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DEPARTMENT OF TRANSPORTATION

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U. S. COAST GUARD

FINDING OF NO SIGNIFICANT IMPACT

FOR

TANK VESSEL RESPONSE PLAN REQUIREMENTS

33 CFR Part 155

This action has been thoroughly reviewed by the Coast Guard and it has been determined, by the undersigned, that this project will have no significant effect on the human environment.

This finding of no significant impact is based on the attached U.S. Coast Guard prepared environmental assessment, which has been determined to adequately and accurately discuss the environmental issues and impacts of the proposed action and provides sufficient evidence and analysis for determining that an environmental impact statement is not required.

11/13/92 Date	D. Reese Environmental Reviewer	D. Reese Chief, NEPA Planning and Analysis Section
11/29/92 Date	A. E. Henn Responsible Official	A. E. Henn Chief, Office of Marine Safety Security and Environmental Protection

U. S. COAST GUARD

ENVIRONMENTAL ASSESSMENT

FOR

TANK VESSEL RESPONSE PLAN REQUIREMENTS

33 CFR Part 155

This Coast Guard environmental assessment was prepared in accordance with Commandant's Manual Instruction M16475.1B and is in compliance with the National Environmental Policy Act of 1969 (P.L. 91–190) and the Council on Environmental Quality Regulations dated 1 July 1986 (40 CFR Parts 1500–1508).

This environmental assessment serves as a concise public document to briefly provide sufficient evidence and analysis for determining the need to prepare an environmental impact statement or a finding of no significant impact.

This environmental assessment concisely describes the proposed action, the need for the proposal, the alternatives, the environmental impacts of the proposal and alternatives comparative analysis of the action and alternatives, a statement of environmental significance, and lists the agencies and persons consulted during its preparation.

April 9, 1992 Date	J. Klingel Preparer	J. Klingel Manager, Impact Analysis Staff
4/16/92 Date	D. Reese Environmental Reviewer	D. Reese Chief, NEPA Planning and Analysis Section
4/22/92 Date	Responsible Official	M. J. DONOHOE Chief, Marine Environmental Protection Division

Environmental Assessment

for

TANK VESSEL RESPONSE PLAN REQUIREMENTS

33 CFR Part 155

Prepared by

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United States Coast Guard

OPA 90/G-MS-2

16 April 1992

Environmental Assessment

TANK VESSEL RESPONSE PLAN REQUIREMENTS

33 CFR Part 155

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Environmental Assessment

for

TANK VESSEL RESPONSE PLAN REQUIREMENTS

33 CFR Part 155

1.0 DESCRIPTION OF PROPOSED ACTION

The Federal Water Pollution Control Act (33 U.S.C. 1321), as amended by sections 4202(a), (b)(4) and 5005 of the Oil Pollution Act of 1990 (OPA 90), establishes requirements for tank vessel and facility "oil or hazardous substance" spill response plans and discharge–removal equipment.

Section 4202(b)(4) of OPA 90 establishes an implementation schedule for these provisions; however, section 4202(b)(4)(B) specifically prohibits vessels and facilities from handling, storing or transporting oil after February 18, 1993, unless a response plan has been submitted for approval. In an attempt to expedite rulemaking actions necessary for the maritime industry to meet this strict timetable, the Coast Guard has segregated promulgation of oil spill response plan requirements for independent action. Response plans for hazardous substance spills will be addressed in a separate rulemaking. In addition, regulations covering the requirements for facility response plans are being developed in concert with the Environmental Protection Agency (EPA). It is anticipated that this will result in two additional, independent rulemaking actions; one by the Coast Guard for marine transportation–related facilities, and one by the EPA for non–transportation–related facilities.

2.0 NEED FOR PROPOSED ACTION

In 1990, Congress passed OPA 90, Pub. L. 101–380 in response to several recent, catastrophic oil spills along the coastal areas of the United States and elsewhere. Many of these spills, which included the EXXON VALDEZ in Prince William Sound, the AMERICAN TRADER along the California Coast and the MEGA BORG in the Gulf of Mexico, resulted in extensive damage to the marine environment and coastal resources, including the loss of fish and wildlife.

Potential benefits directly resulting from proper spill response planning should include, but not necessarily be limited to, more rapid and effective response to oil spills and/or substantial threats thereof, as well as improved vessel/response personnel safety via enhanced personnel training and familiarity with established, appropriate protocol(s). Improvements in (1) communication and notification (i.e., between vessel operators/USCG/State/owner/agent/local response authorities/co–ops and other response contractors/international authorities where appropriate, etc.), (2) response equipment availability and readiness, (3) personnel availability and training and (4) consistency with national and appropriate area/regional contingency plans should decrease initial response time, facilitate improved interaction among involved parties, and enhance the efficacy of ongoing actions.

3.0 OVERVIEW OF THE OIL POLLUTION ACT OF 1990

The EXXON VALDEZ oil spill in Prince William Sound, Alaska during March 1989 raised the consciousness of the American public concerning the issue of marine oil pollution.

The accident dramatically underscored the vulnerability of the environment to such catastrophic spills. Within 18 months of the EXXON VALDEZ accident, four additional major tanker accidents,[1] as well as several smaller barge and marine pipeline accidents, also caused oil spills into U.S. waters.

U.S. oil imports are expected to increase from 7.61 million barrels per day in 1991 to 12.33 million barrels per day in 2010. This increase in demand should result in a proportional increase in tank vessel traffic (i.e., more ships and/or more voyages per ship), with an associated increased risk of accidents. In consideration of the number and severity of recent spills, and in anticipation of future risks, Congress enacted OPA 90, which impacts numerous aspects of the marine oil transportation industry by levying oil spill prevention, preparedness, liability, removal and penalty requirements on marine industries operating in U.S. waters. Since most oil imported into the U.S. is transported by foreign flag vessel, requirements of the Act apply to foreign as well as domestic vessels. In addition to substantive penalty and financial liability issues, OPA 90 also addresses:

- vessel manning;
- tug escorts & pilots when transiting certain waters;
- certification & licensing reviews of officers and crew (including review of criminal, alcohol and drug records);
- pollution prevention training;
- design and construction of tank vessels; and
- response planning for vessels, offshore and onshore facilities.

