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PRELIMINARY EVALUATION OF DOE-NEPA  
MONITORING SYSTEM

**MASTER**

Prepared for  
Department of Energy

by  
ESCOR, INC.  
Northfield, Illinois  
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## Summary of Council on Environmental Quality (CEQ) Monitoring Regulations

The objective of this analysis was to perform a preliminary investigation of the problems involved in designing a DOE-NEPA compliance monitoring system. The requirement for such a system arose from the CEQ-NEPA regulation effective July 30, 1979. The CEQ regulation uses the term "monitoring" to denote any method by which the lead agency can assure implementation of Environmental Impact Statement (EIS) and Record of Decision (ROD) environmental mitigation commitments. Monitoring is required for mitigation measures in "important" cases and may be carried out at agency discretion for all other cases. No definition of "important" is given in the regulation.

The NEPA intent is that all environmental information and planning be incorporated into the decision process as early as possible. In keeping with this concept, any monitoring or enforcement program for a mitigation measure is expected to be adopted and briefly and concisely described in the ROD.

Some methods of implementation and enforcement of monitoring programs are specified in the regulation. The lead agency may: 1) include appropriate compliance conditions in grants, permits or other approvals (1505.3); 2) cooperate with state and local requirements (1506.2); (3) request cooperating federal agencies with jurisdiction to make staff support available with or without remuneration (1501.6) and 4) place responsibility for compliance at the field level (1501.1) to avoid multiple approvals.

## Structure of This Report

The ESCOR analysis was directed toward obtaining information in five areas relevant for the design of a DOE monitoring compliance system:

- 1) What further interpretation of the guidelines could be obtained from CEQ in order to aid in defining monitoring requirements?
- 2) How are other federal and state agencies' compliance monitoring systems structured?
- 3) Is the information now contained in EIS's regarding mitigation measures and their monitoring sufficient to develop a monitoring compliance plan?
- 4) What legal mechanisms are available to DOE to insure implementation of mitigation measures?
- 5) How should DOE structure its program administratively?

These areas are discussed in the following chapters. Preliminary recommendations for the design of information, legal and administrative components of the DOE system are also made in Chapters 3, 4 and 5.

**CHAPTER I**

**Introduction**

**CHAPTER 2**

**Federal and State Compliance Monitoring Surveys**

## Introduction

The initial task of this project was to obtain clarification regarding the interpretation of CEQ guidelines and explore the monitoring systems developed by other federal and state agencies to meet compliance requirements. CEQ regulation clarification was obtained by interviewing Mr. C. Foster Knight, Acting Counsel for CEQ. Federal agencies interviewed were selected based on the number of EIS's prepared in the past, as well as on CEQ's perception of which agencies are most involved in projects requiring EIS's. State agency selection was based on federal EPA perceptions of states with the most advanced environmental compliance systems and on DOE project locations.

## Interpretation of CEQ Regulation Requirements

ESCOR's interview with Mr. Knight was directed in two areas: 1) Clarification of regulation statements; 2) general expectations of CEQ regarding the nature of federal agency monitoring plans.

Although CEQ has begun reviewing agency compliance plans in the areas of EIS and ROD preparation, CEQ's review to date has been based on completeness and form of the documents more than their content. A comprehensive review of agency monitoring compliance is anticipated for the future, but has not yet begun.

In order to define some of the terms of the regulation, ESCOR staff asked Mr. Knight to 1) clarify the term "Important cases" 2) specify what enforcement authority DOE, as lead agency, would have if other parties failed to fulfill EIS commitments, and 3) clarify how much responsibility mandated for environmental protection could be transferred to other agencies (state/federal) by DOE.

Mr. Knight was aware of no established CEQ criteria for "important cases". Due to the variety of environmental problems associated with projects of the agencies under the CEQ regulations, the definition of important cases has been left to the judgement of environmental experts delegated by each agency (either staff or consultant) during the NEPA process. Whether such consideration should be made on a case-by-case basis, or through agency established criteria, Mr. Knight felt was an agency decision.

The only compliance authority available to the lead agency suggested by CEQ was contractual obligations which the agency structures itself and obligations due to existing regulations. Mr. Knight was not aware of any precedents which would indicate the scope of such obligations or recourse available to the agency if contractors failed to carry out mitigation measures.

Transfer of monitoring responsibilities from DOE to local environmental agencies as a project progresses was also discussed. Although often as a project progresses, some environmental compliance aspects come under the jurisdiction of agencies (state/federal) with mandates for environmental protection, Mr. Knight indicated responsibility for compliance monitoring remains with the lead agency.

ESCOR staff asked Mr. Knight about agency reporting requirements to CEQ and the duration of agency responsibilities for monitoring (after lead agency withdrawal, after project closure, etc.). He had no recommendations for frequency or form of monitoring reports to CEQ. CEQ does not have adequate staff to process monitoring reports from agencies. As far as duration of monitoring, it would have to be decided by the lead agency. However, the lead agency is, in Mr. Knight's view, responsible for any environmental damage. It is the lead agency which commits to mitigation measures and monitoring in the EIS. Any contractor to DOE who monitors mitigation measures for DOE does not relieve the lead agency of responsibility.

## Federal and State Compliance Monitoring Survey

ESCOR sought to determine the nature of other federal agencies' experience in compliance monitoring in order to evaluate which aspects of these systems might be adaptable to a DOE project compliance monitoring system. States' environmental agencies were also surveyed to ascertain their experience with NEPA compliance monitoring and to evaluate their potential as a source of EIS environmental compliance information.

The survey of responsible representatives of five federal agencies was conducted specifically for the purpose of answering the following questions:

- 1) What are the characteristics of their compliance monitoring systems?
- 2) What sources of compliance monitoring information are available/utilized?
- 3) With what frequency is monitoring performed?
- 4) How are the results documented?
- 5) What are the legal methods of enforcement?
- 6) What mitigation measures are required under a contractual agreement?

The results of this survey are given in Appendix 1.

The sample federal agencies' systems reviewed have both common and unique elements. The most striking common element is that these agencies all believe these systems fulfill the NEPA compliance monitoring requirements. (These systems were apparently in effect in their present form prior to the CEQ regulation and were not designed specifically for compliance monitoring purposes.) Other common elements are: (1) the decentralization of project



environmental monitoring responsibility to regional or state offices; (2) environmental compliance auditing as a byproduct of other project progress reporting; (3) filing environmental monitoring implementation information with other project reports; (4) lack of sufficient environmental personnel to do extensive on-site environmental reviews; (5) no apparent systematic evaluation of environmental data; (6) no regular follow-up to establish success of mitigation measures.

The major differences in the federal systems investigated are:

1) The level of agency resources expended on compliance monitoring

The lowest agency effort consists of informing local government agencies and interested citizen groups of projects located in their areas via an agency mailing list. Any environmental problems (addressed in the NEPA process or not) are expected to be perceived and reported by these groups to government agencies who will take appropriate action. The highest level of agency effort includes a required 100 on-site visits per year by agency field personnel.

2) Level of perceived federal agency responsibility

Federal agency involvement ranges from assuming all responsibility resides with state or regional offices, to annual federal review of regional compliance monitoring systems (assuming regional review of state systems).

3) Frequency of inspection or review

Frequency of review varies from mandating a required number of on-site visits for every project (often related to project milestones) to the auditing of a sample of selected projects.

4) Level of involvement of "inspector" with monitored project

Level of involvement ranges from having an agency environmental expert, called in only when a problem is perceived, to reliance on an on-site project staff member.

5) Specificity of mitigation measures to be monitored

Mitigation measure descriptions vary from a statement in the EIS that the mitigation of an environmental problem will somehow be addressed to an explicit listing of mitigation measures in the ROD.

6) Level of environmental expertise employed for compliance monitoring

Level of environmental expertise ranges from citizens with no environmental training to environmental staff called in to evaluate potential environment problems discovered by agency field staff.

The state survey was conducted for the purpose of answering the following questions:

- 1) How are state compliance monitoring programs structured?
- 2) What is the role of state permitting agencies in gathering and reporting environmental compliance information?
- 3) Under what conditions is post EIS monitoring conducted by state agencies?
- 4) How is compliance monitoring information documented?
- 5) What is the agency's legal authority in enforcing compliance?

The results of this survey is summarized in Appendix 2.

From review of the selected state environmental agency procedures regarding post EIS monitoring, the following general conclusions can be drawn:

- 1) Most state environmental agencies feel their present NEPA processes require revision to remove deficiencies in the area of post EIS monitoring (some agencies stated they are in the process of such revisions).
- 2) No state environmental agency conducts post EIS monitoring as a matter of policy unless directly required to do so by the EIS or by conditions attached to state permits.
- 3) When permits are required, a separate file is maintained by the issuing agency with no automatic feedback to the lead federal agency.
- 4) Some state environmental agencies, under special conditions, may require regular environmental status reports from facilities, as well as permits.
- 5) Not all permits issued are conditional on on-site inspections.
- 6) Due to state environmental agency routing of state EIS's to concerned divisions during the review process, all permits necessary for a facility should be specified within the state EIS.

**APPENDIX 1**

**Federal Agency Compliance Systems Survey**

Agency: Environmental Protection Agency

System Description: Post EIS monitoring is generally left to the public or "third party". When a project is completed (becomes operational), EPA sends information on the project to interested groups in the area. Any violations may be reported to EPA or other concerned federal agencies for follow-up action.

Construction grants are administered by regional or state environmental agencies through agreements which incorporate monitoring and mitigation measures from Record of Decisions.

Information Service: When funds are applied for, a detailed facility plan is required. Project inspections during the construction phase are expected to discover any discrepancies, structural or environmental. State environmental agencies are expected to bear responsibility for monitoring and enforcement of environmental restrictions. Citizen action groups are also considered an information source of problem areas.

Post EIS Monitoring Schedule: (New Jersey Example) New Jersey requires permitting of sewers or sewer extensions every 2-5 years. This is not necessarily true of other states.

Verification: The federal EPA will audit about 10% of the projects administered by states. An audit may include follow-up on construction reports, or site inspection reports.

Staff Environmental Expertise: Expertise varies widely from state to state.

Legal Requirements: EPA grants are conditional on EIS requirements.

However, once the facility is constructed, EPA no longer has the enforcement incentive of withdrawing funds. The legal enforceability of EPA's authority to restrict development, in sensitive areas on environmental grounds, is currently being tested in Cape May, New Jersey.

Agency: Housing and Urban Development

System Description: It is the responsibility of the HUD project representative to ensure that federal regulations, including environmental, are met.

EIS mitigation measure compliance is required before closing on a project and is part of the contractual agreement. On-site inspections prior to closure are performed by the project evaluation staff in the course of other on-site inspections. Any problem areas are referred to the environmental specialist in the area office who will then make his own inspection.

Information Source: Compliance information comes from two sources, the project evaluator on-site inspections prior to closure, and a document check list compiled for closure consisting of documents provided by contractors, local governments and/or consultants.

Post-EIS Monitoring Schedule: Once a contract is issued there are no regular environmental checks by the agency except as a by-product of project evaluator inspections. No post-closure monitoring of any form is carried out,

Verification: Verification of environmental compliance is provided by contractors, local governments and/or consultants at the time of closure. A follow-up inspection may be carried out by an architectural representative or general project representatives.

Staff Environmental Expertise: The field evaluation staff is not environmentally trained. Each area office has environmental personnel, but because staff size is limited they do not perform regular project checks and only become involved in projects when the project evaluation staff perceive an environmental problem.

Legal Requirements: Mitigation measures required thru the EIS process are incorporated into contractual agreements which must be met prior to closure.

Comments: The nature of projects funded by HUD are not expected to have long range or unpredictable environmental consequences. As such, compliance as a closure requirement is likely to be sufficient.



Agency: Federal Highway Administration

System Description: The Federal Highway Administration delegates full responsibility for post-EIS monitoring to its divisional offices. A management review of regional procedures to determine adequacy of regional monitoring, is conducted annually by the Federal Environmental Quality Division. Most regional offices delegate monitoring responsibility to states and are expected by the federal agency to assess adequacy of state procedures.

Information Source: Projects are reviewed by state or divisional representatives. These same representatives make on-site inspections (including, but not limited to, environmental considerations).

Post-EIS Monitoring Schedule: Major projects are reviewed during construction, all projects are reviewed on completion. In addition, by the nature of FHWA projects, there is a built-in (although not standardized) post-completion monitoring process. Highways must periodically be upgraded (the majority of current projects). Each time a highway is upgraded, the NEPA process is reinvoked.

Verification: After each site visit, the state or divisional representative files a report (including, but not confined to, environmental considerations) with the divisional office. This report becomes part of the project file and is available upon request.

Staff Environmental Expertise: Sample State: Wisconsin

The Dept. of Transportation combines short courses on related environmental issues and impacts for field representatives with a limited staff of environmental experts available for consultation. A detailed manual provides

field representatives with well-defined problem classifications and appropriate follow-up actions.

