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OFF SHORE OIL PLATFORM DECOMMISSIONING:

A Comparative Study of Strategies and the Ecological, Regulatory, Political and Economic Issues Involved in Decommissioning Planning

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by

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Abstract

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Offshore oil and gas structures have been in existence since the 1920's and their associated technology has developed rapidly. Offshore structures have come from being simple derricks at the ends of wooden piers to massive structures weighing over 20,000 tons miles from shore. The complexity of decommissioning these massive structures has increased and the technology to remove them has fallen behind the ability to build and install these deep-water installations. This thesis explores the influences of ecology, regulations, politics, and economics on decommissioning strategies by examining past and ongoing decision-making methodologies in three regional areas; United States West Coast (California), Northern Gulf of Mexico, and the North Sea. Our analysis indicates that decommissioning planning is a developing social process for deep-water structures operating near the frontier of oil and gas production. In California and the North Sea, a collective social view has emerged in

which decommissioning options that result in portions of platforms remaining in the ocean constitute “ocean dumping” and significant opposition has emerged. In the Gulf of Mexico, offshore oil and gas drilling and production activity has been viewed as ecologically beneficial by politically influential diving organizations and sport and commercial fishing groups. The view these groups hold has emerged from a long history of their beneficial use as artificial reefs. Diving organizations and sport and commercial fishing groups view the loss of platforms as loss of fishing habitat and, therefore, a negative impact on their use of the ocean. We conclude that the differences in the areas of ecology, regulations, politics, and economics are substantial and warrant the creation of customized decommissioning programs for each of these regions. We further propose a decommissioning program for California that involves the use of a consolidated decommissioning approach that allows for an exchange of benefits similar to the Gulf of Mexico programs.

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Executive Summary

Offshore oil and gas structures have been in existence since the 1920's and their associated technology has developed rapidly. Offshore structures have grown from being simple wooden derricks mounted on wooden piers to massive structures weighing over 20,000 tons located hundreds of miles from shore. The complexity of decommissioning these massive structures has increased and the technology to remove them has fallen behind the ability to build and install these deep-water installations.

Decommissioning strategies and increased awareness of their associated environmental impacts pose a myriad of technical, social, and ecological challenges for decision-makers. This report explores the influences of ecological considerations, regulations, politics, and economics on decommissioning strategies by examining past and ongoing decision-making methodologies in three regional areas; United States West Coast (California), Northern Gulf of Mexico, and the North Sea. The report examines the historical development, methodology, and outcomes for each case study and identifies pivotal issues, elements or organizations that influence decommissioning planning decisions. The intended audience includes decision-makers and stakeholders with limited first-hand experience in decommissioning projects that require a guidance document to assist them in directing their information-gathering or decision-making strategy. This report provides insights into the decommissioning process and the range of outcomes.

Our analysis indicates that decommissioning planning is a developing social process for deep-water structures operating near the frontier of oil and gas production. In California and the North Sea, a collective social view has emerged in which decommissioning options that result in portions of platforms remaining in the ocean constitute “ocean dumping” and opposition to these decommissioning strategies has emerged. In California, this view has come about as the result of both historic and recent negative impacts of oil and gas production on local coastal populations. In the North Sea the historic use of the ocean as a food-producing resource has fostered strong environmental sensitivity. Coastal populations in California and fishermen in the North Sea region are opposed to uses of the ocean that place ecological resources at risk. These groups are politically strong and have substantial influence in the decommissioning planning process.

In the Gulf of Mexico, offshore oil and gas drilling and production activity has been viewed as ecologically beneficial by politically influential diving organizations and sport and commercial fishing groups. The view these groups hold has emerged from positive experiences with oil and gas platforms that have enhanced fishing and diving opportunities by acting as artificial reefs. These de facto artificial reefs have a long history of use by these groups that view the loss of platforms as loss of fishing habitat and, therefore, a negative impact on their use of the ocean.

Diving and fishing groups in the Gulf of Mexico have influenced decommissioning planning by pushing for the creation of a rigs-to-reefs program in order to preserve the presence of portions of oil and gas platforms and thus the quality of their use of the

ocean. This program has been well supported by the public with the exception of trawler fishermen. Trawler fishermen oppose the creation of artificial reefs because they can act as “snags” on the ocean floor that have the potential to damage trawling gear. In this way artificial reefs cause the loss of trawling area. However, this group has not been influential in affecting decommissioning planning.

An assessment of the decommissioning program in the Gulf of Mexico has revealed that, although political pressure determines what decommissioning options are available to the oil industry, the design of the decommissioning program influences what option is selected. This selection process is determined almost exclusively on the basis of cost effectiveness. Exceptions to this are rare and appear to be influenced by the oil industry’s desire to maintain good public relations in the Gulf. The objectives and constraints of the decommissioning process are equally effective at influencing decommissioning processes. The requirement that artificial reef programs are exclusively funded through a 50/50 decommissioning cost-savings sharing between states and oil companies are particularly influential. These program elements have created an incentive to create deep-water artificial reefs from rigs. These then act as a funding source for the creation and maintenance of shallow-water reefs from rigs or other materials. Program managers trade off accessibility to the deep-water reefs in exchange for funds to create reef access in shallower waters.

Because of the different social characteristics of the North Sea and California, distortions similar to those of the Gulf of Mexico artificial reef programs would not be

tolerated by local political organizations. Caution is therefore highly advised for decision-makers that wish to emulate the Gulf program.

The Gulf of Mexico's artificial reef programs as well as negotiations surrounding the decommissioning of California platforms indicate that decommissioning options are negotiable. This negotiation process has not yet emerged in the North Sea but is anticipated. The commodities being negotiated are cost-effective decommissioning options, offered by the public and their representatives, in exchange for financial concessions. An additional element is the economic benefits to fishing interests. These economic benefits stem from expected ecological benefits to certain fisheries. More cost-effective decommissioning options are offered by leaving all or portions of an oil platform in the ocean and then sharing the avoided cost savings with states managing the artificial reef programs. Ecological benefits may arise from the function of these abandoned platforms as artificial reefs.

In the Gulf, artificial reef users have provided ample evidence of increased fishing opportunity and enhanced fishing experiences although the cumulative ecological impacts of artificial reefs have not been scientifically quantified. These increased opportunities and experiences have occurred in California to a lesser degree, but the opposition of local environmental groups has dampened the political support for an artificial reef program. The environmental groups have pressed governmental representatives to evaluate ecological and resulting economic benefits much more rigorously than in the Gulf. Given the large array of confounding factors involved in such an evaluation, it is unlikely that it can be accomplished satisfactorily. In the

North Sea, ecological impacts, fishing experiences, and their influence on decommissioning process are not well understood.

The cumulative ecological benefits of artificial reefs in the Gulf have not and may never be assessed with scientific credibility. Not only is this due to confounding scientific variables, but also because the benefits have already been valued in a manner different than that being attempted in California; ecological benefits are based upon perception. These perceived benefits have been valued satisfactorily due to the long beneficial relationship of the negotiating parties. This is not the case in California, leading to a demand for a quantification of ecological benefits should an artificial reef program be implemented.

It is our opinion that the basis for the exchange of benefits in the decommissioning negotiations occurring in California is flawed. The commodities being bartered in California are modeled after the Gulf of Mexico programs. Differences in social values and the different assortment of political players have shifted the emphasis of these commodities to the valuation of ecological benefits. Even if such valuation could be done with substantial scientific certainty, political relationships lead us to believe that the valuation cannot be expected to occur to the satisfaction of environmental groups.

We offer a proposal with an alternative negotiation commodity. A significant portion of decommissioning costs are related to the deployment and mobilization of heavy decommissioning equipment such as barges and cranes. These costs are higher if the operation is conducted one platform at a time. An alternative decommissioning

option is to continue with the complete removal requirements but allow for the removal of platforms several at a time—a strategy that we refer to as Consolidated Offshore Decommissioning (COD). The commodity to exchange in this case is time. Rather than requiring the initiation of removal of an individual platform within one year of it ceases operation, the platform may be allowed to remain in place until other platforms require removal. Cost savings can be substantial by decommissioning several platforms sequentially with the same crew and equipment. Time must be valued such that the maximum time that negotiating parties agree to tolerate before removal must occur is equal to the cost-savings that the oil industry gains. Our suggestion involves negotiating for the maximum amount of time until removal of all platforms identified in the COD project is required. This upper limit on time is a more appropriate commodity for exchange over ecological benefits and results in a politically desired decommissioning strategy.

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Preface

This report presents an overview of the decommissioning of offshore oil platforms. Chapter One opens with a general overview of the decommissioning strategies and scenarios for existing offshore installations. Chapters Two through Four each give a brief summary of three regions with active offshore oil development. Chapter Five presents an analytic comparison of these regions and the factors influencing the current debate in regard to the various decommissioning scenarios. Finally Chapter Six presents a proposed strategy for decreasing decommissioning costs, specifically in regard to the currently existing and any future platforms off the coast of California.

Three regions were selected for investigation. These were the Gulf of Mexico, the California Coast, and the North Sea. Regions were selected for their differences in development of decommissioning programs, different ownership interests, availability of information, and variations in environmental conditions. An author was selected to conduct research specifically in one of three assigned areas. Data was compiled and a cross regional analytic comparison was conducted.

Chapter 1: Overview of the Offshore Oil Industry

Introduction

As more offshore oil reserves approach the end of their production life, the decommissioning of the associated deepwater oil and gas platforms has become a challenging task. There are approximately 6500 offshore oil and gas platforms worldwide with a total estimated cost of removal of $35-40 billion (USD). Of these, approximately 3800 platforms exist in the Gulf of Mexico, 27 on the West Coast of the United States, and 475 in Europe. Approximately 315 offshore oilrigs operate in international waters (Gulf Publishing Company, January 1999). The cost of removal in the Gulf of Mexico has been estimated at $1-5 billion (USD) (Kasprzak, 1998; Manago & Williamson, 1997). The depth at which offshore oil and gas structures are located currently ranges up to 1,500 feet for a fixed platform and up to 3,000 feet for a complaint tower structure (Gulf Publishing Company, August 1998). One of the deepest platforms in the Gulf Coast federal waters stands in 1,754 feet 130 miles southeast of New Orleans operated by Texaco (Will & Simon, August 1998). Technological advances, depletion of older near-shore reserves, and the need for oil exploration and production has made deep-water oil and gas production both possible and necessary.

Deepwater structures pose serious technological and political challenges to current removal strategies. Current United States regulations require complete removal and

site clearance. International agreements generally require the same. Oil and gas industry representatives claim that decommissioning technology has not advanced sufficiently to make the complete removal strategy cost effective compared to alternatives that leave some portion of the structure in place. The most recent decommissioning technologies have removed structures only as deep as 450 feet (Lisle Reed, personal communication, 1998; Manago & Williamson 1997). Fixed structures are being installed at depths up to 3,000 feet and offshore oil and gas exploration indicates that these depths will become even greater (Gulf Publishing Co. 1998; Lisle Reed, personal communication, 1998; Manago & Williamson 1997). Noreng (1980) noted the increasing depths at which oil is being extracted stating that "it is likely that the world will have to get increasing quantities of oil from the frontier areas, in the Arctic and on the continental shelves".

The increasing cost of removal, as a function of depth, and the lack of industry removal experience, provide incentives for the oil industry and government regulators to seriously consider alternative methods of decommissioning. At the same time, social factors such as increased environmental awareness have prompted vocal, if not violent, opposition to any decommissioning alternatives perceived as the free use of the ocean as a dumping ground by the oil industry.

In the Gulf of Mexico, where the oil industry and state and federal regulators have had comparatively greater experience in decommissioning, an active program has been developed which offers alternatives to complete removal for both deep and shallow water platforms. The program, which allows operators to leave structures in the water

for the purpose of enhancing fisheries as artificial reefs, allows for a variety of partial-removal decommissioning options. The program, often referred to as Rigs-to-Reefs has been well received by both local environmental groups and the oil industry.

In contrast, California has had little experience in dealing with decommissioning issues. This inexperience, in combination with a greater proportion of structures located in deep waters, the lack of established decommissioning infrastructure and strong local opposition to oil development and production has made the selection of decommissioning strategies in this region a highly contentious issue.

This report seeks to assist individuals who may be involved in, or are presently involved in the selection of decommissioning strategies. The report will accomplish this by; 1) relating historical approaches to decommissioning in United States, specifically the Gulf Coast and the West Coast, California, 2) describing major issues influencing decommissioning strategies in these cases, 3) providing insights into the strategy selection process, and 4) suggesting improvements in the strategies selection process. This report consists of an overview of decommissioning programs in the Gulf States of Louisiana and Texas that account for approximately 99 percent of all of the offshore oil platforms in the Gulf of Mexico (Artificial Reef Subcommittee 1997). This report will also examine decommissioning processes developing in Southern California, specifically Santa Barbara County, and the North Sea.

Offshore Oil and Gas Facility Decommissioning Decision Tree

Figure #1 below illustrates the variety of decommissioning options for equipment aboard oil and gas platforms, connecting piping, and the structure itself. This report addresses the deck and jacket structure. In most instances, the deck portion of an oil and gas platform is recovered for use with a new jacket in another location (Kasprzak, personal communication, February 11, 1999). The jacket, designed for a particular depth, is usually not reusable (Kasprzak, personal communication, February 11, 1999). In this report decommissioning of platforms typically refers to the final disposition of the jacket although the discussion can easily include the deck portion also.

There are a number of issues surrounding all of the decommissioning options shown in Figure #1 that are taken into consideration depending upon the region where the operation takes place. All options involve air emissions from decommissioning equipment. In the Santa Barbara area, designated as a non-attainment area under the Federal Clean Air Act, air emissions can have a significant impact on onshore air quality. These impacts must be considered in the decommissioning process.

