Chapter 1
Overview

The March *24, 1989 Exxon Valdez* oil spill in Prince William Sound, Alaska dramatically illuminated the gap between the assumed and actual capability of industry and government to respond to catastrophic oil spills. There are many reasons why this gap wasn't better appreciated before March 24: elaborate oil spill contingency plans had been prepared and approved; oil spill equipment had been developed and stocked; major damaging spills had occurred infrequently, and almost never in the United States; and a nebulous faith had existed that technology and American corporate management and know-how could prevent and/or significantly mitigate the worst disasters.

The *Exxon Valdez* accident shattered this complacency. In the aftermath of the spill a small army of people has been put to work around the country studying how the United States can do a better job preventing spills and how it can be better prepared to fight one that does occur. In this background paper, OTA examines the state-of-the-art of oil spill technologies and response capabilities. On an encouraging note, it appears that improvements can be made in oil spill cleanup technology and, perhaps even more, in the way we organize ourselves to apply the most appropriate technologies to fight oil spills. Such improvements should result in a reduced risk of significant damage from a major spill in the future.

However, the unfortunate reality is that, short of eliminating oil transportation at sea entirely, there is no perfect solution to offshore oil spills. **It is certain that oil spills will occur again.** If improvements in prevention technology are made, the frequency of major spills may decrease, but improvements are unlikely to eliminate oil spills entirely, and a very large spill under adverse conditions could still overwhelm our capacity to respond effectively. Even using the best technology available and assuming a timely and coordinated response effort, it is not realistic to expect that a significant amount of oil from a major offshore spill could be recovered, except under the most ideal conditions.**Historically, it has been unusual for more than 10 to 15 percent of oil to be recovered from a large spill,** where attempts have been made to recover it. With improvements in technology and response capability, it should become feasible to do much better, but it is unlikely that technical improvements will result in recovery of even half the oil from a typical *large* spill.

It is not feasible to be prepared for all contingencies: each oil spill is unique in terms of location, weather, oceanographic conditions, time of occurrence, characteristics of the oil, equipment available, and experience of response personnel. Accidents are unpredictable. They may be caused by "acts of God" or human error, both of which are impossible to fully anticipate or control. The ideal conditions in which cleanup technology would be most effective rarely occur in the real world.

The U.S. industry has concentrated its efforts in developing technology to fight the numerous small spills in harbors and protected waters. On the one hand, industry has oversold its ability to fight major spills, and the government has largely relied on private capabilities; on the other, the public's expectation about what can be accomplished once a major spill has occurred has been too high. *Prevention* of major spills, although beyond the scope of this study, must be a high priority.[2]

[1] For the purposes of this report the terms "catastrophic," "major)" and "large offshore" spills refer to discharges in excess of 1 million gallons of oil that occur in open waters subject to rough seas, high currents, or other adverse environmental factors.

[2] For a detailed discussion of prevention measures, see U.S. Congress, Office of Technology Assessment, *Oil Transportation by Tankers: An Analysis of Marine Pollution and Safety Measures* (Washington, DC: U.S. Government Printing Office, July 1975).

It is important to put the environmental impacts of a major oil spill into perspective. Such a spill is indeed a catastrophe, but oil spills are not the worst type of pollution with which Federal and State authorities have to deal. In terms of threats to human health and persistence in the environment, spills of hazardous chemicals or radioactive waste can be far larger problems, and accidents involving dangerous materials can cause significant loss of life. Nevertheless, it is a serious problem when a large quantity of oil is spilled in a coastal or near-coastal area. The public is particularly concerned about large spills in sensitive areas because the effects on the local ecosystem are acute, often initially devastating both to biota and economic activities. Oil can be toxic to organisms that come into contact with it and can cause major problems with recreational or other uses of coastal regions, such as commercial fishing in Alaska. If large amounts of oil reach the shore, the oil may persist for long periods, even though natural degradation mechanisms do assist recovery[3].

As bad as the *Exxon Valdez* accident was, it could have been far worse: **only about one-fifth of the crude oil the tanker was carrying was released.** Fortunately, the rest was offloaded. The Amoco Cadiz did spill its entire cargo off the coast of France in 1978, a cargo roughly the same size as that carried by the *Exxon Valdez*.[4] Significantly, neither the oil industry, the Federal Government, nor the State of Alaska were prepared to deal with a spill the size of the *Exxon Valdez* spill. It was fortunate, in a sense, that the spiller in this incident was a major international oil company capable of marshaling significant resources, rather than a small tanker company.

[3] In 1974 the supertanker *Metula* spilled some 16.2 million gallons of oil after grounding in the Strait of Magellan. Essentially, no cleanup occurred and at least half of the oil lost washed onto about 50 miles of shoreline. A study by the National Oceanic and Atmospheric Administration about 6 years after the spill concluded that much of the oil remained in sediments, along beaches, and in marshes. In heavily oiled, sheltered areas, it seems likely that the oil will persist for more than 100 years.

[4] The *Amoco Cadiz* spill released 66.4 million gallons of light crude oil off the Brittany coast in France. Prevailing winds kept the slick near the coast for 1 month, eventually oiling about 200 miles of coastline. In a 19S5 report, *Oil in the Sea,* the National Research Council estimated that it would take decades before the environment recovered.