Each of these strategic approaches will result in one (or several) new Federal regulations. In order to promulgate, in a timely fashion, multiple regulations pertaining to a wide range of issues, as required by OPA 90, the Coast Guard has determined that independent, segregated rulemaking actions are required. As a result, each rule undergoes its own regulatory evaluation or impact analysis and environmental assessment. Thus, a comprehensive overview of OPA 90 environmental impacts is not possible at this time. A comprehensive summary of these impacts could be generated once all interdependent, OPA–related actions have been defined.

A further consideration is that the beneficial effect of some rules may be rendered redundant, or reduced, by the effects of other rules. For example, the benefits of vessel response planning requirements will be impacted by other OPA 90–related rules under development; i.e., by (1) various proposed requirements intended to improve vessel navigation, operation and communication, thereby reducing the probability of occurrence of such incidents, and (2) requiring vessel construction standards intended to reduce the likelihood of a spill, or reduce oil outflow, once a vessel collision or grounding occurs.

Of course, there is no doubt that detrimental local environmental and economic impacts of any spill (destruction of wildlife, injury to habitat, loss of commercial, recreational and social use, cleanup costs, etc.) justify serious consideration of measures which can eliminate or mitigate spill probability. The Coast Guard believes that the programmatic impacts of OPA 90 rulemaking actions on the human environment will be positive and significant; however, the interdependency of the numerous individual, but related, regulatory actions involved effectively limits accurate estimation of the positive impact directly attributable to any specific action. Thus, estimating the environmental impact specifically attributable to the promulgation of vessel spill response requirements is difficult.

4.0 MARINE OIL POLLUTION & ENVIRONMENTAL IMPACT ASSESSMENT

This section presents background information on marine oil pollution in both global and U.S. contexts, and discusses the problems associated with determining specific environmental

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[1] WORLD PRODIGY off Rhode Island, MEGA BORG in the Gulf of Mexico, AMERICAN TRADER off California, and PRESIDENTE RIVERA in the Delaware River.

impacts of oil spills that occur under widely variable and complex physical, biological, ecological and hydrographic conditions.

4.1 Marine Oil Pollution: Global Waters

Approximately half of recent petroleum hydrocarbon (PHC) input to the global marine environment has come from maritime oil transportation sources (570,000 tons in 1990, of which 110,000 tons (20 percent) resulted from marine accidents.) These quantities are considerably less than the estimated *per annum* contributions of approximately 20 years ago. During the 1970s, the maritime transportation industry contributed over 2.13 million tons of oil *per annum* to global seas, with much of this contribution coming from operational sources rather than accidental ones. Maritime industry (operational and accidental) contribution dropped to approximately 70 percent of that amount during the 1980s, and to less than 27 percent by 1990. These reductions can be attributed primarily to international pollution regulations enacted in 1973 and 1978,[2] which gradually came into effect during the 1980s. These regulations have prohibited common operating practices which led to marine pollution.[3] Such operational pollution in 1990 was 16 percent of what it had been in the 1970s.

Though perhaps not as striking as reductions in overall maritime industry oil input, average annual volumes spilled as a result of vessel accidents during the 1980s were also much reduced from 1970s values (110,000 tons vs. 200,000 tons *per annum*.) Even so, a larger proportion of total marine industry oil input to the seas now results from infrequent, catastrophic oil spills, resulting in a shift from predominantly chronic, low-level operational inputs to locally concentrated, immediate-impact inputs.

It should be noted that most vessel casualties do not result in pollution. Approximately six percent of the 9,276 vessel accidents reported in the Lloyd's Register of Shipping Assessment between 1976 and 1989 resulted in oil outflow. Furthermore, relatively minor pollution has resulted from the majority of accidents where PHCs were released to the environment. Lloyd's data indicated that oil outflows occurred as a result of only 370 casualties involving tankers of 10,000 DWT or more.

4.2 Marine Oil Pollution: U.S. Waters

Analysis of tankship and tank barge oil spill data for U.S. waters during the 1981-1990 period reveals large fluctuations in amounts spilled from year to year, with an average of approximately 15,000 metric tons resulting from tanker accidents *per annum*. A total of 8,184 tank vessel oil spills occurred during the 1980s, allowing over 150,000 metric tons of oil to enter U.S. marine and freshwaters.[4] However, considering that approximately one third of all oil transported by sea is through U.S. waters, this spillage is low when compared to worldwide spill statistics (this figure represents less than five percent of the total volume spilled worldwide during the same period.)

Approximately 71 percent of tank vessel oil spills in U.S. waters resulted from operational failures, with the remainder resulting from various accidental causes. However, approximately 89 percent of the total volume spilled resulted from spills of at least 100,000 gallons. Only approximately 13 percent of these major spills were caused by operational

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[2] MARPOL, 1973 and 1978

[3] Previously, tankers would use empty cargo tanks for ballasting down during ballast voyages; the "dirty" seawater was pumped directly overboard at the end of the voyage. Under present regulations, most new tankers must have segregated ballast tanks which never carry cargo.

[4] USCG, Oct. 28, 1991. "Interim Regulatory Impact Analysis for the Oil Pollution Act of 1990, Titles IV & V."

failures. Thus, the majority of spill incidents occurred as a result of operational failures, but most of the volume spilled resulted from accidental causes.[5]

Spill data also indicates that approximately 71 percent of the volume of oil reported spilled in U.S. waters during the 1980s was spilled from tankers and barges in inland waterways, harbors, and bays/sounds. An additional 25 percent of the volume spilled occurred within three miles of shore. Thus, approximately 96 percent of the total volume of oil spilled occurred in areas with high potential for injury/damage to sensitive coastal environments and high cleanup costs.