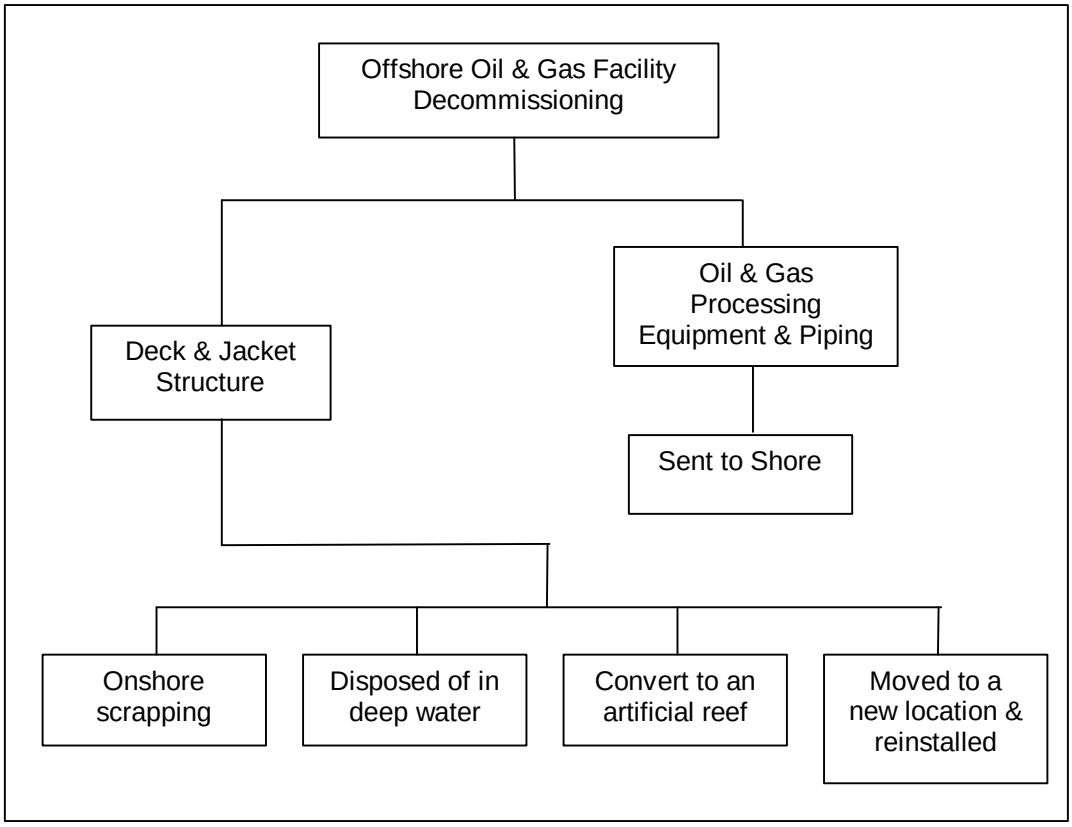
Onshore scrapping for recycling requires that recycling facilities are located within a reasonable distance of the decommissioning site. Scrapping of platforms for disposal in a landfill precludes the availability of the landfill being capable of accommodating the equivalent of a 20,000-ton structure. Such a massive structure could significantly

reduce the useful life of a landfill. Removal and reinstallation, discussed earlier, also assumes that there is a suitable location within a reasonable distance.

Deepwater disposal involves moving the platform beyond the continental shelf and scuttling or sinking it. This option, although possibly most cost-effective, has proven not to be politically feasible in the North Sea. In the Gulf of Mexico and California, this option is not permitted under current federal regulations.

As with deepwater disposal, the conversion of platforms to artificial reefs in the United States requires a change in regulations as has occurred in the Gulf of Mexico. The conversion assumes that the final location of the platform results in a productive reef. Negative impacts to navigation, military operations, and other users of the sea are issues surrounding the location of the artificial reef. The location also must be within a reasonable distance of the original position of the oil and gas platform.

Figure #1: Decommissioning Decision Tree Diagram



Chapter 2: The Gulf of Mexico

Methodology

Information on the Gulf Coast was gathered through literature searches, reviews of federal and state government documents, oil industry periodicals, and interviews conducted with artificial reef program managers via electronic mail and by telephone. Both literature and federal government document information were obtained through computerized library catalogs. Scientific literature searches resulted in information on biological productivity of artificial reefs in the form of censuses and size distribution surveys. Available scientific literature was not informative on the decommissioning strategies selected in the Gulf.

Federal and state government documents provided details concerning the rules and regulations of decommissioning. Transcripts of federal congressional hearings were obtained from government document libraries at both UC Riverside and UC Santa Barbara. The majority of state government documents were acquired directly from state agencies responsible for their artificial reef programs. Texas Parks and Wildlife Department provided copies of their artificial reef program and transcripts from the 1990 January, May, and August meetings of the Artificial Reef Advisory Committee. Louisiana Department of Wildlife and Fisheries provided a copy of the Louisiana Artificial Reef Plan and the copy of a department sponsored paper. The document requests were made to both of these agencies via their respective agency Web sites.

The Hancock Library of Biology and Oceanography at USC provided a copy of the Texas Artificial Reef Fishery Management Plan.

Several books were read in order to gain a thorough understanding of the history and nature of the oil industry and it's technological capabilities. These books include Daniel Yergin's The Prize (1991), Pratt, Priest, and Castaneda's Offshore Pioneers (1997), Judith Ewell's Venezuela and the United States: From Monroe's Hemisphere to Petroleum's Empire (1996), and Romulo Betancourt's Venezuela: Oil and Politics (1979).

Insight on the operation of artificial reef programs was obtained from a number of personal communications with artificial reef program managers. These electronic mail and personal interviews were invaluable in examining the artificial reef programs as they developed from state and federal laws. Jan Culbertson and Doug Peter of the Texas Parks and Wildlife Department were interviewed via electronic mail over the course of approximately two weeks. Rick Kasprzak of the Louisiana Department of Wildlife and Fisheries was interviewed via telephone. Texas and Louisiana members were questioned extensively on the operations of their programs. Tom Van Devender of the Mississippi Department of Marine Resources was contacted via electronic mail briefly in order to confirm the scope of the state's artificial reef program.

The bulk of the information gathered focused on the states of Louisiana and Texas. Ninety-nine percent of the offshore oil and gas platforms are located within the state and federal waters of these two states (Artificial Reef Subcommittee 1997). Although

the states of Florida and Mississippi have active artificial reef programs, they currently have no offshore oil and gas development (Aska 1981, Tom Van Devender, personal communication, February 9, 1999). The states of Mississippi and Alabama comprise the remaining one- percent of the offshore oil and gas operations in the Gulf of Mexico. Because of this, decommissioning strategies and programs in these three states were not included in this report.

Development of the Artificial Reef Program

Fishermen in the Gulf of Mexico have long recognized the value of artificial reefs as "hot spots" of fishing opportunity. As early as 1860, American fishermen had observed that sunken timber and, much later, sunken ships and other objects quickly became artificial reefs that attracted numerous numbers of pelagic and reef-associated fish species (Aska 1981, Stone 1974). The largest assortment of de facto artificial reefs in the world began with the placement of the first offshore oil platform in the Gulf November 14,1947 by Kerr-McGee (Subcommittee on Oceanography, Gulf of Mexico, and the Outer Continental Shelf 1993; Pratt et al, 1997). Up to 4000 structures had been put in place by the 1980s producing not only oil and gas but also increased fishing success for Gulf Coast fishermen. In 1987 offshore oil platforms had become so popular that a Minerals Management Service (MMS) use pattern study estimated that 70% of all offshore saltwater fishing trips within the United States Exclusive Economic Zone were to offshore oil platforms (Reggio 1987).

Not all sunken items serve equally well as artificial reefs. Automobile bodies, "white-goods" (washing machines, dryers, refrigerators, etc.), small sunken boats, and automobile tires had all previously performed poorly under high-energy conditions such as hurricanes (Kasprzak 1998). In several cases, such items proved to be too unstable or of two short of life span and either were dispersed by hurricanes or decayed within a few years. Decommissioned oil platforms have been estimated to last as long as 300 years and, when properly sited, proved to be able to withstand hurricane force conditions (Kasprzak 1998). A number of Gulf demonstration rigs-to-reefs projects proved that platforms possessed the needed characteristics of stability, durability, availability, and function and were quickly recognized as the best material of opportunity for artificial reefs (Artificial Reef Subcommittee 1997, Kasprzak 1998).

The development of the Gulf rigs-to-reefs program required little help from the oil industry. By the 1970s, oil and gas platforms had gained widespread recognition from fishing interests who had begun to organize themselves in promoting a well-organized rigs-to-reefs program. With 40% of offshore platforms expected to be decommissioned by the year 2000, many fishermen viewed the creation of an artificial reef program as a program that would preserve fishing habitat as well as preserve their favorite fishing spots (Sickle and Pope 1987, Subcommittees on Oceanography, Gulf of Mexico, and the Outer Continental Shelf and Fisheries Management 1993, Artificial Reef Subcommittee 1997). Gulf States supported an artificial reef program because they believed that this program would maintain a valuable commercial and sport fishing industry.

An estimated 30% of recreational fisheries catch were caught near Louisiana and Texas offshore oil and gas platforms with overall economic benefits comprising a significant portion of the $640 Million in economic benefits in Louisiana alone (Aska 1981, Reggio 1989, Artificial Reef Subcommittee 1997). A number of conferences had been held in Florida and Texas; in 1974, 1977, and in 1979 (Aska 1981, Artificial Reef Conference 1974). By 1983, House Representative John Breaux of Louisiana had become involved in the public push for an organized artificial reef program sponsoring, along with 17 other representatives, House bill HR 5447 (Aska 1981, Report to Accompany HR 5447 1984). This was a piece of legislation that would become known as the National Fishing Enhancement Act of 1984.

The National Fishing Enhancement Act of 1984 removed significant barriers to the development of artificial reef programs at the state level. The first barrier involved the transfer of liability from oil platform operators to sponsors of artificial reefs. Traditionally, platform operators were required by the Outer Continental Shelf Lands Act found in Title 30 of the Code of Federal Regulations Part 250 (I) to be responsible for site clearance when the operation of an oil platform was terminated. These regulations require that platforms are completely removed and the site restored within one year after production is ceased. The implication was that liability remained with the oil platform operators until this requirement was met. Platform operators were reluctant to leave any structure standing in place without some form of liability release (Tom Van Devender, personal communication, February 11,1999). The Act provided a mechanism whereby liability was transferred from oil platform operators to artificial reef sponsors in the event that platform owners decided to donate their rig to an

artificial reef program. The Act also absolved reef sponsors of liability if the reef met permitting requirements.

Another major obstacle that the Act tentatively removed was the issue of the ecological effect of artificial reefs on fish species. In 1980 prior to the Act, a private developer, Fishery Enhancement Corp, submitted a proposal to place an artificial reef made from thousands of automobile tires off the Coast of Massachusetts (Committee on Merchant Marine and Fisheries 1983). The permitting process required the approval of the regional office of the Environmental Protection Agency. The regional director of the National Marine Fisheries Service, Allen E. Peterson, expressed concern on the ability of the reef to promote fish populations. Mr. Peterson, recommended that "the applicant prove that the reef does in fact enhance fisheries by demonstrating an increase in productivity of the area" (Peterson 1980). Based on these concerns, the Environmental Protection Agency required that the project obtain an ocean dumping permit on the grounds that the platform did not meet the fisheries enhancement exemption in the Ocean Dumping Ban found in Title 40 of the Code of Federal Regulations, section 220.1 (C)(2) (Ikalainen 1980). Although a compromise had been offered in which the platforms would be placed only as a demonstration project, Mr. Peterson maintained that there had not been sufficient evidence that the artificial reef would "enhance" the fishery resource (Peterson 1980). Apparently, the point of contention was what is currently known as the recruitment vs. attraction issue.

At that time, the degree to which artificial reefs acted in promoting mortality of fisheries by aggregating fish for fishermen or the degree to which they promoted

fishery stocks by providing habitat, food, or spawning grounds, was unknown. If artificial reefs functioned such that they contributed to fish mortality more then they promoted fish populations; they could hardly be considered to "enhance" fishery resources. Even to this date, this issue remains unresolved (Doug Peter, personal communication, 1999). Although the reef was eventually permitted, the passage of the Act in 1984 formally legitimized the assumption that it was possible to manage the use of artificial reefs whereby both fishermen and fisheries benefited from artificial reefs. No clear evidence was required that a proposed artificial reef will enhance fish populations prior to its installation.

Overview of the Gulf Coast Artificial Reef Program

Since the passage of the National Fishing Enhancement Act and the subsequent state legislation that created state-managed artificial reef programs, over 1000 offshore oil and gas platforms have been decommissioned (Sickle & Pope 1987). Of these, over 100 offshore platforms have been converted to artificial reefs. Of these decommissioned platforms, 85% of those located in 200-400 became artificial reefs vs. 40% located in 100-200 feet of water (Manago & Williamson 1997). Because decommissioning and site clearance costs increase significantly with depth, this distribution has resulted in tremendous cost saving to the oil industry.

Prior to the program, platform operators were required to remove the platform to 15-feet below the mudline and ensure that no obstructions remained. The conversion of an oil or gas platform to an artificial reef created an array of new options in the way of the selection of decommissioning strategies. However, it should be noted that conversion of a platform to an artificial reef is strictly a voluntary exchange and is often referred to as the "donation" of an obsolete platform. Platform owners will generally donate if any of the decommissioning strategies offered by the local artificial reef program is more cost effective than complete removal to shore.

Conversion to an artificial reef may mean approximately four distinctly different decommissioning strategies. The first involves leaving the platform jacket standing in place cut below the water surface according to Coast Guard navigational requirements. The second involves toppling the jacket in place so long as the

resulting configuration leaves the required clearance from the water surface. The third requires that the jacket be removed to a permitted artificial reef site. The fourth involves the complete removal of the jacket to land facilities for disposal. This fourth option should be considered that default option required by MMS unless the platform becomes an artificial reef. It is possible for a jacket to be decommissioned standing or toppled in place without the proper clearance required for navigation. The ramifications of this strategy will be discussed later.

Regulatory Influences on Decommissioning Strategies

The Texas and Louisiana Artificial Reef Fishery Management Plans

As mentioned earlier, both the Louisiana and Texas artificial reef programs contained approximately 99% of the offshore oil and gas platforms within their jurisdiction. Both state-run programs were created with enabling state legislation. For Texas, this legislation was the Artificial Reef Act of 1989 that became Subtitle H of chapter 89, Parks and Wildlife code. This legislation named the Texas Parks and Wildlife Department as the managing authority for the artificial reef program. The program is funded exclusively through the Artificial Reef Fund. Proceeds to the fund are obtained through a 50-50 avoided cost savings split between the donor of the platform and the Texas Parks and wildlife department. The purpose of the Texas act was to:

(1) enhance and conserve fishery resources to the maximum extent practicable;

(2) facilitate access and use by Texas recreational and commercial fishermen;
(3) Minimize conflicts among competing uses of water and water resources;
(4) Minimize environmental risks and risks to personal and public health and property;
(5) be consistent with generally accepted principles of international law and national fishing law and not create any unreasonable obstruction to navigation;
(6) Use the best scientific information available; and
(7) Conform to the state artificial reef plan. (Texas Parks and Wildlife Code Chapter 89 Subtitle H., section 89.023)

Similarly, the Louisiana artificial reef program was enabled by the Louisiana Fishing Enhancement Act of 1986. The purpose of the Act was to:

(1) Enhance and conserve fishery resources to the maximum extent practicable.
(2) Facilitate access and utilization by Louisiana recreational and commercial user groups.
(3) Minimize conflicts among competing uses of waters covered under this Act and the resources in such waters.
(4) Minimize environmental risks and risks to personal and public health and property.
(5) Be consistent with generally accepted principles of international law and

national fishing law, and not create any unreasonable obstructions to navigation." (HB 1111 1986)

This Act created the Louisiana Artificial Reef Council consisting of the Secretary of the Louisiana Department of Wildlife and Fisheries, Dean of the Center for Wetland Resources, Louisiana State University, and the Director of the Louisiana Geological Survey. As with Texas, an exclusive funding source was created called the Artificial Reef Development Fund whereby avoided cost savings are split 50-50 with the state and the state share is deposited into the Fund.

