because of concern with possible effects on potable ground water resources. In California, the Division of Oil and Gas is the agency with sole jurisdiction over this aspect of geothermal activity, and in the Salton Sea and Imperial Valley areas, the local ground water is of such low quality that it is not a concern.
- 3) Multiple use of resources. Currently there is a problem in the development of hot water geothermal energy in cases where there is a potential for more than one extraction process. Specifically, in many cases hot water can be used to produce

process steam or can be used directly for heating. Also, highly mineralized waters, such as those of the Salton Sea reservoir, have a potential for mineral extraction. Under present law, a company can develop only one of these resources. Provision should be made to allow an operator to develop all available resources in a particular field.

- 4) Regulatory complexities. David N. Anderson, California's Geothermal Officer, has characterized the current state of geothermal regulation as a "maze of regulatory agencies"^(5a); has charted the situation in California. There are many agencies involved in regulation at all levels--Federal, state and local--each with its own set of standards, requirements, and time schedules.⁽⁸⁾ Presently existing regulations often cause costly delays and require extensive duplication of effort. Different agencies of government need different kinds of information, so that a centralized "super-agency" would not serve the purpose. It has been suggested⁽⁸⁾ that a clearing-house be established, one that would not usurp anyone's authority, but which would be an information center to provide help with such things as jurisdiction of agencies, fees and bonds, time schedules and necessary environmental reports. In California, some progress has been made towards this goal. The county in which a geothermal project is to be pursued has been made the lead agency for all state and local permits and reports required. This has proven to be an effective step and a number of delays have been eliminated.

Another problem is the lack of a regulatory standard for the drafting of state regulations. Much of this arises from the differences in definition of the geothermal resource, so that uniform regulation is impossible. However, it still would be useful if some operational standard could be found. In fact, most of the states have modeled their operational regulations upon those devised by California, the first to be confronted with actual production; however, since the basic definitions in several states

are different than those of California, the regulations cannot be the same.

Finally, there is a potential for confusion when a geothermal reservoir is located under lands with different classes of ownership--some of it Federal, some state, some private.^(5d)

At present, each type of land could be developed under a different set of rules, resulting in loss of part of the resource. There is a need for more governmental cooperation and coordination, rather than regulatory expansion and preemption of jurisdiction. It would be beneficial to attempt coordination of development through a coalition of governmental, academic and industrial agencies.

- 5) Environmental and land use concerns. Many of the complexities of geothermal development are related to the requirements for environmental assessments. For example, in California regulation of geothermal operations is vested in one agency, the Division of Oil and Gas, while at least six state agencies are concerned with various aspects of the environmental effects of geothermal development, each with its own requirements. There is the possibility for any project on state or private land that as many as three environmental impact reports may have to be prepared: a Federal Environmental Impact Statement, a State Environmental Impact Report, and a county assessment. These reports can be very extensive and time-consuming, so it is necessary to be aware of the requirements for any particular tract of land in order to prepare the appropriate reports with a minimum of duplication. It is also most important to include environmental considerations in the planning of all projects from their inception.

Environmental groups have complained that not enough attention has been paid to the relative benefits of alternative uses of land in the vicinity of geothermal developments. Michael McCloskey

of the Sierra Club⁽²²⁾ points out that geothermal resources are often found located near recreational and wilderness areas. In such a situation, he believes that it is important to give thorough consideration to the relative merits of the land for recreational uses as opposed to development of the geothermal resources. It has also been charged that the Federal government has not been restrictive enough in its withdrawal of certain Federal lands from geothermal leasing. Included in the areas opened for leasing are national forest land, parts of the national trail system, and units of the scenic and recreational rivers system.

SUMMARY

Present requirements for the preparation of environmental impact reports are extremely stringent, which often results in costly delays in development. For instance, it was for a long time the policy in the Geysers geothermal area to require a new statement for each well to be drilled.^(5a,16) Although this policy has been modified, so that an amendment to a general statement is now accepted, it is an example of the expense which may be incurred.

In some cases it is possible for as many as three separate statements to be required to fulfill Federal, state and local requirements. These may be large and expensive undertakings, and often must be quite different in content. Years may go by between initial licensing and final development approval, while public hearings are held and public comment solicited. There has been much discussion of this particular regulatory problem and some suggestions have been made. One idea involves the changing of the National Environmental Protection Act so that a "solo" environmental statement for all levels of government can be written.^(5b) Taft and Feffer^(7b) have suggested the concept of a "master EIR" for all California geothermal areas; this would be modeled after the Federal impact statement for the geothermal leasing program.⁽¹⁾ Along the same lines, the State of California is currently preparing an Environmental Impact Report (State) for the Imperial Valley.^(5b)

