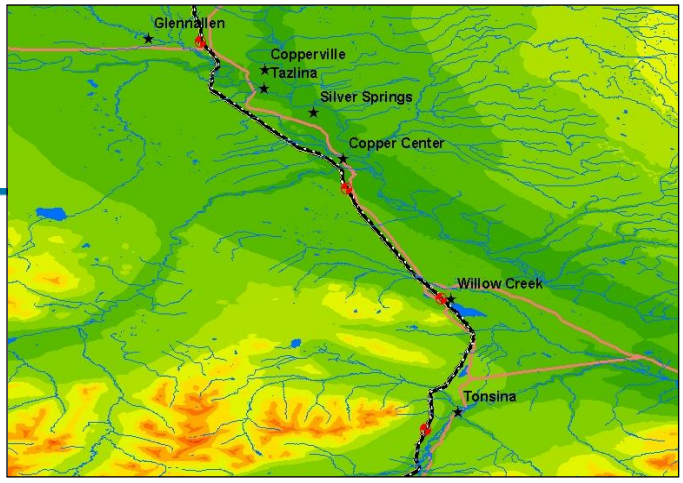
Land Spill Fate and Transport Simulations for the Trans Alaska Pipeline System

CLIENT:

Det Norske Veritas (DNV)

PROJECT ELEMENTS:

- Oil spill prediction model system (OILMAP)
- Land oil spill prediction model system (OILMAPLAND)
- Environmental data assimilation and processing



PROBLEM. PURPOSE.

ASA was requested to simulate oil spills for the Alyeska Pipeline Service Company for their Oil Discharge and Prevention Plan for the Trans Alaska Pipeline System. In order to examine the potential risk to areas of special concern, land spill scenarios were based on spill risk analysis and include the maximum credible and worst case definitions of oil releases.

SCIENCE. SERVICES. SOLUTIONS.

ASA performed a series of simulations to determine the overland path and timing of Prudhoe Bay Crude oil spilled from 200 separate spill points along the Trans Alaska Pipeline. The OILMAPLAND model system was used to predict the movement of oil over land, along rivers and streams and across lakes.

OILMAPLAND is a software system that models the movement of spilled oil or chemicals over the land surface and in the surface water network. OILMAPLAND combines land and water transport models into a single system to help meet the requirements specified in U.S. Department of Transportation regulations for pipeline integrity management. OILMAPLAND provides output products specifically tailored for pipeline HCA analysis and integration into GIS applications for spill contingency planning.

The first step in this modeling effort was to assemble land elevation, stream network, stream velocity, and pipeline route and capacity data for the analysis. Land elevation data come from the National Elevation Dataset developed and distributed by the U.S. Geological Survey as a seamless raster data set with 30-meter grid spacing. The National Hydrography Dataset (NHD) developed by the U.S.G.S. was used to model oil movement in surface water features. Stream velocities for the major rivers in Alaska (Yukon, Tanana, Salcha and Chena) were taken from USGS gauging station measurements at single locations on each river. To determine land type for calculating oil loss to the ground, data from the NHD (wetland and ice) was used along with lithology data provided by DNV.

PRODUCTS. RESULTS.

Modeling services with OILMAPLAND were conducted and model results were delivered to client to aid emergency spill response planning.