Environmental Concerns for Petroleum Operations

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Abstract

The petroleum industry is faced with a problem in the near future: what does it do about environmental hazards that accompany hydrocarbon exploration and production. The industry as a whole, is currently doing a very good job of environmental housekeeping, but has a bad public image as the keepers of the environment. The best environmental policy for the petroleum industry is first educate ourselves in the compliance laws and the best environmental policies, and second to transfer this knowledge to the general public. To begin this educational process the first step is to understand the laws governing our activities.

The environmental concerns for the operator of production facilities, both existing and proposed, will be discussed. The discussion will begin with an explanation of what is meant by the "no net impact" concept of operations. A general outline for compliance with environmental laws and regulations will be presented. This outline will begin with the permitting process and continue to cover such topics as air pollution control, water pollution control, underground injection control, and hazardous waste management. Federal regulations and state regulations of both Texas and New Mexico will be the focus of the discussions.

Introduction

The U.S. Environmental Protection Agency (EPA) is the federal agency primarily responsible for the generation of federal laws, rules, and regulations. Its acts, which are ultimately passed into law by Congress, are intended to control or prevent pollution of the environment. These laws are suggested by the EPA, but the ultimate power of enacting the laws lies with the US Congress. The Congress is susceptible to pressures from various special interest groups to enact legislation that would make operations very costly for domestic oil and gas operators. It is for this reason that persons involved in the technical aspects of the petroleum industry must strive to educate themselves in environmentally safe operations. After the education process is begun the next step is to implement economically sound implementation of environmental policies in operations. After implementation the next and perhaps the most important step is an aggressive technology transfer campaign. This campaign should be directed at the general public to make the populace aware of the environmentally positive attitude of the industry. In today's society a short term environmental problem may gain national exposure, while years of responsible operating procedures will go unheralded by the media. The aggressive technology transfer program will make the general public aware of the efforts the industry is making towards

preserving the environment. With this policy the industry may avoid the implementation of laws without regard to the economic impact on the exploration and production industry.

Everything we do in daily activities carries with it an environmental cost. It is up to society to decide what environmental cost it is willing to pay to continue the current standard of living. It is with this ideal that one may introduce the concept of No Net Impact(NNI). The NNI concept simply states that operations will have no long term environmental consequences. While operations may initially adversely impact the environment, remedial operations will restore the lost aspect of the environment to its natural state. The NNI concept is one method by which society may continue the current standard of living and still leave a clean environment to future generations. The degree of remedial operations involved in a project may be greatly reduced if the operator and all personnel begin operations with the knowledge that NNI on the environment is company policy.

General Compliance Guidelines

The first step in beginning a project which may adversely impact the environment is to have a firm grasp of the environmental legislation involved in regulating the operation. Although the ultimate power for environmental legislation lies with the federal government, the American political system relys upon the states to attend to most environmental affairs. State laws may differ to some degree across the nation, however, the general pattern of administration of regulations is common in most states[1].

The following steps may serve as an initial guide for those who are about to undertake a new project. Before any agency is contacted for permits the operator should first clearly examine each of the following steps to ensure that the project is ready to begin the permitting process.

The first step in any design is to clearly define the proposed installation or change in operations. A careful examination of alternatives may reveal that a short term low cost expenditure is in fact more expensive because of environmental compliance problems.

The site selection process should entail a detailed examination of each proposed location weighing the environmental cost with the economic benefit gained by the location. Sometimes giving up the optimal location for the project in favor of a secondary choice, may reduce the environmental compliance requirements greatly with only a small increase in capital cost. One should survey each site for environmental complications early in the design process. After construction has begun is the wrong time to discover that the site is in close proximity to an area that has stringent environmental compliance requirements. After a site has been selected examine the

proposed operation from the viewpoint of someone who has no interest in the economic viability of your project, but as someone with the only interest of the preservation of a pristine environment. Using this frame of mind identify each aspect of the operation that may potentially affect the environment.

After the site selection process is complete the next step is to identify which permits are required for the project. The project may require permits from local, state, and federal agencies. This process should include a careful examination of the operation and any impact that it may have on the environment. The review should include air pollution from on-site storage of volatile compounds, wastewater streams, anything that is injected into a well for either production or disposal, surface and downhole facilities, and surface transport[1]. The federal and state regulations should then be consulted to determine which agency or agencies will issue the necessary permits. In many instances permits may be required at both the federal and the state level.

