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ENVIRONMENTAL IMPACT ASSESSMENT

COURSE PAPER

ATLANTIC INTERNATIONAL UNIVERSITY

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ENVIRONMENTAL IMPACT ASSESSMENT

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ATLANTIC INTERNATIONAL UNIVERSITY

Table of Contents

Introduction:

The past three decades have been characterized by passage of major federal legislation dealing with the environment, including specific legislation on control of water and air pollution. (1) (2) The legislation with arguably the most significant impact is the National Environmental Policy Act (NEPA) of 1969 (PL 91-190), which became effective on January 1, 1970. This act was the first signed in the 1970s. (3)

The focus of this act along with subsequent executive orders, Council on Environmental Quality (CEQ) guidelines, and numerous federal agency procedures, was to ensure that balanced decision making occurs in the total public interest. (4)

Project planning and decision making should include the integrated consideration of technical, economic, environmental, social, and other factors. Prior to NEPA, technical and economic factors dominated the decision-making process.

The search for petroleum reserves and consequential impact on the environment shall be the primary thrust of this paper. Inclusive in this presentation will be the general provisions for environmental impact on all projects that could influence the environmental inventory.

Environmental inventory is a complete description of the environment as it exists in an area where a particular proposed action is being considered. The inventory is compiled from a checklist of descriptors for the physical, biological, and cultural environment. The physical environment includes such major areas as geology, topography, surface-water and groundwater resources, water quality, air quality, and climatology. The biological environment refers to the flora and fauna of the area, including species of trees, grasses, fish, herpetofauna, birds, and mammals. Specific reference must be made to any rare and/or endangered plant or animal species. General biological features such as species diversity and overall ecosystem stability should also be presented. Items in the cultural environment include human population trends and population distributions, historic and archeological sites, and economic indicators of human welfare.

The environmental inventory serves as the basis for evaluation the potential impacts on the environment, both beneficial and adverse, of a proposed action. Development of the inventory represents an initial step in the environmental impact assessment process.

The environmental assessment represents the key step in meeting the requirements of NEPA. In essence, it is an attempt to evaluate the consequences of a proposed action on each of the descriptors in the environmental inventory. The essential steps in an environmental impact assessment are:

1. Prediction of the anticipated change in an environmental descriptor.
2. Determination of the magnitude or scale of the particular change.
3. Application of an importance or significance factor to the change.

Many of the current assessment approaches embody the steps of prediction, scaling, and significance interpretation, although the methods use many terms to describe these particular steps.

(1) Federal Water Pollution Control Act Amendments of 1972, PL 92-500, 92nd Cong., S. 2770, Oct. 18, 1972.
(2) The Clean Air Act Amendments of 1970, PL 91-604, 91st Cong., Dec.31,1974.
(3) Kreith, Frank: Lack of Impact, *Environment*, vol.15, no. 1, pp. 26-33, 1973.
(4) The National Environmental Policy Act of 1969, PL 91-190, 91st Cong., S. 1075, Jan. 1, 1970.

The scientific validity of the technology available for the prediction of impacts varies depending upon the particular environmental descriptor. For example, extensive research and sound scientific methods have been developed for prediction of air quality impacts (5), at least with regard to anticipated concentration levels of pollutants in the ambient air; however, impacts on flora or fauna as a result of the calculated concentration levels are less quantifiable. Thus it is possible to utilize sound technology for some impact predictions, whereas other predictions must be primarily based on a professional judgment.

In order to accomplish an environmental assessment, as well as to prepare an inventory and write an impact statement, it is necessary that the approach used be interdisciplinary, systematic, and reproducible. Requirements for an interdisciplinary approach indicate that the environment must be considered in its broadest sense; thus the input of persons trained in a number of technical fields needs to be included. (6) The disciplines represented in a specific environmental assessment must be oriented to the unique features of the proposed action and the environmental setting; however, at a minimum it is necessary to have input from a physical scientist or engineer, a biologist, and a person who can address cultural and socioeconomic impacts. Requirements for a systematic and reproducible approach indicate that a degree of organization and uniformity should be utilized in the assessment process.

(5) Hesketh, Howard E.: "Understanding and Controlling Air Pollution," chap 3, Ann Arbor Science Publishers, Ann Arbor, Mich., 1972.

(6) Nemec, Joseph, Jr.: The National Environment Policy Act of 1969 and the Engineering Curriculum, Civil Eng., pp. 64-65, Mar. 1973.

