

PROJECT facts

U.S. DEPARTMENT OF ENERGY
OFFICE OF FOSSIL ENERGY
NATIONAL ENERGY TECHNOLOGY LABORATORY

Arctic Energy Office

03/2005



TUNDRA TRAVEL MODEL FOR THE NORTH SLOPE OF ALASKA

Background/Problem

Exploration and development on the North Slope is dependent on transporting equipment across the tundra only when it is snowy and solid. Standards for depth of snow and ice were arbitrarily set in the 1970s, based on a minimum of six inches of snow and 1 foot of frozen ground. This originally established a 200 day winter season. However, over the past three decades, rising temperatures have cut the season in half to 100 days. Because of the North Slope's vast existing and potential oil reserves, the length of the operations season is critical for industry, state, and federal needs.

The U.S. Department of Energy's (DOE) goal is to assist the Alaska Department of Natural Resources by providing sound scientific analysis in an unbiased manner. Department officials want to revise the standards for tundra travel based on this scientific research. DOE funding and cooperation between the State of Alaska and the oil industry have allowed testing to determine the tundra's ability to withstand the impact of oil exploration.

PARTNERS

**Alaska Dept. of Natural
Resources**

Anchorage, AK

Anndarko Petroleum Corp.

ConocoPhillips Alaska

North Slope Borough

Barrow, AK

MAIN SITE

North Slope, AK

Project Description/Accomplishments

The project developed an ecological model accounting for the interactive effects of snow conditions, soils, and vegetation to predict tundra resistance to oil field disturbance in an effort to replace the current tundra travel standards. New standards for tundra travel will allow exploration activity, including seismic surveys and exploratory drilling, for an increased period of time.

The model will provide a better understanding of the tundra. Development of the ecological model entailed assessing tundra resistance to soil compaction and deformation, including: soil type, vegetative cover, snow depth and density, and depth of frozen ground. The goal is to increase exploration and development activity concurrently with enhanced environmental protection.

The oil industry requires a minimum of 120 days of operation for effective exploration and drilling development on the North Slope. Decreased season length may result in projects extending to up to eight years, added delays, higher costs, and ultimately more damage to the tundra. Planned oil development on 8.8 million acres of Federal lands on the North Slope requires oil drilling equipment to cross state lands where access is dependent on the tundra travel standards. The scientific evidence provided by this project should satisfy both industry and environmental groups that optimal protection of the tundra can be accomplished while providing a longer operational season on the North Slope



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COST

Total Project Value
\$370,000

DOE/Non-DOE Share
\$270,000/\$100,000

CUSTOMER SERVICE

1-800-553-7681

WEBSITE

www.netl.doe.gov

Sites for the tundra tests were selected near Prudhoe Bay that included both coastal and foothill regions. Consideration was given to testing in topographic areas that include representative features, soil types, and vegetation that vehicles will travel over. Testing included snow and ice samples taken over the site of operations and control sites with no travel during the winter season, and samples of the vegetation taken at these sites during the summer. The initial samples were taken in 2003 and repeated in 2004.

A device for consistent measurement of the snow and frozen ground depth was developed to replace a metal rod pounded into the ground that was used in the past. The "slide hammer" is a calibrated steel rod with a 15-pound sliding weight that is dropped, not pounded, giving a precise measure of the force needed to pierce a foot of soil. Several types of equipment (trucks, tracked vehicles, and rolligons) were run over the test site at intervals during freeze-up to simulate normal North Slope traffic on the tundra. Since the original 6 inches/1 foot standard was established, the oil industry has developed several strategies and technologies to reduce the impact of tundra travel, including use of large, soft-wheeled or tracked vehicles that spread the weight over a broad area, and methods to create ice roads with additional inches of ice over the tundra surface. Testing the tundra in areas where these transportation methods are employed will add scientific validity to their use.

Benefits/Impacts

Alaska Gov. Frank Murkowski announced on September 25, 2004, that preliminary results of the study indicate the tundra could be protected adequately even if the rules are eased, allowing for lengthened seasons for oil field development. "This year, if we have a typical winter, we can expect to open the coastal area to tundra travel by mid-December. This is three weeks to a month earlier than the typical openings of the last few years." Alaska DNR announced the opening of the Eastern Coastal area of the North Slope to oil and gas exploration on December 10, 2004, and the Western Coastal area on December 16.



Rolligons, all-terrain vehicles that move on large, low pressure adjustable tires, are typical of the vehicles used for transport on the North Slope.

Fall sampling may allow the vehicles to roll earlier in the season, and repeated sampling throughout the season may allow the season to be extended longer in the spring. The sampling technique and any proposed changes in the standard will allow for more precise, consistent, and accurate determination of the operations season each year. The testing procedures will provide long-term environmental protection for the tundra, while permitting the continued exploration and development of oil and gas resources vital to the Nation's economy and national security.