Legal Requirements: Mitigation measures required through the EIS process are incorporated into contractual agreements (with states or local communities). All permits are handled through divisional offices.

Comments: The nature of projects funded by the FHWA lends itself to well-defined categories for which well-defined and historically verifiable actions can be taken.

Agency: Army Corp of Engineers

System Description: Generally, EIS's are required of Corp projects which involve disposal of dredged materials. The EIS will then contain a definite statement requiring monitoring of quality and quantity of effluents. This requirement is met by the contractor through a local agency using EPA approved labs. Monitoring for hazardous materials during operation is a standard procedure.

When other agencies are involved, periodic liaison (approximately quarterly) between the agencies are maintained. Annual reports are circulated, reviewed, and kept on file.

Information Source: EPA approved lab reports and other agency feedback are the main sources of information.

Post EIS Monitoring Schedule: Projects are constantly reviewed during operation through analysis of disposal materials. The frequency of review is established as needed as part of the project management program. There is no written schedule.

Verification: Verification is in the form of lab reports and project inspection reports (not conducted for environmental compliance purposes) and other agency memos kept in each project file.

Staff Environmental Expertise: Projects are generally reviewed by project engineers not trained in environmental disciplines.

Legal Requirements: Both construction phase and operational phase testing of quality and quantity of effluents are standard contracting procedures for Army Corp of Engineers' projects. Most other EIS mitigation measures are required prior to construction and are contractual.

Comments: Although mitigation measures required by the NEPA process are implemented, no measure of their success is made.

Agency: Department of Interior

System Description: The Department of Interior differs from other federal agencies in that it employs a very large (60,000) on-site field staff. For projects with on-site staff, compliance inspections are essentially continuous. Other projects are regularly inspected by field staff who generate reports. The environmental data and evaluations by field staff are sent to an advisory group drawn from other agencies and the public. Any changes in environmental requirements must be negotiated, usually at the time of contract renewal.

If environmental restrictions fall under other agency jurisdiction, it is assumed that the agency fulfills its responsibility.

Information Source: Information is gathered from technical field inspections which generate reports as completed forms or memos. These reports become part of the project file.

Post EIS Monitoring Schedule: Monitoring schedules vary, depending upon project type. Frequency of inspections can range from 100/year for park lands to 2/year for off-shore drilling, to 1/year for on-shore drilling or mining.

Verification: Verification as forms or memos completed during project inspection are added to the project file.

Staff Environmental Expertise: Environmental expertise is agency and project related.

Legal Requirements: Mitigation and monitoring requirements are incorporated into leasing and contractual agreements. In addition, a blanket clause requiring all necessary permits is included. It is then up to the other party to be sure these are fulfilled. The basic contract can be cancelled at any time if requirements are not met.

Comments: The large field staff makes the Department of Interior situation unique.

**APPENDIX 2**

**State Survey of EIS Compliance Systems**

Agency: California Resource Agency

System Description: The California Resource Agency is concerned with EIS's primarily in the review process. The agency Project Coordinator coordinates state agency reviews and comments.

Permit Jurisdiction: The state of California has developed a Permit Handbook to assist in identifying the relevant agencies and permits required by state government. The Resource Agency has the authority in their EIS process to request special conditions attached to permits. In actual practice, the Resource agency leaves strictly to the agencies who issue permits, the attaching of any appropriate conditions. The rationale being, state and local agencies have the enforcement power and through their normal procedure, in a sense, monitor the facilities.

Post-EIS Monitoring: During the interview it was stated that the weakest link, or possibly the missing link, in the review process is the monitoring of the EIS compliance once a final EIS is approved. If a problem occurs as a result of the project, then the appropriate department would monitor this particular area. The only exception is if there is public concern, then the Resource Agency will monitor the mitigating measure of the EIS. If monitoring of an effluent stream is stipulated in the EIS document by the developer, this does not come directly to the Resource Agency, but is sent to the particular state or local agency of concern.

Verification: All review comments from state and local communities, with a copy of the EIS, are placed in standard files which are maintained at the Resource Agency. Copies of information in the files are available to responsible agencies upon request. Records of the permits remain with the issuing agency. This information is not contained in the manual file of the Resource Agency. However, the local agencies have a procedure to notify the state about permits that have been issued.



Legal Requirements: The California experience has been that the EIS document by itself is not legally binding - it is a public information document or disclosure document. In order to have some legal recourse, there must be some type of commitment by an agency, or a condition on a permit. Contractual stipulations are, however, considered legally binding.

Comments: Currently, EIS review procedures are not entirely adequate to meet new CEQ guidelines, especially in the area of monitoring. Some consideration is now being given to changes designed to meet these new guidelines.

Agency: Illinois, Environmental Protection Agency - Air Pollution Division

System Descriptions: The state of Illinois has structured its review process so that when an EIS is received by the state, it is separated into one of two classes. An EIS that pertains to construction of highways or roads is sent to the Illinois Department of Transportation for initiating the review process. All other EIS's are sent to the Energy Section within the IEPA, Division of Air Pollution Control for coordinating the state agencies' review and comment processes.

Permit Jurisdiction: The state has developed a one-stop permit procedure for EIS's. The Energy section identifies the agency most concerned with the areas significantly impacted, as the lead review agency. Each division specifies the types of permits needed, which are checked against those indicated in the EIS. A new facility under state statute must apply for a construction and operating permit. Each agency sends its comments back to the Energy Section which in practice acts as a focal point or funnel for initiating the review processes and tracking the progress to insure that comments are received in a timely fashion.

The Energy Section leaves it strictly to the various divisions within EPA who issues the permits, to attach any special conditions or stipulations deemed appropriate to the permit.

Post-EIS Monitoring: Post EIS monitoring is only conducted under two conditions: 1) If in issuing the permit there are conditions which require monitoring after completion and during operation of the facility and 2) If the final EIS document stipulates that certain monitoring will be conducted as a condition of the permit. In the first case, this information is sent directly to the agency which issues the permit. Under the second case, the data is

sent by developers of the project to the Energy Section which directs it to the appropriate agency, i.e., if it pertains to water, then the data will be sent to the water division.

Verification: All review comments from state and local communities are placed in a standard file. If the facility is an energy or large facility ("large" is defined as a facility which will produce 100 tons or more of pollutant per year, the same criteria that designates a major stationary source for PSD review), the facility file is maintained by the Energy Section within the Air Pollution Control Division of IEPA. The information is available for review upon request to responsible individuals. Records of the permit are maintained by the issuing agencies and are available upon request in the form of micro-film.

Legal Requirements: To date, Illinois has not been involved in providing input for inclusion in Records of Decision. The state feels that their legal recourse is with the terms and conditions specified in the permits and contractual stipulations.

Comments: The state is in the process of reviewing its current procedures to insure compliance with the new CEQ regulations. Illinois does not have any statutory state requirement for Environmental Impact Statements.

Agency: Minnesota, Environmental Quality Board

System Description: All EIS's received and processed either start (federal EIS) or originate (state EIS) from the EQB. The EQB has a staff of approximately 35, of which one-half are from engineering disciplines. In addition to evaluations conducted by the EQB, each EIS is also reviewed by various agencies within state government. The determination of which agencies will be designated to review and comment on the EIS are those concerned with the areas which in the judgment of EQB personnel are significantly impacted by the project. Minnesota has a comprehensive state statutory EIS requirement.

Permit Jurisdiction: All permit jurisdiction lies within the Minnesota Pollution Control Agency and other state agencies. EQB has the authority to request the Pollution Control Agency to attach special conditions to permits if they feel it necessary. However, in practice this is done by the various reviewing agencies who issue the permits. Minnesota has two types of permits - installation and operating. The rationale for having state agencies issue appropriate conditions to the permit is based on their authority to enforce the conditions of the permit.

Post EIS Monitoring: There is no definite procedure for post-EIS monitoring of federally funded projects. The state agency's power to enforce the conditions of the installation and operating permits, in a sense, monitors the facility. However, under the statutory authority (Minnesota Pollution Control Agency Rule APC-3) the permittee can be required, when requested by the agency, to submit such information and reports citing progress and problems occurring in the installation and operation of a facility. This progress report, if required, is usually submitted on a quarterly basis.

Verification: EQB involvement consists of initiating the review process, conducting public hearings on permits when necessary and selection of and distribution to various agencies of the EIS document for comment. These comments are assembled by EQB and sent to the originator or lead agency sponsoring the EIS. In the case of a federally initiated EIS, no attempt is made to identify which permits are required, i.e., they rely on the EIS document to specify the permits that are required by state and local authorities. A project file is maintained by EQB and information in the file is retrievable upon request by responsible agencies.

Legal Requirement: The state feels that the EIS document in itself is not legally binding. However, the standard conditions for installation and operation are legally binding, in addition to any contractual arrangements made in approving and funding the construction of the facility.

Comments: EQB is currently revising their procedures and guidelines for the state EIS process along the lines required by the July, 1979 CEQ Regulation. These revised procedures and guidelines will also apply to federally initiated EIS's. These new guidelines will incorporate a requirement for attaching to the FEIS a Record of Decision.

Agency: Colorado Department of Health

System Description: Colorado is one of the few remaining states to have Environmental Protection functions in the State Health Department. EIS review procedures originate with the state's clearinghouse. The clearinghouse uses basically the OMB A-95 review procedures. Copies of the EIS are sent to appropriate agencies for review and comment. Within the Department of Health, a coordinator of all EIS's sends the document to the appropriate division within the Health Department. If a major project ("major" is defined the same as in PSD regulations 100 tons pollutant/year) then the Health Department assigns a lead agency to coordinate the review. This determination of a lead agency is based on which impacts will significantly affect the environment.

Permit Jurisdiction: Permit jurisdiction lies with state and local agencies. The State of Colorado has a two-step permit system. An engineering review is conducted of the permit application and upon their preliminary approval a draft permit is issued. The draft permit is sent for comment to the EPA by the applicant and a public notice is issued. If during a 30 day comment period there are no adverse comments on the draft permit, a permit is issued. If there are adverse comments, a special hearing is held to resolve objections and usually special conditions are attached to the permit. This applies to all major projects whether or not an EIS is required.

Post EIS Monitoring: There is no post-EIS monitoring by the state, except that which is specified in the EIS document. The only additional so-called monitoring of a new facility is that which is routinely carried out by permit division inspectors. This is usually an annual inspection unless a problem arises or public concern is expressed.

Verification: All review comments from state and local agencies are placed in a file and are maintained by the state's clearinghouse. Copies are sent to the preparer of the EIS. The data and information, as a result of the review process, is retrievable upon request from responsible agencies.

Legal Requirements: The state considers the EIS document as not legally binding. The Colorado Department of Health regards as the only basis for litigation an environmental impact greater than state statutes or permit conditions.

Comment: The State of Colorado does not have a state EIS requirement.

Agency: New York State Environmental Conservation Department

System Description: The F.E.I.S. review process is initiated by the New York State Department of Environmental Conservation. The Department has approximately nine regional offices throughout the state and the review process is coordinated by the regional office in which the proposed new facility is to be located. Notice that an EIS review has been completed is filed with the New York Tri-state Regional Planning Commission, the Environmental Notice Bulletin, and the State Clearinghouse. New York State has a state EIS requirement. A Federal EIS can also serve to fulfill the state statutory EIS requirement.

Permit Jurisdiction: The Department of Environmental Conservation has a two tier permit system. Construction permits are issued for the initial phase. Following facility completion, testing is conducted to determine if all regulations and standards are met before a Certificate of Operation is issued. During the EIS review process each reviewing agency can attach special conditions to the permit if in their view it is necessary. A special condition could mean monitoring requirements in addition to those stipulated in the EIS. Each reviewing agency will prepare comments and findings which will become part of a computer file.

Post EIS Monitoring: There are only two circumstances under which post EIS monitoring is conducted, when post monitoring is specified in the F.E.I.S. and special monitoring conditions have been attached to the permits during the review process. However, as a normal practice there is no set procedure for monitoring an EIS designated facility. Some agencies with the Department of Environmental Conservation require, as a result of the permit procedures, on-site visits to facilities after the construction phase, to evaluate compliance



with all state regulations and standards. Although performed routinely, normal inspecting practice does not include environmental impact monitoring of facilities requiring an EIS.

Verification: All comments from state and local agencies are reviewed and placed in a file which is maintained by the central office of the Department of Environmental Conservation. The coordinator at the central office will condense these comments for the project computer file. Information from the computerized file is available to responsible agencies. Records of permits are also made a part of the computerized file. Enforcement of permit conditions remains with each of the agencies within the Department. (Chapter VI General Regulations, Part 621, statutory authority, uniform procedures, Environmental Conservation Law).

