

Jurong Island Vision Zero forum

**Safety considerations in hazardous
waste management**

25 August 2022

What I'll cover

- 1. Introduction to Veolia
- 1. Legislation / control of hazardous waste
- 1. Safety features & programs in hazardous waste treatment plant



OUR MISSION:

“RESOURCING THE WORLD”

Improving access to resources

Veolia offers operational solutions that consume fewer environmental resources and are more economically efficient, so as to expand both the potential and the accessibility of the resources available.

Preserving resources

Veolia develops solutions to conserve resources and optimize their use, while protecting their quality and efficiency throughout the usage cycle.

Replenishing resources

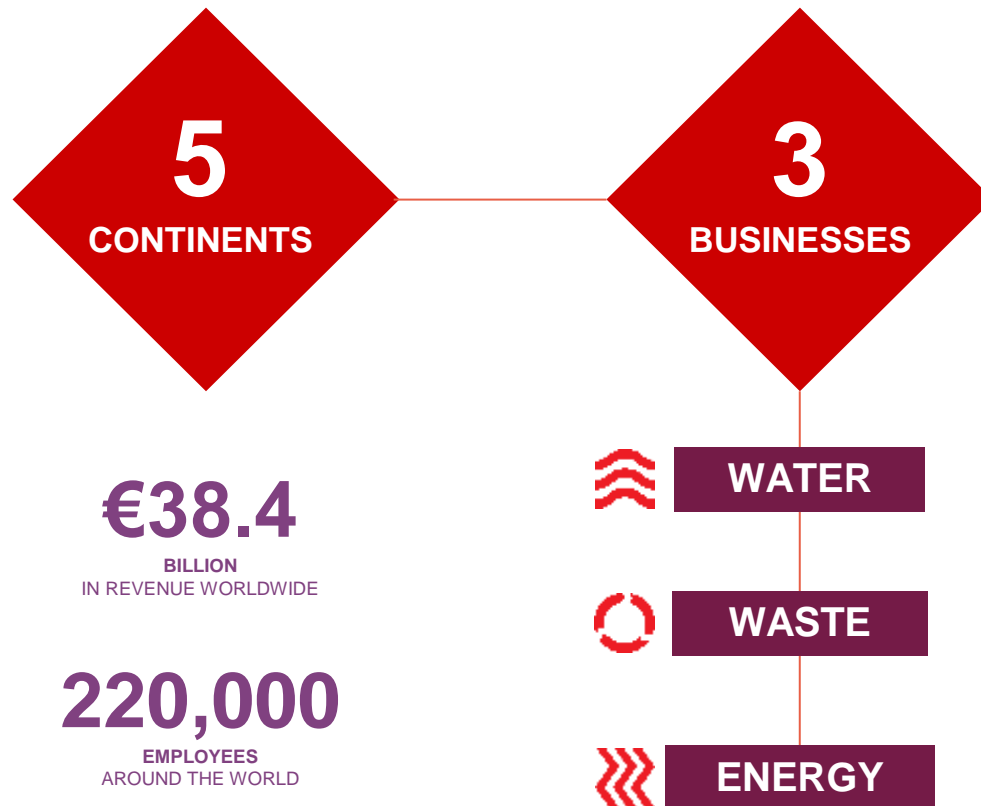
Veolia provides solutions for creating new “secondary” resources that will gradually offset the increasing scarcity of natural “primary” resources, generating new opportunities for social and economic development that protect the environment.



