



Chemical Treatment for Corrosion Control

DAY 1 — Concept, Feasibility & Contracting Framework

1. Concept – Project Report

1.1 Purpose

To identify the need for a chemical field trial based on performance, safety, environmental, cost, or regulatory drivers.

1.2 Contents

- Background of current issue
- Objectives and KPIs
- Scope of systems involved
- Expected technical, financial, environmental, and safety impact
- Stakeholders
- Timeline and milestones

2. Prefeasibility Report (PFR)

2.1 Purpose

Evaluate technical, operational, and economic viability of the trial.

2.2 Technical Feasibility

- Review compatibility
- Safety/environmental considerations
- Known technical constraints (e.g., inaccessible CMS points)

2.3 Economic Feasibility

- Trial cost estimate
- Full-scale implementation estimate

2.4 Operational Feasibility

- Downtime requirements
- Staffing needs
- Logistics review

2.5 Risk Assessment

- Identify key risks
- Mitigation planning

3. Contract for Trial

3.1 Scope Definition

- Duration
- Location
- Systems affected

3.2 Responsibilities

- Chemical supply
- Monitoring
- Training
- Data sharing

3.3 Legal Elements

- Confidentiality
- IP clauses
- Dispute resolution
- Termination criteria



4. Trial Execution

4.1 Preparation

- Baseline data collection
- Staff training
- Safety checks

4.2 Implementation

- Controlled dosing
- Data collection

4.3 Monitoring

- Performance logging
- Interim review meetings
- Troubleshooting

5. Procurement Contract

- Supply volumes
- Delivery schedule
- Pricing
- QA requirements
- Warranties and regulatory compliance

6. Implementation Phase 1 & 2

Phase 1

- Partial rollout
- SOP updates
- Staff training
- Close monitoring

Phase 2

- Full facility rollout
- Optimization
- Continuous assessment
- Documentation updates

7. Alternate Technology – Continuous Education

- Workshops and seminars
- Comparative studies
- Certifications
- Feedback mechanisms

DAY 2 — Site Visit, Data Collection & Baseline Development

1. Site Visits (Pre-Trial)

Purpose

Observe infrastructure, injection points, safety systems, storage, and operational practices.

Key Activities

- Walkthrough of pipelines and injection stations
- Monitoring point verification
- Review of PFD updates
- Interview operators

2. Site Visit Documentation Structure

- Introduction (date, scope, personnel)
- Observation summary
- Findings (corrosion, leaks, hazards)
- SOP compliance
- Photos and annotated diagrams
- Recommendations

3. Field Hypothesis Log

Includes:

- Failure Mode
- Expected Evidence
- Observed Evidence

- Verdict & Confidence
- Data Source
- Recommended Tests

4. Data Collection Before Trial

Operational Data

- Flow
- Pressure
- Temperature
- Chemical dosing rates

Historical Data

- Leak logs
- Repair history
- Root cause reports

Monitoring Data

- Coupon corrosion rates
- Piggings debris
- Online sensor outputs

Laboratory Data

- Water chemistry (LIMS)
- Microbiology
- Metal analysis



5. Bioprobe Field Questionnaire

Temperature Control

- ΔT between rack and main line
- Mesophile vs thermophile range
- Temperature trend review

Velocity & Shear

- Actual velocity
- Reynolds number
- Wall shear stress
- Flow interruptions

Representativeness

- Phase verification
- ΔP stability

Probe Conditions

- Metallurgy & finish
- Clock position
- Dead leg presence

DAY 3 — Pre-Trial Analysis, Correlation & Standards

1. Pre-Trial Data Analysis

Aims

- Establish baseline
- Identify seasonal effects
- Determine trial timing

Methods

- Trend plotting
- Root cause analysis
- Statistical summary
- Correlation analysis

2. Baseline Establishment

- Select interval with no trends
- Apply MW rule
- Avoid false alarms
- Ensure sufficient data points

3. Biocide Trial Guidance

- Log before/during/after dosing
- Record total bacteria and SRB
- Plot bacteria vs time
- Plot residual vs dose

- Monitor ORP and pH shifts

4. NACE / AMPP Standards Referenced

- SP0775 — Corrosion Coupons
- TM0169 — Weight Loss Method
- TM0194 — Bacterial Monitoring
- SP0106 — Internal Corrosion Control
- SP0208 — Chemical Treatment Programs

5. Corrosion Coupon Monitoring

Installation

- As per SP0775
- Cleaning per ASTM G1
- Field practice per ASTM G4
- Pit exam per ASTM G46

Exposure

- Minimum 28 days

Reporting

- Weight loss
- Corrosion rate
- Pit depth
- Fluid chemistry

6. Corrosion Rate Formula

$$\left[\frac{(\text{Initial Wt} - \text{Final Wt}) \times 87,600}{(\text{Density} \times \text{Area} \times \text{Exposure Time})} \right]$$

DAY 4 — SPC, Trending, HSE & Reporting

1. Chemical Corrosion Control Mechanism

- Present data on chart
- Detect trend
- Assess stability
- Determine process capability

2. Definition of Trend (Site Rules)

1. One point $>3\sigma$ from baseline
2. Two consecutive same range
3. Six consecutive increasing/decreasing
4. Fourteen alternating
5. Two of three $>2\times$ baseline
6. Four of five $>1\sigma$ same side
7. Fifteen within 1σ
8. Eight $>1\sigma$ same side

3. Control Chart Construction

- Minimum 25 data points
- Establish average
- Set 3 standard deviation limits
- Apply trend rules

4. SPC Life Cycle of a Trend

1. Gestation
2. Baseline
3. Birth
4. Youth
5. Maturity

5. Importance of Trending

- Differentiate stable vs unstable process
- Avoid missing early changes
- Prevent escalation of corrosion losses

6. Resource Constraints

Personnel Requirements

- Corrosion Engineers
- Technicians
- Analysts

Impact levels: Critical / High / Medium

7. HSE — ISO 14001 Spill Management

Clause 6.1

Risk identification

Clause 8.1

Operational controls

Clause 8.2

Emergency preparedness

8. Hot Tapping HSE (API RP 2201)

- JSA/HAZOP
- MOC approval
- Gas monitoring
- Fire protection
- Environmental containment
- Post-operation NDT
- Lessons learned

9. Reporting Structure

1. Executive Summary
2. Monitoring Locations
3. Methodology
4. Results
5. Discussion
6. Conclusions & Recommendations
7. Appendices
8. Approvals

