COLD REALITIES: OVERCOMING CHALLENGES OF WINTER DEWATERING IN ANCHORAGE, ALASKA

ANMC EMERGENCY SERVICES EXPANSION

Presented by Alyson Mathers and Emily Helenhouse | May 2026

Project Overview

- Location: Anchorage, Alaska
- Excavation below water table required continuous dewatering
- Contaminated site (POLs and Chlorinated Solvents) – treatment of excavation dewatering water
- Site history: Gravel mining and asphalt production plant (1960s-1970s)

- Dewatering timeline:
  - Design, Verification, and proof of concept testing with excavation water in 2024
  - Start full scale temporary dewatering system and shakedown testing January 2025
  - Decommission 23 temporary dewatering wells (35-45 ft. bgs), pump from basement Foundation sub-drains to temporary system for treatment, Fall 2025
  - Current: Temporary treatment system operation, Design of permanent treatment system and data gap analysis

Project Overview

- Project: ANMC Emergency Services Expansion
- Location: Anchorage, Alaska
  - 6-story building addition
  - Parking garage
  - Ambulance turnaround
  - Other facilities

Contaminated Site History

- Site History
  - 19060s-1980s: Material quarry with onsite asphalt production plant
  - 1990s: ANMC constructed
- Identified Contaminants of Concern
  - DRO; RRO; Chloroform; carbon tetrachloride; trichloroethene (TCE); benzene; naphthalene; 1-methylnaphthalene; 1,1,1- and 1,1,2-trichloroethane; 1,1-dichloroethane (1,1-DCA); 1,2-dichloroethane; 2-hexanone; bromodichloromethane; 1,2,3-Trichloropropane; Vinyl Chloride; Ethylene Dibromide; 1,2,3- and 1,2,4-Trichlorobenzene

