News & Comment

Valdez: The Predicted Oil Spill

The potential disaster of a major spill in Prince William Sound was forecast in a 1972 Environmental Impact Statement; the bumbling response was not

THE *EXXON VALDEZ* tanker, freshly loaded with 1.2 million barrels of crude oil and fitted with the latest safety equipment, left Alaska's south coast on the night of 23 March, heading for California. Twenty-five miles out, at 12:04 a.m. on Good Friday, it ran squarely into a reef. The rocks at Bligh Island tore five huge gashes in the hull, one of them 6 feet wide by 20 feet long, creating the worst oil spill in U.S. waters.

Wide World

The *Exxon Valdez,* *on the rocks at Bligh Island. Of the 240,000 barrels of oil spilled, less than 4% has been recaptured.*

The accident took place within range of Coast Guard radars, in fine weather, with good radio contact between the radar operators and the ship, in the absence of traffic, and with clear visibility of 10 miles. It looks like a case of gross human error, the kind that sophisticated technology cannot prevent.

"At 27 minutes after the hour," says Coast Guard spokesman Rick Meidt in Valdez, someone on the ship "called us and said, 'I've run aground and we've lost 150,000 barrels.' At that instant, the spill was already too big for local crews to control.

Meidt says the ship was within range of Coast Guard radars. The radar screen shows the shoreline and a simulated overlay of the traffic lanes with ships moving through them. Had the officer on duty in Valdez been watching, he might have warned the ship that it was headed for the rocks. But he issued no warning. More will come out in a National Transportation Safety Board inquiry that has just begun.

The Coast Guard says its traffic service at Valdez provides advice and guidance as necessary, but none was needed in this case. The ship was well beyond the narrows, with no traffic in sight. Coast Guard Commandant Paul Yost told reporters, "Your children could drive a tanker" through the 10-mile-wide path to the sea.

The spill may damage not just the wild environment of Prince William Sound (see page 22) but the oil companies' hopes of drilling in the Arctic wilderness and expanding offshore operations in California and Florida. A coalition of ten environmental groups seized the occasion on 28 March, calling on President Bush to abandon plans to lease tracts along Alaska's north coast in the Arctic National Wildlife Refuge.

Michael McCloskey, president of the Sierra Club, said the *Exxon Valdez* spill has "damaged the credibility of the oil industry in its claim that the prudent development of oil resources in sensitive and delicate environments is possible." President Bush earlier had proposed a National Academy of Sciences review of the risks of drilling offshore in California and Florida. Now the environmental groups want a similar study on development of the Arctic Refuge. Bush said it would be "irresponsible" to leave the oil reservoirs untapped, and that "we will . . . redouble every effort to provide the proper safeguards" for development of the Arctic fields.

On Good Friday morning, as the tanker continued leaking into Prince William Sound and the hours passed, it became clear that local crews were not prepared to handle a disaster this big. A contingency plan mandated by law requires the Alyeska Pipeline Service Company, whose terminal is at Valdez, to respond to a spill within 5 hours. The response took 10 to 12 hours. The company got off to a slow start, according to the Coast Guard, because a barge with oil containment equipment was out of order. The hardware had to be transferred to a working vessel. Also, one officer says, things moved slowly because people had begun to celebrate the Easter weekend.

Nearly all the oil was released in the first 12 hours, according to Coast Guard dispatches. Speed is essential in controlling oil slicks because they grow exponentially with time. In a few days, the oil also becomes emulsified with water in an intractable "mousse." This accident combined a very large leak with a slow response. When crews reached the scene, the spill was extremely thick and widely dispersed. By last week, about 240,000 barrels of oil—10 million gallons—had spread over 900 square miles of water.

The Alyeska Pipe Line Service Company did not live up to the contingency plan. But Exxon stepped in massively over the weekend, dispatching dozens of experts, planes loaded with chemical dispersants, pumps, containment booms, and exotic oil burning equipment. According to the Coast Guard, there were more than 400 U.S. government personnel on site 5 days after the accident. By the time all were deployed, however, it may have been too late.

According to Coast Guard dispatches, an early test of chemical dispersants on 25 March gave "less than satisfactory results . . . due to lack of wave action." The chemicals were set aside for a time while company employees concentrated on removing oil still aboard the tanker to a ship that had been brought in. This was a dangerous operation. Toxic benzene fumes and other combustible vapors filled the air around the tanker.

After a few partially successful test runs, the dispersants and burning attempts were abandoned because the oil had emulsified into thick ribbons by Monday, 27 March, according to the Coast Guard. The wind also grew stronger, making it difficult for planes with oil dispersants to take off and defeating skimmers and containment booms.