**We contribute to
developing access
to resources,
preserving them
and replenishing
them.**

VEOLIA GROUP OVERVIEW

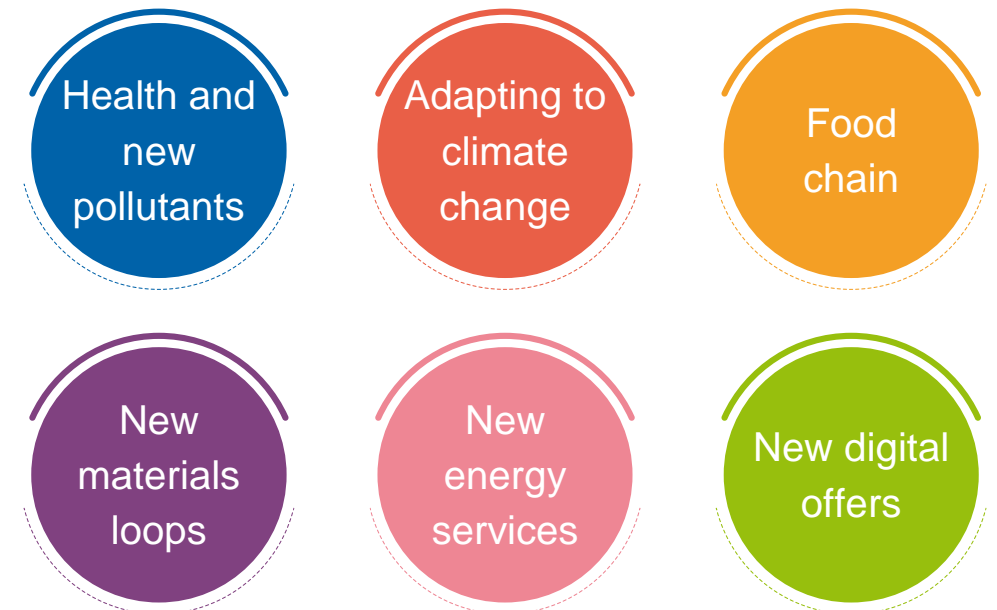
ACTIVE PRESENCE WORLDWIDE



A CHAMPION

OF ECOLOGICAL TRANSFORMATION

We are accelerating the industrialization and deployment of our future solutions in priority sectors:



OUR PRESENCE

IN SINGAPORE

TREATMENT AND RECOVERY
OF LIQUID AND
HAZARDOUS WASTE



Liquid and solid
hazardous waste



SINGAPORE

Liquid and solid hazardous waste treatment facility

Veolia's state-of-the-art facility is able to provide a comprehensive range of treatment services for hazardous chemical wastes including high temperature incineration, evaporation, oily water treatment, inorganic physico-chemical treatment and solids stabilization.

Our service offering allows local waste generators to receive reliable and cost-effective hazardous chemical waste services in full compliance with local Environmental Agency and the latest international EHS standards.



Our Capabilities

High Temperature Incinerator:
50,000 t/y

Evaporator:
28,000 t/y

Oily water treatment:
10,000 t/y

Inorganic physico chemical treatment:
30,000 t/y

Stabilization:
10,000 t/y



Ability to handle all types of hazardous wastes

Varieties of wastes

1. Multiple risks

- Flammable, Toxic, Corrosive, Oxidizing, Carcinogenic, pyrophoric, water reactive
- Difficult to treat waste streams : biohazards, chlorinated aromatics, mercury contaminated waste, low radioactive waste

2. Multiple industrial sources

- Oil & Gas, Specialty Chemicals, Pharmaceutical, Electronics, Aerospace, Marine, logistics industries