Block 3, Lots 5A and 8 Tudor Centre

Hazard ID: 26580

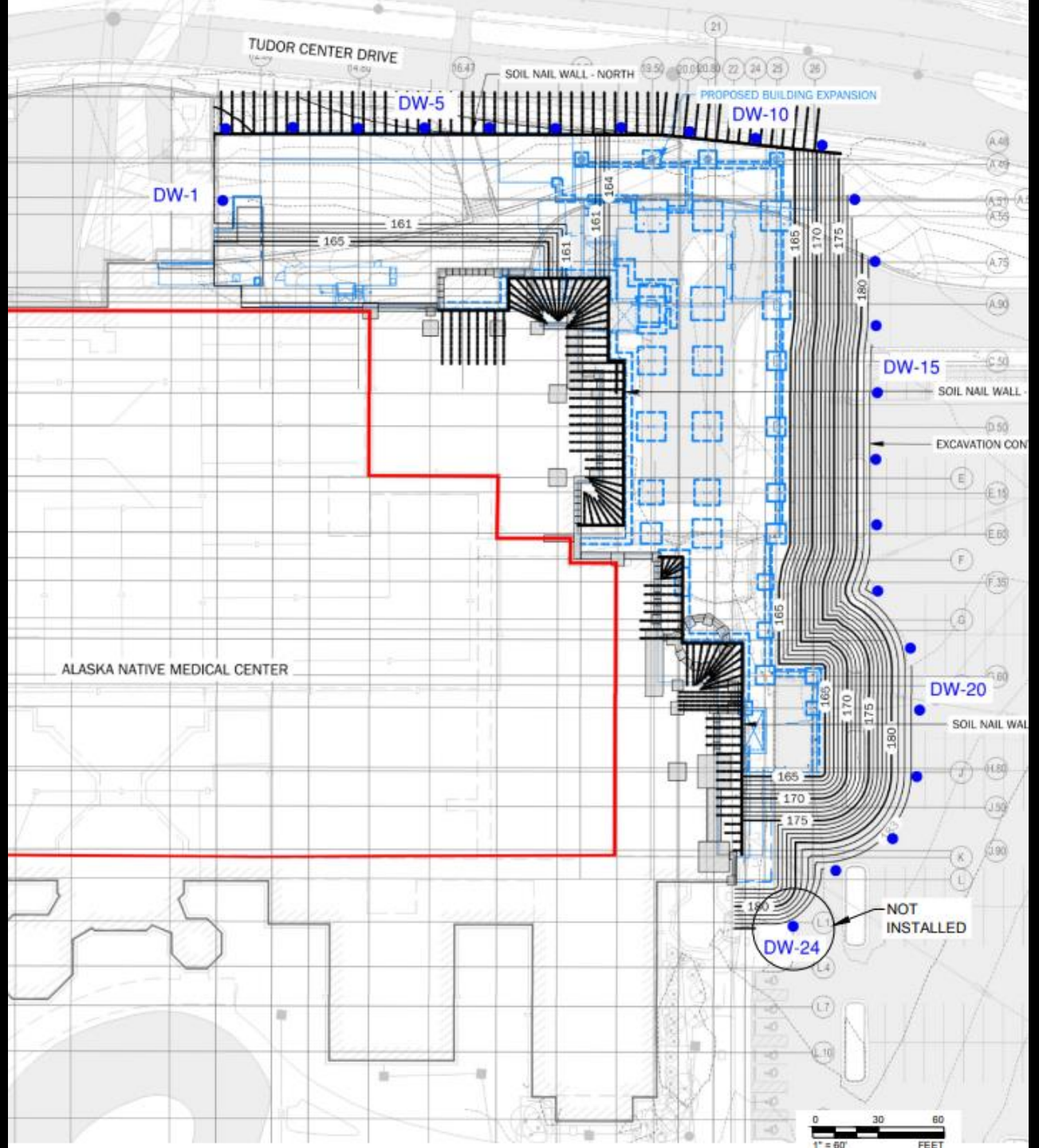
File No. 2100.38.560

SOURCE: USGS, ERIS 2024

Dewatering

- Parking Garage and Building Addition Excavation
- 23 dewatering wells to 30-40 feet bgs
- Continuous dewatering and daily monitoring
- Estimated flow rate: 84 gpm
- Average recorded flow rate: 47 gpm from January to April 2025
- Influent Contaminants: DRO, RRO, 1,2,3-TCP

- NO LARGE-SCALE TREATMENT SYSTEMS AVAILABLE LOCALLY



Timeline

Dewatering Remediation Planning, 2024

Long lead times, sample turnaround times, local availability, field screening

Verification Testing, 2024

Treatment system proof of concept using construction dewatering water (DRO, RRO, Chloroform)

Shakedown Testing, January 2025

Full scale temporary treatment testing

Compliance Monitoring

Monitor for breakthrough, plume migration

Construction

Foundation subdrains installed, foundations installed, backfill placed, 23 dewatering wells decommissioned

Continued Monitoring

Treatment and Groundwater sampling

Groundwater Remediation Plan

- Equipment Considerations
  - Long lead times
  - Limited Local availability
  - High Flow rates
  - COCs
  - GAC Changeout frequency
- Analytical Sampling Considerations
  - COCs, method detection limits – lab selection
  - Turnaround Times
  - GAC changeout frequency
  - Breakthrough and Compliance Monitoring
- Contaminant Plume Migration

- Solutions:
  - Proof of concept – local system with similar EBCT
  - Analytical Sampling Frequency > Estimated Changeout Frequency
  - Field screening (AQR Color-Tec methods, sheen, etc.)
  - Sampling Equipment: Hydrasleeves, Bailers
  - Sampling Locations: Untreated Tank, between GAC Vessels, Treated Tank
  - Sentinel Wells – Groundwater Monitoring

