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EXPORTING ALASKAN NORTH SLOPE CRUDE OIL: EVALUATION OF OIL SPILL RISKS

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ABSTRACT: *On November 28, 1995, President Clinton signed legislation (S.395, Public Law 104-58) that authorizes the exporting of Alaskan North Slope crude oil. The oil would be shipped in U.S. flag vessels through the Gulf of Alaska and along a route 200 miles offshore the Aleutian Islands to the Far East. Implementation of this law is subject to a Determination of National Interest, which considers potential effects to the environment and economy. An interagency group, including the Department of Commerce, the Department of Energy, and the U.S. Coast Guard, was formed to analyze such effects, one of which is oil spill risk. The Minerals Management Service's Oil-Spill Risk Analysis model was used to track and analyze simulated spills from two tanker routes: a proposed route offshore the Aleutian Islands, and the existing domestic tanker routes through the Gulf of Alaska and along the coasts of Washington, Oregon, and California. The model results reflect the estimated risk to coastal areas over the various seasons from spills at large for up to 30 days' travel time. The information generated was used to support planning for mitigation of potential risk and impacts.*

On November 28, 1995, President Clinton signed legislation (S.395, Public Law 104-58) that authorizes the exporting of Alaskan North Slope crude oil when transported in U.S. flag tankers. In the spring of 1996, a Determination of National Interest was completed to support this action. The analysis for this determination was undertaken by several federal agencies, including the Council on Environmental Quality, the Department of Commerce (DOC), the Department of Energy, the U.S. Coast Guard, and the Department of the Interior (DOI) (Department of Commerce, 1996). The lifting of the ban has resulted in some tanker traffic to the Far East originating from the Alaska pipeline terminus at Valdez, Alaska. The routing was chosen to keep tanker traffic at least 200 miles offshore the Aleutian Islands chain. One of the major parts of the analysis addressed the risk of oil spills contacting the coast or other sensitive environmental resources.

Oil spill risk analysis

Conditional contact probabilities. The Oil-Spill Risk Analysis (OSRA) model of the Minerals Management Service (MMS), DOI, was applied to the proposed tanker routing scenarios. The OSRA model has been developed to address estimates of oil spill risks from long-term projects or projections (Smith *et al.,* 1982). It presents a stochastic treatment of risks and simulated spill trajectories, as opposed to a real-time spill response model. Employing the best available data on winds, currents, and tides, the model was used to analyze the chance of spill contact to the coastline from the proposed tanker routes shown in Figure 1 (LaBelle *et al.,* 1996). From each portion of the tanker route, 2000 trajectories were simulated (500 per season). Each simulation was allowed to proceed for up to 30 days' spill travel time, and contacts to the coastline (Figure 2) were tabulated and reported by season.

The resulting probabilities are termed conditional, the condition being an assumption that the spills have occurred. Results show moderate levels of risk (from less than 1% to 58% chance of contact) to the coast off Prince William Sound and to the east coast of Kodiak Island. Since the routes in the Gulf of Alaska are the same whether the oil is exported or moved to the U.S. West Coast, there is no difference in risk to Alaska due to exporting oil. Trajectory analysis of the oil movement off the West Coast shows that most of the risk is concentrated at the major ports of entry: Puget Sound, San Francisco Bay, and Los Angeles.

Spill occurrence probabilities. Using the methodology described in Anderson and LaBelle (1994), the chance of large spills (>1000 barrels) occurring over the life of the planned exports was estimated. The risk exposure variable used was the total volume of oil, which was multiplied by spill occurrence rates calculated from the historical accident record. The projected volumes of oil to be exported ranged from about 6 million to 290 million barrels over a 6-year period, depending on the low or high price scenarios. This method resulted in spill occurrence estimates ranging from less than 1% to 15% chance over the export lifetime.

Combined probabilities—spill occurrence and contact. The overall risks of the proposed exports were estimated by combining the probability matrices created in the spill trajectory contact analysis with the spill occurrence likelihood (Smith *et al.,* 1982). The combined probabilities of spill occurrence and contact associated with the export of oil along tanker routes T1–T30 were calculated for each land segment. Results show no combined probabilities greater than 0.5% (the model's lower limit of resolution) for any land segment over the life of the project.

