



Bulk Fuel Energy and Assessment

Year 1 Findings

Alaska Energy Authority



Bulk Fuel Is Foundational to all To Modern Infrastructure

Bulk Fuel Is Critical In Rural Alaska

- Heat
- Power
- Transportation



Bulk Fuel Is Critical Redundancy, Regardless of Renewable Energy Installations

Even if all the diesel power plants in Alaska are replaced, the bulk fuel facility will remain.



Bulk Fuel In Rural Alaska

- There are over **400 bulk fuel facilities** in Alaska, each sized to support the village from 'barge to barge.'
- The average age of each facility is over ~40 years, with many exceeding **50 years old**.
- Each facility has an average size of **100,000 gallons** each.
- Between 40-60% of these facilities are **threatened** by flooding, erosion, and/or thawing permafrost.
- Upgrading **each facility** would cost between is \$4 million and \$10 million and take 2-5 years to complete.
- The total Cost of Differed Maintenance is projected to approach **\$1.5 Billion**.

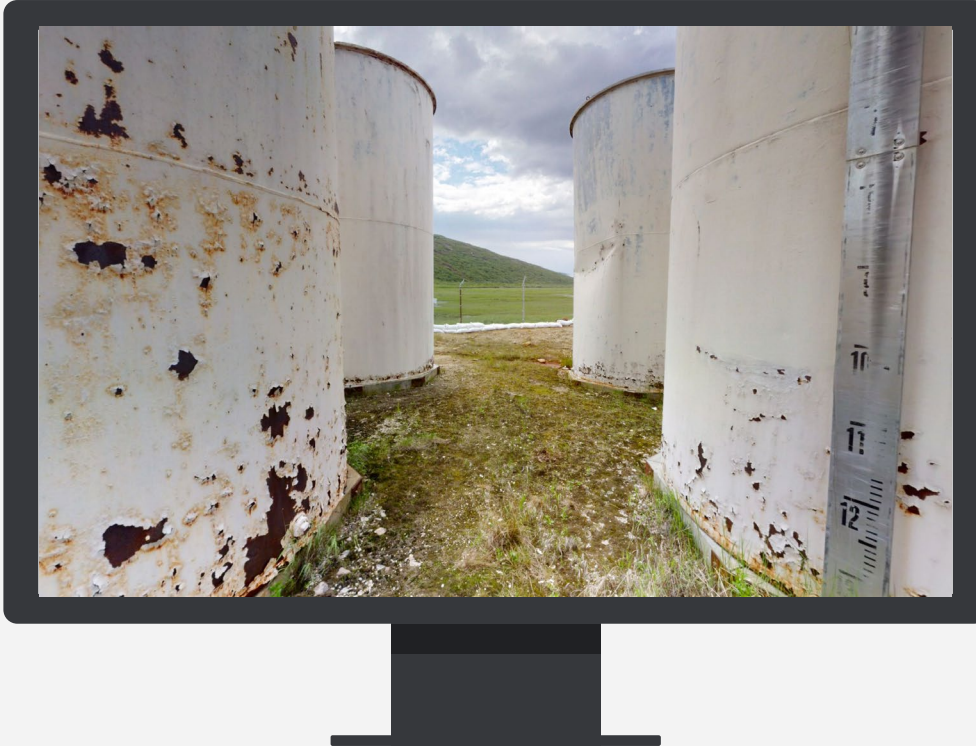
Needs Redesign and New Site

Click the image to the right to view a walkthrough video of the tank farm.

The images in the video were taken during a seasonal flooding event.

Note: Water level was down about 4', but still ~15' above normal river level.





Needs Redesign and New Site

Click the image to the right to view a walkthrough video of the tank farm.

This facility is subject to seasonal ice flow, which has repeatedly damaged the fence, containment, header piping, and tanks.

Note: The header piping (from the river bank) forms a lowercase “b”... it should be a straight line.