Legal Requirements: The state believes that statements or commitments made in the EIS document can be used as a basis for litigation. This is subject to some interpretation. Upon further discussion with the state, the legal requirements from an EIS are as a result of permit conditions and requirements or a contractual arrangement that is part of the funding requirement with the developer of the facilities. In a specific case in New York the lower court ruled, that due to a deficiency in an EIS document for a local municipality approved plan (Pyramided Mall Case) zoning change, to rescind zoning approval because of an EIS facility description deficiency.

Comments: The State of New York has a statutory EIS requirement. It has been the practice in the State that a Federal EIS can serve as a state EIS with some additional information that is specifically required by state statute.

**CHAPTER 3**

**EIS Information Analysis**

## Introduction

The objective of this section of the report is to examine present environmental impact statements with respect to how monitoring and mitigation measures are reported in them. The successful design of a DOE compliance monitoring system will depend upon the ability of DOE staff or their consultants to convert the information contained within the EIS regarding mitigation measures into a compliance monitoring plan. The examination of three EIS's in detail and a number of others to a lesser extent was made by the ESCOR project team in order to answer the following questions:

- 1) What information regarding proposed mitigation measures is necessary to support a DOE compliance monitoring program?
- 2) Is this information available in the Environmental Impact Statements in sufficient detail?
- 3) How can this information be abstracted from an Environmental Impact Statement in order to form the basis of a DOE compliance monitoring plan for a given project?

The remainder of this chapter will examine these questions.

In discussing these questions, however, it should be stressed that the Environmental Impact Statements examined in this project were not developed by groups that had any clear idea of what constitutes "adequate" compliance monitoring of mitigation measures, or what the dimensions of a compliance monitoring plan might be. Thus, the problems in using EIS's to develop DOE monitoring plans may not be as formidable in the future as would be the case for the EIS's examined. The development of compliance monitoring plans should be facilitated as EIS writers become more sensitive to compliance monitoring requirements.

## Desired EIS Monitoring Information

In order for the information from Environmental Impact Statements to be useful in developing a compliance monitoring plan, four types of information were identified which would have to be gathered from examination of the Environmental Impact Statement:

### 1) A description of the DOE project

This description would include the nature of the project, the type and duration of DOE support or involvement in it, the DOE project officer, major milestones, and relevant contractors.

### 2) Environmental Impacts to be Monitored

The description of environmental impacts would include the nature of the projected impacts, how such impacts were evaluated in the Environmental Impact Statements, the sources of information on potential impacts, the types of mitigation measures proposed within the environmental impact statement, the expected duration of the environmental impacts (e.g., during construction phase, or in operation), the contractors involved in the mitigation measures, what results may occur from the failure to mitigate environmental effects, e.g., delay of construction, closure of plant, citizen's suits.

### 3) Environmental Impact Statement Monitoring Plan

The contractor's monitoring plan, developed for the Environmental Impact Statement, should be described with respect to what environmental monitoring is proposed, who will carry it out, in what form the monitoring data will be available, who will have access to such data, frequency of monitoring, what levels of monitored pollutants or effects will trigger actions by the contractor, or relevant state or local agencies.

#### 4) The DOE Compliance Monitoring Plan

The DOE compliance monitoring plan would be developed in response to the information presented in points 1, 2 and 3 above. The description of the plan would include the DOE proposed auditing actions, coordination efforts with relevant local or state environmental officials, the parameters to be monitored, triggering criteria for DOE action, timetable of monitoring actions and reference to legal authorization, either regulatory or contractual, by which DOE can assure compliance.

Further specification of these broad categories of desired information must be made in final DOE compliance monitoring design in order to provide a means of developing an EIS compliance monitoring file. Two characteristics of the EIS compliance monitoring file content and organization should be stressed. The DOE compliance monitoring program, due to the length of time involved in the monitoring program for a specific EIS project, may have a number of DOE project monitoring officers. Thus, the compliance monitoring project file must be self-contained so that extensive background material does not have to be re-read or re-analyzed. Secondly, the timetable of commitments and reporting must be clearly defined so that the replacement of a project officer does not reduce DOE's compliance monitoring effectiveness.

In order to establish the difficulties that might be encountered in the conversion of an EIS into a DOE compliance monitoring file, ESCOR created a preliminary sample form to record information pertinent to the development of a compliance monitoring plan. Major headings of the sample form are shown in Figure 1 with a brief explanation of the information desired. The next step in the analysis was to attempt to fill out Exhibit 1 using sample EIS's as a method of simulating the procedure which DOE staff would undertake in the actual compliance monitoring program.

## IMPACT AND MITIGATION ASSESSMENT

Nature of Impact - brief description of category of impact (air, water, land), geographic location, extent, severity and potential damage.

Information sources on Impact - how was assessment of impact made, what information sources were used, how precise are the estimates and what monitoring was done.

Mitigation measures in EIS - what mitigation measures were proposed, what is the expected effectiveness of the measure, what is the timetable to implement the measure, who is responsible for carrying out the measure.

Monitoring mitigation measure - what monitoring of mitigation measure is proposed in the EIS, who will do such monitoring, how often will each monitoring occur, what parameters will be monitored (including environmental monitoring).

Monitoring information - what information and data will be available from monitoring program, what form is the data in, what is distribution of this data.

Contractor responsible for monitoring -

Relevant local regulatory authority - what local regulatory authorities are responsible for monitoring the impact.

Consequence of failure of mitigation measure - what actions would result from failure of the mitigation measure (e.g., stopping the project, requiring additional pollution control), what would trigger remedial actions (e.g., failure to receive operating permit).

IMPACT AND MITIGATION ASSESSMENT, cont'd.

DOE-NEPA Monitoring Plan - what monitoring actions should DOE-NEPA take, timetable of actions, parameters to be monitored, legal or contractual authority to require mitigation measure compliance, report generation, compliance triggering criteria.

DOE-NEPA project officer:

## Sample EIS Monitoring Plan Information Analysis

The Environmental Impact Statements relating to the Rocky Flats Weapons Development site, the Baca Geothermal plant and Petroleum Production Naval Base No. 1, were analyzed with regard to the description of environmental impacts and proposed mitigation measures for these impacts. ESCOR personnel attempted to fill out the information sheet presented in Figure 1 for each project, based only on the information within the EIS's. In some cases, guesses were made regarding certain pieces of information (e.g., who carried out the environmental analysis), when it was thought that DOE-NEPA would have such information even though the information was not available from the EIS.

The results of this analysis are presented in Appendices 3, 4 and 5. Examination of other EIS's indicated that the three cases examined were "typical", at least in the sense that they bracketed the range of quality of information presented on the mitigation measures and their compliance monitoring.

Based on the results of this effort, the following observations are relevant to the informational problems encountered in the preliminary monitoring design program:

- 1) The Environmental Impact Statements are much more specific in describing environmental impacts than in describing mitigation measures or compliance monitoring. This imbalance of presentation was expected since these Environmental Impact Statements were developed before any real emphasis on compliance monitoring existed. Where compliance monitoring isn't mentioned, very little detail was given. Typically, an environmental impact is described and a statement of intention to monitor the problems involved with such an impact is made.
- 2) Information on local regulatory agencies who might be involved in monitoring mitigation measures is sometimes mentioned, but correlation of monitoring responsibility with such agencies is made in a haphazard fashion. No clear picture emerges as to how such groups may monitor mitigation measures, e.g., what kind of surveillance is normally undertaken by such agencies with regard to each mitigation measure.



A number of mitigation measures do not seem to fall under any regulatory authority so that compliance is largely left up to the contractor.

- 3) The description of what data is generated by contractors as part of their environmental monitoring program is very sketchy. The type and distribution of such data is sometimes described but not consistently throughout the Environmental Impact Statements. No clear picture emerges, regarding the post-operational monitoring data information flow for many of the environmental impacts and mitigation measures discussed.
- 4) The reliability of environmental quality forecasts and the projected effectiveness of mitigation measures are frequently difficult to ascertain from the EIS. This difficulty, in turn, leads to a problem in determining how close the environmental quality parameter in question is to some critical value, above which some action should be taken, e.g., how much land disturbance is acceptable before additional mitigation measures should be required.
- 5) It is extremely difficult to determine from the EIS what were the implications of a failure of a mitigation measure, e.g., would citizen opposition, or local permit be denied because of either a failure to implement a mitigation action or the failure of the mitigation action to be effective.

The focus of the design problem for DOE-NEPA, discussed here, is how much effort should be put into improving the information in the areas cited above. Without any information in these areas, it will be difficult to develop a credible compliance plan for an EIS. In addition, it would be difficult for a DOE-NEPA project officer to allocate DOE monitoring resources among EIS projects because the relative degree of need for compliance monitoring from one project to another cannot be determined.

### Recommendations

Based on ESCOR's analysis of the EIS information on mitigation measures, the following preliminary recommendations can be made:

- 1) In order to ease the problems faced by DOE-NEPA staff in obtaining the necessary information from EIS's, additional guideline material should be developed for the DOE-NEPA compliance guideline book. These guidelines should include what information is desired by DOE in the areas of the information deficiencies listed above. Whether the employment of a specific form, such as the one developed for use in the ESCOR report, should be required will, in part, depend upon the final design of the DOE-NEPA program.
- 2) A sample of a "proper" compliance monitoring information file, based upon a DOE-EIS project, should be developed as soon as possible. A sample of an adequate compliance monitoring information file would aid both EIS writers and DOE monitoring reviewers in understanding the information needs of the compliance monitoring system.

APPENDIX 3

ROCKY FLATS EIS ANALYSIS

Rocky Flats Plant Site

Nature of Project: Used for production of components for nuclear weapons.

DOE Contract Number and Date: FRDA 1545-D/Apr. 1980 EIS.

Contractors: EIS contractor names not available in EIS

Contract Div. Officer: Lynda Brothers

Major Project Milestones: This project relates to facility already in operation

DOE Project Monitoring Officer:

DOE-NEPA Review Officer:

## Radioactivity in Water

### Nature of Impact

Plutonium, americium, tritium concentration measured in drinking water supply reservoir. Normal operation of the plant results in unavoidable, small discharge of non-radioactive and radioactive effluent to the general environment. Efforts to control such releases have resulted in normal plant operations which lead to no significant impact on the environment. Spills or accidents might result in discharges.

### Information on Impacts

There are monthly effluent and environmental monitoring reports. Environment is sampled for chemical and biological pollutants. Water is sampled on the plant site and throughout the surrounding region including the water supply reservoir.

In addition to the monitoring done by DOE plant operators, several federal, state, and local agencies conduct additional surveys on and off the plant site.

An analytical quality control program conducted by Rocky Flats Laboratory checks on the quality of the monitoring data.

Contractor that Analyzed Impact: N/A

### Mitigation Measures in EIS

Process water is routinely recycled and returned to the environment via evaporation. A plan for total water recycle was to be operational in late 1980. This will eliminate all routine waste water discharges except through evaporation.

## Radioactivity in Water

### Sheet 2

There are also mitigation actions for upgrading of filtration systems, double containment of process liquid waste lines, etc.

#### Monitoring Mitigation Measures

DOE - Rocky Flats is responsible for carrying out these mitigation measures all of which are to be in operation in 1981.

The continued monitoring will indicate the effectiveness of these mitigation measures.

#### Monitoring Information

Monitoring is done daily and monthly and annual reports are presented. Data are provided to DOE Rocky Flats Officer, Colorado Department of Health, Region VIII USEPA, County Health Department, interested city and community officials.

#### Contractor Responsible for Monitoring

DOE - Rocky Flats is responsible for monitoring.

#### Relevant Local Regulatory Authority

Those that receive monitoring reports.

#### Impact of Failure of Mitigation Efforts

These measures are improvements over current pollution control operations. Failure would return concentrations to earlier levels. It is not clear if return to earlier levels would result in regulatory action. Possible citizen opposition to facility could result from failure to implement actions.

#### DOE-NEPA Monitoring Plan

## Sanitary Waste

### Nature of Impact

Sanitary waste water is treated by an on-site tertiary treatment facility subject to Permit. Effluents from treatment plant flow into holding ponds which are monitored regularly. Ditches, culverts and underground pipes collect and control surface water runoff which is monitored daily as it enters drainage.

### Information Sources

The Jefferson County Health Department samples and analyses sewage plant effluent monthly. USEPA provides additional routine monitoring.

### Contractor that Analyzed Impact

### Mitigation Measure

A plan expected to be in operation in late 1980 will eliminate all waste water discharges to Great Western reservoir.

A surface water control project designed to contain contaminants during storm runoff is under way. To be operational in 1981.

### Monitoring Mitigation Measures

DOE - Rocky Flats will carry out monitoring of mitigation measures.

Sanitary Waste

Sheet 2

Monitoring Information

Monitoring is done daily and monthly and annual reports are presented. Data is provided to Rocky Flats Office, Colorado Department of Public Health, Region VIII USEPA, County Health Department, interested city and community officials.

Contractor responsible for monitoring

DOE - Rocky Flats is legally responsible for carrying out monitoring.

Relevant local regulatory authority - those that receive monitoring reports.