Step 1: Verification Testing – Proof of Concept

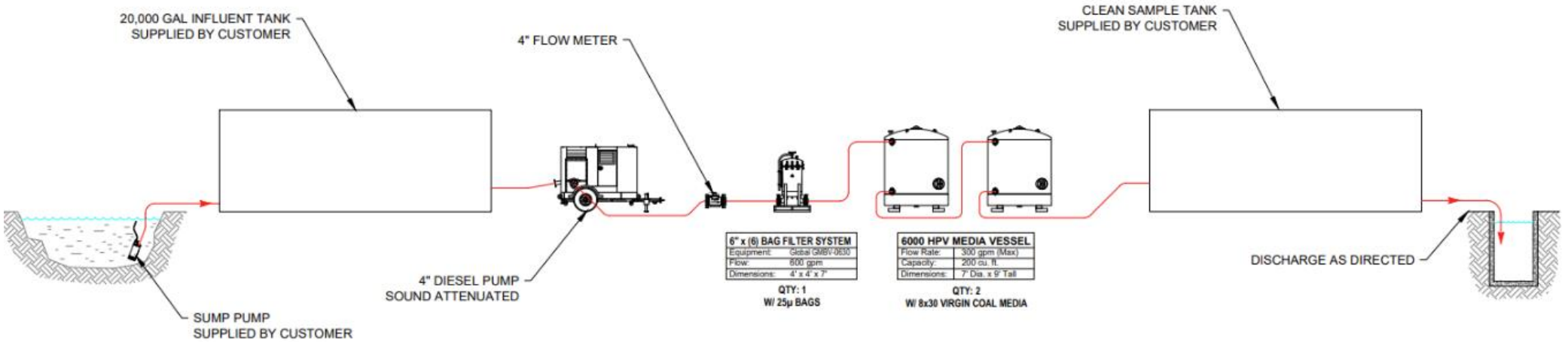
- Contained contaminated dewatering water (Summer/Fall 2024)
  - 10,000 gallons of water with DRO/RRO
  - 5,000 gallons of water with chloroform
- Locally sourced treatment system of smaller scale:
  - Bag filtration unit + 2 x 55gal GAC vessels
  - 10 gpm flow per GAC vessel = 20 gpm flow rate
  - EBCT of 5 minutes = comparable to large scale system
- Treated water below discharge limits, discharge to AWWU system

Results

				Pre-treatment		Post-treatment	
				Tank 1	Tank 2	Tank 1	Tank 2
Analysis Method	**Analyte**	**ADEC Surface Water Cleanup Level**	**Unit**	**Result**	**Result**	**Result**	**Result**
AK102	DRO	1.5	mg/L	**2.63**	**<0.22**	**0.21**	**<0.20**
AK103	RRO	1.1	mg/L	**2.21**	<0.24	**<0.62**	<0.21
8260D	Chloroform	2.2	µg/L	<0.310	**9.5**	<0.030	<0.030

Full-Scale System Design

- Full-scale temporary system components in a temporary, enclosed, heated space
  - Two 18,000 baffle tanks for influent and treated effluent
  - Bag filtration units for turbidity management
  - Two large GAC vessels
  - Blast heating, insulation blankets

