KINGDOM OF SAUDI ARABIA

الهيئة الملكية للجبيل وينبع
Royal Commission for Jubail & Yanbu

ROYAL COMMISSION ENVIRONMENTAL REGULATIONS

2025

Volume II

Environmental Permits and Licenses Program

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF UNITS AND ABBREVIATIONS

APHA	:	American Public Health Association
AWWA	:	American Water Works Association
COD	:	Chemical Oxygen Demand
BOD	:	Biochemical Oxygen Demand
BTU	:	British thermal unit
C	:	Degrees Centigrade
d	:	Day
dBA	:	A-weight sound pressure level in decibels
DRE	:	Destruction and Removal Efficiency
dscm	:	Dry standard cubic meter
ECRA	:	Electricity & Co-generation Regulatory Authority
EIA	:	Environmental Impact Assessment
EPC	:	Environmental Permit to Construct
EPO	:	Environmental Permit to Operate
ESQ	:	Environmental Screening Questionnaire
EERP	:	Environmental Emergency Response Plan
h	:	Hour
H_t	:	Net heating value of a gas combusted in a flare
J	:	Joule (equivalent to 0.239 calories)
kg	:	Kilogram
kJ	:	Kilojoules (equivalent to 1000 joules)
kPa	:	Kilo Pascals
l	:	Liter
L_{10}	:	Noise level in decibels exceeded 10% of the time
lb	:	Pound
lb/MBTU	:	Pound per million British Thermal Units
min	:	Minute
ml	:	Milliliter
mm	:	Millimeter
MPN	:	Most Probable Number
MEWA	:	Ministry of Environment, Water and Agriculture
MW	:	Megawatt (equivalent to 10^6 watts of electricity)
MWAN	:	National Center for Waste Management
NCEC	:	National Centre for Environmental Compliance
NMHC	:	Non- methane hydrocarbon
NMOC	:	Non-methane organic carbon
NTU	:	Nephelometric Turbidity Unit
Pa	:	Pascal, a unit of pressure expressed as Nm^{-2}
pH	:	$-\log_{10}$ (hydrogen ion concentration moles/l)
PAP	:	Permit Application Package
PCB	:	Polychlorinated Biphenyl
POHC	:	Principal Organic Hazardous Constituent
POM	:	Polycyclic Organic Matter
ppm	:	Parts per million (mass)
ppmv	:	Parts per million volume
ppt	:	Parts per thousand
psi	:	Pounds per square inch (gauge)
psia	:	Pounds per square inch (absolute)
RCC	:	RC City
s	:	Second
SAR	:	Sodium Adsorption ratio unit
scm	:	Standard cubic meter
SOCMI	:	Synthetic Organic Chemical Manufacturing Industries
t	:	Tonne (equivalent to 1000 kilograms)

TCLP	:	Toxicity Characteristic Leaching Procedure
TDS	:	Total Dissolved Solids
TKN	:	Total Kjeldahl Nitrogen
TOC	:	Total Organic Carbon
TPH	:	Total Petroleum Hydrocarbons
TSS	:	Total Suspended Solids
UST	:	Underground Storage Tank
Watt	:	Unit of power (equivalent to one joule per second)
WEF	:	Water Environment Federation
WMF	:	Waste Management Facility
WRF	:	Waste Recycling Facility

GLOSSARY

Abatement	Reduction or lessening (of pollution) or doing away with (a nuisance) by legislative or technical means, or both.
Acid gas flare	A flare used exclusively for the incineration of hydrogen sulphide and other acidic gases derived from natural gas sweetening processes.
Ambient air	Air outside a facility boundary.
Appurtenance	An adjunct or appendage which is an integral part of a tank, unit or apparatus.
BAT	Best Available Techniques (BAT) is the application at facilities of the most effective and advanced production processes, methods/ technologies or operational practices to prevent and, where that is not practicable, to reduce emissions or discharges and other impacts to the environment as a whole. BAT must as a minimum achieve emission or discharge standards in these regulations taking into account energy, environmental and economic impacts and other costs to the facility.
BIF	Boiler or Industrial Furnace that burns liquid or solid hazardous materials other than fossil fuels.
By-Product	A substance or object generated as an integral part of the production process, the primary objective of which is not the production of that item. Use of the substance shall be certain i. Without any further processing. ii. To be used as raw material to produce new product iii. Material stored for more than 180 days shall be considered as waste unless authorized by RC.
CAS Number	CAS (Chemical Abstracts Service) Registry Number.
Central Wastewater Treatment Facility	The Industrial Wastewater Treatment Plant (IWTP) or the city Sanitary Wastewater Treatment Plant (SWTP) which receives wastewater from different facilities/sources for final treatment.
Chlorine Residual Combined (Available)	The residual consisting of chlorine that is combined with ammonia, nitrogen, or nitrogenous compounds (Chloramines).
Chlorine Residual Free (Available)	The residual consisting of hypochlorites ions (ocl-), hypochlorous acid (hocl) or a combination of the two. These are the most effective in killing bacteria.
Chlorine Residual Total	The total amount of chlorine present in a sample. This is the sum of the free chlorine residual and the combined available chlorine residual.
Colored Emissions	Colored emissions referring to the visibility resulting from homogenized gaseous pollutant(s). Opacity standard is not applicable for colored emissions.
Component (VOC service)	Pumps, valves, compressors and pressure relief valves which are in contact with streams containing >10 wt.% VOC.
Component (organic HAP service)	Flanges, connectors, pumps, valves, compressors and pressure relief valves which are in contact with streams containing >5 wt.% organic HAP.
Connector	Flanged, screwed, welded, or other joined fittings used to connect two pipe lines or a pipe line and a piece of equipment.
Contaminated Sites	Any site within RCCs that exceeds the soil quality standards provided in these regulations Table 6 or the RC approved baseline data is considered a contaminated site. Baseline Data Collection Criteria: Baseline study as agreed with the regulator shall include parameters listed in Table 6 and any other chemicals not listed in Table 6 and are being used in the facility in liquid or solid state shall be included in establishing baseline data.

GLOSSARY (Continued)

Day	Refers to working day.
Dredged Material	Material excavated from the marine waters, including rock, gravel, sand, silt/clay, and mud.
Dredging	All underwater activities pertaining to disturbing the sediments/earth moving and the process of removing sediments beneath the surface waters by mechanical or hydraulic means.
DRE	Standard which verifies that a combustion unit is destroying the organic components found in hazardous waste.
Duct burner	A device that combusts fuel and that is placed in the exhaust duct from another source, such as a stationary gas turbine, internal combustion engine, kiln, etc., to allow the firing of additional fuel to heat the exhaust gases before the exhaust gases enter a heat recovery steam generating unit.
EIA 3rd Party	Class A: Approved by RC to conduct EIA studies for First, Second & Third Category facilities. Class B: Approved by RC to conduct EIA studies for First and Second category facilities. Class C: Approved by RC to conduct EIA studies for First category facilities only.
Emission	The process of discharging into the atmosphere or the material being discharged.
Emission inventory	The systematic compilation, either by measurement or estimation, of detailed information on pollutant emissions in a given area or facility.
Emission standard	The amount of pollutant permitted to be discharged from a pollutant source.
Existing facility	Any facility which has received environmental approval from the Royal Commission before the effective date of these Regulations or a facility that is contracted for prior to the effective date of these Regulations provided that RC is informed.
Facility	Any apparatus, installation, equipment or grouping thereof which is subject to an applicable standard or regulation; facility, facility operator and operator are synonyms. Entities receiving/exporting materials/chemicals are also considered as facility.
Facility Closure	Facility closure/decommissioning is defined as the closure of land lease agreement or surrender of EPO.
Flare	The flame produced by the disposal, in an arrangement of piping and a burner, of surplus or residual combustible gases.
Fossil fuel	Coal, petroleum, natural gas and any form of solid, liquid or gaseous fuel derived from such materials for the purpose of creating useful heat.
Fugitive emission	Any gaseous or particulate contaminant entering the atmosphere which could not reasonably pass through a stack, chimney vent, or other functionally equivalent opening designed to direct or control its flow.
Generator	Any operator of a facility whose process produces hazardous waste as defined in these Regulations or whose act first causes the hazardous waste to become subject to regulation.
Guideline	Guideline values are for information, reference and study purposes
Habitat	An area occupied by an organism, population, or community that includes living and non-living elements with specific characteristics including the basic needs for shelter and food.
HAP	Hazardous air pollutant as specified in Table 2C.
Inhalable particulate	Any substance dispersed in the atmosphere in the form of individual solid or liquid particles each of which is less than 10 microns in diameter.

Impervious Barrier	Wherever liner requirement is mentioned for secondary containment in these regulations, it refers to an impervious barrier of HDPE liner of 2.0 mm thickness for new installations and 1.5 mm for existing facilities. An alternative to HDPE liner may be approved by RC provided that it fulfils following requirements: (a) Synthetic material or another material that has a permeability rate to the regulated substance stored of 1×10-7 cm/sec or less, or (b) For concrete structures with synthetic coatings, a material that: i. Meets the design and construction standards of Design Considerations for Environmental Engineering Concrete Structures, ACI 350.4R-04, 2004 Edition, and Control of Cracking in Concrete Structures, ACI 224R-01, (Reapproved 2008), and ii. Is applied to the concrete in accordance with Design, Installation, and Maintenance of Coating Systems for Concrete Used in Secondary Containment, SSPC-TU 2/NACE 6G197, Publication No. 97-04/Item No. 24193, February 1997.
Land Farming	Land farming, also known as land treatment or land application, is an above-ground remediation technology for sludge material generated from petroleum industries which will degrade the hydrocarbon content by bio-remediation process. This process involves spreading the oily sludge in a thin layer on the loose soil of the ground and also application of the required nutrients and moisture and providing oxygen by ploughing the soil regularly.
Leachate	Any liquid, including any suspended components in the liquid that has percolated through or drained from solid waste.
Major upset	An unscheduled occurrence or excursion of a process or operation that results in an emission that contravenes the regulations or standards and is beyond immediate control, or a release that is initiated to protect life in immediate or adjacent areas.
Modification	Any physical change to, or change in the method of, an existing facility which increases the unit capacity or contribution to pollution emitted into the atmosphere OR results in an impact to the environment not previously occurring.
Modified facility	Any facility which is subject to modification as follows: a. Production increases greater than 10% b. 10% increase in emissions or discharges from a facility c. New pollutants are emitted or discharged.
New facility	Any new facility/ project or plant
Normal Conditions	25˚C and 760 mmHg (for ambient standards), 20˚C and 760 mmHg (for source standards)
NOx	Oxides of nitrogen, representing nitric oxide and nitrogen dioxide.
Nuisance	An act which causes material inconvenience, discomfort or harm and is persistent and likely to re-occur.
Opacity	The degree to which an emission of air contaminants obstructs the transmission of light expressed as a percent of light obstructed as per EPA Method 21.
Operator	Any entity who operates or controls a facility at a given location to whom decisive economic power over the technical functioning of the facility has been delegated.
Point source	An individual air emission / pollutant source originating from a specific location.
POHC	Selected “Principal Organic Hazardous Constituent” (POHC) which are high in concentration and difficult to burn, that are monitored to ensure its destruction and removal efficiency in a hazardous waste combustion unit.
POM	Polycyclic organic matter is a broad class of compounds that includes the Polycyclic Aromatic Hydrocarbon Compounds (PAHs), of which are formed primarily from combustion and are present in the atmosphere in particulate form.
Potable Water System	All facilities, including the desalination plants, groundwater abstraction systems and blending plants, producing water for the potable water network and the potable water storage and distribution systems connecting to these facilities to the end users.

GLOSSARY (Continued)

Process Commissioning	Commissioning refers to the startup of the plant or unit after it has been designed and installed as per EPC conditions. A commissioning process may be applied not only to new projects but also to existing units and systems subject to expansion, renovation or revamping.
Process construction	Construction in process areas. It excludes geo technical surveys, installation of fencing or construction of non-process facilities.
RATA	Relative Accuracy Test Audit is a test used to determine the CEMS Analyzers' relative accuracy of sulfur dioxide (SO_2), nitrogen oxides (NO_X), and carbon dioxide (CO_2) or oxygen (O_2) concentration measurements, and volumetric flow measurements of the flue gas (known as stack gas flow).
RC City (RCC)	Industrial city under RC Jurisdiction
RCER	Royal commission environmental regulations.
Reconstructed facility	Any facility that is dismantled, damaged or destroyed and is intentionally reconstructed following the original design in the same or different location.
Sanitary wastewater	Sanitary wastewater is the water produced from urban use and defined as the effluent that arises from the usage of potable water for the normal domestic purposes of washing, cooking, cleaning, personal hygiene, sanitation and the preparation of food.
Severe Damage	Damage(s) that has/have significant impacts on the environment of the RC industrial City.
Soil contamination	All the activities/incidences that cause soil to exceed Table 6 or RC approved baseline data.
Soil contamination investigation	Soil Contamination Investigation is the study carried out to identify the activities, services, products, causes, sources etc. leading to soil contamination.
Soil contaminations delineation	The term "soil contaminations delineation" in this regulation means assessment of the horizontal and vertical extent of the contamination.
Soil reclamation/ rehabilitation	The term 'soil reclamation/rehabilitation" in this regulation means "bringing back the soil to its original condition or improving the condition to an acceptable state as per clause 1.5.4 on a case-by-case basis in agreement with RC.
Source	The point of emission or discharge of an air pollutant or effluent.
TEQ	Releases of dioxins and furans are reported in units of toxic equivalence (TEQ) relative to the most toxic type of dioxin, 2,3,7,8-tetrachlorodibenzo-p-dioxin.
Thermal Oxidizer	Thermal oxidizers are employed to destruct gaseous waste streams containing volatile organic compounds (VOCs) and/or organic hazardous air pollutants (HAP). Incinerator is generally used for the combustion of solid and liquid wastes, such as hazardous, medical, municipal, or sewage waste. Any Thermal Oxidizer burning liquid waste shall be considered as incinerators.
Third Party	The "Third Party" contractor is the one who shall be selected on the basis of ability and absence of any conflict of interest.

GLOSSARY (Continued)

First Category Facility	A facility that has negligible or no impact on public health or the environment during construction or operation. First Category facility is typically support industries and commercial establishments.
Second Category Facility	A facility that has potential for moderate impacts to public health or the environment during construction or operation. Second Category facility typically includes secondary industries and some larger support industries.
Third Category Facility	A facility that has significant potential for environmental harm including permanent or irreversible damage to public health or the environment during construction or operation. Third Category facility typically includes primary industries and some larger secondary industries.
True vapour pressure	The vapor pressure of a volatile substance under actual conditions of storage or transfer.
Used oil	Any oil that has been refined from crude oil, or any synthetic oil, that has been used and as a result of such use is contaminated by physical or chemical impurities
Variance stream	A non-cooling water discharge to the seawater cooling system. Any water other than once through cooling water discharge to the seawater cooling system
VOC	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. The following have been determined to have negligible photochemical reactivity, and are not VOCs: • methane; ethane; acetone; cyclic, branched or completely methylated siloxanes; methylene chloride (dichloromethane); perchloroethylene (tetrachloroethylene); 1,1,1-trichloroethane (methyl chloroform); 1,1,2-trichloro-1,2,2-trifluoroethane (CFC-113); trichlorotrifluormethane (CFC-11); dichlorodifluoromethane (CFC-12); chlorodifluoromethane (HCHC-22); trifluoromethane (HFC-23); 1,2-dichloro 1,1,2,2-tetrafluorothane (CFC-114); Chloropentafluoroethane (CFC-115); 1,1,1-trifluoro 2,2-dichloroethane (HCFC-123); 1,1,1,2-tetrafluoroethane (HFC-134a);2-chloro-1,1,1,2-tetrafluoroethane (HCFC-124); 1,1,2,2-tetrafluoroethane (HFC-134); 1,1,1 trifluoroethane (HCFC-143a); 1,1-difluoroethane (HFC-152a); parachlorobenzotrifluoride (PCBTF); 3,3-dichloro-1,1,1,2,2-pentafluoropropane (HCFC-225ca); 1,3-dichloro-1,1,2,2,3-pentafluoropropane (HCFC-225cb); 1,1,1,2,3,4,4,5,5,5-decafluoropentane (HFC 43-10mee); and perfluorocarbon compounds which fall into these classes: • cyclic, branched or linear completely fluorinated • alkanes • cyclic, branched or linear completely fluorinated ethers with no unsaturation • cyclic, branched or linear completely fluorinated tertiary amines with no unsaturation • sulphur containing perfluorocarbons with no unsaturation and with sulphur bonds only to carbon and fluorine.
WMF	Waste Management Facility which stores, treats, disposes of wastes using physical, chemical, thermal, landfilling and other techniques
WRF	Waste Recycling Facility which recovers all recoverable and resalable materials out of wastes before disposing the residual wastes

INTRODUCTION

The Royal Commission for Jubail and Yanbu continually supports the developmental process in the community by providing a healthy and clean environment, and through responsible and wise management of the natural resources of the Kingdom of Saudi Arabia, to achieve sustainable development and maintain the delicate balance and harmony between environmental protection and industrial advancement.

The Volume II is divided into two sections. Section 1 describes the RC policy regarding the "Environmental Permit Program" and the procedures to apply for permits to construct and operate an industrial facility. Section 2 presents the forms used to complete the permit application package.

Further, in this volume, various procedures and guidelines are addressed as given below:

- **Appendix A: Environmental Screening Questionnaire (ESQ)**
- **Appendix B: Best Available Techniques (BAT) Analysis required under Articles 1.1.11 & 1.1.12 of the RCER-2025, Volume I)**
- **Appendix C: Environmental Impact Assessment Guidelines**
- **Appendix D: Environmental Emergency Response Plan (EERP) Guidelines**
- **Appendix E: Groundwater Monitoring Guidelines**
- **Appendix F: Guidelines for Testing of Stacks and Fugitive Emissions**
- **Appendix G: COTINUOUS EMISSION MONITORING SYSTEM (CEMS) GUIDELINES**
- **Appendix H: Guidelines for Installing Auto Sampling System Inside Facility Fence**
- **Appendix I: Guidelines for Asbestos Dismantling, Removal, Transport and Disposal**
- **Appendix J: Guidelines for Noise Measurement**
- **Appendix K: Forms Required to Obtain Approval for:**
  - **i. Stack & Cooling Tower Drift Loss Testing**
  - **ii. Conducting Environmental Impact Assessment**
  - **iii. Fugitive Emissions Testing**
  - **iv. Environmental Laboratory & Noise Testing**
- **Appendix L: GUIDELINES FOR ENVIRONMENTAL SITE ASSESSMENT AND REMEDIATION**
- **Appendix M: Dust Mitigation Plan**
- **Appendix N: Stack/Rata Test Plan**
- **Appendix O: Environmental Management Plan**

SECTION 1

THE ENVIRONMENTAL PERMIT PROGRAM

This section describes the RC policy concerning the “Permit Program” as well as procedures to obtain the Environmental Permits.

1.1 Royal Commission Policy

This Environmental Permit Program (EPP) governs all applications, reviews and approval procedures associated with obtaining the necessary "Environmental Permit to Construct" (EPC) and "Environmental Permit to Operate" (EPO).

The purpose of the permit application package is to provide the background information necessary for Royal Commission to evaluate the environmental impact of the facility, and the environment and the community and issue the required environmental permits.

It is through the implementation of the EPP, RC ensures that industries are complying with all Royal Commission Environmental Regulations (RCER). This program also governs surveillance, inspection, continuous monitoring, environmental impact assessment (EIA), environmental emergency response plan (EERP), best available techniques (BAT) analysis, performance and stack testing as well as auditing plans.

1.2 Categories of Facilities

Facilities are categorized into three different types based on their size, type of activities, raw materials and products, as well as the potential for air emissions, using process water and cooling water, generating wastewater and waste materials and noise during their construction and operation. Such categorization is given below:

- **First Category Facility:** A facility in this category would have negligible or no impact to the environment at any time.
- **Second Category Facility:** A facility in this category would have potentially moderate impacts and may result in relatively moderate harm to the environment.
- **Third Category Facility:** A facility in this category would have the greatest potential for significant adverse environmental impacts including permanent and irreversible damage to the public or the environment during construction and/ or operation.

1.3 Permit Procedure for Industrial Facilities

All facilities are required to submit soft and hard copies of Environmental Screening Questionnaire (ESQ), which is a part of RC's Industrial Site Allocation Request (SAR). A copy of ESQ is included in Appendix A. Based on the criteria developed by the RC for project categorization; the RC will review the ESQ and will determine the category of the facility. A flow chart describing the steps of the RC permitting process is shown in Figure 1.

1.3.1 Issuance of Environmental Permit to Construct

All Facilities

All facilities are required to submit a complete permit application package (PAP) with all applicable forms. Further, all of the relevant engineering data shall be provided based on the proposed technology.

Recommendations resulting from the EIA study (Second & Third Category facilities only) shall be incorporated into the design of the plant, emission control systems, wastewater treatment options, etc. Further, if results of EIA required changes in the design, these changes shall be included in the final design phase. (All drawings and related documents shall be submitted in hard copies in A3 sizes and soft copies(y) in PDF formats only. In addition, the related attachments in PAP shall be clearly identifiable, and the drawings shall highlight the related information.

i. In addition to submitting the completed application package, the applicant is also required to prepare a detailed environmental impact assessment (EIA) report (for (Second & Third Category facilities only), and Environmental Management Plan (EMP) as per Appendix “O” for First Category facilities to evaluate the potential impact of one or more components of the proposed facility on the environment.

   The environmental impact assessment / modeling studies shall be carried out to identify the potential adverse impacts of the proposed facility on the atmospheric conditions, the marine life including coral reefs, ground water or any other area of environment, which is likely to be adversely affected.

   Modeling studies shall consider all the existing topographical, geological and meteorological conditions in air and water quality simulations. These studies will consider normal situation as well as all the possible worst-case scenarios, as these cases will be used to evaluate the maximum possible damage to the environment during such situations. The environmental impact assessment (EIA) report submitted for these facilities, will also suggest what precautionary/ mitigation measures should be taken during such circumstances to minimize the expected damage.

ii. Facilities may also be required to conduct health risk assessment study on a case-by-case basis.

iii. When RC is satisfied that an adequate abatement/control system has been designed for all pollutants generated, along with guarantees that the facility will comply with all environmental regulations, an “Environmental Permit to Construct” will be prepared and sent to the investor.

iv. The Permit to construct will contain a list of special conditions that are required to be carried out during the construction period before commencing operations.

v. Investor will sign a lease with the Royal Commission only after the "Environmental Permit to Construct" (EPC) is issued.

vi. During the construction stage, periodic inspections of the development site will be conducted by RC to ensure compliance with agreed permit stipulations and environmental standards.

vii. The EPC issued to the facility gives authorization for starting construction. This The EPC will expire automatically one day before the effective date of EPO.

viii. If investor decides to change technology /technology supplier (s), RC shall be notified and the PAP shall be updated accordingly.

First Category Facilities

i. In order to fully evaluate the environmental impacts relating to a facility's operations, all first category facilities shall submit Environmental Management Plan prepared in accordance with the guidelines provided in Appendix "O" in addition to the ESQ. RC may request the facility to complete the applicable permit application forms as needed.

ii. Once the facility will demonstrate compliance with all environmental regulations, an "Environmental Permit to Construct" will be issued.

1.3.2 Issuance of Environmental Permit to Operate

i. The facility management shall apply for the issuance of the "Environmental Permit to Operate" (EPO) by submitting an updated permit application package (highlighting the changes, if any) along with the previously submitted EIA and EERP at least 60 days before the planned date of commencing operations and/or expected date of construction completion. EIA and EERP shall be updated if the changes categorize the facility as modified facility pursuant to Clause 1.3.7 of the currently enforced RCER, Volume 1.

ii. Prior to the issuance of the EPO, RC will conduct a site inspection to confirm construction completion, facility readiness and compliance to all permit conditions specified in the Environmental Permit to Construct. If there are no issues preventing its issuance, the EPO will be prepared and sent to the investor.

iii. Start-up operations are not allowed until the Royal Commission issues the Environmental Permit to Operate.

iv. The permit will contain a list of special conditions that are required to be carried out during the operation of the facility.

v. Industrial facilities are required to monitor emissions or waste streams and report results to RC as required by the permit and RCER. RC reserves the right to verify such data through its own sampling and monitoring programs.

vi. The RC shall impose penalties as per the RC Penalty System, if any non-compliance with RCER is observed.

vii. The environmental Permit to Operate is issued for a period of five (5) years for all facilities.

1.4 Permit Procedure for Industrial Facilities not covered by Royal Commission Lease

1.4.1 For some of the industries that might not be covered by Lease Agreement with the Royal Commission, but exist within the Royal Commission boundaries are also required to obtain Environmental Permits.

1.4.2 Categorization of facilities in to respective types, the review of process, submittal requirements etc. are the same as described for industrial facilities above.

1.5 Permit procedures for Commercial Establishments/ Infrastructure Developments

All commercial establishments / infrastructure developments are required to obtain an environmental permit, if the proposed facility has any environmental concerns.

1.6 Renewal of “Environmental Permit to Operate"

1.6.1 Industries are required to submit EPO Renewal Form for renewal of the "Environmental Permit to Operate”, six (6) months before the expiry of the existing permit to operate. Based on the information provided in the EPO Renewal Form, RC may request updated PAP/forms, if deemed necessary. If PAP or selected forms are requested by RC, industries also have to submit a detailed account of all the modifications carried out during the last permit period.

1.6.2 RC will review the application to confirm whether the industrial facility is in compliance with all regulations and stipulated permit conditions. An inspection of the facility shall be carried out.

1.6.3 When RC is satisfied with all of the provided information a renewed “Environmental Permit to Operate” will be prepared.