4.3 Approaches to Reducing Tank Vessel Oil Pollution

At this time, vessel accidents constitute the primary cause of maritime oil pollution (by volume) in U.S. waters. There are three basic approaches to reducing the negative impacts of this accidental oil pollution: (1) by reducing the frequency of casualties resulting in spills (i.e., improving operations), (2) by reducing the potential outflow once a casualty occurs (i.e., improving vessel design), and (3) by improving the efficacy/timeliness of response once oil reaches the environment. Vessel response planning requirements would primarily be intended to improve efficacy/timeliness of response. However, increased crew awareness and training likely to result from required response planning would be expected to result in secondary benefits that would affect both frequency and volume of accidental oil spills.

Various approaches could be used to improve operations, which may include, but are not necessarily limited to: (1) improving navigational methods and technology (both afloat and ashore) to mitigate grounding and collision potential; (2) improving fire safety to minimize possibilities of fires and explosions; (3) improving crew training and readiness; (4) improving vessel design; (5) improving vessel inspections to detect corrosion or other problems that could contribute to accidental oil spills; and (6) improving industry preparedness by requiring appropriate response and contingency plans. Requiring vessel response and contingency planning should impact both accidental and operational causes of oil pollution. In addition, OPA 90 addresses these issues through many other regulatory and research/development measures.

4.4 Approaches to Environmental Impact Assessment

Analysis of historical spill volume data and the relative spill-prevention/mitigation effectiveness of various vessel and operational measures can be used to estimate volumes of oil that can be prevented from entering the marine environment as a result of specific regulatory actions. It is difficult, however, to quantify the exact environmental benefits derived by preventing the introduction of specified volumes of oil, because it is statistically impossible to predict exactly where and when these oil spills may be averted. In addition, environmental scientists generally agree that, using current methods and technology, determining the extent of injury to complex and difficult-to-sample ecosystems after oil spills occur is extremely difficult, and often may not be possible. The National Research Council (NRC), for example, has concluded that:

> "Scientific studies of tanker spills present several problems for the serious scientist -- awesome difficulties in field sampling, and readiness of personnel and equipment. Spills are not anticipated, and in the past, personnel and equipment have seldom been readily available. Also, most spills occur in areas that have not been studied previously, and adequate controls are rare. Spills frequently occur in weather conditions that make sampling difficult or impossible. These problems are compounded in offshore spills, where sampling becomes much more difficult, background data are less available,

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[5] USCG. Preliminary Regulatory Impact Analysis for Vessel Response Plans, January, 1992.

and the expense of large ship operations is difficult to finance on short notice."[6]

Since the recovery of an ecosystem from any spill is complex and dependent upon many variables (such as geographic location, climate/season, population dynamics, and ecological interactions of the various species), precise impact predictions cannot be made without grossly-oversimplifying interactive assumptions. "There is no evidence to date, using present-day assessment techniques, that tanker spills have unalterably changed the world's oceans or marine resources."[7] However, there is no doubt that oil spills have caused both short- and long-term adverse impacts to marine and coastal environments. For example, when the EXXON VALDEZ grounded on Bligh Reef in Prince William Sound, Alaska on the night of March 23-24, 1989, spilling approximately 11 million gallons of North Slope crude, the oil spread through the sound, the Gulf of Alaska and lower Cook Inlet. More than 1,200 miles of coastline were oiled, including portions of various national forests, refuges and parks. Oil from the EXXON VALDEZ spill contaminated shorelines nearly 600 miles from the site of the vessel casualty.[8] Immediate impacts to biota included deaths of large numbers of birds and sea otters, while the spill did not prohibit migration and spawning of large schools of salmon and herring.[9] According to the U.S. Fish and Wildlife Service, seven killer whales were described as "missing" from one pod as little as seven days after the spill, and additional individuals disappeared from the same and other pods over the next several months. Many of these missing whales were females who left behind abandoned calves.

Assessment of long-term impacts of the EXXON VALDEZ oil spill will require many years, probably decades of study. The NRC report, Oil in the Sea: Inputs, Fates, and Effects, as adopted by reference in Appendix A to this document, summarizes the impacts of oil spills in representative environments, including inshore, open bay, open ocean with offshore winds, open ocean with onshore winds, underwater blowouts, and onshore tropical locales. The reader is referred to these discussions for additional impact information.

Environmental impact assessment and cleanup often require the expenditure of significant human, economic, equipment and technological resources and time, and do not always produce measurably beneficial results. In fact, cleanup operations can result in negative impact on certain economic and natural resources. Furthermore, once assessment and cleanup are completed, environmental restoration to pre-spill conditions may take many years, further complicating environmental evaluation of the adverse impact of spilled oil.

5.0 ALTERNATIVES CONSIDERED

Reasonably foreseeable "no action" conditions were compared to reasonably foreseeable future conditions associated with three levels of positive rulemaking action. (Proper implementation and enforcement of, as well as regulated community compliance with, noted positive actions were assumed.) Alternatives considered, as discussed in Section 6.0, included (1) no action, (2) requiring comprehensive response plans for all tank vessels, (3) tiering to limit response plan requirements for vessels carrying oil only as secondary cargo, and (4) tiering to limit response plan requirements for vessels carrying oil as secondary cargo and for inland tank barges.

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[6] NRC. 1985. Oil in the Sea: Inputs, Fates, and Effects, p. 549. National Academy Press, Washington, D.C.

[7] Ibid., p. 489.

[8] U.S. Fish and Wildlife Service. 1991. Summary of Effects of the EXXON VALDEZ Oil Spill on Natural Resources and Archaeological Resources, p. 1. Washington, D.C.

[9] Ibid., p. 3.

6.0 SUMMARY OF ESTIMATED ENVIRONMENTAL IMPACTS

6.1 No Action

Some oil companies and other entities to be affected by the proposed regulations have already initiated significant improvements in their response and contingency planning, personnel training, operations, and communications and equipment inventories since the EXXON VALDEZ incident in 1989.[10] Improvements in response/cleanup efficiency resulting from this voluntary industry effort would be incident specific (dependent upon the degree of responsible party (R.P.) involvement in the voluntary planning/preparatory effort and the size(s) of spills targeted by the R.P. for maximum response effort.) It is estimated that most of the beneficial effects on the environment which would occur primarily due to enhanced (voluntary) planning and preparatory efforts by industry would occur during small to moderate spill episodes.