For the West Coast analysis, the combined probabilities were based on the volume of oil transported, about 2 billion barrels, over the 6-year

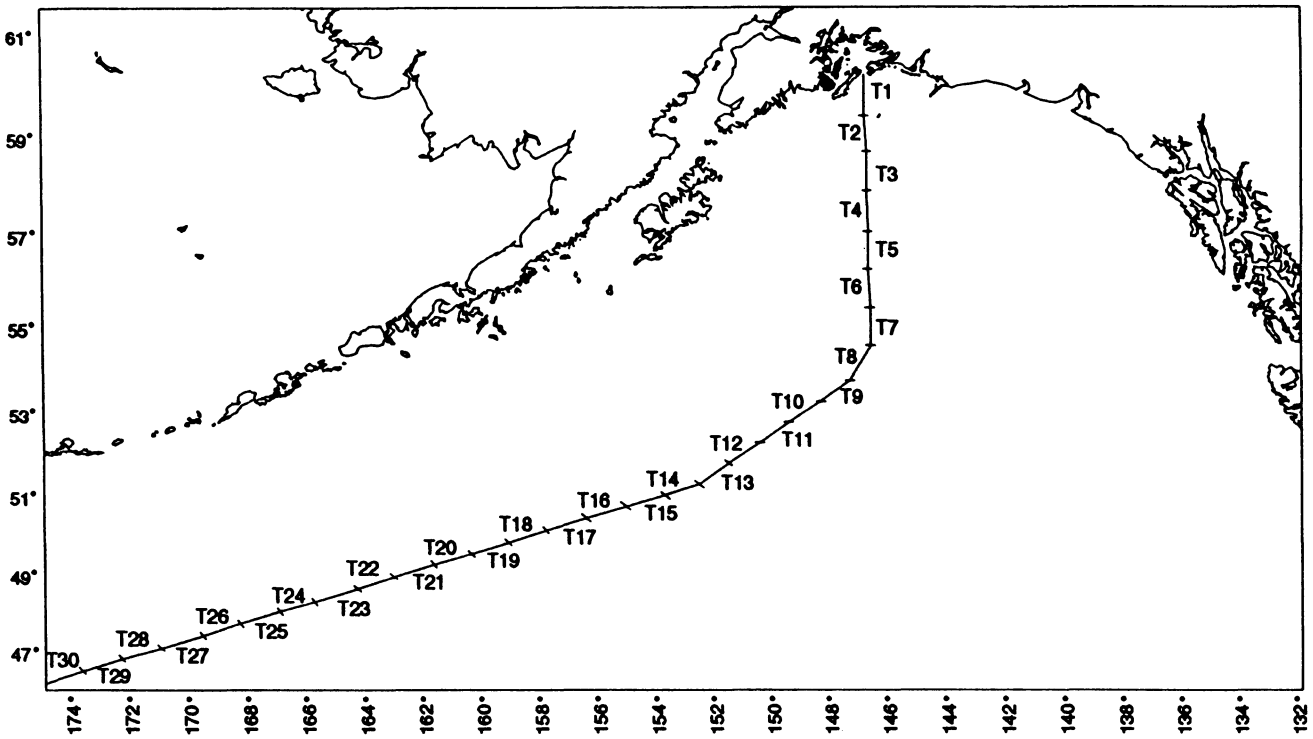

Figure 1. Tanker route segments (T1–T30) used in oil spill risk analysis for Alaska North Slope oil exports