3. Multiple physical states

- Solid, Sludge, Liquid, Powder, Gas

Various packaging

1. Bulk wastes

OTC bins, iso tankers and vacuum trucks

2. Packaged wastes

Drums, IBC, Pallets, Crates, Jerry cans, Tins, Bottles, lab packs



Our Capabilities

High Temperature
Incinerator:
50,000 t/y

Evaporator:
28,000 t/y

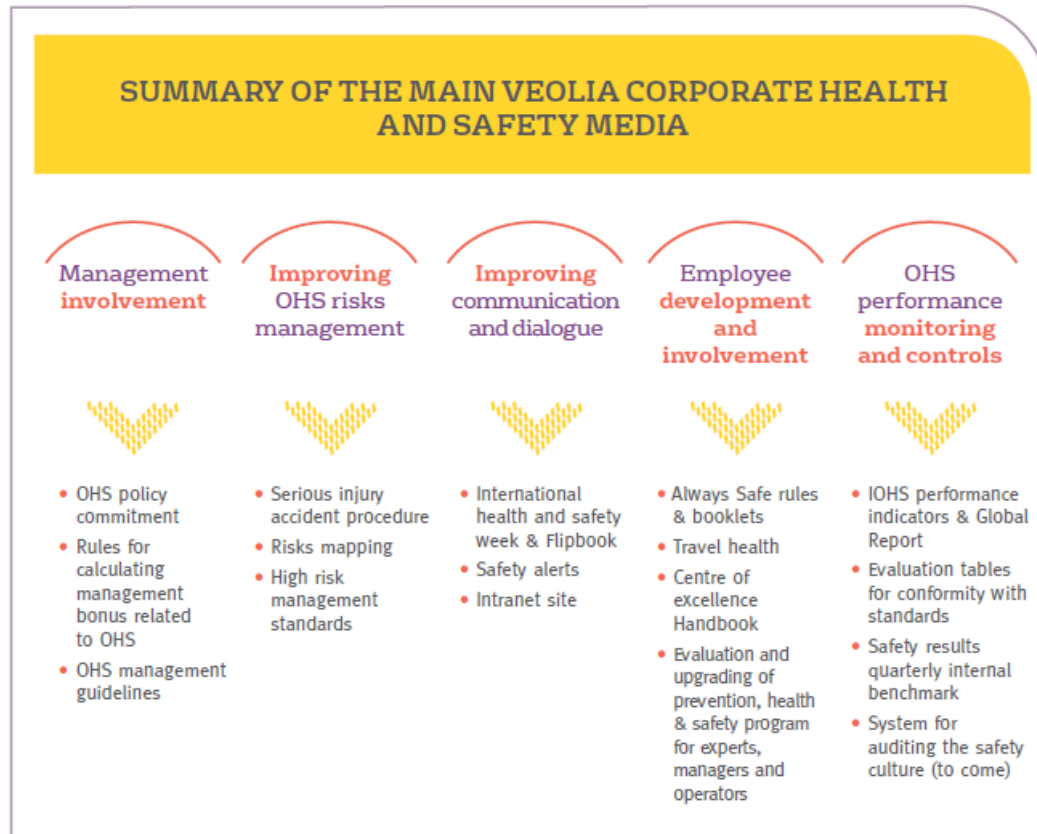
Oily water treatment:
10,000 t/y

Inorganic physico
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Stabilization:
10,000 t/y

THE ESSENTIALS OF VEOLIA HEALTH & SAFETY

Veolia's policy is based on the 5 strategic Health and Safety pillars to **reach the “interdependent” safety culture level** in order to make zero accident a choice and to strive for excellence.



Singapore's waste management national regulatory landscape

NEA as main authority governing / administering management of waste in S'pore

- Environmental Public Health (Toxic Industrial Waste) Regulations
- SS 593 : Code of practice for Pollution Control
- SS 603: Code of Practice for Hazardous Waste Management
- Management of Hazardous Waste information paper

MOM

- WSH Guidelines on Toxic Industrial Waste Treatment

Key EHS plans for Hazardous Waste

- **EHS elements integrated into the project management phase**
 - ✓ Quantitative Risk Assessment (QRA)
 - ✓ Environmental Baseline Study (EBS)
 - ✓ Pollution Control Study (PCS)
 - ✓ Hazard and Operability Study (HAZOP)
 - ✓ Administration Building designed to meet platinum green mark
- **Building EHS Capabilities**
 - ✓ Training visits to other Veolia Hazardous Waste plants
 - ✓ Identifying and training operation personnel for Company Emergency Response (CERT) and Environment, Health & Safety (EHS) roles as per local regulations.
- **Best Practice Approach**
 - ✓ Studying and implementing best practices from both Veolia and other similar plants globally (eg. COE, technical committee, WASABI)
 - ✓ Adopting relevant Process Safety Management elements, eg, MOC, prestart-up safety review (PSSR), to strengthen EHS processes.
 - ✓ Learning from industry experience