Description:

The environmental impact statement (EIS) is a document written in the format as specified by NEPA, CEQ guidelines, and specific agency guidelines. The EIS represents a summary of the environmental inventory and the findings of the environmental assessment. Environmental impact statements are also referred to as "environmental statements," "impact statements," "environmental impact reports," or "102 statements". (7) The term 102 statement refers to the section in NEPA that spells out the requirements for the preparation of an EIS.

There are two categories of EISs: draft statements and final statements. The draft statement is the document prepared by an agency proposing an action; it is circulated for review and comment to other federal agencies, state and local agencies, and public and private interest groups. (See Appendix: Image EIA 1) The final statement is the draft statement modified to include a discussion of problems and objections raised by reviewers. The final statement must be on file with CEQ for at least a 30-day period prior to initiation of construction on a project.

Section 102 of NEPA requires that environmental statements be prepared for "major Federal actions significantly affecting the quality of the human environment." The Corps of Engineers uses the acronym MASAQHE for this phrase. (8) To attempt to define a "major action significantly affecting the quality of the human environment" involves many quantitative and qualitative considerations. The simplest way of defining a major action is to compare a predicted impact with an environmental quality standard for a given parameter. It is possible to do this for many substances found in air and water, for example, suspended particulates in the atmosphere and dissolved oxygen in water. However, there are many environmental parameters for which only subjective standards are available, such as scenic vistas and archeological sites.

The following section will detail the five point impact statement process and relevant guidelines in the composition of each section.

(7) "A Handbook Approach to the Environmental Impact Report, 2d ed., Garing, Taylor and Associates, Arroyo Grande, Calif., 1974.

(8) "Environmental Impact and Related Statements," app.F, Policy and Procedure Memorandum 90-1, Federal Highway Administration, U.S. Department of Transportation, Washington, D.C., Sept. 1972.

General Analysis:

Basic Contents of an Impact Statement

Section 102, part C, of NEPA identifies five points that need to be adhered to in an EIS. The first one is to describe "the environmental impact of the proposed action." To be complete, both beneficial and detrimental impacts should be included. The basic thrust of NEPA is that it is a "full disclosure law," implying that both positive and negative ramifications of a given proposed action should be explored in complete detail. (9) In addition, attention must also be directed toward the primary and secondary impacts associated with a proposed action. (10) Primary and secondary impacts are also referred to as direct and indirect consequences. In general, agencies have developed methods and procedures to respond in part to direct impacts, both beneficial and adverse. However, the major impact of a project is often from secondary or even tertiary effects, and these are much more difficult to assess due to the abundance of predictive techniques available.

The second item required by NEPA is an identification of "any adverse environmental effects which cannot be avoided should the proposal be implemented." If a thorough approach has been utilized in describing the environmental impact of the proposed action, this section should basically be an abstract of the negative impacts, both direct and indirect, of the proposed action. New information is not included in this section.

The third point focuses on a discussion of "alternatives to the proposed action." This section has caused a great deal of difficulty, and many court cases have resulted from inadequate treatment of this section by the proposing agency. One alternative that should be discussed is the no-action, or no-project, alternative. This alternative requires the proposing agency to predict what the future environment will be without the project, and it serves as the basis against which impacts of the proposed action can be compared.

The fourth item is a description of "the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity." This section is based on the principle that each generation should serve as trustee of the environment for succeeding generations; therefore, attention must be paid to the question of whether options for future use of the environment are being eliminated by the particular proposed action. In practice, many impact statements have described the impacts associated with the construction and operational phases of a proposed action, considering the construction phase to be short term and the operational phase to be long term.

The fifth point is a discussion of "any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented." Semantic difficulties are encountered with the terms irreversible and irretrievable. Again from a practical standpoint, most impact statements focus attention on possible changes in land usage as a result of a proposed action, loss of cultural features such as archeological or historical sites, preclusion of development of underground mineral resources, loss of habitat for plants and animals, loss or impact on rare and endangered plants and/or animals, material required for project construction, energy usage required during project utilization, and even the human and monetary expenditures involved.

(9) Best, Judith, A.: The National Environmental Policy Act As A Full Disclosure Law, *Natl. Tech. Info. Svc. Rept*. PB-227-809, Dec. 1972.

(10) Council on Environmental Quality: Preparation of Environmental Impact Statements: Guidelines, Fed. Reg., vol. 38, no 147, pp.20550-20562, Aug. 1, 1973.

