

# Environmental Awareness, Environmental Impact & Protection and Environmental Management system

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**Abstract** — To ensure that an effective management system in place to enable YANSAB to identify and comply with the applicable environmental requirements and minimize the potential for negative environmental impacts.

## TYPES OF ENVIRONMENTAL POLLUTION

1. AIR POLLUTION.
2. WATER POLLUTION.
3. SOIL POLLUTION.
4. RADIOACTIVE POLLUTION.
5. NOISE POLLUTION.

This OMS (Operation Management system) system/element applies to all activities, products and services of YANSAB with the potential to impair the quality of the environment. This OMS system is addressed by the requirements stated in the OMS systems (sub-elements).

ENVIRONMENTAL STANDARD: SHEM-13.00 (OMS-P-3111)

As per Safety, Health and Environment Management (SHEM) procedure there is Environmental Standard i.e., SHEM: 13.00 element. It has 4- sub elements, which are,

SHEM: 13.01 AIR MANAGEMENT

SHEM: 13.02 WASTE MANAGEMENT

SHEM: 13.03 WATER MANAGEMENT

SHEM: 13.04 SOIL & GROUND WATER MANAGEMENT

**Keywords:** EHSS (Environment, Health, and Safety & Security), Environmental Pollution, OMS (Operation Management System)

## I. INTRODUCTION

The definition of the environment is "everything that surrounds us, everything made of the water, the air or the

### 1) Spillage: (Chemical and polymer)



land, including ourselves." The environment consists of land, air, water - and people.

### A. Environmental Aspect -

Everything we make or do affects the environment. This is particularly the case while at work. Working people are cutting chopping, chipping and counting lumps of the environment all day.

If our climate is changed, it affects the atmosphere, human being, animals and plants. Examples are as follows,

- 1) Smoke fumes from a chimney affecting residents / residential area.
- 2) Chemicals of the plant release in the river and ocean.
- 3) Disposal of Trash or Garbage submerged between the layers of earth. This is called landfill waste disposal. Therefore, harmful gases are released like methane and carbon dioxide.
- 4) Vehicle release the harmful gases are carbon dioxide, carbon monoxide & Nitrogen oxide.

### B. Environmental Impact -

Our work may affect the land, air, water and people in negative or positive ways. The impacts may also be direct - e.g. smoke fumes from chimney-affecting residents. Or indirect - the water around a power station will warm up while producing the electricity that your organization needs

The main environmental issues are energy, water, waste, transport, pollution. Food and carbon dioxide emissions. Energy uses valuable resources that are in increasingly short supply, and produces carbon dioxide that affects the climate. Water can be here there and everywhere, but not be fit to drink. Waste needs to be controlled otherwise our countryside will be full of landfill sites. More and more goods are transported every longer distance.

2) Effect the Marine life



3) Environmental Pollution: Material Spillage in Product Handling Department (PHD) of YANSAB (SABIC)



C. Polymer pellet spillage in Warehouse of YANSAB

Mostly we are handling with materials of Polymer pellets in Product handling department (PHD). We can view the below picture. Polymer pellets spillage in Open warehouse. We Observed in PHU, some birds like pigeon died due to eating of Polymer pellets.



*D. Waste oil spillage in Waste oil storage area in YANSAB Plant*

Waste oil storage area located in Garage workshop. Waste oil of PHU are flammable in nature. Waste oil spillage can affect the animals, earth and environment.



*E. Ink & solvent spillage in Bagging line (PACKAGING AREA) of Yansab Plant*

We handle the ink and solvent in bagging area for printing of bags. What is the effect of Ink and solvent? Ink and solvent may affect the Respiratory system and central nervous system. It causes the skin Allergy and Asthma.



*F. Environmental Pollution*

Environmental pollution is unwarranted disposal of mass or energy into earth's natural resource pool such as water, land, or air that results in long- or short-term detriment to the atmosphere and its ecological health to negatively impact the living beings and their life both quantitatively and qualitatively.

Environmental pollution is the addition of unwanted chemicals that cause a change to the environment.

Environmental pollution is a significant problem in the world today. Some industries release chemicals into the air, which cause harm to the ozone layer that shields us from

UV radiation. Some industries release harmful chemicals into water resources.

**II. REQUIREMENTS**

A system have been defined to ensure that information, application, reports and other data that is to be submitted to a regulatory authority is complete, correct and reliable.

The Environmental department shall submit following reports after review for complete, correct and reliable data to the Royal commission Environmental Control Department and SABIC Regional EHSS.

Monitoring	Frequency	Reporting
Air emission & water discharge	Monthly	15th of the calendar day for the previous month
Stack testing	Annual	Maximum of 60 days after completion of the stack testing
Fugitive emission	Semi-annual / annual	Maximum of 60 days after completion of the Fugitive emission monitoring program
Ground water monitoring	Semi-annual	By maximum of 90 days after completion of the each round of ground monitoring
Waste Generation Audit	Semi-annual	31 <sup>st</sup> July & 31 <sup>st</sup> Jan
Fence noise monitoring	Annual	Maximum by 60 days after conducting test

### A. Air Management

Air pollution is generally defined as the presence of substances (air pollutants) in the outdoor atmosphere in quantities, which are injurious to human, plant, animal life or to property.

#### 1) Examples of Air Pollutants:

Sulfur Dioxide (SO<sub>2</sub>):

Nitrogen Oxides, Sulfur dioxide, Carbon dioxide, Carbon monoxide.



### B. Air Pollutants

#### 1) Impacts of Air Pollutants –

- 1) Health Impact to humans, animals, plants and aquatic life.
- 2) Global warming (Carbon dioxide and Carbon monoxide).
- 3) Ozone depletion (CFC's / Halon).
- 4) Land and food impact (Contamination of ground water).
- 5) Marine life (Oil, hydrocarbon & heavy metals).
- 6) Long-term liability and property damage.

#### 2) Purpose –

Effective management system is in place:

- To define the general air protection program requirements in managing the environmental quality

for air emissions at all stacks and flares in YANSAB plant.

- To verify its compliance with Royal Commission Environmental Regulations-RCER 2010.