Impact of failure of mitigation measures - constitutes violation of water discharge permits and might result in state regulatory action.

DOE - NEPA Monitoring Plan



## Radioactivity and Other Pollutants in Air

### Nature of Impact

Concentrations at plant perimeter are important. Included are plutonium, CO, NO<sub>2</sub>, O<sub>3</sub>. Radioactivity carried from plant site in air-borne particulates is also of concern.

### Information Sources on Impact

Particulate samples collected from air samplers operated continuously at plant perimeter and in nine communities located near plant. Check with DOE Radioactivity Concentration Guides and EPA proposed guidelines for plutonium.

Monitor ambient air for selected nonradioactive pollutants. Use a self-contained mobile van. Monthly data collected on CO, NO<sub>2</sub>, O<sub>3</sub>. Check with NAAQS.

Air borne dust from radioactive material storage piles on-site and dose assessment 50 miles around plant were made in 1979.

Contractor that Analyzed Impact - DOE - Rocky Flats

### Mitigation Measures in EIS

Air pollutants not considered dangerous on basis of 70 year doses. No mitigation measures except for gradual removal of waste piles.

### Monitoring Mitigation Measures and Monitoring Information

Monthly monitoring reports by Rocky Flats and others. See Water impact.

Contractor Responsible for Monitoring - DOE - Rocky Flats

Radioactivity and Other Pollutants in Air  
Sheet 2

Relevant Local Regulatory Authority

Agencies receiving monthly reports. See Water impact.

Impact of Failure of Mitigation

Continued, almost imperceptible doses from air-borne radioactive particulates, if waste piles are not removed.

## Transportation Accidents

### Nature of Impact

Danger of locally high level of radioactivity from transport accidents. Shipping primarily by truck.

Information Sources on Impact - DOT accident reports

Contractor that Analyzed Impact - DOE - Rocky Flats

Mitigation Measure - Conformance with DOT packaging requirements.

Monitoring Mitigation Measure

Monitoring Information

Accident reports - Since 1952 shipments covered 4,000,000 miles with no accident that released radioactive material.

Contractor Responsible for Monitoring - DOT

Relevant Local Regulatory Authority

Impact of Failure of Mitigation Measure

Release of radioactivity and investigation by DOT

APPENDIX 4

Naval Reserve No. 1 EIS Analysis

Petroleum Production Naval Reserve No. 1

Project Description

Expansion of reserve for the storage of 50 million barrels of oil at Naval Reserve No. 1 as a strategic reserve.

DOE contract/date - FEA-FES 76/2 (DOE/EIS-0034) Jan. 1979

EIS contractors - not available in EIS

Major project milestones

Acquisition of additional storage facilities

Procurement of additional oil

Development of oil transport plans

Transport and storage operations

DOE project officer:

DOE - NEPA Review Officer:

## Disturbance of Land

### Nature of Impacts

During construction in the areas of sparse vegetation there will be gullying which removes top soil and deposits it in stream bottoms.

Removal and destruction of vegetation and habitat during construction will take place. Two rare species of cotton may be destroyed.

Vegetation will be reduced in an area where food is the limiting factor in wildlife habitat.

During construction, traffic volume on local roads will increase resulting in impaired flow. Local impact is expected to be severe. Planned truck volume during this period will destroy local roads.

Any spills would harm the vegetation and wildlife.

### Information Sources on Impact

EIS contractor estimates - Estimate of reduction in vegetation is said to be beyond the scope of the EIS study.

### Contractor that Analyzed Impact

Unknown if other than EIS contractor

### Mitigation Measures in EIS

Existing pipelines are to be repaired, replaced, and enlarged to lessen chances of a spill from a ruptured pipe. Dykes are to be constructed to contain spills. Railroad tracks are to be improved

## Disturbance of Land

### Sheet 2

prior to extensive use to lessen chances of spills from railroad accidents. A spill prevention program in compliance with EPA requirements was being developed when the EIS was written.

A plan to restore vegetation is included in the EIS. The extent to which this will restore habitat is questionable.

A mitigation plan to combat fugitive dust is included.

All major project facilities are to be surrounded by berms to contain runoff water

After drilling, the land is to be reconstructed to the original topography.

#### Monitoring Mitigation Measures

The principles of the "Kern County Land Use Elements" document are to be met by construction plans and monitored by county representatives.

DOE is to have gathered field data on endangered species and to monitor them in an attempt to meet the requirements of the U.S. Fish and Wildlife Service of the Department of Interior.

The project is to adhere to the "Master Wildlife Management Plan". DOE was to develop a mitigation plan with monitoring.

#### Monitoring Information

No statements on monitoring information are available in the EIS.

Disturbance of Land

Sheet 3

Contractor Responsible for Monitoring

Little information - assume it's the plant operator.

Relevant Local Regulatory Authority

Kern County Land Use Agency

U.S. Fish and Wildlife Service of Department of Interior.

Impact of Failure of Mitigation Scheme

Removal of excessive top soil and deposit of top soil in stream bottoms.

Failure to prevent or contain an oil spill may forever ruin vegetation and habitat.

Failure of revegetation and contouring effort will result in permanent scarred terrain and loss of animal habitat. Authority of local agency to delay project or bring action is not evident in EIS if mitigation measures fail.



## Subsidence

### Nature of Impact

During normal operation there is danger of surface subsidence related to withdrawal of liquids and gases from beneath the surface.

### Information Sources on Impact

Predictions of the amount of subsidence that could occur during operation are to be made periodically by operator.

### Information Sources on Impact

Unknown if other than EIS contractor.

### Mitigation Measures in EIS

Adequate reservoir pressure is to be maintained via development of a water injection system.

### Monitoring Mitigation Measure

A surface leveling net is to be extended across the site to tie into subsidence survey station on the California Aqueduct.

### Monitoring Information

No statements on monitoring information availability are in EIS.

### Contractor Responsible for Monitoring

No information

### Relevant Local Authority

No specific authority is mentioned that monitors subsidence on California Aqueduct.

### Impact of Failure of Mitigation Scheme

Subsidence of plant site, possible rupture of pipelines etc. If subsidence occurs, significant potential for citizen damage suits exists

## Water

### Nature of Impacts

Normal operation and maintenance of project facilities require substantial quantities of water.

During construction, the wastewater disposal system will be overtaxed.

Wastewater will be injected back into oil zones in the pressure maintenance program.

### Information Sources on Impact

No information available.

### Contractor that Analyzed Impact

Contractor who constructed EIS.

### Mitigation Measures

Fresh water supplies and the pumping capacity of the West Kern County Water District are adequate to handle the universal demands of the project.

Most process wastewater will be injected back into the oil zones as part of the pressure maintenance program.

There must also be additional evaporation ponds and septic systems.

### Monitoring Mitigation Measures

No monitoring description in EIS.

### Monitoring Information

No description in EIS

Water  
Sheet 2

Contractor Responsible for Monitoring  
Operator of Plant.

Relevant Local Regulatory Authority

Kern County water supply authority not specifically identified.

Impact of Failure of Mitigation Measure

Need to increase local water supply capacity.

## Air Pollutants

### Nature of Impact

During construction some additional air pollution is expected from land clearing, diesel engine emissions, and increased emissions from auto and truck traffic. There will also be increased noise levels.

During normal operation, additional HC, NO<sub>x</sub>, CO, SO<sub>2</sub>, and particulates will be emitted. NO<sub>x</sub> emissions will significantly increase, primarily from natural gas combustion at compressors and process heaters and the emission will be a significant increase to air basin. CO emissions also increase from some sources but are not expected to be significant. Small increases in SO<sub>2</sub> and particulates are also expected.

During construction fugitive dust is expected to be a major problem.

Compressor stations may leak gas and carbon exposure may be increased.

### Information Sources on Impact

No monitoring indicated for NO<sub>x</sub> or HC.

Compressor Stations are to be equipped with monitors for gas leaks and programmed to shut down if a leak occurs. The danger from carbon radioactivity is to be carefully posted and exposure base lines established at each plant.

### Contractor that Analyzed Impact

Unknown if other than EIS contractor

### Mitigation Measures in EIS

Compressor stations are equipped with detectors.

Air Pollution

Sheet 2

CO, particulates, SO<sub>2</sub> effluent levels are considered too low to warrant any mitigation measure.

Mitigation measures to combat fugitive dust are mentioned in EIS.

Monitoring Mitigation Measures

New sources of air pollution are subject to New Source Review of FEPA and local Kern County APCD levels. The project overall must show a net reduction in HC to get a new source permit.

Contractor Responsible for Monitoring

Unknown if not plant operator

Relevant Local Regulatory Authority

Kern County air pollution officials.

Impact of Failure of Mitigation Measures

Excessive HC and NO<sub>x</sub> may lead to excessive photochemical oxidants. This could lead to permit difficulties with Kern County environmental authorities.

Failure at compressor stations could lead to excessive carbon and danger to operators.

APPENDIX 5

BACA EIS Analysis

## Ecological

### Nature of Impact

- (i) Disturbance of Winter Elk Range
- (ii) Loss of habitat for Jemez Mountain Salamander
- (iii) Potential effects on rare plant species

### Information Sources on Impact

(i) Five baseline studies were made 1974-1978. Information is in EIS and is available as indicated on page 11-9. Studies were performed or contracted for by plant operators.

### Contractor that Analyzed Impact

EIS contractor

### Mitigation Measures

- (i) Increased erosion during construction mitigated through use of accepted construction practices
- (ii) All roads and well pads will be dyked and runoff will be diverted to settling ponds before discharge to surface drainage
- (iii) All disturbed areas will be revegetated with native species as soon as possible
- (iv) High elk use areas are to be avoided
- (v) Dense population area of Jemez Mountain Salamander will be avoided. Where this is impossible, salamanders will be moved
- (vi) A mitigation plan for minimization of historic and archaeological sites involving a survey by the Office of Contract Archaeology, Dept. of Anthropology, Univ. of N.M. has been approved.
- (vii) With respect to Indian religious sites and ceremonies DOE is to follow a 4 step plan (11-3) which involves consultation

Ecological  
Sheet 2

with Indian leaders on siting of wells, plant, powerlines, roads, etc.

(viii) Transmission line route will avoid elk and salamander areas. A screen of vegetation will be maintained between lines and public use areas to minimize visual impact.

Monitoring Mitigation Measures

(i) A detailed plan for environmental monitoring during plant construction and operation to measure impacts associated with the proposed project is in preparation by the commercial partners. Much of the plan is yet (at time of EIS) to be formulated by DOE.

(ii) Fine baseline or preoperational studies were made 1974-1978. These included vegetational surveys, sampling of small mammal populations, bird transit surveys, elk pellet group transit counts, and general observation of large mammals. Further, detailed surveys of rare and endangered species were made.

(iii) The pre-operational surveys are to be continued during operation over the five year period of DOE involvement in the project.

(iv) Roadside census will be conducted seasonally along all roads in three habitat types.

(v) Small mammal live trapping will be conducted seasonally in each of 3 habitat types near the well plant site.

(vi) Elk and deer pellet transit plots will be established throughout the region. Major elk migration tracks and watering areas will be identified and monitored.



(vii) Two days will be spent each year traversing the project area searching for signs of large mammals and reptiles.

(viii) During optimum periods (cool wet Spring and Summer Days), two to four days/year will be spent searching for the Jemez Mountain Salamander to promote information on its range and general abundance in the area.

(ix) Field observers will record sight of Peregrine Falcons

(x) With continuous monitoring any modification of the ecosystem in the project area will become evident.

(xi) Recreational use in the area is available in the form of visitor-day data collected by National Park Service and/or State Highway Commission.

(xii) The New Mexico Dept. of Game and Fish annually measures the elk level.

(xiii) Right of way permits for road, transmission lines, and pipelines must be obtained from U.S. Forest Dept. They require that the right of way avoid Indian ceremonial areas, habitat, and historic sites "whenever possible".

(xiv) Traffic during construction must pass through Indian areas. Fatalities are a problem. A count could be used to monitor.

(xv) A plan for close communication with Indian leaders is included in the EIS. Reports from Indian groups serve as a monitoring device.

#### Monitoring Information

For kind of information - see above. There is no indication of the form a report on monitoring will take nor is it clear to whom it will be available.

Ecological  
Sheet 4

Contractor Responsible for Monitoring

Primarily DOE. To lesser extent, commercial partners. In some cases, local agencies (see above).

Relevant Local Authority

U.S. Forest Dept.

State Highway Commission

New Mexico Dept. of Game and Fish

National Park Service

DOE

Impact of Failure of Mitigation Plan

- (i) Loss of endangered species (salamander)
- (ii) Loss of elk
- (iii) Dissatisfied Indian Community
- (iv) Reduction in recreational area

## Water

### Nature of Impact

- (i) Increased stream sedimentation and possible damage to trout fishing may result from construction activities
- (ii) Plant requires increased water supply which is in scarce supply for irrigation
- (iii) Geothermal fluid withdrawal will reduce the flow in the Jemez River

### Information Sources on Impact

See Monitoring Section.