Funded and Replaced Tank Farm

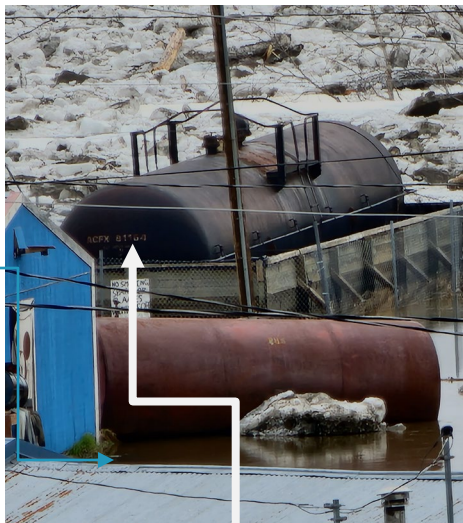
Click the image below to view a walkthrough video of the tank farm.



Observed Hazards



Environmental Risks



Old train car repurposed for retail fuel dispensing. Flooding caused by ice damming on the Yukon River.



Spill containment filled with garbage and water; lid frequently missing.



Tanks shouldn't be submerged in water; water also has an oily sheen and thick vegetation.

Environmental Risks



Receding floodwaters carried significant oil sheen during spring breakup.



Significant water in the containment poses hazards to personnel and the tank farm's integrity.

Electrical Risks



Improper routing of electrical lines through tank farm corners.

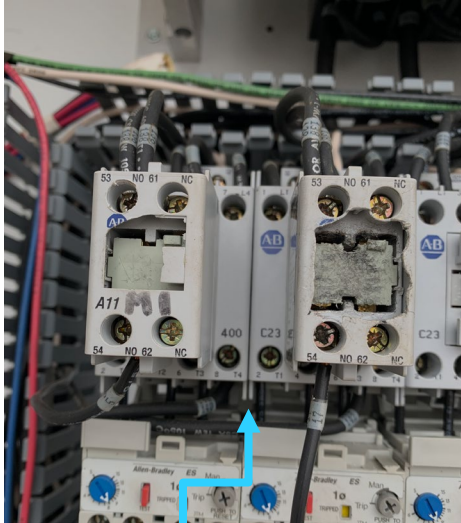


Snow packed into the main power feed for the bulk fuel farm.

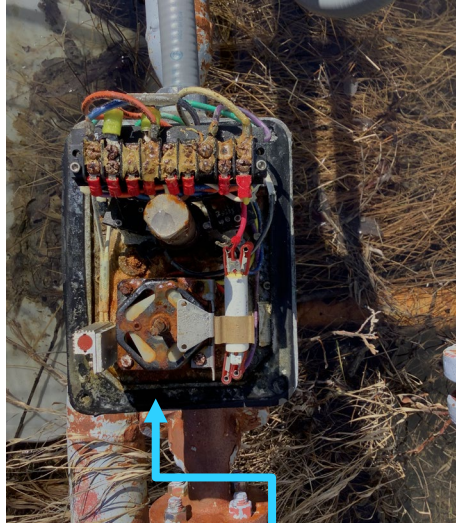


Improper wiring protection near highly flammable fluid storage.

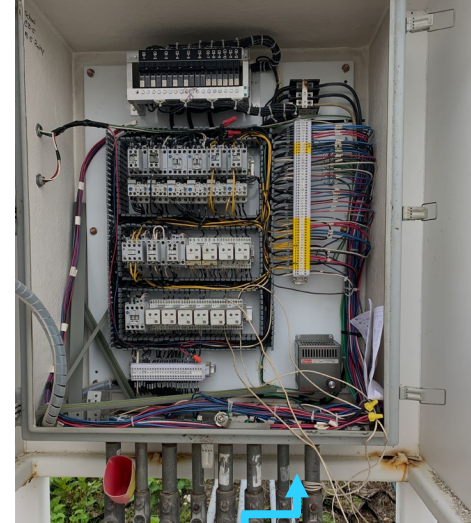
Electrical Risks



These electrical relays are damaged from improperly using a screwdriver to bypass failed components.