After the initial study is completed each agency involved should be contacted to begin the permitting process. Early contact with the agency will eliminate any surprises after the project has begun. Also, early contact gives you the opportunity to describe the project in favorable terms, before any opposition to the project has developed.

During the permitting process determine exactly what type of studies are required for each permit. This may be enhanced by careful examination of the permit applications and discussions with agency personnel. Environmental study requirements should be identified early in the project design to alleviate possible delays.

Air Pollution Control

The primary agency in Texas responsible for air quality control is the Texas Air Control Board(TACB). The legislation which the TACB enforces are the Texas Health and Safety Code, the Texas Clean Air Act, Regulations I,Ii, VI,VII,IX,X, and the Texas Air Control Board Enforcement(TACB) Rules. The TACB requires a permit for facilities which release more than 250 tons per year of CO or NO_x or 25 tons per year of any other contaminant except CO_2, H_2O, CH_3, H_2 or O_2. The exception to this rules is when at least one facility at the same property has been subject to public notification and comment as required by Reg. VI, Rules 116.6 and 116.10. If a permit is required the TACB will grant a permit to those facilities which meet or exceed all TACB regulations as outlined in Reg. VI, Rule 116.3 and EPA's 40 CFR 52.21 and 51.301 PSD Air Quality Regulations.

Enforcement of the regulations can include revocation of the permit, fines, and criminal charges. The executive director can order the

facility to reduce emission or to shut down immediately if a danger to human health or safety has been found.

The primary air pollution control agency in New Mexico is the Air Quality Bureau(ACB). The legislative basis for the ACB is the Air Quality Regulation 702, this gives the ACB the power to review and grant permits and to levy fines. The ACB requires both a construction permit and a Prevention of Significant Deterioration (PSD) permit for any permanent facility which may release more than 10 tons per year of any regulated air contaminant or one ton per year of lead into the ambient atmosphere. Also the ACB requires permits for facilities which are below the annual limits, but have emission rates greater than 10 pounds per hour of any regulated air contaminant or 5 tons of lead per year. New Mexico also requires permits for temporary and portable installations, the ACB may require a separate permit for each installation. Violations are subject to fines; however, operators are given a grace period within which they can produce a plan to achieve compliance within 30 days.

Water Pollution Control

The Texas agency charged with the protection of its waters is the Oil and Gas Division of the Railroad Commission of Texas(TRRC). The legislation behind the Texas regulations concerning water pollution are as follows House Bill 2005 (1983); Rule 8 (amended through December 1, 1987); House Bill 1047 (1981); Texas Water Codes , Sect. 26.13(b); Federal Water Quality Act (1987). The permits required by the TRRC are a National Pollution Discharge Elimination System(NPDES), which is a Federal permit and is described in the Code of Federal Regulations(CFR) 40 CFR Part 106. The TRRC also requires a state issued discharge permit.

A permit is required for the use of brines or any other mineralized waters. This includes the use of a pit for water storage. The TRRC will only issue a permit after it has found that the mineralized waters will not potentially pollute either the surrounding agricultural land or the ground water. The TRRC may sometime pass some permits to the Texas Water Commission (TWC), which may make recommendations as to the permit. This will increase the time required for a permit to be granted or denied.

Texas does allow temporary pit use for the express purpose of drilling and test for hydrocarbons. This exemption includes reserve pits, completion/workover pits, circulation pits, flare pits, or fresh water pits used for makeup water only. The TRRC will require that the operator restore the pit in accordance with {Rule 8(d)(4)] upon termination of drilling/workover operations.

The TRRC can either modify, suspend, or terminate a permit if it finds that a violation has occurred. These violations may include increased risk of underground or surface water pollution, waste of a natural

resource such as oil or natural gas, any change in conditions at the operation, or a violation of the original permit has occurred.

The New Mexico agency which regulates the protection of water resources is the Oil Conservation Division of the New Mexico Water Quality Control Commission. The state legislation are the Water Quality Control Commission Regulations, New Mexico Water Quality Act; Federal EPA regulations 40 CFR part 435, subpart C. New Mexico does not require a separate state permit, but reserves the right to review the NPDES required by the EPA prior to its filing.

The NPDES states that no polluted water may discharged into the waters of the United States, unless they are of sufficient quality as to be used for water sources for either livestock or wildlife or other agricultural purposes. If the waters are not of this quality then discharge is not permitted and the water must be disposed of by other methods. Violations of the NPDES regulations may result in suspension of the permit and severe civil liabilities.