The Council on Environmental Quality (CEQ) guidelines of August 1, 1973 call for the addition of two more new sections in an impact statement, plus an expansion of a previously required section. The initial section of an impact statement became a description of the proposed action as well as a description of the existing environment. One new section pertains to the relationship of the proposed action to existing land-use plans, policies, and controls in the affected area, which requires a discussion of how the proposed action may conform or conflict with the objectives and specific terms of any federal, state, or local land-use matters, either approved or proposed.

The second new section calls for an indication of what other interests and considerations of federal policy are thought to offset the adverse environmental effects of the proposed action. This section is oriented to a discussion of other decision factors that the agency feels tend to counterbalance any adverse environmental effects. (11)

The Environmental Protection Agency (EPA) was established in December 1970 as the environmental regulatory agency of the United States. (12) It is not the chief administrative agency for EISs. The EPA reviews EISs prepared by others, particularly with regard to water pollution, air pollution, solid waste management, noise, radiation, and pesticides. Each statement reviewed is assigned a rating based on the proposed action and the EIS document itself. (13)

The environmental impact assessment process is becoming an integral part of the planning process for federal agencies within the United States. The process is being accomplished at the initial stages of project planning as opposed to an after-the-fact statement prepared in accordance with the letter of the law of NEPA. Future trends indicate a focus on regional impacts, greater public involvement, more impact statements from the private sector, and more court cases dealing with the substantive issues of environmental impact assessment. It is possible that detailed requirements for separate impact statements will be altered in the future in response to the degree that environmental impact assessment becomes a part of project planning documentation. (14)

Recent natural disasters along the Gulf Coast of the United States have caused a reevaluation of the impact assessment procedure. Major reconstruction and repair will naturally alter or modify much of the already damaged ecosystem. Case in point was the floodwater disposal and evacuation in the city of New Orleans following the temporary levee repairs. Tremendous volumes of water with untold amounts of bacteria, petrochemical derivatives, along with other sewage components were allowed into the existing water reservoirs. Subsequent impact assessments after-the-fact will no doubt reveal major modifications are needed in the case of natural disasters.

(11)Jenny, Brian P.: CEQ—A View From the Top, in "How Effective are Environmental Impact Statements?", pp. 11-14, Water Resources Research Institute, Oregon State University, Corvallis, July 1973.
(12)"Reorganization Plan No. 3," The White House, Washington, D.C., July 9,1970.
(13)"Environmental Impact Statement Guidelines," rev. ed., p. 120, region X, Environmental Protection Agency, Seattle, Wash., Apr. 1973.
(14)Curlin, James W., and H. Steve Hughes: "National Environmental Policy Act of 1969: Analysis of Proposed Legislative Modifications—First Session, 93rd Congress, U.S. Government Printing Office, Washington, D.C., June 1973.

Actualization:

One of the first steps in the environmental assessment process is to describe the environmental setting for the project study area. This description provides base-line data against which prediction and assessment of the impacts of the proposed action and alternatives can be compared. It is useful in describing the environmental setting to consider arranging the various factors into the following categories: physical-chemical, biological, cultural, and socioeconomic. The following sections will address these four major areas and how they are relevant to the assessment process.

Defining the Environmental Setting

There are several purposes for defining the environmental setting. One is to form a basis for assessment of the environmental impact of the proposed action and alternatives, including the no-action alternative. Another is to provide sufficient information so that decision makers and reviewers unfamiliar with the general location can develop an understanding of the project need as well as the environmental characteristics of the study area.

In defining the environmental setting for a project, it may be possible to establish the basis for the project need, whether the project involves construction of a highway, reservoir, or sewage-treatment plant, initiating a water-flood project in an existing hydrocarbon reservoir; expansion and/or modification of an airport facility; or development of an industrial park. Even though there may be a section in the environmental assessment report that deals specifically with project need, the basis can be delineated in the description of the environmental setting. (10)

One of the most important purposes for describing the environmental setting is to identify any environmentally significant items prior to initiation of the proposed action, as well as to enumerate any potentially critical environmental changes should the project be implemented. Critical environmental changes should be addressed in the prediction and assessment step in the environmental assessment process. The basic structure of the description of the environmental setting is best determined relative to the project need and potential alternatives for meeting that need. One of the key aspects in describing the environmental setting is to ensure that all environmental factors that need to be considered are included, while at the same time excluding those items that require extensive effort to procure and interpret but that have little relevance to the environmental impact of the proposed action or any of its alternatives.