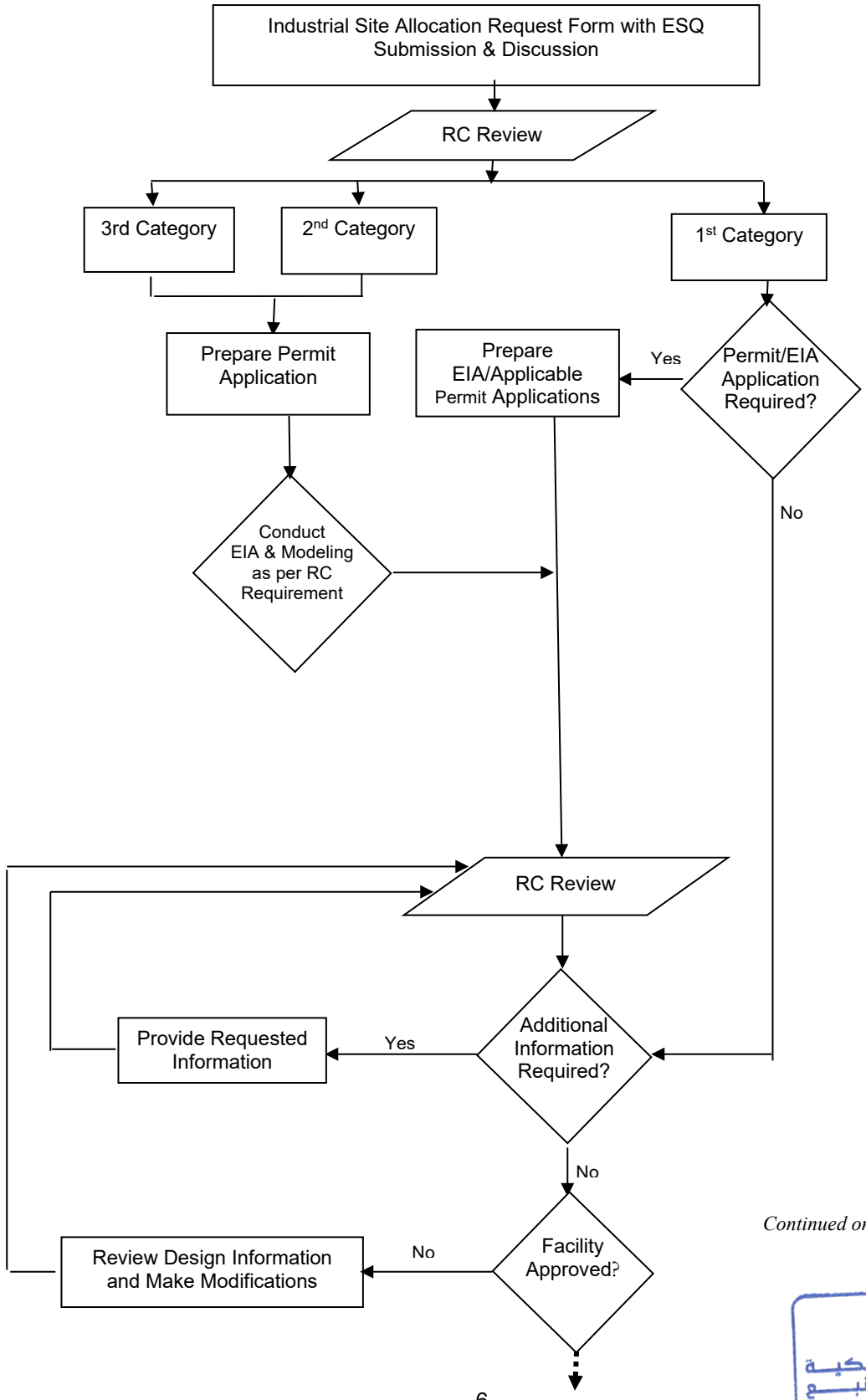
1.7 Amendment to Existing Environmental Permit to Operate

1.7.1 The facility shall submit an amended permit application package 6 months in advance in case a major expansion or significant change to the process or scope of operation is planned after the issuance of EPO in accordance with Section 1 of the currently enforced RCER, Volume I.

1.7.2 As per RC requirement, the facility is required to submit an environmental impact assessment (EIA) report for Second and Third Category facilities (and for First Category on case-by-case basis or if required by MEWA) to evaluate the impact of one or more components of the proposed facility on the environment. After approval of the permit applications and EIA report, an Environmental Permit to Construct (EPC) will be issued for undertaking the modification/ expansion activities incorporating necessary conditions for compliance with the RCER.

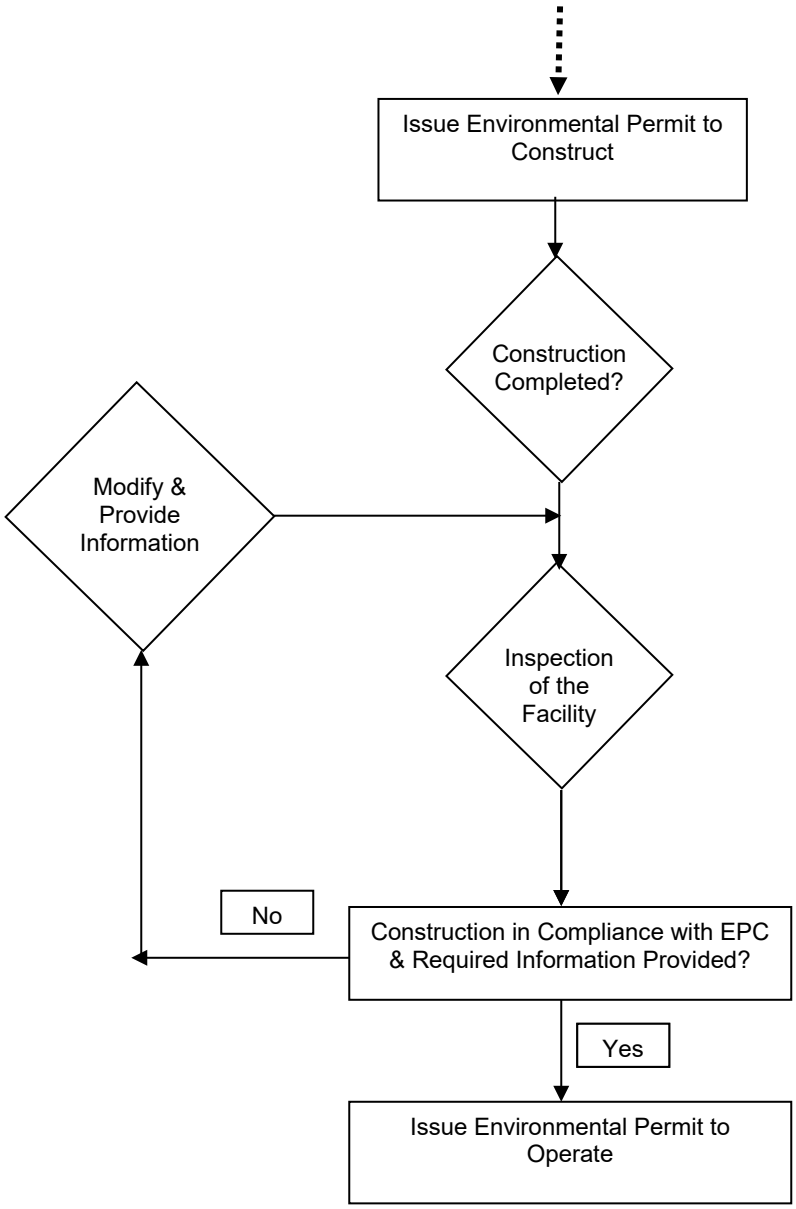
1.7.3 Amendments to the “Environmental Permit to Operate” will be prepared and sent to the facility management. The amendments automatically expire on the same day, as the “Environmental Permit to Operate”.

FIGURE 1: Environmental Permitting Process for New, Reconstructed and Modified Facilities



Continued on next page >>>

Continued from previous page >>>



SECTION 2

PERMIT APPLICATION PACKAGE

This section provides permit application forms needed to apply for an Environmental Permit to Construct and Environmental Permit to Operate.

2.1 Instructions for Completing Permit Application Package

Figure 2 summarizes the entire application package. In following paragraphs, important points are described which would help in completing the application forms required to submit for obtaining permits to construct and to operate industrial facilities.

a) This application package must be submitted by a facility which intends to operate or develop and operate a commercial (if required) or industrial facility in the Industrial City.

b) All information requested in these application forms must be provided. Do not leave any space uncompleted. If a question does not apply, answer with “None” or “NA”.

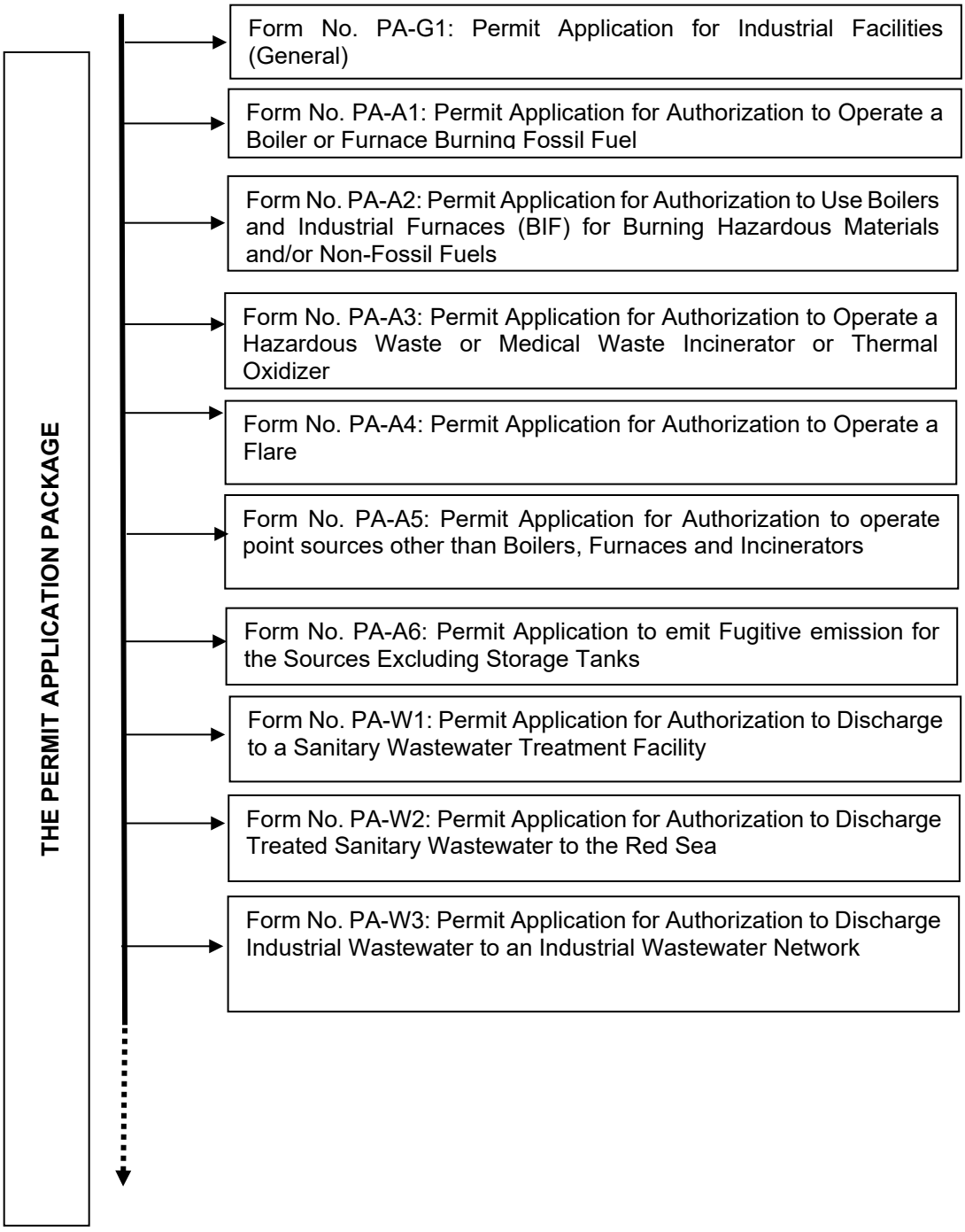
c) An authorized representative of the facility must sign and stamp the STATEMENT OF CERTIFICATION in the application package before being returned to the Royal Commission.

d) The completed applications have to be submitted in electronic form (a Compact Disc) as well as in printed form. An electronic copy of the forms can be obtained from the Royal Commission. The printed document must bear the signature of the authorized representative.

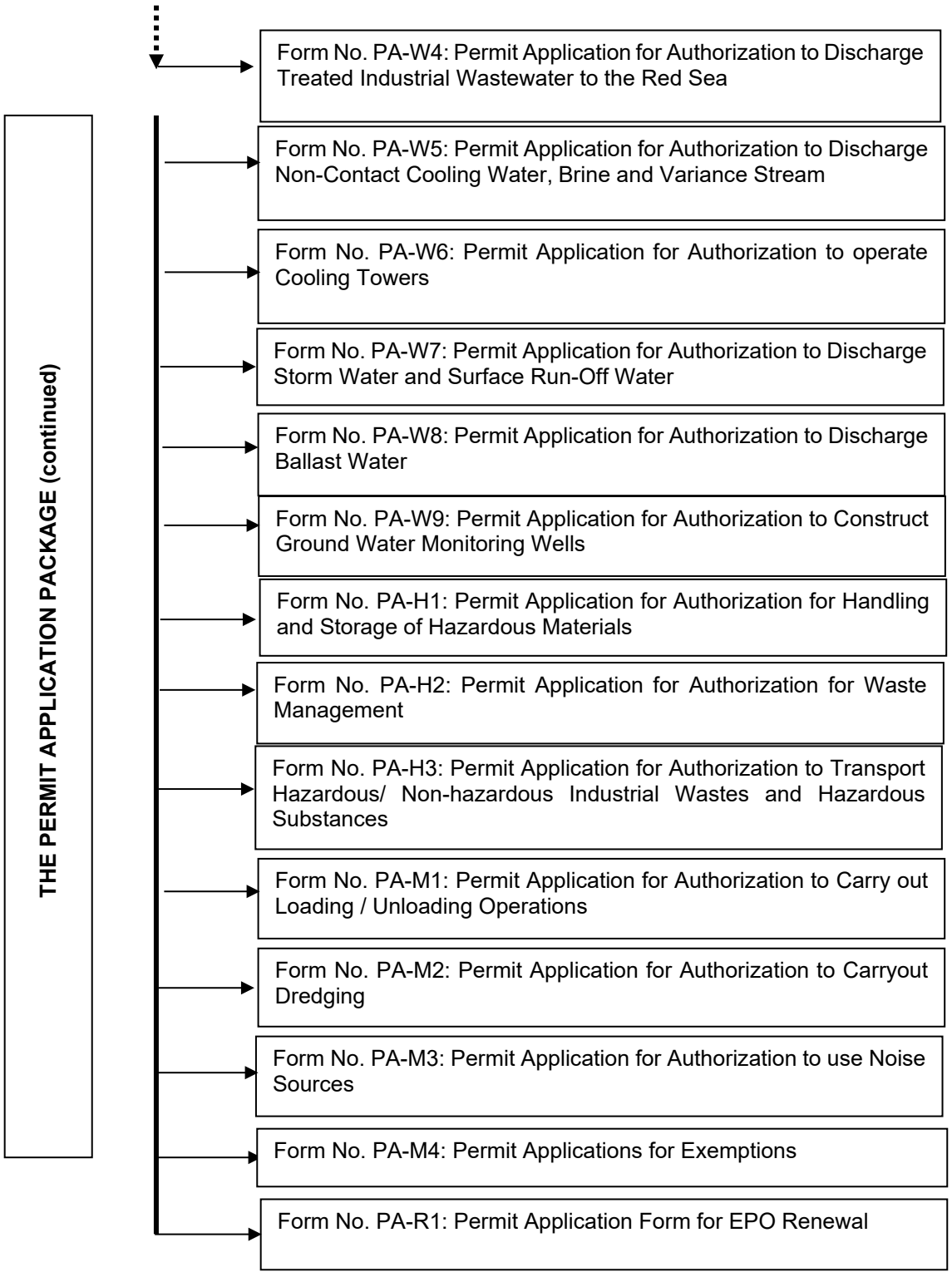
e) PAP forms shall be organized in the same order as presented in Figure 2.

f) Submit Environmental Emergency Response Plan (EERP) as per “Guidelines” provided in Appendix D, covering issues hazardous material management (as per Clause 4.3.19 of the currently enforced RCER, Volume I), hazardous waste management, loading/ unloading operations and other potential emergencies.

FIGURE 2: The Permit Application Package



(Continued on next page)



2.2 Checklist for Permit Applications and Statement of Certification

☐ PA-G1. General	☐ PA-W6. Cooling Towers
AIR ENVIRONMENT	☐ PA-W7. Storm Water
☐ PA-A1. Boilers and Furnaces	☐ PA-W8. Ballast Water to Sea
☐ PA-A2. Boilers & Furnaces burning Hazardous Materials/Non-Fossil Fuel	☐ PA-W9. Ground Water
☐ PA-A3. Incinerators/Thermal Oxidizers	**HAZARDOUS MATERIALS AND WASTE**
☐ PA-A4. Flare	☐ PA-H1. Hazardous Substance Storage
☐ PA-A5. Other Point Sources	☐ PA-H2. Waste Management
☐ PA-A6. Fugitive Emissions	☐ PA-H3. Transportation of Wastes and Hazardous Substances
WATER ENVIRONMENT	**MISCELLANEOUS**
☐ PA-W1. Sanitary Wastewater	☐ PA-M1. Loading & Unloading
☐ PA-W2. Sanitary Wastewater to Red Sea	☐ PA-M2. Dredging
☐ PA-W3. Industrial Wastewater	☐ PA-M3. Noise
☐ PA-W4. Industrial Wastewater to Red Sea	☐ PA-M4. Exemptions
☐ PA-W5. Cooling Water (once through system)	☐ PA-R1: Permit Application Form for EPO Renewal

STATEMENT OF CERTIFICATION

On behalf of the facility, I hereby declare that I am familiar with all processes and operating plans of this facility and certify that the environmental information provided above is accurate. I understand that the submission of incorrect information is considered a highly serious issue and could lead to subsequent withdrawal of any permit issued and issuance of penalties. Notification on any changes will be submitted to the Royal Commission. Also, I am fully committed to implement and comply with Royal Commission Environmental Regulations.

Name of the Facility: _____

_____ _____
Signature of Facility Representative Date

Name

Title

Facility Stamp

PERMIT APPLICATION FORMS

PERMIT APPLICATION FORM

General

FORM PA-G1
PERMIT APPLICATION FOR INDUSTRIAL FACILITIES - GENERAL

1. APPLICANT

Name of Industrial Facility: English:_____

Name of the Project : English : _____

Name of Industrial Facility: Arabic:_____

Name of the Project : Arabic:_____

Owner(s) of the Facility: _____
(Attach a copy of Commercial Registration and Industrial License)
(Attach a copy of Saudi Energy Efficiency Center (SEEC) Certificate complying with SEEC's standards and requirements for new facilities including facilities to be reconstructed, modified or expanded)

Location of the Existing/Proposed Facility: Jubail/Yanbu/Ras Al-Khair/Jazan
Site Location: Primary/ Secondary/ Support Area
Land Block Number: _____, Lot Number:_____

Status of Safety Security Certificate:_____
(Attach a copy of RC Safety Security Certificate/ Copy of The High Commission for Industrial Security (HICIS) Certificate)

Operator of the Facility: _____

Applicant Address: _____

Project Coordinator: _____

Title: _____

Tel: _____ Fax: _____

E-mail: _____

Technical Contact: _____

Title: _____

Tel: _____ Fax: _____

E-mail: _____

Area of the Facility: _____ Hectares / Square Meters.
(Attach a copy of Land Coordinate Diagram (LCD), Attach City Plot plan indicating the project site)

Provide the land lease agreement details:_____
(Attach a copy of front and signature pages)

Facility Status (Tick the option)

[ ] New [ ] Existing

[ ] Modification In Case of modification complete the following:

Name of Plant	Before Expansion				After Expansion					
	Production Capacity	Total Air Emission Load (t/y)	Industrial Wastewater Quantity (m^3/day)	Hazardous Waste Quantity TPY	Production		Number of Air Emission Sources Added	Total Air Emission Load (t/y)	Industrial Wastewater Quantity (m^3/day)	Hazardous Waste Quantity TPY
					Capacity	% Change				

Item	Before Expansion	After Expansion
Raw Material Consumption		
Total Production Capacity		

2. OPERATIONAL ACTIVITIES:

2.1 Operations / Process Description

a. Describe the proposed operations at the facility including the main chemical reactions and process units involved

List the relevant section/ page numbers in the addendum

b. Provide block flow diagrams outlining the main process units

List the relevant section/ page numbers in the addendum

c. Provide mass / material balance calculations indicating inputs and outputs of process units including air, water and waste releases. (Provide all the input & output quantities in a block diagram).

List the relevant section/ page numbers in the addendum

d. Provide detailed process flow diagrams (PFDs) with stream composition.

Drawings No _____

e. Are there are any loading and unloading operations at the port

[ ] Yes [ ] No

List the relevant section/ page numbers in the addendum

f. Are there are any truck loading operations at the facility

[ ] Yes [ ] No

List the relevant section/ page numbers in the addendum

2.2 Operating Schedule

a. Operating hours of the facility per day: _____ Hours/day

b. No. of Shifts/day _____ Shifts

c. Scheduled operating days per calendar year: _____ Days

d. No. of employees:

i. Admin: _____

ii. Technical (Production, Tech. Services, Maintenance**)** & others: _____

iii. Total: _____

2.3 Raw Materials and Product Description

Provide detailed description of raw materials used, products and by-products.

a. Raw Materials Used Directly in Production *(Insert more rows if needed)*

Material	Process	Delivery and Storage Method	Hourly Consumption (Unit)	Annual Consumption (Unit)	Maximum Storage Capacity (Unit)	Country of Origin

b. Other Materials Used *(Insert more rows if needed)*

Material	Process	Delivery and Storage Method	Hourly Consumption (Unit)	Annual Consumption (Unit)	Maximum Storage Capacity (Unit)	Country of Origin

c. Raw Materials available from the Industrial City.

Material	Process	Delivery and Storage Method	Hourly Consumption (Unit)	Annual Consumption (Unit)	Maximum Storage Capacity (Unit)	City of Origin	Facility Name

d. Final Products *(Insert more rows if needed)*

Process	Product	Product Name (In Arabic)	Hourly Production (Unit)	Annual Production (Unit)	Storage Method	Delivery to end users Method	Maximum Storage Capacity (Unit)	End Users Name & Location

e. By-Products *(Insert more rows if needed)*

Process	By-Product	By-Product Name (In Arabic)	Hourly Production (Unit)	Annual Production (Unit)	Storage Method	Delivery to end users Method	Maximum Storage Capacity (Unit)	End Users Name & Location

2.4 Process Technology Suppliers for Major Process Units e.g. Catalytic Cracking, Catalytic Reforming, Polymerization, Thermal Cracking, etc.

Process Name	Technology Supplier	Country of Origin

2.5 Provide in sequence list of all Unit Operations and Unit Processes to be employed in the manufacturing process.

S. No.	Unit Operations (e.g. Distillation, Crystallization, Leaching, Solvent Extraction, Adsorption, Evaporation, Others)	S. No.	Unit Processes (e.g. Hydrogenation, Sulfonation, Alkylation, Nitration, Others)

2.6 Energy Requirements

Type	Units	Average Consumption	Annual Consumption
Power	kVA		
Electricity	KW/MW		
Liquid Fuel	tones/day		
Gaseous Fuel	scm/day		
Other Fuels (specify) Generated internally or imported	tones/day or scm/day		
External Steam Consumption	tones/day		

2.7 Water Consumption

Type of water used / required	Average	Maximum
Desalinated water for process (m^3/day)		
Drinking water for Process (m^3/day)		
Reclaimed water (IWTP Effluent) for process (m^3/day)		
Reclaimed water (SWTP Effluent) for process (m^3/day)		
Non-Contact Cooling Seawater (m^3/h)		
Other water (m^3/day)		
Drinking water (m^3/day)		
Irrigation water (m^3/day)		

2.8 Wastewater Generation

Type of wastewater	Average	Maximum
Industrial-wastewater (m^3/day) Managed as per Table 3B		
Sanitary wastewater (m^3/day)		
Other wastewater (m^3/day) Managed as per Table 3C & 3C-1 (e.g. variance stream, blowdown and brine.)		

2.9 Waste Generation (Solid & Liquid)

Type of Wastes	Physical Status	Annual Quantity	Waste Management (Select as Applicable)		
			Landfill Disposal	Incineration	Re-Use /Recycle
Municipal	Solid				
	Liquid				
Non-Hazardous	Solid				
	Liquid				
Hazardous	Solid				
	Liquid				

2.10 Air Emissions *(Insert more rows and columns if needed)*

Sr. No.	Source ID & Name	Pollutants							Quantity (t/y)	
		NO_X	SO_2	CO	PM	VOCs	Other1	Other2	Before Abatement	After Abatement

*Data shall include all point (stacks, flares, process vents etc.) & non-point sources such as storage tanks, holding ponds, fugitive emissions etc. Data source shall be the relevant applicable PAP form.

2.11 Tanks & Ponds

a) Total number of hazardous materials, waste and wastewater storage tanks

b) Total number of wastewater, storm water and any other ponds (e.g. evaporation, retention, irrigation, pits etc.)

3. SITE PLANS:

Provide site plans indicating the following:

a. Facility Plot Plan

Drawing No. _____

b. Buildings

Drawing No. _____

c. Plant facility boundaries

Drawing No. _____

d. Specific process areas

Drawing No. _____

e. All sanitary and industrial effluent discharge sources to the wastewater collection system.

Drawing No. _____

f. All non-contact cooling water discharge sources

Drawing No. _____

g. All wastewater and storm water lagoons and surface impoundments

Drawing No. _____

h. Storm water drainage plan

Drawing No. _____

i. All effluent treatment facilities

Drawing No. _____

j. All atmospheric emission point sources emitting greater than 10 tons/year of any hazardous air pollutant (see RCER-2025, Volume I, Table 2C) and all point sources emitting greater than 100 tons/year of any ambient air standards pollutant (see RCER--2025, Volume I, Table 2A).

Drawing No. _____

k. All air pollution control equipment locations

Drawing No. _____

l. Areas of hazardous waste storage, treatment or disposal

Drawing No. _____

4. LAND USE PLANNING *(for new or modified facilities within the boundaries of an existing site)*

Indicate on the Site Plan the following:

a) Areas subject for development _____ SQ. M.

b) Areas potentially contaminated with previous activities or storage of materials.

_____ SQ. M.

c) Areas with known or potential groundwater contamination (Attach groundwater baseline study report).

Drawing No. _____

5. CONSTRUCTION ACTIVITIES

a. Estimated length of the construction period _____

b. Anticipated volume of dredged material, if any, during construction? cu. m.
_____

c. Describe below, any site dewatering which will be required during construction of the facility, including anticipated dewatering and disposal rates? m^3/day.
_____

d. Describe the type, quantities and disposal methods of municipal wastes during construction of the facility.

_____

_____

_____

e. Describe the type, quantities and disposal methods of industrial wastes during construction of the facility.