Electrical actuator cap is removed, exposing it to the flammable atmosphere around the tank.



Wires improperly routed through cabinet door; light switch bypasses control panel safety functions.

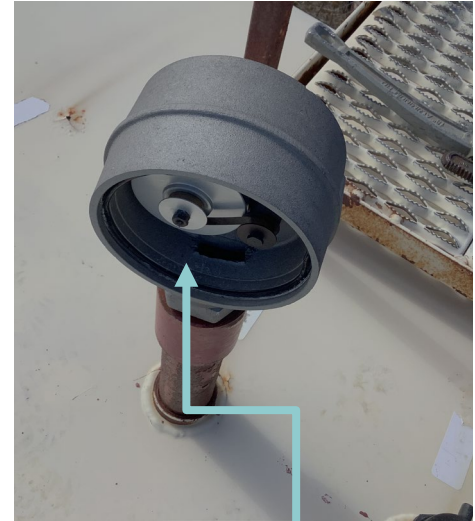
Poor Operations & Maintenance



Sediment and water in filter, indicating water in fuel, diminishing lifespan of engines & heaters



This indicates 5 inches of water at the tank's bottom.



The front of this gauge is missing, allowing water to flow into the tank.

Poor Operations & Maintenance



Tanks not secured to foundations, and so were toppled by rising water from Typhoon Merbok.



Poor housekeeping leads to increased exposure for injuries and incidents.



This tank, missing its cap, is exposed to the elements, though it's still used for storing extra fuel.

Poor Operations & Maintenance



Leaky fuel nozzle draining into an open-top bucket.

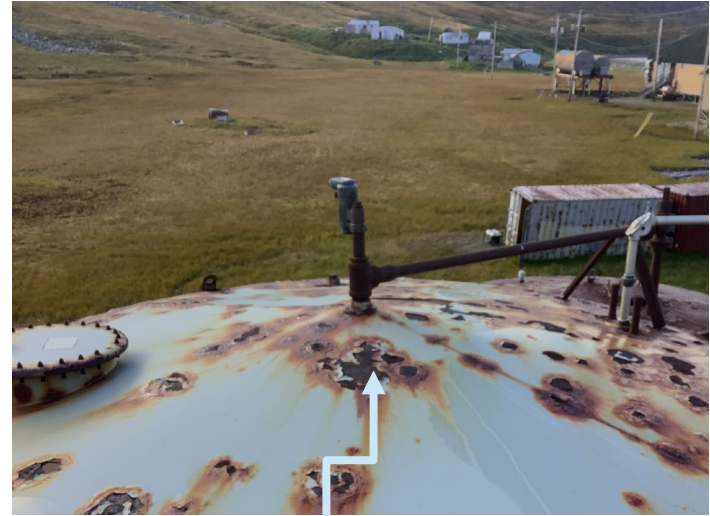


Containment is filled with water and trash, leading to untreated contaminated water poured onto the ground.

Corrosion Risks



Deep corrosion poses a risk of tank shell failure.

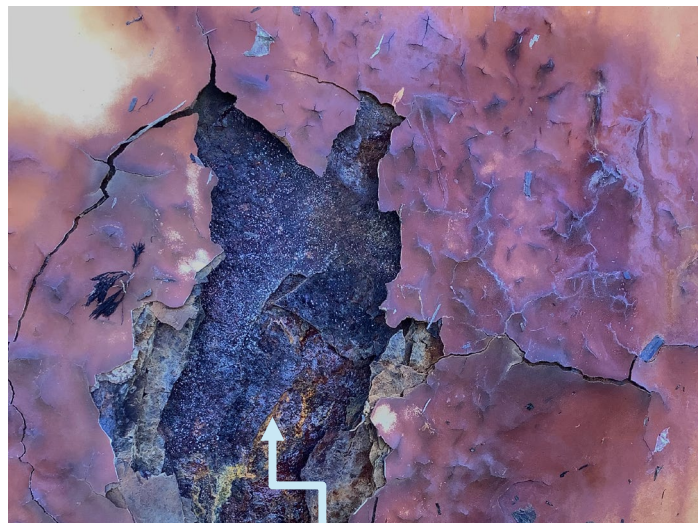


Heavy corrosion on top of this storage tank.