A specific reference and example of describing the environmental setting for oilfield applications is the proposition for a gas/oil pipeline.

Chart EIS 1: List of Environmental Factors for an Oil/Gas Pipeline

1. Land features and uses—Identify present uses and describe the characteristics of the land area. (Agriculture, business, industry, recreation, residence, wildlife topography, physiography, geology, soils, geological hazards)
2. Species and ecosystems—Identify those species and ecosystems that will be affected by the proposed action. (Species, communities and associations, unique and other biotic resources

(10) Council on Environmental Quality: Preparation of Environmental Impact Statements: Guidelines, Fed. Reg., vol. 38, no 147, pp.20550-20562, Aug. 1, 1973.

3. Socioeconomic considerations—If the proposed action could have a significant socioeconomic effect on the local area, discuss the socioeconomic future of the area without the implementation of the proposed action.(Economic development, population densities, distance logistics, number of residences)
4. Air and water environment—Describe the prevailing climate and quality and quantity of the air and water resources of the area. (Climate, hydrology and hydrography, air-noise-water quality)
5. Unique features—Identify unique or unusual features of the area, including historical, archeological, and scenic sites and values.

Prediction and Assessment of Impacts on the Air Environment

One of the major impacts of many actions is on the air quality in the vicinity of the project area. Construction of highways, airports, dams, waterways, power plants, industrial parks, apartment houses, and pipelines generates construction dusts and exhaust emissions from construction equipment. The operation of airports and power plants and the use of highways and industrial parks also cause emission of gaseous and particulate air pollutants. Steps must be taken toward determining the air quality impacts of alternatives and a proposed action on the mesoscale and microscale levels. The mesoscale level assessment measures the contribution of the proposed action to area and regional emission inventories. The microscale level assessment is a comparison of calculated concentration levels of air pollutants at specific locations to applicable ambient air quality standards. Both levels of impact assessment are necessary in order to adequately address the air quality impacts associated with proposed actions. A basis for predicting the impact on air quality is to first define air pollution:

The presence in the outdoor atmosphere of one or more contaminants such as dust, fumes, gas, mist, odor, smoke, or vapor in quantities, of characteristics, and of duration, such as to be injurious to human, plant or animal life or to property, or which unreasonably interferes with the comfortable enjoyment of life and property. (15)

The sources of air pollution can be categorized according to type, that is, whether natural or artificial, by number and spatial distribution, or by type of emissions such as gases and particulates. The two major classes of gaseous air pollutants are inorganic gases and organic vapors. Particulate air pollutants are any dispersed matter, solid or liquid, in which the individual aggregates are larger than single small molecules (about 0.0002 microns in diameter) but smaller than about 500 microns. One of the primary concerns is the effect of air pollutants on aesthetics, economic viability, safety, personal discomfort, and health. (16) The prediction and assessment of air quality impacts involves identification of the type and quantities of air pollutants emitted from the construction and operation of each alternative under consideration for a proposed action.

(15)Perkins, Henry C.: “Air Pollution,” p.3, McGraw-Hill Book Company, New York, 1974.
(16)Rossano, August T.: “Air Pollution Control Guidebook for Management,” pp. 87-91, Environmental Science Service Division, D.R.A., Stamford, Conn.,1969.

Prediction and Assessment of Impacts on the Water Environment

One of the major impacts from many actions is evidenced by changes in water quality both in the vicinity and downstream from project areas. Construction of reservoirs, power plants, industrial parks, and pipelines will cause short-term impacts on the water environment; and operation of these same facilities will result in longer-term impacts. General impacts on the water environment are related to hydraulic and hydrologic cycle changes as well as to the introduction of suspended and dissolved materials in to receiving waters. As was the case with the air environment, the necessary steps are directed toward determining the water impacts of alternatives on the mesoscale and microscale levels. Mesoscale assessment considers the contribution of alternatives to area water pollutant sources, both point and non-point. Microscale assessment involves comparisons of calculated concentrations of water pollutants to applicable water quality standards. Both levels of impact assessment are necessary in order to adequately address water quality impacts associated with proposed actions.