#### 3) Scope –

- Utilities plant: Boilers (111-B-001/002/003/004) ET-I plant: Off Gas Oxidation Reactor (48-F-201)
- PET-II plant: HTM Furnace (015-61 E 11/ 21/ 31/ 41)
- TA plant: HTM furnace (27-B-100)
- PTA plant: CO removal Unit (11-B-250)
- Aromatics (54-B-01/55-B-01A & B/56-B-01/57-B-01)
- Flare (Aromatics & Acetic Acid plant)

#### 4) Definition -

- BIF: Boilers and Industrial Furnaces that burn hazardous materials other than fossil fuels.
- CEMS: Continuous Air Emission Monitoring System
- Point Source: an individual air emission / pollutant source originating from a specific location.
- Regulated Point Source: Point sources that have potential to emit before the use of abatement equipment more than 100 t/y of any air pollutant listed in attachment IR-SHEM-13.01 of any hazardous pollutant listed in attachment SHEM-13.06 or as defined in the EPO.
- Ambient air: is defined as any air on the external side of a pollution source's
- boundary fence to which the public have access. This includes industrial areas
- neighboring a pollution source.
- Point Source: an individual air emission / pollutant source originating from a specific location.
- Automated Method or analyzer: means a method for measuring concentration of an ambient air pollutant in which sample collection, analysis, and measurement are performed automatically through an analyzer system.

#### 5) VOC Definition:

Volatile Organic Compound - any compound of carbon, excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates, and ammonium carbonate, which participates in atmospheric photochemical reactions.

(VOC) service means pumps, valves, compressors and pressure relief valves which are in contact with streams containing more than 10% weight of VOC.

6) *Hap Definition:*

Organic (HAP) hazardous air pollution service means flanges, connectors, pumps, valves, compressors and pressure relief valves which are in contact with streams containing more than 5% weight of organic HAP as specified in Table 2C of RCER. Expected 13.06A or as defined in the Expected results:

- Zero environmental incident related to this management system including those resulting in a Regulatory non-compliance relating to air pollution control.
- Regulated Point Sources are identified and their monitoring program established as required by RCER 2010.
- A fugitive emissions monitoring and leak repair program is implemented to meet RCER-2010 requirements.

C. *YANSAB - SHEM-13.01: Section 5.0: Requirements*

- 5.7 Point Source - Regulation Requirements
- 5.8 Annual Point Source Emission Monitoring
- 5.9 Continuous Emission Monitoring of Point Source
- 5.10 Ambient Air Emission Monitoring
- 5.11 Annual Fugitive Emission Monitoring
- 5.12 Reporting of Incident related to air emission

1) *Point Source - Regulation Requirements*

- No emission from point sources in excess of source emission standard
- Plant owner shall monitor and take corrective action to maintain emission within limit
- Performance testing of point source in case of new point source installation
- Flare shall be operated with a flame present at all times and shall be monitored by thermocouple and visual monitoring.

III. MONITORING

A. *Annual Point Source Emission Monitoring*

- 1) Annual stack emission testing of point sources.
- 2) Measurement of applicable parameters during stack emission testing that are stated in EPO or RCER 2010.
- 3) Restrict the annual emission testing for identical point source to the following number of sources providing all sources are tested at least once every 4 years:

No. of Identical Sources	No. Tested Annually
1-3	1
4-8	2
>8	3

- 4) Prior notification at least fourteen (14) day prior to Royal commission, before conducting stack emission testing
- 5) Submission of test report to Royal Commission.

B. *Continuous Emission Monitoring of Point Source*

- 1) Continuous emission monitoring systems (CEMS) shall be installed and operational
- 2) Maintain records of CEMS as follow:
  - Monthly measurement reports
  - Calibration records
  - Maintenance check records
  - Periods when the continuous monitoring system is inoperative.

C. *Continuous Emission Monitoring of Point Source*

- 1) Concern plant shall submit CEMS report summarizing the continuous emission monitoring data for affected sources, at the end of the each month within first five days of the next month to Environment department.
- 2) EHS Section shall review and submit CEMS reports received from plants to the Royal Commission-EPCD.

D. *Ambient Air Quality Monitoring*

- 1) YANSAB shall not emit from any source quantities of air contaminants exceeding the source standards described in EPO or RCER 2010.
- 2) YANSAB shall undertake ambient air quality measurement as determined by the Royal Commission or SABIC EHSS. In case of SABIC EHSS, this may require assessing the air quality within the facility boundary to evaluate the health impact of the facility employees.
- 3) Ambient air monitoring analyzer used in the ambient air monitoring shall be tested for zero calibration before taking every measurement and calibrated annually by the Vendor as per vendor recommendation to qualitatively assess the quality of the monitoring data being produced.
- 4) Procedure for Ambient Air Monitoring: Upon receipt of the request from Royal Commission or SABIC CEIHD, the authorized Focal Person (EHS Manager) for communication with Royal Commission will inform the Environmental Engineer who will trigger the procedure for ambient air quality monitoring.

E. *Ambient Air Quality Monitoring*

YANSAB EHSS Department shall submit ambient air quality monitoring report to Royal Commission-EPCD and SABIC CEIHD after review.

F. *Fugitive Emission Monitoring*

- Identify various locations for fugitive emission monitoring.
- All affected components in YANSAB Plants shall be monitored on a minimum of semi-annual basis, starting within 180 days of initial startup of operations.
- The common sources of leaks from various components are Valves, Flanges, Pumps & compressors, Pressure relief devices, Process drains, Open-ended lines or valves, accumulator vents and Access door seals.



- Install monitoring instruments to the selected sides.
- Types of detectors used in instrument are depending upon HAP properties such as Catalytic oxidation, Flame ionization, Infrared absorption or Photo ionization.
- Evaluate the performance after calibrating with standard values.
- Records the analyzed results as per your needs.
- Compare the analyzed results with RCER norms and send reports for compliance in the specified formats.
- Some of the sources are exempted from monitoring according to criteria defined in IR-SHEM-13.06 table.
- Data management system (DMS) shall be followed to the analyzed and recorded data.
- This DMS shall be used to track the fugitives concentration, work orders, provide historical data and keep track of monitoring frequency for each point as specified in the regulations.
- The fugitive emissions DMS provide reports such as daily reports, standard reports, emission calculation reports etc. at different level.
- An immediate action shall be taken to control the fugitive emission at sources.

SOURCE	POLLUTANTS	STANDARD
For valves, pumps, compressors and pressure relief valves in VOC service	Fugitive VOC	10,000 ppm
For valves and flanges in organic HAP service	Fugitive organic HAP	500 ppm
For other components except valves and flanges in organic HAP service	Fugitive VOC	10,000 ppm

*G. Reporting of Incident related to air emission*

Respective plant of point sources shall report incident related to air pollution as per applicable criteria of SHEM-10.