### Contractor that Analyzed Impact

EIS contractor

### Mitigation Measures in EIS

- (i) 14 acres of land will be removed from irrigation over the 30 year life of the plant to make up for plant use.
- (ii) Accidental release of geothermal fluids and a spill mitigation and prevention plan is on file with the State of New Mexico.
- (iii) Fluids will neither be withdrawn from nor injected into shallow aquifers which will be protected from infiltration by the use of impermeable pits to contain vented or drilling fluids.

### Monitoring Mitigation Measures

- (i) Preoperational monitoring includes a physical description of Redondo, Sulfur, and San Antonio Creeks; sampling and taxonomic description of the algal community at 18 stations in Redondo and

Sulfur Creeks; sampling and qualitative description of the macroinvertebrate benthic community at 25 stations in the 3 creeks.

(ii) Discharges of the 3 creeks and the East Fork of the Jemez River were monitored for one year.

(iii) A preoperational groundwater monitoring program will be administered by the commercial partners. There are to be three data collections per calendar year.

(iv) During operation there will be collection and species identification of aquatic macrophyter at each sampling station.

(v) During operation there will be sampling and generic identification of the more abundant perphyton at each site

(vi) During operation there will be sampling and qualitative description of macroinvertebrate benthos at each site.

(vii) During operation there will be qualitative descriptions of the fish community at each station

(viii) Surface water quality will be monitored during construction and operation and samples analyzed for health or environmental significance, including: water velocity, dissolved  $O_2$ , free  $CO_2$ , carbonate alkalinity, conductivity, temperature, turbidity, suspended solids, dissolved solids, pH, total nitrogen and total phosphorous.

(ix) Groundwater monitoring will be continued by commercial partners designed to detect spring and stream flow depletion.

(x) Fish and Game Department of New Mexico monitor trout catch in the Jemez River and San Antonio Creek.

Water  
Sheet 3

(xi) Fish and Game Department of New Mexico also checks stream flow and H<sub>2</sub>O quality.

(xii) Permits from the Office of the State Engineer must be obtained for water use and to retire irrigated land. The Office of the State Engineer also monitors stream flow in the Jemez River.

(xiii) Rate of discharge and sedimentation of the Jemez River is monitored at Battleship Rock by the U.S. Geological Survey.

(xiv) Water quality data on Sulfur and Redondo Creeks are obtained by the U.S. Forest Service.

(xv) U.S. Forest Service permits for roads and power lines are intended to control run off and in turn limit sedimentation.

Monitoring Information

The kinds of information are described above. There is no indication of the form a report on monitoring will take, nor is it clear to whom it will be available.

Contractor Responsible for Monitoring

Primarily, responsibility resides with DOE, to a lesser extent, the commercial partners, and in some cases, local agencies (see above).

Relevant Local Authority

U.S. Forest Department

U.S. Geological Survey

Office of State Engineer

Fish and Game Department of New Mexico

DOE

Water  
Sheet 4

Impact of Failure of Mitigation Measures

- (i) Lack of water for irrigation in region
- (ii) Loss of flow in Jemez River resulting in sedimentation and loss of fishing.
- (iii) Disruption of Indian wells

**CHAPTER 4**

**Enforcement Mechanisms**

## Introduction

The EIS information needs discussed in the previous chapter are related to the choice of enforcement mechanisms that DOE-NEPA selects in its monitoring program. If, for example, enforcement of mitigation measures is left to local regulatory groups, then identification of such groups by DOE-NEPA would become an important component of the EIS information base.

In this chapter, the focus is shifted from information design questions to the choice of enforcement mechanism. The need for the examination of enforcement mechanisms in the monitoring design study underscores the significance, from a legal standpoint, of the CEQ Regulation monitoring guidelines. The Regulation, in essence, alters the EIS from having a purely informational purpose to giving it a partially enforceable status. The extent of this alteration will depend on what further interpretations CEQ makes of the Regulation.

While the required degree of legal enforceability of mitigation measures via the EIS is still in question, there is little doubt as to the need to develop some form of mitigation monitoring plan for all EIS projects. This monitoring requirement is binding on the Department of Energy by virtue of 42 CFR-1505.3 which says in part, "Mitigation.....and other considerations established in the Environmental Impact Statement, or during its review and committed as part of the decision, shall be implemented by the lead agency ....." (emphasis added). While monitoring appears to be required only in "important" cases, this section appears to require the execution of a mitigation plan in all cases. (See also - 1505.2 (C) for similar language).

This section of the report will examine some of the enforcement problems which DOE will have to answer before the DOE-NEPA monitoring system can be established. The following sections will discuss:



- . What factors should be considered in judging alternative enforcement mechanisms.
- . What alternative enforcement mechanisms should be considered.
- . What future issues need to be resolved.

### Factors in Evaluating Enforcement Mechanisms

The choice of methods in assuring mitigation measure implementation will depend upon the ability of the enforcement system to fill a number of goals:

1) Compliance with CEQ guidelines.

Does the enforcement program comply with the requirement of 42 CFR-1500 et Seq.? Although the ability to meet CEQ requirements is a critical issue, as noted in Chapter 2, the ambiguity evidenced by CEQ regarding what constitutes sufficient enforcement or monitoring makes the operational use of this criteria for judging legal mechanisms difficult.

2) Resource Requirements.

Will the enforcement program require significant expenditures of resources by DOE? Resource requirements could be categorized in terms of initial efforts to develop an enforceable monitoring program (e.g., writing performance specifications for a contract regarding the implementation of mitigation measures) vs long run resource requirements of the enforcement mechanism (e.g., litigation actions resulting from failure to perform).

3) Project Delay

Could the enforcement program cause significant delays in DOE projects? Such delays could occur either because of the administrative delays of the program itself or because the enforcement mechanism has a high potential for inducing lengthy litigation.

4) New DOE Authority

Does the assurance mechanism require DOE to seek and secure new authority to act, such as regulatory authority or additional contracting capability?

5) Need for Cooperation

How much cooperation from contractors and federal, state or local agencies is required for the enforcement mechanism to be implemented and to operate?

6) Administratability

Can the program be effectively administered by DOE staff? For example, if the enforcement program does provoke a significant amount of litigation, DOE may be in a position of having to implement an unwieldy program largely consisting of court-ordered activities.

7) Efficacy

To what extent does the program usefully result in mitigation of environmental impacts from DOE sponsored projects. Also, does the mechanism allow DOE to force a contractor to comply with the EIS or ROD mitigation conditions? In other words, can DOE obtain "specific performance" - that is, can the DOE, through its enforcement mechanism, require that a specific mitigation measure be carried out, or alternatively, does DOE only have the right to sue for damages of some sort if the mitigation measure is not carried out? Obviously, the attainment of specific performance rather than damages should be the goal of the enforcement mechanism.

## 8) DOE Liability

Does the assurance mechanism expose DOE to ancillary liability?  
What is the likelihood of attack of the enforcement program from members of the public and the potential of involving both DOE and the project contractor in citizen suits?

## 9) Flexibility

Is the program flexible enough to handle a) existing vs new projects; b) important vs nonimportant projects; c) clear and complex cases; d) cases involving both willful and accidental delays in contractor compliance with mitigation measures?

### Range of Enforcement Mechanisms

In deciding on a mitigation assurance program, DOE should consider a range of mechanisms. The following options illustrate such a range and some of the parameters which might accompany each alternative:

- 1) Reliance on federal, state or local EPA regulatory authority. Reliance on federal, local or state environmental regulatory authority for the enforcement of mitigation measures, represents the most passive approach DOE could take to the enforcement problem. A program could be established by DOE which would set out requirements for contractor reporting to DOE relating to the implementation of mitigation measures which are relevant to local or state environmental regulations. The contractor would possibly submit progress reports on the mitigation measure implementation and continued DOE funding of the project could be conditioned upon the preparation of these reports. The reports could then be forwarded to relevant local, state or

federal enforcement agencies. The system of reports would constitute, in effect, an augmented surveillance program to existing environmental regulatory groups. No change in DOE enforcement capabilities or contractual arrangements with DOE contractors would be required. The major problem in this approach relates to whether all mitigation measures would be covered by federal, local or state regulatory agencies.

2) Incorporation of the Record of Decision into DOE Contracts

Conditions or mitigation objectives from the record of decision could be incorporated by an amendment into the original agreement between DOE and the DOE project contractors. In effect, this would make the record of decision binding on the project contractor. The major problem in this approach is that the language of the record of decision does not always easily lend itself to the inclusion (by reference) in an enforceable contractual framework. Records of decisions are not presently written with contractual binding performance specifications. Furthermore, inclusion of the record of decision by reference into existing contracts could put DOE in the position of being liable for forecasts DOE makes as part of the EIS review process. If such forecasts are not correct and the ROD is part of a contractual arrangement, DOE might find itself in a difficult position, e.g., acceptable future environmental quality could be dependent upon both successful mitigation measures by the contractor and upon the forecasted background pollution concentrations made by DOE. If future pollution concentrations are greater than those predicted, it will be

possible for both DOE and the contractor to be liable. (DOE is, of course, liable in any case as the lead agency.)

### 3) Extra Grant Conditions

Beyond the use of the record of decision, DOE could negotiate mitigation procedures with the contractor and include them as conditions within the DOE grant to the contractor. - 1505.3 states this as an explicit option. This approach would allow conversion of the intent of the record of decision into a possibly enforceable contractual agreement. A problem here is that the basic DOE contract may be let before the record of decision exists. In that case, what mechanism is available to force the contractor to agree to amendments to the original contract when the amendments are based upon a subsequent record of decision?

One possible approach would be to include a "conditions subsequent" clause in the original DOE project contract. Such a provision would, in effect, nullify the basic contract, unless the contractor and DOE agreed upon amendments to the original contract which related to the implementation of environmental mitigation measures. The major difficulty with the use of the conditions subsequent approach is the "blank check" aspect to it. The contractor may be quite hesitant to invest money in, say, a geothermal plant with partial DOE funding without knowing exactly what mitigation measures are going to become contractual obligations. This risk can be reduced by putting restrictions on the feasible range of "conditions subsequent" to the original DOE contract, e.g., such conditions will relate only to the implementation of mitigation measures which

would not exceed, reasonable available control technology as defined by the federal EPA. Alternatively, DOE can share some of the financial risk of unexpected high cost due to the implementation of mitigation measures which are eventually defined in the record of decision.

4) Special Contractual Agreements

The DOE could enter into a separate mitigation contract or agreement with the contractor. Such agreement could provide for liquidated damages, specific performance, performance binding or other equitable relief beyond what is traditionally included in project grant contracts. The major difficulty with this approach is that it is difficult to define what consideration DOE is providing in this contract. In the original contract for the project for, say, the construction of a geothermal plant, federal monies are exchanged for the construction of the plant. Under a separate and subsequent contract for mitigation measures, the contractor is providing the mitigation measure services, but what is the DOE providing? One approach to this problem is to separate some of the funding from the original DOE project contract and use the separated funds specifically for a mitigation measure contract. If the funding of environmental control measures is separable from the overall project, this funding could then be tied to implementation of mitigation measures.

5) Regulatory Approach

DOE could secure the authority to establish a regulatory program by which the agency could enforce mitigation conditions in the record of decision or require a "mitigation assurance permit" prior to the commencement of the project. This approach represents the most active (and probably least politically attractive)

enforcement mechanism. Its major advantage is that the enforcement power would be geared specifically to the monitoring problem now confronting DOE.

6) Hybrid

DOE could combine some of the parameters from each of the 5 mechanisms listed above into a combined or hybrid program. The exact choice of mechanisms would depend upon the significance of the project, resource constraints, the nature of DOE's participation, and the financial support of the project by DOE.

Additional Issues

Deciding upon any of the above assurance mechanisms, DOE should also consider four additional issues which need to be resolved, regardless of the program chosen:

- 1) Contractor reluctance - all of the mitigation assurance programs are likely to meet with some contractor reluctance. Guidelines explaining the program to potential contractors is indicated. The potential follow-up enforcement measures by DOE must be firmly established and thoroughly communicated for the monitoring program to be creditable.
- 2) Insurance Difficulties - any assurance mechanism is likely to add some uncertainty to defining liability of the contractor. This will make securing insurance for projects possibly more difficult and/or expensive. Keeping the potential liability of the contractor as clearly stated as possible, will minimize this impact (possibly through performance bonding or liquidated damages).
- 3) Implications for EIS Program - the CEQ guidelines could represent a major alteration in the use and effectiveness of the EIS process. In effect, the assurance mechanism could for the first time make statements of an EIS enforceable in court. It is likely that the

Introduction of the EIS monitoring process will alter procedures and requirements in the initial EIS review process, and possibly in the contracting arrangements for the project itself. The implication that, for example, records of decision may serve as a basis of contractual documents may require a much greater care in selecting the exact wording of such documents in the EIS review and comment stages.