Water pollution can be defined in a number of ways; however, the basic elements of most definitions are the concentration of particular pollutants in water for sufficient periods of time to cause certain effects. If the effects are health related, such as those caused by pathogenic bacterial intrusion, the term "contamination" is appropriate. Effects that have to do with limitations on water availability due to certain water quality requirements related to usage, can serve as a basis for defining a condition of water pollution. "Nuisance" refers to aesthetically displeasing effects created by oils, grease, or other floating materials.

Potential water quality impacts must be considered based on a clear delineation of various water quality characteristics. It is necessary to utilize a manifold evaluation of water quality characteristics in order to develop a total evaluation of existing water quality as well as microscale changes that might result from project alternatives. Water quality can be described in terms of physical, chemical, and bacteriological parameters.

Physical parameters include color, odor, temperature, solids (residues), oils, and grease. (17) Color can be defined relative to type and density, the type being related to whether it is true color (dissolved) or apparent color (filterable). Odor is described by type and threshold odor number, which is related to the odor-free water required for diluting an odorous water sample to a nonodorous level. Total solids are comprised of suspended and dissolved solids, and each of these fractions can be further divided into organic (volatile) and inorganic (fixed) components. Turbidity is another measure of the solids content, and it is related to light transmittance through water. Settleable solids describe the materials present in solution that will settle by gravity in a one hour period. Specific conductance (conductivity) is a measure of the inorganic dissolved solids present in ionic form. In surface watercourses oil and grease is of interest relative to nuisance considerations.

Chemical parameters can be subdivided into organic and inorganic constituents. Several tests can be employed to describe the organic characteristics of water. The most used test is the biochemical oxygen demand (BOD), which is defined as the amount of oxygen required by bacteria in decomposing organic material in a sample under aerobic conditions at 20°C over a five day incubation period.

(17)Federal Water Pollution Control Administration: "Water Quality Criteria," p. 189, Washington, D.C., Apr.1, 1968.

Other tests that describe the organic content of water include the chemical oxygen demand, total organic carbon, and total oxygen demand.

Inorganic parameters of potential interest in water quality characterization include salinity, hardness, pH, acidity, alkalinity, and the content of iron, manganese, chlorides, sulfates, sulfides, heavy metals, nitrogen (organic, ammonia, nitrite, nitrate) and phosphorus.

Bacteriological parameters include coliforms, fecal coliforms, specific pathogens, and viruses. Total coliform and fecal coliform organisms are used as indicators of the presence of pathogens. Specific pathogens such as salmonella organisms may be relevant for certain environmental impact studies.

The first step in prediction and assessment of water quality impacts involves identification of types and quantities of water pollutants emitted from construction and operation of each alternative under consideration.

The second step involves assembling information on existing water quantity and quality levels in the area of project, particularly focusing on quality parameters related to anticipated water pollutants to be emitted from construction and operational phase of the project.

The third step is to identify any unique pollution problems that have occurred in the project area. This is necessary in order to adequately describe the environmental setting, to indicate a familiarity with the area, and to focus on the environmentally sensitive parameters.

The fourth step is to accurately describe the groundwater quantity and quality.

The fifth step is to summarize the meteorological data required in order to predict and assess air quality impacts associated with proposed actions. In addition, certain climatological factors such as precipitation, evaporation, and air temperature are important in terms of predicting and assessing water quality impact.

Step six is compliance acknowledgement of Federal Water Quality Standards as outlined in the Federal Water Pollution Control Act Amendments. (18)

Step seven summarizes the waste and allocation study for the particular surface watercourses in the vicinity of proposed alternatives.

Step eight examines the impact of alternatives in terms of their relative contributions to existing waste loads in streams.

Steps nine and ten are predictive methods for sediment accumulation and downstream concentrations of various water pollutants from the project area.

Steps eleven and twelve are pollution control measures put in place along with any foreseen operational impacts.

Prediction and Assessment of Impacts on the Noise Environment

Another of the major impacts of many actions is on the noise environment in and adjacent to the project area. Noise can be defined as unwanted sound or sound in the wrong place at the wrong time. Noise can also be defined as any sound that is undesirable because it interferes with speech and hearing, is intense enough to damage hearing, or is otherwise annoying. (19)

(18) Federal Water Pollution Control Act Amendments of 1972, PL 92-501, 92nd Cong., S. 2770, Oct.18, 1972.

(19) Environmental Protection Agency: *Report to the President and Congress on Noise*, 92nd Cong., 2d Sess., Document 92-63, Washington, D.C., Feb. 1972.