*1) Benefits of Air Pollution Monitoring:*

The point source unit/s shall not discharge at any time air contaminants in such concentration and of such duration as to be injurious to, adversely affect, or cause nuisance to public health or welfare, animal life, vegetation, or property. Comply with the environmental Regulation. Reduce environmental impact.

To evaluate air quality measurement within the boundary to evaluate the health impact of YANSAB employee.

To evaluate YANSAB emissions sources quantities of air pollution that result in ground level concentration exceeding the Royal Commission standard.

2) *Benefits of Fugitive Emission Program:*

- Reducing the Hydrocarbon emissions of hazardous air pollutants to the atmosphere.
- Reduced fire risk to the entire facility and neighboring plants.
- Improvement of air quality in the immediate environments of the plant
- Improvement to the residential community in the industrial city.
- Reduction of the ground level ozone (hydro Carbon) which is hazardous to human health.
- Comply with the environmental Regulation.

H. *Responsibilities:*

1) *Plant Manager/ Sr. Manager*

- 1) Monitor and maintain the air emission within the specification.
- 2) To take corrective action in case of exceeding of air emission.
- 3) Stack emission annual monitoring
- 4) Calibration of CEMS (Continuous Air Emission Monitoring System).
- 5) Report monthly measurement data to EHS Section.
- 6) Report exceeding of air emission in AMAN as per IR-SHEM-10 criteria.

2) *Plant Manager/Sr. Manager*

- Monitor and maintain the air emission within the specification.
- To take corrective action in case of exceeding of air emission.
- Undertaking ambient air quality measurement as determined by the Royal Commission or SABIC CEIHD.
- Report exceeding of air emission in AMAN as per SHEM 10.0 criteria.

3) *EHS*

- 1) EHS Section sends the Notification to Royal Commission for conducting stack emission testing
- 2) Review monthly reports received from plants and submit to Royal Commission
- 3) Submit annual stack test monitoring reports to Royal Commission

4) *EHS Section*

- Upon receipt of the request from Royal Commission or SABIC CEIHD, trigger ambient air quality monitoring.
- Review ambient air quality monitoring report and submit to Royal Commission.

5) *Prevention:*

- 1) Reduce the emission of chemicals, fuels and hydrocarbons.

- 2) Planting of trees, which will absorb the gases. Most of the Trees takes CO<sub>2</sub> and release oxygen.
- 3) Use less number of vehicles on the road which will not affect the atmosphere or drive electric vehicles.
- 4) Comply with Environmental regulation.
- 5) Don't burn your garbage.

IV. WASTE MANAGEMENT

Waste management is an important element of environmental protection. Its purpose is to provide hygienic, efficient and economic solid waste storage, collection, transportation and treatment or disposal of waste without polluting the atmosphere, soil or water system.

Waste management refers to the various schemes to manage and dispose of wastes.

Ensure handling, storing and final disposal of hazardous waste in such a way that it has minimal impact on the environment.

All plants & departments that generate hazardous and non-hazardous waste from their activities, products and services.

A. *Classification of waste:*

1) *Hazardous Waste:*

These wastes are defined as any solid, semi-solid, liquid, or contained gaseous waste, or combination of such wastes, which may because of its quantity, concentration, physical or chemical characteristics pose a hazard or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of or otherwise managed.

2) *Non-hazardous Industrial Waste:*

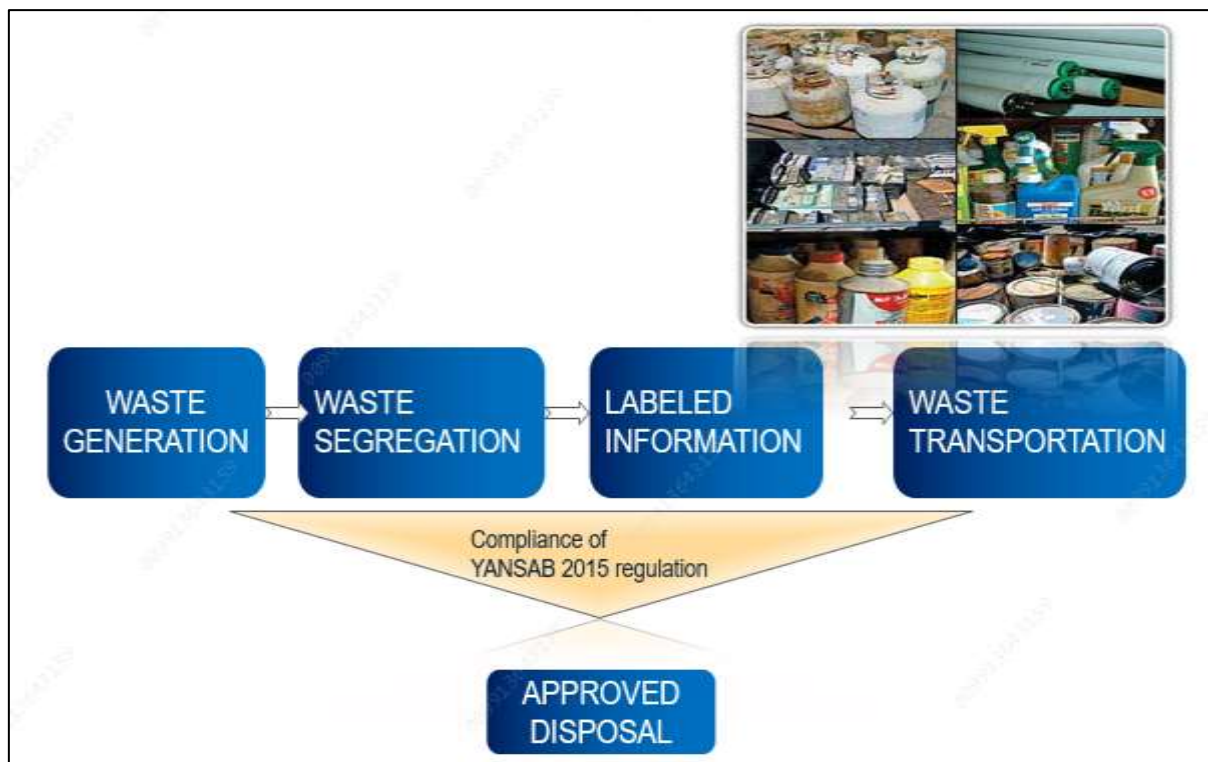
These wastes are defined as any solid, liquid, semi-liquid or contained gaseous materials or wastes resulting from industrial operations, provided that they are not hazardous.