_____

_____

_____

f. Provide the details of any temporary construction activities.

_____

_____

_____

PERMIT APPLICATION FORMS

Air Environment

FORM PA-A1
PERMIT APPLICATION FOR AUTHORIZATION TO OPERATE A BOILER OR FURNACE BURNING FOSSIL FUEL

Note: A separate application has to be filled for each combustion source, unless they are identical.

1. DESCRIPTION

a. Provide the following information on each boiler/furnace

Source	Unit ID	Stack ID

b. Provide the following information on each boiler/furnace/heater/reformer

DESCRIPTION	UNITS	DATA			
		Boiler	Heater	Furnace	Reformer
Number of Identical Units	Nos.				
Maximum Design Capacity	MW MMBTU/Hour				
Operating Capacity	% of design capacity				
Operating Schedule					
Normal	Hours/day				
	Days/year				
Maximum	Hours/day				
	Days/year				

In case of melting furnaces, please provide the following as well:

Feed Material: _____
Feed (MT/hr): _____
Fuel Types: _____
Fuel Qty. (Primary) _____
Co-Fuel Qty. _____
Additives Type (if any) _____
Additives Qty. (MT/hr) _____

c. Provide a description of the design of the boiler/ Furnace/heater/reformer in an attachment. The description should include details such as:

i. Use of the boiler/ furnace/heater/reformer and process description

ii. Type of boiler or furnace or heater or reformer:

iii. Fuel feed

iv. Make and type of burners

v. Number of burners

vi. Type of atomization

vii. Start-up and shut down including emergency procedures and their frequency

viii. Manufacturer's Name and Model Number.

ix. Expected useful life

List the relevant section/ page numbers in the attachment

d. Provide the following drawings

i. Layout indicating the location of the boiler/furnace/heater/reformer and the stack.

Drawing No. _____

ii. Line diagram identifying all sources feeding the boiler/furnace/heater/reformer and outputs

Drawing No. _____

e. Operational Philosophy: Tick the appropriate one

[ ] Continuous [ ] Cold standby [ ] Hot standby

2. COMBUSTION INFORMATION

a. Enclose complete fuel composition report giving a complete description of the fuel used for this combustion source

	Liquid Fuel	Gaseous Fuel
Type of fuel		
Type of firing (e.g. wall fired, tangential etc.)		
Average feed rate (Nm^3/h) or (kg/h)		
Max feed rate (Nm^3/h) or (kg/h)		
Density		

Heat Input (Joules/h) *		
Total Heat Input*		
Heat Release Rate (Joules/sec-m^3) *		
High Heating Value (kJ/m^3)		
Air Intake rate (Nm^3/h)		
Fuel Composition (wt%) *Please specify each constituent including:* - *Sulfur content (wt %)* - *Nitrogen content (wt %)* - *H2S Content (wt %) for gaseous fuels*		

* Provide Sample Calculations.

b. Are there any other streams other than fossil fuels being combusted in the unit?

[ ] Yes [ ] No

If yes, complete form PA-A2 "Permit Application for Authorization to Use Boilers or Industrial Furnaces (BIF) for Burning Hazardous Materials"

3. EMISSIONS CONTROL

a. Are there any emission control devices?

[ ] Yes [ ] No

b. If yes, specify type of the control device

Source	Control Device*	Control Unit ID	Expected useful life	No. of units	Arrangements Series/ Parallel	Dedicated / common	Pollutant	Pollutant Inlet Conc. (mg/m^3)	Pollutant Inlet Load (t/y)	Control Efficiency (%)	Waste Generation (If any)		
											Quantity (t/y)	Important properties	Disposal Method

* Choose one of the following control devices

[ ] Low NOx Burners (LNB)
[ ] Flue Gas Recirculation (FGR)
[ ] Selective Catalytic Reduction (SCR)
[ ] Selective Non-Catalytic Reduction (SNCR)
[ ] Acid / Caustic Scrubber
[ ] Activated Carbon Adsorber
[ ] Electrostatic Precipitator (ESP)
[ ] Wet FGD System (FGD Wet)
[ ] Dry FGD System (FGD Dry)
[ ] Ultra Low NOx Burners (ULNB)
[ ] Water/ Steam Injection
[ ] Other: _____

c. Provide technical information, design details along with vendor guarantees for each control device

List the relevant section/ page numbers in the attachment

4. BEST AVAILABLE TECHNIQUES (BAT) ANALYSIS

a. Do any boilers or furnaces or heater or reformer have the potential to emit more than 100 TPY of pollutants as listed in Table 2-A of RCER-2025, Volume I before emission control *(for new and modified facilities only)*

[ ] Yes [ ] No

Please provide evidence for the pre-abatement emission load based on the following:
EF: Emission Factors; MB: Material Balance
ST: Stack testing or monitoring; EC: Engineering Calculation

_____
_____
_____

b. Do any boilers or furnaces or heater or reformer have potential to emit more than 10 TPY of hazardous air pollutants (HAP) as listed in Table 2-C of RCER-2025, if before emission control (for new and modified facilities only)

[ ] Yes [ ] No

Please provide evidence for the pre-abatement emission load based on the following:
EF: Emission Factors; MB: Material Balance
ST: Stack testing or monitoring; EC: Engineering Calculation

_____
_____
_____

c. Are any boilers or furnaces or heater or reformer currently non-compliant with point source emission standards as listed in Table 2-B of RCER-2025 and/or EPO as applicable (for existing or modified facilities)

[ ] Yes [ ] No

Please provide evidence, for example last stack testing reports (reference any attachments)

_____

_____

_____

If the answer to any of the above questions is yes, provide BAT analysis to justify the selection of each relevant emission control device.

List the relevant section/ page numbers in the attachment

5. AIR POLLUTANTS

Complete the following table for all emission sources. For sources that are equipped with an emission control device, provide data after the emission control.

Source	Unit ID	Stack ID	Pollutant	Max Conc. (mg/m^3)	Max. Conc. in Regulated Unit		Max. Emission Rate (kg/hr)	Emission Rate (t/y)	Emission Estimation Technique*
					Conc.	Unit			

* Provide a sample calculation for emission estimates. Emission estimation must be based on one of the following

EF: Emission Factors; MB: Material Balance
ST: Stack testing or monitoring; EC: Engineering Calculation

6. STACK INFORMATION

a) Enclose a line diagram identifying all sources, which discharge from or vent to this stack. Briefly describe all source units identified on the line diagram. The line diagram should also include the gas flow rate (Nm^3/hr) and pollutants emitted to the atmosphere (g/sec).
Drawing No. _____

b) Provide the following information (add additional columns if necessary)

Stack ID	Dedicated/Common	Stack Base Height Above mean sea level (A) (m)	Stack height above ground (B) (m)	Total Stack height (A+B) (m)	Stack height above adjacent structure (m)	Inside stack diameter (m)	Stack Coordinates (UTM)

7. FLUE GAS CHARACTERISTICS

Stack ID	Flow Rate (Nm^3/hr)	Exit Temp (C)	Exit Velocity (m/s)	Percent Moisture (%)	Oxygen Content (%)

8. SAMPLING/ ANNUAL STACK TESTING

a) Provide list of emissions monitored annually:

Source	Pollutant

b) Provide drawing of the sampling ports and platforms

Drawing No. _____

c) Provide diameter of sampling port and its distance from the last disturbance point: -

_____

(Note: Sampling port diameter and location shall be as per USEPA requirement)

9. CONTINUOUS EMISSION MONITORING SYSTEM (CEMS)

Provide the following information *(add additional rows if necessary)*

Source	Pollutant	Type of Monitoring Devices	Justification if CEMS Not Installed
	NO_X		
	SO_2		
	O_2		
	Opacity		
	Other (Please Specify)		
	NO_X		
	SO_2		
	O_2		
	Opacity		
	Other (Please Specify)		
	NO_X		
	SO_2		
	O_2		
	Opacity		
	Other (Please Specify)		

Provide information on measures in place for monitoring, recordkeeping, calibration and maintenance of continuous emission monitoring systems.

List the relevant section/ page numbers in the attachment

FORM PA-A2
PERMIT APPLICATION FOR AUTHORIZATION TO USE BOILERS OR INDUSTRIAL FURNACES (BIF) FOR BURNING HAZARDOUS MATERIALS & NON-FOSSIL FUELS

Note: A separate application has to be filled for each combustion source, unless they are identical.

1. DESCRIPTION

f. Provide the following information

Type of BIF (boiler/furnace/heater/reformer)	Unit ID	Stack ID

g. Provide the following information on each BIF (boiler/furnace/heater/reformer)

i. Name of the source ____

ii. Number of identical units: ____

iii. Expected useful life ____

iv. Manufacturer's name & Model ____

v. Maximum Design Heat Input ____ MW

vi. Operating Capacity ____ MW

vii. Heat Input from Fossil Fuel Min ____ % Max ____ %

viii. Heat Input from Waste/Non-Fossil Fuel

Min ____ % Max ____ %

ix. Operating Schedule

Normal ____ h/day ____ days/year
Maximum ____ h/day ____ days/year

x. Operating Schedule (With Waste & Non-Fossil Fuel)

Normal ____ h/day ____ days/year
Maximum ____ h/day ____ days/year

h. Provide a description of the design of the BIF in an attachment. The description should include details such as:

i. Type of BIF

ii. Use of the BIF and process description

iii. Feed system for the hazardous materials

iv. Fuel feed

v. Blending procedures prior to firing

vi. Type of firing

vii. Make and type of burners

viii. Type of atomization

ix. Excess air (%)

x. Start-up and shut down procedures and their frequency

List the relevant section/ page numbers in the attachment

i. Provide the following drawings

i. Layout indicating the location of the BIF and the stack.

Drawing No. _____

ii. Detailed process flow diagram identifying all waste sources feeding the unit and outputs

Drawing No. _____

iii. Drawing of the combustion chamber showing feed of fuel and hazardous materials

Drawing No. _____

j. Operating Data

i) Primary combustion chamber Temperature (ºC) _____
ii) Secondary Combustion chamber Temperature (ºC)
Max _____ ºC
Average _____ ºC
iii) Description of automatic feed cut-off system
iv) Secondary Combustion chamber residence time _____ Sec
v) Destruction rate efficiency for organic and chlorinated organic waste _____%

2. FUEL FEED

Provide description details of the fuel (including its complete composition) used for this combustion source

Item	Primary Fuel	Secondary Fuel
Type of fuel		
Normal fuel feed rate (kg/h)		
Maximum fuel feed rate (kg/h)		
Heat Content of the fuel (BTU/lb)		
Fuel Composition (wt%) Please specify each constituent including: - Sulfur content (wt %) - Nitrogen content (wt %) - H_2S Content (wt %) for gaseous fuels		

3. WASTE FEED

Provide all process units that are connected to the BIF *(add additional lines if necessary)*

Process	Waste to be Combusted	Physical Properties	Chemical Composition

Item	Waste Streams*				
	Waste Stream 1	Waste Stream 2	Waste Stream 3	Waste Stream 4	Cumulative Information on Waste Streams
Name/ Source					
Waste composition (wt%) - *Please specify each constituent*					
Physical state					
Heat content (BTU/lb)					
Normal feed rate (kg/h)					
Max feed rate (kg/h)					

** Add more columns if necessary*

4. EMISSIONS CONTROL

a. Are there any emission control devices?

[ ] Yes [ ] No

b. If yes, please specify type of the control device

Source	Control Device*	Control Unit ID	Expected useful life	No. of units	Arrangements Series/ Parallel	Dedicated / common	Pollutant	Pollutant Inlet Conc. (mg/m³)	Pollutant Inlet Load (t/y)	Control Efficiency (%)	Waste Generation (If any)		
											Quantity (t/y)	Important properties	Disposal Method

* Choose one of the following control devices

[ ] Low NOx Burners (LNB)
[ ] Flue Gas Recirculation (FGR)
[ ] Selective Catalytic Reduction (SCR)
[ ] Selective Non-Catalytic Reduction (SNCR)
[ ] Acid / Caustic Scrubber
[ ] Activated Carbon Adsorber
[ ] Electrostatic Precipitator (ESP)
[ ] Wet FGD System (FGD Wet)
[ ] Dry FGD System (FGD Dry)
[ ] Ultra Low NOx Burners (ULNB)
[ ] Water/ Steam Injection
[ ] Other: _____

c. Provide technical information, design details along with vendor guarantees for each control device.

List the relevant section/ page numbers in the attachment

5. BEST AVAILABLE TECHNIQUES (BAT) ANALYSIS

a. Does any BIF have the potential to emit more than 100 TPY of pollutants as listed in Table 2-A of RCER-2025, Volume I before emission control *(for new and modified facilities only)*?

[ ] Yes [ ] No

Please provide evidence for the pre-abatement emission load based on the following:
EF: Emission Factors; MB: Material Balance
ST: Stack testing or monitoring; EC: Engineering Calculation

_____
_____
_____

b. Does any BIF have potential to emit more than 10 TPY of hazardous air pollutants (HAP) as listed in Table 2-C of RCER-2025, Volume I if before emission control *(for new and modified facilities only)*?

[ ] Yes [ ] No

Please provide evidence for the pre-abatement emission load based on the following:
EF: Emission Factors; MB: Material Balance
ST: Stack testing or monitoring; EC: Engineering Calculation

_____
_____
_____

c. Is any BIF currently non-compliance with point source emission standards as listed in Table 2-B of RCER-2025, Volume I and/or EPO as applicable *(for existing or modified facilities)*?

[ ] Yes [ ] No

Please provide evidence, for example, last stack testing reports (reference any attachments)

_____
_____
_____

If the answer to any of the above questions is yes, please provide BAT analysis to justify the selection of each relevant emission control device.

List the relevant section/ page numbers in the attachment

6. AIR POLLUTANTS

Complete the following table for all emission sources. For sources that are equipped with an emission control device, provide data after the emission control.

Source	Unit ID	Stack ID	Pollutant	Max Conc. (mg/m^3)	Max. Conc. in Regulated Unit		Max. Emission Rate (kg/hr)	Emission Rate (t/yr)	Emission Estimation Technique*
					Conc.	Unit			

* Provide a sample calculation for emission estimates. Emission estimation must be based on one of the following
EF: Emission Factors
MB: Material Balance
ST: Stack testing or monitoring
EC: Engineering Calculation

7. STACK INFORMATION

a) Enclose a line diagram identifying all sources, which discharge from or vent to this stack. Briefly describe all source units identified on the line diagram. The line diagram should also include the gas flow rate (Nm^3/hr) and pollutants emitted to the atmosphere (g/sec).

Drawing No. _____

b) Please provide the following drawings *(add additional columns if necessary)*

Stack ID	Dedicated/Common	Stack Base Height Above mean sea level (A) (m)	Stack height above ground (B) (m)	Total Stack height (A+B) (m)	Stack height above adjacent structure (m)	Inside stack diameter (m)	Stack Coordinates (UTM)

8. FLUE GAS CHARACTERISTICS

Stack ID	Flow Rate (Nm^3/hr)	Exit Temp (^oC)	Exit Velocity (m/s)	Percent Moisture (%)	Oxygen Content (%)

9. SAMPLING/ ANNUAL STACK TESTING

a) Provide list of emission tests conducted annually:

Source	Pollutant

b) Provide drawing of the sampling ports and platforms

Drawing No. _____

c) Provide diameter of sampling port and its distance from the last disturbance point:

_____

(Note: Sampling port diameter and location shall be as per USEPA requirement)

10. CONTINUOUS EMISSION MONITORING SYSTEMS (CEMS)

Provide the following information *(add additional rows if necessary)*

Source	Pollutant	Type of Monitoring Devices	Justification If CEMS Not Installed
	NO_X		
	SO_2		
	CO		
	O_2		
	THC		
	Other (Please specify)		
	NO_X		
	SO_2		
	CO		
	O_2		
	THC		
	Other (Please specify)		
	NO_X		
	SO_2		
	CO		
	O_2		
	THC		
	Other (Please specify)		

Also, provide information on measures in place for monitoring, recordkeeping, calibration and maintenance of continuous emission monitoring systems.

List the relevant section/ page numbers in the attachment

FORM PA-A3
PERMIT APPLICATION FOR AUTHORIZATION TO OPERATE A HAZARDOUS WASTE OR MEDICAL WASTE INCINERATOR OR THERMAL OXIDIZER

A separate application/ section is required for each incinerator in the facility unless they are identical.

1. DESCRIPTION

xi. Provide the following information on each boiler/furnace:

Source	Unit ID	Stack ID

xii. Number of Identical Incinerators: _____ Units

xiii. Type

[ ] Single Chamber [ ] Multiple Chamber
[ ] Controlled Air [ ] Fixed Hearth
[ ] Stepped Hearth [ ] Rotary Kiln
[ ] Liquid Injection [ ] Other (*specify*): _____

xiv. Manufacturer's Name & Model No: _____

_____

xv. Expected Useful Life : ___ Years

xvi. Type of charging the waste

[ ] Continuous [ ] Batch

xvii. Design Maximum Charging Rate ___ kg/h

[ ] Solid ___ kg/h
[ ] Liquid ___ kg/h
[ ] Sludge ___ kg/h
[ ] Gases ___ kg/h

xviii. Thermal Capacity ___ kJ/h

xix. Operating Schedule

Normal ___ h/day _____ days/year
Maximum ___ h/day _____ days/year

xx. Provide a description of the incinerator/Thermal Oxidizer. The description should include details (as applicable) such as:

a. Incinerator/Thermal Oxidizer design
b. Waste charging methods
c. Residue removal system
d. Wastewater generated and methods of disposal
e. Start-up and shut down procedures and their frequency
f. Automatic material feed cut off system
g. Procedure for emergency shut down and the use of the emergency dump stack

List the relevant section/ page numbers in the amendment

xxi. Provide the following drawings

a. Layout indicating the location of the incinerator/Thermal Oxidizer and the stack.

Drawing No. _____

b. Process flow diagram

Drawing No. _____

c. Line diagram identifying all source feeding waste to the incinerator/Thermal Oxidizer

Drawing No. _____

2. COMBUSTION INFORMATION

a. Provide the following information:

	Combustion Temperature °C	Residence Time (sec)
Primary Chamber		
Secondary Chamber		

b. Calculation of the residence time of the exhaust gas in the secondary chamber

List the relevant section/ page numbers in the amendment

c. Destruction rate efficiency for organic and chlorinated organic waste _____%

3. FUEL

a. Provide a description of the incinerator/Thermal Oxidizer fuel source(s)

Fuel	Primary Fuel	Secondary Fuel
Type of fuel		
Density (kg/m^3)		
Max feed rate (Nm^3/h) or (kg/h)		
High Heating Value (kJ/m^3)		
Air Intake rate (Nm^3/h)		
Excess air (%)		
Fuel Composition (wt%) *Specify each constituent including:* - *Sulfur content (wt %)* - *Nitrogen content (wt %)* - *H2S Content (wt %) for gaseous fuels*		

b. Is the incinerator/Thermal Oxidizer equipped with a heat recovery system?

[ ] Yes, energy production rate ___ kW [ ] No

If yes, please specify type of the heat recovery system

[ ] Recuperative [ ] Regenerative [ ] other: _____

4. INFORMATION ON WASTE TO BE BURNT

Normal waste feed rate (kg/h)	
Maximum waste feed rate (kg/h)	

a. Provide all process units that are connected to the incinerator (add additional lines if necessary)

Process	Waste to be Combusted	Physical Properties	Chemical Composition	Hazardous Properties*

* Indicate if any radio active material is present in the waste

Item	**Waste Streams***				
	Waste Stream 1	Waste Stream 2	Waste Stream 3	Waste Stream 4	Cumulative Information on Waste Streams
Source					
Waste composition (wt%) *Please specify each constituent*					
Heat content (MJ/scm)					
Min feed rate (kg/h)					
Max feed rate (kg/h)					
Quantity of fuel needed (m^3/h)					

** Add more columns if necessary*

b. Include energy and mass balance for each type of waste stream

List the relevant section/ page numbers in the amendment

5. EMISSIONS CONTROL

a. Are there any emission control devices?

[ ] Yes [ ] No

b. If yes, specify type of the control device

Source	Control Device*	Control Unit ID	Expected useful life	No. of units	Arrangements Series/ Parallel	Dedicated / common	Pollutant	Pollutant Inlet Conc. (mg/m³)	Pollutant Inlet Load (t/y)	Control Efficiency (%)	Waste Generatio	
											Quantity (t/y)	Importa properti

* Choose one of the following control devices

[ ] Acid Gas Removal
[ ] Particulate Removal
[ ] Post Combustion Reaction Control
[ ] Organic Removal
[ ] Other: _____
[ ] Acid / Caustic Scrubber
[ ] Activated Carbon Adsorber
[ ] Electrostatic Precipitator (ESP)
[ ] Wet FGD System (FGD Wet)
[ ] Dry FGD System (FGD Dry)

Provide technical information, design details along with vendor guarantees for each control device

List the relevant section/ page numbers in the amendment

6. BEST AVAILABLE TECHNIQUES (BAT) ANALYSIS

a. Does the incinerator have the potential to emit more than 100 TPY of pollutants as listed in Table 2-A of RCER-2025, Volume I, before emission control *(for new and modified facilities only)*

[ ] Yes [ ] No

Please provide evidence for the pre-abatement emission load based on the following:
EF: Emission Factors; MB: Material Balance
ST: Stack testing or monitoring; EC: Engineering Calculation

_____
_____
_____

b. Does the incinerator have potential to emit more than 10 TPY of hazardous air pollutants (HAP) as listed in Table 2-C of RCER-2025, Volume I, if before emission control *(for new and modified facilities only)*

[ ] Yes [ ] No

Please provide evidence for the pre-abatement emission load based on the following:
EF: Emission Factors; MB: Material Balance
ST: Stack testing or monitoring; EC: Engineering Calculation

_____
_____
_____

c. Is the incinerator currently non-compliant with point source emission standards as listed in Table 2B of RCER-2025, Volume I and/or EPO as applicable *(for existing or modified facilities)*

[ ] Yes [ ] No

Please provide evidence, for example, of last stack testing reports (reference any attachments)

_____
_____
_____

If the answer to any of the above questions is yes, please provide BAT analysis to justify the selection of each relevant emission control device.

List the relevant section/ page numbers in the report

7. AIR POLLUTANTS

Complete the following table for all emission sources. For sources that are equipped with an emission control device, provide data after the emission control.

Source	Unit ID	Stack ID	Pollutant	Max Conc. (mg/m^3)	Max. Conc. in Regulated Unit		Max. Emission Rate (kg/hr)	Emission Rate (t/y)	Emission Estimation Technique*
					Conc.	Unit			

* Provide a sample calculation for emission estimates. Emission estimation must be based on one of the following:
EF: Emission Factors; MB: Material Balance; ST: Stack testing or monitoring;
EC: Engineering Calculation

8. STACK INFORMATION

a) Enclose a line diagram identifying all sources, which discharge from or vent to this stack. Briefly describe all source units identified on the line diagram. The line diagram should also include the gas flow rate (Nm^3/hr) and pollutants emitted to the atmosphere (g/sec).
Drawing No. _____

b) Provide the following information *(add additional columns if necessary)*

Stack ID	Dedicated/Common	Stack Base Height Above mean sea level (A) (m)	Stack height above ground (B) (m)	Total Stack height (A+B) (m)	Stack height above adjacent structure (m)	Inside stack diameter (m)	Stack Coordinates (UTM)

9. FLUE GAS CHARACTERISTICS

Stack ID	Flow Rate (Nm^3/hr)	Exit Temp (^oC)	Exit Velocity (m/s)	Percent Moisture (%)	Oxygen Content (%)

10. SAMPLING/ ANNUAL STACK TESTING

a) Provide list of emissions tested annually:

Source	Pollutant

b) Provide drawing of the sampling ports and platforms

Drawing No. _____

c) Provided diameter of sampling port and its distance from the last disturbance point:

_____

(Note: Sampling port and location shall be as per USEPA requirement)

11. CONTINUOUS EMISSION MONITORING SYSTEMS (CEMS)

Provide the following information *(add additional rows if necessary)*

Source	Pollutant	Type of Monitoring Devices	Justification if CEMS Not Installed
	NO_X		
	SO_2		
	O_2		
	HCl		
	PM		
	Other (Please Specify)		
	NO_X		
	SO_2		
	O_2		
	HCl		
	PM		

	Other (Please Specify)		
	NO_X		
	SO_2		
	O_2		
	HCl		
	PM		
	Other (Please Specify)		

Also, provide information on measures in place for monitoring, recordkeeping, calibration and maintenance of continuous emission monitoring systems.

List the relevant section/ page numbers in the amendment

FORM PA-A4
PERMIT APPLICATION FOR AUTHORIZATION TO OPERATE A FLARE

A separate application/ section is required for each flare in the facility unless they are identical

1. USE OF FLARE

a. Indicate type of flares (including emergency flares, if any) which are planned for the proposed plant.

[ ] Normal
[ ] Emergency (Power Failure, shutdown/turnaround, startup, upsets & off-spec material)

Flare ID: _____

b. Provide a description of the design of the flare. The description should include details regarding

- Provide RC Coordinates of the location: X:_____, Y:_____
- Gas collection system.
- Knock-out drum.
- System to prevent flash back.
- Ignition and flame detection systems.
- Flare assisted by Steam / Air
- Source of steam/ air.
- Competing demands for steam/air under normal conditions and in emergencies.
- Manufacturer's name and model number.
- Type of Metering System for measuring fluids to be flared

List the relevant section/ page numbers in the attachment

c. Provide the following drawing

- Location of the flare: Drawing No:_____

- The flare header system presenting sources of materials to be flared

Drawing No. _____

- The knock-out drum

Drawing No. _____

- The flare tip

Drawing No. _____

2. INFORMATION ON THE FLARE

Provide the following information to describe the flare:

Type (elevated, ground flare, etc)	
Base height above sea level (m) – A	
Height above ground level (m) – B	
Total Flare Stack Height (m) – A+B	
Effective release height (m)	
Flame length (m)	
Cross sectional area (m^2)	
Average design feed rate (kg/hr)	
Maximum design feed rate (kg/hr)	
Combustion Temperature (°C)	
Destruction Removal efficiency (%)	
Exit Temperature (°C)	
Net Heating Value of the flared gas including supplementary fuel (MJ/scm)	
Air assistance feed rate (m^3/hr)	
Steam assistance feed rate (kg/hr)	
Maximum smokeless design flow rate (kg/hr)	
Maximum exit velocity at the tip of flare (m/sec) (shall be less than 122 m/sec)	

3. SUPPLEMENTARY FUEL

Provide the following information on the supplementary fuel:

Fuel type	
Use (start-up, shutdown, emergency, etc.)	
Average fuel feed rate (m^3/hr)	
Max. fuel feed rate (m^3/hr)	
Heat content (MJ/scm)	
Sulfur content	
H_2S content (g/dscm)	
Nitrogen content (wt%)	

4. FLUIDS FLARED/ FLARING SCENARIOS

Provide all process units / sources that are connected to the flare *(add additional lines if necessary)*

Process / Source	Main Fluids Flared	Scenarios *	Frequency of Flaring (No. of hrs/day)	Flaring Rate (kg/hr)

** Fill all scenarios for flaring that may occur (normal, start-up, emergency, off-spec raw material or product, process upsets, power failure, etc.)*

5. INFORMATION ON THE FLUIDS TO BE FLARED

Provide information on the composition of fluids to be flared for each scenario

Item	**Scenarios**			
	Normal	Power Failure	Start-up	Shut-down
Name & Composition of Fluid				
1 *Hydrocarbons*				
2 *Sulfur (S)*				
3 *Water (H_2O)*				
4 *Nitrogen (N)*				
5 *Carbon Monoxide (CO)*				
6 *Carbon Dioxide (CO_2)*				

Item	Scenarios			
	Normal	Power Failure	Start-up	Shut-down
7 *Inert gases*				
Heat content (MJ/scm)				
Max feed rate (kg/h)				
Total heat release rate (kcal/sec)				
Quantity of steam available (kg/h)				
Quantity of air available (m^3/h)				
Excess air (%)				
Combustion efficiency				
Volume of flue gases (scm/sec)				

6. RADIATION ISOPLETHS:

Enclose radiation isopleths superimposed on facility layout and adjacent areas.