OPA 90 requires promulgation of regulations requiring owners or operators of all tank vessels to submit vessel response plans addressing, to the maximum extent practicable, a worst case discharge, and to a substantial threat of such a discharge. The "no action" alternative would not ensure a consistent level of preparedness throughout the marine industry, and would not be consistent with the requirements of the Act.

6.2 Requiring Comprehensive Response Plans for All Tank Vessels

All "tank vessels," including tank ships, inland barges, offshore supply vessels (OSVs), and other specialty vessels carrying oil in bulk (i.e., fishing vessels, freighters carrying bulk oil (e.g., tallow) in wing tanks), would be required to submit comprehensive oil spill response plans. It is anticipated that these plans would consist of vessel– and cargo–particular information, and would detail the shoreside response plan, including notification tree, responsible individuals/parties, incident response resources and mobilization procedures. In addition, requirements for drills and exercises ranging from "table top" to full field operations would be required. (Refer to TABLE 1 for a summary of anticipated requirements based on this and the two following "action" alternatives.)

Compared to other alternatives considered, requiring all tank vessels to generate comprehensive response plans would be most protective of the environment. However, such a requirement could unnecessarily increase industry costs by forcing owners/operators of all tank vessels to comply with the same response planning requirements, regardless of the relative threat individual vessels pose to the environment in the event of a spill.

6.3 Limiting Response Plan Requirements for Vessels Carrying Oil as Secondary Cargo

Response plan requirements (or portions thereof) could be reduced for vessels carrying oil as secondary cargo. Although some OSVs, tugs, fishing boats, cargo vessels and spill response vessels carry small quantities of oil in bulk as cargo, there is some concern that requiring comprehensive response plans for these vessels would levy excessive economic penalties on owners and operators of such vessels, relative to the risk of environmental damage resulting from an oil spill[11]. The oil carried by these vessels is mostly a non–persistent oil.

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[10] Jardim, G.M. "Improving Chevron's Oil Spill Prevention, Preparedness, and Response Capabilities," in Proceedings of the 1991 International Oil Spill Conference (Prevention, Behavior, Control, Cleanup), March 4-7, 1991, San Diego, California.

[11] U.S. Coast Guard. Preliminary Regulatory Impact Analysis for Vessel Response Plans, January, 1992.

It is assumed that overall environmental protection, as compared to what could be expected if a total, comprehensive response plan requirement were imposed, would be marginally reduced. However, economic, paperwork and other regulatory demands on industry would also be reduced in relation to the reduced potential risk posed to the environment by such vessels, when compared to the risk posed by oil tankers and other vessels that carry oil as primary cargo.

6.4 PROPOSED ALTERNATIVE – Limiting Response Plan Requirements for Vessels Carrying Oil as Secondary Cargo and Inland Tank Barges

Inland tank barges are typically unmanned vessels, which would complicate: (1) maintenance of full response plans on–board and (2) decisions pertaining to who would carry out response plan drills. In addition, since a unit "tow" of barges can consist of barges owned by several different companies, the potential exists for conflicting or disparate on–board response plans during multi–barge tows.

This evaluation assumes that inland tank barge operators would be required to maintain response plans consisting of the following components:

- **Corporate vessel response plan module**: Corporate contingency plans and generic tank barge contingency plans applicable to all tank barges in the operator's fleet would be developed. Response organizations or contractors capable of responding to an incident would be identified.

- **Vessel module:** Barge–specific notification procedures (i.e., who to call in the event of emergency and how to contact that party) would be stored in a mailbox on the barge or on the towboat.

- **Drills:** Corporate tabletop drills would be required once per year, and the Coast Guard would conduct one annual unannounced area drill on the inland waterways. No vessel drills would be required.

7.0 COMPARISON OF ALTERNATIVES

Catastrophic oil spills are statistically rare events in United States navigable waters, but the occurrence of any such event will currently (and most likely continue to) exceed industry, governmental and associated response capabilities, whether or not the proposed regulations are promulgated and enforced.[12] (The reader is referred to Appendix A for further discussion on response/recovery efficacy.) However, OPA 90 prohibits the storage, handling or transportation of oil aboard tank vessels in U.S. waters after February 18, 1993 if the owner/operator has not submitted an oil spill response plan. Thus, oil spill response planning within the maritime industry will proceed, whether or not the Coast Guard elects to pursue positive rulemaking action.

The "no action" alternative would not result in universally enforceable Federal vessel response plan standards. Total reliance on voluntary, across–the–board improvements in response/cleanup planning and operations could result in a wide variety of planning arrangements. A lack of uniformity in standards and procedures would likely: (1) be confusing to both industry and the regulatory agencies; (2) levy uneven economic burdens on various

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[12] U.S. Congress, 1991. Coping With an Oiled Sea: An Analysis of Oil Spill Response Technologies. Office of Technology Assessment, OTA-BP-O-63. U.S. Government Printing Office, Washington, D.C.

TABLE 1 Summary of Assumed Regulatory Alternatives

Alternative	Applicable Fleet Segment	Plan Intensity	Annual Drill Requirement
(1) No action	Voluntary response planning for all tank vessels		
(2) Full response plan required	All tank vessels - international tankers - Jones Act tankers - Tank barges - Offshore supply vessels - Specialty tank vessels	Comprehensive Vessel Response Plan - Corporate Module - Vessel Module tailored to each vessel - Shoreside response	4 vessel (notification and emergency procedures) 1 corporate(tabletop) 1 corporate (field) 6 unannounced USCG area drills (operational)
(3) Limited response plan required for vessels carrying oil as secondary cargo	Full response plan required for all vessels except: - OSVs - Tugs - fishing vessels - cargo vessels - spill response vessels	OSV & specialty tank vessel requirements: - Vessels carry notification list and procedures - Owner/operator must *identify* regional response organization, but not necessarily enter retainers	Based on size of vessel. Secondary cargo carried quarterly or yearly.
(4) Limited response plan required for OSVs, specialty vessels & inland barges	As per Alternative 3, but inland tank barges also subject to limited response plan requirements	As per Alternative 3, plus inland tank barge requirements: - Barges only carry notification list & procedures - Corporate "generic" contingency plan, including identified response contractors	As per Alternative 3, plus inland tank barge requirements: - Annual corporate (tabletop) - No vessel drills - 1 unannounced USCG area drill on inland waterways

Source: USCG. Preliminary Regulatory Impact Analysis for Vessel Response Plans, January 1992.

owners/operators (variability would be dependent upon the complexity and completeness of the individual plans selected); and (3) not result in uniform protection of the environment from injury caused by tank vessel oil spills.