3) *Non-hazardous Waste:*

All wastes that are not considered hazardous wastes, including domestic wastes, construction wastes, etc. shall follow the SHEM requirements for nonhazardous wastes. Note that these types of wastes may be subject to separate regulatory requirements, such as the requirement for a specific type of disposal facility (e.g., in KSA, nonhazardous waste must go to a class II landfill and construction and municipal waste may go to a sanitary landfill.)

B. *Expected Result:*

- 100 % compliance with RCER 2010 Waste management regulation requirement.
- Ensure handling, storing and final disposal of hazardous waste in such a way that it has minimal impact on the environment.
- Zero violations from Royal Commission on waste management.
- Zero environmental incidents of Class A, B, and C category related to this management system.



## V. REQUIREMENT

Flow chart of Waste disposal –

Waste Generation → Waste Segregation → Waste handling and Storage → Labelled information → Waste transportation → Disposal.

### A. Waste Handling and Storage at YANSAB

All plants shall make efforts to reduce generation of waste at the source itself and all activities shall apply the following order as a priority in waste prevention and management:

- 1) Prevention or reduction
- 2) Re-use
- 3) Recycling
- 4) Recovery
- 5) Disposal

Individual plant must be classify their wastes as Hazardous and Non Hazardous waste.

5.3- Respective plant shall segregate, label, pack, and store the waste in appropriate container or bag initially in the unit generated area and then notify the EHSS Section.

YANSAB has constructed Hazardous Waste Storage Yard area with secondary containment near Bagging area and Garage Workshop area. The waste materials will be stored according to their category, content and compatibility.

All containers used to hold hazardous waste materials should be kept closed at all times. The drums should be properly covered with tightly fitted lids, properly identified and placed (four only) on a pallet. The pallets (with the filled, sealed drums) are kept in a separate area. No empty drums are to be kept in this separate area.

Drums shall be stacked on pallets or skids with no more than two (2) drums high. Proper care should be exercised in handling all hazardous substances to avoid container damage and accidental discharge and spillage.

YANSAB concerned plant shall notify the EHS Section about the generated waste by sending the “Hazardous Waste Generation/Disposal Form” as per attachment “IR-SHEM-13.02” along with following Information.

- The type and name of chemical waste
- Material Safety Data Sheet (MSDS) of the generated chemicals that make up the waste.
- Quantity of generated Waste.

On receipt of the waste notification, Environment technician shall inspect the waste and return the “Hazardous Waste Generation/Disposal Form” with his comments.

Environment technician shall give filled labels to the waste generating Unit and ensure that the generating department has labeled drums/bags/container properly.

After receiving confirmation from the EHS Section waste generator shall weigh the waste in presence of environment technician and then waste generator shall send the waste to waste storage area.

### B. Waste Disposal from YANSAB

Wastes generated at YANSAB shall not be transported outside the boundary of the Industrial City for storage or disposal except for recycle / reuse, recovery or treatment as approved by Royal Commission-EPCD.

Wastes generated at YANSAB shall be disposed to Royal Commission-EPCD approved waste disposal facility by complying with the waste manifest regulations.

YANSAB shall take approval from Royal Commission-EPCD for disposing waste to Royal Commission-EPCD approved waste disposal facility and make a contract with a Royal Commission-EPCD approved Waste Management Company in order to dispose the hazardous wastes as & when required.

YANSAB Shall dispose all the wastes generated at the facility to the Waste Disposal facility within one hundred and eighty (180) days of the waste being generated and shall

receive a completed copy of the manifest within thirty (30) days from the disposal facility after receiving and acceptance of the waste

YANSAB shall ensure that all wastes are placed in waste compatible containers that properly contain the waste to prevent any spillage or leakage during transportation

YANSAB shall, prior to transporting the waste, obtain the signature of the waste transporter on the manifest acknowledging acceptance of the waste by the transporter – GEMS (Global Environmental Management system) contractor.

All records shall be maintained during the activities of waste disposal (Waste manifest, Waste Disposal Certificate after the hazardous waste have been permanently disposed, issued by the waste management company) must be maintained.

YANSAB shall provide to Royal Commission-EPCD and SABIC CEIHD a completed waste audit form as per attachment IR-SHEM-13.02 once every six (6) months, that contain the following information regarding the waste generated:

- Name of YANSAB as generator facility of waste.
- Description of the waste generated.
- Waste classification.
- Quantity of waste generated for the time period in question.
- Dates of disposal.
- Manifest Number

YANSAB shall report incident as per SHEM-10 criteria for any release or spillage of waste material if any.

There is some checklist must be filled by employee of YANSAB. They are,

- 1) Monthly Inspection checklist of Waste storage area. – filled by Safety Officer.
- 2) Monthly Inspection checklist of Waste storage yard. – filled by concern department.
- 3) Internal waste Disposal Manifest form. – filled by concern department and EHSS department of YANSAB.

#### C. Benefits of Hazardous waste management:

To control the waste for segregation, storage, packing, loading and transporting for final disposal.

- 1) Meets Environmental Royal Commission regulations.
- 2) Reduction of environmental hazardous waste incidents.
- 3) Reduction or elimination of waste.

There is some checklist must be filled by employee of YANSAB. They are,

- 1) Monthly Inspection checklist of Waste storage area. – filled by EHSS department.
- 2) Monthly Inspection checklist of Waste storage yard. – filled by Shift Supervisor.
- 3) Internal waste Disposal Manifest form. – filled by concern department and EHSS department of YANSAB.

## VI. WATER MANAGEMENT

Water pollution is the contamination of water sources by substances which impure the water. Impure water unsafe for drinking, cooking, cleaning, swimming and other activities.

Pollutants include chemicals, trash, pesticides, Industrial waste, bacteria, oils.

The discharging of garbage, sewage, and liquid wastes of agricultural lands, households, and factories into the rivers and lakes. The dumping of litter like plastic and glass, and other solid wastes into water bodies. The pollutants like lead, asbestos, petrochemicals, etc.

#### A. Purpose

To ensure that an effective management system is in place to manage all water streams (including, but not limited to process water, potable water, gray water, industrial wastewater, sanitary wastewater, cooling water and storm water) in order to meet all applicable regulatory requirements, and minimize the potential for negative environmental impacts.

#### B. Scope

This Sub-element applies to all activities, products and services of YANSAB that use, manage, withdraw or discharge water (process water, potable water, gray water, industrial wastewater, sanitary wastewater, cooling water and storm water) for their activities, products and services with the potential to impair the quality the environment.