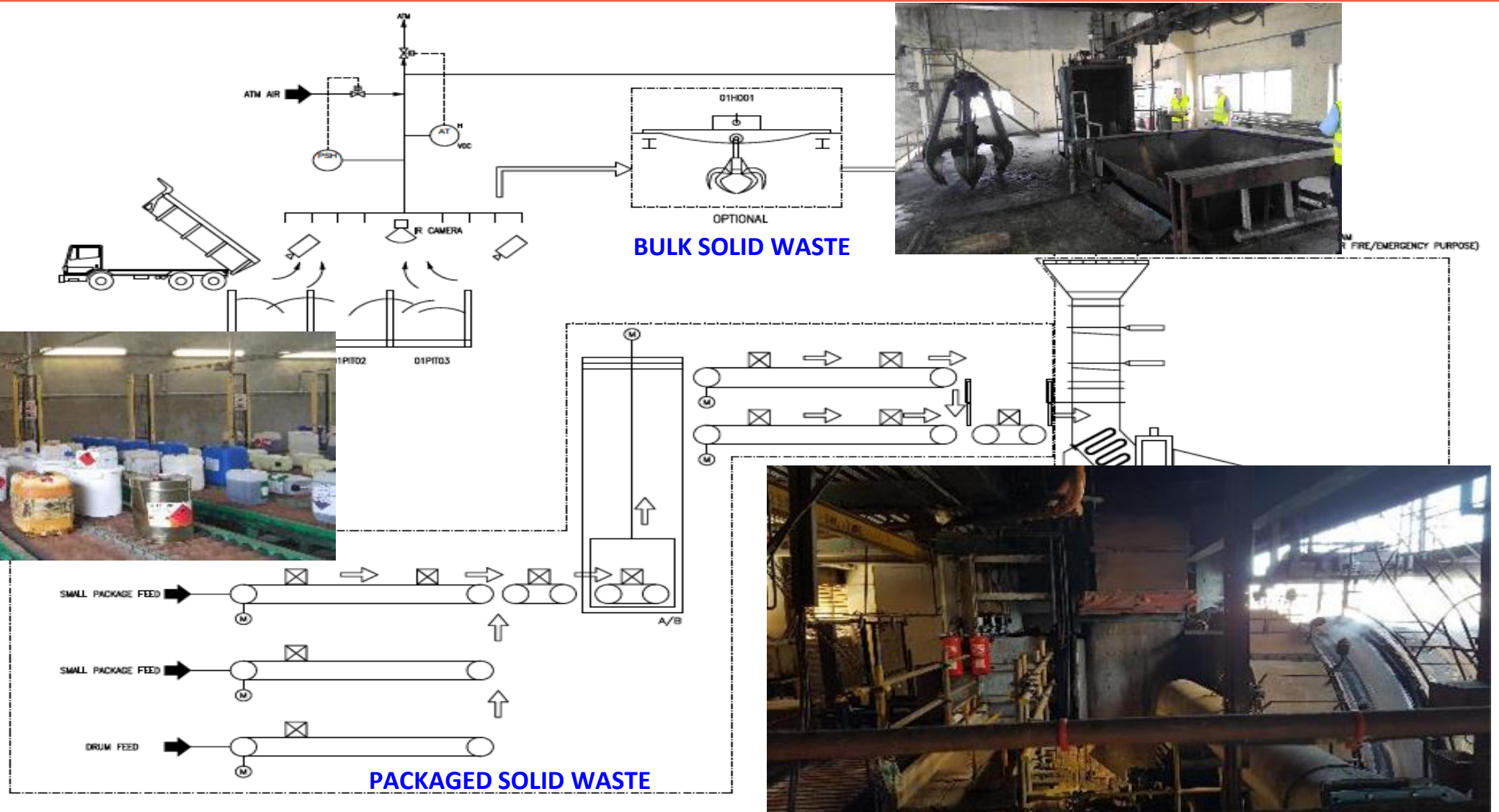


Safety & Environment in Design of Hazardous Waste Treatment Facility

Some
design
features ...



