FRONTLINE™
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PROJECT: 631210

Technical Case Study Report

High Velocity Water Flush and Glycol Removal

Site Location: Nevada, USA

Project Number: #631210

Asset ID: Closed Cooling Water System

Asset Description: Cooling System

Overview

Frontline Global Services performed an Off-Line service on a closed cooling water (CCW) system. The planned work scope was a Glycol Removal Process.

During execution, the primary deliverable was glycol reduction to support the customer's intent to operate the CCW system with water only.

Project Objectives

- **Ensure Safety and Efficiency:** Complete work safely while minimizing downtime and supporting site requirements.
- **Verify and Document Performance:** Confirm glycol concentration at low point locations using field measurement and document the final condition.
- **Glycol Removal:** Drain and rinse the system to reduce glycol concentration.
- **Support Water-Only Refill Readiness:** Reduce glycol concentration to a level that enables the customer to refill and operate the CCW system with water only.

Methodology

The CCW service utilized an Off-Line drain-down and water rinse approach. Upon arrival, project equipment was staged and the team initiated system drain-down to enable tie-in work. In parallel, the team drained 16 underground low points to remove retained glycol/water mixture.

A water flush was then performed to dilute and remove glycol. Due to observed glycol crystallization, a second rinse was completed to bring glycol back into solution and continue concentration reduction.

Verification was performed by sampling low point areas and measuring concentration using a temperature-compensated glycol refractometer. Reported readings reflected a reduction from an initial condition of approximately 10% glycol to a final reported concentration of approximately 1% (conservatively reported; field indication closer to approximately 0.5%).

Process

1. **Mobilization and System Setup:** Confirmed system identification, aligned on the execution plan, reviewed site safety requirements, staged equipment and prepared tie-in points.

2. **Glycol Drain-Down:** Drained glycol from the system to support tie-ins and complete initial removal.

3. **Low Point Drainage:** Drained 16 underground low points in parallel with the main drain-down to remove retained glycol/water mixture.

4. **Initial Water Flush:** Completed the first flush using clean water to dilute and remove remaining glycol.

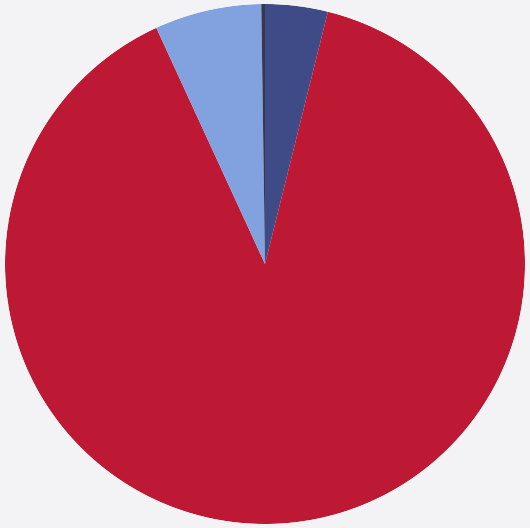
5. **Second Rinse:** Completed a second rinse to address glycol crystallization and improve dilution performance.

6. **Sampling and Verification:** Collected low point samples and verified glycol concentration using a refractometer.

7. **Final Condition and Turnover:** Left the system in its final condition, not fully emptied, allowing the customer to refill and operate with water only.