#### C. Definitions

- Grab Sample: Samples taken within a very short period of time to determine the hazardous constituents at a specific time.
- Composite sample: A composite sample is a mixture of individual grabs proportioned according to wastewater flow pattern. Compositing is commonly accomplished by collecting individual samples at regular time intervals.
- YANSAB: Yanbu National Petrochemicals company Ltd.
- BOD; Biochemical Oxygen Demand.
- COD: Chemical Oxygen Demand.
- EA: Element Administrator.
- EDP: Environmental Discharge Protocol.
- EHSS: Environment, Health, Safety & Security.
- EPO: Environmental Permit to Operate.
- ETP: Effluent Treatment Plant
- YANSAB - SHEM: YANSAB safety, security, health and environment management system.
- IWTP: Industrial Waste Treatment Plant.
- LIMS: Laboratory Information Management System
- PSM: Plant Shift Manager.
- RCER: Royal Commission Environmental Regulation
- RC: Royal Commission.
- TOC: Total Organic Carbon.
- TSS: Total Suspended Solids.
- TDS: Total Dissolved Solids.
- SEA: Sub Element Administrator.

#### D. Expected Results

- 1) Decrease in SHEM 10 incidents related to discharge of Wastewater to RC IWTP, storm water or contamination of potable water or receiving water body, surface drains and treatment plants.

- 2) Sampling, monitoring and reporting is executed as per the applicable local requirements and legislation on water (RCER & EPO)
- 3) An increase in water conservation by monitoring annual consumption.

#### E. Procedures

5.3- YANSAB developed EDP (Environmental Discharge Protocol) refer to attachment -SHEM-13.04, which enable intercommunication control among departments before discharging of industrial waste water from different YANSAB facilities to ETP with full compliance to RC regulations after final disposal to IWTP to avoid contaminants in such concentration and of such volume as to adversely affect, or cause nuisance to, public health or welfare, animal or aquatic life, vegetation or property. Shift supervisor shall not discharge industrial wastewater to the Wastewater system if it exceeds the wastewater pretreatment standards at the point of discharge as per YANSAB EPO.

5.4- YANSAB constructed new effluent treatment plant (ETP-III) which will work in parallel with existing plant (ETP-II) as a pretreatment system at the facility to ensure that the wastewater meets the discharge standards. As per RC regulation YANSAB facility shall have storage capacity to retain three days (72 hours) of industrial wastewater production. Wastewater retained in the ponds shall be regularly discharged so that the ponds are normally kept empty to provide containment for emergencies and to minimize fugitive emissions.

5.5- Utilities Operations shift supervisor shall submit report summarizing the industrial waste water discharge data for affected source, at the end of the each month within first five days of the next month to the EHS Section. The report shall include, as a minimum, the following information:

- 1) Monitoring period.
- 2) Name of the facility
- 3) Date and time of sample collection
- 4) Flow rate of the industrial wastewater discharge as specified in the EPO.
- 5) Actual Monitoring data along with results of the industrial waste water analysis for the parameters as specified in the EPO.
- 6) The number, frequency and justification for the non-compliance Events
- 7) An explanation for the occasions when the waste water discharge standards were exceeded and the corrective action taken to prevent recurrence.
- 8) Occurrences and duration of any startups, shutdowns or malfunctions in the operation of the affected waste water discharge source or analysis device.
- 9) Periods when the waste water monitoring system was inoperative.
- 10) Actions taken to mitigate the non-compliance events.

5.6- EHS Engineer shall review and submit waste water discharge report received from Utilities Department, electronically to the Royal Commission-EPCD and SABIC EHSS every month in accordance with RCER 2010 requirements (unless otherwise specified in the EPO or other approvals from Royal Commission-EPCD).

5.7- Instrument Supervisor shall maintain a flow meter and flow totalizer which installed at discharge of treated industrial wastewater from ETP-II&III to MARAFIQ as per SHEM-03.02.

5.8- Shift supervisor shall record the daily average flow for treated industrial wastewater to MARAFIQ IWTP. (Untreated industrial wastewater is not applicable in YANSAB).

5.9- Instrument Supervisor shall maintain an auto-sampling system (24-hour composite sample) which installed within ETP-III facility for treated waste water at point of discharge to IWTP, MARAFIQ per SHEM-03.02.

5.10- ETP field operator shall collect Grab samples for specific parameters as per SHEM-13.04 & IR-SHEM-13.04 (SMP analysis & frequency) which filled according the EPO or other requirements from Royal Commission, and the DCS operator to communicate the LIMS results to shift supervisor and he shall act according EDP (Environmental Discharge Protocol) as attachment -SHEM-13.04.

5.11- Field operators at PTA, Aromatics, Acetic acid, polyester & U&O shall collect Grab samples for specific parameters as per SHEM-13.04 & SHEM-13.04 (SMP analysis & frequency) before sending to ETP plant.

5.12- Sr. Process Engineers (PTA, Aromatics, Polyester, and Acetic acid) shall do the necessary troubleshooting to maintain the design quality specifications of waste water streams influents to ETP as per SHEM-13.04.

5.13- Sr. Process Engineer shall do the necessary troubleshooting to maintain RC regulation for final treated water discharge to MARAFIQ as per SHEM-13.04.

5.14- A sampling plan is a scheme or design to locate appropriate sampling points so as to facilitate collection of suitable representative samples of the wastewater. Sample monitoring points for YANSAB different facilities (PTA, Aromatics, polyester, Acetic acid and Utilities & offsite) generating industrial waste water to ETP are shown in attachment # SHEM-13.04.

## VII. SAMPLING

### A. Sampling Plans

- 5.14- The sampling plans shall be prepared & developed by:
- Sr. Process Engineers (PTA, Aromatics, polyester, Acetic acid) for influent streams to ETP as per-SHEM-13.04 & SHEM-13.04.
  - Sr. Process Engineer for effluent discharge to MARAFIQ as per SHEM-13.0& SHEM-13.04.

Development of sampling plans requires the following documentation / information:

- 1) Background information about the site.
- 2) Wastewater storage / discharge location and current situation.
- 3) Types of samples needed.

### B. Sample Handling and Preservation

5.15- The sampling system is rinsed prior to collecting a sample to minimize the potential for cross contamination. The samples are collected in various containers for different analysis at different timings as per attachment # SHEM-13.04. All the sample containers are labeled prior to sampling.

Sample preservation procedures, container materials, and maximum allowable holding times for various industrial wastewater parameters has given in SHEM-13.04.