References

1. U. S. Department of Interior, Geothermal Leasing Program. Final Environmental Statement, 4 vol., 24 Oct., 1973, EIS-CA-73-1681-F-(1 to 4)-GA.
2. Anderson, D. N., and L. Axtell, Geothermal Resources in California, In: Geothermal Overviews of the Western United States, 1972, Geothermal Resources Council Special Report No. 1, El Centro Conference, February 16-18, 1972.
3. Anderson, D. N., Geothermal Laws and Regulations in the Western United States, In: California Division of Oil and Gas and Geothermal Resources Council Short Course, Sacramento, California, May 1973.
4. California Department of Conservation, Division of Oil and Gas, Proposed Geothermal Regulations, Final Draft, February 2, 1974, 27 p, Chapter 4, Division 3, Public Resources Code, Subchapter 4, Geothermal Operations.
5. California University, Riverside, and National Science Foundation/RANN, Proceedings: National Conference on Geothermal Energy, Palm Springs, California, May 10-11, 1973.
 - a. Anderson, D. N., Flow Chart of Critical Path in Geothermal Exploration, p. 141-143.
 - b. Anderson, D. N., moderator, Panel Discussion on Geothermal Production and Resource Utilization, p. 34-37.
 - c. Barnea, Joseph, Luncheon address covering hot water fields, their problems and opportunities in the United States, p. 58-68.
 - d. Cahraman, T. H., The Interrelationship between Federal, State and Local Regulatory Agencies on the Development of the Geothermal Resource in California, p. 102-140.
 - e. Comalli, Ernest, moderator, Panel Discussion on Geothermal Taxation, p. 15-17.
 - f. Kendall, G. R., moderator, Panel Discussion on Environmental Considerations, p. 24-33.
 - g. Pierson, D. E., moderator, Panel Discussion on Geothermal Development, p. 21-23.
 - h. Stone, Reid T., moderator, Panel Discussion on Geothermal Exploration, p. 18-20.
 - i. Appendices containing legal reference documents.
6. Geothermal Resources Council, Compendium of First Day Papers Presented at the First Conference of the Geothermal Resources Council, El Centro, California, February, 1972. Special Report No. 2.
 - a. Aidlin, J. W., Review of some of the Legal Problems in Geothermal Development, p. 69-77.

- b. Hess, Hamilton, Environmental Priorities, Human Needs and Geothermal Power, p. 19-28.
 - c. Stone, R. T., Federal Geothermal Leasing and Operating Regulations and Environmental Impact Statements, p. 5-10.
7. Geothermal Resources Council, Special Short Course No. 2, Geothermal Regulations, South San Francisco, California, May 23-24, 1974, Preliminary Study Guide. (Proceedings in press.)
- a. Conover, R. D., Federal Regulations and Lease Terms and Their Relationship to State Laws and Regulations, 9 p; plus regulations for geothermal lease sales published in Federal Register (v. 38, no. 248, December 28, 1973).
 - b. Taft, M. I., and A. P. Feffer, EIR's: Truth and Consequences, 32 p.
8. Hickel, W. J., Geothermal Energy, A National Proposal for Geothermal Resources Research, University of Alaska, College, Sponsored by National Science Foundation/RANN, In: Final Report of the Geothermal Resources Research Conference, Battelle Seattle Research Center, Seattle, Washington, September 18-20, 1972, 95 p., NTIS no. PB-222-326.
9. Heyman, Ira, NEPA/CEQA: Legal Aspects, In: Environmental Impact Assessment--Guidelines and Commentary, T. J. Dickert, Ed., with K. R. Domeny, University of California Extension, Berkeley, 1974, p. 17-26.
10. Atomic Energy Commission, AEC Manual, Immediate Action Directive No. IAD o510-32, Interim Atomic Energy Commission Operational Procedures for Implementing Section 102(2)(c) of the National Environmental Policy Act of 1969; Section 309 of the Clean Air Act, as amended; Executive Order 11514; Guidelines of the Council on Environmental Quality; OMB Bulletin No. 72-6; and Part II.2.a.(3) of OMB Circular No. A-95 (Revised); November 13, 1973.
11. U. S. Clean Air Act of 1970.
12. U. S. Department of Interior, Bureau of Reclamation, Boulder City, Nevada, Proposed Deep Geothermal Test Well, Geothermal Resource Investigation, Imperial Valley, California, EIS-CA-73-0188-F, February 1973.
13. Anderson, D. N., Transcript of panel discussion (p. 72), In: Proceedings of the Geothermal Power Development Conference, Berkeley, California, June 18, 1974, Lawrence Berkeley Laboratory, University of California, LBL-3099.
14. Imperial County, California, Department of Public Works; Letter from David E. Pierson, Director, to Bureau of Reclamation, Boulder City, Nevada, March 9, 1972, Comments on Draft Environmental Statement, East Mesa Anomaly, Imperial County, California.
15. California, State Lands Commission, Title 2, Article 4.1, Rules for the Leasing of State Geothermal Lands.
16. California, State Senate, Subcommittee on Geothermal Resources of the Joint Legislative Committee on Public Domain; Geothermal Resources in California: The Problems and the Potential, December 1973.

17. California, Regional Water Quality Control Board, Colorado River Basin, Indio; Waste Discharge Requirements for Geothermal Energy and Mineral Corporation, North of Westmorland, Imperial County, Order No. 72-50, March 22, 1972.
18. McCaskie, Guy, Shorebird and Waterbird Use of the Salton Sea, California Fish and Wildlife Quarterly, vol. 56, no. 2, Publication of California Fish and Game Department.
19. Imperial County, California, Office of the Agricultural Commissioner; Imperial County Agriculture, 1973.
20. California, Imperial Irrigation District, Historic Salton Sea, El Centro, California, 1966.
21. Imperial County, California, Department of Public Works; Terms, Conditions, Standards, and Application Procedures for Initial Geothermal Developments, Imperial County, California, May 1971.
22. McCloskey, Michael, Comments on a Paper by Martin Fulcher at the Conference on an Interdisciplinary Approach to Geothermal Development, Boulder, Colorado, June 21, 1973, Sierra Club, San Francisco, California.

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