The first three objectives of the Texas and Louisiana artificial reef legislation are key influences on the selection of decommissioning strategies. The first objective describes what is being done or what managers are to accomplish at the artificial reef site; enhance and conserve fisheries. One problem is that neither piece of state legislation nor the federal legislation defined what "enhancement" of fishery resources is. At the same time, "enhancement" of the fishery resource is not defined in the Ocean-Dumping Ban either.

The second objective, facilitate access and utilization of the artificial reefs has influence on the location of artificial reefs by program managers. A Minerals Management study indicated that different user groups of active oil and gas platforms as de facto artificial reefs in Louisiana varied considerably both seasonally and spatially (Ditton & Auyong 1984). In Louisiana, recreational users fish an average of 25 miles from shore, charter fishermen are willing to travel 16-40 miles, scuba divers

19-47 miles, and commercial fishermen 23-72 miles (Sickle & Pope 1987). Use studies in Texas indicate that the majority of recreational users of artificial reefs do not travel more than 30 miles from popular boat launch shore sites such as Galveston (Stephan et al 1990). Therefore, in order to meet the requirement of the legislation strictly, program managers would have to place the vast majority of artificial reefs less than 30 miles from shore. Although platform owners want to minimize decommissioning costs by donating a platform to an artificial reef program, relocation requirements imposed by program managers for the purpose of facilitating access may make related decommissioning options much less economically attractive. The nature of this conflict will be discussed in more detail in the section titled “economic considerations”.

The third objective of the states' legislation is that both programs are to minimize conflicts among competing users. Once again, this requirement has influence on where artificial reefs are to be placed. One of the major competing uses of the Gulf is the shrimping fishery. Trawlers whose equipment is used to trawl the bottom of the ocean generally harvest shrimp. Trawl nets can snag and be damaged or lost on artificial reefs. Although the National Fisheries Enhancement Act absolves reef sponsors (usually the state) of liability, siting artificial reefs in trawling grounds is generally avoided in order to minimize conflicts with the trawling industry (Committee on Merchant Marine and Fisheries 1993, Stephan et al 1990). As with the access and utilization requirement, this feature also spatially limits the location of allowed artificial reef sites and causes the goals of platform owners and program managers to conflict.

In order to minimize conflicts, facilitate access, and meet other requirements of their respective legislation, both the Texas and Louisiana artificial reef programs utilized exclusion mapping. Traditional trawling grounds, shipping lanes, areas with unstable substrate, historical sites, and other inappropriate locations were mapped. In Texas, these areas were excluded from artificial reef development and remaining areas are termed artificial reef "priority areas".

In Louisiana, sets of eight “artificial reef planning areas” were selected. Reef complexes, or aggregates of artificial reef material including platforms, are developed within these planning areas. Artificial reef complexes are not allowed to exceed 0.75 square miles in area (Sickle & Pope 1987).

In comparison, Texas priority areas allow for somewhat greater flexibility in siting artificial reefs vs. Louisiana planning areas (Rick Kasprzak, personal communication, February 11, 1999). The eight Louisiana planning areas are permitted under general permits issued by the U.S. Army Corps of Engineers. Oil and gas platforms converted to artificial reefs outside of these permitted areas are required to undergo their own permitting process (Rick Kasprzak, personal communication, February 11, 1999). In Texas, there is only one general permit issued for High Island. All other new artificial reefs must undergo the 90-day permitting process (Douglas Peter, personal communication, February 2, 1999). Because of this, Texas artificial reefs may be located anywhere within the more extensive priority areas. The need for new permits does not necessarily stop the creation of a new artificial reef in either state.

Economic Influences on Decommissioning Strategies

Both the Texas and Louisiana artificial reef funds began with no seed money from the states. Therefore, initial effort was focused on obtaining enough funding to maintain artificial reefs which would benefit the most recreational users as possible. Several use studies indicated that the largest majority of recreational artificial reef users did not travel further than 30 miles from shore. At the same time, few such near shore artificial reefs could be placed without requiring expensive buoying under Coast Guard regulations. Such buoying could cost over $12,000 per buoy and $1000 in maintenance per year (Committee on Merchant Marine and Fisheries 1983). The cost savings split that would result from the decommissioning of shallow water platforms is generally not sufficient to meet this funding requirement.

Because of this, artificial reef program managers face a dilemma. Focusing on the creation of near shore artificial reefs would create an artificial reef program that could not sustain itself financially even though it would benefit the most recreational users. In order to meet the financial needs of an artificial reef program, a larger number of deep-water platforms would have to be decommissioned as artificial reefs thereby generating sufficient funding to support shallow water reef construction, maintenance, and marking. Such deep-water artificial reefs, despite attracting a few users, generate significantly larger cost saving to the platform operators and thus greater funding for artificial reef programs then shallow water platforms.

Currently, sufficient funding exists to support the Louisiana artificial reef program. Approximately $13 million is contained in the fund as of this writing generating more than enough funding for the program (Rick Kasprzak, personal communication, February 11, 1999). This is not necessarily the situation for Texas, which has far fewer offshore platforms being decommissioned in its waters.

Note that it is ultimately the decision of the platform owners to decide whether or not a platform becomes an artificial reef. Artificial reef program managers have relatively little control over this decision (Jan Culbertson, personal communication, January 26, 1999). Platform owners base this decision primarily on cost-effectiveness. The marginal cost-effectiveness between decommissioning strategies, specifically complete removal vs. donation to an artificial reef program, is relatively little for shallow water platforms (Committee on Merchant Marine and Fisheries 1993). These marginal differences increase dramatically for deep-water platforms and can amount to as much as one million dollars per platform (Rick Kasprzak, personal communication, February 11, 1999). Because of the relatively higher cost-savings to platform owners and their greater contributions to artificial reef funds, decommissioning deep-water platforms as artificial reefs is more attractive to both platform owners and program managers. However, other factors contribute to determining what decommissioning strategy is selected from those offered by a platform's donation to a reef program.

Location of any obsolete oil and gas platform with respect to a planning or priority area is another major determinant for the selected decommissioning strategy. In

comparing the cost of complete removal vs. relocation to an artificial reef site, the distance at which the platform is moved has significant influence. Platforms located within planning or priority areas have a greater cost-effectiveness advantage over platforms located outside of these areas. For platforms located outside of planning or priority areas, those closest to these areas also have a greater cost-effectiveness advantage.

Obsolete oil and gas platforms that are already located in priority or planning areas do not always have to be moved. The decision of whether or not these platforms are moved depends on a cost comparison between the costs of buoying, marking, and maintaining a toppled platform against the financial gains to the artificial reef funds from higher avoided cost savings (Rick Kasprzak, personal communication, February 11, 1999, Douglas Peter, personal communication, February 4, 1999). It may be a case that decommissioning the platform in place, although resulting in higher financial gains for the artificial refund, is more costly over the long run due to the operation and maintenance costs. Therefore artificial reef program managers may reject a donated platform thereby influencing decommissioning strategies. This is particularly true if Coast Guard regulations require that the artificial reef site be marked with buoys that add substantially to the cost of maintaining the reef.

There are two situations in which a new artificial reef requires buoying. First, if the artificial reef is located within five hundred yards of a fairway, channel, or anchorage area and second, if the reef has less than 200 feet of water clearance (Sickle & Pope 1987). Because shipping lanes are not necessarily fixed, a donated platform that runs

the risk of requiring buoying in the future due to rerouting of shipping lanes may not be accepted as decommissioned in place even if current lane routes do not require buoying (Rick Kasprzak, personal communication, February 11, 1999).

Buoying and depth requirements can prove to be prohibitive for converting platforms to artificial reefs near shore or in shallow water. The situation in Mississippi is such that the state waters are so shallow that the state cannot accept obsolete platforms without many of them protruding above the water surface or requiring buoying even if the platform is toppled on its side (Tom Van Devender, personal communication, February 10, 1999). Although not as extensive a problem for Texas, funds for shallow, near shore reefs made of other materials of opportunity such as rubble or shells are gained from the rigs-to-reefs program (Douglas Peter, personal communication, February 2, 1999).

Not all platforms converted to artificial reefs are located within priority or planning areas. These donated platforms must go through the permitting process for siting artificial reefs on a case-by-case basis. In Louisiana, this process has been used for platforms that have been severely damaged in hurricanes or accidents, or proven to be extremely expensive to remove (Rick Kasprzak, personal communication, February 11, 1999). In all cases, these platforms must demonstrate biological value by functioning as an artificial reef. In Louisiana, deep-water platforms have been allowed to be decommissioned in place if they demonstrate the ability to function as an artificial reef despite being unreachable by most fishermen. The Louisiana artificial

reef program allows for this condition by designating these artificial reefs as deep-water sanctuaries (Sickle & Pope 1987).

External financial influences may also come into play in the selection of decommissioning strategies. Although not having its own offshore oil and gas platforms, the state of Florida has been involved in offering financial incentives to platform owners. In several cases, the state, or private organizations have subsidized the relocation of obsolete platforms into Florida State waters (Texas Artificial Reef Advisory Committee August 1990). None of the state's legislation excludes private organizations from becoming involved in the siting of artificial reefs. These organizations must, however, go through the permitting process if new artificial reefs are being created.

Ecological influences on Decommissioning Strategies

Both the Texas and Louisiana artificial reef programs require that artificial reefs enhance fishery resources. In practice, enhancement has been demonstrated to mean a combination of improving fishing success and increasing local fish biomass. This is best illustrated by site selection criteria of priority and planning areas.

The siting of new artificial reefs must take into consideration the impacts on displaced species. Artificial reefs cannot be placed where they may adversely affect fish species such that they undermine existing and proposed fishery management plans

and regulations (Stephan et al 1990). These priority and planning areas were also selected to both facilitate access of fishermen to fisheries and enhance fishery resources (Sickle & Pope 1987, Stephan et al 1990). These two objectives are influential in determining the location of artificial reef sites. Reefs are generally not placed near existing, natural hard bottom or biologically productive grass beds (Jan Culbertson, personal communication, January 26, 1999, Stone 1985). In practice, facilitating access to fisheries has meant increasing fishing success and fishing opportunities; increased fishing success by increasing the number of fish that may be caught at an artificial reef and increasing opportunities by locating artificial reefs at reasonable distances for most of the human fishing population.

Not all platforms are able to function well as artificial reefs. Many shallow water platforms are constructed of small single caissons that lack the complicated geometry that make them suitable for artificial reefs (Douglas Peter, personal communication, February 4, 1999). When some deep-water jackets are "topped" or cut to meet Coast Guard requirements, the most biologically productive section of the jacket may be removed significantly reducing ecological value to fishermen (Dr. Lee Bafalon, personal communication, June 1998). In Texas waters, biological productivity extends to approximately 300 feet below the surface of the water (Douglas Peter, personal communication, February 2, 1999). Generally, these single caisson shallow water platforms and biologically unproductive deep-water platforms are rejected for artificial reefs for the reasons just discussed. However, an interesting form of logic has been applied to justify the decommissioning of deep-water platforms in place and topped (partial removal).

In October 1987, a platform in two hundred forty feet of water was toppled in place near South Marsha Island off the coast of Texas. Although the platform was inaccessible to most recreational fishermen and a dubious artificial reef, the platform owner justified this strategy by claiming that it provided the maximum savings and "hence the maximum donation [to] the program" (Artificial Reef Advisory Committee May 21, 1990). This line of reasoning still persists although it is not a dominating factor. Still, "the [Texas] Program does accept deeper water structures for their biological as well as economic value to further enhance near shore reefs" (Douglas Peter, personal communication, February 2, 1999).

Ecological considerations have been cited in Texas to recommend specific methods to employ to sever the legs of offshore oil and gas platforms from the sea floor. There are two methods used for severing the legs; mechanical or abrasive cutting and explosives (Artificial Reef Subcommittee 1997, Rick Kasprzak, personal communication, February 11, 1999). Generally, the use of explosives inside of the jacket legs has proven to be the most economical and thus most often method utilized in the Gulf of Mexico (Artificial Reef Subcommittee 1997). From an ecological perspective, explosives are not the most desired because of their potential to cause mortality to tortoises and damage the biota already encrusted on the jacket (Artificial Reef Subcommittee 1997, Jan Culbertson, personal communication, January 26, 1999). Artificial reef program managers have no enforcement authority to determine what method is used. However, Texas program managers prefer partial removal with

cutting (versus using explosives and toppling in place) to achieve required clearances from the water surface and maximize ecological value (Rick Kasprzak, personal communication, February 11, 1999, Jan Culbertson, personal communication, January 26, 1999).

Although attempts have been made to quantify the cumulative ecological impact of offshore oil and gas platforms, little progress has been made in quantifying the ecological benefits of artificial reefs in the Gulf of Mexico. Possibly the U.S published the most recent assessment of the ecological significance of oil and gas platforms in April 1998. Geological Survey. The USGS study concluded that oil and gas platforms in the Gulf of Mexico constituted 12 km^2 of artificial reef habitat compared to 2,780 km^2 of natural reef habitat or just under one-half of one percent of the total reef habitat (LGL Ecological Research Associates Inc. & Science Applications Int. Corp. 1998). In Texas, work is being done to assess the biological productivity of particular artificial reefs and studies have been conducted to determine the impact of decommissioning strategies on fish and invertebrate populations associated with the decommissioned platform (Jan Culbertson, personal communication, January 26, 1999). None of these studies address the cumulative ecological impacts of artificial reefs in the Gulf so these impacts are not influential in determining decommissioning strategies.

Political Influences on Decommissioning Strategies

The selection of decommissioning strategies in the Gulf of Mexico enjoys comparatively little political turmoil. Both the Louisiana and Texas artificial reef

programs involved public input during their development. The most prominent concerns expressed surrounded issues of access to artificial reefs by user groups and impacts on the trawling industry. The Texas approach to dealing with these issues was the creation of a 10 member advisory committee consisting of representatives from the following:

Salt water sports fishing organization,

Offshore oil and gas industry,

The Texas tourist industry,

The state General Land Office,

The shrimping industry,

Texas diving clubs,

The state Attorney Generals Office,

Texas University, and

An environmental group (Stephan et al 1990, Artificial Reef Subcommittee 1997).

The purpose of this committee was "to maximize the input of those interest groups most affected by the placement of artificial reefs in salt waters" (Stephan et al. 1990). Public hearings were held on a routine basis and representatives were held accountable to their constituents. The result of the meetings of this advisory committee was the creation of the Texas Artificial Reef Fishery Management Plan written by the Texas Parks and Wildlife Department that manages the artificial reef program.