Basic steps associated with prediction of changes in the noise environment and assessment of the impact of these changes, are as follows:

1. Identify noise levels for the alternatives under consideration during both the construction and operational phases.
2. Determine existing noise levels for the project area. This may involve field measurements or the determination of land-use patterns. Identify unique noise sources in the area as well as unique places where noise levels must be minimized.
3. Obtain applicable noise standards and criteria for the area.
4. Determine the microscale impact by predicting anticipated noise levels for each alternative during both construction and operational phases. Compare predicted noise levels with applicable standards or criteria in order to assess impact.
5. If standards or criteria are exceeded, consider noise abatement methods to minimize impact on the noise environment. (20)

Prediction and Assessment of Impacts on the Biological Environment

Major impacts from many actions occur on floral and faunal species that are components of the biological environment within and adjacent to project areas. General impacts on the biological environment are related to changes in community types; and their geographical distribution. Specific impacts may occur in the life cycles of rare and endangered species inhabiting the area of concern.

Basic steps associated with prediction of changes in the biological environment and assessment of the impact of these changes, are as follows: (21)

1. Prepare a description of the flora and fauna comprising the biological environmental settings. Describe community types and their geographical distribution, and develop species descriptions for each community type.
2. Identify rare and endangered species inhabiting the area of interest, and discuss relevant characteristics of these species.
3. If appropriate, discuss past and current management practices as related to floral and faunal species, as well as special activities associated with protected species.
4. Discuss natural succession as it relates to the alteration of communities with time. In essence, this is an attempt to describe what the environment will become without implementation of the proposed action.
5. Predict the impacts of alternatives on the biological environmental setting. Quantify the impacts where possible, and qualitatively discuss the implication of the remainder.
6. Summarize the critical impacts associated with various alternative. Do not only consider individual species, but rather describe general impacts on the overall ecosystem.

(20)Environmental Protection Agency: "Public Health and Welfare Criteria for Noise," Publ. 550/9-73-002, Office of Noise Abatement and Control, Washington, D.C., July 27, 1973.

(21)Odum, E.P.: "Fundamentals of Ecology," 3d ed., chaps. 1-7, W.B. Saunders, Philadelphia, Pa., 1971.

Prediction and Assessment of Impacts on the Cultural Environment

One of the major concerns associated with many actions is relative to their potential impact on cultural resources, which include architectural, historical, and archeological sites, as well as areas of unique importance due to their ecological, scientific, or geological information. The sphere of cultural resources includes not only the precise limits of the project area, but also all surrounding lands on which the project may have a reasonably direct impact by modifying land-use patterns or by opening areas for agriculture or for public use, thus increasing potential vandalism. (22)

Basic steps associated with prediction of changes in the biological environment and assessment of the impact of these changes, are as follows:

1. Identify known cultural resources in the area of interest. These sources should include historical and archeological sites; areas of ecological, scientific, or geological significance; and areas of ethnic importance. Prepare a discussion the cultural overview of the area, including prehistorical as well as historical patterns in the area.
2. Indentify potential cultural resources in the area of interest.
3. Determine significance of known and potential cultural resources relative to local, regional, and national concerns.
4. Delineate possible impacts of alternatives on known and potential cultural resources in the area of interest. Impacts should be determined for preconstruction, construction, operation, and postoperation phases.
5. Depending upon the findings of steps 3 and 4, do one of the following: proceed with selection of proposed action from the alternatives, or eliminate one of more alternatives and then proceed with selection of the proposed action. Following selection of the proposed action, conduct a detailed reconnaissance of the project area for the selected action and develop mitigation measures for impact minimization and cultural resources preservation.
6. Develop procedures that will be used during the construction phase of previously unidentified cultural resources are uncovered.

Prediction and Assessment of Impacts on the Socioeconomic Environment

Many major impact associated with certain proposed actions are evidenced by changes in the socioeconomic factors in the project area and surrounding region. Socioeconomic changes may be beneficial or detrimental. Emphasis on this category of the environment is more recent than the focus on the physical-chemical, biological, and cultural environments, and results from the realization that the total environment includes factors associated wit human concerns, which are described by socioeconomic parameters.

(22)McGimsey, C.R., III: “Archeology and Archeological Resources,” Society for American Archeology, Washington, D.C.,1973.