7. NOISE

Indicate noise levels 100m from the center of the flare during:

	Noise Level (dBA)
Emergency	
Normal	

8. Illumination (Light Pollution)

Indicate illumination levels 100m from the center of the flare during:

	Lux
Emergency	
Normal	

9. AIR POLLUTANTS

Complete the following table for all emission sources. For sources that are equipped with an emission control device, provide data after the emission control.

Source	Unit ID	Pollutant	Max. Emission Rate (kg/hr)	Emission Rate (t/y)	Emission Estimation Technique*

* Provide a sample calculation for emission estimates. Emission estimation must be based on one of the following

EF: Emission Factors EC: Engineering Calculation

10. CONTINUOUS IMAGING (DIGTIAL RECORDING) SYSTEM

a. New Facility

Provide the details of the System

b. Existing Facility

Provide the details of the system, if installed.

11. FLARE FLOW MONITORING DEVICE

a. Provide the details of the flow monitoring device

b. Provide the following drawing

Location of the flow monitoring device:
Drawing No: _____

FORM PA-A5
PERMIT APPLICATION FOR AUTHORIZATION TO OPERATE POINT SOURCES OTHER THAN BOILERS, FURNACES, FLARES AND INCINERATORS

1. EMISSION SOURCES

a) Sources Other than Boilers, Furnaces, Flares, Incinerators e.g. scrubber, cyclone separator, process vents, etc.

List of Sources emitting air pollutants that are not covered in PA-A1, PA-A2, PA-A3 and PA-A4 *(add additional rows if necessary).*

Source	Unit ID	Type of Control Device	Control Device ID	Stack ID

b) Provide the following drawings

- Detailed process flow diagram identifying all emission sources

Drawing No. _____

- Layout indicating the location of the sources and point where they are emitted to the atmosphere

Drawing No. _____

c) Provide source description identifying all emission streams connected to the control device

d) Provide source description identifying all emission streams not connected to the control device (if any)

2. EMISSIONS CONTROL

Are there any emission control systems in place?

[ ] Yes [ ] No

If yes, specify type of the control device

Source	Control Device*	Control Unit ID	Expected useful life	No. of units	Arrangements Series/ Parallel	Dedicated / common	Pollutant	Pollutant Inlet Conc. (mg/m³)	Pollutant Inlet Load (t/y)	Control Efficiency (%)	Waste Generation (If any)		
											Quantity (t/y)	Important properties	Disposal Method

Provide technical information, design details along with vendor guarantees for each control device

List the relevant section/ page numbers in the attachment

3. BEST AVAILABLE TECHNIQUES (BAT) ANALYSIS

a) Are there any sources (other than boilers, furnaces and incinerators) with the potential to emit more than 100 TPY of pollutants as listed in Table 2A of RCER-2025, Volume I, before emission control *(for new and modified facilities only)?*

[ ] Yes [ ] No

Please provide evidence for the pre-abatement emission load based on the following:
EF: Emission Factors; MB: Material Balance
ST: Stack testing or monitoring; EC: Engineering Calculation

b) Are there any sources (other than boilers, furnaces and incinerators) with the potential to emit more than 10 TPY of hazardous air pollutants (HAP) as listed in Table 2-C of RCER-2025, Volume I, if before emission control *(for new and modified facilities only)*?

[ ] Yes [ ] No

Please provide evidence for the pre-abatement emission load based on the following:
EF: Emission Factors; MB: Material Balance
ST: Stack testing or monitoring; EC: Engineering Calculation

c) Are there any sources (other than boilers, furnaces and incinerators) that are currently non-compliant with point source emission standards as listed in Table 2-B of RCER-2025, Volume I and/or EPO as applicable *(for existing or modified facilities)?*

[ ] Yes [ ] No

Please provide evidence, for example, of last stack testing reports (reference any attachments)

_____
_____
_____

If the answer to any of the above questions is yes, provide BAT analysis to justify the selection of each relevant emission control device.

List the relevant section/ page numbers in the attachment

4. AIR POLLUTANTS

Complete the following table for all emission sources. For sources that are equipped with an emission control device, provide data after the emission control.

Source	Unit ID	Stack ID	Pollutant	Max Conc. (mg/m^3)	Max. Conc. in Regulated Unit		Max. Emission Rate (kg/hr)	Emission Rate (t/y)	Emission Estimation Technique*
					Conc.	Unit			

* Provide a sample calculation for emission estimation. Emission estimation must be based on one of the following

EF: Emission Factors
MB: Material Balance
ST: Stack testing or monitoring
EC: Engineering Calculation

5. STACK INFORMATION

a) Enclose a line diagram identifying all sources, which discharge from or vent to this stack. Briefly describe all source units identified on the line diagram. The line diagram should also include the gas flow rate (Nm^3/hr) and pollutants emitted to the atmosphere (g/sec).
Drawing No. _____

b) Provide the following information *(add additional columns if necessary)*

Stack ID	Dedicated/Common	Stack Base Height Above mean sea level (A) (m)	Stack height above ground (B) (m)	Total Stack height (A+B) (m)	Stack height above adjacent structure (m)	Inside stack diameter (m)	Stack Coordinates (UTM)

6. FLUE GAS CHARACTERISTICS

Stack ID	Flow Rate (Nm^3/hr)	Exit Temp (°C)	Exit Velocity (m/s)	Percent Moisture (%)	Oxygen Content (%)

7. SAMPLING/ ANNUAL STACK TESTING

a) Provide list of emissions monitored annually:

Source	Pollutant

b) Provide drawing of the sampling ports and platforms

Drawing No. _____

c) Provide diameter of sampling port and its distance from the last disturbance point:

_____

(Note: Sampling port diameter and location shall be as per USEPA requirement)

8. CONTINUOUS EMISSION MONITORING SYSTEMS (CEMS)

Please provide the following information *(add additional rows if necessary)*

Source	Pollutant	Type of Monitoring Devices	Justification If CEMS Not Installed
	NO_X		
	SO_2		
	CO		
	O_2		
	THC		
	Other (Please specify)		
	NO_X		
	SO_2		
	CO		
	O_2		
	THC		
	Other (Please specify)		
	NO_X		
	SO_2		
	CO		
	O_2		
	THC		
	Other (Please specify)		

Also, please provide information on measures in place for monitoring, recordkeeping, calibration and maintenance of continuous emission monitoring systems.

List the relevant section/ page numbers in the attachment

FORM PA-A6
PERMIT APPLICATION FOR AUTHORIZATION TO EMIT FUGITIVE EMISSIONS FOR THE SOURCES EXCLUDING STORAGE TANKS

1. FUGITIVE EMISSIONS SOURCES

a) Provide a list of Volatile Organic Compounds (VOC) processed at the facility *(add additional rows if necessary)*

b) Provide a list of Hazardous Air Pollutants (HAP) processed at the facility *(add additional rows if necessary)*

c) Provide a list of Dust Sources at the facility (add additional rows if necessary)

2. FUGITIVE EMISSION MONITORING PROGRAM

Provide an outline of fugitive emission monitoring and maintenance program to be adopted by the facility to control emissions from the affected components.

List the relevant section/ page numbers in the attachment

3. FUGITIVE EMISSION ESTIMATES

a) Provide an estimate in accordance with USEPA AP42 Emission Factor (latest revision) of the quantity of fugitive emissions of streams containing more than 10 wt% of VOCs.

VOC Source		Component Count	Mass Fraction of Organics (%)	Uncontrolled Avg. Emission Factors (1)	Total Leaking Components (2)	Un-controlled Emissions (t/y) (1×2)	Leaking Components After LDAR (3)	Un-controlled Emissions After LDAR (t/y) (A=3×1)	Control Efficiency (%)	No. of Non-Leaking Components	Non-Leaking Components Emission Factor*	Emission from non-leaking components (t/y) (B)	Total Emissions (tons/year) (A+B)
Valves	Gas												
	Light Liquid												
	Heavy Liquid												
Pumps	Gas												
	Light Liquid												
	Heavy Liquid												
Flanges/ Connectors	Gas												
	Light Liquid												
	Heavy Liquid												
Pressure Relief Valves	Gas												
	Light Liquid												
	Heavy Liquid												
Comp-ressors	Gas												
	Light Liquid												

	Heavy Liquid												
Pump Seals	Gas												
	Light Liquid												
	Heavy Liquid												
Others (specify)	Gas												
	Light Liquid												
	Heavy Liquid												
Total													

*Emission factor shall be used for facilities with no LDAR program implemented. Actual screening values shall be used for other facilities for calculating emissions. (Refer: EPA-453/R-95-017 1995 Protocol for Equipment Leak Emission Estimates)

b) Provide an estimate in accordance with USEPA AP42 Emission Factor (latest revision) of the quantity of fugitive emissions of streams containing more than 5 wt% of Hazardous Air Pollutants (HAP):

HAP Source		Component Count	Mass Fraction of Organics (%)	Uncontrolled Avg. Emission Factors (1)	Total Leaking Components (2)	Un-controlled Emissions (t/y) (1×2)	Leaking Components After LDAR (3)	Un-controlled Emissions After LDAR (t/y) (A=3×1)	Control Efficiency (%)	No. of Non-Leaking Components	Non-Leaking Components Emission Factor*	Emission from non-leaking components (t/y) (B)	Total Emissions (tons/year) (A+B)
Valves	Gas												
	Light Liquid												
	Heavy Liquid												
Pumps	Gas												

	Light Liquid												
	Heavy Liquid												
Flanges/ Connectors	Gas												
	Light Liquid												
	Heavy Liquid												
Pressure Relief Valves	Gas												
	Light Liquid												
	Heavy Liquid												
Comp-ressors	Gas												
	Light Liquid												
	Heavy Liquid												
Pump Seals	Gas												
	Light Liquid												
	Heavy Liquid												
Others (specify)	Gas												
	Light Liquid												
	Heavy Liquid												
Total													

*Emission factor shall be used for facilities with no LDAR program implemented. Actual screening values shall be used for other facilities for calculating emissions. (Refer: EPA-453/R-95-017 1995 Protocol for Equipment Leak Emission Estimates)

4. FUGITIVE EMISSIONS/ ODOURS FROM OPEN WASTEWATER SYSTEMS

a) Estimate the emissions from open wastewater systems (e.g. aeration tanks, lagoons, API separators etc.) in tons/year using USEPA AP 42 or Water 9 (USEPA approved procedure)

Fugitive Emission Source	Pollutant	Type of Compound (VOC/ HAP)	Quantity Emitted (t/y)

b) Describe the potential for odors from open wastewater systems (e.g. aeration tanks, lagoons, API separators etc)

List the relevant section/ page numbers in the attachment

c) Describe systems used to cover the ponds to control the emissions of VOCs and odorous compounds from open wastewater systems

List the relevant section/ page numbers in the attachment

5. FUGITIVE DUST EMISSIONS FROM OPEN AREA SOURCES/WAREHOUSES

Estimate the emissions from area sources (e.g. open storage of solid materials; such as: ores, sand, warehouses etc.) in tons/year using USEPA AP 42 or Other USEPA approved procedure

Fugitive Emission Source	Pollutant		Quantity Emitted (t/y) *	Emission Estimation Technique
	PM_{10}	$PM_{2.5}$		

* Provide a sample calculation for emission estimates. Emission estimation must be based on one of the following

EF: Emission Factors
ST: Stack Testing or Monitoring
MB: Material Balance
EC: Engineering Calculations

6. FENCE-LINE MONITORING FOR VOCS OR ODOROUS COMPOUNDS BY AMBIENT AIR ANALYZERS

a) Provide the following information (add rows if necessary)

Fugitive Emission Source (Nearby)	Pollutant	Name and Type of Ambient Air Analyzer
		Total No. of Analyzer Installed at the Facility: _____ Fence-line: _____

b) Provide information on measures in place for monitoring, recordkeeping, calibration and maintenance of Ambient Air Analyzers.

List the relevant section/page number in the attachment

c) All Ambient Air Analyzers locations on Facility's Map

Drawing No: _____

PERMIT APPLICATION FORMS

Water Environment

FORM PA-W1
PERMIT APPLICATION FOR AUTHORIZATION TO DISCHARGE SANITARY WASTEWATER TO A SANITARY WASTEWATER TREATMENT FACILITY

1. DISCHARGE RATES OF SANITARY WASTEWATER

Average discharge rate (m^3/day)		Maximum Design Discharge rate (m^3/day)	
Maximum discharge rate as expected during normal operation (m^3/hour)			

2. DISCHARGE OF OTHER STREAMS

a) Is there any wastewater other than sanitary wastewater that will be discharged of to the sanitary system?

[ ] Yes [ ] No

If yes, complete both (b) and (c).

b) Describe the sources and justify why they are being discharged to the sanitary system

List the relevant section/ page numbers in the addendum

Source/ Process	Average Quantity (m^3/day)	Maximum Quantity (m^3/ hr)

c) Complete the following table providing information on each constituent that will or may be present in the wastewater

Parameter*	Average Concentration (mg/l)	Maximum Concentration (mg/l)

* *As per Table 3B of RCER-2025 Volume I and other Parameters if any*

3. MODE OF SANITARY WASTE WATER DISCHARGE

Will the wastewater be discharged to the SWTP?

[ ] Yes, via sewer [ ] Yes, via tanker [ ] No

If via sewer, provide pump station number: _____

If no or via tanker, provide justification

List the relevant section/ page numbers in the attachment

FORM PA-W2
PERMIT APPLICATION FOR AUTHORIZATION TO DISCHARGE TREATED SANITARY WASTEWATER TO THE RED SEA *(Yanbu and Jazan Only)*

1. DISCHARGE RATES

Source (s)	Average Quantity (m^3/day)	Maximum Discharge Quantity (during normal operation) (m^3/hour)	Maximum Design Quantity (m^3/day)

2. SANITARY WASTEWATER TREATMENT SYSTEM

Describe the wastewater treatment system (including the effluent handling units, data on design loading rates and design pollutant removal efficiencies)

List the relevant section/ page numbers in the attachment

Provide a flow diagram of the sanitary wastewater treatment system

Drawing No. _____

Site plan indicating the discharge point at the plant and the location of discharge to the Red Sea (Note: Provide RC and UTM coordinates of discharge location)

Drawing No. _____

3. WASTE WATER OTHER THAN SANITARY WASTE WATER TO THE SYSTEM

Whether the facility will discharge any waste water stream other than sanitary wastewater to the sanitary waste water treatment system?

[ ] Yes [ ] No

If yes, provide quality parameters for the influent stream

4. QUALITY PARAMETERS OF INFLUENT AND EFFLUENT FROM THE TREATMENT SYSTEM

Complete the following table providing information on each constituent that will or may be present in the wastewater stream (influent to the treatment system and treated effluent).

Parameter*	Influent concentration (mg/l)**		Effluent concentration (mg/l)	
	Daily Average	Daily Maximum	Daily Average	Daily Maximum

* As per Table 3C of RCER-2025 Volume I and other parameters if any

**Provide the influent concentration only if other waste water streams are also joining in the sanitary waste water treatment system.

5. SLUDGE GENERATION

Details of sludge generated from the effluent handling and treating units shall be provided in the following table *(Insert more rows if there is a need)*.

Type of Sludge	Quantity (t/y)	Properties	Method of on-site storage	Disposal Method	Frequency of Disposal

FORM PA-W3
PERMIT APPLICATION FOR AUTHORIZATION TO DISCHARGE INDUSTRIAL WASTEWATER TO AN INDUSTRIAL WASTEWATER TREATMENT FACILITY

1. INDUSTRIAL WASTEWATER GENERATION:

Provide schematic flow diagrams showing rate of wastewater generation including the flow rate (m^3/day) and significant quality parameters concentration from each process unit or source.

Diagram No. _____

2. DISCHARGE RATE OF INDUSTRIAL WASTEWATER:

Average discharge rate (m^3/day)		Design discharge rate, (m^3/day)	
Maximum discharge rate during normal operation (m^3/hour)			
Discharge point location (RC and UTM coordinates)			

Sources and quantity of wastewater being generated

Source (s)	**Composition**	**Average Quantity** (m^3/day)	**Maximum Quantity** (m^3/hour)	**Final Destination (E.g. IWTP, Variance, Re-use, Pond, etc.)**

Details of ponds at the facility (If Applicable)

Sr. No.	**Name of Pond**	**Capacity (m^3)**	**Cover Details**	**Source & Type of Water Discharged to Pond**	**Final Destination (e.g. IWTP, Re-use, etc.)**

3. WASTEWATER PRE-TREATMENT SYSTEM:

a) Is there a wastewater pre-treatment system: [ ] Yes [ ] No

If the answer is no, go to question 4

b) Provide Best Available Techniques (BAT) analysis for the wastewater pre-treatment *(for new and modified facilities only)*

List the relevant section/ page numbers in the attachment

c) Provide Best Available Techniques (BAT) analysis/internal management for the wastewater pre-treatment *(for existing non-complying facilities only)*

List the relevant section/ page numbers in the attachment

d) Describe the wastewater pre-treatment system including:

i. Process description for the pretreatment plant.

List the relevant section/ page numbers in the attachment

ii. Provide PFD's with stream compositions and flow rates

iii. Provide design details of specific process units (e.g. Lagoons, neutralization, flocculation, MBR, UF, etc.) with pollutant design load and removal efficiencies.

iv. Provide vendor guarantee for pollutant removal efficiency of each treatment unit.

List the relevant section/ page numbers in the attachment

Process Flow Diagram No. _____

v. Treatment chemicals (if any) and the quantity to be used *(Insert more rows of there is a need)*

Chemical (s)	Average Quantity (kg/day)	Maximum Quantity (kg/hr)

vi. Will the pre-treatment of the wastewater lead to any source of air emissions?

[ ] Yes [ ] No

If yes, confirm that air emissions are included in Form PA-A6 "Fugitive Emissions"

[ ] Yes [ ] No

4. WASTEWATER QUALITY – NORMAL OPERATIONS:

Complete the following table providing information on the composition of the wastewater effluent during normal operations. Where a pre-treatment system is used, include the influent composition to the pre-treatment system.

Parameter*	**Influent concentration (mg/l)**		**Effluent concentration (mg/l)**	
	Daily Average	Hourly Maximum	Daily Average	Hourly Maximum

**As per Table 3B of RCER-2025, Volume I and other parameters if any*

5. INDUSTRIAL WASTEWATER QUALITY - UPSET CONDITIONS/ TURNAROUNDS

a) Provide details on the wastewater generated during upset conditions or turnarounds

Frequency of upsets _____ times every _____ year(s)
Frequency of turnarounds _____ times every _____ year(s)

Average discharge rate (m^3/day):		Maximum discharge rate (m^3/hour):	

b) Sources and quantity of wastewater being discharged during such conditions

Source (s)	**Average Quantity** (m^3/day)	**Maximum Quantity** (m^3/hour)

c) Procedures for ensuring that wastewater generated meets RC criteria:

List the relevant section/ page numbers in the attachment

d) Complete the following table providing information on the composition of the wastewater effluent during upset conditions/turnarounds. Where a pre-treatment system is used, include the influent composition to the pre-treatment system:

Parameter*	**Influent concentration (mg/l)**		**Effluent concentration (mg/l)**	
	Daily Average	Hourly Maximum	Daily Average	Hourly Maximum

***** *As per Table 3B of RCER-2025, Volume I and other parameters if any*

6. HOLDING POND

a) Provide information on the holding pond that will retain 72 hours of industrial wastewater

Maximum discharge quantity in 3 days (m^3):		Capacity of the Holding Pond (m^3):	

b) Provide design details of the Pond(s):

i. Construction/design basis
ii. Dimensions
iii. Inlet and outlet structures
iv. Liner characteristics
v. Oil/water or solids separation devices
vi. Cover to control VOCs and Odorous emissions

List the relevant section/ page numbers in the attachment

Design Drawing No. _____

7. INDUSTRIAL WASTEWATER DISCHARGE LOCATION

Will the industrial wastewater be discharged to the IWTP?

[ ] Yes, via sewer [ ] No

If via sewer, provide pump station number and RC and UTM coordinates _____

If no or via tanker, provide justification

List the relevant section/ page numbers in the attachment

8. SAMPLING

a) Provide location of sampling points, flow meter, flow totalizer, auto-sampling system and continuous monitoring analyzers for temperature, pH, conductivity, TOC and other parameters if requested by RC.

Drawing No. _____

b) Provide details of continuous monitoring analyzers used for effluent monitoring

List the relevant section/ page numbers in the attachment

c) Identify list of additional parameters to be regularly monitored and reported to the Royal Commission in the monthly self-monitoring reports

Parameter*	Frequency

* *As per Table 3B of RCER-2025, Volume I and other parameters if any*

9. SLUDGE GENERATION

Provide details of the sludge generated from the system *(Insert more rows if necessary.)*

Type of Sludge	Quantity (t/month)	Hazardous properties	Hazardous Constituents	Method of On-site Storage	On site Treatment	Disposal Method	Frequency of Disposal

Will this sludge lead to any source of air emissions?

[ ] Yes [ ] No

If yes, confirm that air emissions are included in Form PA-A6 "Fugitive Emissions".

[ ] Yes [ ] No

FORM PA-W4
PERMIT APPLICATION FOR AUTHORIZATION TO DISCHARGE TREATED INDUSTRIAL WASTEWATER TO THE RED SEA *(Yanbu and Jazan Only)*

1. INDUSTRIAL WASTEWATER GENERATION:

Provide schematic flow diagrams showing rate of wastewater generation including the flow rate (m^3/day) and significant quality parameters concentration from each process unit or source.
Diagram No. _____

2. DISCHARGE POINT COORDINATES (RC and UTM Coordinates)

North: East:

3. DISCHARGE RATE OF INDUSTRIAL WASTEWATER:

Average discharge rate (m^3/day)		Maximum design discharge rate (m^3/hour)	
Maximum discharge rate during normal operation (m^3/hour)			

Sources and quantity of wastewater being discharged

Source (s)	**Average Quantity (m^3/day)**	**Maximum Quantity** (m^3/hour)

4. WASTEWATER TREATMENT SYSTEM

e) Is there a wastewater pre-treatment system

[ ] Yes [ ] No

If the answer is no, go to question 5

f) Provide Best Available Techniques (BAT) analysis for the wastewater treatment *(for new and modified facilities only)*

List the relevant section/ page numbers in the attachment

g) Describe the wastewater treatment system including:

i. Process description for the treatment plant.

List the relevant section/ page numbers in the attachment

ii. Design details of all the effluent handling units with associated PFD's (include data on design loading rates and design pollutant removal efficiencies)

List the relevant section/ page numbers in the attachment

Diagram No. _____

iii. Treatment chemicals (if any) and the quantity to be used *(Insert more rows of there is a need)*

Chemical (s)	Average Quantity (kg/day)	Maximum Quantity (kg/hr)

iv. Will the treatment of the wastewater lead to any source of air emissions

[ ] Yes [ ] No

v. If yes, confirm that air emissions are included in Form PA-A6 "Fugitive Emissions"

[ ] Yes [ ] No

5. WASTEWATER QUALITY – NORMAL OPERATIONS:

Complete the following table providing information on the composition of the wastewater effluent during normal operations. Where a treatment system is used, include the influent composition to the treatment system.

Parameter*	Influent concentration (mg/l)		Effluent concentration (mg/l)	
	Monthly Average	Daily Maximum	Monthly Average	Daily Maximum

* *As per Table 3C of RCER-2025, Volume I and other parameters if any*

6. INDUSTRIAL WASTEWATER QUALITY - UPSET CONDITIONS/ TURNAROUNDS

e) Provide details on the wastewater generated during upset conditions or turnarounds

Frequency of upsets _____ times every _____ year(s)
Frequency of turnarounds _____ times every _____ year(s)

Average discharge rate (m^3/day)		Maximum discharge rate (m^3/hour)	

f) Sources and quantity of wastewater being discharged during such conditions

Source (s)	Average Quantity (m^3/day)	Maximum Quantity (m^3/ hour):

g) Procedures for ensuring that wastewater generated meets RC criteria:

List the relevant section/ page numbers in the attachment

h) Complete the following table providing information on the composition of the wastewater effluent during upset conditions/ turnarounds. Where a treatment system is used, include the influent composition to the treatment system:

Parameter*	**Influent concentration (mg/l)**		**Effluent concentration (mg/l).**	
	Monthly Average	Daily Maximum	Monthly Average	Daily Maximum

***** *As per Table 3B of RCER-2025, Volume -I and other Parameters if any*

7. HOLDING POND

c) Provide information on the holding pond that will retain 72 hours of industrial wastewater

Maximum discharge quantity in 3 days (m^3):		Capacity of the Holding Pond (m^3):	

d) Provide design details of the Pond(s):

vii. Construction/design basis

viii. Dimensions

ix. Inlet and outlet structures

x. Liner characteristics

xi. Oil/water or solids separation devices

List the relevant section/ page numbers in the attachment

Drawing No. _____

8. MEANS OF TREATED INDUSTRIAL WASTEWATER DISCHARGE

a. What are the means to be used for discharging the treated industrial wastewater to the Red Sea?