Exxon officials claimed that the compa-

ny's efforts to drop dispersants over Easter weekend were delayed by state officials, who were worried about the damage that might be done to herring and salmon roe. In shallow waters, the chemicals are as toxic as oil. Whether the 24- to 48-hour delay made a significant difference in this case needs more analysis.

As a rule, chemicals should be used within the first 24 hours after a spill, says James Butler, a marine scientist at Harvard who chaired a recent National Academy of Sciences study on the use of dispersants. The decision to use them is always controversial. Butler says his committee ran afoul of "a relatively uninformed but highly emotional" point of view that "oil is bad, so oil plus chemicals must be worse." While adding dispersants to the oil may deliver a shock to marine life immediately, not treating it can be worse over the long term. Clotted oil washes up on the shoreline and makes its way into sediments, where it remains toxic for years.

Another question that has come up is whether the spill could have been avoided if the *Exxon Valdez* had been built with a shielded hull. In 1977, after the breakup of the *Argo Merchant* tanker off Nantucket, the Coast Guard proposed that new tankers larger than 20,000 tons (deadweight) be built with double bottoms. The idea was opposed by shippers as too expensive. The International Maritime Organization also rejected it. As an alternative, the Coast Guard proposed that new tankers use segregated water ballast and oil tanks, reducing a common source of pollution—flushing sea water through the oil tanks. The design standard was approved, and the *Exxon Valdez*, built in 1986, is a tanker of the new, clean variety.

Coast Guard official Joseph Angelo says that double bottoms would protect against spills in some groundings. But if the depth of hull penetration is more than 6 feet, they are ineffective. The damage to the *Exxon Valdez* has not been fully examined, although the largest hole in its side is 6 feet wide and 20 feet long. A double bottom might not have helped.

The postmortem has begun, and one of the first questions asked is: What happened to the vaunted "national contingency plan" that was supposed to contain disasters like this?

When the oil companies won permission from Congress in 1973 to lay a pipeline quickly from Alaska's North Slope to the port of Valdez, it was understood that ocean transport would be the riskiest part of the operation. The main risk identified in the Interior Department's Environmental Impact Statement of 20 March 1972 was that a tanker on its way out of Valdez might break up in this remote area where little could be done to intervene, permanently changing "the solitude and wilderness aspects of this scenic area."

In retrospect, the 1972 environmental statement proved accurate. In a worst case scenario, it predicted significant spills at the rate of one a year, dumping perhaps as much as 140,000 barrels into the water. It noted that spill cleanup efforts in the past were inefficient, capturing no more than 8 to 15% of the lost oil. Less than 4% of the Valdez spill has been recaptured.

Congress decided the risk was worth taking, mainly because dependence on imported oil was growing and the ocean route could bring U.S. oil to market more rapidly than any other. The environmentalists, joined by midwestern congressmen, campaigned for an alternate plan that would have carried the oil across Canada to Chicago in a pipeline three times longer. It would have skirted some active seismic areas and avoided ice-laden Alaskan waters. But the oil industry and Administration leaders said Canada might not cooperate.

Congress voted to grant most of the concessions sought by the oil companies in 1973, having been told that steps would be taken to reduce the risk of spills. For example, the Environmental Impact Statement said that "equipment and planned procedures for Port Valdez are at the current state of the art." The Coast Guard and the industry would have a "national contingency plan" and a local plan to identify manpower and machinery that could be used in a crisis. "The oil industry and Alyeska are aware of the continuing research in oil spill control technology and intend to incorporate improvements in all plans."

Put to the test on 24 March, the promise proved more modest in reality than in its public image. The Coast Guard's oil spill contingency plan, according to spokesman Rick Meidt, kicks in only if industry cannot or will not take responsibility. "We don't have enough people; we have virtually no equipment" for containing spills, he says. The Coast Guard has a small "bag of money," authorized at $35 million but funded at less than $10 million, which it can spend in emergencies if industry shirks its duty. The amount is dwarfed by the projected commercial losses in Prince William Sound—$100 million or more. But federal expenditures were limited because Exxon took responsibility the morning after.

Even if the Coast Guard had stockpiled equipment at Valdez, says Meidt, it would have made little difference. "It's one thing if you're talking about a spill of maybe a couple thousand gallons that could be contained in a containment boom. This thing is gigantic." ■ ELIOT MARSHALL

Wide World

Spreading slick. *The delay in using dispersants has been criticized.*

Ellis Rubinstein Named News Editor

Ellis Rubinstein, formerly Editor of *The Scientist*, has assumed the post of News Editor of *Science*. He brings to *Science* a distinguished career of editing for both consumer- and science-based magazines. National Magazine Awards were received by *Science 85* and *IEEE Spectrum* for stories which were developed under his editorships. Rubinstein is a Fellow of the AAAS and a member of the American Society of Magazine Editors and the Institute of Electrical and Electronic Engineers.