### C. Sample Collection

5.16- Area field operator is responsible to collect the following samples as per sampling plan:

#### 1) Routine Sampling:

- 1) Open the sampling tap and let the water flow for couple of minutes in the drain or collect in a container for disposal.
- 2) Use recommended gloves throughout sampling procedure and new gloves for each sampling point
- 3) Collect sample in appropriate sample container with preservatives.
- 4) Rinse sample containers, without preservatives, with sample water before final collection.
- 5) For volatile analyses, add preservative to sample vial if required. After capping, invert vial, gently tap and look for air bubbles. If bubbles are present, un-cap vial, add more water and repeat procedure.
- 6) Label each sample container with the details required for sample identification.
- 7) Put all the samples containers at the sample rack.
- 8) No need to create LIMS request as Lab Department already aware on the required analysis as per SHEM-13.04F in case for ETP, and as per IR-SHEM-13.04L in case of different waste water streams feeding ETP.
- 9) For ETP, field operator at ETP area shall collect the required routine samples as per SHEM-13.04, ETP sample schedule and send it to LAB. DCS operator will communicate the LIMS results.
- 10) For different waste water streams feeding ETP, field operator at these units ( PET, Aromatics, Acetic acid, PET-I/II , U&O) shall collect the required routine samples as per SHEM-13.04 and send it to LAB. DCS operator will communicate the LIMS results.

#### 2) Special sampling:

- 1) Open the sampling tap and let the water flow for couple of minutes in the drain or collect in a container for disposal.
- 2) Use recommended gloves throughout sampling procedure and new gloves for each sampling point.
- 3) Collect sample in appropriate sample container with preservatives.
- 4) Rinse sample containers, without preservatives, with sample water before final collection.
- 5) For volatile analyses add preservative to sample vial if required. After capping, invert vial, gently tap and look for air bubbles. If bubbles are present, un-cap vial, add more water and repeat procedure.
- 6) Label each sample container with the details required for sample identification.
- 7) Put all the samples containers at the sample rack. DCS operator is responsible to create a request via LIMS (Laboratory Information Management System) for the required analysis.
- 8) For ETP, field operator at ETP area shall collect the required routine samples as per SHEM-13.04, ETP

sample schedule and send it to LAB. DCS operator will communicate the LIMS results.

- 9) For different waste water streams feeding ETP, field operator at these units (PTA, Aromatics, Acetic acid, PET-I/II, U&O) shall collect the required routine samples as per SHEM-13.04 and send it to LAB. DCS operator will communicate the LIMS results.

#### D. Composite Sampling:

24 hours Auto sampler is provided at ETP-III plant and shall be used for composite sample collection. Mixing of manual samples can be considered for composite sample, if accepted or recommended by RC. Collection of composite samples shall be considered in determining an average characteristic of the wastewater.

- 1) Every day, at 00:00 hours , ETP field operator has to collect a sample from the Auto sampler located at ETP-III and send it to IR LAB for pH, COD, TDS,TOC,BOD,TSS, Oil & grease.
- 2) Once the result is ready from LIMS , UTY DCS operator shall fill a “Daily Auto sampler monitoring report” (SHEM-13.04) located at YANSAB portal and maintain a record on daily basis in case required by Royal Commission or MARAFIQ.
- 3) DCS operator will communicate the LIMS results.

#### E. Sample Transportation

A chain-of-custody record is developed for each sample. A typical custody record documents the information such as sample owner, personnel to whom custody handed over, type of sample container, sample volume, type of preservative used, sampling location, sample number, date & time of sampling, analyses to be performed, special instructions (if any) etc . The samples are transported with the custody record to the laboratory. All the liquid levels should be marked on the sample containers to ensure no spillage of samples during transport.

#### F. Equipment List

##### 1) Grab Sampling (Manual routine/special sampling):

- 1) Bucket with a rope to collect sample from channel or manhole.
- 2) Sample bottles.
- 3) Icebox with ice.
- 4) Glass vials for organic samples.
- 5) A request via LIMS ( only for special samples)
- 6) Indelible marker.

##### 2) Composite Sampling (Auto Sampling system with 24-hr composite sample collection):

- 1) New sample bottle to collect sample from Auto sampler at ETP-III.
- 2) Glass vials for organic samples.
- 3) Indelible marker.

#### G. Sample Handling

All the sample containers must be secured and must be labeled as to identify the sample by area operator. The label shall contain at least the following information:

- 1) Name of YANSAB and location to be put on sample (if samples sent out side for analysis).
- 2) Description of sample.
- 3) Date and time of sampling.

- 4) Sample Number.
- 5) Name of Sampling Personnel
- 6) Type of preservative, if any.
- 7) Analytical Requirements.


YANSAB laboratory shall develop & follow up a chain of custody procedures via LIMS for tracking the samples. (SHEM-08.02).

#### H. Industrial Waste Water Sampling

##### 1) Benefits of Industrial Waste Water Sampling:

- Improving of waste water monitoring process.
- Reduce EHSS incidents with root cause related to Industrial Waste Water Sampling activities.
- Reduce EHSS near-miss / violation related to Industrial Waste Water activities.
- A Sampling plan shall be developed to collect the representative samples from various locations and frequency.

- The samples are collected in various containers according to their behavior for different analysis.
- Sampling shall be carried out by either manual (Grab sampling) or by Composite sampling (Auto Sampler)
- Fill all mandatory requirements in the field record forms
- Analyze the samples
- Send the wastewater to MARAFIQ plant facility at RC (Royal Commission) if it is meeting the standards.
- If the ETP does not meet the standard, it should be held at the company until the required treatment is made (recycle)
- Discharging of waste water outside the premises shall ensure compliance with the Royal Commission waste water specifications.
- Mixing or diluting the wastewater with sea water, fire water or potable water is not allowed without prior authorization from the Royal Commission.

Parameter	
pH	
Acidity	
Alkalinity	
Heavy Metals	
TOC	
Nitrate	
Organic components	
Ammonia	
Nitrate-nitrite	
Nitrite	
Phosphorous, total	
Oil and Grease	
DO	
BOD	
COD	
Phenols	

#### I. Prevention of Water pollution:

- Use less Plastic
- Reuse Items
- Recyclable Options
- Do Not Dispose of Oils in the Sink
- Cleaning Chemicals
- Handle Toxic Chemicals Properly
- Shop to Stop Water Pollution
- Do Not Throw Away Medicines

#### J. Prevention of Water pollution:

- Use less Plastic.
- Reuse Items like plastic bottles, Plastic bags etc.
- Recyclable Options.
- Do Not Dispose of Oils in the Sink.