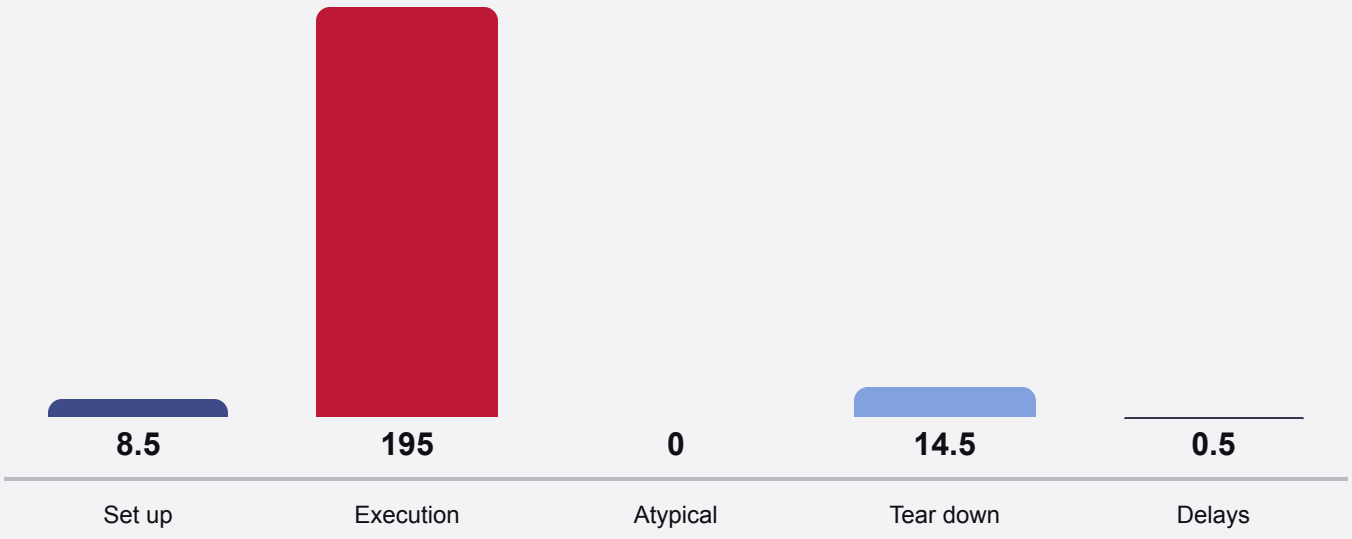
Key Project Metrics

Total Project Hours: 218.5



- **Project Set Up**
  8.5 hours · 3.9%
- **Project Execution**
  195 hours · 89.2%
- **Atypical Project Execution**
  0 hours · 0.0%
- **Project Tear Down**
  14.5 hours · 6.6%
- **Delays**
  0.5 hours · 0.2%