Corrosion Risks



This tank overturned during Typhoon Merbok, with rust coating its bottom due to the containment holding water.

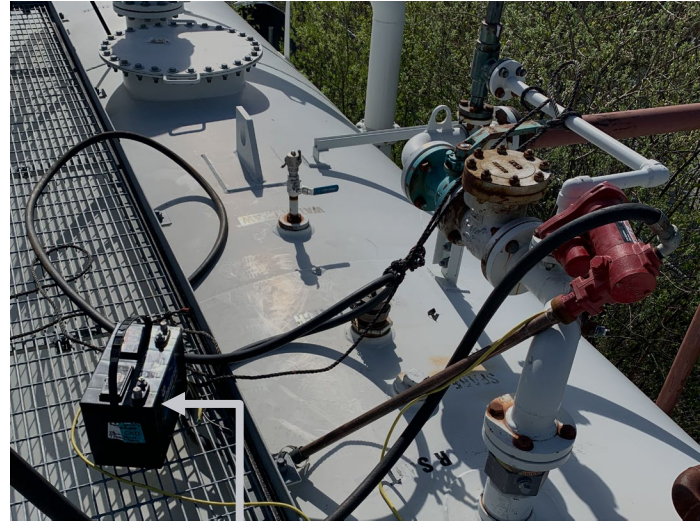


This tank is still in use for fuel storage despite severe corrosion.

Improper Configuration



This makeshift fuel transfer method is improper, dangerous, and poses environmental risks.



This portable pump is not designed for large fuel transfer and is an ignition source on top of flammable tank.

Safety Risks



This tank access is unsafe and hinders safe maintenance on top of the tanks.

Note: The board used to cross the tanks in this image is actually common in rural Alaska and is done on tanks as tall as 30' high, and if tanks are maintained properly, the traverse occurs monthly.



How 3D and VR Can Help: Inspecting and Evaluating for Upgrades

Limited funding requires prioritizing based on needs and environmental threat.

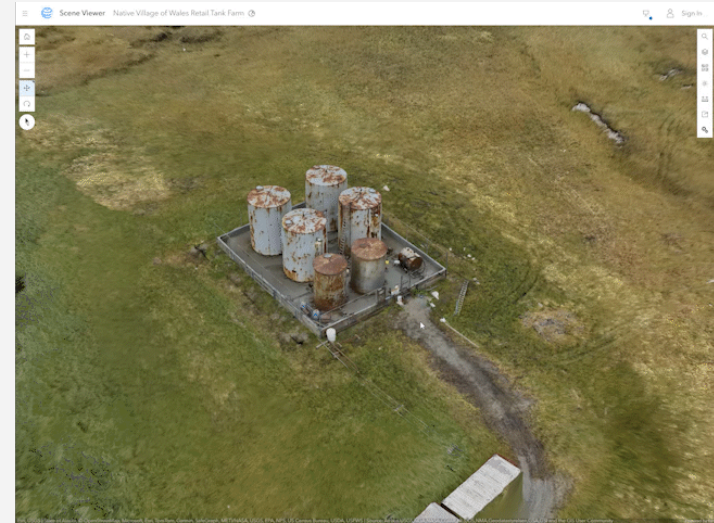




How 3D and VR Can Help: Operations, Maintenance, and Training

Images and data collected are shared with communities, agencies, and authorized contractors.





How 3D and VR Can Help: Technical Support and Troubleshooting

Images and inventory information used for remote technical support and troubleshooting.

**Thank
You**



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ENERGY
AUTHORITY