Requiring all tank vessels to submit equivalent, full response plans would undoubtedly provide greater protection for sensitive marine and freshwater ecosystems than would the other alternatives considered. However, the Coast Guard believes that this approach would unnecessarily levy inequitable economic burdens on many smaller vessels, including inland barges as well as OSVs, fishing vessels, tugs and other specialty vessels carrying bulk oil as secondary cargo. In general, these vessels carry, (1) much smaller quantities of non-perstent oil (less to spill) and (2) less-environmentally persistent oils (i.e., distillates such as gasoline, diesel, fuel oils, etc.) than do tank vessels transporting oil as primary cargo. As a result, the areal extent of substantial environmental threat in the event of a spill are reduced. In addition, these secondary cargos often consist of petroleum distillates (i.e., gasoline, diesel, jet fuel, fuel oil) rather than crude oil. Despite being more toxic upon initial discharge, such distillates tend to be much less persistent in the environment than crude oil. Requiring comprehensive response plans to be carried aboard unmanned inland barges, where unit "tows" often consist of barges belonging to more than one owner or operator, could cause confusion during vessel drills or actual spill events.

Spill risk and imminent threat to the human environment depend upon many factors, including vessel type and cargo capacity. The Coast Guard believes that tiering regulatory planning requirements based on vessel size and type would adequately address environmental concerns while resulting in more equitable economic burdens on industry.

8.0 ENVIRONMENTAL SIGNIFICANCE OF THE PROPOSED ACTION

The Coast Guard proposes to issue regulations, as required by section 311(j)(5) of the FWPCA and section 4202(b)(4) of OPA 90, requiring owners or operators of all tank vessels to submit vessel response plans addressing, to the maximum extent *practicable*, a worst case discharge. (A worst case discharge for a vessel is defined in section 311(a) of the FWPCA, as amended by section 4201 of OPA 90, as a discharge in adverse weather conditions of a vessel's entire cargo.) Owners/operators of OSVs, tugs, cargo vessels, spill response vessels, other vessels carrying oil as secondary cargo, and inland tank barges will be required to submit less substantial response plans, based on the reduced relative environmental threat posed by these vessels, and upon the need to minimize unnecessary economic burdens on these industries.

Requiring owners or operators to identify and ensure by contract, or other means approved by the President, the availability of private personnel and equipment sufficient to remove, to the maximum extent practicable, a worst case discharge and to mitigate or prevent substantial threat of such a discharge, should result in industry-wide improvements in spill response. Improved spill response should enhance protection of the environment by: (1) reducing volumes of oil spilled during certain incidents, (2) reducing areal extent of environmental impacts, and (3) reducing duration of environmental exposure to spilled oil. Mechanisms of improvement would include, but not necessarily be limited to: (1) improved organization for integration of response and contingency planning among regulated entities, facility and/or cargo owners, local, area, regional, state, national and international response organizations and co-ops; (2) improved and more timely incident notification and communication; (3) enhanced vessel/facility personnel training and awareness; (4) improved and more timely accessibility to response equipment, contractors and other responders via pre-negotiated contractual relationships and strategic prepositioning of equipment and personnel; and (5) more rapid and accurate deployment of response equipment and personnel.

As noted in section 4.4 of this document, quantitative estimates of the effectiveness of proposed vessel response plan regulations are difficult to develop. In any given incident, the overall effectiveness of a vessel response plan would depend not only upon how well it is executed, but on outside variables such as weather, sea state, proximity to response resources, and other factors. "Moreover, discerning the *improvement* associated with a VRP [vessel

response plan] – that is the difference between the *pre*–VRP and *post*–VRP outcome – is difficult because of the lack of control cases. Detailed models have not been reported in the oil spill literature."[13] A database of 76 spills was created from Coast Guard marine pollution case files, however, and rough estimates of the potential effectiveness of advanced vessel response planning were generated.[14] Categorical estimates of potential benefits were derived for: (1) casualty prevention, (2) spill volume reduction, (3) response improvement, and (4) damage reduction (monetary estimate of benefits). The greatest estimated improvement was predicted in the spill reduction category (22 percent), while damage reduction was expected to approximate only seven percent. "This is because cleanup costs and damages are not related in direct proportion to the volume spilled. Generally, reducing spill volume by a certain percentage will result in a smaller decrease in economic and environmental damages."[15] Results of this analysis of potential benefits are presented in TABLE 2 below.

TABLE 2: Summary of Vessel Response Plan Effectiveness Results. (Percentage improvement)

	Casualty Prevention	Spill Reduction	Response Improvement	Damage Reduction
Cause				
Collision	5	9	16	6
Grounding	6	15	14	6
Explosion	0	0	10	5
Structural	17	23	13	5
Operational	89	87	27	12
Fleet Segment				
International	18	20	15	5
Jones Act	12	25	9	4
Coastal Barge	20	27	21	9
Inland Barge	11	18	15	5
Overall Sample	**16**	**22**	**16**	**7**

Source: USCG. Preliminary Regulatory Impact Analysis for Vessel Response Plans, January 1992.

[13] USCG. Preliminary Regulatory Impact Analysis for Vessel Response Plans, January 1992.

[14] Ibid.

[15] Ibid.

The proposed action and alternatives have been evaluated in conformance with the requirements of NEPA. The significance of the impacts of the proposed action and alternatives were considered to the maximum extent practicable, based on the information available.