- Cleaning Chemicals.
- Handle Toxic Chemicals Properly.
- Do not contaminate the water of river, ponds, lake or ocean.
- Do not throw any medical waste or residue in pond or river.

### VIII. SOIL AND GROUND WATER MANAGEMENT

#### A. Purpose

To ensure that a system is in place to assess and protect the soil and ground water quality in order to reduce its harmful impacts on the environment.

#### B. Scope

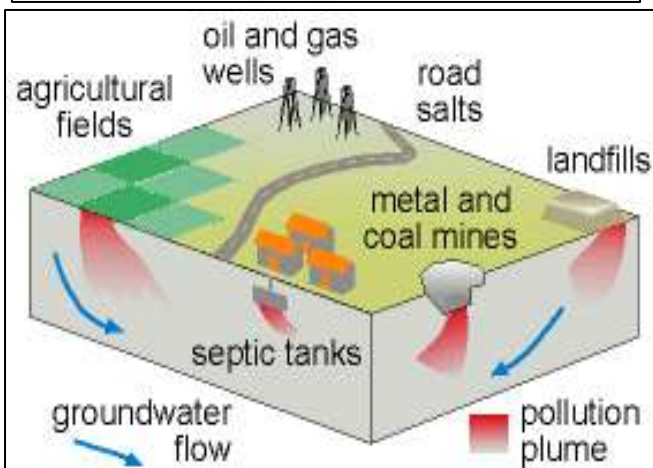
To cover the areas within YANSAB Complex where hazardous chemicals and /or metallic/ nonmetallic minerals

are used, manufactured, stored and annual monitoring of all (24 numbers) ground water monitoring wells.



### C. Expected Results

- Ensure monitoring and reporting of ground water annually and soil monitoring as per applicable Royal Commission Environmental Regulations 2015 requirements.
- Zero number of violations received from Royal Commission with respect to Soil and Ground Water Management.
- In case of contamination of soil and/or groundwater, corrective action is taken to cleanup, mitigate or control impacts to soil and/or groundwater.
- Protection of soil and groundwater from the impact of production plants and supporting department activities to the maximum extent.



### D. Requirements

5.1- YANSAB shall not discharge to the receiving waters (e.g., Red Sea), Harbor receiving waters, Cooling Water Canal, surface water drainage channels, any natural water-body or on open ground any extracted groundwater which contains contaminants in concentrations exceeding the limits in accordance with Royal Commission Environmental Regulations (RCER) 2010, without prior authorization. (For KSA, Refer Attachment IR-SHEM-13.05A: Water Quality Standards for Direct Discharge for Jubail and Yanbu city Facilities of KSA).

5.2- YANSAB is handling hazardous materials in quantities exceeding 5000 kg at any one time has installed Twenty Four (24) permanent groundwater monitoring wells against the minimum requirement of minimum three (03) wells. These wells have been located so that representative samples of the groundwater that may be impacted by the proposed facility operations can be obtained.

5.3- YANSAB facility with groundwater monitoring boreholes installed shall monitor the groundwater quality annually and report the results to the Royal Commission and SABIC CEIHD.



**E. Ground Water Sampling**

5.4- Sampling preparation: the sampling system is rinsed to avoid any contamination. The samples are collected in various containers for different analysis. All the containers are labeled prior to sampling. Sample are preserved and stored and then immediately and as soon as possible to minimize changes in the chemical composition prior to SABIC CEIHD laboratory analysis.

**F. Sample Handling**

5.5.1- All the samples should be properly preserved by following the procedures mentioned in Attachment IR-SHEM-13.05: Guidelines for Monitoring of Ground Water. Type of containers and preservatives for samples has given in SHEM-13.05.

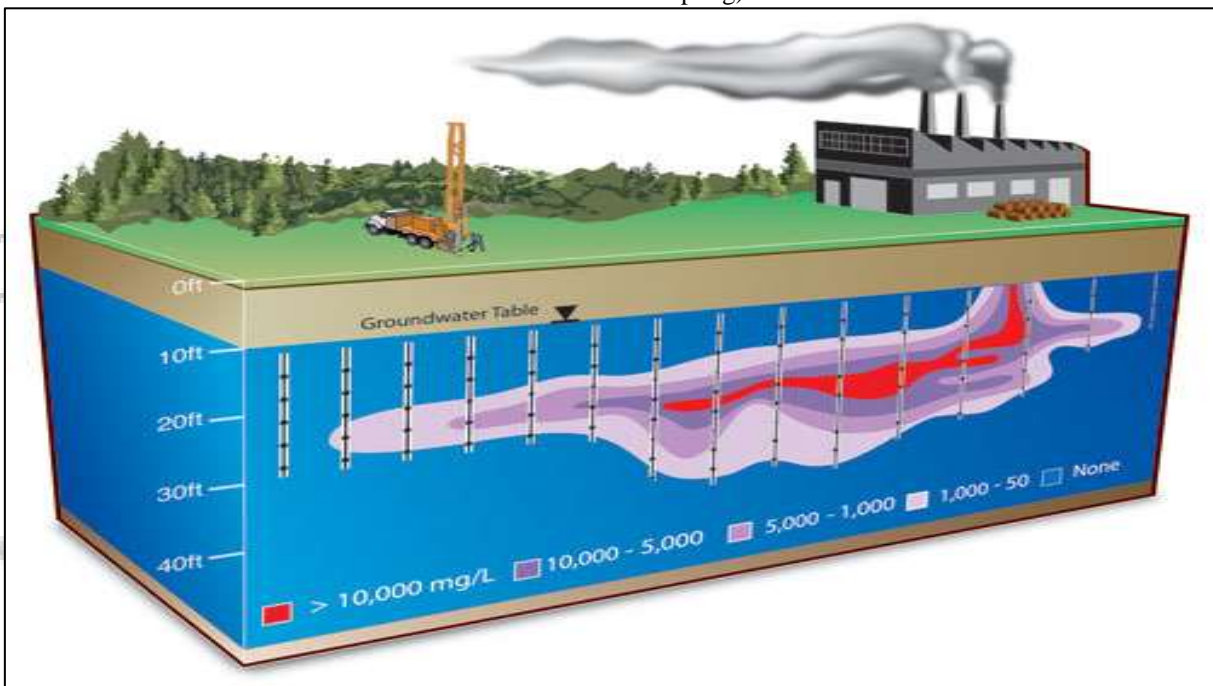
5.5.2- A chain-of-custody record is developed for each sample. All the sample containers must be secured and

must be labeled as to identify the sample. The label shall contain at least the following information:

- 1) Name and Location of Ibn Rushd.
- 2) Description of sample.
- 3) Date and time of sampling.
- 4) Sample Number.
- 5) Name of Sampling Personnel.
- 6) Type of preservative, if any.
- 7) Analytical Requirements.
- 8) Special instructions (if any), etc.