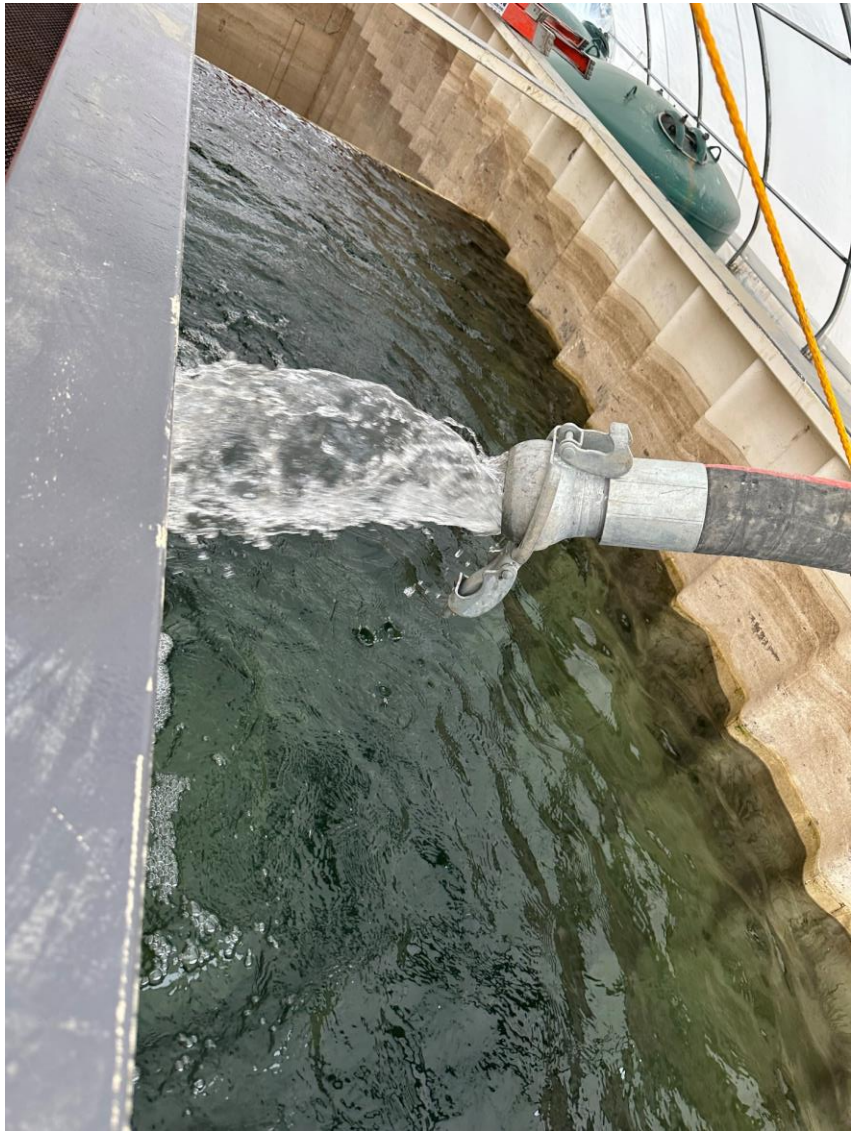


Step 2: Verification Testing – Full Scale System

- Full Scale System
- Treat 18,000 gallons from dewatering wells
- Contaminants below maximum discharge values
- Recycled to reduce turbidity to less than maximum discharge values
  - New GAC = high initial turbidity