4) No Precedent

It is very difficult to give a strong opinion on the legal ramifications of the alterations of the EIS program in general because so much of what might be developed could be challenged and such challenges would amount to cases of first instance in the courts. It is impossible, therefore, to offer a reliable prediction of the outcome of such challenges.

Recommendations

ESCOR recommends employing a two-tier system of enforcement. The basic mechanism should be reliance on existing federal, state and local authority. This approach will result in a minimum of resources expended, minimize DOE liability, and is administratively the most efficient system. Our opinion is that it should be adequate in the vast majority of cases. The approach does require increasing the available information on relevant state and local environmental enforcement groups and increasing the level of liaison with such groups and DOE-NEPA. No new authority would be required under this system. Possible shortcomings of this approach are related to the areas of CEQ compliance and efficacy. If the mitigation measures do not fall under any present state, federal or local group's jurisdiction, the efficacy of the program is, of course, impaired. Likewise, if the mitigation measures



call for controls more stringent than federal or state environmental regulations (as was required in a number of cases in the EIS's examined in Chapter 3), reliance on local, state or federal regulations is again ineffective. The potential for such problems to occur, however, is far outweighed by the simplicity and efficiency of the local, state and federal regulatory approach.

It is possible that in a few cases federal EPA or local regulatory authority may be insufficient for DOE compliance monitoring needs. These situations could occur if the size of the project is significant, if the impacts occur in non-criteria pollutants, and/or if public scrutiny or opposition to the project is potentially high. (The religious conflict in the Baca case mentioned in Chapter 3 is an example). Due to such cases, one of the other enforcement techniques mentioned in this chapter may be required.

The use of the record of decision by reference within existing contracts is not recommended by ESCOR for reasons cited earlier. The ROD is simply not a precise enough document for obtaining the type of specific performance that DOE would want to require and this option is not acceptable in terms of increasing DOE liability. The creation of an entirely new regulatory permit system for what should prove to be a relatively few cases does not seem appropriate or necessary. These objections leave the two contractual alternatives - the use of amendments in the original project grant, or the creation of a separate contract regarding mitigation measures.

The amendments to the original grant (using the mechanism of specifying conditions subsequent if necessary) would seem to allow for the administratively most feasible approach. This technique would not require as great an intrusion by DOE-NEPA at the time of the original contract negotiations, as would the negotiation of a separate contract involving only mitigation measures. DOE would not have to structure separate funding streams for the basic construction project and for the execution of mitigation measures. ESCOR recommends that procedural guidelines be developed for the use of this mechanism, but with the clear understanding that such a contractual approach would be used very rarely.

**CHAPTER 5**

**Administrative Practice**

## DOE Administrative Structure and Practices

The last area of investigation in this project is concerned with the administrative changes DOE-NEPA should make in order to accommodate compliance monitoring requirements. Initial efforts were directed toward defining present DOE-NEPA administrative practices. To that end, ESCOR staff examined the DOE Environmental Compliance Guide to determine at what points in the DOE-NEPA process the NEPA Affairs Division is involved. Some of these points of interaction in the NEPA process can potentially be used by the NEPA Affairs Division to develop with DOE contractors or other DOE branches, the post-EIS monitoring plans and reporting requirements.

Exhibit 2 is a summary of the relevant stages and authorized NEPA Affairs Division actions in the review process as it is presently defined. The stages which could be utilized to influence mitigation measure compliance or reporting are:

- . Conducting scoping meetings and reviewing comments.
- . Evaluating EIS implementation plans.
- . Aiding in analysis of DEIS requirements.
- . Reviewing DEIS for document adequacy.
- . Reviewing and resolving General Counsel comments.

If strong reliance is to be placed on local, state and federal environmental agencies for enforcement of mitigation measures, the DOE monitoring plan may be developed at a later stage in the process, say, near the review of

DESIGNATED PARTICIPATION OF THE NEPA AFFAIRS DIVISION IN THE NEPA COMPLIANCE PROCESS

Stage in NEPA Process

NEPA Affairs Division Authorized Action

1) Evaluation of Action Significance

- Identification of action as potentially requiring an EIS.

- Review action and determine level of documentation required.
- Log in action on DOE tracking system

2) Initiation of EIS Preparation

- Designation of Lead Agency
- Scoping

- Coordination with other concerned agencies
- With Responsible Supervisory Official, conduct scoping meetings
- With Responsible Supervisory Official, review and evaluate scoping comments

- Implementation Plan Review

- Evaluate implementation plan for approval
- Coordinate implementation plan review including consultation with General Counsel

3) Preparation of DEIS

- Analysis of DEIS Requirements
- Internal Review of DEIS

- May be asked to aid responsible supervisory official
- Review and coordinate other DOE office reviews to determine document adequacy
- Provide comments to responsible supervisory official
- Prepare approval memo for Assistant Secretary for Environment
- Transmit Memo to General Counsel to initiate formal consultation

DESIGNATED PARTICIPATION OF THE NEPA AFFAIRS DIVISION IN THE NEPA COMPLIANCE PROCESS

Page 2

Stage in NEPA Process

NEPA Affairs Division Authorized Action

4) DEIS Approval

- DEIS Distribution
- Public Review of DEIS

- Review General Counsel comments and resolve any differences
- Transmit concurrence to Assistant Secretary for Environment

5) Preparation of FEIS

- Analysis of FEIS Requirements
- Internal Review of FEIS

- Initiate distribution of DEIS
- With responsible supervisory official, review public hearing comments
- May be asked to aid responsible supervisory official
- Review and coordinate other DOE office reviews to determine document adequacy
- Provide comments to responsible supervisory official
- Prepare approval memo for Assistant Secretary for Environment
- Transmit Memo to General Counsel to initiate formal consultation
- Review General Counsel comments and resolve any differences
- Transmit concurrence to Assistant Secretary for Environment

DESIGNATED PARTICIPATION OF THE NEPA AFFAIRS DIVISION IN THE NEPA COMPLIANCE PROCESS

Page 3

Stage in NEPA Process

-Public Review of FEIS

6) NEPA Follow-up

-Review Implementation

NEPA Affairs Division Authorized Action

-With responsible supervisory official, review public hearing comments

-Determine adequacy of implementation with EIS commitments

-Consult with responsible supervisory official any inadequacies

document adequacy or analysis of DEIS requirements. If contractual amendments to the original grant are contemplated as the enforcement mechanism, the monitoring compliance plan development should probably be initiated at an earlier stage. The specification of information to be gathered by DOE-EIS contractors should be part of the DOE-NEPA procedural guidelines in any case, so that its availability to DOE-NEPA is assured at whichever stage the monitoring compliance plan is developed.

The relationship of these stages to the letting of the basic DOE grant is relevant to the administrative design problem. The basic contract is normally signed prior to the initiation of the NEPA process, but DOE participation in the project is contingent on an authorization to begin construction. This authorization must follow successful completion of the NEPA process and specification of the mitigation measures in the ROD. Thus, in effect, the use of conditions subsequent clause is already employed in the DOE contracting process. Therefore, expansion of these conditions to require adoption of subsequent contractual amendments to the original grant to mandate periodic progress reports on implementation of mitigation measures would seem feasible.

#### Recommendations

Having examined other Federal agency compliance monitoring systems, EIS information content on mitigation measures, alternative enforcement mechanisms, and present DOE-NEPA administrative practices, ESCOR recommends the adoption of a system loosely based on the Federal EPA approach. The characteristics of this system are represented here for easy reference as Exhibit 3.



Agency: Environmental Protection Agency

System Description: Post EIS monitoring is generally left to the public or "third party". When a project is completed (becomes operational), EPA sends information on the project to interested groups in the area. Any violations may be reported to EPA or other concerned federal agencies for follow-up action.

Construction grants are administered by regional or state environmental agencies through agreements which incorporate monitoring and mitigation measures from Record of Decisions.

Information Service: When funds are applied for, a detailed facility plan is required. Project inspections during the construction phase are expected to discover any discrepancies, structural or environmental. State environmental agencies are expected to bear responsibility for monitoring and enforcement of environmental restrictions. Citizen action groups are also considered an information source of problem areas.

Post EIS Monitoring Schedule: (New Jersey Example) New Jersey requires permitting of sewers or sewer extensions every 2-5 years. This is not necessarily true of other states.

Verification: The federal EPA will audit about 10% of the projects administered by states. An audit may include follow-up on construction reports, or site inspection reports.

Staff Environmental Expertise: Expertise varies widely from state to state.

Legal Requirements: EPA grants are conditional on EIS requirements. However, once the facility is constructed, EPA no longer has the enforcement incentive of withdrawing funds. The legal enforceability of EPA's authority to restrict development in sensitive areas on environmental grounds is currently being tested in Cape May, New Jersey.

The basic rationale for adoption of this approach is that the EPA system is the one that has a post-operational monitoring component that relies most heavily on information dissemination and local regulatory efforts to assure compliance. The HUD system does not monitor projects at all after construction. The Department of Interior, Corps of Engineers and Highway Administration do post operational monitoring but such monitoring seems to require more extensive resources than the EPA approach. These systems also employ contractual obligations more extensively than the EPA system. Furthermore, the nature of the relationship between DOE and a DOE funded energy facility seems to resemble EPA's situation more closely than the other agencies. Strong regulatory controls, continued ownership of the facility or periodic reassessment of a project give these other agencies stronger long-term control over their projects than DOE has over its projects. DOE, like EPA, essentially turns many of its projects over to others for ownership and operation after construction is completed.

The final reason for adoption of a modified EPA approach is linked to ambiguity of the guidelines and CEQ's present interpretation of them. The need to set up more stringent monitoring based on contractual obligations and frequent on-site inspections is lacking.

The modifications to the EPA system that ESCOR recommends relate to providing more structuring of the information flows with respect to the frequency and content of mitigation measure compliance reporting. Secondly, a possible strengthening or formalizing of relationships between DOE-NEPA and local and state environmental agencies with regard to information on mitigation compliance may be desirable. The characteristics of a DOE-NEPA system incorporating these changes is shown in Exhibit 4.

## Proposed DOE-NEPA System

System Description: Pre-operational monitoring of mitigation compliance is accomplished through DOE contract project officers. A checklist may be provided to such officers by DOE-NEPA to aid in their inspections.

Post EIS compliance monitoring takes place by three mechanisms:

- 1) Periodic contractor compliance status reporting to DOE-NEPA
- 2) Dissemination of compliance reports to relevant federal, state and local environmental agencies having permit authority
- 3) In rare cases, DOE staff project site visits to verify compliance with a contractual obligation regarding a mitigation measure

Information System: Structure of post-EIS reporting is developed by DOE-NEPA staff or their consultants around the stage of reviewing of DEIS by DOE-NEPA.

Post-EIS Monitoring Schedule: Schedule of compliance monitoring is set out in post-EIS reporting requirements document.

Verification: Verification of reporting accuracy is left largely to local regulatory groups except where contractual obligations to DOE are involved.

Staff Environmental Expertise: Pre-operational compliance monitoring depends upon DOE contract officers without significant environmental expertise. In case of difficulty, DOE-NEPA consultants or staff are available. Post operational compliance monitoring relies upon local environmental agency personnel with environmental expertise.

Legal Requirements: Legal requirements are mostly based upon federal, state and local regulatory authority.

ADDENDUM

PRELIMINARY EVALUATION OF DOE-NEPA  
MONITORING SYSTEM

Prepared for  
Department of Energy  
NEPA Affairs Division

by  
ESCOR, INC.  
Northfield, Illinois  
May 19, 1981

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RECOMMENDED COMPLIANCE MONITORING SYSTEM FOR "IMPORTANT" EIS'S

ESCOR recommends the following steps in an environmental compliance monitoring system for important EIS's:

- 1) During review of FEIS, DOE/NEPA staff will designate projects as "important" cases if they meet some established guidelines (size of project is significant, impacts occur on non-criteria pollutants, etc.). Determination of important cases would be the prerogative of DOE/NEPA.
- 2) Recommendations for contract inclusions regarding project environmental monitoring are currently made by the DOE program office. Prior to contracting projects which have been designated as important cases, these recommendations will be reviewed by DOE/NEPA for environmental mitigation and monitoring adequacy.
- 3) Based on operations office recommendations, DOE/NEPA formulates a compliance plan and prepares a post-EIS reporting requirements document.
- 4) The post-EIS reporting requirements document is recommended to the DOE program office and incorporated into project contracts.
- 5) Status reports from on-site investigations are included in an environmental project file maintained and reviewed by DOE/NEPA for the life of the project.

- 6) Any perceived problems raised by the post-EIS compliance reports are referred to the program offices and contracting officer for enforcement action.