In evaluating the environmental impact of the proposed action, the following points were considered:

(1) environmental benefits of vessel response plan requirements can not be accurately quantified in isolation, due to preliminary and complementary effects of various other OPA 90–related regulatory actions. For example, regulations intended to improve navigation, vessel construction, crew training, etc., should result in a reduced probability of casualties and reduced numbers/volumes of oil spills once casualties occur, effectively reducing the overall benefit of proposed vessel response plan regulations and;

(2) due to the variability in estimates of the reductions in spill volume that will result from vessel response plans, the Coast Guard estimates that these plans will result in a 15% reduction in spill volume and overall costs.

(3) some level of vessel response planning will be standard industry practice, whether or not the Coast Guard issues related standards, as OPA 90 requires submission of vessel spill response plans independent of any proposed regulation; and

(4) portions of the maritime industry have already initiated improvements in spill response planning as a result of the EXXON VALDEZ oil spill in March 1989.

Though the Coast Guard believes that the overall environmental impact of OPA 90–related rulemaking actions will be significant and positive, the proposed action implementing provisions requiring the promulgation of vessel response plan requirements and standards, when considered independently, is not expected to result in significant impact on the quality of the human environment, as defined by NEPA.

9.0 COORDINATION

A public meeting was conducted at Coast Guard Headquarters on 26 September 1991 to obtain the views of interested parties regarding the scope of appropriate documentation necessary for Coast Guard compliance with the provisions of the National Environmental Policy Act (NEPA), as it pertains to OPA 90 rule promulgation. No comments pertaining to NEPA requirements relating to vessel response plan rulemakings were received. All comments resulting from an Advance Notice of Proposed Rulemaking (ANPRM) published in the Federal Register (56 FR 169, August 30, 1991) were considered and are available for public inspection.

DRAFT

APPENDIX A

OIL SPILLS

Summary of Effects on Marine, Coastal and Inland Waterway Environments

1.0 Introduction

Though petroleum hydrocarbons (PHCs) enter the marine and freshwater environments from many sources, catastrophic oil spills such as those resulting from the EXXON VALDEZ (March 24, 1989) and other large tank vessel accidents can economically and biotically adversely impact portions of the human and natural environment. Throughout the world, approximately three to five such major spills have occurred per annum since the TORREY CANYON accident off the English coast in 1967 [1]. On average, during the period of 1978 – 1990, 6.5 major (10,000 gallons or more) tank vessel oil spills occurred per year in U.S. waters and eight of 82 major spills involved quantities of one million gallons or more [2]. Location, oceanographic conditions, time of occurrence, characteristics and volume of oil spilled, response equipment, and personnel availability and fitness are unique for each spill. Even under the best of conditions, using best available technology (BAT) and assuming a timely and coordinated response effort utilizing well trained personnel, it is unrealistic to expect that a substantial amount of oil from a major offshore spill could be recovered. Where recovery attempts have been made, it has been historically unusual to recover more than 10 – 15 percent of the spilled oil. The Office of Technology Assessment (OTA) of the Congressional Budget Office has estimated possible maximum recovery levels exceeding 30 percent, with improved technology, but then concluded that it is unlikely that oil recovery during major spill events will approach 50 percent [1].

Major tank vessel oil spills occur in fresh as well as saltwater. The GRAND EAGLE, for example, spilled approximately 11,000 barrels (approximately 462,000 gallons) of Ninian crude into the Delaware River during October 1985, just weeks prior to the expected arrival of migratory waterfowl. An estimated 78 acres of marshland were impacted and 54 oiled birds died. Ninety–two birds, mostly cormorants, ducks, geese and gulls, were treated [3].

2.0 Oil – Inputs to the Environment

Data describing and comparing the primary causes of tank vessel oil spills, spill size and frequency, and related information are relatively abundant in the scientific, business and regulatory literature [4,5,6,7]. Estimates of oil quantities transported by tank vessels annually and projected U.S. usage/transportation trends are available from various sources [4,8]. Mean annual oil inputs to the world's oceans have been estimated and volumes, by source, roughly approximated [4,12,13] (TABLES 1 and 2). Though some of this information is based on incomplete, occasionally inconsistent data, it is generally accepted as being sufficiently representative to use in further data interpolation and analysis.

TABLE 1 Input of Petroleum Hydrocarbons to the Marine Environment - 1985 (mta)[a]

Source	Probable Range	Best Estimate[b]
Natural Sources		
Marine seeps	0.02 - 2.0	0.2
Sediment erosion	0.005 - 0.5	0.05
(Subtotal)	0.025 - 2.5	0.25
Offshore production	0.04 - 0.06	0.05
Transportation		
Tanker operations	0.4 - 1.5	0.7
Dry-docking	0.02 - 0.05	0.03
Marine terminals	0.01 - 0.03	0.02
Bilge & fuel oils	0.2 - 0.6	0.3
Tanker accidents	0.3 - 0.4	0.4
Nontanker accidents	0.02 - 0.04	0.02
(Subtotal)	0.95 - 2.62	1.47
Atmosphere	0.05 - 0.5	0.3
Municipal & industrial wastes & runoff		
Municipal wastes	0.4 - 1.5	0.7
Refineries	0.06 - 0.6	0.1
Nonrefining industrial wastes	0.1 - 0.3	0.2
Urban runoff	0.01 - 0.2	0.12
River runoff	0.01 - 0.5	0.04
Ocean dumping	0.005 - 0.02	0.02
(Subtotal)	0.585 - 3.12	1.18
TOTAL	1.7 - 8.8	3.2

(a) Million tons per annum Source: Taken directly from Oil in the Sea: Inputs, Fates, and Effects, National Research Council (NRC), pg. 82 (1985).

(b) Total best estimate, 3.2 mta, is a sum of the individual best estimates.

Assuming that the best estimates listed in TABLE 1 are reasonable, approximately 45 percent of the petroleum hydrocarbon input to the marine environment between 1975 and 1985 apparently came from marine transportation-related (tanker and nontanker) sources. Tanker operations (0.7 mta) and accidents (0.4 mta) resulted in approximately 1.1 mta of the estimated

transportation–related 1.47 mta contribution. Less than 15 percent of the total input came from tanker accidents.