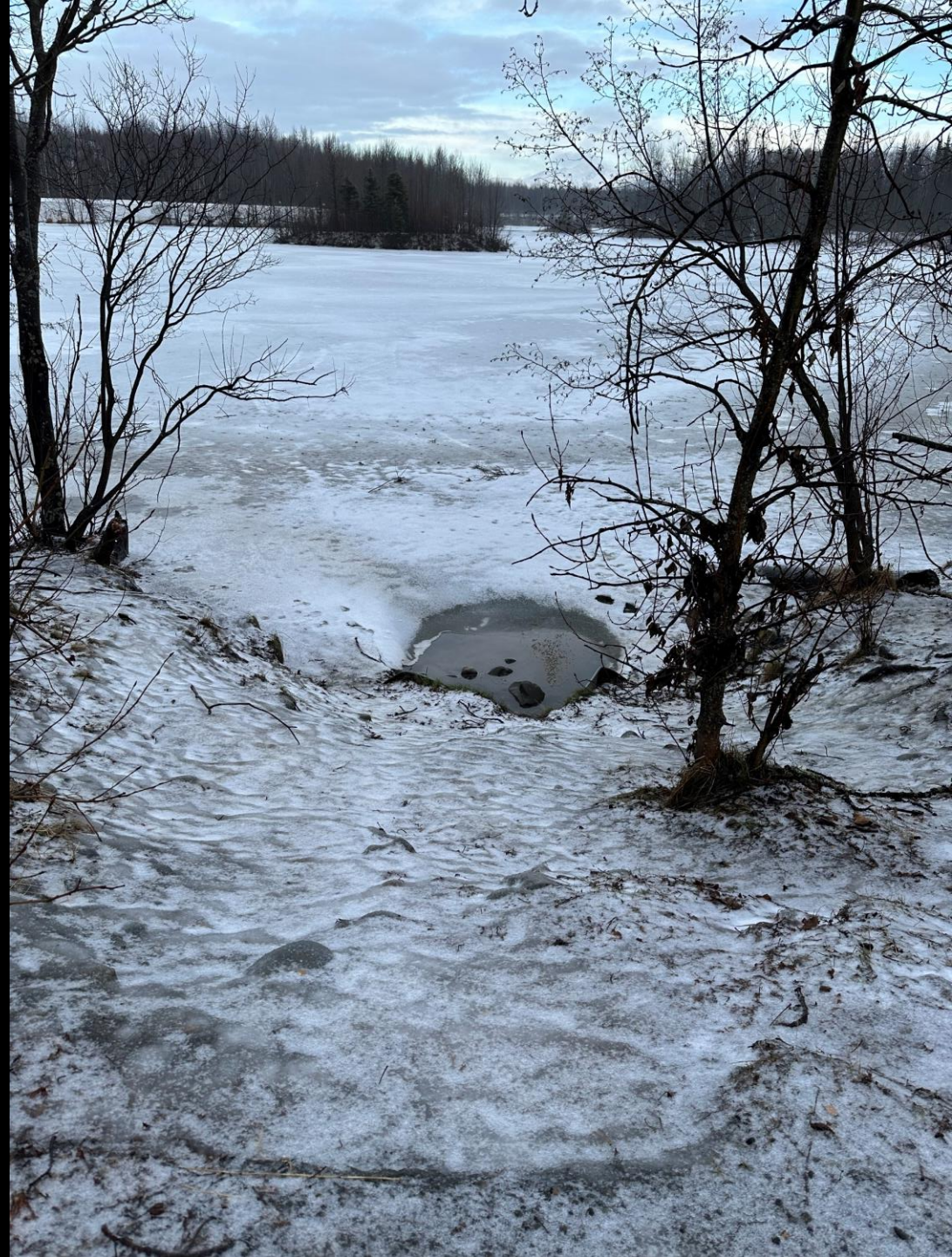
Shakedown Testing

- Increased sample frequency – First 2 weeks of operation
  - Analytical samples (GRO/DRO/RRO/VOC) every two days
  - Hourly field screening: pH and turbidity until stabilization
  - Groundwater sampling of accessible dewatering wells
  - Slow startup due to cold temps, troubleshooting system
    - Heated blankets
    - Thawing dewatering wells



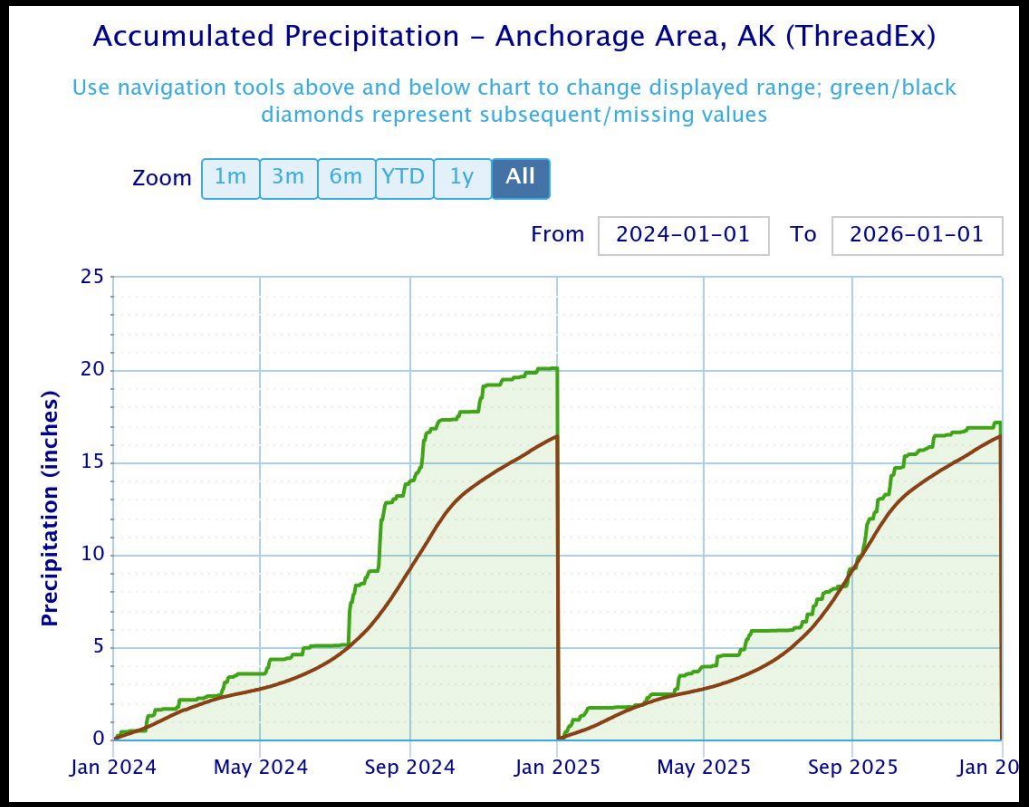
Monitoring and Compliance

- Daily monitoring of treated effluent water
- Weekly monitoring of the stormwater outlet
- Weekly analytical sampling
  - Influent groundwater
  - Between lead and lag GAC vessels
  - Treated effluent
  - Sentinel wells installed between known contamination zones and dewatering wells
    - Sampled weekly with hydrasleeves for increased flexibility and reduced volatile disturbance