In certain cases, DOE/NEPA may wish to take a more active role. This can be done in a number of ways:

- 1) DOE/NEPA may wish to originate some recommendations for contract inclusion rather than just reviewing DOE operation office recommendations;
- 2) DOE/NEPA may, in extreme cases, wish to schedule some inspection of project compliance itself;
- 3) DOE/NEPA may wish to take a more active role in assuring the resolution of compliance problems rather than just referring them to the DOE contracting officer.

The proposed system should be able to accommodate these alterations. The safety compliance program could follow a similar procedure for "important cases".

After re-evaluation by ESCOR's environmental attorney, we are still of the opinion that there is a legal requirement to implement some form of monitoring for every project. We, therefore, would still recommend the adoption of a "passive" system (described in Chapter V of our project report) for cases not designated by DOE/NEPA as "important". The characteristics of such a system are reproduced here for convenience.



## PROPOSED GENERAL DOE/NEPA COMPLIANCE MONITORING SYSTEM

System Description: Pre-operational monitoring of mitigation compliance is accomplished through DOE contract project officers. A checklist may be provided to such officers by DOE/NEPA to aid in their inspections.

Post-EIS compliance monitoring takes place by three mechanisms:

- 1) Periodic contractor compliance status reporting to DOE/NEPA;
- 2) Dissemination of compliance reports to relevant federal, state and local environmental agencies having permit authority;
- 3) In rare cases, DOE staff perform site visits to verify compliance with a contractual obligation regarding a mitigation measure.

Information System: Structure of post-EIS reporting is developed by DOE/NEPA staff or their consultants around the stage of reviewing of FEIS by DOE/NEPA.

Post-EIS Monitoring Schedule: Schedule of compliance monitoring is set out in post-EIS reporting requirements document.

Verification: Verification of reporting accuracy is left largely to local regulatory groups except where contractual obligations to DOE are involved.

Staff Environmental Expertise: Post-operational compliance monitoring depends upon DOE contract officers without significant environmental expertise. In case of difficulty, DOE/NEPA consultants or staff are available. Post operational compliance monitoring relies upon local environmental agency personnel with environmental expertise.

Legal Requirements: Legal requirements are mostly based upon federal, state and local regulatory authority.

## DOE's Legal Authority for Environmental Monitoring

The following section was developed by Mr. Swartzman, our environmental attorney, after reviewing the National Environmental Policy Act (1969), the Council on Environmental Quality Regulations (1978), appropriate passages from Public Law 95-91 and the recent DOE directive 5440.1A.

From what source does DOE derive its legal authority to require or provide environmental monitoring?

I reviewed the National Environmental Policy Act of 1969, specifically looking for language which authorized or required the Department of Energy to include mitigating enforcement mechanisms in their programs. It is my opinion that this is not included in the Environmental Policy Act, that in fact, NEPA is designed to effect the decision-making process of federal agencies, but not to have a further programmatic impact on the activities of the agencies. However, the Council on Environmental Quality Requirements (dated November 29, 1978) I feel takes a significant step beyond the spirit and the letter of NEPA. The regulations, in fact, do make a number of statements which very strongly require that the results of environmental impact statements be acted upon and not just be taken into account in the decision-making process. For instance, Regulation 1500.1C states that the purpose of NEPA is not to produce paper but to produce action - "The NEPA process is intended to help public officials . . . take actions that protect, restore, and enhance the environment". Regulation 1500.6 states that federal agencies, including DOE, are to view the Act as supplementary to the powers given to them under

other laws and that they should comply with NEPA and with these regulations which I am citing, unless specifically prohibited from doing so by other laws. In Section 1500.3 it is stated that the mandate of this Act is "applicable to and binding on all federal agencies", which implies, or more than implies - it actually states that DOE will have to comply with the sections of these regulations. Specifically, Regulation 1505.3 requires the agencies to monitor the work after an EIS is prepared in all important cases and says that the agency may monitor in other cases, but that mitigation shall be implemented in all cases. Especially, I would refer the reader to some of the other language under that section which states that the agency shall include conditions of mitigations in any contracts, grants or programs, and secondly, that the agency shall condition funding of actions on that mitigation. I think that clearly states that DOE will have to comply. In addition, Regulation 1507.1 states that all agencies of the federal government shall comply with these regulations. So, it appears that even though NEPA itself does not, in my opinion, require some of these actions, CEQ's interpretation of NEPA and the regulations that they promulgated under NEPA do, in fact, require this.

How is environmental monitoring authority delegated within DOE?

As far as internal authorization to do mitigation monitoring enforcement, I would refer the reader to DOE Order DOE 5440.1A, dated October 20, 1980; and in that document I will make two references. Point 5B5 sets out certain responsibilities of the Assistant Secretary for Environment and that Secretary's

NEPA Affairs Division. This section states that the Director of that division shall "track environmental impacts and issues relating to actions subject to National Environmental Policy Act review, and assure the implementation of practical, substantive, environmental mitigating measures into Department of Energy programs" (emphasis is Mr. Swartzman's). In addition, Section 5C9 and 10 require the "various responsible supervisory officials" to make clear what mitigating measures they are committed to implement and to monitor and prepare, where appropriate, periodic reports on the status of this implementation. It appears that those two sections taken together give internal authority to DOE officials to monitor the progress of mitigating measures and then gives the responsibility, as well as the authority, to the NEPA Affairs Division to actually take action to assure that the mitigation measures are implemented. There is no discussion of this in DOE's regulations dated March 28, 1980 and which appear at 45 Federal Register 20694. This is DOE's submission entitled "Compliance with the National Environmental Policy Act in Response to CEQ's Regulations". These regulations by DOE are silent as to the issue of monitoring and mitigation enforcement. Given the internal memo I referred to earlier, which is dated subsequent to this regulation, I think you could read the silence in the Federal Register publication as not being prohibiting of mitigation enforcement actions, but merely that DOE had not at that time made a decision as to what they were going to do.

Are we aware of any limits on DOE's monitoring authority?

There are two potential limits on DOE's activities in implementing the CEQ regulations. One is the act that set up the agency which is the

Department of Energy Organization Act 42 US C 7112. A cursory review of portions of that Act indicated nothing specific prohibiting the Department of Energy from implementing the mitigation measures required by CEQ. As I pointed out above, that's the one time in which the Department of Energy would not have to mitigate or take mitigation actions, if they were specifically prohibited from doing so. The second area that might limit them is case law. However, to my knowledge, no case law has been generated on this and a cursory review of the Act does not indicate any conflicting language. It appears that the agency can, in fact, go ahead and implement CEQ's regulations. However, a definitive opinion on that would have to wait a thorough review of the case law and of that Act.

So, in conclusion, I would say that although I think that much of what CEQ is requiring the agencies and DOE to do is on a tenuous basis when it comes to the Environmental Policy Act itself, it is clear that the regulations as they exist today give a strong mandate to the Department of Energy that they shall monitor and shall take action to make sure that mitigation is accomplished.

## Use of the Record of Decision and Safety Analysis Reporting System for Implementing Post-EIS Monitoring

### Can Record of Decisions be used as a mechanism to implement the monitoring system?

Conditions or mitigation objectives from the Record of Decision could be incorporated by an amendment into the original agreement between DOE and the DOE project contractors. In effect, this would make the Record of Decision binding on the project contractor. The major problem in this approach is that the language of the Record of Decision does not always lend itself easily to the inclusion (by reference) in an enforceable contractual framework. Records of Decision are not presently written with contractual binding performance specifications. Furthermore, inclusion of the Record of Decision by reference into existing contracts could put DOE in the position of being liable for forecasts DOE makes as part of the EIS review process. If such forecasts are not correct and the ROD is part of a contractual arrangement, DOE might find itself in a difficult position, e.g., acceptable future environmental quality could be dependent upon both successful mitigation measures by the contractor and upon the forecasted background pollution concentrations made by DOE. If future pollution concentrations are greater than those predicted, it will be possible for both DOE and the contractor to be liable. (DOE is, of course, liable in any case as the lead agency.)

### Can the SARS Guidelines be used as a mechanism for implementing post-EIS monitoring?

The SARS Guidelines, like the NEPA Regulation, are devoted to devising a method of identifying potential hazards and identifying measures which

would reduce these hazards. In regard to monitoring, the SARS Guidelines offer the following:

"Plans for safety audits, reviews, and surveillance activities for the facility or operation should be described. These descriptions should reference the frequency and type of surveillance activity to be conducted as well as the credentials of the performing personnel."

Thus, SARS does not constitute a compliance monitoring system in any sense but is only useful in identifying hazards and requiring safety monitoring plans. Its applicability as a mechanism to implement the NEPA monitoring function is therefore limited.

Can the environmental and safety monitoring programs be combined?

ESCOR recommends merging the environmental and safety monitoring into a combined system. Including the post-SARS compliance monitoring program with the post-EIS environmental compliance monitoring program will eliminate redundancy of effort and in some cases reduce the required resources for both goals. (A common information file can be used, as well as common on-site visits when appropriate.) A combined program has the added advantage of accumulating in one office all project monitoring information.



An Example of a Generic Geothermal Monitoring Plan (based on the  
Baca EIS and formatted as the sample plan provided to Eric Zimmerman)

Introduction

Geothermal resource development may cause various environmental impacts. These impacts result from drilling and construction operations, and from the withdrawal, processing and disposal of large volumes of geothermal fluids.

This Generic Monitoring Plan encompasses the key environmental issues which are associated with geothermal energy recovery and which require monitoring. These issues are summarized under the following headings:

- . atmospheric
- . geological
- . hydrologic
- . ecological
- . process

The composition and geological setting of geothermal fluids varies from region to region. A specific environmental monitoring plan based on this generic plan may require monitoring for additional, or only some of, the various parameters which are presented in the generic plan. However, any formulation of a monitoring plan for a geothermal facility will require an assessment of the following:

- . baseline air quality
- . baseline meteorology
- . characterization of the geothermal source
  - geology
  - chemistry

- . terrestrial ecology
- . aquatic ecology
- . surface and subsurface water hydrology
- . surface and subsurface water quality
- . geothermal recovery processes

Environmental monitoring must be carried out to demonstrate that the geothermal recovery facilities are being constructed and operated in compliance with environmental standards and regulations. Environmental standards and other requirements for construction and operation include consideration of occupational safety and health, air quality, water quality, solid and hazardous waste disposal, spill prevention and cleanup, noise, endangered species, proper management of flood plains and wetlands, and preservation of national historic landmarks.

#### Overview of Monitoring Plans

Environmental monitoring is divided into two phases: pre-operational and operational. The pre-operational phase encompasses that period of time up to the start of construction and consists of baseline data collection. The operational phase of monitoring encompasses construction, well site testing, plant startup and plant operation. The purpose of the operational monitoring program is to detect any significant deviations from the baseline data:

- . which indicate that the recovery facility is not operating properly;
- . which constitute a harmful effect on the environment; or
- . which are in excess of applicable air quality and emission standards.

Table 1 presents a summary of the generic monitoring requirements of a geothermal energy recovery facility according to category (i.e., atmospheric, hydrologic, etc.) and operational phase. A discussion of the generic parameters which need to be monitored for each category is presented in the following sections.