The Coast Guard updated PHC input estimates to the oceans in 1990 [12,13] and concluded that approximately 0.57 mta comes from marine transportation–related sources (TABLE 2), which reflects a nearly two–thirds decrease in estimated input since 1985. Though improvements in record–keeping and other accounting/estimating procedures may have been partially responsible for differences in these results, major decreases in maritime input "can be attributed to international cooperation in development and execution of rules for tanker design, clean ballasting and vessel operations, and supportive action of most major maritime states [12]."

TABLE 2: Estimated World Maritime Operational and Accidental Sources of Oil Entering the Marine Environment (mta) - 1990

Bilge and Fuel Oil	0.25
Tanker Operational Losses	0.16
Tanker Accidents	0.11
Non-tanker Accidents	0.01
Marine Terminal Operations	0.03
Drydocking & Ship Scrapping	0.01
TOTAL	0.57

Source: Tanker Spills: Prevention by Design, NRC, pg. 12, 1991.

More detailed information concerning inputs of oil to the marine environment is available in Oil in the Sea: Inputs, Fates, and Effects, Chapter 2, "Inputs," pp. 43 – 88 [4]. By virtue of its comprehensive study of oil in the marine and aquatic environment this report is hereby incorporated by reference as provided by 40 CFR 1502.21 of the Council on Environmental Quality regulations.

3.0 Oil – Fate in the Environment

Physical, chemical and biological transformations begin in oil immediately upon introduction to either marine or freshwater environments. The rate and degree of transformation is dependent upon numerous factors, but is tied to advective and spreading processes (simply illustrated in FIGURE 1) which result in a rapid increase in surface area exposed to "weathering" processes [4].

Oil spreads out along the interface between water and the atmosphere. This surface film, or "slick," then tends to move with water currents and wind drift. Recent data has shown that oil spread rate can increase approximately four–fold every 24 hours [9] and that speed of drift is roughly 60 percent of water current speed and two–to–four percent of wind speed [10], though the entire spreading process is likely to be profoundly influenced by sea state, especially under severe conditions in which oil may be carried by spray [4]. Of particular significance is the observation that a thicker region of oil tends to drift more rapidly than a thinner one. Thus, thicker regions tend to accumulate near the leading edge of a drifting slick.

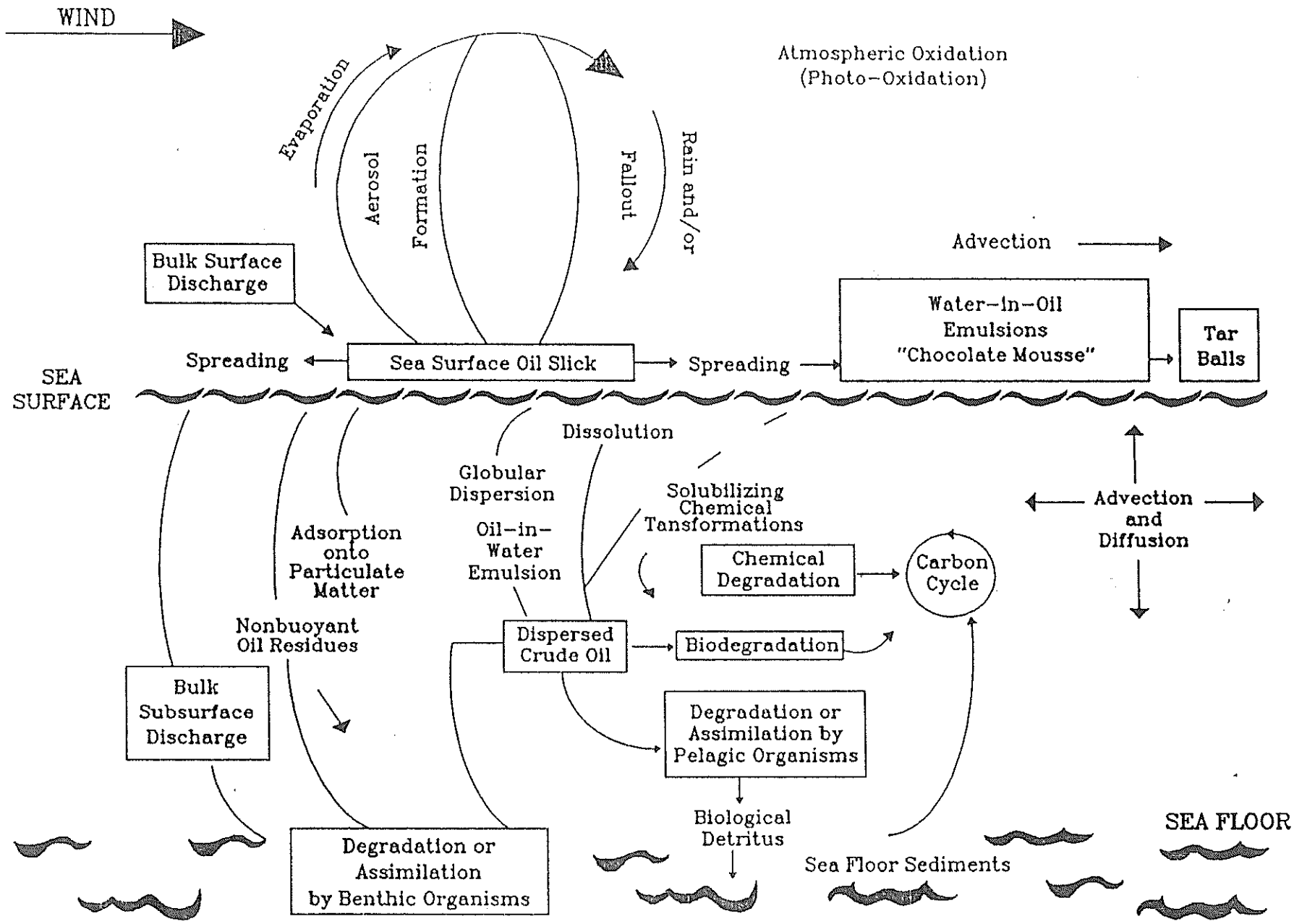

FIGURE 1: Schematic of physical, chemical, and biological processes.
SOURCE: Copied from Oil in the Sea, Inputs, Fates, and Effects.
NRC, pg. 271 (1985).