Similarly, the state of Louisiana created a three-member council called the Louisiana Artificial Reef Council. Members consisted of the Secretary of the Louisiana Department of Wildlife and Fisheries, the Director of the Louisiana Geological Survey, and the Dean of the Center for Wetland Resources at Louisiana State University (Sickle & Pope 1987). Guidance for the program was provided by the Louisiana Artificial Reef Initiative, an organization of representatives from:

The Center for Wetland Resources,
Louisiana Cooperative Extension Service,
Louisiana Department of Culture, Recreation and Tourism,
Department of Marine Resources,
Department of Wildlife and Fisheries,
Louisiana Geological Survey,
Louisiana Sea Grant College Program,
Louisiana Wildlife Federation (and other conservation groups),
National Marine Fisheries Service,
Offshore Operators Committee,
Recreational and commercial fisheries groups,
U.S. Army Corps of Engineers, and
The U.S. Department of the Interior--MMS (Sickle & Pope 1987).

These managerial bodies are heavily weighted towards pro-artificial reef development. The only opposition group in Texas, the Texas Shrimp Association, opposes the artificial reef program on the grounds of loss of trawling area, lack of compensation, and lack of incorporation of artificial reefs in fisheries management plans (Anderson

1993). The belief is that these concerns are not adequately reflected in the management of the Texas artificial reef program. Wilma Andersen (1993), Executive Director of the Texas Shrimp Association, has charged that the artificial reef program has created a “dash for the cash” incentive where program managers accept donated platforms without the consideration of the expenses imposed on trawlers in the form of the loss of trawling area. The shrimp industry does have representation in the Texas Artificial Reef Advisory Committee but is consistently out-voted, as they are only one of ten members (Anderson, 1993).

Despite the concerns of the trawling industry, artificial reef programs are perceived to be highly valuable. Fishermen have a historically beneficial relationship with offshore oil and gas platforms and can reap the rewards of higher fishing success by simply mooring directly to platforms and fishing (Rick Kasprzak, personal communication, February 11, 1999). Because of this, political influence on decommissioning strategies focuses on enforcement of the objectives of the states’ legislation concerning artificial reefs particularly, accessibility for all user groups.

Summary

The creation of artificial reef programs in the Gulf of Mexico has opened an array of new decommissioning options available to platform owners that were previously not available or under consideration. Prior to these programs, platform operators were required to completely clear the site of operations and restore it to its original

condition. Enabling legislation at both the state and federal level has removed significant roadblocks for considering alternative decommissioning strategies by relieving platform owners of liability after the platform is "donated" and by formally legitimizing the assumption of net ecological benefit provided by artificial reefs. The selection of the strategy still remains with the platform owner who, for the most part, chooses the most cost-effective strategy.

The objectives of the states' enabling legislation determine what decommissioning strategy is the most cost-effective. The three objectives with the most influence are; enhancement and conservation of fisheries, facilitation of access of fishermen, and minimization of user conflicts. All three influence which donated jackets are accepted and where the accepted jacket is located. These mandated goals of artificial reef program managers do not always coincide with the cost-minimization goals of platform owners. A jacket that is located near an artificial reef site such that relocating the jacket to the site is the most cost-effective strategy for the owner may still be rejected on the basis that it does not have adequate ecological value. Likewise, a jacket that has high ecological value may be located so far from an artificial reef site that it is not cost-effective for the owner to donate it to the program (and thus incur the expense to relocate it).

Economics issues are influential in decommissioning obsolete platforms in less obvious ways. In accepting a donated jacket, state artificial reef program managers or occasionally private organizations accept the cost of monitoring, maintaining, and marking the site. Shallow water platforms donated to an artificial reef program do not

generate enough funds to cover all of these costs over the lifetime of the reef. In order to compensate for such budgetary shortfalls, program managers are willing to accept deep-water platforms as artificial reefs and allow a decommissioning strategy that maximize cost savings to the platform owner. In this way, the accompanying portions of the cost savings that the states acquire are maximized. These funds are then used to pay for the development of shallow water artificial reefs made from other low-profile materials of opportunity (e.g. shells) and shallow water reefs made from platforms. The legislative goal of access of fishermen to artificial reefs is met in a roundabout way. Deep-water artificial reefs that are inaccessible to most fishermen are accepted as artificial reefs in order to gain funds to increase access to shallow water reefs. In this sense, both the objectives of the program managers (acquire sufficient funding to maximize benefits to fishermen) and the objectives of platform owners (minimize decommissioning costs) are reinforced.

Economic issues are also influential on the decommissioning strategies for shallow-water platforms. By allowing a platform to be decommissioned in place (either topped or toppled), the costs associated with maintaining, monitoring, and marking a new artificial reef site are incurred. These costs are compared to the increased cost-savings split achieved by relocating the platform to an already existing artificial reef site where the costs to the program are minimized. In the same sense, a donated platform that is allowed to be decommissioned in place could be rejected (or required to be relocated) on the basis that it runs the risk of needing marking due to proximity to shipping lanes.

Political influences in decommissioning are already reflected in the enabling legislation of the artificial reef programs in the Gulf of Mexico. These influences manifest themselves in the involvement of stakeholders, primarily fishermen, in the design of the programs early in their development. Despite some opposition from the trawling industry, artificial reefs enjoy popular support.

Chapter 3: California Coast

Methodology

To gather all the supporting data for California, we used various publications from academic and governmental sources such as the Minerals Management Service (MMS), US Dept. of Interior, and MELVYL (University of California electronic database collection). In the MMS Catalog of Publications (1994-1996), we found scientific and technical publications about offshore oil and gas. We studied the abandonment and removal of offshore oil and gas facilities from the workshop proceedings of the Minerals Management Service and California State Lands Commission (1994). We also gathered information in the Louisiana State University (LSU) Proceedings (1996) that were organized by the US Department of Interior, MMS, LSU, and the Center for Energy Studies. This was an international workshop on offshore lease abandonment and platform disposal covering current technology, regulation, and environmental considerations. We also examined the history of oil and gas seeps in the Santa Barbara Channel from a publication by the Western States Petroleum Association (WSPA), 1997. Various techniques of abandonment by abrasive water-jet cutting for platform removal and well abandonment were studied in publications by the Oil States Micro-Cutting Services (MCS), 1997.

Alternative methods of decommissioning were considered by studying the Artificial Reef Plan for Sport Fish Enhancement written for the California Department of Fish

and Game's Near-shore Sport Fish Habitat Enhancement Program (Wilson et al., 1990). We looked into journals such as "Fisheries", by American Fisheries Society (Vol. 22, No. 4, April 1997) to form an educated opinion on the issues with which the fishermen are concerned. We then compared this information to information available on recent advances in aquatic habitat technology published in the Japan-US Symposium on Artificial Habitats for Fisheries Proceedings, 1991 (Tokyo, Japan, by M. Nakamura, R. Grove, C. Sonu). Important articles like the "Artificial Reefs: The Importance of Comparisons with Natural Reefs", (by Carr M. H., M. A. Hixon, April 1997, Fisheries) gave us additional input on artificial reef management. We used general references such as the book on "Environmental Law", by Kusabek (Second Edition), to be updated on current environmental legislation.

Several interviews were conducted during the investigation. Michael Mitchell, MMS (Santa Maria) and the Crew of Platform IRENE were interviewed during a visit to the offshore oil platform IRENE on May 15, 1998. Mr. Mitchell let us know of the health, environmental and safety issues that MMS is supervising regarding the offshore oil platforms. The crew of the platform IRENE gave us a tour detailing the working environment and the operation of an oil platform. We conducted a number of interviews with the staff of Minerals Management Service—Pacific Outer Continental Shelf Region (MMS). Dr. Lisle Reed was interviewed for approximately 3-hours on May 21, 1998. We discussed the evolution of regulations regarding off shore oil and gas production, identified the key players, and the various existing and proposed options for decommissioning the offshore oil platforms currently on the coast of California. We also spoke about the royalties that the state and federal government

collect and the possibility of negotiating royalties so that offshore oil fields are economically attractive to continue production until they are completely depleted. Physical Scientist, John Smith, discussed the physical and engineering aspects of the offshore oil platforms and described the financial responsibilities of every party involved regarding the future decommissioning of the oil platforms. Regional Supervisor, Richard Wilhelmsen, focused on the environmental evaluation and safety regulations with which all the offshore oil platforms have to comply. Environmental Scientist, Frank Manago, discussed the environmental issues regarding the initial placement and the decommissioning of any offshore oil platform. He provided us with the recently published proceedings of the public workshop regarding the decommissioning and removal of oil and gas facilities offshore California held in Ventura, California in 1997. Administrative Assistant, Barbara Voyles, provided the map that MMS has recently compiled regarding all the existing offshore oil platforms off the California Coast. She also provided copies of *Oil and Gas Journal*. Public Affairs Officer, John Romero, was instrumental in giving us other materials regarding the work that Mineral Management Service (MMS) is involved with and showed us the MMS document collection.

Further, we interviewed a number of oil and gas industry representatives. CHEVRON Biologist, Dr. Patrick O'Brien, of Technical Corporation in Richmond, CA (May 1998) was interviewed for 3-hours. Dr. O'Brien discussed the issues with which the industry is dealing when it comes to removing the oil platforms. We also interviewed Senior Environmental Specialist on Ecology, Michael Ammann, of CHEVRON Research and Technology Company. Mr. Amman discussed the biology involved with the oil

platforms and the various options that CHEVRON had when it removed four platforms in California State waters in 1997. He also advised us on the new options that the company is researching for the removing of the platforms from the federal waters. During our discussion, he let us know of the financial aspects of the decommissioning.

Professor James Kennett, of the Geological Sciences department at the University of California, Santa Barbara (personal communication, June 1998) referred to the changes that may take place on the ocean floor topography immediately after the removing of the oil drills and rigs. Professor Kennett indicated the consequences on the benthic habitat and the changes in the stratigraphy and geology.

During a 3-day summer conference at UCSB (July 1998), we invited the following three guests to present an update on the latest information regarding offshore oil platform decommissioning: Paul Mount, California State Land Commissioner, Long Beach, California, Dr. L. Reed, Regional Director, U.S. Minerals Management Services, and Dr. Lee Bafalon, CHEVRON, Ventura, California. These three speakers represent three different points of view: Federal government, state government, and private industry and gave us “inside information”. Dr. Bafalon is the Chevron legal counsel responsible for negotiating the environmental legalities and regulations when removing or selling oil platforms in California.

Prof. Bruce Luyendyk, Chairman of the department of Geological Sciences, UCSB, in a lecture on March 17, 1999, presented evidence showing that offshore oil production seems to have decreased the natural hydrocarbon seepage in the Santa Barbara

Channel. Resources such as newspapers, TV media, Internet, books, and journals were used to collect additional information.

Recent Decommissioning Experiences

Oil and gas production structures along the West Coast of the United States consist of a total of 27 oil and gas platforms and approximately 200 miles of associated pipelines located off the coast of southern California. Of the 27 platforms, four are located in California State tidelands within 3 miles of the coast, and 23 on the Federal Outer Continental Shelf (OCS). The lack of infrastructure for decommissioning operations and the relatively greater distribution of deep-water platforms versus shallow water means that the decommissioning and removal of platforms will present significant technical, environmental and material disposal challenges.

There are a total of seven platforms that have already been decommissioned from California State waters. The CHEVRON 4-H project where platforms Hope, Heidi, Hilda, and Hazel were removed during the summer of 1996 (Naughton 1997). In the late 1980s, Texaco removed platforms Helen and Herman (Mount, 1998). All six of these platforms were located in less than 150 feet of water. In addition, Exxon has decommissioned a converted tanker ship renamed the Offshore Storage Treatment (OST) floating facility in 1994 (Simon Poulter, February 1999, personal communication, Culwell, 1997).

The decommissioning of the converted tanker was a technically complex operation, with separate phases. The first phase involved disconnecting and removal of the vessel, the mooring buoy, and a riser section. The second phase involved cutting the piles and removal of the mooring base and sub-base, and cutting and removal of pipeline and power cable segments from the seafloor. The final phase involved a survey of the area to recover debris. The Pacific OCS Region worked cooperatively with all interested parties before, during, and after that work.

According to Paul Mount (1997, 1998), Chief of Mineral Resources Management Division, California State Lands Commission, there are many invaluable lessons learned from the removal of the 4H. Intensive advance planning and coordination prevented accidents and minimized environmental effects. Early and complete coordination with all agencies and information provided early to the community regarding the project were important ingredients to the successful decommission of these four platforms. It was also necessary to address the concerns and needs of fishermen. It became obvious that explosives could be used safely underwater with detailed engineering and environmental pre-planning. Finally, California State Lands Commission engineering staff onsite was essential to timely approval of plan modifications and prevention of problems.

The newest of the Pacific OCS Region's 23 platforms have been in place since 1989; the oldest was installed in 1967. The Pacific OCS Region's facilities range from small shallow water to deepwater structures. There is one platform in less than a 100 feet of water and two platforms in water depths of over a thousand feet (Dunaway, 1997).

The first platform decommissioning will likely take place over the next 5-10 years. Chevron has started the planning process for decommissioning of their five platforms. Of those five, the oldest was installed 20 years ago and the newest only 13 years ago. The water depths range from around 300 feet to about 700 feet. Platform Harvest, off Point Arguello, is in 675 feet of water. And Platform Gail, in Santa Barbara Channel, is in 739 feet of water. These deeper waters, which would set a decommissioning world record to date for water depths, and the necessarily larger structures provide challenges for both industry and regulatory agencies.

According to Dr. O'Brien (CHEVRON, personal interview, 1998), some of the issues with which CHEVRON dealt when the company removed the 4 oil platforms off the California Coast (State Waters) in August 1997 were: the development of selection criteria (i.e. which platform needed to be removed), the evaluation of key environmental impacts, the ranking alternatives and decision on the preferred option, and the developing of a project execution plan, schedule and budget. Further, CHEVRON had to obtain internal approvals and submission of applications for permits and mobilization of marine equipment, deconstruct the platform (3 to 6 months), determine the severing methodology for piles, conductors, jacket disposition, and the final onshore disposition. In addition CHEVRON had to provide studies for habitat enhancement and for the future ocean floor use, and, most importantly, allocate funds for the project.

Oil companies are in the preliminary stages of developing plans for removing as many as five California OCS platforms and two associated onshore processing facilities early in the 21st century. Three of the platforms are located in water depths ranging from 600 to 740 feet. If complete removal is the selected decommissioning strategy, these three platforms could constitute the world's first ultra-deepwater decommissioning project. In terms of its combined onshore and offshore components, it may be the largest and most complex decommissioning project ever to be undertaken.