5.6- The samples are transported with the custody record to the laboratory in an icebox, for analysis. All the liquid levels should be marked on the sample containers to ensure no spillage of samples during transport.

5.7- All information on field sampling shall be recorded in the Field Record Form (Refer Attachment SHEM-13.05: Field Record Form for Ground Water Sampling).



**G. Ground Water Sampling**

- A Sampling plan shall be developed to collect the representative ground water samples from ground water sampling wells, located at twenty four locations in the premise to meet RC requirements and Specifications.
- There are two types of sampling- Baseline Sampling- in the early stages of plant areas; On-going Sampling - Yearly and up-to-date continuous monitoring to assess changes in ground water quality around the YANSAB premises.
- The samples are collected in various containers according to their behavior for different analysis and preserved by adding preservatives.
- Sampling shall be carried out by purging of the well to remove the stagnant water.
- Fill all mandatory requirements in the field record forms.
- Sample must be secured and labeled for identification purposes.

- Analyze the sample and report to RC with respect to RC standards.

Parameter
pH
Heavy Metals
TOC
Nitrate
Conductance
Ammonia
Oil and Grease
DO
Organic components

**H. Benefits of Ground Water Sampling:**

- Comply with Royal Commission (RC) regulations.
- Identify ground water contamination risk area.
- Reduce EHSS incidents with root cause related to ground water contamination.
- Reduce EHSS near-miss / violation related to ground water contamination.

IX. ENVIRONMENTAL MANAGEMENT SYSTEM

ISO (International Organization for Standardization) is the world's largest developer and publisher of International Standards.

A. ISO 14001

- ISO 14001 is a series of International Standards on Environmental Management.
- It provides a framework for the progress of an environmental management system.
- It provides a framework for a supporting audit program.
- The main thrust for its development came as a result of the Rio Summit on the Environment held in 1992.
- ISO 14001 is the corner stone standard of the ISO 14000 series. It specifies a framework of control for an

Environmental Management System against which an organization can be certified by a third party.

- ISO 14001 based on EMS (Environmental Management System) Policy Manual.
- The goal is for organizations to control the impacts that their activities, products and services have on the environment.

1) ISO 14001 consists of:

- General Requirements
- Environmental Policy
- Planning
- Implementation and operation
- Checking and corrective action
- Management review

Formation	23 February 1947
Type النوع	NGO
Purpose/focus	International standardization
Headquarters	Geneva, Switzerland
Membership	163 members
Official languages	English, French, and Russian



Members



B. To whom do the standards apply -

- Standard is Voluntary
- Large and Small Business & Industry anywhere in the world
- Products or Service Sectors (Garments, Hospitals, Hotels, etc.)
- Applicable to all types of organizations (Private , Public, or governmental )

C. Why ISO 14001 useful –

- Implement, Maintain and Improve an Environmental Management System
- Minimize harmful effects on the environment caused by its activities
- Achieve continual improvement of its environmental performance
- Assure itself of its conformance with its own stated environmental policy

- Ensure compliance with environmental laws and regulations.
- Seek certification of its environmental management system by an external third party organization
- Marketing Tool: Shows customers, shareholders, vendors, etc. that we are a “Good Corporate Citizen”
- Increase access to new customers and business partners
- Demonstrate an innovative and forward thinking approach to customers and prospective employees
- Better manage our environmental risks, now and in the future
- Enhance our Business growth and reputation.

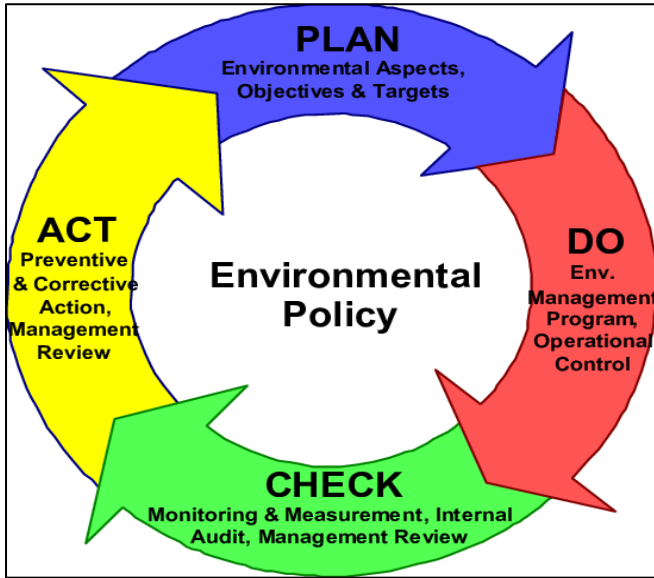
D. P-D-C-A cycle for EMS:

The plan-do-check-act (PDCA) cycle is the operating principle behind all ISO standards, including the ISO 14001. This cycle provides a constant process that allows organizations to achieve ongoing improvement.

PDCA (plan-do-check-act or plan-do-check-adjust) is an iterative four-step management method used in business for the control and continual improvement of processes and products.

*E. Plan-do-check-act Procedure:*

- Plan: Recognize an opportunity and plan a change.
- Do: Test the change. Carry out a small-scale study.
- Check: Review the test, analyze the results, and identify what you've learned.
- Act: Take action based on what you learned in the study step.



*F. ISO 14001:2015: EMS (Environmental management system) –*

- 1) Requirement of Environmental management system are policy, Environmental aspect, Environmental Impact and Environmental control procedure.
- 2) Ensure compliance of Environmental rules and regulations.
- 3) It provides the outline for the progress of Environmental management system.
- 4) It provides outline for the support of Audit program.

**X. CONCLUSION**

The Industrial environment in Yanbu and Jubail regions of Saudi Arabia have always co-existed in an integrated fashion through transparency and accountability with increasing use of cleaner and energy efficient technology, reducing potential environmental impacts, influencing positively on local community and upholding the highest ethical standards.

A system is in place to track air emissions, hazardous waste, and wastewater sampling etc. to evaluate pollution prevention steps consistent with policy, regulatory requirements, and business objectives.

Identifying, addressing, and tracking the resulted corrective actions for continuous improvement for Environment systems.

To secure and maintain wellbeing of the employees, contractors, visitors and property in addition to maintaining a good image of YANSAB.

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