Veolia Singapore Hazardous Waste Treatment Facility High Temperature Incinerator (HTI)



Fire protection system

1) Plant fire protection system

- Fire protection according to SCDF, NFPA and recognised risk insurance standards
- Thermographic scanner
- Deluge system
- Fixed foam monitor
- Fire shutter doors



2) Tank Farm Fire Protection

- API storage tank standard
- Fire protection according to SCDF, NFPA and recognised risk insurance standards
- Dedicated sprinkler protection
- Foam pourer
- Secondary containment
- Chemical retention basin



Storage Facility Fire Protection

Dedicated storage facility with hazard compartmentalisation and fire protection designed according to NFPA

Ex-proof lighting
and shutter doors

Dedicated sprinkler
protection

Chemical
impervious flooring

Sump leading to
secondary
containment



Waste Pit Fire Protection

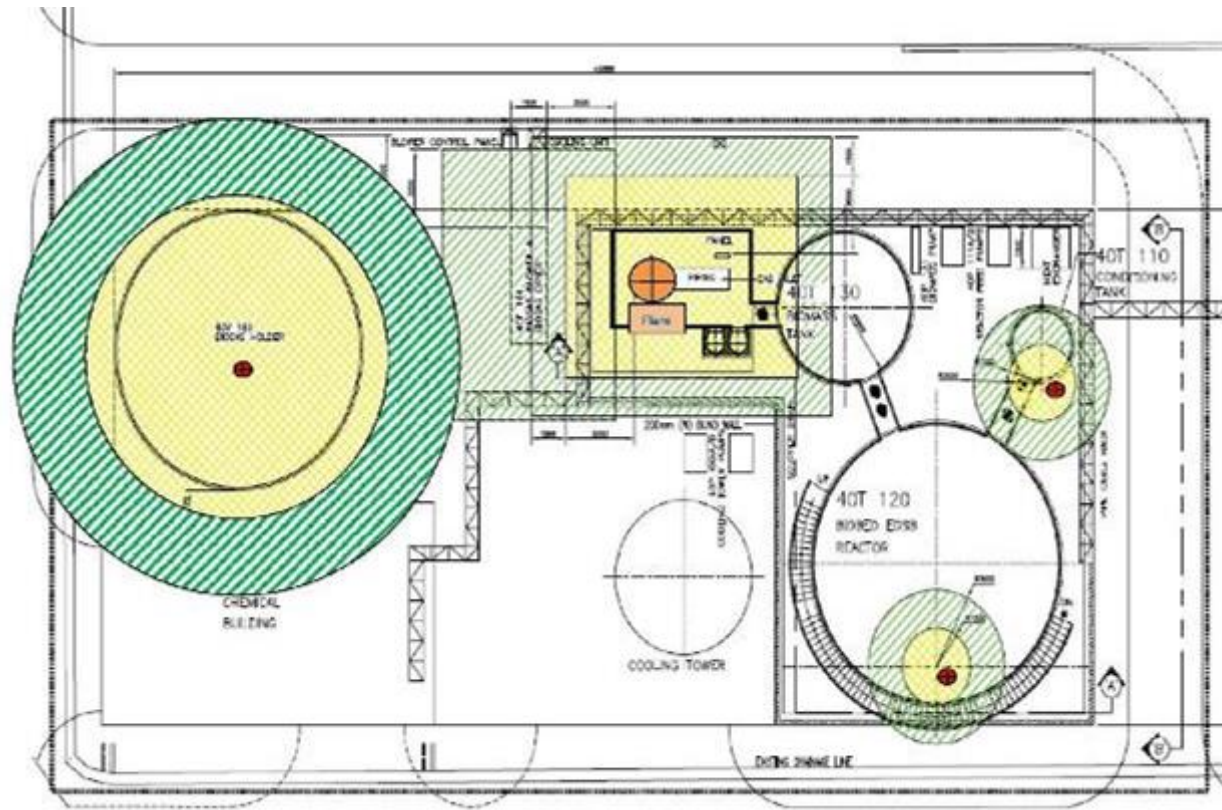
- Infrared sensors
- CCTV monitoring from control room
- Wall mounted water sprinklers
- Ceiling mounted water sprinklers
- Fixed foam monitor



Plant Hazardous Area Zoning

ATEX (explosive atmosphere) zoning, adequate spacing requirements were taken into consideration while defining our Waste storage & processing area.