Regulatory Influences on Decommissioning Strategies

Decommissioning in California is a complex regulatory process. According to Simon Poulter (1997), the lead and key agencies involved with permitting and decommissioning of oil and gas facilities are:

Minerals Management Service

Army Corps of Engineers

State Lands Commission

County or City Governments

California Coastal Commission

Air Pollution Control District

Regional Water Quality Control Board

National Marine Fishing Service-California Department of Fish and Game

U.S. Coast Guard

Minerals Management Service enforces regulations stemming from the Outer Continental Shelf Lands Act and assures that offshore oil and gas operations, including the decommissioning of OCS platforms takes place in a safe and environmentally sound manner (Reed, 1998). Currently, MMS manages 83 leases, all of which are off the coast of California. The Federal Outer Continental Shelf (OSC) off California begins 3 miles from the coast adjacent to State tidelands. MMS Pacific OCS, directed by Dr. Lisle Reed, enforce site clearance requirements for abandoned platforms.

Site clearance is the process of eliminating or otherwise addressing potentially adverse impacts from debris and seafloor disturbances due to offshore oil and gas operations. Site clearance requires that the ocean floor be returned to its original condition so as to not interfere with other users (McCarthy, 1997). Sonar search and mapping technology is being used effectively to document site conditions and the industry has shown considerable diligence in addressing potential user problems. However, high relief shell mounds that remained at the sites of the four recently removed shallow water platforms will locally preclude some activities of one user group (trawler fishermen), although they may well enhance opportunities for others (recreational fishing).

In California, the permitting process for decommissioning oil and gas facilities can take from 14 months to over four years to be completed (Poulter, 1997). The applicant prepares a decommissioning plan, conducts pre-application meetings with

the agencies involved, and then the application is submitted for completeness review. A draft environmental document is prepared and undergoes public review. When the response to all comments are included, there is a public hearing to approve the final environmental document. The lead agency, in this case MMS, holds a public hearing for approval of the proposed project. After other agency permit applications are deemed complete, a draft of the permit becomes available for public comments. Finally, before the project and mitigation implementation begins, there is a final public hearing for permit approval.

The Environmental Review Process for permitting and decommissioning of oil and gas facilities includes:

- National Environmental Policy Act (NEPA)
  - Environmental Impact Statement
  - Environmental Assessment
- California Environmental Quality Act (CEQA)
  - Environmental Impact Report (EIR)
  - Mitigated Negative Declaration

Currently, in California, the operators of obsolete oil and gas platforms are obliged to initiate the complete removal of the entire structure within six months from the cessation of oil production. However, MMS (Reed, 1998) can waive this requirement if an alternative decommissioning strategy is proposed as long as the operator can justify the necessity of the new alternative and all interest groups involved are in agreement.

Economic Influences on Decommissioning Strategies

When Chevron was about to remove the 4-H platforms, the company was approached by interest groups to evaluate the option of artificial reefs (Bafalon, 1998; Reed, 1998, Mount, 1998). According to Bafalon (1998), since Chevron had already received permits to proceed with the complete removal of the state-water platforms, it was not economical for the company to interrupt the procedure at that time. However, as the momentum grew, and the rigs-to-reef program showed success in the Gulf of Mexico, the option of partial removal of the oil platforms and the creation of artificial reefs and fish habitats out of the remaining pieces of the jackets became a welcome alternative to the oil industry.

In the Gulf of Mexico, legislation regarding the artificial reefs program already exists. This is not the case in California (Reed, 1998). Currently, there is no legislation that covers the creation of artificial reefs from oil installations. In the Gulf of Mexico, the States of Texas, Louisiana and Florida are the key players mostly involved. In the case of California, both the Federal and State government are involved regarding the fate of the deep-water offshore oil platform decommissioning and the available alternatives. The legislation in California mandates that once a platform stops producing oil and gas, the initiation of complete removal must begin within six months of the termination of production (Poulter, personal communication, 1999).

According to Reed (1998), this means that when decommissioning an offshore oil platform, the owner company has to completely removed all the components involved including components 15 feet below the ocean seafloor mud (sea bed) and cap all wells with 300 feet of cement. The Minerals Management Service has the capability to allow for some other option as long as all interest parties agree and there is good justification why a different option other than complete removal should take place (Reed, May 1998). The California Dept. of Fish and Game is considering proposing an exemption to the current legislation, which may allow for partial removal and the oil platform jackets to be turned into artificial reefs. In general, the commercial fishermen and trawlers still oppose such an option. However, according to Ammann (1998), some fishermen may agree to such an option if they are compensated in the following ways: setting up a fishing compensation fund, being offered new gear that will help fishermen detect artificial reefs, enhancing of another reef, building an artificial reef in areas that there is not enough fish population for commercial fishing, and financial compensation for any lost fishery (due to the artificial reef attracting fish from other fisheries).

The royalties that the federal government and the state government collect from the oil companies are at least 16.7% respectively (Mount, 1998). However, according to Reed (1998) these royalties can be negotiated down after it becomes uneconomical for the oil company to operate a particular platform. According to Reed (1998), for an oil field to be profitable off the shore of California, it needs to produce a total of at least 100 million barrels of oil.

County decision-makers are unlikely to be influenced by losses of tax revenues caused by different decommissioning strategies. "Neither will oil [production] have a significant impact on local economies in the future" (Schlotter, 1999). Santa Barbara County's economy is diversified such that only about 5% of tax revenues come from oil and gas production activities (Dianne Meester, personal communication, 1998)

If the option upon decommissioning is the creation of artificial reefs (they succeed better in shallow waters), the problem in California would be that the state bears the liability for possible future accidents. Presently, there is no legislation for this liability in California. The liability could be assumed by the California Dept. of Fish and Game, i.e. by the State of California (Reed, 1998; Bafalon, 1998). This option would involve the complete removal of the structure that is above water (carried for disposal to shore or sold to China or Vietnam for offshore oil platforms), partial removal of the 180 top feet that are underwater and leaving all the rest on site. The trawler fishermen are concerned about navigational hazards and snagging their nets. The oil companies believe that all fishing boats are equipped with instruments that can detect where the artificial reefs (ex-platform jackets) are (Bafalon, 1998). In any case, even after partial removal, there are no ships that have a draft deeper than the top of the remaining oil platform jackets—a situation that could cause navigational accidents (Bafalon, 1998).

If the option is complete removal, what will happen to the steel waste? The options are to transfer part of them to a ship scrap yard (the only ones that are currently big enough to hold the volume of the deep water platforms are in Portland and in San

Francisco) and dispose the rest at an onshore landfill (Reed, 1998; Bafalon, 1998). This may result in protest by the communities that will have to accept the waste due to the volume of the waste and the air emissions from the transportation and scrapping process. The other alternative is to dispose of them in canyons in the ocean away from the coast but still within the 200-mile zone (Reed, 1998; Bafalon, 1998). Indeed, the US Environmental Protection Agency has assigned sites that can be used for ocean "dumping" as long as the materials dumped meet the regulations (Bafalon, 1998).

Another option for an oil company is to sell the platforms that are not economical to keep. Bafalon (1998) stated that although a particular platform may not be profitable for a major company (a major company is involved in operation, production, refining, selling, etc.), it may be profitable to an independent company (an independent company is only involved with production) to buy and operate due to the smaller costs. In this case, who carries the liability of decommissioning the platform when oil and gas are depleted? According to Bafalon (1998), the new owner is responsible. However, the federal government has made sure not to allow the sale if the new owner does not place a bond to cover the decommissioning. Further, according to Bafalon (1998), in the case that the new owner cannot cover the financial burden of decommissioning, the federal government will make sure to reach the "deep pockets", i.e. the original company (which is usually a larger company and can afford the burden) and transfer the liability to it. Bafalon (1998) maintains that this is the reason that companies will negotiate all the different options they have when they sell the

platform to another operator. In the case of Chevron, the optimum will be to transfer the liability of the financial burden of decommissioning completely to the new owner.

According to Bafalon, the removal of the 4-H cost $40,000,000 to Chevron. There are only five barges in the world that have the capability to lift the deep-water structures that are in the Federal waters. To mobilize the equipment necessary to remove the platforms that are much bigger than these in state water, it will cost at least $60,000,000 (Bafalon, 1998). Each day that the equipment stays in the water involved with the particular decommissioning project, it costs the company $300,000. Reed (1998) projects that complete removal of all five federal water structures (440 feet to 890 feet) that Chevron owns and wants to remove because some of them are not profitable, will cost Chevron at least $400,000,000 (including air emission costs). Unfortunately, according to Bafalon (1998), although it would make sense that all owner-companies get together and plan simultaneous decommissioning of the platforms that are near the end of oil production and share the costs in mobilizing equipment, this cannot happen. Some of the other companies will be producing successfully for the next 10-15 years, so the timing for decommissioning between companies as well as platforms is staggered. Also, it is customary for the major companies to be the ones to study the different options and create the path that other companies in the future will be willing to follow.

Ecological Influences on Decommissioning Strategies

Ammann (1998) has suggested that when it comes to decommissioning, a company has the following options:

1) Complete removal with a systematic "hopping" of the jacket to shallower water and cutting with scrapping of each section at a Portland, Oregon facility;
2) Partial removal whereby approximately the top 180 feet of the jacket is cut and placed on the ocean floor next to the jacket, and;
3) Complete removal and relocation, either to "dump" it in federal ocean waters or to create an artificial reef in shallow waters.

According to Ammann (1998) and Bafalon (1998), due to the benthic disturbances and re-suspended material, complete removal using the “hopping” technique is the least environmentally desirable option. For the partial removal option, the Coast Guard requirements for navigational safety should be met either through buoying, marking on navigational charts, or cutting to a pre-determined depth. The third option is considered to cause the least environmental damage as compared to all the options. However, in order to create a successful artificial reef, one needs rocks and other supporting material, so this may be the most expensive of all the options (also due to the potential liability for possible navigational accidents). Ammann (1998) stated that although there are no artificial reefs in California made from offshore oil platforms, the California Dept. of Fish and Game has already successfully created a number of artificial reefs made with other materials of opportunity.

According to Carr et al., 1997, the most important ecological consequences of "abandoning" the Pacific Outer Continental Shelf Offshore Facilities is a potential change in regional fish production (the biomass of fish accrued per year), which may in turn influence yields to fisheries. Hard substratum reefs represent a small fraction of the available offshore habitat in California, but are sites of high fish production. According to Bafalon, 1998, if the part of the jacket that is cut and removed is more than the top 180 feet of it, the jacket will not be a reliable artificial reef fish habitat. For an offshore oil platform jacket to survive as an artificial reef, it is necessary to leave behind as much of the vertical structure of the jacket as possible.

In mid-1997, trawl testing was attempted over the shell mounds using roller gear of the type that CHEVRON had previously supplied to Santa Barbara Channel trawl operators as mitigation for problems alleged to be associated with one of their OCS pipelines. Reports indicate that roller trawls did not experience significantly greater snags then those encountered when traversing natural benthic habitats. Currently, the shell mound issue remains unresolved. Commercial trawl fishermen want the mounds removed to clear the area for their activities. However, others consider these relief features to be potential habitat that may enhance hook and line fisheries (commercial and recreational) and diving opportunities (McCarthy, 1997).

Increased offshore oil drilling off California has raised interest in the role that these platforms play in marine ecosystems. Questions have been raised regarding what fish live around platforms, how these structures influence populations over

surrounding reefs, and whether the platforms act to enhance fish populations (promoting recruitment) or only as aggregators. These questions are particularly relevant when the platforms are to be decommissioned and the possibility of allowing them to remain as artificial reefs is raised. Love and Westphal (1990) concluded that platforms were important fishing locations for sport fishing. Rockfish dominate both the jacket structures of a platform and the nearby natural reefs. However, juvenile rockfish composes most of the platform's rockfish population, while mature rockfish are most abundant over natural reefs. Love and Westphal (1990) showed that while mid-water rockfish species were abundant at both platform and natural reefs, species compositions were different, with those benthic rockfish characteristic of high-relief substrata absent or rare around the platforms. Bafalon (1998) maintains that only the first fish that populate a platform are attracted from other habitats. The rest are born and raised around the platform, turning the platform into a new fish and mussel habitat.

To this day, there is no robust evidence neither in the Gulf of Mexico, nor in the coast of California that proves whether an offshore oil platform is a fish-recruiting or a fish-attracting device. In the early 1980s, there was a company located in Santa Barbara, California, which collected the mussels off the legs of the oil platforms off the coast of California and sold them for at a profit to some of the best restaurants in California (Mandra, 1998-1999). According to Mandra (personal communication, 1998-1999), the company underwent rigorous evaluations from State and Federal Health agencies in order to prove that there were no harmful impurities in the mussels. Love (1999) claims thousands of fish and many invertebrates surround or coat the pilings and

crossbeams of the oil platforms. When an oil platform is decommissioned, millions of animals loose their habitat. Love (1999) maintained that during one of his talks, one person in the audience stood up and said, “I don’t care how many animals die, I want those platforms gone”. Love believes that once we create a community of organisms, even if we do it inadvertently, we bear some responsibility for the creatures we have also “created” (1999).

Graae (1997) concludes that since little is known about the carrying capacities of natural reef systems, it is hard to prove that artificial reefs enhance production in regions where natural reefs are present. Artificial reefs tend to be less productive than natural ones and can actually harm fisheries. Graae suggests that due to the great amount of uncertainty surrounding this issue, plans to construct artificial reefs or abandon oil platforms should be carefully scrutinized.

McGinnis (1996) states that policy makers should adopt a case-specific approach to reviewing the cultural and ecological importance of each platform and structure. If a rigs-to-reef program is adopted as an alternative to complete removal, policy makers adopt an approach akin to a living permit, which supports values of adaptive decision making. Further, McGinnis (1996) maintains that policy making should be based on cooperative approaches that can coordinate the values and interests of a broad range of government and non government participants. Some of the concerns include: the importance of rockfish, the ambiguous relationship between funds spent in scientific research and public policy, different platforms have different ecological and socioeconomic worth, there are significant cultural and ecological differences between

the Gulf and California regions, micro-climate (and global climate) can impact native species diversity and habitat in the region. Also, some questions can be raised concerning the incentives that are needed to encourage private sector, government, environmental and public support for a rigs-to-reef program, on the consistency in interpretation of federal, state, and local regulations and their sufficiency, on the possible incorporation of new technology and scientific information.

Bafalon (1998) referred to the Yukon Project that the San Diego County is examining as a potential for an artificial reef underwater park for diving recreation and sport fishing off of Mission Bay (it will include sunken boats). According to Bafalon (1998), Chevron is examining the possibility of transferring the jackets of the deep-water offshore oil platforms to the San Diego Bay and creating artificial reefs upon their decommissioning. Bafalon (1998) believes that this is a "win-win-win" situation for the company (saving money), for the state (creation of artificial reefs and new habitats, less waste in landfills onshore, recreational diving) and for the proponents and opponents of artificial reefs and offshore oil platforms. Moreover, Ensenada, Mexico, is another city that examines the option of attracting Chevron's offshore oil platform jackets for the creation of artificial reefs. In this case, according to Bafalon (1998), the liability for accidents on the artificial reefs gets carried to Mexico. Chevron is only responsible for transferring the jackets off the coast of Ensenada.

