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."

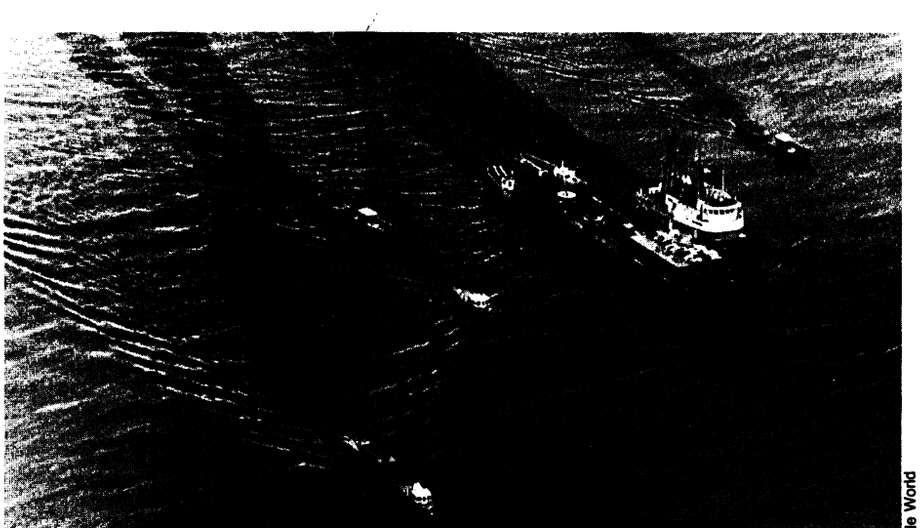
In retrospect, the 1972 environmental statement proved accurate. In a worst case scenario, it predicted significant spills at the rate of one a year, dumping perhaps as much as 140,000 barrels into the water. It noted that spill cleanup efforts in the past were inefficient, capturing no more than 8 to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