



Feasibility and Impact Review for Emergency Intentional Wellhead Ignition & Safety Evaluation (FIRE-WISE)

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Funded by the Department of Homeland Security Center of Excellence at University of Alaska Anchorage, Duration: 2024 - 2026 (ongoing), **Amount:** \$374,000

Overview

The FIRE-WISE project supports U.S. national priorities for Arctic energy security and environmental resilience, aligning with initiatives such as Restoring America's Maritime Dominance and Unleashing Alaska's Extraordinary Resource Potential.

- The Arctic's central North Slope contains about 3.6 billion barrels of oil and 8.9 trillion cubic feet of natural gas, critical to U.S. energy independence.
- Increased drilling raises the risk of wellhead blowouts, where sea ice and extreme conditions hinder response operations.

Through Department of Homeland Security (DHS) funding, the project developed a numerical modeling framework that integrates droplet dynamics, combustion behavior, and atmospheric dispersion to evaluate Intentional Wellhead Ignition (IWI) as a mitigation strategy. The framework enables science-based decision support for the Bureau of Safety and Environmental Enforcement (BSEE), Bureau of Ocean Energy Management (BOEM), United States Coast Guard (USCG), and DHS, improving preparedness for Arctic energy emergencies and strengthening national security in a strategically important region.

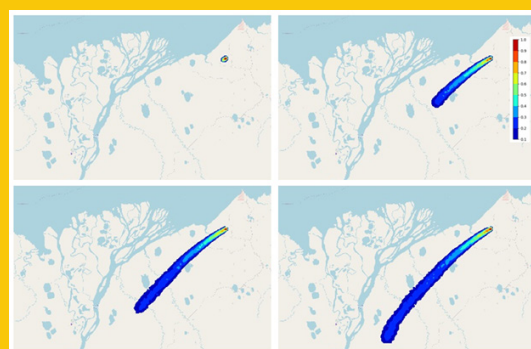
Impact

This project supported two research fellows through the ADAC-ARCTIC Fellowship Program: Sabrina Yeung from Princeton University (undergraduate) and Jillian Peslak from Rowan University (graduate). The team presented research findings at the DoD Energy and Innovation Symposium (2025) and the ASCE Environmental and Water Resources Institute (EWRI) Congress (2025), with an additional abstract accepted for EWRI 2026.

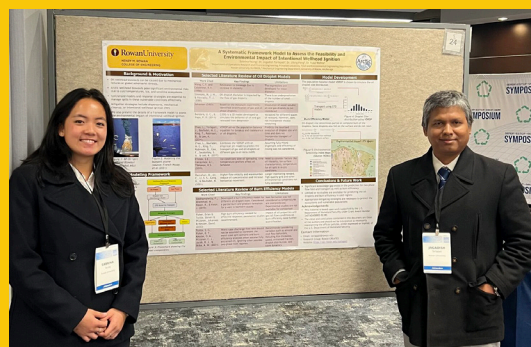
Stakeholders were engaged to collect input and share progress. During the first year of the project, the project team had ongoing meetings with state and federal agencies, as well as industry representatives from BSEE, BOEM, EPA, ADEC, USCG Sector Western Alaska, ConocoPhillips Alaska, and Hilcorp Alaska. We also presented our work at the Arctic and Western Alaska Area Contingency Plan meetings. This outreach work enabled the project team to understand the operational strategies for oil spill response and intentional wellhead ignition. This research provides a valuable science-based tool for oil spill response in the Arctic for federal on-scene coordinators.



Oil Spill on Adak Island (Source: NOAA)



Model Simulations Showing Downward Dispersion of Emissions from IWI



Dr. Torlapati & Sabrina Yeung at DOD Energy and Innovation Symposium