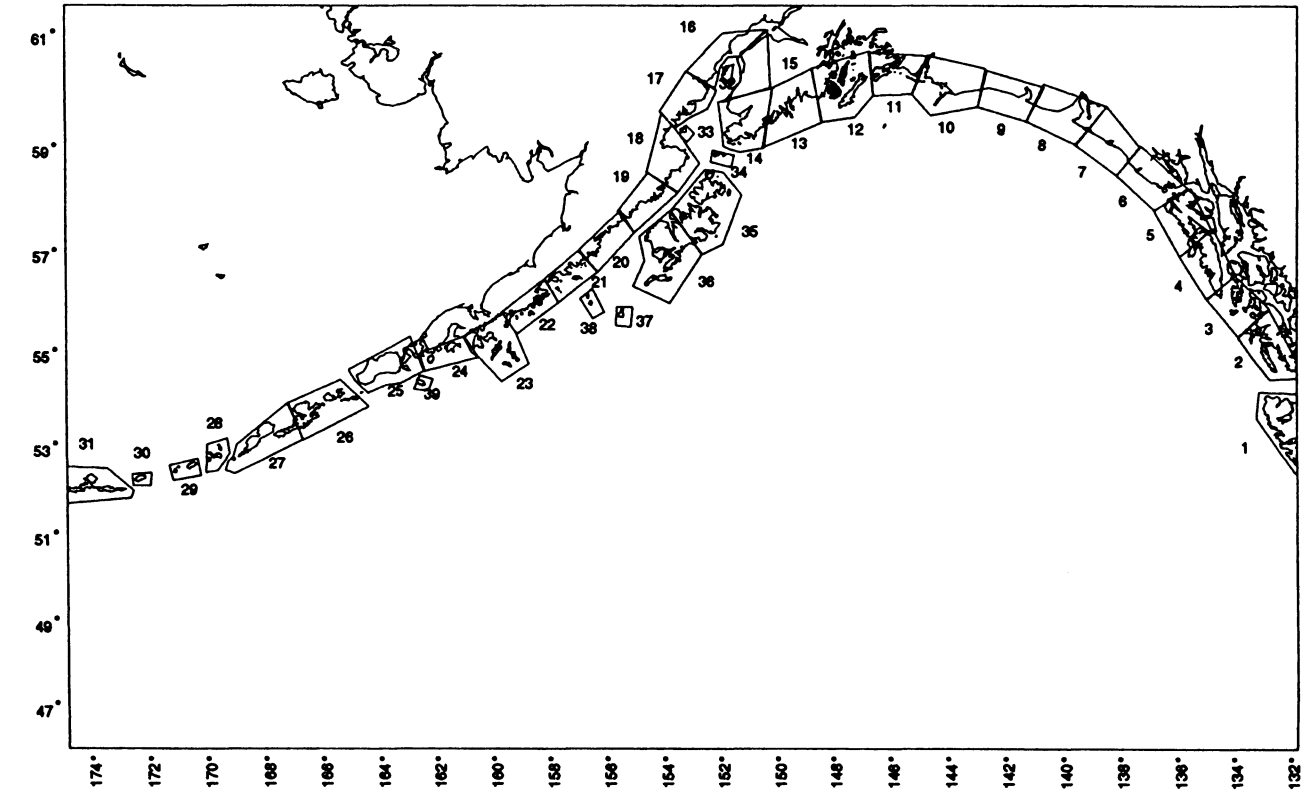

Figure 2. Study area coastline divided into 39 land segments in oil spill risk analysis for oil export analysis

period. This analysis found no combined probabilities greater than 3% for any West Coast land segment.

Conclusion

These results were used to help determine that the proposed exports would not pose an unacceptable risk to the environment. This analysis was instrumental in quantifying the overall likelihood of oil spill occurrence and contact from the planned tanker route. Another part of the analysis addressed the risks of transporting North Slope oil to the coasts of Washington, Oregon, and California. If some oil is shipped to the Far East, the risks to this region will decline to some degree, unless imports make up the difference.

Biography

Robert P. LaBelle is the chief of the Technology Assessment and Research Branch in the U.S. Minerals Management Service. He has almost 20 years of experience in oil spill and ocean modeling research.

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CONTINGENCY PLANS FOR THE SALVAGE OF A BARGE CONTAINING BUNKER C OIL AND PCB: THE *IRVING WHALE* EXPERIENCE

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ABSTRACT: *To illustrate the Canadian approach in developing contingency plans, we will use the example of lessons learned in the framework of the* Irving Whale *recovery project. The* Irving Whale *sank in 1970, in the Gulf of St. Lawrence (Canada), between the Iles-de-la-Madeleine (Québec) and Prince Edward Island. The barge came to rest in 67 meters (220 feet) of water, and contained an estimated 3100 tons of Bunker C oil and 7.5 tons of PCBs (Aroclor 1242). The recovery operation was successfully completed in the summer of 1996. Descriptions of some of the various tools, strategies, and emergency measures implemented to protect the environment are presented, including: (1) a brief description of the coordination of scientific and technical advice; (2) the geographic information system used for resource mapping and a shore-*