[ ] Via pipeline [ ] Via tanker [ ] Other means

If via pipeline, provide pump station number and RC and UTM coordinates _____

If via tanker or other means provide justification

List the relevant section/ page numbers in the attachment

b. Site plan indicating the proposed location (also RC and UTM coordinates) of the discharge point to the Red Sea

Drawing No: _____

9. SAMPLING

c. Provide location of sampling points, flow meter, flow totalizer, auto-sampling system and any continuous monitoring analyzers

Drawing No. _____

d. Provide details of the cabin to be built outside facility boundary for housing the auto-sampling system

Drawing No. _____

e. Provide details of any continuous monitoring analyzers used for effluent monitoring

List the relevant section/ page numbers in the attachment

f. Identify a list of parameters to be regularly monitored and reported to the Royal Commission in the monthly self-monitoring reports

Parameter	Frequency

10. SLUDGE GENERATION

Provide details of the sludge generated from the system *(Insert more rows if necessary.*

Type of Sludge	Quantity (t/month)	Physical Properties	Chemical Composition	Hazardous Constituents	Method of On-site Storage	Disposal Method	Frequency of Disposal

Will this sludge lead to any source of air emissions?

[ ] Yes [ ] No

If yes, confirm that air emissions are included in Form PA-A6 "Fugitive Emissions".

[ ] Yes [ ] No

FORM PA-W5
PERMIT APPLICATION FOR AUTHORIZATION TO DISCHARGE NON-CONTACT COOLING WATER, BRINE* AND VARIANCE STREAM

1. NON-CONTACT COOLING WATER

Provide a schematic flow diagram of the non-contact cooling water system including inlet, heat exchangers, distribution and discharge.

Diagram No. _____

2. RATE OF NON-CONTACT COOLING WATER

Average discharge rate (m^3/day)		Maximum design discharge rate (m^3/hour)	
Maximum discharge rate during normal operation (m^3/hour)			

3. TEMPERATURE

What is the estimated increase in temperature of the non-contact cooling water passing through the system?

Daily average increase in Temp (ºC):		Maximum increase in Temp (ºC):	

4. ADDITIVES

a) Will supplementary chlorination be used?

[ ] Yes [ ] No

b) Will any chemical(s) be introduced in the non-contact cooling water system on a continuous or intermittent basis?

[ ] Yes [ ] No

If the answer is "No" go to Question (5)

c) If yes, provide information on the chemical(s):

Chemical	Composition	Application Rate/ Frequency	Conc. in Final Discharge (mg/l)

d) Submit Safety Data Sheets (SDS) of all the additives (except for chlorine)

List the relevant section/ page numbers in the addendum

5. CHARACTERISTICS OF VARIANCE STREAMS DISCHARGES

d) Any water stream(s) will be introduced to the non-contact cooling water system on a continuous or intermittent basis (variance stream) and/or to the canal or sea:

[ ] Yes [ ] No

If the answer is "No" go to Question (7)

e) If yes, complete the following tables providing information on each Variance Stream/Brine which will be introduced either continuously (Brine) or intermittently (variance stream)

Source	Discharge Rate (m^3/day) Intermittent (For Variance Stream Only)		Frequency of Discharge for Intermittent Streams
	Average	Maximum	

Quality of the variance stream prior to mixing with the return cooling water

Source	Parameter*	Average Concentration (mg/l)	Maximum Concentration (mg/l)

** As per Table 3C-1 of RCER-2025, Volume I and other Parameters if any*

6. CHARACTERISTICS OF BRINE DISCHARGES TO THE SEAWATER OUTFALL

a) Any wastewater (Brine) stream(s) will be introduced to the seawater outfall:

[ ] Yes [ ] No

b) If yes, complete the following tables providing information on brine which will be introduced to the seawater outfall

Source	Discharge Rate (m^3/hour)	
	Average	Maximum

Quality of the brine prior to mixing with the seawater outfall

Source	Parameter*	Average Concentration (mg/l)	Maximum Concentration (mg/l)

* *As per Table 3C of RCER-2025, Volume I and other Parameters if any*

7. SAMPLING

d) Provide location of sampling points, flow meter, flow totalizer and continuous monitoring analyzers for temperature (inlet & outlet), pH, Ammonia and other parameters if requested by RC for the seawater cooling return.

Drawing No. _____

e) Provide location of sampling points, flow meter, flow totalizer, and continuous monitoring analyzers for pH, Ammonia and other parameters if requested by RC for the variance stream/ brine prior to mixing with the seawater cooling return.

Drawing No. _____

f) Provide location of sampling points, flow meter, flow totalizer and continuous monitoring analyzers for temperature (inlet & outlet), pH, Ammonia and other parameters if requested by RC for the brine prior to mixing with the seawater outfall.

Drawing No. _____

g) Provide details of continuous monitoring analyzers used for each variance stream / brine / seawater cooling return

List the relevant section/ page numbers in the attachment

h) Identify additional list of parameters to be regularly monitored and reported to the Royal Commission in the monthly self-monitoring reports for seawater cooling return

Parameter	Frequency

i) Identify additional list of parameters to be regularly monitored and reported to the Royal Commission in the monthly self-monitoring reports for each variance stream / brine

Name of Variance Stream/Brine	Parameter	Frequency

j) Provide a site plan indicating the proposed location (also RC and UTM coordinates) of the outfall

Drawing(s) No. _____

k) Provide a site plan indicating the proposed location (also RC and UTM coordinates) of the variance stream/brine discharged to the seawater cooling return.

Drawing(s) No. _____

FORM PA-W6
PERMIT APPLICATION FOR AUTHORIZATION TO OPERATE COOLING TOWERS

Note: A separate application has to be filled for each cooling tower, unless they are identical.

1. NON-CONTACT COOLING WATER

Provide a schematic flow diagram of the non-contact cooling water system including inlet, heat exchangers, distribution and discharge.

Diagram No. _____

2. TYPE OF WATER USED IN COOLING TOWER

[ ] Seawater
[ ] Reclaimed Water
[ ] Other (e.g. raw water, drinking water, desalinated water): _____

3. TYPE OF COOLING TOWER

[ ] Fan Assisted Natural Draught (FAND)
[ ] Mechanical Draught (MD)

4. DESIGN DETAILS OF COOLING TOWER

Length (m)		Width (m)	
Height (m)		No. of cells	
Temp. In (ºC)		Temp. Out (ºC)	
Total Water Circulation Rate in the System (m^3/hour)		Drift Losses (% of total circulated water)	
Makeup Water (m^3/h)		Air Velocity (ft/s)	

Provide plot plan indicating the location of the cooling towers and their associated inlet and outlet flow of water.

Diagram No. _____

5. DISCHARGE RATE OF COOLING TOWER BLOW DOWN

Average discharge rate (m^3/day)		Maximum discharge rate (m^3/hour)	

6. LOCATION OF BLOW DOWN DISCHARGE

[ ] Industrial Wastewater Treatment Plant (IWTP)
[ ] Seawater Cooling Return

7. ADDITIVES*

e) Will supplementary chlorination be used?

[ ] Yes [ ] No

f) Will any chemical(s) be introduced in the cooling water system on a continuous or intermittent basis?

[ ] Yes [ ] No

If the answer is no, go to question 8

g) Provide information on the chemical(s):

Chemical	Composition	Application Rate/ Frequency	Conc. in Final Discharge (mg/l)

h) Submit Safety Data Sheets (SDS) of all the additives (except for chlorine)

*Chromium based water treatment chemicals shall not be used in cooling towers.

List the relevant section/ page numbers in the addendum

8. CHARACTERISTICS OF BLOWDOWN (VARIANCE STREAM)

Quality of the blowdown prior to mixing with the return cooling water

Parameter*	Average Concentration (mg/l) *	Maximum Concentration (mg/l) *

***** *As per Table 3-C-1 of RCER-2025, Volume I and other parameters if any*

9. SAMPLING

l) Provide location of sampling points, flow meter, flow totalizer and continuous monitoring analyzers for pH, Ammonia and other parameters if requested by RC for the cooling tower blowdown.

Drawing No. _____

m) Provide details of continuous monitoring analyzers (pH, Ammonia and other parameters if requested by RC) used for cooling tower blowdown

List the relevant section/ page numbers in the attachment

n) Identify a list of additional parameters to be regularly monitored and reported to the Royal Commission in the monthly self-monitoring reports for cooling tower blow-down

Parameter	Frequency

o) Biological Monitoring Program for Legionella Bacteria (Existing Facilities Only)

Cooling Tower ID	Year	Concentration (CFU/ml) (Attach Reports)
	Year 1	
	Year 2	
	Year 3	
	Year 4	
	Year 5	

10. LOCATION OF THE OUTFALL TO THE RED SEA (YANBU)

Provide a site plan indicating the proposed location (also RC and UTM coordinates) of the outfall to the Red Sea

Drawing(s) No. _____

11. COOLING TOWER BOTTOM SLUDGE

Provide the following information regarding the cooling tower bottom sludge

Quantity (ton)	Hazardous properties	Hazardous Constituents	Method of On-site Storage	On site Treatment	Disposal Method	Frequency of Disposal

FORM PA-W7
PERMIT APPLICATION FOR AUTHORIZATION TO DISCHARGE STORMWATER AND SURFACE RUN-OFF WATER

1. STORM WATER DISCHARGES

Provide details of the site drainage and storm water collection system. Include the followings:

a. Drawing showing the drainage from the process and non-process areas. Indicate the point where the plant's storm water will meet the storm water channel outside the boundary fence and gate valve that prevents discharging storm water into the channel.

Drawing No. _____

b. The size of process and non–process areas on-site

Process Area (m^2)	
Non-Process Area (m^2)	

c. Estimate the first flush surface run off volume (m^3) from both process and non-process surface areas for a 30 mm storm event:

Volume from Process Area (m^3)	
Volume from Non-Process Area (m^3)	
Total Volume (m^3)	
Capacity of the Storm water Pond (m^3) *	

*Process area only

2. STORMWATER COLLECTION AND DISPOSAL:

a. Is the stormwater system separated from the industrial wastewater collection system?

[ ] Yes [ ] No

If no, provide justification for not separating both collection systems

List the relevant section/ page numbers in the attachment

b. Describe the proposed method of collecting the first flush and diverting the stormwater in excess of the first flush:

List the relevant section/ page numbers in the attachment

c. If the water is found to be contaminated, what measures will be taken to dispose of it as per Table 3B of RCER-2025, Volume I?

List the relevant section/ page numbers in the attachment

3. STORMWATER POND

a. Provide design details of the stormwater pond:

i. Construction/design basis

ii. Dimensions

iii. Inlet and outlet structures

iv. Impermeable liner characteristics

v. Oil/water or solids separation devices

List the relevant section/ page numbers in the attachment

b. Provide a drawing of the stormwater pond showing its design details

Drawing No. _____

FORM PA-W8
PERMIT APPLICATION FOR AUTHORIZATION TO DISCHARGE BALLAST WASTEWATER

1. BALLAST WATER SYSTEM

Provide schematic flow diagrams for the ballast water treatment system

Diagram No. _____

2. DESIGN DISCHARGE RATE OF TREATED BALLAST WASTEWATER

Average discharge rate (m^3/day):		Maximum discharge rate (m^3/day):	

3. DISCHARGE OF THE FINAL EFFLUENT

h) Site plan of the facility indicating the exact location of the proposed discharge using RC and UTM Coordinates.

Drawing No. _____

North (m)	
East (m)	

i) Process description for the treatment system

List the relevant section/ page numbers in the attachment

j) Design details of all the effluent handling units with associated drawings

List the relevant section/ page numbers in the attachment

Drawing No. _____

4. QUALITY PARAMETERS OF INFLUENT AND EFFLUENT FROM THE TREATMENT PLANT

Complete the following table providing information on each constituent that will or may be present in the final discharged ballast water.

Parameter*	Influent Concentration (mg/l)	Effluent Concentration (mg/l)

* *As per Table 3E of RCER-2025, Volume I and other Parameters if any*

5. SLUDGE GENERATION

Details of sludge generated from the effluent handling and treating units shall be provided in the following table (Insert more rows if there is a need).

Type of Sludge	Quantity (t/y)	Physical Properties	Chemical Properties	Hazardous Properties	Method of On-Site Storage	Disposal Method	Frequency of Disposal

Will this sludge lead to any source of air emissions?

[ ] Yes [ ] No

If yes, confirm that air emissions are included in Form PA-A6 "Fugitive Emissions".

[ ] Yes [ ] No

FORM PA-W9
PERMIT APPLICATION FOR AUTHORIZATION TO CONSTRUCT GROUNDWATER MONITORING WELLS

1. BASELINE GROUNDWATER QUALITY (for new facilities only)

f) Provide the location of the monitoring wells used to conduct the baseline groundwater study

Drawings No. _____

g) Complete the following table providing information on the baseline groundwater quality constituent that will or may be present in the groundwater. (attach reports)

Parameter*	Concentration (mg/l)

*As per Groundwater Monitoring Guidelines (RCER-2025, Volume II, Appendix E)

h) Provide the flow pattern of the groundwater flow marked with directions and superimposed on the facility map.

2. PROPOSED LOCATION OF THE PERMANENT GROUNDWATER MONITORING WELLS

Provide the location (also RC and UTM coordinates) of the permanent monitoring wells for each hazardous material handling, storage or process area.

Drawings No. _____

3. DESIGN AND CONSTRUCTION DETAILS OF PERMANENT GROUNDWATER MONITORING WELLS

Provide the Design details of the monitoring wells proposed to be constructed

Drawings No. _____

(Note: Refer to Groundwater Monitoring Guidelines in RCER-2025, Volume II, Appendix E)

PERMIT APPLICATION FORMS

Hazardous Materials & Waste

FORM PA-H1
PERMIT APPLICATION FOR AUTHORIZATION FOR HANDLING AND STORAGE OF HAZARDOUS MATERIALS

1. HAZARDOUS MATERIALS HANDLING

Provide the following information on all hazardous substances (raw materials/feed stocks, products / by products additives, catalysts, fuels, solvents, lubricants, and any other chemicals or materials) to be used at the facility and stored in quantities in excess of 50 kg for highly toxic materials and 5000 kg for other hazardous materials.

Hazardous Substance/ Major Hazardous Constituents	Physical Properties	Hazardous Materials Classifications	Process/ Unit Used	Maximum Storage Quantity (kg)	Storage Methods*	Transport Methods

* Above ground storage tank, underground storage tanks, ISO Container, cylinder, tote, drum, stockpile or surface impoundment, other

a. Provide Safety Data Sheet (SDS) for all above hazardous substances to be handled

List the relevant section/ page numbers in the attachment

b. Provide details of any radioactive materials handled by the facility. Submit approval certificate from Nuclear and Radiological Regulatory Commission (NRRC).

2. HAZARDOUS MATERIALS STORAGE – MOBILE STORAGE

a. Complete the following table for all hazardous materials stored in mobile storage area.

Hazardous Material	Type of Storage[1]	No. of Units	Capacity of Unit (m^3)	Storage Temperature[2]	True Vapour Pressure at Storage Temp (kPa)	Storage Area[3]

1. ISO container, tote, drum, bags, cylinder, other
2. Ambient temperature = 40 ºC
3. Warehouse, yard or other

b. Provide design details, specifications and drawing for the secondary containment for each area where these materials are stored. Details must include

i. Capacity of the area

ii. Construction materials

iii. Impervious liner characteristics

iv. Drainage, if any.

List the relevant section/ page numbers in the attachment

Drawing No. _____

3. HAZARDOUS MATERIALS STORAGE – ABOVE GROUND STORAGE TANKS

a. Complete the following table for all hazardous materials stored in above ground storage tanks

Hazardous Material	Tank ID	Capacity (m^3)	Shape [1]	Dimensions (m)	Storage Temp (^oC)

>>> table continued

True Vapor Pressure at Storage Temp (kPa)[2]	Type of Tank[3]	Secondary Containment Capacity (m^3)

1. Cylindrical, Horizontal, vertical, rectangular,
2. if storage is at ambient temperature then provide True Vapor Pressure @ 40 ^{0}C
3. Fixed roof, Fixed Roof w/Internal Floating Roof, Pressurized Tank, External Floating Roof

b. Provide the following for each type of storage tank

i. Design details, specifications and materials of construction for each storage tank

Drawing No. _____

ii. Overspill and leak detection systems

iii. Secondary containment including construction material and impervious liner characteristics and drainage, if any.

iv. Inspection criteria including floating roof as well as primary and secondary seal inspections

List the relevant section/ page numbers in the attachment

c. Provide description of the process that use or generate above hazardous substances

List the relevant section/ page numbers in the attachment

4. HAZARDOUS MATERIALS STORAGE – UNDERGROUND STORAGE TANKS (for existing facilities only)

a. Complete the following table for all hazardous materials stored in underground storage tanks

Hazardous Material	Tank ID	Capacity (m^3)	Dimensions (m)

>>> table continued

Storage Temperature	True Vapor Pressure at Storage Temp (kPa)	Secondary Containment Capacity (m^3)

b. Provide the following for each type of underground storage tank

i. Justification for using underground storage

ii. Design details, specifications and materials of construction for each storage tank

Drawing No. _____

iii. Tank corrosion protection and structural integrity

iv. Overspill and leak detection systems

v. Secondary containment including construction material and impervious liner characteristics and drainage, if any.

vi. Inspection criteria

List the relevant section/ page numbers in the report

c. Provide description of the process that use or generate above hazardous substances

List the relevant section/ page numbers in the attachment

5. EMISSIONS CONTROL

a. Provide calculations for storage tank emissions using USEPA AP-42 Methods for both static, transfer/withdrawal losses and during tank turnovers

List the relevant section/ page numbers in the attachment

b. Are there any emission control devices?

[ ] Yes [ ] No

If yes, specify type of the control device *(add additional rows if necessary)*

Source	Control Device	Control Unit ID	Pollutant	Pollutant Inlet Conc. (mg/m³)	Pollutant Inlet Load (t/y)	Control Efficiency (%)

c. Provide technical information, design details along with vendor guarantees for each control device

List the relevant section/ page numbers in the attachment

6. AIR POLLUTANTS

Complete the following table for all emission sources. For sources that are equipped with an emission control device, provide data after the emission control.

Source	Unit ID	Pollutant	Max Conc. (mg/m^3)	Max. Conc. in Regulated Unit		Max. Emission Rate (kg/hr)	Emission Rate (t/y)	Emission Estimation Technique*
				Conc.	Unit			

* Provide a sample calculation for emission estimation. Emission estimation must be based on one of the following

EF: Emission Factors – USEPA AP 42 MB: Material Balance
EC: Engineering Calculation

7. TANK EMISSION CALCULATIONS

Provide emission estimates for all storage tanks (Fixed Roof, External / Internal Floating Roof using the US EPA AP-42 Emission Calculation. Also provide the data as required in the following tables.

a. Fixed Roof Tanks: (insert more columns if necessary)

Fixed Roof Tanks	1	2	3
Tank Identification No.			
Total number of identical tanks			
Type of tank			
Name of material stored in the tank			
Tank Diameter (Ft)			

Color of the a) Roof b) Shell			
Tank Capacity (gallons)			
Total throughput per year (gallons)			
Number of turnovers per year			
Height of tank			
Average vapor space height (ft)			
Avg. temperature of storage liquid, Ts. (°F)			
True vapor pressure of storage liquid at the storage temperature (Ts) in Pisa			
Molecular weight of vapor in storage tank at 82 °F (lb/lb mole)			

b. Floating Roof Tanks: (insert more columns if necessary)

Floating Roof tanks	1	2	3
Tank Identification No.			
Total number of identical tanks			
Name of material stored in the tank			
Type of tank (Internal floating/ External floating roof)			
Type of seal (Fill as per Note-1)			
Tank Diameter (Ft)			
Color of the a) Roof b) Shell			
Condition of shell (light rust/ Dense rust /Gunite lined)			
Number of columns (for Int. fl. Tanks)			
Effective column diameter (Ft) (= Column perimeter/ 3.14)			
Tank Capacity (gallons)			
Total throughput per year (gallons)			
Number of turnovers per year			
Avg. temperature of storage liquid, Ts. (°F)			

True vapor pressure of storage liquid at the storage temperature (Ts) in Pisa			
Average density of the liquid stored (lb/gallon)			
Molecular weight of vapor in storage tank at 60 °F (lb/lb mole)			

Note 1:
A - Metallic shoe seal with primary seal only
B - Metallic shoe seal with shoe mounted secondary seal
C - Metallic shoe seal with rim mounted secondary seal
D - Liquid mounted resilient seal with primary seal only
E - Liquid mounted resilient seal with weather shield
F - Liquid mounted resilient seal with rim mounted secondary seal
G - Vapor mounted resilient seal with primary seal only
H - Vapor mounted resilient seal with weather shield
I - Vapor mounted resilient seal with rim mounted secondary seal

c. Internal Floating Roof Tanks (insert more columns if necessary)

Deck fittings			
Deck fitting type (Fill as per Note -2)			
Number of such deck fittings			
Total length of deck seams (ft)			
Area of Deck (ft^2)			

Note 2:
A - Access hatch, Bolted cover, Gasketed
B - Access hatch, Unbolted cover, Gasketed
C - Access hatch, Unbolted cover, Ungasketed
D - Automatic gauge float well, Bolted cover, Gasketed
E - Automatic gauge float well, Unbolted cover, Gasketed
F - Automatic gauge float well, Bolted cover, Ungasketed
G - Column well, Built-up column-sliding cover, Gasketed
H - Column well, Built-up column-sliding cover, Ungasketed
I - Column well, Pipe column-flexible fabric sleeve seal
J - Column well, Pipe column-sliding cover, Gasketed
K - Column well, Pipe column-sliding cover, Ungasketed
L - Ladder well, Sliding cover, Gasketed
M - Ladder well, Sliding cover, Ungasketed
N - Roof leg or hanger well, Adjustable
O - Roof leg or hanger well, Fixed
P - Sample pipe or well, Slotted pipe-sliding cover, Gasketed
Q - Sample pipe or well, Slotted pipe-sliding cover, Ungasketed
R - Sample pipe or well, Sample well-slit fabric seal, 10% open area
S - Stb drain, 1 Inch diameter
T - Vacuum breaker, Weighted mechanical actuation, Gasketted
U - Vacuum breaker, Weighted mechanical actuation

FORM PA-H2
PERMIT APPLICATION FOR AUTHORIZATION FOR WASTE MANAGEMENT

1. MUNICIPAL WASTE GENERATION AND DISPOSAL

If municipal waste is generated, please fill the following information *(add additional rows if necessary)*

Process/ Source	Type/ Name	Maximum Quantity (t/y)	Classification[1]	Mode of Transportation	Disposal/ Recycling Method[2]	Disposal/ Recycling Location

1 Municipal (e.g. office, canteen), inert, construction, waste
2 Disposal (landfilling), recycling or reuse, etc.

2. NON-HAZARDOUS INDUSTRIAL WASTE GENERATION

If non-hazardous waste is generated, please fill the following information *(add additional rows if necessary)*

Process / Source	Type / Name	Maximum Quantity (t/y)	Physical Form	Chemical Composition	Mode of Transportation	Disposal / Recycling Method[1]	Disposal/Recycling Qty. (t/y)	Disposal / Recycling Location

1. Stabilization, Landfilling, Recycling or Reuse, etc.

3. (a) HAZARDOUS INDUSTRIAL WASTE GENERATION

If hazardous waste is generated, please fill the following information *(add additional rows if necessary)*

Process/ Source	Name	Type (Inorganic, Organic, Misc.)	Maximum Quantity (t/y)	Physical Form	Chemical Composition	Hazard Classification[1]	Hazardous Constituents

>>> Table continued

Mode of Transportation	Treatment / Recycling & Disposal Method[2]	Disposal/Recycling Qty. (t/y)	Disposal/ Recycling Location

1. In accordance to the United Nations Chemical Hazard Classification System
2. Disposal (evaporation, incineration, stabilization/ Class II landfill, Class I landfill), Recycling or Reuse etc.

3 (b). Identify the additional waste(s) which could potentially be recycled, reused or regenerated *(add additional rows if necessary)* *

Waste Name	Type (Inorganic, Organic, Misc.)	Quantity (t/y)	Chemical Composition	Method of Recycling / Reuse / Regeneration	Location of Recycling / Reuse / Regeneration facility

*Other than the waste(s) identified for recycling in section 3(a).

3 (c) Waste Reduction Plan (as per clause 5.1.5 of RCER-2025, Volume I)

List the relevant section/ page numbers in the attachment

4. HAZARDOUS & NON-HAZARDOUS INDUSTRIAL WASTE ANALYSIS DATA

Provide a detailed chemical and physical analysis of a representative sample of hazardous substance or waste to be disposed at or by this facility as required in the table below. (Published or documented data on the hazardous substance or wastes can also be given).

Waste Description	Physical form & pH & odor	Moisture content %	Free Liquid (%)	Chemical Composition *	Organic content, %	Calorific value, kcal/kg	VOCs as per US EPA Method	SVOCs as per US EPA Method

>>>>Table continued

TCLP Test Results	Loss on Ignition %	Hazardous properties and constituents* * Heavy metals (Ba, Cd, Cr, Pb, Hg, Ag, As, Se, Cu, Fe, Mn, Ni, V)

* Proximate analysis
** Actual Hazardous constituents including metals

Indicate if the waste is any of the following:

Waste Characteristic	Yes/No
Ignitable	
Corrosive	
Reactive	
Toxic	
Oxidizing	
Pyrophoric	
Explosive	
Radioactive	

Indicate if the waste has any of the following:

Waste Characteristic	Yes/No
PCBs	
Cyanides	
Sulphides	
Oil Content	
Organic Solvent	

5. WASTE HANDLING AND STORAGE

a. Provide following information for all wastes stored at the facility.

Waste Description	Storage methods (tanks/ drums/IBCs/ surface impoundments, etc.)	Material of construction	Number of units	Storage capacity of each unit

Is the waste storage area shaded / Covered? (Yes / No)

b. Provide design and liner details of any surface impoundments used for storing hazardous wastes

List the relevant section/ page numbers in the attachment

c. Provide a drawing showing the location of the waste handling and storage area(s)

Drawing No. _____

d. Provide a drawing showing design details of the waste handling and storage area(s)

Drawing No. _____

e. Provide details of secondary containment used to prevent overflow from spills/ leaks around hazardous wastes storage areas.

List the relevant section/ page numbers in the attachment

6. WASTE PRE-TREATMENT AND DISPOSAL

a. Provide the following information for each treatment technique and/ or waste/ substance treated at the facility.

