Memorandum

To: Micheal Cunningham, DRMS.

From: Tyler Fasenmyer, Ensero Solutions Inc.

CC: Jim Harrington, CLL. & Billy Ray, Ensero Solutions Inc

Date: August 23, 2023

Re: Schwartzwalder Water Treatment Plant - Disruption of Discharge

1 SYSTEM SHUTDOWN EVENT

1.1 EVENT DESCRIPTION AND OVERVIEW

The Schwartzwalder RO water treatment system was shut down due to a malfunctioning sensor in the backfill slurry tank and remained offline for 20 days. The sensor failed to send a consistent signal to the pumping system causing intermittent tank level control.

The purpose of the backfill slurry tank was to temporarily hold the rejected brine from the RO system. The fluid level in the tank was controlled by pumping the water into the mine pool. The pump operation was controlled by an ultra sonic level sensor. The failure of the sensor resulted in inconsistent pump operation and overloading of fluid.

The proposed changes to the treatment process required notification and approval of the EPA, in compliance with the site's Underground Injection Permit. The operations team completed the required updates to the as design drawings and obtained the authorization to commence inject into the mine pool once the changes have been made.

1.1.1 TANK OVERLOAD

On July 17, 2023, at 8:44 AM it was discovered that the Backfill slurry tank had been overfilled and the concentrate fluid had collected in the secondary containment.

- The concentrate fluid from the tank was captured in the secondary containment.
- System was operational through the day the tank level was monitored.
- System was shut down at the end of the shift for the instrumentation repairs to be completed the next day.

1.1.2 TANK FLOAT

The operations team attempted to empty the containment to safe level. Through the process, it was observed that the tank became unstable and began to float. The team had a safety stand down the following day to complete a risk assessment.

- The team relied on the pump system that is used to send the contents of the tank underground.
- Two suction lines were required to protect the pump from cavitation.
- During the process the tank was inadvertently emptied before the secondary containment.
- The amount of water in the containment and the empty tank caused the tank to float in the containment.
- Weight was added to the tank to stabilize it by using water from the mine pump.

1.1.3 INJECTION LINE BREAK

The operations team determined through the risk assessment process that the backfill slurry was an unnecessary hazard and should be eliminated from the water treatment process design. Several temporary connections were completed inside the water treatment plant to redirect flow directly underground. The operations team conducted an operational test on the system to test the functionality of the system updates. It was discovered that several connections inside the underground adit (and outside the bulkhead) were not suitable for the observed flows.

- Back fill slurry line inside the underground adit is constructed of Schedule 40 PVC.
- Section of the old piping broke during testing.
- Section of weak plumbing was removed, and a new connection was made in the line.
- It was determined that 80% of the line still had integrity.
- A second injection line constructed out of HDPE SDR-11 was identified.
- Team determined that the second line could be used as the new concentrate line.
- Design changes were made at the water treatment plant to redirect the water flow to the HDPE SDR-11 line.

1.2 TIMELINE OF SHUTDOWN

- July 17, 2023: 8:44 AM - Operations team discovered concentrate fluid inside the secondary containment.
    - System was operational through the day the tank level was monitored.
- **July 17, 2023:** 17:30 - The RO system was shut down.

- **July 18, 2023 – July 21, 2023:** – Operations team worked to assess corrective actions and system modifications.
    - Safety Stand Down.
    - Management team completed regulatory discussions.
    - Operations team completed additional site maintenance items.
    - System Design.

        - Develop bill of materials.
        - Procure materials for modification.
- **July 24, 2023:** Process change system test.
    - Operations team completed temporary connections.
    - Operations team completed operations test.
    - Operations team identified plumbing changes that would be required.
- **July 31, 2023 – August 3, 2023:** System design update Completed.
    - Internal plant process lines were updated.
    - External process lines were updated.
    - System was tested.

2 DESIGN MODIFICATION

The operations team completed a risk assessment and determined that it would be best practice to eliminate the tank from the water treatment process. The RO concentrate control process would be redesigned to streamline the flow of brine from the RO systems directly underground. The team constructed several new pipelines and manifolds to allow for system flow transitions that would reduce hammer pressure and high levels of flow through out the system. The modified design allows the concentrate from both RO systems to be comingle into a single line and boosted directly underground from the RO discharge. This method reduces the risk of storing contaminated water above ground and reduces the potential for process disruption by reducing the complexity of water handling.

2.1 TIMELINE OF SYSTEM TEST

- **July 18, 2023 – July 21, 2023:** – Operations team worked to assess corrective actions and system modifications.
    - System Design.
        - Develop bill of materials.
        - Procure materials for modification.
- **July 24, 2023:** System was tested to identify process functionality.
    - Team identified areas to update process control fittings**.**
    - Team identified areas to update process line material type.
- **July 31, 2023:** System design was implemented.
    - Design was updated.
- **August 1, 2023:** Injection permit change approval.
- **August 4, 2023:** 12:00 – RO skid #2 was put online for discharge.
    - The system was monitored over a 12-hour period.
- **August 5, 2023:** 12:00 – RO skid #1 was put online for discharge.
    - The system was put into full operations.