Waste Water Monitoring Plan

Alumex PLC – Sapugaskanda Plant

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1. Purpose

The purpose of this wastewater monitoring plan is to ensure that all wastewater generated from production at the Alumex PLC Sapugaskanda facility is:

- properly collected,
- effectively treated through the Effluent Treatment (ET) Plant,
- continuously monitored,
- discharged in full compliance with applicable regulatory requirements, particularly the Central Environmental Authority (CEA) discharge standards for inland surface waters, and
- managed in a way that minimizes environmental risk and operational non-compliance.

This monitoring plan also establishes a structured framework for:

- routine operational monitoring,
- laboratory verification,
- trend analysis,
- reporting to the Hayleys Sustainability Portal, and
- responsible sludge management.

2. Plant Overview and Wastewater Sources

2.1 Main Wastewater Generating Operations

The Sapugaskanda plant generates industrial wastewater mainly from the following process areas:

a. Anodizing Plant

Typical wastewater streams include:

- acidic rinse water,
- alkaline cleaning rinse water,
- de-smutting residues,
- aluminum-bearing suspended matter,
- dissolved metals,
- possible fluoride-containing streams depending on process chemistry.

b. Powder Coating Pretreatment Plant

The pretreatment line generates wastewater containing:

- acidic/alkaline cleaning residues,
- suspended solids,
- dissolved metals,
- oil and grease from surface cleaning operations.

All these streams are directed to the Effluent Treatment Plant (ETP).

3. Monitoring Philosophy

For aluminum finishing plants, wastewater monitoring should follow **three control levels**:

Level 1 – Daily Operational Control

Used for immediate plant process control.
These are the parameters that indicate whether treatment chemistry is functioning properly.

Daily monitoring at ET plant

Parameter	Frequency	Purpose
pH	Daily	Confirms neutralization effectiveness
Chromate level	Daily	Early detection of chromium breakthrough

Daily checks allow operators to quickly respond to:

- acid/alkali overdosing,
- poor chromium reduction,
- upset in chemical dosing,
- abnormal loading from production.

Level 2 – Monthly Compliance Verification

Used for formal environmental compliance.

Third-party monthly analysis (Lindel Industrial Laboratory)

Parameter	Frequency
pH	Monthly
COD	Monthly
BOD	Monthly
TDS	Monthly
TSS	Monthly
Fluoride	Monthly
Oil & Grease	Monthly
Hexavalent Chromium	Monthly
Nickel	Monthly

The following parameters are tested monthly:

These tests verify compliance with the CEA discharge standards applicable to inland surface waters.

Level 3 – Trend and Risk Review

Used by management for medium-term control and preventive action.
Monthly data should be reviewed for:

- increasing pollutant loading,
- recurring process instability,
- gradual decline in treatment performance,
- chemical optimization opportunities.

4. Data Review Analysis

Monthly third-party reports should be reviewed jointly by:

- Executive Laboratory
- Executive Sustainability

4.1 Review Method

Each monthly result should be compared against:
a. Regulatory limit
Compliance against CEA inland water discharge standard.
b. Historical trend
Compare with previous:

- 3 months
- 6 months
- 12 months

c. Internal warning level
A practical operational approach is to create **internal trigger limits** below the legal limit.

5. Corrective Action Protocol

If any monitoring result approaches the **internal alert level** or exceeds the applicable **CEA discharge standard for inland surface water**, immediate corrective action shall be initiated to prevent non-compliant discharge and to identify the source of the deviation.

The purpose of this protocol is to ensure that abnormal wastewater conditions are controlled before they create environmental impact or regulatory non-compliance.

5.1 Immediate Actions

1. Reconfirm Sampling and Analysis

Before operational intervention, the first step is to verify that the abnormal result is technically valid.
Actions:

- confirm sampling location, date, and time,
- verify whether the sample was representative of normal discharge conditions,
- check sample preservation and handling conditions,
- review laboratory records for possible analytical error,
- conduct **repeat internal testing immediately** for critical parameters such as:
    - pH
    - chromate / hexavalent chromium
    - other relevant quick-check parameters where internal capability exists.

This step helps distinguish between:

- actual treatment failure,
- temporary fluctuation,
- sampling error,
- analytical anomaly.

2. Inspect ET Plant Operating Conditions

If the result is confirmed or suspected to be genuine, the ET plant operating condition shall be checked immediately.