Waste Description	Pre-treatment technique	Pre-treatment efficiency, %	Treatment chemicals/Reagents	Disposal method

b. Waste treatment facilities: Complete design, drawings and operational details for all the treatment techniques/ processes employed at the facility.

List the relevant section/ page numbers in the attachment

Drawing No. _____

c. Waste Disposal facilities: Complete design, drawings and operational details for all the disposal methods employed at the facility

List the relevant section/ page numbers in the attachment

Drawing No. _____

FORM PA- H3
PERMIT APPLICATION FOR AUTHORIZATION TO TRANSPORT HAZARDOUS/ NON-HAZARDOUS INDUSTRIAL WASTES / HAZARDOUS SUBSTANCES

1. APPLICANT

Name of Transporter: _____

Owner(s): _____

Operator (s): _____

Applicant Address: _____

_____

Contact Person: _____

Title: _____

Tel: _____ Fax: _____

E-mail: _____

Transporter Status: [ ] New [ ] Existing

2. APPLICANT ACTIVITY

[ ] An industrial facility, which will be transporting hazardous substances or wastes offsite that are produced in the course of its own daily operations:

[ ] A contracting entity whose primary activity involves transporting hazardous substances for other commercial or industrial facilities:

Note: Submit Commercial Registration Certificate for the activity.

3. INFORMATION ON THE TRANSPORTED MATERIALS

Provide information on the hazardous and non-hazardous materials and wastes that will be transported

[ ] Bulk Solids
[ ] Liquid
[ ] Sludge
[ ] Drums
[ ] Other: _____

4. INFORMATION ON THE MEANS OF TRANSPORTATION

a) Indicate the type of transportation activity for which authorization is sought:

[ ] Vehicle/ Trucks
[ ] Road Tanker
[ ] Ship
[ ] Other _____

b) Provide information required in the following table:

Registration No. *	Vehicle Type & Model.	Year of manufacture	Materials to be Transported	Capacity (tons/ drums)	Operating Area / Region

* Submit copy of vehicle registration details and Motor Vehicle Periodic Inspection – MVPI (Fahas Al-Daoury) in support of the above.

c) Is all transportation system covered for collision, liability or other applicable insurance?

[ ] Yes [ ] No

If 'Yes', then complete the following table:

Name of the insurance* company	Address of the insurance company	Type of Insurance

* Submit copy of insurance document in support of the above.

d) Is an emergency response plan and equipment available for transportation system?

[ ] Yes [ ] No

If 'No', when will such plan and equipment be available?

_____

e) Is an employee health/ safety / training plan available for transportation system?

[ ] Yes [ ] No

If 'No', when will such plan be available?

_____

f) Provide a copy of National Center for Waste Management (MWAN) Certificate

g) Is GPS system installed?

[ ] Yes [ ] No

If 'No', provide justification and submit schedule for installation.

_____

PERMIT APPLICATION FORMS

Miscellaneous

FORM PA-M1
PERMIT APPLICATION FOR AUTHORIZATION TO CARRY OUT LOADING/ UNLOADING OPERATIONS

1. DESCRIPTION OF LOADING / UNLOADING OPERATIONS

a. Is there loading/ unloading of fluids that may contain Volatile Organic Compounds (VOC) or Organic Hazardous Air Pollutants (HAP) at the facility?

[ ] Yes [ ] No

b. Is there loading/ unloading of fluids that may contain Volatile Organic Compounds (VOC) or Organic Hazardous Air Pollutants (HAP) at the port?

[ ] Yes [ ] No

c. Is there loading/ unloading of bulk materials that may emit dust or suspended particulate matter at the facility?

[ ] Yes [ ] No

d. Is there loading/ unloading of bulk materials that may emit dust or suspended particulate matter at the port?

[ ] Yes [ ] No

If the answer to any of the above questions is yes, provide details on the loading/ unloading operations.
List the relevant section/ page numbers in the attachment

e. Provide a site plan indicating the locations of loading / unloading assemblies

Drawing No. _____

2. DETAILS ON MATERIALS TO BE LOADED/ UNLOADED (GAS):

(add additional rows if necessary)

Material	Maximum Quantity loaded/ unloaded (t/d)	Average Quantity loaded/ unloaded (t/y)	Frequency	Molecular Weight	Temperature of gas loaded/ unloaded (°C)

3. DETAILS ON MATERIALS TO BE LOADED/ UNLOADED (SOLID):

(add additional rows if necessary)

Material	Maximum Quantity loaded/ unloaded (t/d)	Average Quantity loaded/ unloaded (t/y)	Frequency	Density (kg / m^3)

4. DETAILS ON MATERIALS TO BE LOADED/ UNLOADED (LIQUID):

(add additional rows if necessary)

Material	Maximum Quantity loaded/ unloaded (t/d)	Average Quantity loaded/ unloaded (t/y)	Frequency	Density (kg / m^3)	Temperature of the liquid material loaded / unloaded (^oC)	True vapor pressure of liquid at temp. of loading (kPa)

5. DETAILS ON THE METHOD OF LOADING/ UNLOADED

a. Type of Cargo [ ] Road Tanker [ ] Ship

[ ] ISO Container
[ ] Other (*specify*): _____

b. Method of Loading/ Unloading [ ] Submerged [ ] Vapor balance
[ ] Splash

[ ] Other (*specify*): _____

c. Tanks Loaded/ Unloaded [ ] Dedicated [ ] Multiple use
[ ] Ship

[ ] Other (*specify*): _____

d. Provide secondary containment details to contain spills during tanker loading/unloading and drum withdrawal/unloading activities.

6. EMISSIONS CONTROL

Are there any emission control systems in place?

[ ] Yes [ ] No

If yes, please specify type of the control device

Source	Control Device	Control Unit ID	Pollutant	Pollutant Inlet Conc. (mg/m³)	Pollutant Inlet Load (t/y)	Control Efficiency (%)

Provide technical information, design details along with vendor guarantees for each control device

List the relevant section/ page numbers in the attachment

7. AIR POLLUTANTS

Complete the following table for all emission sources. For sources that are equipped with an emission control device, provide data after the emission control.

Source	Unit ID	Pollutant	Max Conc. (mg/m³)	Max. Conc. in Regulated Unit		Max. Emission Rate (kg/hr)	Emission Rate (t/y)	Emission Estimation Technique*
				Conc.	Unit			

* Provide a sample calculation for emission estimate. Emission estimation must be based on one of the following:

EF: Emission Factors
MB: Material Balance
ST: Stack testing or monitoring
EC: Engineering Calculation

8. ADDITIONAL INFORMATION FOR USEPA AP-42 CALCULATIONS

Provide the following information for each liquid material loaded/unloaded which is used for AP 42 Calculations *(insert more columns if necessary)*

Source			
Name of material loaded			
Type of cargo (Trucks/Ships/Barges)			
Type of loading (Fill as per note-1 below)			
Number of loading arms (if applicable)			
Molecular weight of vapor at 60°F (lb/lb-mole)			
Temperature of liquid loaded, Deg F			
Vapor pressure of liquid at the above temperature, psia			
Average loading rate for each arm, ton/hr			

Note-1: Type of loading:

A - Submerged loading of a clean cargo tank
B - Submerged loading with dedicated normal service
C - Submerged loading with dedicated vapor balance service
D - Splash loading of a clean cargo tank
E - Splash loading with dedicated normal service
F - Splash loading with dedicated vapor balance service
G - Submerged loading into ship
H - Submerged loading into barge

FORM PA-M2
PERMIT APPLICATION FOR AUTHORIZATION TO CARRY OUT DREDGING

1. DREDGING

Type of Dredging [ ] Maintenance [ ] Capital

Method of Dredging [ ] Mechanical [ ] Hydraulic

Dredging Volume _____ cubic meters

Dimensions of Dredged Site _____ m Long x _____ m wide x ____ m deep

Proposed Period of Dredging From _____ to _____

Location: Northing _____ Easting _____

Provide a site map indicating the approximate location of the dredging area, its topography, bathymetry, including area proposed for access causeways, dredging, filling and spoil disposal. The habitat of marine organism and the area that might be affected by dredging activity (if any) shall be included in the map.

Drawing No. _____

Describe the proposed dredging activity including its purpose and methodology and the proposed control systems. Attach copy of MEWA / NCEC approval certificate.

List the relevant section/ page numbers in the attachment

2. IMPACTS OF DREDGING OPERATIONS

a) Provide details on the assessment of the impact of the dredging operations, which must include seasonal factors such as weather and marine life (spawning and migration), flora and fauna and factors that could influence the preferred timing of the dredging activity. Also, include the effects on costal erosion, water circulation, depth, current pattern, water fluctuation and water temperature.

List the relevant section/ page numbers in the attachment

b) Describe type of material to be dredged including potential source of contamination present in the sediment

List the relevant section/ page numbers in the attachment

c) Describe the proposed pollution mitigation measures

List the relevant section/ page numbers in the attachment

d) Describe the temporary storage and final disposal of dredged materials

List the relevant section/ page numbers in the attachment

e) Describe how the dredged material as well as the water that contains silt and clay would be contained and disposed at the disposal site:

List the relevant section/ page numbers in the attachment

f) Provide details if any explosives are proposed to be used at any point during the overall operation (e.g. to remove coral knolls)

List the relevant section/ page numbers in the attachment

g) In the space provided below, describe any maintenance operations which are anticipated and their frequency:

List the relevant section/ page numbers in the attachment

h) Prior to dredging provide Sediment Sampling Plan (Number of core samples, sediment grain size or its composition and chemical analysis on the proposed dredging site as well as its sampling procedures and sample handling protocols).

FORM PA-M3
PERMIT APPLICATION FOR AUTHORIZATION TO USE NOISE SOURCES

1. NOISE SOURCES/ LEVELS

a. Provide a list of all equipment which has potentially sources of noise (> 85dB) (*add additional lines if necessary)*

Source	Noise Level (dBA)	Duration	Frequency

List the relevant section/ page numbers in the attachment

b. Provide a plot plan showing location of equipment/ sources with noise levels > 85 dBA

Drawing No. _____

c. Provide a boundary noise model and/or survey report as attachment to this form and fill the following based on the attached survey/modelling report:

Sr. No.	Baseline Monitoring Location at Facility Boundary		Baseline Noise Level (dBA)	Final Noise Level after Facility Operation (Baseline+Predicted) (dBA)
	Northing	Easting		
1				
2				
3				

Add rows as required.

2. NOISE CONTROL

Provide a description of all proposed attenuation processes or specific measures to assure compliance with the regulations (*add additional lines if necessary).*

Source	Proposed Noise Control Device	Resulting Noise Level (dBA)

FORM PA-M4
PERMIT APPLICATION FOR EXEMPTIONS

1. NON-COMPLIANCE *(for existing facilities only)*

Provide the following information on non-compliance issues at the facility *(add additional lines if necessary)*

Compliance Issue No	Process/ Unit	Regulation / Standard Not Met	Compliance Issue	Extent of non-compliance	BAT Analysis Reference*	Compliance Plan Reference*

* List the relevant section/ page numbers in the attachment

2. EXEMPTIONS

Complete the following table *(add additional lines if necessary)*

Compliance Issue No	Previously Exempted	Measures Taken to Address Issue*	Reason for Exemption[1]	Justification*	Final Compliance Date
	Yes No				
	Yes No				
	Yes No				

[1] Choose of the following: Technical, Hazardous/ Safety, Financial, Other
* List the relevant section/ page numbers in the attachment

Permit Application Form

EPO Renewal

FORM PA-R1
PERMIT APPLICATION FOR ENVIRONMENTAL PERMIT TO OPERATE (EPO) RENEWAL

---

1. Current EPO Issue Date:

   _____

2. Current EPO Expiry Date:

   _____

Please attach current EPO with conditions with this form.

3. Is there any change in the production capacity of any product?

Yes [ ] **No [ ]**

If yes, please provide below information:

a. Existing production capacity (tons/year):

   _____

b. New production capacity (tons/year):

   _____

c. Change in Production (%):

   _____

d. Did facility get RC approval for this production increase?

Yes [ ] **No [ ]**

If yes, please attach RC approval letter.

4. Is there any change in the raw materials and/or products?

Yes [ ] **No [ ]**

If yes, please provide names & quantities of new raw materials/products (attach sheets, if required).

5. Does the facility have a waiver/exemption from RC for any of the EPO condition?

Yes [ ] No [ ]

If yes, please provide below information:

EPO Condition No.	Type of Waiver/Exemption (Temporary/Permanent)	Supporting Document (Please attach RC letter)

6. Did facility add any new regulated process unit that is not covered in the current EPO?

Yes [ ] No [ ]

If yes, was RC approval obtained?

Yes [ ] No [ ]

If yes, please attach RC approval letter.

7. Did facility add any new storage area e.g. for waste, raw material/product/any other materials, pond and tank etc.?

Yes [ ] No [ ]

If yes, was RC approval obtained?

Yes [ ] No [ ]

If yes, please attach RC approval letter.

8. Was any new chemical added in the process other than those listed in Sr. no. 4?

Yes [ ] No [ ]

If yes, please provide names & quantities of new raw materials (attach sheets, if required).

9. Does the facility have any request to modify any of the EPO condition?

Yes [ ] No [ ]

If yes, please provide below information (Add rows if required):

EPO Condition No.	Modification Request	Justification (Attach sheets, if required)

10. Provide below information for the EPO condition(s) for which the facility is not in compliance (Add rows if required)

EPO Condition No.	Reason of non-compliance	Action Taken by Facility

11. Is there any change in current emissions (t/y), waste generation (t/y) and/or wastewater generation (m^3/day) or any new addition of any pollutant(s), waste and wastewater stream(s)?

Yes [ ] No [ ]

If yes, please fill the below table.

Current Air/Waste/Wastewater Pollutant/Stream Name	Current Quantity	New Air/Waste/Wastewater Pollutant/Stream Name	Quantity for New Addition
Air Pollutant Name	t/y	Air Pollutant Name	t/y
Waste Name	t/y	Waste Name	t/y
Wastewater Stream	m^3/day	Wastewater Stream	m^3/day

Add rows, if required.

12. Attach the following documents as applicable
    a. Air Emission Inventory Report
    b. Cooling Tower Drift Loss Test Report
    c. Waste Reduction Plan
    d. Any other document requested in the current EPO (e.g. Action Plan, BAT update, Studies etc.)

Note: Based on the above information, facility may be requested to submit the updated permit application package.

STATEMENT OF CERTIFICATION

On behalf of the facility, I hereby declare that I am familiar with all processes and operating plans of this facility and certify that the environmental information provided above is accurate to the best of my knowledge. I understand that the submission of incorrect information is considered a highly serious issue and could lead to subsequent withdrawal of any permit issued and issuance of penalties. Notification on any changes will be submitted to the Royal Commission. Also, I am fully committed to implement and comply with Royal Commission Environmental Regulations.

Name of the Facility: _____

_____

Signature of Facility Representative Date _____

Name

Title

Facility

Stamp

APPENDIX A

ENVIRONMENTAL SCREENING QUESTIONNAIRE (ESQ)

ENVIRONMENTAL SCREENING QUESTIONNAIRE (ESQ)

Facility Name: ----------

Facility Location (Please provide coordinates of each corner): ----------

This questionnaire has been designed to identify the environmental issues related to the proposed industrial facilities. Additional information or a detailed application may be required. If additional space or lines are required, please add as needed.

1. Facility Information: Provide the following on separate sheets.

a. Brief proposed process / technology description. Please submit a two-page summary explaining the process / technology in brief starting from raw material until final product is obtained including all potential pollution sources and their control measures.

b. Process flow or block flow diagram showing all raw materials and auxiliaries used, water consumption per process, wastewater generation, emission points as well as solid and hazardous waste generation.

c. Does the promoter have finalized the technology supplier for their project? Yes No

d. If yes, provide the name and address of the technology supplier(s).

e. Does the plant use any technology that has not been used elsewhere? Yes No

f. How many similar plants are currently operating in Saudi Arabia or in other parts of the world using same technology that is being planned in the industrial city?

g. Does the facility operation involve bulk material handling of raw materials or products that are fine powder in nature?
If yes, provide estimated quantities of such materials.

h. Do facility operations involve trucking of solid/liquid/waste materials or raw materials or products? If yes, provide estimated number of trucks that will be employed per day.

ENVIRONMENTAL SCREENING QUESTIONNAIRE (ESQ)

2. Raw Materials: *Complete the following table relating to <u>all</u> raw materials/ feedstock used in the proposed facility*.

Raw Material/ Feedstock	Process	Delivery Method	Storage Method	On-Site Storage Quantity	Max. Hourly Consumption (unit)	Annual Consumption (unit)

3. Other Materials/ Auxiliaries Used: *Complete the following table relating to other materials used in the proposed facility*.

Material	Process	Delivery Method	Storage Method	On-Site Storage Quantity	Max. Hourly Consumption (unit)	Annual Consumption (unit)

4. Products/ By-Products: *Complete the following table relating to all products or materials produced by the proposed facility.*

Process	Product/ By-Product	Max. Hourly Production (unit)	Annual Production (unit)	Storage/ Delivery Method	Maximum Storage Capacity

ENVIRONMENTAL SCREENING QUESTIONNAIRE (ESQ)

For industrial waste management and recycling facilities, please provide below information:

Sr. No.	**Name of Waste to be handled** (Spent Caustic, Waste Oil etc.)	**Type of Waste** (Hazardous/Non-Hazardous)	**Physical State** (Solid, Liquid, Sludge etc.)	**Handling*Method/ Technology**	**Quantity (tonnes/Year)**

**Storage, Treatment, Recovery, Recycling, Disposal.*

5. Hazardous Materials:

(a) Does the facility use or generate any radioactive materials?
If yes, provide details of type and quantities of such materials.

(b) Does the facility use or generate highly toxic materials such as methyl isocyanate, phosgene, hydro fluoric acid (HF), mercury compounds, arsenic compounds, cyanides, etc.?

If yes, list the name of the materials with quantities.

(c) Does the facility use or generate carcinogenic materials such as benzene, carbon tetrachloride, vinyl chloride, hydrazine, PCBs (Polychlorinated biphenyls), etc?

If yes, list the name of the materials with quantities.

(d) Complete the following table relating to all hazardous materials to be utilized by the facility. Include fuels, oils, paints, coating materials, solvents, degreasing agents, cleaning materials, acids, alkalis, oxidizing agents, reducing agents, batteries, toxic compounds, refrigerants etc.

Hazardous Substance/ Constituent	Physical Properties	Hazardous Material Classification[1]	Process/ Unit Used	Max. Storage Quantity (kg)	Delivery/ Storage Method	Surplus Disposal Method

6. Fuels:

(a) Complete the following table relating to processes using fossil fuels **(Crude oil, Fuel oil, Natural Gas, LPG, etc.)**

Process	Fuel Name/Type	Fuel Consumption (unit)	Sulfur Content (%)

7. Air Emissions - Point Sources:

(*a) Are there any point sources that have potential to emit more than 100 tons/year (before the use of abatement equipment) of any air pollutant listed in Table 2A of RCER-2025, Volume I?*

If yes, list all such sources with estimated emission.

[1] *According to RCER-2025, Volume I, Section 4.1 – Hazardous Material Classification*

(b) Are there any point sources that have potential to emit more than 10 tons/year (before the use of abatement equipment) of any hazardous air pollutant listed in Table 2C of RCER-2025, Volume I?
If yes, list all such sources with estimated emission.

(c) Complete the following table relating atmospheric emissions from point sources. Include all point sources such as stacks, vents, extraction hoods, ducts etc. Pollutants should include any emissions that may contain gases, particulate emissions, volatile organic compounds, acid gases, toxic gases, fumes, visible emissions and odors.

Source (e.g. boiler, scrubber, incinerator, heater etc.)	Source Capacity (as applicable)	Fuel Used	Number of Each Source	Pollutant Name	Pollutant Concentration (unit)[2]	Emission Rate (kg/hr)	Stack Height (meter)

8. Incinerator: *Complete the following table relating to Incinerator of the facility.*

Type of Incinerator (E.g. Rotary, Vertical etc.)	Number of Incinerators	Max. Waste Feed Rate (Kg/Hr.)	Type of Auxiliary Fuel Used	Waste to be Burnt (Provide hydrocarbon content and calorific value)

[3] *As defined in RCER (glossary for VOC and Table 2C of the currently enforced RCER, Volume I for HAP)*

[2] *Unit of concentration should be the same as the units of the point emission source standards in Table 2B of RCER-2025, Volume I. If no point source emission standard exists for the particular component, the unit should be mg/m³.*

ENVIRONMENTAL SCREENING QUESTIONNAIRE (ESQ)

9. Flare: *Complete the following table relating to flares of the facility.*

Type (Elevated/Ground)	**Number of Flares**	**Fluids to be Flared**	**Flaring Scenario** (Emergency, Normal etc.)	**Supplementary Fuel**	**Steam Assisted/ Air Assisted**

10. Fugitive Air Emissions: *Complete the following table relating to potential fugitive emissions. Include all potential emissions of volatile organic compounds; dust sources and odor sources (e.g. water treatment lagoons, etc.).*

Sources (E.g. Tanks, Valves, stockpiles, ponds/lagoons etc.)	**Quantity**	**Size/Area/Capacity**	**Type of Material Handled (E.g. Chemical, wastewater, fine powder, rock etc.)**

11. Water Consumption: *Complete the following table relating to water consumption.*

Process	**Average Consumption (m^3/hr)**	**Maximum Consumption (m^3/hr)**	**Treatment Required?** *If yes, please specify type of treatment*

ENVIRONMENTAL SCREENING QUESTIONNAIRE (ESQ)

12. Effluent/ Wastewater Discharges:

(a) Does the facility operation involve generation of wastewater that cannot be pre- treated at their site to comply with RCER-2025, Volume I pretreatment standards?

(b) Complete the following table relating to effluent discharges. Include all discharges of industrial wastewater, cooling water, liquid effluents and pre-treatment methods, if any.

Source	Discharge Location (IWTP, SWTP, Sea etc.)	Discharge Flow Rate (Avg.)	Pollutant Concentration						Pre-Treatment Required? *If yes, please specify type of pre-treatment*
			Temp. (°C)	Oil & Grease (mg/l)	pH	TDS mg/l	TOC mg/l	TSS mg/l	
Process wastewater effluent (m^3/day)									
Return sea water cooling (m^3/hr)									
Cooling tower blow down (m^3/day)									
Other effluents (m^3/ day)									
Sanitary wastewater (m^3/day)									

13. Cooling Towers: *Complete the following table relating to the cooling tower.*

Type (Mechanical, Natural Draft)	Type of Water Used (Seawater, Potable, Reclaimed etc.)	Total Water Circulation Rate (m3/hr.)	Drift Loss (%)	Sludge Generated (t/y)	Sludge Disposal Location	Frequency of Sludge Disposal

ENVIRONMENTAL SCREENING QUESTIONNAIRE (ESQ)

14. Solid / Liquid Waste (Hazardous and Non-Hazardous): *Complete the following table relating to the production, storage and disposal of all solid, sludge and liquid wastes.*

Source	Type (Hazardous/non-hazardous)	Physical State	Amount Generated (tons/year)	Composition	Treatment/Storage/ Disposal/Recycling Method	Treatment/Storage/ Disposal/Recycling Location

15. Noise: *Complete the following table relating to the noise sources.*

Source	Frequency (Continuous/Intermittent)	Noise Level Inside Premises (dBA)	Noise Level at Boundary Fence (dBA)

16. Groundwater: *Complete the following table relating to groundwater.*

No. of Temporary Boreholes	No. of Permanent Wells (Minimum 03 wells)

In addition, please provide drawing showing location of temporary boreholes and permanent groundwater monitoring wells. Please attach the groundwater baseline quality analysis conducted by RC approved 3rd party laboratory.

17. Loading / Unloading Operations: *Complete the following table relating to Loading/Unloading Operation at Marine Terminals/Bulk Loading Terminal at the facility.*

Is there loading/unloading of material containing "Volatile Organic Compounds" (VOCs) or "Hazardous Air Pollutants" (HAPs) at the FACILITY?	Is there loading/unloading of material containing "Volatile Organic Compounds" (VOCs) or "Hazardous Air Pollutants" (HAPs) at the PORT?	Is there loading/unloading of material that emit "Dust" or "Suspended Particulates" at the FACILITY?	Is there loading/unloading of material that emit "Dust" or "Suspended Particulates" at the PORT?
Yes/No	Yes/No	Yes/No	Yes/No

ENVIRONMENTAL SCREENING QUESTIONNAIRE (ESQ)

18. Dredging Operations: *Complete the following table relating to Dredging Operation at the facility.*			
Does the facility construction involve any "Dredging" operation? Yes/ No			

19. Other Information:			
Indoor abrasive blasting	[ ] Yes	[ ] No	if yes, material used: _____
Outdoor abrasive blasting	[ ]Yes	[ ] No	if yes, material used: _____
Underground storage tanks	[ ]Yes	[ ] No	
Aboveground storage tanks	[ ]Yes	[ ] No	
Painting on site	[ ]Yes	[ ] No	
Hazardous materials storage area	[ ]Yes	[ ] No	if yes, provide a sketch of the area

Additional Information: *Please use the space below to add any other relevant information that may facilitate the issuance of the permit.*

1. *Design drawings including PFDs/PIDs etc.*
2. *Construction drawings for all the hazardous material/waste storage areas with properly sized secondary containment and showing liner details.*
3. *Vendor guarantee on vendor letterhead (duly signed and stamped) for all emissions/discharge values for regulated sources*
4. *Site Plans, Plot Plans*

- Mention "N/A" if not applicable.

APPENDIX B

BEST AVAILABLE TECHNIQUE (BAT) ANALYSIS

APPENDIX B
BEST AVAILABLE TECHNIQUE (BAT) ANALYSIS
NEW AND MODIFIED FACILITIES

In this section, the details concerning BAT analysis are provided.

Affected Sources

The operator of a facility shall substantiate, by providing BAT analysis, the selection of the BAT solution required under Clause 1.1.11, 1.1.12 and 1.1.13 of the currently enforced RCER, Volume I for pollution control measures for the following facilities:

a. For any source which does not meet the source emission or discharge standards.
b. Any source emitting greater than 100 t/y before control of any of the parameters listed in the currently enforced RCER, Volume 1, Table 2A
c. Any source emitting greater than 10 t/y before control of any hazardous air pollutants identified in the currently enforced RCER, Volume I, Table 2C
d. Any industrial effluent pre-treatment required for compliance with Section 3.