Hours by Category



Project Milestones

Project Setup


System as Found

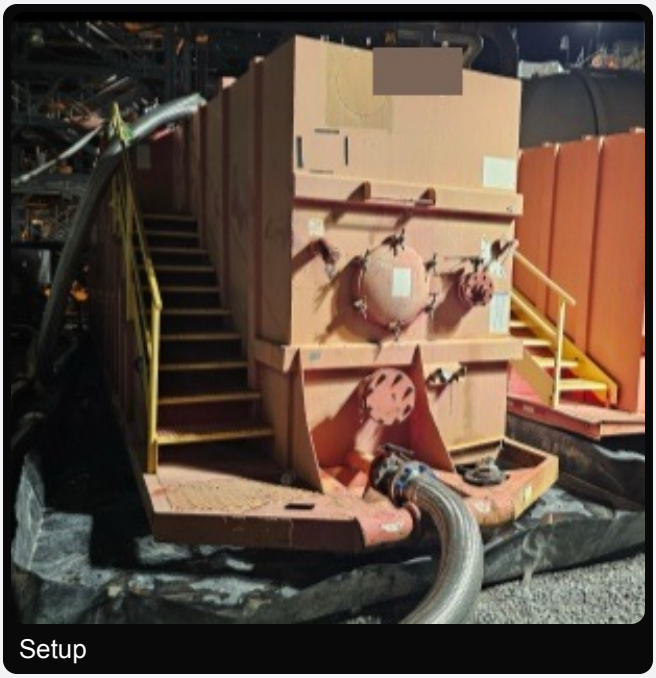

Flush Setup to System


Flush Setup to System


Setup

Project Milestones

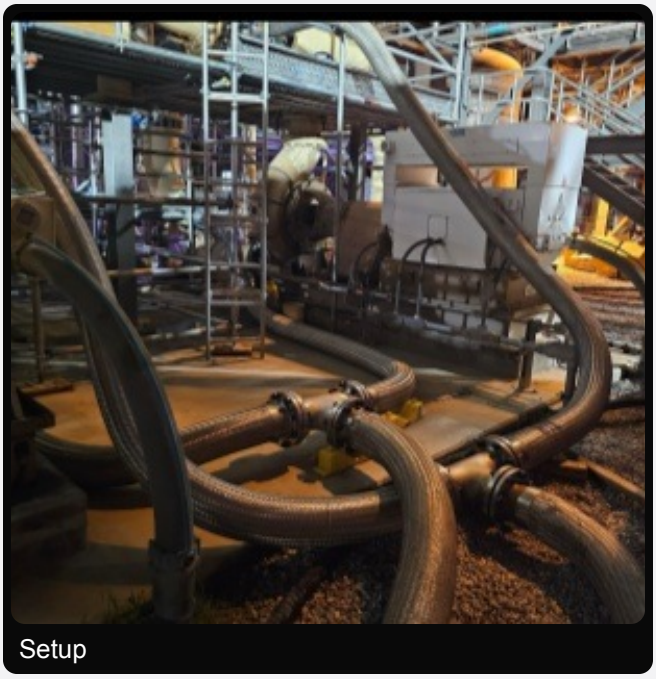
Project Setup



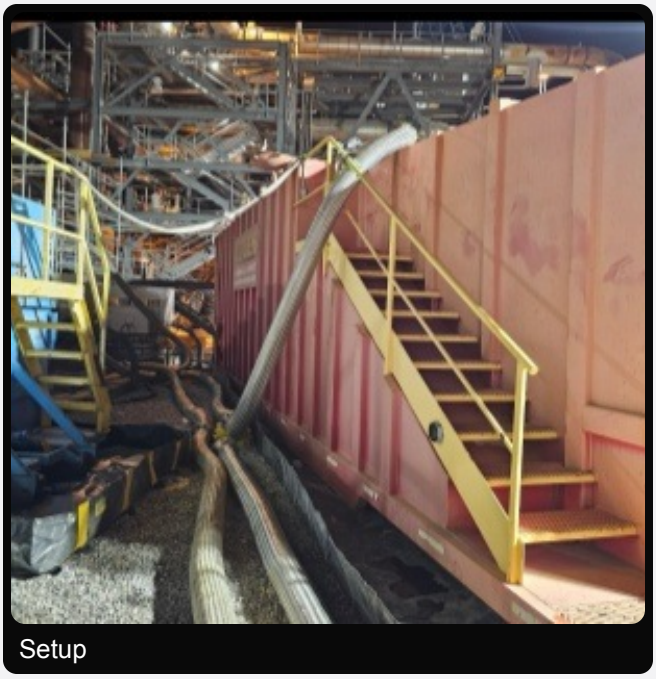
Setup



Closed Cooling System Setup



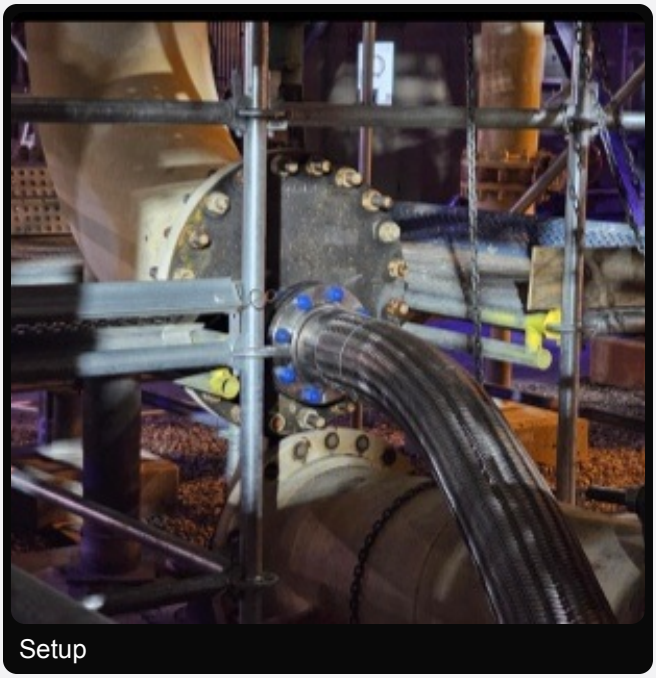
Setup

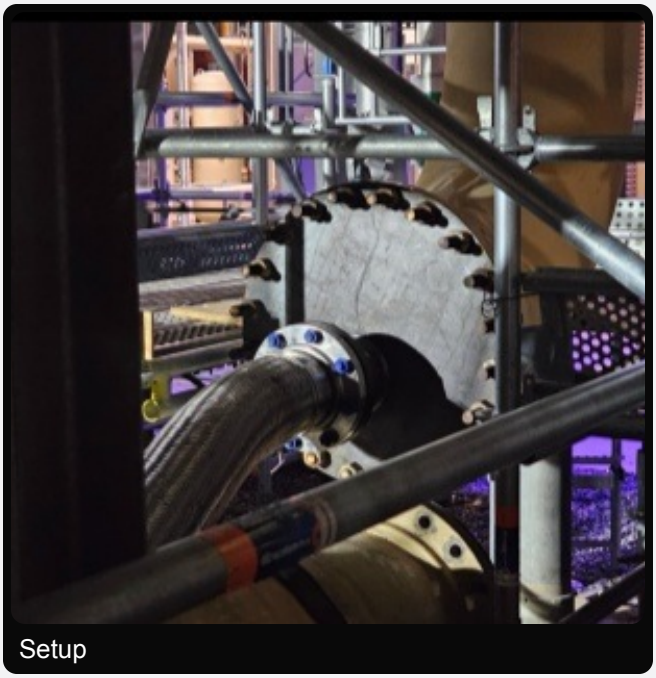


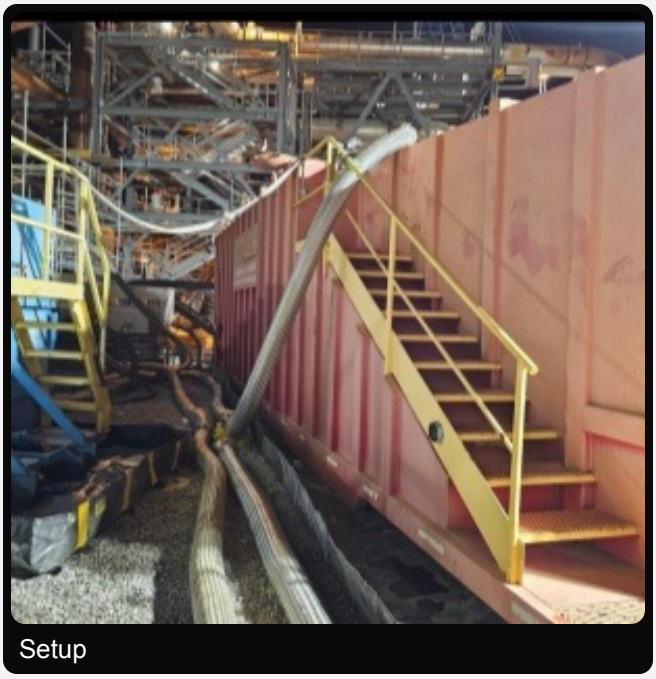
Setup

Project Milestones

Project Setup


Setup


Setup


Setup


Setup

Project Milestones

Draining



Initial Draining at a Low Point



Inside Generator



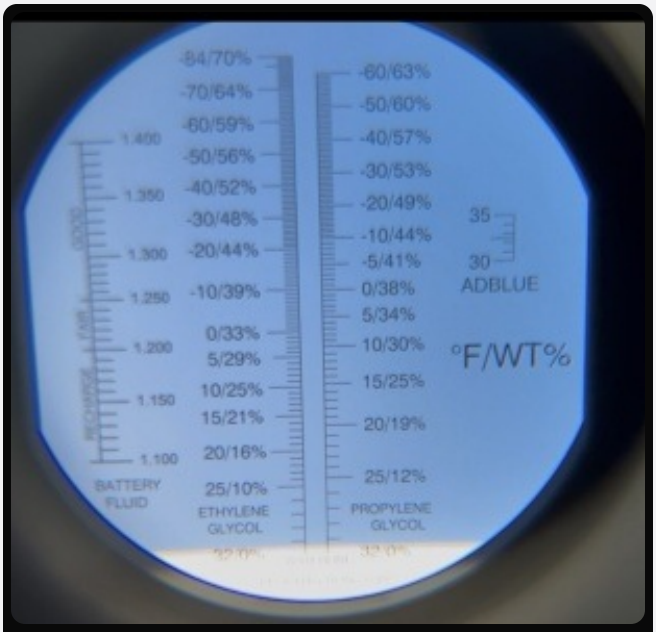
Low-Point Draining at Fin Fans



Low-Point Draining at Fin Fans

Project Milestones

Results



First Rinse Result, Reported As 8%


Before and After Samples

Project Summary

- **Efficient & Safe:**
  Work was completed safely and in coordination with site requirements.
- **Glycol Reduction Achieved:**
  Concentration was reduced from approximately 10% to a final reported 1%, enabling transition to water-only refill.
- **Verified End State:**
  Final condition was confirmed through low point sampling and documented refractometer readings.
- **Key Field Impacts:**
  41,090 gallons recovered (higher than expected), low points 9 feet underground, and glycol crystallization requiring a second rinse contributed to a 9-day field duration, originally proposed as 7.5 days.

Before and After Samples



Conclusion

The Frontline team successfully executed glycol reduction on the closed cooling water system using an Off-Line drain-down and water rinse approach. The project achieved a significant reduction in glycol concentration from approximately 10% to approximately 1%, verified by refractometer sampling at system low points.

Although a complete 0% condition was not pursued due to disposal cost considerations, the customer expressed a high degree of confidence in the final condition for turnover and water-only refill.

Overall, the work was completed with 100% safety performance and a smooth transition to customer turnover.

100%	**100%**	**100%**	**100%**
Project Safety Record	Project Environmental Stewardship Record	Project Results Guaranteed	Project Success



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