Basic steps associated with prediction of changes in the socioeconomic environment and assessment of the impact of these changes, are as follows: (23)

1. Describe the environmental setting in terms of socioeconomic factors. The area of interest for each factor will be dependent upon the relationship of the factor to the alternatives under consideration, as well as upon the available data base.
2. Identify critical environmental concerns relative to the socioeconomic factors described above. Primary emphasis should be given to those factors that would be deemed marginal or inadequate in terms of societal standards.
3. Predict changes in the socioeconomic factors as a function of various alternatives under consideration, including the no-action alternative. Changes should be quantified where possible and qualitatively described as a minimum.
4. Discuss the implications of the changes relative to critical or marginal items defined in step 2. Identify factors that will be changed from satisfactory to marginal or critical.

(23) Adkins, W.G., and D. Burke, Jr.: "Social, Economic, and Environmental Factors in Highway Decision Making," pp. 69-74, Res. Rept. 148-4, Texas Transportation Institute, Texas A&M University, College Station, Nov. 1974.

General Recommendations:

Several purposes are served by impact analysis methods. One is to ensure that all environmental factors that need to be considered are included in the analysis. This purpose is relevant since the environment is a complex system of physical-chemical, biological, cultural, and socioeconomic resources, and various types of actions can create complex impacts and interrelationships on these resources. Methods whose approach to considering environmental factors is systematic are desirable.

Impact analysis methods should provide a means for evaluation of alternatives on a common basis. Many impact statements adequately describe the environmental impacts of proposed actions; however, they consider only the relative economic evaluation of alternatives to the proposed action. Methods of impact analysis provide the approach for evaluating absolute or relative impacts of alternatives. In conjunction with impact evaluation, it may be determined that there are data deficiencies in terms of either the description of the environmental setting, factors associated with the proposed action, or technology available for impact prediction and assessment. Methods for impact analysis can and should aid in identifying data needs and planning special studies or field studies.

Another important purpose of methods of impact analysis is the evaluation of mitigation measures. Attention should be directed toward measures that will minimize the environmental impact of alternatives and the proposed action. Methods for impact analysis can and should aid in evaluation of the effectiveness of proposed mitigation measures.

Another purpose for assessment methodologies is to provide information in summary form for public participation. Utilization of systematic, interdisciplinary, and organized approach gives credence to the validity of the impact analysis. Care must be exercised in any public distribution of information resulting form the application of an impact methodology that the information does not appear to mislead the public or misrepresent or confuse the results. Information presented to the public should be provided in summary form only.

Finally, methods of impact analysis are required to ensure compliance with the spirit and intent of the NEPA. (24)

(24)Drobny, N.L., and M.A.Smith: Review of Environmental Impact Assessment Methodologies, internal working paper, Battelle-Columbus, Columbus, Ohio, 1973.

Conclusion:

Impact assessment is about making the best possible decision using the best available information in a systematic and proper manner. It is essential to a sound and sustainable business operation. It is also an essential part of good governance and a key to sustainable development. Over the past 20 years, the emergence of widespread concerns about environmental, socioeconomic, health and other global issues means that business managers or decision makers are confronted with far greater challenges and difficulties than their predecessors many decades ago. Many of these challenges are multi-disciplinary in nature. Any corporate decision nowadays may have far reaching environmental or social effects or far greater unintended consequences which could undermine the reputation or long term viability of a company. (25)

Impact assessment is already a part of corporate management to anticipate, manage and respond to environmental, social and health risks; to position the company as an environmentally responsible corporate citizen; and to enhance corporate image and build trust with the community.

Looking at the protests against economic globalization taking place at meetings of international institutions such as the World Bank and the International Monetary Fund, it becomes clear that we live in a world where people do not automatically trust companies and their ability to be a force for good in the developing world. People are increasingly demanding to participate in corporate decisions that will affect their lives and are demanding demonstrable evidence that companies are managing their environmental and social impact in the countries where they operate.

In this context, the environmental and social impact assessment process, and specifically consultation with interested and affected parties, is becoming increasingly important to ensure the minimization of adverse impacts and the optimization of benefits to the host country and local communities.

Impact assessment traditionally tends to focus on the assessment of adverse impacts on the natural and social environment. It is important to identify, assess and determine appropriate ways of responding to opportunities for generating environmental and social capital in affected communities. Significant attention should be given to the development of practical and concrete impact management recommendations. Baseline studies and the assessment of impacts are not ends in themselves. These activities are a means to an end, that end being the development of an environmental and social management plan that ensures that implemented projects contribute to sustainable development.

