CASE STUDY

# Preventing Closed-Loop Failure by Identifying Unmonitored Biological Growth and Iron Transport

## CHALLENGES

Prior to Guardian's involvement, the closed loop at a commercial facility ran without biological testing and with corrosion monitoring focused mainly on copper. Iron remained above 7 ppm, confirming active corrosion and iron transport, while odours and fouling indicators suggested unaddressed microbiological activity.

Previous pH adjustment masked symptoms without controlling biology or corrosion byproducts, increasing fouling, heat-transfer loss, iron deposition, and reducing equipment life.

## SOLUTIONS

Guardian conducted a site review and expanded testing to include iron and biological indicators. Active bacterial contamination was confirmed and a corrective treatment plan to control microbiological activity, stabilize iron levels, and rebalance system chemistry developed

A written remediation scope and budgetary estimate were provided to operations, establishing a controlled path to system recovery and long-term stability.

## RESULTS

**Operational risk identified early:** Hidden biological activity surfaced before escalation.

**Control restored to the treatment plan:** Corrective actions targeted iron transport—not pH alone.

**Recovery made executable:** A defined remediation scope enabled planned correction vs. reactive failure.

## AT A GLANCE

A large commercial facility operated a closed-loop heating system without biological monitoring and incomplete corrosion testing. Guardian identified active bacterial contamination and uncontrolled iron transport, and defined corrective actions to prevent fouling, heat transfer loss, and premature equipment failure.

## KEY METRICS

**LOSS OF SYSTEM CONTROL IDENTIFIED**

**BIOLOGICAL AND CORROSION RISK SURFACED**

**PLANNED FIX BEFORE FAILURE-DRIVEN REPAIRS**

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## DATA

Prior to Guardian's involvement, system monitoring focused narrowly on copper corrosion and pH adjustment, leaving biological activity and iron transport unmeasured. Elevated iron levels, combined with odour and fouling indicators, confirmed that the closed loop was operating with active corrosion and unmanaged microbiological risk. Expanding diagnostics restored visibility into system conditions and allowed corrective action to be defined before failure-driven intervention was required.

## SYSTEM DIAGNOSTIC SUMMARY

| Parameter | Observed Condition | Operational Implication |
|---|---|---|
| Dissolved Iron | >7 ppm | Active corrosion and iron transport occurring |
| Biological Testing | Not previously performed | Microbiological risk unmanaged |
| Odour / Fouling Indicators | Present | Likely biological activity |
| pH Control | Adjusted with caustic | Symptoms masked, not corrected |
| Treatment Focus | Copper corrosion only | Incomplete system protection |