Political Influences on Decommissioning Strategies

Environmentalists point to the Santa Barbara channel oil spill in 1969 as one of the fundamental causes of the environmental movement. The images of oil covered beaches and dead wildlife shocked the nation. The image of offshore oil production as a safe and necessary operation was seriously challenged. The Santa Barbara environmental community has never forgotten the threat that these platforms represent. This concern now manifests itself via active and vocal opposition to all present and future oil extraction operations in this region.

In 1998, President Clinton announced a moratorium on offshore oil lease sales on the West Coast. Many people perceived that the central coast of California was included in this ban on further development. This moratorium stated that no future leases would be sold while this moratorium is in place. However, a number of leases currently owned but yet undeveloped by the oil companies, are excluded from this restriction. This is due to the fact that forty federal leases off the central California coast were sold during the Bush administration (1988-1992), and the industry is scheduled to begin the process of extraction as soon as the MMS authorizes development. If the oil companies fail to begin development within the first year after MMS instructs them to do so, their leases revert back to the federal government and the oil companies lose their investment (Poulter, personal communication, 1999).

In 1995, the MMS launched the California Offshore Oil and Gas Energy Resource Study (COOGER). During the tenure of this study a moratorium was established on

the development of all central California offshore oil leases which were owned by private industry. The COOGER study was commissioned to examine the potential for development of these sold but yet undeveloped leases. This study was initiated following complaints by local and national organizations in opposition to the development of these leases based on the perceived lack of investigation into the environmental effects of oil production in this region (Martin, 1998). The COOGER study allowed for three public comment forums where local community members and organizations (including: Get Oil Out (GOO), the Sierra Club, and the Environmental Defense Fund) expressed their concerns regarding future development (COOGER Public Forum, 1998). Approximately halfway through the scheduled comment period we observed that the majority of the public walked out in protest because of the MMS's failure to consider the indefinite extension of the temporary moratorium on development. This action was representative of the public's opposition to any further oil development in this region.

The organizations opposed to development are also opposed to any relaxation in the requirement mandating complete removal of all offshore platforms following the cessation of production (Kropp, 1997; Mango and Willimson, 1997). Current regulations require the oil companies to begin the process of decommissioning within six months of the termination of production (Poulter, personal communication, 1999). Further, complete removal is the only decommissioning option acceptable by current regulations. The Sierra Club opposes any legislation that would facilitate leaving any portion of offshore platforms in place as fishing reefs (Solen, 1999). The Southern California Trawlers Association supports complete removal as the only

decommissioning option (Mango and Williamson, 1997). This list of people and organizations that oppose any modification to the complete removal requirement is only partial. If past social activism addressing offshore oil production is any indication, this opposition may grow to be more robust.

Ultimately, elected state and federal legislators will make the decision that may allow for a decommissioning option other than complete removal. A number of California representatives are actively opposing any future development of offshore oil in this region (Campaign Literature, 1998). Although no public statements in regard to decommissioning have yet been made, officials may adopt the position of their constituents as they have done regarding expansion of offshore oil development. Currently (1999), Congressional Representative Lois Capps and Senator Barbara Boxer have introduced legislation aimed at restricting the development of the central coast oil leases owned by private industry with a possible buy-out as compensation (Martin, 1999). The same organizations and citizens that actively oppose offshore oil production can be anticipated to mount effective campaigns against any relaxation of current regulations (requiring complete removal). Regardless of the current stated positions, it can be anticipated that the public debate over the fate of these platforms will become much more vociferous.

Summary

The current situation regarding the offshore oil platform decommissioning in California was best described during the latest COOGER (California Offshore Oil and Gas Energy Resources) meeting on March 15, 1999 ("Catching the COOGER", The Independent, March 19, 1999). Get Oil Out (GOO) president, Abraham Powell, referring to the COOGER study, said: "The next time the government wants to give us the big picture of oil development, we ask that the fox not be allowed to construct the chicken coop". Power believes that the oil companies should not be the ones that construct the offshore oil decommissioning debates and orchestrate the public forums. Representative Lois Capps said that the COOGER report's current analysis "is an insult to the people" and "shows blatant disregard for the immense and severe impacts (The Independent, March 19, 1999). State senator Jack O'Connell and Assembly member Hannah-Beth Jackson concurred and county supervisors voted unanimously to forward similar concerns in a written statement to MMS

Under the political climate in the State of California and the various liability issues regarding the platforms, it would seem difficult for any other alternative but complete removal of the offshore oil platforms to take place. However, the different options that are currently being examined in California, besides complete removal include: scrapping onshore, the rigs-to-reefs program, the sale of the platforms to other oil companies, the relocation of the platforms for use elsewhere in the ocean, the storage of the platform onshore for possible reuse, the partial abandonment of the platform in place by either cutting it off below the water line ("topping") or tipping the platform over ("toppling"), leaving the platform in place for research and recreational fishing, or

deepwater dumping (Manago, F. and B. Williamson, 1997). The current debate focuses mostly on whether to completely remove the platforms or whether to convert them to artificial reefs. The scientific argument surrounding the issue of platform abandonment centers on the need to study each area around a platform to determine if an artificial reef is necessary and whether a platform is suitable to act as a reef.

All federal agencies, under the lead of MMS, currently require complete removal of the oil platforms. The leading state agency, the State Lands Commission, allows construction of platforms on the condition that upon completion, the oil industry must restore the marine environment to its natural state. What remains to be shown in California, is whether restoring the environment to its "natural state" (i.e., as the Santa Barbara Channel was before 1958) is the best option available or not. The limited number of platforms and the public positions of those who would have to create new regulations that would allow alternative decommissioning options indicate that at this time complete removal is the only viable decommissioning method.

Chapter 4: North Sea

Methodology

The information on decommissioning strategies used in the North Sea was obtained from stakeholder advocacy internet web pages, e.g.: Environmental groups such as Greenpeace, and oil production companies such as Chevron, Mobil, and Shell Oil and from industry publications, e.g. 'Oil and Gas Journal' and 'World Oil'. Additional information was collected from 'Infield', an industry information service company that has extensive data regarding North Sea production. Interviews with industry consultants including Simon Poulter supplemented this collection of materials. The report from the MMS decommissioning workshop held in Ventura and hosted by UCSB on September 23-25, 1997 contained some material referencing the North Sea decommissioning experience. The UCSB Library electronic catalog was also utilized and a number of relevant news and journal articles and books were included in the analysis.

Additional information directly addressing decommissioning in this region may be available in foreign government publications. Due to the difficulty in collecting government publications from foreign countries and the additional complications involved in the translation of some documents, these publications have not been included in the preparation of this document. When reviewing this section it is important to consider the partisan nature of the references utilized. Further

investigation is required to adequately integrate this region into a comprehensive analysis.

Development in the Region

Exploratory North Sea oil and gas drilling first began in 1961 in Dutch coastal waters (Hann, 1986). At the time, state ownership boundaries of the continental shelf had not been established. In 1964 the passage of the Continental Shelf Act proportioned the North Sea to the surrounding nations (Hann, 1986). Development of gas and oil resources in the North Sea proceeded quickly afterwards under the guidance of their respective national owners (Noreng, 1980). Currently there are approximately 420 large structures in the North Sea (Pearce, 1995). Approximately 209 are offshore oil production facilities operated by Norway. Of the Norwegian structures, there are 47 deep-water Offshore Platforms (Knott, 1995). The United Kingdom (UK) has approximately twice that number. Denmark, The Netherlands and the remaining countries on the Northwest European continental shelf also have development in the region (Knight, 1996).

Recent Decommissioning Experiences

The issue of the decommissioning of offshore oil and gas platforms was raised early in the development of the North Sea oil fields. In the late 1970's, the oil industry had expressed concern that "a formidable item of expenditure may be incurred at the end of a project's life if platforms have to be removed" (Robinson & Morgan 1978). Decommissioning of fixed platforms in the North Sea is expected to peak during 2005-2010 when as many as 20 platforms will be decommissioned each year (Knott, 1995). The total cost of decommissioning all currently installed platforms in the North Sea is estimated to be $12-15 billion (USD) (Manago & Williamson, 1997). Because of state-owned working interests, Norway's government faces the problem of paying 70-80% of Norway's expected total $7.7 billion (USD) abandonment costs (Knott, 1995).

A limited number of platform decommissioning operations have occurred in the North Sea for structures classified as shallow-water (Manago & Williamson, 1997). Generally, these are considered structures in less than 350 feet of water. Of these, the largest offshore facility ever decommissioned in the North Sea is platform ODIN, located in Norwegian waters. At a depth of 340 feet, it may be the world's largest offshore structure ever decommissioned (Manago & Williamson, 1997). A partial removal strategy was selected whereby the topsides were removed but a portion of the jacket was left in place. The intent to remove the remaining portion has been stated but a firm schedule for its removal has not yet been developed. In two other similar shallow-water decommissioning operations, the entire platform was removed with reuse or recycling of the recovered materials (Manago & Williamson, 1997).

North Sea experience in decommissioning deep-water facilities has been limited. To date, the Brent Spar floating-installation has been the only deep-water installation decommissioned and removed in its entirety from its original location. Jointly owned by the UK and Shell Oil, the Brent Spar installation had originally been scheduled for deep-water disposal; scuttled at sea far from any coastal zone. The proposal has been part of an approved abandonment plan required under the British Petroleum Act of 1987 for platforms on the United Kingdom Continental Shelf (Side, 1997). Although this proposed deep-water disposal strategy had been firmly backed by the British government, led by Prime Minister John Major, it was met with firm public resistance (Grove-White, 1997; Side 1997).

Brent Spar became front-page news in the UK and an issue of both national and international political debate. Environmental groups led by Greenpeace International mounted an effective public campaign against deep-sea disposal including European-wide consumer boycotts of Shell products and a three-week occupation of the idle Brent Spar installation (Oil and Gas Journal 1995; Side 1997). Public protest against deep-water disposal became so fierce that, at one point, British gas stations owned and operated by Shell Oil were threatened with violence (Side, 1997). The plans for ocean dumping were halted and the issue was reconsidered. Brent Spar was eventually towed to shore and plans are underway for its conversion into a new quay at Mekjarvik, near Stavange on the coast of Norway (Shell Oil, 1999; Wall Street Journal, January 30, 1998).

The Brent Spar incident represents a significant turning point in decommissioning planning in the North Sea. The British government has a strong tradition of social planning (Noreng, 1980). This tradition manifested itself in the rational scientific approach to decommissioning planning (Side 1997). Shell's reversal of its decommissioning strategy represented victory for Greenpeace International, a humiliation of Prime Minister John Major, and a "change of policy that unsettled the very basis of executive authority" (Grove-White, 1997). Future decommissioning strategies will certainly take stronger consideration of public opinion.

International Maritime Standards Influence on Decommissioning

National governments surrounding the North Sea have agreed to follow the international standards established by the United Nations International Maritime Organization (IMO) as well as those established by the 1998 meeting of the Oslo and Paris Commissions (OSPAR conference). Both sets of standards require; "that all abandoned or disused installations or structures placed on the sea bed on or after January 1998, standing in less then 100 meters of water and weighing less then 4,000 tonnes in air, excluding the deck and superstructure, should be entirely removed" (IOM, guidelines 10/19/89).

Following the highly politicized and controversial decommissioning of Brent Spar, the OSPAR Commission released a statement during EXPO 1998 held in Sintra, Portugal. The Sintra Statement represented a tightening of the standards established

by the IMO concerning the decommissioning of offshore oil and gas platforms currently in place and the imposition of a new standard for all new platforms in the North Sea. "On or after 1 January 1998, no installation or structure should be placed on any continental shelf or in any exclusive economic zone unless the design and construction is such that entire removal upon abandonment or permanent disuse would be feasible". At the same time, the OSPAR Commission re-emphasized its "commitment to prevent the sea being used as a dumping ground" and declared that "all dumping of steel installations is prohibited" (Sintra Statement 1998). However, the Sintra Statement contains an allowance for exceptions when necessary for safety and or technical reasons.

All decommissioning decisions will have to be approved by the national regulatory agencies as well. In the UK a sample of these agencies include The Department of Trade and Industry, Health and Safety Executive, and the Department of Fisheries and Agriculture (Prasthofer, 1995).

Economic Influences on Decommissioning Strategies

The economic interests of the United Kingdom and Norway in nationalized and semi-public oil companies in the North Sea causes these nations to be highly engaged in the decommissioning debate. The UK's state oil company, British National Oil Corporation (BNOC) and British Petroleum (BP), a semi-public oil company, both have presence in the North Sea (Noreng 1980). Norway's wholly owned state oil

company, Statoil, represents Norwegian economic interests in the decommissioning debate (Noreng 1980). Oil revenues represent a small part of UK gross national product but a larger portion in Norway (Noreng 1980).

The economic interest of the UK and Norway in the selection of decommissioning options does not necessarily indicate that the most cost-effective strategy will be selected. Both governments pursue multiple and complex social goals aside from that of a private oil company—the maximization of profits (Noreng 1980). The UK and Norway are characterized as "mature democracies" where interest groups and political parties can influence social policies (Noreng 1980). This assures that the selection of decommissioning strategies will require social considerations as well as economic. The realities of the direct costs to nations holding majority or whole ownership interest will present the citizens of these countries with some difficult decisions regarding the experience of complete removal and the necessity of other vital social services.

Decommissioning costs are difficult to forecast during the development of oil fields in the North Sea. Theoretically, if decommissioning costs could be known instead of uncertain for the placement of a variety of production facilities such as fixed platforms, compliant towers, mobile oil production units, semi-submersible platforms, or sub-sea production systems, decommissioning costs could be used to influence which production facility would be employed for a particular oil field. However, this is not the case. Costs of an oil production project are difficult to calculate due to unpredictable accidents, mechanical failures, market conditions, or political interventions over the

life of the production facility (Robinson & Morgan 1978). Perennial storms greatly enhance risks and influence the selection of production equipment (Noreng, 1980; Knott 1993).

Ignorance of production and cost figures persists even for established oil fields in the North Sea (Robinson & Morgan 1978). Even more difficult to assess are the effects of oil price volatility on a production project (Robinson & Morgan 1978). Because of these problems, project planners find it more appropriate to allocate costs to production rather than arbitrary time periods such as the decommissioning phase (Robinson & Morgan 1978). Such production costs focus on more immediate engineering-related concerns (Will & Simon, August 1998).

Ecological Influences on Decommissioning Strategies

The question as to whether biota surrounding North Sea oil and gas platforms represents an actual increase in biomass in the region remains unanswered. Due to the environmental conditions that exist in the North Sea, there is not a tradition of recreational fishing offshore. Even if it did exist, most of the platforms are too far from the coast and in waters too turbulent for them to offer attractive prospects in this context (Picken & McIntyre, 1987).