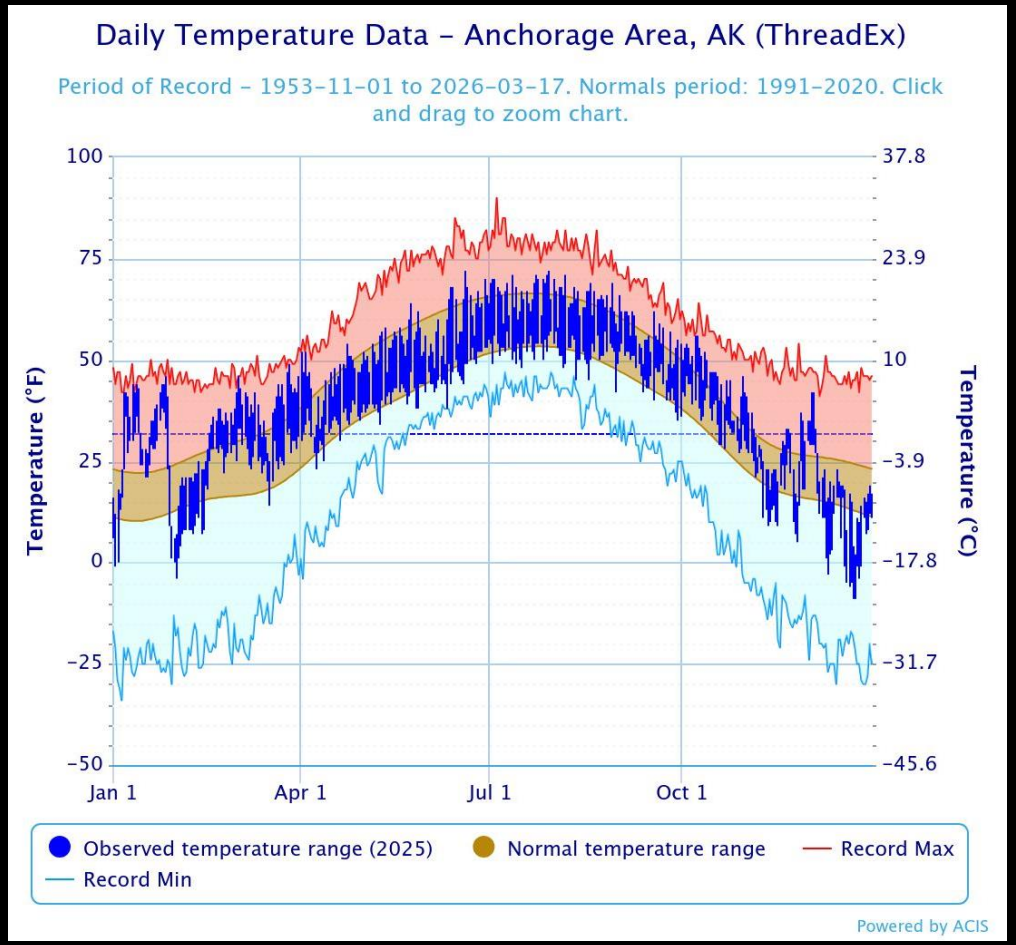


CHALLENGES IN ALASKA

Climate



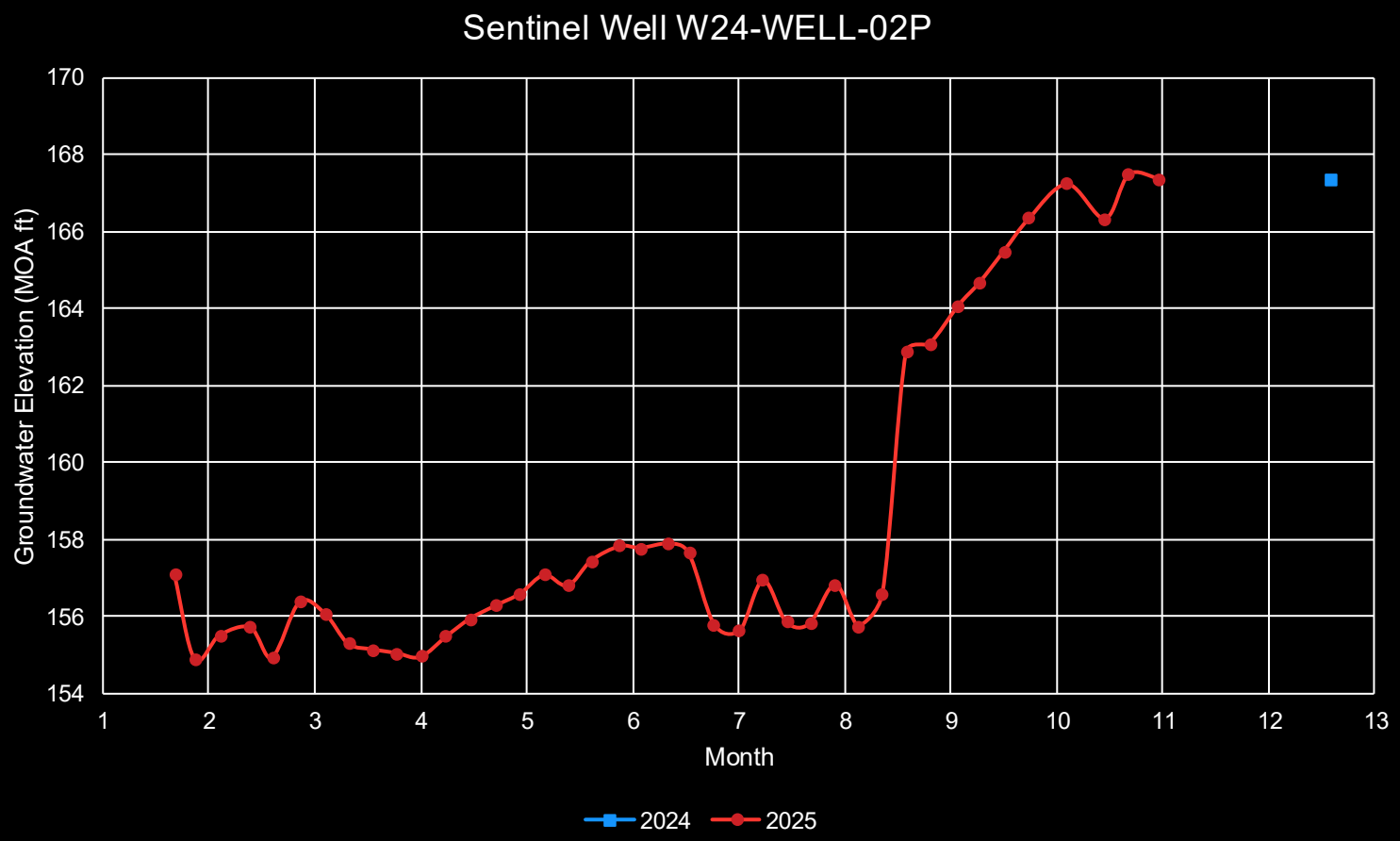
Accumulated Precipitation, 2024 and 2025



Daily Temperature, 2025

https://www.weather.gov/arh/climate?wfo=afc

Groundwater elevation



Winter Weather: Challenges

- Subfreezing temps
- Snow and ice accumulation
  - locating wells, ice in annular space
- Wind storms (>80 mph in December 2024)
  - Equipment loss/Damage
- Heating for dewatering treatment system
- Winter rain, freeze and thaw cycles
  - Impacts on excavation flooding, flow rates, and sediment loads

Winter Weather: Solutions

- Shelter upgrade
  - Tent to Connex
- Larger Capacity Bag Filter System
- Heaters
- Heat Trace
- Insulation blankets
- Blow torches
- Ice Chippers and Shovels
- Safety vests
- Field Check Ins

Lead Times, Delays

- Equipment
- Materials (Barge)
- Analytical Results

- Solutions
  - Field Screening
    - AQR Color-Tec
  - RUSH turnaround times
  - Preorder materials and equipment
  - Weekly review of supply stock

Accessibility and Safety

- Tight construction site, limited free space
- Multiple heavy equipment in operation
- Uneven ground – excavation, ice

- Solutions
  - Boot grips
  - Sampling in Pairs
  - Daily coordination with contractors
  - Walkie-Talkie radios, hand signals

THANK YOU

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