Application of BAT

The definition of the term BAT, and by reference its application to preparation of Permit Application Package is as follows:

Best- means the most effective in achieving a high general level of protection of the environment as a whole. There may be more than one set of techniques that achieve comparable effectiveness in preventing or rendering harmless polluting emissions. Thus, there may be more than one set of “best” techniques.

Available- techniques shall mean those developed on a scale which allows implementation in the relevant industrial sector under economically and technically viable conditions, taking into consideration the costs and advantages, whether or not the techniques are used or produced inside the Kingdom, as long as they are reasonably accessible to the operator.

Techniques- shall include both the technology used and the way in which the installation is designed built maintained, operated and decommissioned.

The essence of BAT is that the selection of techniques to protect the environment should achieve an appropriate balance between realizing environmental benefits and costs incurred by operators. The act of balancing the benefits against the cost will be a judgment. The following considerations shall be taken into account.

a) In general, the greater the environmental damage the greater the costs of BAT that can be required before costs are considered excessive.

b) Where similar cost solutions exist, the presumption is made that the solution that provides the higher degree of environmental protection will be selected.

c) The objective is to prevent damaging releases or to reduce such releases to the extent possible without imposing costs. If after applying BAT serious harm would still result, the issue of an Environmental Permit to Operate can still be denied.

d) The concern is with what costs in general are excessive; the lack of profitability of a particular entity or its financial position should not affect the determination of the BAT solution.

For existing facilities there are some additional factors, which affect the determination of and implementation of BAT.

a) The configuration of the existing plant, which may make it excessively costly, in relation to the harm, which would be avoided, to fit particular types of control technology.

b) The disruption to existing operations that could arise if upgrading was required immediately. The establishment of timetables for upgrading to new standards or as near as possible to such standards will be required. The operators of existing facilities will be expected to ultimately achieve new plant standards.

c) The harm that would result from delaying the achievement of the BAT solution weighed against the benefit or competitive advantage gained by the operator for allowing such a delay.

d) The assessment of the length of the remaining life of the facility. For facilities which are unable to achieve new plant standards and which continue to cause harm to the environment, a timetable for replacement of the process in question, or closure of the facility, will need to be developed.

BAT Analysis

The BAT analyses should include the following:

a) Identification of options considered for potential control technologies and techniques. Considerations to be taken into account when determining BAT bearing in mind the likely costs and benefits of a measure and the principles of precaution and prevention include:

i) the use of low-waste technology;
ii) the use of less hazardous substances;
iii) the furthering of recovery and recycling of substances generated and used in the process of waste, where appropriate;
iv) comparable processes, facilities or methods of operation which have been tried with success on an industrial scale;
v) technological advances and changed in scientific knowledge and understanding;
vi) the nature effects and volume of the emissions concerned;
vii) the commissioning dates for new or existing installations;
viii) the length of time needed to introduce the best available technique;
ix) the consumption and nature of raw materials (including water) used in the process and their energy efficiency;
x) the need to prevent or reduce to a minimum the overall impact of the emissions on the environment and the risks to it;
xi) the need to prevent accidents to minimize the consequences for the environment

b) The solution that is most effective in preventing, minimizing or rendering harmless polluting emissions should always be included as one of the options evaluated.

c) Justification for elimination of the technically infeasible options.

d) Ranking of the remaining technologies on the basis of control effectiveness, expected emission rate, expected reduction, energy and environmental impacts and economic impacts.

BAT Summary (List all the technologies evaluated for each pollutant) *

Source	Pollutant	BAT	Inlet Conc. In regulated units	Outlet Conc. In regulated units	Emission Load Before BAT (t/y)	Emission Load After BAT (t/y)	Control Efficiency (%)	Cost (USD/ton of emission reduction)	Environmental Concerns of Technology	Remarks (e.g., technical feasibility etc.)

**Support data with references.*

APPENDIX C

ENVIRONMENTAL IMPACT ASSESSMENT GUIDELINES

APPENDIX C
ENVIRONMENTAL IMPACT ASSESSMENT GUIDELINES

INTRODUCTION

These guidelines are intended for use by developers and consultants to gain a clear understanding of the process and objectives when conducting an environmental impact assessment (EIA), for proposed developments within the Royal Commission in accordance with the currently enforced Royal Commission Environmental Regulations (RCER), Volume I.

The objective of an EIA is to assess the possible impacts, positive or negative, that a proposed development may have on the environment. A comprehensive EIA will identify and evaluate all predicted impacts while recommending mitigation measures which could be implemented to protect natural, social and economic aspects, prior to major decisions and commitments are made.

The EIA should be a standalone document containing sufficient information to avoid or minimize the need of search out previous or supplementary reports. The EIA should incorporate all supporting EIA studies or data which are directly related to the project.

The aim of the Royal Commission EIA guidelines are to promote the objectives of responsible planning in accordance with the currently enforced Royal Commission Environmental Regulations (RCER), Volume I. Developers planning to establish Third Category and Second Category industries within the industrial city are required to conduct an EIA to understand the potential environmental impacts of the construction and operation of their proposed facility and to ensure all the objectives are met according to regional, national and international standards.

The Investor will use the recommendations in the EIA to set adequate design controls in order to avoid or mitigate against the potential adverse environmental impacts of their operation. Proposed developments will be assessed by the Royal Commission based largely the EIA submission to determine whether a development should be permitted, and to help set the conditions of the facility permit.

THE EIA PROCESS AND QUALIFICATION OF EIA CONSULTANT

The environmental impact assessment is a process by which information about the environmental effects of a development, is assembled, analyzed, commented upon and taken into account by the planning/regulatory authority, the developer, and consultants how best to mitigate the potential adverse effects identified.

The EIA shall be prepared by a qualified “Third Party” environmental consultant. A “Third Party” is a consultant who does not have any known conflict of interest and has a team of experts who has performed several similar EIA projects. If the proposed development is significant in nature (e.g., petrochemical complexes, refineries), the consultant is required to have significant experience conducting such studies for that type of facility. Due to the multifaceted nature of a full comprehensive EIA, the consultant may enter into a joint venture with other consultants. The facility is required to appoint a “Third Party” from a list of consultants which are approved by the Royal Commission for the preparation of EIA studies.

Once the assessment of impacts and potential mitigation measures are determined through the EIA process, the final design of the overall facility can be determined, not before i.e., the results of the EIA consultation should be continually fed back into the design process and used to inform decision-making.

The developer is required to prepare the EIA report as well as Permit Application Package (PAP) in parallel since each of these tasks is dependent on the other. However, the developer is required to consult RC-EPCD for preparation of scope of work before proceeding with EIA and modelling study. Both PAP and EIA are to be submitted in hard and soft copy format for getting the Environmental Permit to Construct (EPC).

THE NEED FOR AN EIA

Clauses 1.1.7, 1.1.8 and 1.1.9 of the currently enforced RCER, Volume I regulate the requirements of conducting the EIA of all the new projects or the modification of the existing ones (if required by RC). First, all the facilities shall submit to the RC the ESQ (as provided in Appendix A) for any new project or modification to the existing project. Based on the information provided in ESQ, the RC will categorize the proposed project depending on their environmental impact.

The First Category does not, generally, need the EIA report if the RC determines that the impact on the environment is deemed negligible. However, the Second Category and Third Category projects would require the submission of a detailed EIA reports to obtain the EPC.

THE SCOPE

The EIA Scope of work (SOW) shall be submitted to RC for prior approval before undertaking the EIA. The main tasks, issues, parameters and coverage of an EIA are referred to as the scope. The scope of the EIA shall be appropriate to the scale and nature of the proposed development and the risks to the environment. The future environmental impacts of the project are potentially significant, sensitive, diverse, or unprecedented, and cannot be readily identified, assessed or mitigated: There are expected adverse environmental impacts on human populations and natural habitats. The scope shall consider the following factors but not limited to:

- The scope shall focus the assessment while making sure that indirect, secondary and cumulative effects are not overlooked. The scope shall define the geographical study area, the range of topics to be studied, and the extent of the investigation (level of detail) and methodology.

- The level of detail given on each identified potential impact should match the degree of significance of the potential consequences of the impact.

- The study domain to be considered shall cover the community area as well as surrounding areas (at least 30 km for Second Category facility and 75km for Third Category facility).

- The study should clearly identify potential sources of contamination, pathways and sensitive receptors. Receptors should include humans e.g., users of schools, hospitals, mosques, etc., ecological habitats and environmental receptors such as aquifers.

If any specific standards for the EIA study are not available in the currently enforced RCER, Volume I, then any acceptable "Environmental Regulations" referred in WHO, US-EPA, EU, World Bank and IFC (handbooks on pollution prevention) shall be used.

THE REPORT FORMAT

The following sections follow a typical EIA format. Each consecutive section is designated a chapter, beginning with the executive summary which summarizes each chapter outlining the main points.

1. **Executive Summary.**
   - A summary of the main findings of the report.

2. **Introduction**
   - Project Understanding, Overview & Background
   - Report Structure / Method. The procedures or methodology used should be clearly outlined.
   - Justification: Describe the reason and/or need for the development.

3. **Policy, Legal, and Administrative Framework**
   - International, National and Local Regulatory Policies, standards and conventions. The key environmental regulations and standards applicable are:

     • *"*The currently enforced *Royal Commission Environmental Regulations (RCER-2025) Volume I"* that includes all regulations, standards, and guidelines which industries operating in any of the RC industrial cities shall comply with.
     • *"*The currently enforced *Royal Commission Environmental Regulations (RCER-2025), Volume II"* that covers procedures and forms for applying to obtain "*Environmental Permit to Construct*" (EPC) and "*Environment Permit to Operate*" (EPO).

   - Sustainable Development Policies
   - World Bank
   - Equator Principles
   - Other Relevant Legislation
   - Best Available Techniques (BAT)

4. **Detailed Description and Layout of the Proposed Development**

   - Site & Layout plan(s) of the development showing buildings, stacks, storage areas, roads, parking, and infrastructure including all utilities, such as fuel filling station, power supply, and water supply.
   - Elevations, cross sections and plans of all built development supported by photomontages or similar to show the visual appearance proposed.
   - A description of the extent and type of industrial development proposed including a description of the uses proposed and the processes to be used. This includes the following information:

- List of machinery, process units, control devices etc. technical information (such as capacity and expected hours of operation) and operational control measures (emissions data such as NOx, SOx, particulates, CO, organic compounds, heavy metals, other pollutants, noise etc.).
- An estimate of the essential types and expected consumption of raw materials and/or fuel types. This should include a description of the intention of reusing byproducts or waste products from other industries.
- Proposed usage of water in the different industrial stages and sources of water supply and options for water recycling and reuse.
- Quantities of solid and liquid waste generated and the arrangements for collection, recycling, storage, treatment and disposal (solid/ liquid and hazardous waste).
- Transportation description including internal and external transport activities (transport of raw materials and product by truck, train and ship).
- Description of unloading of raw materials and loading of product.
- Details of storage facilities for raw materials, type of storage, size, number, surface coating, roofing, drainage.
- Details of storage of any hazardous, toxic or inflammable substances.
- Identification of the proposed means of surface (storm water) water drainage.
- The expected project life span.

- Extent of implementation of Zero discharge of pollutants in to water bodies (sea, lake, groundwater etc.)

5. Air Quality & Meteorology

Baseline meteorological and ambient air quality data (as background) for the parameters monitored by RC shall be sourced from RC only. For the parameters & locations for which RC does not have baseline data, consultant shall conduct sampling to establish the baseline. Consultant shall submit baseline-sampling methodology with EIA scoping for RC review providing details related to analyzer specifications, sampling duration & locations etc. At least, five years data shall be used where possible, including but not limited to following parameters:

- Baseline Meteorology
  - wind speed and direction
  - rain fall and temperature
  - relative humidity etc.
- Ambient Air Quality: including but not limited to:
  - Natural sources e.g., particulate matter (PM10+PM2.5)
  - NOx (as Nitrogen Dioxide)
  - SOx (as Sulfur Dioxide) / H_2S
  - CO (Carbon monoxide)
  - NMHC, BTEX (benzene, toluene, ethyl benzene and xylene)

It is to be noted that for modeling purposes, the dataset for 'worst case' and "normal scenarios shall be used. The choice of model must be US-EPA approved (or other RC accepted model), be appropriate to the issue being considered, and contain inherent replicability, reliability and consistency. It is recommended that the latest version of AERMOD model shall be used for a domain less than 50km and the latest version of CALPUFF shall be used for long-range domain (>50km). During impact assessment, the following factors shall be considered but not limited to:

- Impact Assessment on air quality from all sources (Point, line, area, volume etc) resulting from:
  - Construction/commissioning/operation/decommissioning
  - Normal and abnormal operation conditions
  - Odor: Odor assessment must be evaluated and compared with the environmental guidelines of EU or USA. This shall cover odor threshold limit of pollutants as well as their nuisance and health impact level.
- Green House Gas emission annual estimation (tons per year). All greenhouse gases shall be estimated based on fuel consumption and an approved US-EPA method.
- Prevention of Significant Deterioration (PSD) shall be followed during dispersion modeling for all ambient air quality pollutants emanating from the facility.

A brief summary of PSD is as follows:

The main purpose of PSD regulation is to demonstrate that new emissions emitted from a proposed major stationary source or major modification, in conjunction with other applicable emissions increases and decreases from existing sources, will not cause or contribute to a violation of any applicable PSD increments assigned by RC for respective air quality pollutants.

Generally, RC Best Available Technique (BAT) analysis for RC PSD will involve (1) an assessment of existing air quality, which may include ambient monitoring data and air quality dispersion modeling results, and (2) predictions, using dispersion modeling, of ambient concentrations that will result from the applicant's proposed project and future growth associated with the project, (3) selection of BAT control so that pollutant increase with a new source addition stays below PSD increments.

The RC Ambient Air Quality Standards (the currently enforced RCER-2025, Volume I,Table 2A) represent maximum allowable concentrations "ceiling values." A PSD increment, on the other hand, is the maximum a allowable increase in concentration that is allowed to occur. Air quality deterioration is said to occur when the amount of new pollution would exceed the applicable PSD increment. The PSD program requires:

- Air Quality Analysis (monitoring and modeling)
- Increment Analysis (modeling)
- Installation of Best Available Technique/Technology (BAT) Performing

Averaging Period	Pollutant	Allowable Increment Level *
Annual	SO_2	25 % of Available Increment**
	NO_2	
24 Hours	SO_2	

* 40 CFR 51.166; 40 CFR Part 51 Appendix W & International Finance Corporation (IFC)

** Available Increment = Ambient AQ Std. – Background level

Example for Available Increment for XYZ Facility:

In following Table-1, the predicted modeled concentrations have been compared to 25% of the available increment. The available increment is defined for each pollutant as the difference between the baseline and the ambient air quality standard, as outlined in the IFC/WB Guidelines (World Bank, 2007). No XYZ facility modeled SO_2 concentrations exceed 25% of the available increment indicated in the tables below:

Table-1 Summary of Impact Predictions for SO_2					
Location	Baseline ($\mu g/m^3$)	Standard ($\mu g/m^3$)	Available Increment ($\mu g/m^3$)	25% of Available Increment	XYZ Facility Modeled ($\mu g/m^3$)
1-Hour Average					
Maximum	44.3	730	686	171	161
AQMS#6	44.3	730	686	171	97.3
Jubail Prison	44.3	730	686	171	77.8
Jubail Old Town	44.3	730	686	171	35.9
Construction Camps/Farms	44.3	730	686	171	70.8
Sabhkat al Fasl (Nesting Area)	44.3	730	686	171	31.6
JIC Community area I	44.3	730	686	171	30.9
JIC Community area II	44.3	730	686	171	41.7
24-Hour Average					
Maximum	30.2	365	335	83.7	44.6
AQMS#6	30.2	365	335	83.7	31.2
Jubail Prison	30.2	365	335	83.7	5.03
Jubail Old Town	30.2	365	335	83.7	4.20
Construction Camps/Farms	30.2	365	335	83.7	18.2
Sabhkat al Fasl (Nesting Area)	30.2	365	335	83.7	3.55
JIC Community area I	30.2	365	335	83.7	2.69
JIC Community area II	30.2	365	335	83.7	3.11
Annual Average					
Maximum	8.75	80.0	71.3	17.8	5.80
AQMS#6	8.75	80.0	71.3	17.8	3.01
Jubail Prison	8.75	80.0	71.3	17.8	0.38
Jubail Old Town	8.75	80.0	71.3	17.8	0.25
Construction Camps/Farms	8.75	80.0	71.3	17.8	1.25
Sabhkat al Fasl (Nesting Area)	8.75	80.0	71.3	17.8	0.13
JIC Community area I	8.75	80.0	71.3	17.8	0.14
JIC Community area II	8.75	80.0	71.3	17.8	0.12

*Values are taken as an example for XYZ Facility

Emissions from regulated sources of a new facility or major modification of existing facility shall not exceed any applicable RC Prevention of Air Quality Deterioration (PAQD) increment limits assigned by RC for each ambient air quality parameters (Table 2A of RCER Volume I).

The PAQD increment for each respective pollutant shall be less than 25% of the available increment. The available increment is defined for each pollutant as the difference between the background level (baseline) and the ambient air quality standard, as outlined in the World Bank's Agency-International Finance Corporation criteria. This shall be reflected and validated in the air dispersion modeling results.

In an air dispersion modeling report, the presentation of the results shall include isopleths which should be plotted on industrial city geographic map for all averaging periods (e.g., 1-hour, 24-hour, annual). The submitted values for all source input data (such as emission quantities/ rates) for each source, must be clearly explained and should mirror the Permit Application. Softcopies of all input files shall be submitted to the RC for approval before proceeding with studies. A temporary license shall be made available to the RC verification of the modeling results, if requested.

6. Hydrogeology and Hydrology

- Baseline Conditions including:
  - Groundwater: A comprehensive assessment of the existing groundwater conditions including chemical and biological analysis in accordance with the Royal Commission Groundwater Guidelines.
  - Hydrogeology: including geologic cross sectioning, hydraulic gradient, permeability, flow rate, porosity etc.
  - Soil Quality – Chemical Analysis
- Impact Assessment
  - Groundwater Flow direction and Spill Modeling
  - Construction/Commissioning/Operation/Decommissioning

7. Ecological Resources

(Note: The requirement of this item will be decided by the RC on a case-by-case basis)

Habitats both natural and man-made for flora and fauna, both on site and in the surrounding area. Their populations and their value which may reflect rarity, economic value and attractiveness.

- Baseline Assessment
  - General Description of Site and Surroundings
- Impact Assessment
  - Construction/Commissioning /Operation/Decommissioning
- Accidental Events
- Recommendations for Habitat Protection, Creation and Enhancement
- Mitigation Measures to avoid harmful alterations, modification, disruption and destruction of ecologically sensitive habitats utilized by globally and locally protected species.

8. Noise & Vibration

Noise levels are regulated according to the currently enforced RCER and include sensitive receptor locations e.g. residential, schools etc. The potential sources of noise associated with a development need to be identified. If any noise source is likely to be significant for particular receptor, an assessment will need to be made including:

- Baseline Conditions: Conduct noise and vibration study.
- Noise Impact Assessment (modeling)
  - Construction/Commissioning/Operation/Decommissioning
  - Emergency/abnormal Plant Operations

9. Waste Management

With an emphasis on waste that contains toxic or otherwise harmful compounds with resulting effects on amenity, water quality and land quality and potential adverse effects on human health:

- Waste Generated during Project Lifetime
  - Classification of Wastes
  - Construction/Operation/Decommissioning
  - Waste Management Approach with details of treatment and disposal methodologies
  - Wastewater Management
- Impact Assessment
  - Construction/commissioning/operation/decommissioning
  - Accidental Events

10. Water Quality Management

With an emphasis on the impacts on the environment and/or Wastewater treatment facilities due to various wastewater discharges including:

- Non-contact cooling water
- Industrial waste water
- Sanitary wastewater
- Ballast water

Depending on the requirement of the RC, the developer shall perform EIA study for thermal pollution to the sea, chemical pollution to the sea or groundwater, pollutants released from cooling towers operations (emissions and blow down) using internationally approved models and accepted by RC.

11. Marine Environment

This parameter is required if the proposed project is near to coastal area or if it has a direct discharge to sea, or where likely impacts are deemed significant. All coastal seawater models shall be approved by the RC and shall address the anticipated impacts on the marine environment. Existing seawater quality data can be obtained from RC. It is to be noted that if the study area is not located near an existing marine monitoring station, then additional investigations/sampling shall be undertaken as part of the EIA study.

The following factors shall be included during the impact assessment but not limited to:

- Baseline Conditions
  - Ambient Sea Water Quality
  - Marine Ecology
- Impact Assessment
  - Construction/commissioning/operation/decommissioning
  - Accidental Events
- Detailed Discussion
  - Mitigation Measures to avoid harmful alterations, modification, disruption and destruction of ecologically sensitive habitats such as coral reefs, Seagrass beds, mangrove forests, fish and fish habitat and also areas utilized by globally/locally protected species.
  - Effects on Spawning grounds, nurseries and migration corridors

12. Socio-Economic Aspects

(Note: The requirement of this item will be decided by the RC on a case-by-case basis)

- Baseline Social Setting
  - National Socio-Economic Data
  - National Economic Activity
  - National Utility Infrastructure
  - National Transportation Infrastructure
  - National Education
  - Regional and Municipal Socio-Economic Data
  - Construction/Commissioning/Operation/Decommissioning
- Impact Assessment

13. Traffic and transport infrastructure

The EIA shall include conducting traffic surveys and reviewing the current infrastructure and transport system. Based on these investigations, the assessments shall be made on impacts of the project on the usage and demands on public transport systems, railways, ports etc.

14. Utilities Infrastructure and Usage

The current utilities Infrastructure and their Usage shall be reviewed. The assessment shall anticipate the impacts of the project on the increased demands on existing utility infrastructure notably water supply, sewage and wastewater treatment, and electricity. Existing services and infrastructure may become overloaded adversely affecting existing users. If there are any significant benefits, where the development enables a major improvement to local infrastructure, those shall be explained clearly and reported.

15. Archaeology and Cultural Heritage

(Note: The requirement of this item will be decided by the RC on a case-by-case basis)

- Conduct a review of relevant literature and assess the implications regarding potential disturbance or damage to archaeological property.
- Assess potential impacts on the cultural heritage.

16. Health and Safety Aspects

- Baseline Assessment (Using records and statistics obtained from health organizations).
- Impact Assessment
  - Construction/ Commissioning/Operations/Decommissioning

17. Sustainable Development Assessment

- Describe the Sustainable Development Policies of the proposed development
- Integration of Sustainable Development Elements into the project:

18. Analysis of Alternatives

The consideration of alternatives (including alternative sites, alternative site layouts, alternative processes and alternative phasing of construction) is mandatory. The “do nothing” option (that is, the possibility of not carrying out the proposed development at all) should also be assessed. It is particularly important to justify convincingly why it was decided to choose the site proposed. The choice of the preferred alternative shall involve a comparison of the magnitude and significance of the effects of the alternatives considered. Where no alternative sites were considered, the reasons, as to why alternatives were not feasible, shall be explained.

An integral element of the assessment of alternatives is an assessment of all technologies available to the developer to demonstrate that the environmental impacts of alternatives have been considered. This is also considered an integral element of the design process to determine the best available techniques (BAT) that satisfies regulatory standards. The reasons for choosing the proposed technologies, taking account of the environmental effects, shall be justified.

- Site Alternatives
- Alternative Process Technology / Production Options and Plant Design
- Water Use Alternatives
- Wastewater Pre-Treatment Alternatives
- Pollution Control Alternatives
- Waste Management Alternatives
- “Do Nothing” Option

19. Cumulative Impacts Assessment

A detailed assessment of the following aspects in regards to the cumulative impacts with other existing projects taking into account of the existing baseline situation.

- Air Quality
- Water Quality
- Noise
- Waste Management
- Marine Environment
- Socio-Economic (if requested by RC)
- Community and Employee Health
- Detailed discussion of unavoidable adverse impacts
- Environmental aspects & impacts register with control measures

20. Determine the significance of effects

The most frequent method used here is the use of the Leopold Matrix which distinguishes between the nature, extent and magnitude of the predicted impacts, the significance of the consequent effects on each of the study parameters, and the seriousness of the effect.

The criteria for evaluating the significance of impacts and their effects shall be set in advance and shall be based on local standards wherever possible. Where these are not available, acceptable international standards shall be used (e.g., WHO, US EPA regulations/ guidelines, etc.).

21. Mitigation Measures

This section investigates the potential mitigation measures for minimizing adverse effects and enhancing any beneficial effects. Where the predicted impacts exceed environmental quality standards or, there are stated or perceived uncertainties relating to the accuracy of the predicted effects, effective mitigation measures shall be adopted to control impacts.

As previously stated, the key to achieving effective mitigation, is early consultation between all parties. Making mitigation measures an integral part of the initial design phases provides opportunities to eliminate or reduce effects by, for example, layout modifications or industrial process selection. The incorporation of mitigation measures at a later stage may not be possible. As the design evolves, impacts shall be continually re-evaluated to check that mitigation will still be effective.

Mitigation strategies shall take into account the following factors but not limited to:

- Sustainability,
- Integration,
- Feasibility, and
- Compliance with statutory obligations under other licenses or approvals.

The key mitigation measure is the technology choice. Based on the BAT analysis, the chosen technology shall represent the best option taking into consideration practicality, potential impacts, cost and availability. The types of mitigation strategies identified, shall be reflected in the Permit application.

The potential mitigation measures shall include but not limited to:

- Water quality: Control and treatment of liquid effluent (e.g. recycling, cooling waters, cooling towers, oil separators, sand traps, ponds and clarifiers)
- Waste**:**
  - Waste recovery facilities,
  - Procedures for handling, storage, transport and disposal of waste for all hazardous and dangerous material (e.g., recycling of waste as raw material(dust) or fuel(chemicals), closed storages secured from storm water runoff.
  - Control and disposal of solid waste (e.g., reused as fuel or at other industries).

- Air quality:
  - Control of stack emissions (e.g. burners, filtration technologies and scrubbers),
  - Control in fuel inputs (e.g. substitution of fuels with low emission specification)
  - Control of fugitive emissions (e.g. encapsulating/covering conveyors, water spraying)
- Noise:
  - Control of noise from plant and machinery to ensure compliance with relevant standards,
  - Sound attenuation measures such as wall and banks (e.g. maintenance on noisy machines, noise adsorbing claddings and encapsulation)

22. Environmental Management & Monitoring Plan (EMMP)

Effective implementation of the findings and recommendations of an EIA largely depends upon the environmental management and monitoring plans that includes clear performance benchmarks and indicators to enable effective monitoring and supervision of mitigation measures at the ground level. The EMMP shall cover the following:

- Management of construction impacts
- Management of operational impacts (e.g. hazardous materials and fuel management, transport and packing management, maintenance and site security plans, emergency and contingency plans),
- Strategies and action plans to feed information from monitoring into management practices,
- Environmental Awareness and training programs for operational staff,
- Indicators of compliance with licensing and approval requirements.