Additional research has indicated that the contribution from this limited number of platforms would be insignificant in comparison to the total size of this fishery. These

platforms would also be a net snagging danger to commercial fishermen if left in place (Picken & McIntyre, 1987). In contrast to this position, other researchers contend that there may be a significant contribution to total fish yield and recommend that further research is required (Prasthofer, 1995).

Political Influences on Decommissioning Strategies

Political pressures are not exclusively exerted by public organizations. The integration of semi-public and state owned oil companies means that considerable influence may be exerted by oil companies on British and Norwegian governments and regulatory bureaucracies. Oil companies have demonstrated the ability to capture or "colonize" organizations responsible for governing them, essentially making them "embassies" within the state government (Noreng 1980). At the same time, the level of political influence of Norway's Statoil Company has been contingent upon the nation's need for oil (Noreng 1980).

Political influence of the UK on its semi-public oil company, British Petroleum (BP) is somewhat complicated by the position of the state as a shareholder. Serious problems could be created by private shareholders if the state attempts to impose its will (Noreng 1980). "It is more than doubtful whether the UK government is able to exercise any effective control with British Petroleum, where it historically owns half the shares" (Noreng 1980). An example of this lack of control occurred during the OPEC oil embargo during the winter of 1973-1974. Even with the UK's majority shareholding

in BP, the government could not persuade the oil company to favor Britain in the company's allocation of oil (Hann 1986). Thus the imposition of a decommissioning strategy cannot simply be in the form of a government-declared industry wide mandate either for a public or a semi-public oil company.

Public pressure influencing the decommissioning debate has proven formidable in the North Sea. The increasing economic surplus caused by historic increases in the international price of oil has made public opinion demand tougher terms for North Sea oil companies (Noreng 1980). In Norway, the political weight of fishermen and the coastal populations coupled with the countries dependence upon the ocean as a food source make environmental protection a high priority (Noreng 1980).

Indeed, the decision-makers of the North Sea cannot ignore the political pressures of the public on the decommissioning debate. Public opinion has generally been against the use of the ocean as a means to dispose of offshore oil and gas platforms. "There has been a very negative public perception of the issue (rigs-to-reef) in the North Sea. In the North Sea this has resulted in both the oil companies and the Government taking stock of the way in which the consultative and decision making processes regarding decommissioning are carried out. "It is likely that in the future there will be much more open dissemination of information and a much broader discussion of the issues, before a decommissioning option is selected for a particular structure." (Pulsipher, 1996). Greenpeace International has publicly stated its firm opposition to any consideration of ocean dumping and endorses complete removal with recycling and reuse as the only acceptable disposal options. A Greenpeace International

political advisor recently made this public statement; "There is not one credible argument for dumping oil installations in the ocean." (Greenpeace International, 1998).

Summary

North Sea oil production is a fairly recent occurrence making the requirements of decommissioning oil and gas platforms an emerging issue. International laws regarding this issue have been amended to reflect public opposition towards any decommissioning strategy other than complete removal. However, these laws have been tempered by technological limitations imposed by the deepest of platforms, resulting in conditional statements for decommissioning requirements. Ecological considerations for the selection of decommissioning strategies are poorly understood, but information gathered in this report suggests that these considerations may be influential particularly when combined with the economic and political influence of fishermen and populations dependent upon the ocean for food and livelihood.

Economic and political considerations in the North Sea are complicated by the stake that the governments have in the revenues of both publicly owned and semi-publicly owned oil companies. The business objective to maximize profits comes into direct conflict with broader governmental social priorities. Further complicating this debate, oil companies are in the position of exerting substantial influence on public policy as well as being influenced by public will. Independent governmental influence is not

easily applied to oil companies as semi-owned companies are subject to the opinions of other shareholders and even entirely government owned companies are not solely dependent upon the government in regard to their business decisions and policy formulation.

Chapter 5: Comparative Analysis

Characterization of Decommissioning Planning

Decommissioning planning is best characterized as a process of negotiation. During the negotiation stakeholders perform a mutually beneficial exchange that improves social welfare. The two negotiation groups consist of the oil companies on one hand and other stakeholders on the other. This group of other stakeholders includes sport fishermen, sport diver groups, environmental groups, the commercial fishing industry, state and local governments, and federal or national governments. The commodities that are exchanged vary in their specifics but generally follow the form of oil companies offering financial concessions or services in exchange for more cost effective decommissioning options from which to choose.

This characterization is best illustrated in the case of the Gulf of Mexico with the creation of the artificial reef program. In this case, oil companies exchange financial concessions and services for a number of possible decommissioning strategies that are more cost effective than the default requirement of complete removal and site clearance. The services that the oil companies offer are indirectly provided through the donation of the decommissioned platform jacket for use as an artificial reef. This reef, in turn acts to increase fishing success and enhance ocean recreational experiences for both fishermen and divers. The specific value of the benefits of the artificial reef are discussed later.

The characterization also applies to California where efforts have been underway to emulate the Gulf of Mexico artificial reef programs. The commodities for exchange are very similar although the stakeholders are different. The effects of these differences will be discussed later in the Chapter. The North Sea is in an evolving state with respect to our characterization. The events surrounding the decommissioning of the Brent Spar indicate that society as a whole has established a place in the negotiation process. What commodities will be offered for exchange have yet to be determined, but we believe that our model of the process will emerge.

Regulatory Influences on Decommissioning Strategies

All three case studies indicate that political pressure can be exerted to alter regulations and thus available decommissioning strategies. Platform owners represent only one category of stakeholders with influence on regulatory changes that expand or contract available decommissioning options. Platform owners will generally select the most cost-effective decommissioning option of those available.

The range of decommissioning options in the different regions can be viewed as an expression of what state or regional populations are willing to tolerate with respect to how the ocean is used. In the Gulf of Mexico and California, national or state legislative changes that expand options beyond the requirement for complete removal and site clearance have or can be anticipated to occur. In the Gulf of Mexico,

regulations offer a wide range of decommissioning strategies to select from. In contrast, few decommissioning options are currently available in the North Sea and California. Gulf of Mexico populations are willing to tolerate decommissioning strategies that present an economic gain to society in the form of enhanced fishing opportunities to regional fishermen. This tolerance originates from a long history of fishermen fishing adjacent to operational platforms and directly experience the benefits that these de facto artificial reefs offer. Fishermen gained direct benefits in the form of higher fishing success and were able to perceptually value what would later become the artificial reef program. Such a history does not exist in California and much uncertainty exists concerning any future ecological and economic benefits.

Economic Influences on Decommissioning Strategies

Economic influences on decommissioning operate on two levels in the regions observed. First, economics plays a role in defining what decommissioning options society is willing to allow for oil platform owners and second, in determining which option the oil platform owner takes.

In the Gulf of Mexico, economic considerations influence the decommissioning process in complex ways discussed in Chapter Two. These decisions occur at the level of the artificial reef program managers who, through legislated goals, implicitly represent the interests of the regional fishermen and divers. Although the discussion in Chapter Two will not be repeated here, it can be concluded that the design of the artificial reef program in the Gulf of Mexico has been influential by specifically delineating the economic goals and constraints of artificial reef program managers.

In California, the goals and constraints of an artificial reef program have not been defined, therefore it is not possible to determine the future role that economic considerations will have in the decision making process if alternative decommissioning strategies are made available. The goal of creating the maximum economic benefits for the region can clearly be anticipated but, as has been demonstrated in the case of the Gulf of Mexico, the design of the decommissioning program can have unanticipated and undesirable consequences.

The valuation of artificial reefs in the Gulf of Mexico facilitated the development of artificial reef programs by providing a basis of trade that fishermen were familiar with. Fishermen leveraged their legislative influence to expand decommissioning options in exchange for the benefits of being able to fish from artificial reefs made from oil rig jackets. The 50-50 cost savings split that emerged served to increase the political attractiveness of the program by making it financially self-supported.

The Gulf of Mexico artificial reef program, in its inception and operation, represents a mutually beneficial exchange of commodities between society (primarily fishermen) and oil platform owners. The goods exchanged are money and oilrig jackets from platform owners in exchange for expanded decommissioning options that may be more cost-effective than complete removal. The oil rig jackets offer the benefits of increased fishing opportunities, enhanced fishing experiences (by increasing the probability that fish will be caught), and secondary economic benefits to Gulf States by stimulating the sport and commercial fishing industry.

As stated earlier, economic gains from conversion of oilrig jackets to artificial reefs had been perceptually quantified by fishermen. It was this perceptual valuation that facilitated the creation of the artificial reef programs and thus the expansion of decommissioning options. In contrast, stakeholders in California include groups that have not experienced direct benefits from artificial reefs and therefore, have not valued the potential benefits of an artificial reef program. These groups tend to be non-consumptive users of the ocean and include individuals who value such things as

scenic value, the health of marine ecosystems, or non-consumptive recreational users such as surfers and beach goers.

Ecological Influences on Decommissioning Strategies

Ecological influences on the decommissioning process in the North Sea are not well understood and there is insufficient research for them to be addressed in this report. These influences are present in the decommissioning processes of the Gulf of Mexico and California. In both cases, artificial reef managers or government agencies desire economic benefits in the form of a strengthened fishing industry through enhancing the ecological benefits to fisheries. Therefore, in addition to financial concessions, ecological benefits are the basis of trade between platform owners and government agencies.

For the Gulf of Mexico, fishermen and government agencies have a history of reaping the benefits from the presence of operational installations and the established rigs-to-reef program. Although not quantified, this experience has decreased the uncertainty surrounding what these benefits actually are in quantifiable terms.

In California however, stakeholders who are non-consumptive users do not have experiences from which to draw from to value the benefits of artificial reefs. For these groups, there is uncertainty regarding the ecological benefit and the resulting economic benefits that would result from an expansion of decommissioning options

through the creation of artificial reefs. The high level of uncertainty has created a demand that the benefits of artificial reefs be quantified. Given the inherent uncertainty in ecology due to the high number of confounding variables, the benefits of artificial reefs cannot be quantified with a reasonable level of scientific certainty. Even if this were done, political conflicts discussed later would temper the weight that the analysis would carry in the negotiation process of decommissioning planning.

Political Influences on Decommissioning Strategies

All three regions examined, the Gulf of Mexico, California, and the North Sea, are highly influenced by political pressure in the selection of decommissioning options. However, the composition and goals of the stakeholders are quite dissimilar. In the Gulf of Mexico, stakeholders take on the utilitarian role in their relationship to the decommissioning process. Gulf Coast fishing and diving interests seek to maximize their direct benefit. Almost all of these Gulf of Mexico stakeholders receive some type of benefit from the relationship between the artificial reef programs and oil and gas platform owners.

In both California and the North Sea the decommissioning process indirectly impacts many political groups with substantial influence on the outcomes. In California, the direct participation of such environmental groups as the Environmental Defense Fund and the Surfrider Foundation has been welcomed and solicited. In the North Sea the participation of Greenpeace came in the form of staged media events and product boycotts. North Sea stakeholders were not included in the preliminary review process surrounding the decommissioning of the Brent Spar and as a result, the debate became confrontational.

The major difference between California and North Sea environmental groups in comparison to Gulf of Mexico environmental groups is their relationship with the oil companies and the oceans. Environmental groups in both California and the North Sea tend to consist of individuals that are non-consumptive or indirect users of the

ocean. Environmental groups in the Gulf of Mexico consist of users such as the Gulf Coast Fishermen's Environmental Defense Fund. This difference has implications for how the benefits from an artificial reef program are distributed and how the benefits are perceived. Gulf Coast environmental groups have greater certainty in both obtaining the benefits and understanding the benefits. For California environmental groups, benefits from an artificial reef program structured after the Gulf of Mexico programs could not be received directly nor valued through experience.

In all three case studies, public participation in the decommissioning process is very influential. In California and the North Sea, platform owners may be expected to make financial concessions in exchange for the opportunity to "dump" platforms in the ocean. In the Gulf of Mexico, the nature of this exchange is different. Political groups have long experienced the benefits of the presence of the de facto artificial reefs. The exchange therefore, is an effort to keep these structures in the Gulf so that benefits related to fishing opportunities can continue to be reaped.

Summary

This report has demonstrated the significant differences in the status of the decommissioning processes in the Gulf of Mexico, California, and the North Sea. This discussion has shown that the division of influences on decommissioning strategies into areas labeled “regulatory”, “economic”, “ecological”, and “political”, is somewhat arbitrary. There are clearly interaction effects between these four arenas. However, this division has been necessary to facilitate the discussion.

The selection of decommissioning strategies is a highly political issue involving many stakeholders who may or may not be directly impacted by the disposition of decommissioned offshore oil and gas platforms. The free use of the ocean as a dumping ground for oil platforms is clearly not tolerated by many western nations in light of the uncertain ecological impacts of such activities. However, the cases of the Gulf of Mexico and California indicate that western societies may accept compensation by oil companies for allowing access to the ocean as a resource for disposal.

These negotiations must involve a set of commodities that both the oil companies and society are willing to barter for. In the case of the Gulf of Mexico, the oil companies desired a mechanism where alternative decommissioning options to complete removal were available. These options would also include a release from liability for any part of the oil platform left in the ocean. Fishermen and divers, by far the most influential group involved in the negotiations, desired that their recreational

opportunities be maintained by leaving oil platforms in the ocean to act as artificial reefs—a role that platforms had historically played while in production. Additional financial concessions on the part of the oil companies were required so that the resulting artificial reef program would be financially self-supported. The program, operating strictly under the legislated goals, is not self-supported and so a distortion has emerged. Deep-water platforms are being accepted into the program as artificial reefs even though their distance from shore makes them inaccessible to the majority of fishermen. The larger cost-savings gained by the reef program from allowing partial removal of deep-water platforms is then used to fund shallow-water reefs. Program managers trade between accessibility of the deep-water reef in exchange for funds to develop, manage, and maintain shallow-water reefs.

It is not our intention to judge whether or not this distortion is negative or not. The lack of an outcry from fishermen and divers indicates that this outcome is socially acceptable. However, any attempt to emulate the programs in the Gulf (i.e. the attempts currently being made in California) should include an assessment of whether the program design could lead to practices not directly aligned with the intentions of the stakeholders involved. Such practices could result in stiff public opposition to the program and ultimately its demise. In the case of the North Sea and California any distortion similar to the one described in the Gulf would not be well received.

The Gulf artificial reef programs work because they satisfy the desires of the influential stakeholders; fishermen, divers, and oil companies. In the North Sea and California, not all stakeholders directly benefit, as do those in the Gulf. North Sea

coastal populations and fishermen are wary of oil company actions that have the potential to damage their food supply and livelihood. Unlike the fishermen and divers of the Gulf of Mexico, these stakeholders have not experienced a history of beneficially use of the oil platforms. Coastal populations of California are also wary of oil company actions due to a history of negative experiences. The ecological and aesthetic impacts of an oil spill on the beaches of Santa Barbara in 1969 are still remembered by many and have created an unfavorable public perception of oil companies and their operations and developed a strong environmental awareness in local citizens. We anticipate that political groups that are not directly impacted by the selection of decommissioning strategies will continue to oppose strategies other than complete removal in both California and the North Sea.

