The focus of the U.S. Coast Guard’s Arctic Spill Response project is to ensure that the on-scene coordinator (OSC) has the background information and technical expertise to monitor the progress of an Arctic oil spill and its cleanup operation. To accomplish this, one of the project goals for the Arctic Pollution Response project was the development of a relatively simple, computer-assisted forecasting system for oil spills in Arctic areas. The model needed to be easy to use and immediately available because past spill incidents have shown that often the Coast Guard has less than one day to respond. The model has therefore been designed to produce data output showing spill trajectories for 24 hours within a few hours of the spill. This will provide the OSC with the information to make judgments concerning the area where the environment will be affected, and the resources and priorities for protecting them. Should a spill occur today, the best method for forecasting during the early stage of the spill would be similar to the basic vector addition technique used by the National Response Center for many past spills. This technique is excellent for immediate forecasts of the oil slick’s directional movement and outer boundaries. The vector technique has been incorporated into a simple computer model designed for Arctic areas.

Tests were conducted from August 1 to 14, 1985, in the area north of Prudhoe Bay, Alaska, to study the coastal circulation inside the barrier islands to test the short-term spill movement model. Drifters were released and their paths were tracked using a microwave tracking system. Parameters measured were wind speed and direction and the speed and direction of currents. If oil were moved solely by local winds, then current speeds in the vicinity should approximate 3% of the wind speed. However, current speeds exceeded these values. An explanation for the dynamics of these enhanced currents is presented based on the data collected. To verify the predictive capability of the model, the tracks of the drifters were computed and overlaid on model outputs. Generally, comparisons of the drift tracks to model outputs are in good agreement. Areas where performance was not up to expectations are discussed. The drift data and current measurements indicate the ability of the model to simulate successfully the direction of movement and speed of advance of an oil spill in the Arctic. The model will provide the Coast Guard’s OSC with an adequate prediction technique for short-term periods up to 24 hours.

Effective rehabilitation of oil spill sites is very dependent on the initial approach to containment, recovery, and cleanup. This is especially true in spill situations where the water table is near the surface (bog) or at the surface (fen), or the vegetation is submerged or nonexistent (marsh). In general, these three types of muskeg must be handled with extreme care to minimize environmental damage.

It is therefore important to have response strategies and options to assist work crews in making rational and cost-effective decisions. For land-based applications, the most effective means of containment and recovery are trenches, dykes, and hellholes. These techniques can also be used to improve drainage, so that aeration of the soil can take place. During this phase of the operation, proper equipment and construction techniques must be selected to mitigate soil and vegetation damage. In some cases, damages during construction have exceeded those of an oil spill, owing to improper containment and recovery procedures. In some instances, it may be beneficial to delay the physical aspects of a response until more suitable conditions exist, for example, a freeze-up.

Rehabilitation of oil spill sites also depends on the percentage of oil in the soil. In many cases this percentage can be reduced by such cleanup procedures as flushing or burning. However, care must be taken when either of these methods is used, since, for example, improper flushing can lead to soil turnover, which may trap oil in deeper soil layers. Burning may leave residues that may resist biological decomposition and can be a safety hazard.

The research and development subcommittee of the Prairie Regional Oil Spill Containment and Recovery Advisory Committee (PROSCARAC) has developed the field guide “Containment and Recovery of Oil from Muskeg Areas.” The purpose of this guide is to provide assistance to the on-scene commander and work crews involved in cleanup operations so that work procedures are efficient and damage is kept minimal. The guide covers techniques for containment, procedures for recovery, options for cleanup and disposal, and basic rehabilitation procedures. Material for this guide was compiled from research and spill experiences. The format is straightforward and easy to use. It is anticipated that proper use of this guide will result in effective, cost-efficient cleanup procedures.