Merely making data available to less developed communities is not sufficient to ensure meaningful participation in the impact assessment process. Communities need to be “empowered” to understand and assess information, which does not come naturally to communities which might never have seen the kind of development being proposed, or which do not have the background to interpret the information on emissions and predicted impacts. This is the responsibility and accountability that comes with assessing the impact of a project.

(25)http://www.iaia.org/Non_Members/Pubs_Ref_Material/pubs_ref_material_index.htm

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(7) "A Handbook Approach to the Environmental Impact Report, 2d ed., Garing, Taylor and Associates, Arroyo Grande, Calif., 1974.

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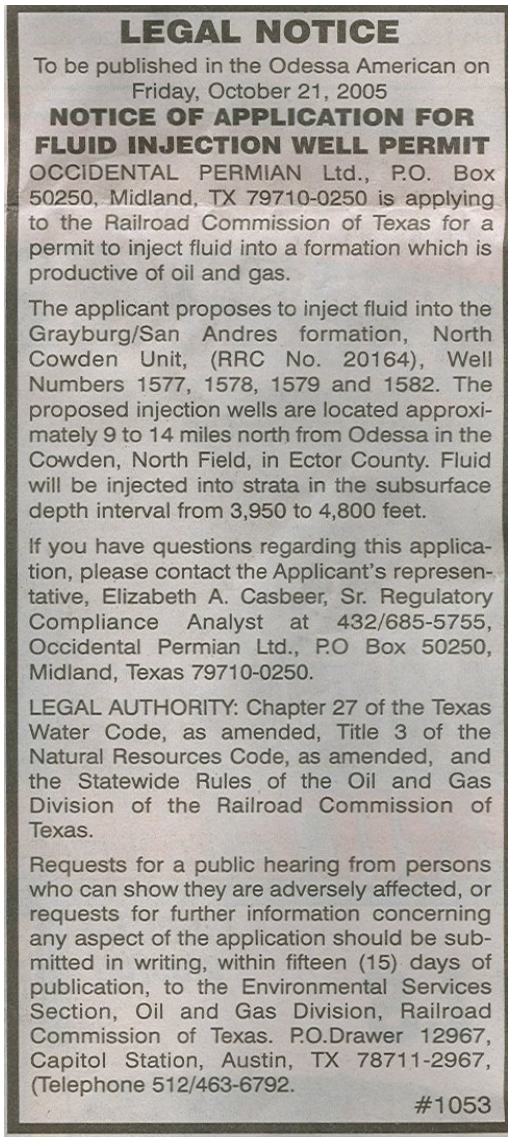
Appendix

Image EIA 1

Public Notice for Oilfield Environmental Impact Projection from west Texas newspaper. Take note of the following features: (1) Specific mention of compliance with the state agency. (2) Geological and structural impact of water injection (3) Contact information for further questions (4) Reference to legal authority to provide information.



LEGAL NOTICE

To be published in the Odessa American on Friday, October 21, 2005

NOTICE OF APPLICATION FOR FLUID INJECTION WELL PERMIT

OCCIDENTAL PERMIAN Ltd., P.O. Box 50250, Midland, TX 79710-0250 is applying to the Railroad Commission of Texas for a permit to inject fluid into a formation which is productive of oil and gas.

The applicant proposes to inject fluid into the Grayburg/San Andres formation, North Cowden Unit, (RRC No. 20164), Well Numbers 1577, 1578, 1579 and 1582. The proposed injection wells are located approximately 9 to 14 miles north from Odessa in the Cowden, North Field, in Ector County. Fluid will be injected into strata in the subsurface depth interval from 3,950 to 4,800 feet.

If you have questions regarding this application, please contact the Applicant's representative, Elizabeth A. Casbeer, Sr. Regulatory Compliance Analyst at 432/685-5755, Occidental Permian Ltd., P.O Box 50250, Midland, Texas 79710-0250.

LEGAL AUTHORITY: Chapter 27 of the Texas Water Code, as amended, Title 3 of the Natural Resources Code, as amended, and the Statewide Rules of the Oil and Gas Division of the Railroad Commission of Texas.

Requests for a public hearing from persons who can show they are adversely affected, or requests for further information concerning any aspect of the application should be submitted in writing, within fifteen (15) days of publication, to the Environmental Services Section, Oil and Gas Division, Railroad Commission of Texas. P.O.Drawer 12967, Capitol Station, Austin, TX 78711-2967, (Telephone 512/463-6792.

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