Inspection shall include:

- **pH correction performance**
  Verify whether neutralization is occurring within the target operating range.
- **chemical dosing pumps**
  Check whether dosing pumps are functioning correctly, primed, and delivering the required dosage.
- **chromium reduction stage**
  Confirm whether chromium reduction chemicals are being added correctly and whether reduction conditions are adequate.
- **coagulation and flocculation condition**
  Observe floc formation and reaction performance.
- **clarifier settling performance**
  Check for:
    - poor settling,
    - sludge carry-over,
    - cloudy overflow,
    - excessive sludge blanket.

- **filter press condition**
  Confirm whether sludge removal is adequate and whether excessive solids recirculation is occurring.

3. Inspect Production Source

The source of the abnormal loading should be checked immediately at the production areas. Inspection should focus on:

- **abnormal discharge from anodizing plant**
  - bath dumping,
  - excessive rinse contamination,
  - acid or alkali carry-over.
- **abnormal pretreatment discharge**
  - concentrated chemical dumping,
  - poor rinse control,
  - excessive drag-out.
- **uncontrolled chemical washdown**
  - floor washing into drains,
  - chemical spill wash-off,
  - maintenance cleaning discharge.

Where necessary, relevant process personnel should be informed immediately so that abnormal upstream discharge can be isolated or minimized.

5.2 Emergency Response for Non-Compliant Effluent

Where monitoring indicates that wastewater quality is outside acceptable operating limits, or where there is reasonable evidence that the treated effluent may not comply with discharge requirements, the situation shall be treated as an environmental emergency condition.

Immediate emergency actions

1. Stop discharge to inland surface water
The treated effluent discharge shall be immediately stopped / isolated.
This is critical to prevent non-compliant wastewater from entering the receiving water body.
Operationally, this means:

- closing the discharge outlet / discharge valve, or
- diverting flow back to the holding, equalization, or treatment system, where practicable.

No discharge shall resume until compliance is re-established.
2. Activate the Emergency Response Procedure
The incident shall be managed in accordance with the plant's **Emergency Response Plan / Environmental Emergency Response Procedure**.
The emergency response process should include:

- immediate notification of:
  - **Executive Sustainability**

    - **Executive Laboratory**
    - **ET plant responsible personnel**
    - relevant production heads where necessary
- recording:
    - time of incident
    - affected parameter
    - measured result
    - probable source
    - immediate containment actions taken

3. Contain and stabilize the system

The ET plant team shall take immediate action to restore treatment stability.
Possible emergency actions may include:

- correction of pH,
- re-dosing reduction chemicals,
- adjustment of coagulant/flocculant dosage,
- recirculation of off-spec effluent for retreatment,
- temporary holding of incoming high-strength wastewater where possible.

4. Investigate the root cause

The incident investigation should identify whether the non-compliance resulted from:

- abnormal production discharge,
- chemical dosing failure,
- pH upset,
- chromium reduction failure,
- clarifier malfunction,
- sludge carry-over,
- accidental chemical spill,
- operator error.

5. Resume discharge only after confirmation

Discharge to inland surface water shall only recommence after:

- internal testing confirms recovery of the affected parameter,
- ET plant conditions are stabilized,
- responsible personnel confirm that discharge quality is back within acceptable limits.

Where necessary, confirmatory sampling should be carried out before resuming normal discharge.

6. Monthly Reporting

6.1 Monthly Reporting

After completion of monthly sampling, receipt of the third-party laboratory report, and internal review by the **Executive Laboratory** and **Executive Sustainability**, the validated wastewater monitoring data shall be formally recorded and uploaded to the **Hayleys Sustainability Portal**.

The purpose of monthly reporting is to:

- maintain traceable environmental compliance records,
- monitor wastewater quality trends over time,
- support internal sustainability performance tracking,
- provide verified environmental data for corporate ESG reporting.

Before uploading, all reported figures should be checked for:

- consistency with the laboratory report,
- consistency with internal daily monitoring records,
- correctness of units,
- unusual deviations from previous months,
- confirmation that the data represents the final discharge from the ET plant.

Where any abnormal trend, internal alert, or corrective action has occurred during the month, a brief explanatory note should also be maintained in the internal record for audit and management review purposes.

6.2 Monthly Reporting Shall Include

The following wastewater quality and quantity data shall be reported monthly through the **Hayleys Sustainability Portal**.

Parameter	Reporting Basis	Remarks
pH	Monthly laboratory result	Final discharge compliance parameter
COD	Monthly laboratory result	Indicates organic pollution load
BOD	Monthly laboratory result	Indicates biodegradable organic load
Oil and Grease	Monthly laboratory result	Indicates hydrocarbon/surface contamination
TSS	Monthly laboratory result	Indicates suspended solids carry-over
Wastewater Quantity	Monthly total discharge volume	Total treated wastewater discharged during the month

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