Underground Injection Control

The agency responsible for the regulation of underground injection in the state of Texas is the Oil and Gas Division of the Railroad Commission of Texas(TRRC). The legislation which sets forth the regulation of underground injection control are the Texas Water Code, Chapter 27, Statewide Rules 9,46, and 74, Texas Natural Resources Code. The TRRC requires an under ground injection control (UIC) permit for disposal, injection and storage wells.

Prior to approval of a permit the TRRC will determine that injection into a particular formation will be contained within that formation and that use of the formation will not endanger any other natural resources. This may be accomplished by a letter from the operator stating the above facts. This is an area where a potential environmental study should be performed by the operator prior to permit application. Applicants for a permit are also required to furnish information on all wells within a 1/4 mile radius of the proposed project. Abandoned wells found within the radius must be properly plugged as to prevent movement of the injection fluid out of zone. Also the applicant is required to contact the owner of the surface rights of the proposed location, the local authorities or other appropriate officials in writing prior to actual permit application.

Before operation of any injection facility is initiated the well must pass a mechanical integrity test to ensured that the well is capable of withstanding operating pressures without risk of mechanical failure.

Enforcement of these regulations is by means described in Chapter 27 of the Texas Water Code and by penalties specified in Title 3 of the

Natural Resources Code. The permit may be revoked at any time if it is discovered that the operation is in violation of any part of these statutes.

The New Mexico agency which regulates underground injection of fluids is the Oil Conservation Division of the New Mexico Water Quality Control Commission. The state laws which govern the process are the New Mexico Water Quality Act, Oil and Gas Rules 701-711.

Permits are required for the injection of any fluid into the subsurface. These permits will vary as to the purpose of the injection well (enhance oil recovery wells and/or salt water disposal wells).

Hazardous Waste Management

Hazardous waste is defined by the Resource Recovery Act(RCRA) of 1976 as a waste or combination of waste which because of its quantity, concentration, or physical, chemical, infectious characteristics may (1) cause or significantly contribute to, an increase in mortality or an increase in serious irreversible or incapacitating reversible illness or (2) pose a substantial present or potential hazard to human health or the environment when improperly stored treated or disposed of. This is the definition of a hazardous waste as defined by Congress; however, the EPA is the agency left to officially classify hazardous waste in the US.

The Texas agency which regulates the management of oilfield related hazardous waste is the Oil and Gas Division of the Railroad Commission of Texas(TRRC). The Texas Solid Waste Disposal Act and the Texas Industrial Solid Waste Regulations of the Water Quality Board, along with subtitle C of RCRA expressly exclude any waste resulting from activities relating to the exploration and production of oil and/or natural gas. These exemption from the regulations are constantly under protest from various environment groups. If these exemptions are revoked the exploration and production industry will be faced with a very serious challenge to maintain the economic viability of their operations. The state of Texas has empowered the TRRC to monitor and regulate the activities of the oil and gas producers in the state, the TRRC state wide regulations and Rule 8 contain several provisions relating to the disposal of any solid waste generated by oil field operations.

The New Mexico agency which regulates hazardous waste in New mexico is the Hazardous Waste Bureau, Environmental Improvement Division of the New Mexico Health and Environment Department. The regulations by which permits are granted is the 1990 Code of Federal Regulations (CFR), these regulations maybe found in 40 CFR, Parts 260 - 271. The state may adopt federal legislation, but issues permits under its own jurisdiction.

The regulations contained in the CFR expressly exempt any drilling fluids and/or produced waters from regulation as a hazardous waste; therefore, a permit is not required for drilling and production operations. However, if the fluids are to be treated in some secondary process for additional oil recovery or the waters contain solvents or other additives used to enhance separation processes a permit may be required.

Conclusions

The regulations of the states of Texas and New Mexico along with the associated Federal regulations have been discussed. These regulations are new in relation to other regulations governing oil and gas operations. The knowledge of these regulations will allow operators to produce oil and natural gas while maintaining a clean environment for the future.

The guidelines for compliance given in this paper are general but should provide a first look checklist for the operator when planning a new project or change in operations. The appropriate state and Federal Agencies, especially the EPA regional office, should be contacted before the project is begun, to ensure that all aspects of environmental compliance have been covered.

Compliance with the current regulations and guidelines is tedious, but not economically unreasonable. Many operators in the industry voluntarily exceed the requirements set forth by the regulations. These operators should not only continue their efforts for protection of the environment, but they should publicize these efforts so that the general public will be made aware of the environmentally responsible attitude of the industry. Continue efforts in this area will prevent promulgation of new environmental laws and regulations that would lessen the economical potential of oil and gas operations.

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