In none of the three case studies has the cumulative ecological effects of decommissioning strategies been thoroughly assessed. The research efforts in the Gulf of Mexico are being conducted in the context of optimizing biological productivity of individual reefs and maintaining productivity of platforms during decommissioning operations. Cumulative effects over the entire region are not known and are confounded by the multitude of ecological variables involved over such a large area. We cannot foresee such effects being determined in the North Sea or California with an acceptable level of scientific certainty or to the satisfaction of all stakeholders in the near future.

Ecological issues related to cumulative effects of artificial reefs have not played a significant role in decommissioning strategies in the Gulf of Mexico. The experiences

of fishermen and divers extends back to the 1940's (Kasprzak, personal communication, February 11, 1999). This experience and the political strength of fishing and diving organizations has made equitable access of the different groups and maximizing productivity of reefs a priority.

In California, there is a demand for understanding the cumulative ecological impacts of decommissioning strategies arising from an artificial reef. Again, this demand is driven by political groups who do not directly receive the benefits of artificial reefs as do fishermen and divers in the Gulf. These political groups include Get Oil Out (GOO), the Surfrider Foundation, the Sierra Club, and the League of Conservation Voters. We do not anticipate that these groups would accept the conversion of oil platforms to artificial reefs without a favorable and certain assessment of ecological impacts. In this sense, ecological issues in California pose a much greater barrier to negotiations that would allow any other decommissioning option other than complete removal and site clearance.

Thus it appears that political considerations play a dominant role in determining what decommissioning options are made available to oil companies. Political groups will determine what options are or are not acceptable and will influence legislation and its subsequent regulations. Regulations, on the other hand determine, on a case-by-case basis, the final disposition of an offshore oil platform. The design of a regulatory program has the potential to result in a politically unacceptable outcome and must be considered carefully. The importance of enhancements to fisheries will be determined by the values of stakeholders. How these ecological values propagate and influence

decommissioning strategies through the legislative and regulatory processes will ultimately determine the offshore decommissioning alternative selected.

Conclusion: The Suitability of an Artificial Reef Program in California

Negotiators in favor of developing an artificial reef program in California often point to the success of the program in the Gulf of Mexico inferring that such success could be replicated in California albeit on a smaller scale. The efforts to transpose the Gulf of Mexico programs onto the California sociopolitical structure warrant a comparison that we believe this report accomplishes in earlier chapters. A direct comparison will be made in this section.

The use of an artificial reef program in the Gulf of Mexico was a local, socially acceptable solution to a problem. With the exception of the trawling industry, the solution was strongly supported by all of the stakeholders because each stakeholder benefits. This result is often described as a "win-win" situation in literature describing the Gulf of Mexico artificial reef program. The win-win result has been a strong motivator to replicate the program in California.

However, we do not believe that an artificial reef program is appropriate in California. It is not the solution to the problem for several reasons. First, the problem is defined differently in California. In the Gulf of Mexico, the problem was the loss of fishing and diving recreational areas. In California, the problem is the expense of undertaking the

deepest platform removal projects to date. This disparity in defining the problem warrants different solutions. Whereas an ecological solution with financial incentives is appropriate in the Gulf of Mexico, a solution that more reflects the financial needs is warranted in California.

Second, the nature of the stakeholders is significantly different. As mentioned earlier, almost all of the stakeholders in the Gulf of Mexico received some form of benefits from the implementation of the artificial reef programs. In California, there exists a group of stakeholders that would not enjoy the direct benefits of artificial reefs but rather support the existence value of the ocean's fisheries, believing that they thrive in a pristine environment. These are what have been referred to as non-consumptive ocean users and consist of environmental groups whose constituents value the ocean for its scenic beauty or its ecological integrity. These groups tend to view artificial reefs as 'ocean-dumping' absent any scientific evidence otherwise.

Third, the California environmentalist stakeholders do not have the experiences in valuing the benefits of artificial reefs and thus ask for a numeric valuation. This numeric valuation, regardless of its scientific rigor, may have little influence in swaying opinions on ocean dumping taking into account the antagonistic nature of the relationship between environmental groups and oil companies in California.

In essence, we feel that attempts to replicate the artificial reef program of the Gulf of Mexico in the socioeconomic setting of California do not adequately address these significant differences in the political landscapes. A "win-win" situation in the Gulf

does not predict a “win-win” result in California. However, we do believe that the stage is set for the negotiation process that continues even as of this writing. But we believe that the commodities that are being proposed for exchange (i.e. ecological and economic benefits) are 1) highly uncertain; 2) result in a decommissioning option that is politically contentious, and; 3) do not approach the distribution of benefits to stakeholders in the Gulf of Mexico.

Chapter 6: Recommendations

Proposal: Consolidated Offshore Decommissioning

Following our conclusion that the decommissioning alternative selected for the twenty-three existing platforms off the coast of California should not involve the use of artificial reefs, we propose the establishment of a new program, Consolidated Offshore Decommissioning (COD). This program will result in a distribution of cost savings between oil companies and local governments and ultimately the complete removal of offshore oil and gas platforms. This program can truly be seen as a win-win solution and as such will be more politically acceptable than an artificial reef program.

We propose that MMS be allowed to extend its six-month removal deadline for idle platforms, or platforms that have finished their economic life, in order to allow for two or more platforms to be removed at once utilizing the same crew and equipment. Recognizing that not all platforms end production at the same time, a fee will then be assessed for the first idle platform on each year that the first idle platform remains in place while waiting for the next platform(s) to become idle. This fee will be based on the cost savings of consolidating the decommissioning process and on the maximum allowable time that an idle platform may remain in place. One platform owner or groups of owners may collaborate to remove as many platforms together. The number of platforms that remain idle and the duration that they remain in place will be

determined by the owner(s) weighing the fees against the removal cost for a single platform. However, the fee will be set through a negotiation process that places the fee at such an amount that leaving the first idle platform for more than some maximum allowable time results in zero cost savings to the oil companies or company involved.

The COD process would work in the following way.

1) Stakeholders, including oil platform owners, work together, in an open forum, to determine what the maximum allowable time they will tolerate for a platform to remain in place.
2) An oil company, or oil companies approach MMS with a proposed consolidated offshore decommissioning project. The company or companies would outline which platforms they wish to remove together.
3) MMS and the platform owner(s) calculate the avoided cost savings and then determine what the annual fee will be. The annual fee is assessed based on the longest time that any of the platforms will remain in place idle. This time period will typically begin with the first platform to become idle.
4) The fees are collected annually and the monetary benefits are distributed to the stakeholders through local programs such as schools, parks, conservation programs, land acquisitions, or endangered species preservation.
5) Some time before the maximum allowable time deadline is reached, all of the platforms identified in the removal project are removed. It is certain that platforms will be removed prior to the deadline, or no cost savings is

realized. Owners have the option to remove the platforms at any time before the deadline.

COD will result in reductions in decommissioning expenses in a manner similar to an artificial reef program by expanding decommissioning options temporally. Currently, MMS may grant extensions of the removal deadline on a case by case basis. Our proposal takes this process from a case by case basis and extends it over multiple platforms. The cost of mobilizing equipment, forming work crews, conducting environmental investigations, and collecting permits for each platform individually verses consolidating decommissioning for some or all of the platforms raises removal costs significantly. The establishment of a fee-based permit program will distribute a portion of the avoided costs through participation in the program to the counties most directly effected.

We anticipate that a major public complaint in regard to the presence of non-producing platforms would be the perceived damage to scenic ocean-views. Our research indicates that the amount of capital expenditures necessary for removal of the above-water portion of the deep-water platforms is less than that required for removal of the jackets and pilings. We also propose a possible extension of COD to issue separate permits and fees for both that portion of the platform extending above the water and for the portion below the water. The fee schedule is structured in order to speed the removal of the above-water portion on a faster schedule then the portion unseen by the public. This is accomplished by allowing for shorter maximum allowable times for the top portion of the platform than the bottom. By then dividing

the avoided costs by the maximum time period allowed, a higher fee will be assessed for the top portion than the bottom. This tiered fee schedule will provide incentives for the topsides to be removed together before the jackets. This program extension precludes that a submerged jacket's structural integrity is maintainable through cathodic protection or some other means. Submerged jackets whose structural integrity has been compromised pose serious safety challenges during the removal.

Another important element of cost savings for platform owners from a phased removal for a single platform is the opportunity cost of capital. Opportunity cost of capital refers to the cost of not employing the reusable top sections of an oil platform in another area. If the top sections were not re-deployed, the idling of this oil company's asset, the top section, represents a monetary loss that should be included in the calculated cost savings the platform owner realizes from a phased removal.

Regardless of whether or not the top sections are removed before the jackets, liability for any remaining portion of the platform(s) would remain with the owner or owners until each site is completely cleared. Production and other contaminated equipment will be removed and the wells plugged as is currently required. Owners would continue to maintain the structures with respect to lighting and corrosion protection of top portions and marking and buoying of submerged portions. The costs of liability will be factored into the owner's economic considerations when determining how long the platform or submerged portions remain.

Currently, MMS practices such a program by allowing exceptions to the six-month

time limit on a case by case basis without charge. Consolidated Offshore Decommissioning has the potential to generate significant cost savings to the oil industry. For example, with the cost of mobilization estimated at $60 Million (USD) for a single removal project, this proposal will reduce decommissioning costs per platform and result in a distribution of a portion of the cost savings to local county governments through annual fees. These disbursements may follow the direction of current federal legislation that has proposed a similar distribution program for federal offshore oil production royalties.

Permit Fee Discussion

The fee should not exceed the total cost savings to the oil company divided by the maximum number of years that the presence of the first idle platform in the removal project will be tolerated by the stakeholders. An example can be done using Lee Bafalon's $60-Million in mobilization costs. If two platforms are removed at once, the average mobilization costs go from $60-Million to $30-Million per platform, $20-Million per platform if three are removed at once, etc. If three platforms could be removed at once where, without a COD program, only one would be removed at a time, the total avoided mobilization cost savings is $120-Million. If the maximum allowable time that a platform is allowed to remain idle before removal is negotiated to be 12 years, the annual fee would be $10-Million. Again, this is simply dividing the cost savings by the maximum allowable time.

Given that a platform owner would not participate in the program unless some cost savings could be realized, let us say that there will be a time delay of 8-years between the time that the first platform becomes idle and the last platform to become idle. In this case, the COD project will pay a total fee of 8-years multiplied by the fee of $10-Million per year or a total of $80-Million.

Because fees represent benefits that are accrued over time to stakeholder, discounting should be considered in the negotiation process. Discounting is a method of placing the value of future benefits into a present value. For example, a $10-Million fee is more valuable received today rather than 8 years later as would occur in the fee example just discussed. If the fee were received today, the money could be translated into open space purchases that would generate social benefits 8 years earlier than if the fee were received 8 years later. Put simply, society would rather have the open space now than later.

Discounting can have significant effects on the value of benefits that stakeholders receive from fees paid by platform owners. A hypothetical discount rate of 4% applied to the earlier example of $10-Million earned for 8-years reduces the nominal total value of $80-Million to a discounted value of just over $67-Million. We leave the decision as to whether or not to apply discounting to the stakeholders. In addition, should discounting enter into the process, the decision on what discount rate to apply will also need to be negotiated.

Although the fee is based on the longest idle platform, the fee is assessed over the life

of the project and not the time of the first idle platform. This method of assessment prevents a distortion where platform owners remove the first idle platform and declare that fees do not have to be paid even though other idle platforms have been allowed to remain.

In cases where the economic situation changes, for example, an idle platform is purchased and put back into production or the original consolidated offshore decommissioning project is declared to no longer be cost-effective, fees already paid will not be reimbursed. This is because, particularly in the first example, the platform owner has already saved on removal costs through the sale and the shared avoided cost savings still follows the intent of the program. In the second case, where the original project is no longer cost effective, some removal costs have still been saved in that some other consolidated decommissioning project may still be arranged, even if at a lower cost savings. But this situation would most likely occur with if the alternative offered higher cost savings unless there is an incentive to do otherwise. Again, the cost savings form COD still follows the intent of the program. If another COD project is begun, the new fee schedule will be assessed beginning for the new year and the new fees will not be retroactive for platforms that were idle under the old COD project.

Proposal Justifications

The basis for the trade of benefits offered through this proposal is superior to those of an artificial reef program. The benefits are more easily measured for the government

under the fee proposal since they can be formulated from a politically determined time limit. In the case of an artificial reef program, the expected benefits include the cost savings split and the economic gains from enhancement of fishing opportunities and populations. These latter benefits have not been measured in the Gulf but rely on ecological benefits to fish populations (Jan Culbertson, personal communication, January 26, 1999). The ecological benefits of an artificial reef program in California have not yet been quantified (Dianne Meester, personal communication, February 19, 1999). Uncertainty in measuring ecological benefits makes them less attractive as an influence on decommissioning strategies.

Clearly, the uncertainty surrounding ecological benefits of California artificial reefs and the long-term liability that government entities would acquire with such a program is a significant roadblock in negotiating a trade of benefits. The Consolidating Offshore Decommissioning proposal switches the basis of the trade from uncertain ecological benefits to a far more certain basis. The proposal is far more certain in that there is a clear range of the value of the benefits reflected in the fee. The benefits cannot exceed the cost savings of allowing a delay in the removal of the oil and gas platforms regardless of what the negotiators determine the maximum tolerated delay to be. This increase in the level of certainty of valuation for both parties coupled with the outcome that many of the locally affected groups prefer make the proposal more attractive.

The details of this consolidated offshore decommissioning proposed program should be established in an open process. The necessity for all stakeholders to engage in the formulation and adoption of this program is recognized as fundamental to the

creation of a successful program. By offering this consolidated offshore decommissioning proposal we seek to add to the public discussion and work constructively toward the best possible solution.

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In the offshore oil and gas fields, facilities decommissioning research has become a very important topic. The offshore oil and gas facilities should be deposit and abandon after stop production. This paper proposes decommissioning method of the offshore platform by studying this problem. Do you want to read the rest of this conference paper? Request full-text. Citations (1). References (0). Optimization of decommission strategy for offshore wind farms. Conference Paper. Jul 2016. When it comes to the decommissioning of large offshore oil and gas platforms, the UK has a problem. The traditional way to decommission such large assets is to transfer them to the nearest ultra-deepwater (UDW) port â€“ a quayside area where water depth reaches more than 24m â€“ and perform the required work there. However, the UK does not have natural UDW ports, and the dredging process required to create sufficiently deep artificial ports is considered both prohibitively expensive and environmentally unsound. Because of this, most North Sea oil and gas assets are transferred to Norwayâ€™s UDW port