Table 1

SUMMARY OF GENERIC MONITORING REQUIREMENTS FOR  
GEOHERMAL RESOURCE DEVELOPMENT

<u>Type of Monitoring</u>	<u>Phase</u>	<u>Generic Requirements</u>	<u>Baca Specifications</u>
ATMOSPHERIC	Pre-operational	<ul style="list-style-type: none"> <li>. Air quality baseline data.</li> <li>. Meteorological baseline data.</li> </ul>	<p>H<sub>2</sub>S concentrations in the area of the geothermal wells and in the general project area. Sampling: 50 stations over 50 days in general area, 24 stations over 11 months near wells. Wind speed and direction at 4 locations in general area; and temperature, humidity and precipitation at project site.</p>
	Operational	<ul style="list-style-type: none"> <li>. Continued air quality and meteorological monitoring (as necessary on a site-specific basis).</li> </ul>	<p>4 sites - at plant and 3 mobile stations. Will monitor: wind speed and direction, temperature, humidity, solar radiation, precipitation, TSP, H<sub>2</sub>S (see Baca EIS pages 11-15 for details).</p>
GEOLOGICAL	Pre-operational	<ul style="list-style-type: none"> <li>. Baseline data on natural subsidence and seismicity of project area.</li> </ul>	<p>None specified.</p>
	Operational	<ul style="list-style-type: none"> <li>. Detection of any induced subsidence or seismicity.</li> </ul>	<p>Regional seismicity grid in area.</p>

Table 1 (continued)

Type of Monitoring	Phase	Generic Requirements	Baca Specifications
HYDROLOGIC	Pre-operational	<ul style="list-style-type: none"> <li>. Baseline data collection of surface water data: flow rates, levels, quality.</li> <li>. Subsurface water data: groundwater levels, quality.</li> </ul>	<p>1 year discharge data collection from Redondo, Sulphur and San Antonio Creeks. In addition, 2 years of water quality from creeks and springs (see Table 3.3, Baca EIS). Additional data to be collected 3 times per year (see pages 11-10, 11).</p>
	Operational	<ul style="list-style-type: none"> <li>. Continue monitoring of surface water quality to detect environmental impacts.</li> <li>. Continue monitoring of subsurface water to detect any impacts (groundwater levels and quality) due to geothermal fluid withdrawal and reinjection.</li> </ul>	<p>7 surface water sites selected to monitor parameters considered to have health or environmental significance (specific parameters to be determined). Initial sampling frequency is once monthly, and to be reduced when baseline data is complete (see page 11-14, Baca EIS). Subsurface water monitoring schedule designed to detect spring and stream flow depletion in project area.</p>
ECOLOGICAL	Pre-operational	<ul style="list-style-type: none"> <li>. Baseline data on flora and fauna surveys (vegetation, wildlife, birds).</li> </ul>	<p>Vegetation surveys, small mammal surveys, bird transect surveys, rare and endangered species - Jemez salamander, elk pellet group transect counts, winter large mammal survey.</p>
	Operational	<ul style="list-style-type: none"> <li>. Continue gathering baseline data where necessary.</li> <li>. Monitor (regularly) for any baseline variations and any impacts caused by facility.</li> </ul>	<p>Avian monitoring, mammalian monitoring, faunal monitoring, salamander monitoring, peregrine monitoring, biotic summary. See pages 11, 12, 13 in Baca EIS for description.</p>

Table 1 (continued)

<u>Type of Monitoring</u>	<u>Phase</u>	<u>Generic Requirements</u>	<u>Baca Specifications</u>
ECOLOGICAL (continued)			
Aquatic	Pre-operational	<ul style="list-style-type: none"> <li>. Watershed survey.</li> <li>. Aquatic community surveys (algal, benthic, invertebrates, fish, etc.).</li> </ul>	<p>Physical description of Redondo, Sulphur and San Antonio Creeks. Sampling and taxonomic description of algal community (18 stations), macroinvertebrate survey (25 stations) (see page 11-9, Baca EIS).</p>
	Operational	<ul style="list-style-type: none"> <li>. Continued monitoring of aquatic communities on a regular basis.</li> </ul>	<p>Periphyton sampling and generic identification, macroinvertebrate benthos sampling, qualitative description of fish community (all at each site), stream substrate diversity (see page 11-13, Baca EIS).</p>
PROCESS	Pre-operational	<ul style="list-style-type: none"> <li>. Noise.</li> <li>. Geothermal fluids.</li> </ul>	<p>Mitigation measures developed (p. 11-5). Not specified.</p>
	Operational	<ul style="list-style-type: none"> <li>. Noise.</li> <li>. Geothermal fluid characterization.</li> <li>. Leachates.</li> <li>. Verify performance of mitigation and control techniques.</li> </ul>	<p>Mitigation measures developed (p. 11-5). Initial analysis only.  Not specified.</p>

## ATMOSPHERIC MONITORING

### Objective

The purposes of an atmospheric monitoring program include:

- . establishment of the baseline air quality;
- . establishment of the baseline meteorology;
- . characterization of the atmospheric transport properties of the area; and
- . detection of any significant impact on atmospheric quality during operation.

### Plan

Geothermal energy recovery may release a variety of gaseous substances to the atmosphere. The principal gas of concern is hydrogen sulfide. However, other gaseous species, such as residual methane, ammonia, carbon dioxide, heavy hydrocarbons, boron, mercury, and radon, should also be monitored if they are present in the geothermal fluid. The atmospheric monitoring program is designed to detect whether any of these substances are native to the area where the project is being developed, and to detect, once the project is in operation, any significant impacts on the atmospheric quality of the area.

Table 2 presents the basic atmospheric and meteorological parameters which may need to be monitored. Pre-operational atmospheric monitoring consists of obtaining baseline data on the air quality and the meteorology of the area. The primary air quality parameters to be monitored are: H<sub>2</sub>S, B, SO<sub>2</sub>, O<sub>3</sub>, NO, NO<sub>x</sub>, CO<sub>2</sub>, Hg, NH<sub>3</sub>, Rn, As, and TSP. This list contains most of the gaseous substances which may be released into the atmosphere due to

geothermal resource development. The list of parameters will need to be adjusted to site-specific conditions (e.g., baseline air quality, additional process emissions).

The primary meteorological parameters which need to be monitored are wind speed and direction, precipitation, relative humidity, atmospheric pressure, temperature, and solar radiation. These parameters should be monitored on a continuous basis and atmospheric stability calculated as-needed for individual projects.

Operational phase atmospheric monitoring is an extension of the baseline monitoring of air quality and meteorology. In addition, emissions from various streams (i.e., drilling, construction, plant operation, water tower cooling, etc.) need to be monitored. These process streams are discussed under the section for process monitoring.

If the geothermal fluid contains significant quantities of mercury, ammonia, radon, arsenic, or boron, then monitoring of the air-borne concentrations of these constituents will be required. In addition, meteorological conditions at various elevations in the proximity of the geothermal plant and wells must be monitored to detect any significant impacts.



Table 2

ATMOSPHERIC MONITORING

- Air Quality, Meteorological and Noise -

<u>Parameter</u>	<u>Frequency</u>	<u>Location</u>
H <sub>2</sub> O, SO <sub>2</sub> , O <sub>3</sub> , NO, NO <sub>x</sub> , CO <sub>2</sub> and TSP B, NH <sub>3</sub> , As, Rn, Hg (Others as necessary)	Prior to operation: At EPA recommended intervals to set up baseline information.  During operation: At regular intervals (probably same as baseline frequency) determined by responsible agency.	At well sites and recovery facility (throughout program site).
Wind speed Wind direction Precipitation Relative humidity Atmospheric pressure Temperature Solar radiation	Continuously Continuously Continuously Continuously Continuously Continuously Continuously	At all selected meteorological stations (1 fixed site, and additional mobile stations as necessary).

## GEOLOGICAL MONITORING

### Objective

The objectives of the Geological Monitoring Program are:

- . to determine the baseline subsidence and seismicity of the area prior to geothermal fluid withdrawal; and
- . to determine if the production and reinjection of geothermal fluids has induced additional subsidence or seismicity.

### Plan

The development of the geothermal resource for energy recovery will require the subsurface withdrawal, reinjection or disposal of massive volumes of geothermal fluids. This may induce subsidence and seismicity, even in areas that are normally stable geologically. To assess the impacts and occurrence of any movements, a monitoring program in the project area must be undertaken. This monitoring plan is outlined in Table 3.

The level of induced subsidence and seismicity considered to be significant is site-specific and will vary for each geothermal recovery plant. Therefore, mitigation measures may vary for each project.

Table 3

GEOLOGICAL MONITORING

<u>Parameter</u>	<u>Frequency</u>	<u>Location</u>
Subsidence	At a frequency sufficient to establish baseline elevations and rate. Annually or semi-annually thereafter, or at a frequency sufficient to determine any deviations from baseline projections.	Set up monitoring over entire project area.
Seismicity	Continuously.	Single location at site.

## HYDROLOGIC MONITORING

### Objective

The purpose of the Hydrologic Monitoring Program is to:

- . obtain baseline data on surface and subsurface hydrology and water quality; and
- . detect any variations in the baseline data (during operation) which may require mitigation procedures.

### Plan

Table 4 outlines a generic hydrologic monitoring plan for a geothermal facility. The locations of the sampling sites are site-specific and depend on the hydrologic features of the project area. At least one permanent surface water station and one permanent subsurface water monitoring well should be established. In addition, sampling sites may include public water supplies, domestic groundwater wells, agricultural irrigation and drainage systems, rivers, streams, creeks or any other hydrologic features present in the project area.

It is necessary to monitor surface water and groundwater levels and water quality at permanent stations and at regular frequencies throughout the operation of the project.

Table 4

HYDROLOGIC MONITORING

<u>Parameter</u>	<u>Frequency</u>	<u>Location</u>
Surface and groundwater major water quality constituents: Na, K, Ca, Mg, Cl, SO <sub>4</sub> , CO <sub>3</sub> , HCO <sub>3</sub> , TDS, SS, pH, Temp. (others as necessary).	Monthly.	Set up permanent surface water quality station (number depends on watershed, at least one for every major water artery).  Special monitoring wells (number of sites depends on size of project).  Any water/runoff control structures (i.e., retention ponds).
Surface and groundwater trace water quality constituents: Ag, As, B, Ba, Cd, Cr, Cs, Cu, F, Fe, Hg, Li, Mn, Mo, Ni, Pb, Rd, Se, Sr, V, Zn (others as necessary).	Monthly to determine baseline. Less frequently thereafter (4-6 times annually during operation).	Same as above, but not necessary at runoff control structures.
Flow rates	Monthly	At surface water monitoring stations.
Water levels (surface and subsurface)	Continuously	At permanent surface water monitoring station and permanent groundwater monitoring well.

## ECOLOGICAL MONITORING

### Objective

The purpose of the Ecological Monitoring Program is:

- . to establish detailed baseline data on the terrestrial ecology;
- . to establish detailed baseline data on the aquatic ecology; and
- . to detect any impacts on the above from geothermal recovery operations.

### Plan

Ecological monitoring is divided into two categories - terrestrial and aquatic. The generic parameters which need to be monitored are listed on Table 5 - Ecological Monitoring.

Pre-operational terrestrial monitoring requires determination of terrestrial biological systems in the general project area. Studies should include seasonal vegetation surveys, sampling of small mammal populations, bird transect surveys, and observations of large mammal populations. In addition, surveys of rare and endangered species will be required if any of these species are found in the impacted project area.

Pre-operational monitoring of aquatic biota consists of: 1) a physical description of the present area watershed (size, number of streams and rivers, seasonal variations, etc.), 2) sampling and description of algal and macroinvertebrate benthic communities, and 3) qualitative description of fish and other aquatic species.

Operational monitoring of the terrestrial and aquatic habitat requires

- 1) a continuation of any incomplete pre-operational baseline studies, and
- 2) determination of any significant variations from baseline studies in the terrestrial and aquatic habitats during construction and operation of the geothermal facility.

Table 5

ECOLOGICAL MONITORING

<u>Parameter</u>	<u>Frequency</u>	<u>Location</u>
Terrestrial:		
Vegetation surveys	Sufficient sampling (approx. 4 times per year) to determine baseline variations.	Over entire project area.
Small mammal populations	As above.	As above.
Bird transect surveys	As above.	As above.
Large mammal population	As above.	As above.
Rare and endangered species survey	As above, (only if encountered in other surveys).	As above.
Aquatic:		
Physical description of watershed	Sufficient to establish seasonal baseline variations. Less frequently during operation.	Affected watershed.
Sampling of algal and macroinvertebrate communities	As above, during operation: sufficient to detect any impacts (perhaps once or twice yearly).	Site specific.
Fish and other aquatic species	As above.	Site specific.



## PROCESS MONITORING

### Objective

The purpose of Process Monitoring is:

- . to identify any operational processes or process streams which are impacting, or have the potential to significantly impact, the environment; and
- . to verify the performance of any proposed mitigation and control techniques.

### Plan

Table 6 presents the process streams which may require monitoring. A plan to monitor noise levels is necessary, but on a site-specific basis. Noise monitoring may be constrained only to certain operations (i.e., construction, drilling) rather than all geothermal recovery operations, and only at specified times.

Characterization of any solid wastes generated by the facility will be included as part of process monitoring. Storage facilities (e.g., landfills, ponds, tanks) for liquid or solid wastes (i.e., geothermal fluids, drilling fluids, cuttings, etc.) must be monitored for air-borne, surface water and groundwater impacts. This monitoring will include screening tests for hazardous materials as defined under RCRA regulations. Waste cooling tower fluids contain algacides, herbicides and corrosion preventers. The process and disposal operations must be monitored.

A change in the chemical composition of the geothermal fluid may occur during the plant's operational life; thus, the fluids must be monitored to detect any changes in composition. A change in the

composition may require process adjustments and monitoring of additional parameters which were not originally identified.

In addition to monitoring the parameters presented in Table 6, the monitoring program should verify the performance of any proposed mitigation and control techniques, by allowing a comparison of baseline environmental parameters to those measured after operational controls have been applied.

Table 6

PROCESS MONITORING

<u>Parameter</u>	<u>Frequency</u>	<u>Location</u>
Noise	Determined on a site specific basis.	At construction and drilling sites. At plant site.
Leachates	On an as-needed basis, to detect any significant runoff.	Drilling fluid and cuttings disposal area. Any other waste disposal areas.
Cooling tower fluids	As needed.	Cooling tower and disposal areas.
Geothermal fluids (H <sub>2</sub> S, NH <sub>3</sub> , Hg, As, Cu, Zn, Se, Pb, Ag, Sb, TDS, pH, Eh) (others if necessary)	As needed by processing requirements.	Extraction/injection wells or geothermal plant (as specified by processing requirements).