

National Crude Oil Spill Research Site in Bemidji, MN



2014/15 Research Opportunities & Grants Available for Remediation, Investigation and Instrument Testing

The National Crude Oil Research Site (Site) dates back to 1979, when a dramatic pipeline rupture released 10,000 barrels of crude petroleum to the land surface and shallow subsurface. Support from the U.S. Geological Survey's (USGS) Toxic substances Hydrology Program facilitated the establishment of the Site and since 1983 hundreds of scientists from across the globe have made their way to this "underground observatory" to study the effects of a terrestrial oil spill.

The site is available at no charge for conducting approved research or testing of new detection or remediation techniques at the site. There is also an opportunity for you to provide funds supporting research by other parties that is critical to you and your company. In addition, research grants totaling \$150,000 are available for approved projects with the average award being \$2,000 - \$5,000.

Project Proposals

Environmental consultants, researchers and representatives of the pipeline and refinery industry are encouraged to submit proposals for site projects. Examples of projects:

- Crude oil remediation technologies
- Analytical methods
- In-situ detection instruments e.g. LIF
- Ecological investigation
- Wetland investigation
- Spray zone investigation

Research Site Information

The site consists of four distinct research areas: North Pool (extensively developed) Middle Pool, South Pool and Spray zone.

NORTH POOL – this is the location of the "Underground Observatory" initially established to investigate biodegradation and natural attenuation. This area has more than 200 water wells (2-inch diameter or larger), which are screened at different depths in the aquifer, provide a 3-dimensional view of the interaction between subsurface crude oil, aquifer sediments, and groundwater. Additionally, a network of multi-port vapor wells, installed in the unsaturated zone above the aquifer, provide a way to sample and measure soil gas composition. A variety of other

unique instruments are also installed, including electrode arrays and probes for measuring self-potential, soil moisture, temperature, CO₂, and O₂. This location is available for research coupled with non-invasive site assessment methodology.

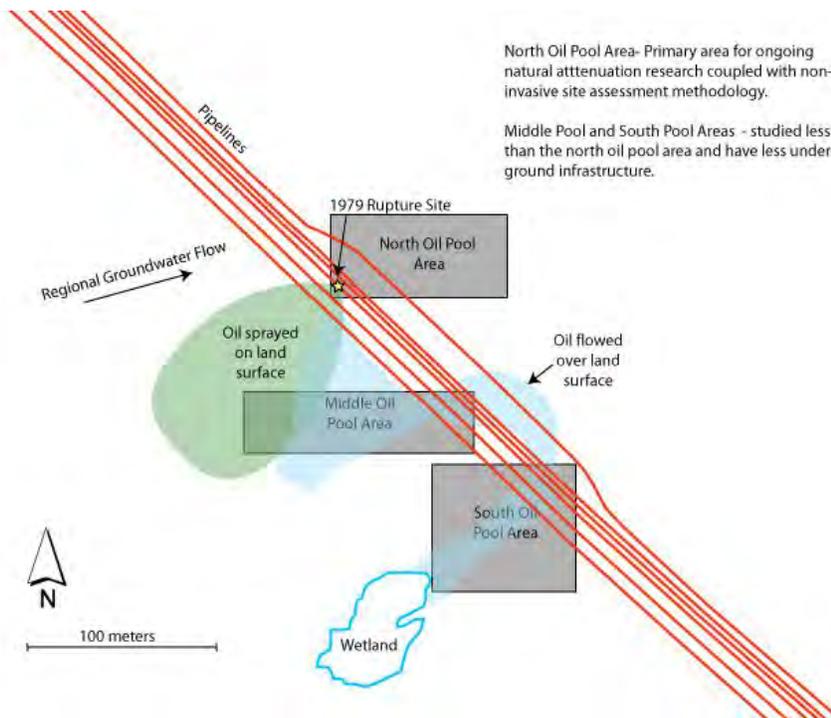
The location has been well-characterized through collection and analysis of more than 1,000 core samples over the decades. Cores have been collected by myriad research groups for project-specific objectives. Core samples have been analyzed in many ways, including grain size distribution, moisture content, microbial community biomass and composition, geochemistry, oil saturation, and other characteristics.



MIDDLE POOL & SOUTH POOL - have oil present in the subsurface, and these two less-studied areas are suitable for additional research to be undertaken. Proposals for more invasive research will be considered in these areas.



SPRAY ZONE – is the former area of groundwater extraction and spray re-infiltration. The surface of this area is characterized by water repellency. Proposals for ecological investigation, soil properties and soil remediation research will be considered in this area.



North Oil Pool Area- Primary area for ongoing natural attenuation research coupled with non-invasive site assessment methodology.

Middle Pool and South Pool Areas - studied less than the north oil pool area and have less underground infrastructure.

Field Session



Each year, the USGS coordinates a 2-week field session during which geochemists, geophysicists, microbiologists, hydrologists, engineers, graduate students, and technicians from across the world gather to

collect samples and other data to better understand the behavior and degradation of crude oil in the subsurface. Multi-disciplinary collaborative research thrives as this diverse research group seeks to understand the physical, chemical, and biological processes at work at a crude oil spill. Researchers are also devising and testing novel methods, including less-invasive monitoring methods and the “freeze shoe” by which to observe and measure processes at work at the site. Coordinated research during these weeks helps pool available resources including a drill rig (with freeze shoe) and GeoProbe (with freeze shoe). Electricity is available at the site.

GeoProbe with Freeze Shoe



The Freeze Shoe seals the end of a core sample enabling a water sample to be obtained from precisely documented depth.

Past Research & Current Data

Research applicants are encouraged to review previous Site related research papers. These are available at <http://toxics.usgs.gov/bib/bib-bemidji.html>. Site-level data (such as water and oil levels, water chemistry, and some geological data) are available on the site web page at <http://mn.water.usgs.gov/projects/bemidji/index.html>. One real-time water level observation well is monitored at the site, and continuous water level data available on the web at http://waterdata.usgs.gov/mn/nwis/uv/?site_no=473423095053301&PARAMeter_cd=72019,62611.

Contact

If you are interested in conducting research at the site and/or applying for a grant please contact Jim McCann @ jim.mccann@state.mn.us or 651-757-2159. Additional information may be found at <http://www.pca.state.mn.us/index.php/waste/waste-and-cleanup/cleanup/remediation-sites/national-crude-oil-spill-research-site-in-bemidji-minnesota.html>