# An Oil Spill Response Model for the Arabian Gulf

## CLIENT:

Abu Dhabi National Oil Company (ADNOC) through MC Corporation

## PROJECT #:

1990-032

## PROJECT ELEMENTS:

- Oil spill response model: OILMAP customization
- Database development
- Model testing
- Model training session

OILMAP Version 6 currently in use by ADNOC

## PROBLEM. PURPOSE.

As part of a multi-investigator effort led by MC Corporation, ASA was contracted to develop a personal custom computer based oil spill model system for the Arabian Gulf based upon ASA's OILMAP system framework which predicts the trajectory and fate of oil from user defined release points.

## SCIENCE. SERVICES. SOLUTIONS.

In addition to spilled oil trajectory and fate, the custom model developed by ASA can predict the probability that oil will impact water surface and shoreline segments for user selected, high probability spill locations (e.g., petroleum loading sites, tanker routes, shipping lanes, etc.). The latter predictions were used by MC Corporation scientists in siting spill response equipment and personnel.

The model included two domains: the entire Arabian Gulf and the southern portion of the Gulf (Qatar and east to the Strait of Hormuz). The model was tested by application to the Hasbah spill (1980), the Norwuz platform (1983) blowout, and the Mina Al Ahmadi spill (1991). In all cases the model successfully reproduced the major transport pathway for the spill.

ASA personnel also took part in the database development phase of the project. An ASA scientist was on site in Abu Dhabi for one month assisting the biological data collection component of the shoreline sensitivity mapping work used to support the model database.

## PRODUCTS. RESULTS.

OILMAP was delivered to ADNOC with several customized data sets. Currents were generated by hydrodynamic model simulations of the principal semi-diurnal and diurnal tides and wind driven flows for each principal wind direction. The hydrodynamic model resolution was 10 km for the entire Gulf and 2.5 km for the southern portion of the Gulf. A Markov matrix of winds was generated based on 20 years of observations at the Abu Dhabi airport. The oil database was expanded to include several ADNOC oils. ASA also delivered the results of several stochastic simulations run from ADNOC-specified release points using statistical winds generated from the Markov matrix. With the final delivery, a model training session was held to assist spill responders in using the model.