Spread and drift affect processes that include evaporation, dissolution, vertical dispersion, emulsification, sedimentation and possible upwelling of dispersed oil droplets. Oil density, viscosity and other physical and chemical properties are important factors in the relative susceptibility of the spilled material to these processes. Viscosity of the oil, when spilled, is especially critical to the rate of transformation. Viscosity changes as the oil is exposed to weathering processes and this dynamism affects the efficiency of any response effort, as well as the ultimate fate of the material remaining in the environment. Rough seas accelerate emulsification of the oil, expanding initial spill volume and producing "chocolate mousse", which is difficult to pump, mechanically collect, burn or chemically treat [1]. As a result, greater amounts of the spilled oil remain in the environment. Evaporation, water take-up, photo-oxidation, chemical degradation, biodegradation and other factors change not only the viscosity, but also the toxic, reactant and other physical and chemical properties of the material.

Spreading of oil upon initial discharge is controlled primarily by gravitational effects which are influenced by wind, waves and currents, but after a few hours, viscosity, surface tension and other physical and chemical characteristics become controlling factors [11]. Ultimate area occupied by the oil depends upon the volume spilled, yet, even massive spills eventually spread into thin layers and become fragmented into patches and windrows [11]. Depending upon location of the spill, wind, current and other oceanographic conditions, some of the oil may strand on shorelines. Shoreline stranding is typical of inland spills. Thus, injury to wetlands, seagrass beds, beaches, rocky habitats, coral reefs, intertidal areas and terrestrial ecosystems may result. In general, oil stranding tends to occur primarily near the high tide line, where physical smothering, penetration into sediments, reintroduction to the water column and other processes occur. Recovery rate of impacted shorelines depends upon the extent of initial impact, persistence of the oil, biological community health, resiliency, and complexity and many other factors. Recovery time may range from a few weeks or months on high-energy rocky shores to many years in soft-sediment, low energy offshore areas, marshes and wetlands [11].

Larger petroleum hydrocarbons, particularly cycloalkanes and aromatic compounds, are resistant to evaporation, nearly insoluble in water, and difficult to biodegrade [10]. As a result, these compounds tend to persist in the environment.

More detailed information concerning the fate of oil in the marine environment is available in Oil in the Sea: Inputs, Fates, and Effects, Chapter 4, "Fates," pp. 270 - 368 [4].

4.0 Oil – Effects on the Environment

Considerable laboratory and field research has been conducted to ascertain effects and mechanisms of action of complex PHCs and derivatives in marine offshore, coastal, estuarine and freshwater environments. Extreme complexity and variability of the PHCs and the environments studied, however, have limited the types and comparability of data collected. Current scientific methodology and technology may be inadequate for such a complex task. As a result, data detailing actual short-term and long-term effects of spilled oil on these natural systems, associated populations, organisms and human health are sporadic and incomplete, often difficult to evaluate or compare and, at times, contradictory. The relative immiscibility of oil and water complicates comparison of laboratory results with possible aqueous exposures in the field. Problems with logistics and finances have also placed limits on the amounts and types of information to be collected in the field, especially when areas to be studied are located either offshore or in regions not readily accessible. Oil composition begins to change immediately upon discharge, and the impacts of weathered oil differ in intensity and type from unweathered oil. Maintaining the temporal commitment necessary to fully study the effects of a spill on the natural environment has not always been possible. Study of the impacts of the EXXON

VALDEZ oil spill in Prince William Sound, Alaska is continuing. A better understanding of the impacts and related mechanisms, natural recovery potential and other factors involved during and after a catastrophic spill of a specified crude oil, under a specified set of cold water conditions should result.

Variables influencing the effects of oil spills on the aquatic and marine environments include, but are not limited to:

Weather conditions – wind direction, velocity, air temperature and relative humidity, percentage of overcast, etc.

Sea state – wave height, type, frequency, variability, degree of whitewater and frothing, upwelling or downwelling, water current velocity and direction, etc.

Characteristics of the water – depth, temperature, pH, nutrient and oxygen content, etc.

Location of spill – proximity to sensitive ecosystems and organisms, distance from shore, etc.

Size of spill – minor, medium, major or catastrophic.

Type of oil spilled – physical and chemical properties of the crude or other oil, concentration and solubility of non-hydrocarbon constituents, relative toxicity, etc.

Duration of exposure – effects of fresh versus weathered oil, period of environmental contamination, etc.

Type of ecosystem impacted – system complexity and health, degree of sensitivity of local organisms or populations, types of substrates (if any) impacted, etc.

Season of the year – life cycle stages of important local or migrating/drifting animal or plant species, etc.

Type and extent of cleanup – Damages/benefits associated with any cleanup/protective/restoration actions taken.

Crude oil occurs naturally in the environment. Natural seepage into global waters is difficult to quantify, though upwards of 1.5 million barrels of oil may enter the oceans from natural seeps each year [11]. Available evidence has not demonstrated that tankers have unalterably changed the world's oceans or marine resources [4]. In fact, studies have documented nature's ability to recover with time. In the short-term, however, impacts of oil spills on local environments can be devastating. In contrast to offshore situations where environmental impacts may be transient and minimal (though supporting data is meager), there is great concern about possible effects on coastal environments where biological production is high. Recolonization of impacted areas does occur, though speed of recovery is dependent upon climatological, ecological and other factors, including possible synergistic effects resulting when oil is combined with other types of pollution. Much additional information needs to be collected before any generalization on the long-term impacts of oil spills can be made.

More detailed information concerning the impacts of oil in the marine environment is available in Oil in the Sea: Inputs, Fates, and Effects, Chapter 5, "Effects," pp. 369 – 548, and in Appendix A, "Impact of Some Major Spills (Spill Case Histories)," pp. 549 – 582 [4].

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