- Determined based on likelihood and frequency of presence of flammable environment
- Used to:
 - ✓ Stipulate equipment explosivity specifications
 - ✓ Determine procedural requirements, eg, hot work controls



NOTES & HOLDS

1. HAZARDOUS AREA CLASSIFICATION IS DONE ACCORDING TO NFPA 820 CODE FOR BEGAS SCRUBBER, BLOWER/DRYER, GAS HOLDER AND FLARE
2. HAZARDOUS AREA CLASSIFICATION IS DONE ACCORDING TO API RP 505 FOR GENERAL TANK AND PRESSURE RELIEF VALVE
3. PLANT USER HAS FINAL RESPONSIBILITY AND MUST VERIFY THE HAZARDOUS AREA CLASSIFICATION WITH LOCAL REGULATION
4. HAZARDOUS AREA CLASSIFICATION SYMBOLS FOR NFPA 820:

	DIVISION 1		UNCLASSIFIED
	DIVISION 2		DIVISION SOURCE

5. HAZARDOUS AREA CLASSIFICATION SYMBOLS FOR API RP 505:

	ZONE 0		UNCLASSIFIED
	ZONE 1		DIVISION SOURCE
	ZONE 2		

5. REFERENCE DOCUMENT EB4001

Pressure Release valve

Flare Stack

Waste Acceptance Plan

Input



Safety Data Sheet (SDS)



Waste Specification Declaration Form



Full Chemical Analysis



Basic Chemical Analysis

Stage

Pre-acceptance



Finger printing



Final acceptance

Decision

We can treat it

We will receive it

We will proceed to treat it

Waste status

Waste is at client location

Waste arrives at treatment plant

Waste is treated at treatment plant

Process Safety Management System

SS 506 Part III / Process Safety Elements :

- Management of Change
- Process Hazards Analysis
- Pre-startup Safety Review
- Mechanical Integrity
- Incident investigation
- Emergency planning & response
- Hot Work



Our QEHS certifications

- ISO 45001, ISO 14001 & ISO 9001
- bizSAFE STAR
- CHWMEG



A snapshot - Safety on All Levels



For safety at the collection site

- Job Safety Analysis
- Risk Assessment
- Spillage control/ Emergency response
- Appropriate PPE
- Labelling of Waste Containers
- Safety Trainings before collection e.g. SIC, HAZMAT
- Vehicle Safety

For safety at the treatment facility

- Plant Fire Protection System
- Highly automated feeding system
- State-of-the-art centralised control room
- Environment, Health & Safety (EHS) studies
 - Quantitative Risk Assessment (QRA),
 - Environmental Baseline Study (EBS),
 - Pollution Control Study (PCS),
 - Hazard and Operability Study (HAZOP)



For determining compatibility and the treatment method

- Pre-acceptance testing
- Post-acceptance testing
- Review of Waste Specification Declaration (WSD) and Safety Data Sheet (SDS)
- All lab analyses are only done by qualified chemists

For safety at the storage facility

- EXplosive ATmosphere (ATEX) zoning
- Nitrogen blanketing at areas containing flammable materials
- Tank Farm Fire Protection System
- Training on Company Emergency Response (CERT)
- Barcoding of wastes for identification of treatment route
- Storage categorisation based on HAZMAT classification

Major Hazard Installation (MHI) Regulations

- Demonstrate companies' ability to preventing major hazardous events by reducing risks to as low as reasonably practicable (ALARP)
- MHIs comprise:
 - Petroleum refining facilities.
 - Petrochemical manufacturing facilities.
 - Chemical processing plants.
 - Installations where large quantities of toxic and flammable substances are stored or used.



Major Accident Prevention Policy (MAPP)



Existing Requirements

Process Hazard Analysis (PHA)

Safety & Health Management System (SHMS)

Emergency Response Plan (ERP)

Quantitative Risk Assessment (QRA)



Thank You