First Category facilities shall prepare their Environmental Management Plan (EMP) as per guidelines provided in Appendix “O” of RCER – 2025, Volume II.

APPENDIX D

ENVIRONMENTAL EMERGENCY RESPONSE PLAN (EERP) GUIDELINES

APPENDIX D

ENVIRONMENTAL EMERGENCY RESPONSE PLAN (EERP) GUIDELINES

INTRODUCTION

The development and implementation of an Environmental Emergency Response Plan (EERP) is considered by the Royal Commission as a major part of any industrial operation. The emergency planning is also a national pre-requisite as set by the other local government agencies concerning industrial operation as well as an international requirement governed by the international agencies like the World Bank (*Disaster Risk Management Guidelines)*, OSHA (*Hazardous waste operations and emergency response. - 1910.120*, *Standards - 29 CFR*) and USEPA (*Response Planning and Risk Management Guidelines)*.

The importance of an EERP is derived from its very name as being the planning and management of avoiding potential risks during the industrial operation. It involves preparing an integrated plan for tackling a disaster before it occurs as wells as after it occurs i.e., disaster response e.g., emergency evacuation, quarantine and mass decontamination and rebuilding site etc.

The EERP concept is a continuous process by which RC as a legislator and industries operating in the industrial city manage hazards in an effort to avoid them or to eliminate their adverse impacts resulting from these hazards. Actions to be taken in an emergency depend in part on the type of the industry, its design, the capacity of the units, the hazardous materials to be released, location and perceptions risk of those exposed. Effective emergency management relies on thorough integration of emergency plans at all levels.

Any facility operating in the industrial cities under RC jurisdiction shall develop it's own EERP for all kinds of emergencies. The EERP shall be a high standard technical document which addresses, as a minimum, the following areas:

1. PURPOSE OF EMERGENCY PLAN

The main purpose of the EERP is to define procedures to be followed in the event of an accident or emergency at the facility premises. Scope of the plan covers natural incidents/operational accident scenarios such as spills, fire, and road accidents which may occur during the course of normal /abnormal operations. The aim of preparing an emergency and contingency plan for facilities operating within in RC boundaries is to have an effective procedure that can be followed by each facility in case of an unavoidable emergency, incident and accident at the site The facility shall conduct safety analysis of all operational components considering it as a useful tool in designing emergency procedures.

RC will review and approve the EERP according to procedures and incorporate it together with the EERPs of other industries operating in the area as part of the RC's overall emergency planning procedures.

2. REGULATORY FRAMEWORK

The EERP shall be prepared in compliance with the currently enforced RCER Volumes I and II, and it shall be a supplement to Royal Commission Environmental Permit Application package (PAP) and Environmental Impact Assessment (EIA) study report in order to obtain the Environment Permit to Construct (EPC) and the Environmental Permit to Operate (EPO).

A major task of the EERP is the preparation of an integrated preventive plan to stop a disaster before it occurs. Further, it also requires proper response planning such as emergency evacuation, quarantine, mass decontamination, etc. for handling the disaster after its occurrence.

3. DESCRIPTION OF SITE

The facility shall include a brief description of the site with reference to final site plan as listed in PAP Form "PA-G1 (General)". Further, the site plan shall address all aspects of environment and safety in compliance with all applicable RC Regulations and Guidelines.

4. PROCESS RELATED RISKS

Priorities shall be set by the facility for identifying process related risks with greatest probability of occurring and greatest loss, and risks with lower probability of occurrence and lower loss are handled in descending order, as per technical design and manufacturer's guidelines for each unit.

5. TYPE OF EMERGENCIES

All potential emergency scenarios that apply to the facility in particular shall be discussed in detail and shall include but not limited to the following typical emergency scenarios:

i. Incidents related to failure or malfunction of process equipment that may result in a sudden release of chemicals including hazardous substances.
ii. Incidents/ Accidents that may result in environmental impacts, health hazard or material damage such as truck collision or flip over on highway or near plant, Industrial accident on-site, site entrance blockage, absence of key staff at one time, sudden breakdown of major units, machinery, vehicles, non-availability of badly needed maintenance /repair tools.
iii. Medical emergencies related/not related to process; trauma, dermatitis, injury, exposure to hazardous substance, sickness, sunstroke, electrocution etc.
iv. Accidental spills or release of hazardous materials related/not related to process equipment failure that can lead to a medical emergency, environment impacts or material damage
v. Natural events such as earthquakes, floods, sandstorm, lightning, heavy rainfall, etc.
vi. Fires (small scale as well as large scale).

6. ROAD ACCIDENTS

The facility shall consider special provisions set by RC, MEWA or OSHA for transport of all toxic and hazardous chemicals including fuels, product, raw material, waste or if regulated under international standards including US Department of Transport (DOT) or USA National Fire Protection Association (NFPA).

Further the facility shall develop appropriate accident prevention program which will address issues related to: possibilities of minor major road accidents/flip over of fuel tankers/trucks carrying raw material or product or waste, schedule of vehicle movement to avoid peak traffic and road accidents, driver's education on traffic rules and speed limits on-site and off-site, vehicle maintenance as per owner's manual and dealership maintenance program, etc.

7. FIRE FIGHTING

The facility shall identify all potential fire hazards on-site and fire hazard characteristics that apply to fuel, raw material, product, by-product, waste with reference to MSDS, plant design and OSHA (29 CFR Part 1910, Subpart L Fire extinguishing equipment).

The following shall be included in the fire response section:

i. Locations of fire alarm/systems/extinguishers
ii. Staff training in safe operation of fire extinguishers, isolation and extinguishing small fires.
iii. Potential sources of fire
iv. Fire hose reel locations
v. External Support Services needed
vi. Firefighting equipment should pass RC industrial security and Civil Defense specifications
vii. Firefighting measures/instructions for each material handled on-site as per MSDS
viii. Emergency plant shutdown

8. INCIDENT / ACCIDENT MANAGEMENT

Facility shall prepare procedures for avoiding risks that include preventive measures/actions for preparing for disaster before it occurs, disaster response (e.g., emergency evacuation, quarantine, mass decontamination etc.); and supporting, and rebuilding after natural or human-made disasters have occurred and shall also include Emergency Plant Shutdown to isolate equipment, process units, tanks, etc., from one another to prevent the spread of an emergency/hazardous situation.

9. ALARMS AND COMMUNICATION

Guidelines for communicating emergency messages/alarms shall be included in EERP and shall also be a part of training for all employees. The Facility shall prepare a hot-line list of all concerned government authorities/organizations for contacting in the event of an emergency by the EERP team.

10. TRAINING PRACTICES

All technical/administrative/skilled labor/non-skilled labor and other on-site/offsite employees of the facility shall receive initial site induction into the safety rules and basic emergency response procedures.

As a result of emergency training, all employees shall be well versed with available options when responding to emergency situations so that rational and intelligent decisions can be made.

11. ENVIRONMENTAL EMERGENCY RESPONSE PERSONNEL (EERP Team)

The EERP Team is a group of workers who prepare for and respond to any emergency incident, although under certain circumstances the team may be an ad-hoc group of willing volunteers after approval from the facility.

Procedures shall be set-up for selecting a designated EERP team, and developing a Emergency Response Planning Organization (structure, authorities & responsibilities, emergency personnel names and contact numbers).

The EERP team members shall be trained and prepared to fulfill the roles required by each specific situation.

For large events, where external assistance is sought by the facility, the EERP Team shall be required to work jointly in a unified command system with RC and any other concerned government agency.

12. SAFETY, HEALTH AND ENVIRONMENT (SHE)

The facility shall incorporate SHE aspects into the EERP, and shall identify various health hazards; hazard ID, health effects hazard characteristics of each material stored/handled on-site, exposure control, Personal Protective Equipment (PPE), conditions to avoid, waste on-site with reference to plant design, technical supplier specs., Material Safety Data Sheet (MSDS) and other factors.

A specific log, hazard symbol signage notice boards and labeling system for all site components in the plant shall be developed according to conditions in each working area.

All hazardous material shall be clearly marked with USA National Fire Protection Association (NFPA) diamond labels, and selection of signs design and contents shall be prepared in general with applicable regulations and guidelines from U.S EPA, OSHA, NESHAP, HAZOP and HAZWOPER.

13. IMMEDIATE RESPONSE MEASURES

The facility shall prepare easy-to-follow step-by-step actions in the form of a written procedures for the ERP team to respond, contain or stop the cause of the emergency effectively without delay, respond to material damage Incidents, respond to medical emergencies, and respond to process failure emergencies.

14. EMERGENCY PROCEDURES

All the emergency procedures shall be written procedures for responding to any emergency or incident likely or suspected to be likely to cause material damage to the plant, its employees (including contractors), the environment or the surrounding communities and industrial installations. These procedures shall be prepared and kept. While preparing the above procedures, the following points shall be taken into consideration:

i. No worker on-site is authorized to give a public statement by any means
ii. Site shall be off-limits to non-authorized persons
iii. Internal and external responders' names and contact numbers with ID copies shall be obtained and approved by the facility
iv. The Facility shall be able to clearly know, identify and define each type of emergency
v. Proper response measures for spills/gas releases and other emergencies shall be prepared

15. REDUCING ENVIRONMENTAL IMPACT

The Facility shall establish procedures to minimize adverse impacts as a result of the emergency situation and to determine safe entry to the emergency or incident area and

procedures for clean-up, repair, containment measures, rehabilitation of contaminated land, containment and removal of spilled material.

16. CORRECTIVE ACTION PLAN

A Corrective Action Plan shall be prepared by the EERP Team and implemented to avoid creating conditions that could potentially aggravate, repeat or augment the original incident. After preparing an incident report the facility shall take corrective actions that may include:

i. Compliance with RC requirements.
ii. Control the source of pollution
iii. Plan to avoid recurrence of similar incidents
iv. Study the impacts of an incident on surrounding environment.
v. Procedures for cleanup or repair of the affected area affected by the hazards
vi. The Facility shall ensure that repair works do not create disruptions that may result in new or further releases of contaminants.
vii. Assess the need for mitigation

17. MATERIAL HANDLED AND STORED AT SITE

All material stored, handled on-site as well as material transported to and from the site shall be declared by the facility and classified in accordance with the currently enforced RCER, Volume I and the facility shall follow provisions stipulated in the currently enforced RCER, Volume I specially to Section 4 for regulations concerning “Hazardous Material Management”.

18. EMERGENCY EQUIPMENT ON-SITE/OFF-SITE

A list of equipment to be used solely for the purpose of emergency response and shall be available at a designated location on-site for the purpose of making an initial emergency response.

19. PPE FOR EMERGENCY PERSONNEL, FIRST AID, AND MEDICAL EXAMINATION

The facility shall ensure the availability of suitable PPE for the EERP team and all other personnel to be used in emergencies. First aid boxes shall be available in selected areas around the site for use by workers. The First Aid box shall be inspected regularly.

The facility shall have a proper medical facility to conduct periodic medical examinations of the facility employees.

20. EVACUATION ROUTES AND ENVIRONMENTAL EMERGENCY DRILLS

The facility shall prepare specific guidelines for determining the extent of the area that needs to be evacuated in an emergency, activating an evacuation, evacuation routes, evacuation sequence and communication guidelines during an evacuation.

The facility shall conduct potential environmental emergency drills periodically in relation to the hazardous materials.

APPENDIX E
GROUNDWATER MONITORING GUIDELINES

APPENDIX E
GROUNDWATER MONITORING GUIDELINES

Goal

To provide an effective system for monitoring the characteristics of groundwater within facilities and to rapidly detect any pollution of groundwater as a result of any leakages, accidental discharges etc.

1. Groundwater Network: Minimum design requirements

The number of groundwater monitoring wells installed is determined by (RC will determine the required numbers of wells) Facility type.

First Category facilities may not be required to install any groundwater monitoring wells if subject to the following conditions:

(a) The facility's allotted site doesn't have a history of ground water contamination.
(b) The facility has no onsite storage of toxic materials with quantities greater than 50 Kg and of hazardous materials (including oil, industrial/sanitary wastewater etc.) with quantities greater than 5 metric tons at any time.
(c) Number/type of potential contamination sources
(d) Site area
(e) Previously determined groundwater contamination

RC has the right to request installation of groundwater wells for facilities storing materials lesser than the above referred quantities based on the impact evaluation.

The location of groundwater monitoring wells is determined by (RC shall approve locations before installation)

- Location of potential contamination sources
- Hydraulic gradient (direction of groundwater flow)
- Number and placement of storage tanks
- The presence of obstructions such as buildings or underground service lines

- Having determined the potential sources of contamination, as well as the hydraulic gradient, groundwater monitoring wells, should be located 'down gradient' in a manner that is likely to establish whether any change in water quality detected is a result of any leakages, discharges etc. coming from that particular source. It is required, however; to also locate a minimal number of groundwater monitoring wells 'up gradient' to provide verification that contamination is in fact from a particular source while also providing coverage due to potential fluctuations of the hydraulic gradient.
- It is recommended that each monitoring well shall be located in an area which is not likely to be affected by future developments, excavations, vehicular movements etc.

2. Borehole Drilling & Installation Guidelines

Borehole Drilling

- To avoid borehole cross-contamination, the drilling contractor shall decontaminate all equipment that will be placed in the borehole on site prior to use and again between boreholes. Decontamination methods include steam cleaning, high-pressure hot water washing, and detergent washing followed by rinsing with potable water.

- Boreholes, hollow-stem auger flights, and permanent or temporary casing shall have a minimum inside working diameter of at least 100mm greater than the external diameter of the PVC well pipe, i.e., if the well pipe is 100mm in diameter, then the borehole shall have a minimum diameter of 200mm.

- The borehole drilling method shall be left to the discretion of the contractor.

- During drilling, a borehole log shall be completed clearly identifying the subsurface geology encountered as the borehole is advanced. Particular note should be made of potentially contaminated soils noted by discoloration, odors etc. The borehole log should identify the final borehole depth in meters, as well as the depth to groundwater when initially encountered.

Groundwater Monitoring Well Construction

- The RC recommends that groundwater wells should have a minimum internal diameter of 100 mm (4 inch), (however 50 mm (2 inch) is acceptable), and consist of Schedule 40 PVC (polyvinyl chloride), flush joint threaded; be new and visually clean. All PVC used shall conform to ASTM F-480 Standard Specification for Thermoplastic Water Well Casing Pipe and Couplings. The use of solvents, glues or rubber sealants is prohibited.

- The groundwater monitoring well shall consist of a casing (blank section), and well screens. The well screen must be installed at an elevation to straddle the water table (to allow for the rise and fall of the water table) such that any floating contamination (fuel products and their derivatives) may be monitored. The screen slot size is recommended to be 0.25mm, however 0.50mm is acceptable.

- The final depth of the groundwater well should be no less than 3-4 meters below the water table (if using 100mm diameter casing) and 4-5m if using 50mm casing. If well construction is conducted during winter months, allow an additional 0.5 – 1.0 m to compensate for seasonal fluctuations of the water table. Otherwise, it may be that there is insufficient water inside the well during sampling.

- Upon completion of the borehole, the well casing and well screen shall be assembled above ground into manageable sections and inserted into the borehole.

- Once the PVC pipe including the screen and blank sections are installed, the silica sand filter is packed around the well screen to at least two (2) feet above the screen taking care that uniform packing is achieved. This acts as a sand filter to allow the ingress of groundwater into the monitoring well while restricting unwanted sediments etc. The silica sand (or similar material) shall have a consistent grain size with a uniformity coefficient of less than 2.5 or less. The grain size shall be selected to filter out fines present in the geological formation and will typically be within 0.7mm – 1.25mm.

- Bentonite chips follow, forming a clay (impervious) seal to prevent ingress of surface water which may contaminate the underlying ground water and monitoring samples. The Bentonite chips shall be untreated, pellet form, premium grade, sodium bentonite. The thickness of the bentonite seal shall be no less than 600mm.

- The remaining area around the blank PVC section (annular space) is packed with cement Bentonite grout annular seal. (Native materials may not be used to backfill the hole).

Note: There shall be no grease, oil film or other foreign substance on the outside or inside of the PVC pipe

It is recommended that a 1m solid steel or FRP plastic housing (with appropriate cap) is installed to protect the exposed section of PVC riser pipe. The monitoring wells must be adequately sealed near ground level with cement-based cap sloped away from the well to prevent ingress of surface water.

- To easily identify installed monitoring wells, a tag or plate is attached to the housing with identification markings. The installation of crash barriers is optional however is recommended in areas where there the potential for damage by vehicular movement etc.
- After completion of monitoring well construction, the well shall be 'developed' (removal of all water) by pumping. Alternatively, fresh clean water can be used to displace the dirty sediment laden water within the well. This process should continue until the well water is clean and free of silt, sand and clay.

- Well development water can be discharged to the ground surface unless it contains visible evidence of contamination.

- For installation of groundwater monitoring wells, refer the diagram in Annexure 1 (Groundwater Monitoring Well Standard Drawing - Minimum Construction Requirements).

Well Development

Newly installed monitoring wells should be developed soon after installation and before groundwater sampling is undertaken. Well development is undertaken to remove the fluids artificially introduced into the subsurface as a result of the drilling process. In order to estimate the volume of fluids added to the aquifer during drilling, driller's logs should be consulted. Ideally the well development process should aim to remove a volume of groundwater from the aquifer equivalent to the volume of fluids artificially introduced during drilling. As a minimum, three (3) well volumes of groundwater should be removed in order to 'develop' a newly installed groundwater monitoring well.

Level Survey

As part of the groundwater monitoring well installation program, a topographic survey must be conducted. The ground level and top of standpipe level at each of the facility's boreholes must be accurately recorded in order that the water table (phreatic surface) can be plotted in meters above sea level. This will in turn, enable the groundwater flow direction to be calculated.

Documentation

During installation of each monitoring well, the "Groundwater Monitoring Well Installation Record" (Annexure 2) shall be completed and submitted to RC along with attached borehole logs.

3. Groundwater Sampling/ Analysis Guidelines

Groundwater sampling information

During sampling, the "Groundwater Monitoring Sampling Record" (Annexure 3) shall be completed and submitted to RC.

Measuring Total Depth of Groundwater Well

Total groundwater well depth shall be measured using an electronic measuring device (Solon or equivalent). Remember to subtract the height of the riser from the overall measurement. Record the result as total depth in meters below ground level (BGL) of the groundwater well on the groundwater well sampling sheet. Clean the tape before using it again.

Measuring Depth to Water Table

- Depth to water table (depth to groundwater) is the depth in meters from the ground surface to the water table. By monitoring water table levels, we can identify whether and when groundwater levels are rising, falling or remaining static and provided valuable information if groundwater modeling or hydrology studies are conducted.

- **Procedure**

1. Lower the measuring device into the groundwater well until it hits the water and gives a beep.
2. Measure the depth from tape to the top of the well casing.
3. Subtract the height of the casing above the ground level from the measurement.
4. Lower the tape to the bottom of the well to get depth of the water column. Subtract #4 from # 3 to get height of the water column in the well (used to calculate purging) with reference to top of casing (TOC).
5. The probe will give a *different signal* if product on the water is detected- determine thickness of the product using the probe and log the thickness found.
6. Record the result as water level (in meters BGL) with the date of the measurement on the groundwater monitoring sampling record.
7. Use a plastic ground sheet to keep equipment clear of contact with the ground. Place a meter and half square of heavy-duty polyethylene on the ground where the sampling equipment is kept to prevent contact with the soil. Replace for every well.
8. Wash the measuring device thoroughly according to the decontamination procedure before using it again to prevent contamination.

Groundwater Well Purging

- The purpose of groundwater sampling is to retrieve a water sample that represents the characteristics of water below the ground surface. To obtain a true representative sample, it is necessary to remove the stagnant water from the groundwater well casing before a sample is taken. This is called purging. At least three well volumes of water should be removed before sampling.

- **Purging using a Bailer**

A groundwater well can be purged using a bailer, only when a reasonably small volume of water is to be removed, typically used when there is little or very slow recharge of the well during purging, or with a short water column in a two-inch diameter well.
A bailer is a simple mechanical device that can used to draw water from the groundwater well (see Figure 1). It consists of some form of tubing with a one-way check valve at the bottom. When the bailer is lowered into the groundwater well casing below the water level, it fills with water. The check valve closes once the bailer containing the water sample is lifted to the surface. Bailers come in various types (polyethylene, Teflon, stainless steel, acrylic), lengths (from 30 cm to 180 cm), and widths (19 mm to 90 mm) and with numerous features like weighted, unweighted, single check-valve, double check valve, controlled flow bottom, etc.

Figure1. Bailer

- **Purging using a Pump**

The most efficient purging of the well prior to sampling is accomplished using a pump. Small electric pumps in plastic housings that operate from a 12-volt battery are the most convenient pumps to use for groundwater purging and sampling (Figure 2). There are several types of submersibles, battery operated, pumps available, which have slightly different options such as variable flow rate and ability to pump to a certain depth. The overall length of the pump should be around 25cm to allow for ease of cleaning. The pump should be able to push out water from a depth of around 7.6 meters or more. If the well continually runs dry during purging, note the length of time needed to recharge. If more than two hours to recharge, see directions under Sampling.

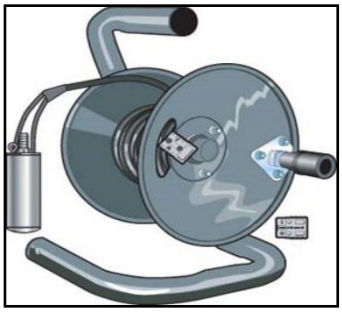


Figure 2. Submersible

Sampling

To draw water from a monitoring well, a bailer or a pump has to be used.

Note. The RC does not recommend purging by means of a bailer as the time required can be extensive, especially on a deep 4-inch diameter well. If the well takes more than two hours to recharge after purging, do not sample. Close up the well, return the following day and immediately sample the well.

- **Equipment**

a. Abstraction device like adjustable-rate submersible pumps or bailer
b. Tubing with 1/4 inch or 3/8-inch inner diameter, Tygon brand or equivalent, pharmaceutical grade (Pharmed) tubing should be used for the section around the rotor head of a peristaltic pump, to minimize gaseous diffusion.
c. Water level measuring device (interface probe), capable of measuring to 0.01-meter accuracy (electronic “tape”, pressure transducer).
d. Power source (generator, etc.). If a gasoline generator is used, it must be located downwind and at least 30 feet from the well so that the exhaust fumes do not contaminate the samples.

e. Indicator field parameter monitoring instruments - pH, dissolved oxygen (DO), turbidity, specific conductance, and temperature.
f. Decontamination supplies (for example, non-phosphate detergent, distilled/de-ionized water, isopropyl alcohol, etc.).
g. Logbook(s), and other forms (for example, well purging forms)
h. Sample Bottles.
i. Sample preservation supplies (as required by the analytical methods).
j. Sample tags or labels.
k. Disposable bailers.
l. Large reusable bailer (3 inch)
m. Containers to carry and store the equipment
n. Well construction data, location map, field data from last sampling event.
o. Well keys (if casing is locked).
p. Site specific Sample and Analysis Plan/Quality Assurance Project Plan.

- **Decontamination of Equipment Procedure.**

1. Cross Contamination: Purging the wells with the same section of tubing in each well is a source of cross contamination. This is prevented by using a new length of tubing for each monitoring well and is required.
2. Effective cleaning of probe and pump: The correct procedure is to retrieve the interface probe and its cable and deposit them into a bucket for immediate cleaning by first using detergent if oily, or if not oily, rinse with potable water followed by distilled water and follow with a solvent such as isopropanol. The solvent must not be an analyte that is part of the VOC analysis.
   For the pump, pump one gallon of distilled water through immediately after use. Wash or wipe the exterior surface of the pump power line with a detergent solution and rinse or wipe three times with distilled water. Thoroughly wash or wipe three times with solvent (typically isopropyl alcohol) and allow to air dry before reuse. Lines used to lower the bailer shall be replaced for each bailer used.
3. Cleaning supplies list: Water, solvents, wipes, brushes and buckets for the probe and pump, non-phosphate detergent, distilled/de-ionized water, etc. per item F in Equipment list above.
4. If wells with product in them are sampled, use large diameter reusable bailers with a drum or other means of storing the oily purge water. Do not discharge the oily water onto the ground.
5. The groundwater monitoring/sampling Contractor is responsible for disposing of contaminated purge water and oil responsibly in accordance with RC waste management guidance.

- **Bailer Procedure**

1. Before taking a sample; purge the groundwater well by removing the calculated volume of water (3x well volume). It is a good idea to allow the well to settle for some time especially if there was potential sediment disturbance during purging.
2. To sample, lower the bailer slowly and gently into the water column of the groundwater well until it is submerged, do not allow the bailer to come into contact with the bottom of the well.
3. Carefully remove the water sample and empty it from the base of the bailer into a prepared sample container. Care should be taken not to allow the top of the water column to enter a sampling contain if the groundwater has a sheen on it – since the hydrocarbon sheen will likely skew many organic test results.

- **Pumping Procedure**

  Using a pump is the efficient way of sampling a groundwater well as well as for groundwater well purging.

  1. Assemble the pump system, keeping in mind how much water your particular pump can lift, and that any extension of the casing above ground level will reduce this capacity.
  2. Purge the groundwater well by pumping out appropriate volume of water (see 'Purging using pump' for details).
  3. If murky water persists, allow to settle before sampling, otherwise continue pumping water to obtain sample, with the pump in the same position as for purging.
  4. If the position of screened section is not known, lower the pump to a distance halfway between the water table depth and the borehole tip depth (i.e., the bottom of the well).

- **Sample Preservation**

  Add preservative, as required by analytical methods, to samples immediately after they are collected if the sample containers are not pre-preserved. Check analytical methods (e.g., EPA SW-846, standard methods, etc.) for additional information on preservation. Check pH for all samples requiring pH adjustment to assure proper pH value. All samples should be placed in a chilled ice box immediately for transport to the lab.

  Note: Any parameters which are liable to change in transient (such as temperature, pH and dissolved oxygen) should preferably be measured in the field and not in a laboratory after transportation.

Field Quality Control (QA/QC)

Quality control samples are required to verify that the sample collection and handling process has not compromised the quality of the groundwater samples. All field quality control samples must be prepared the same as regular investigation samples with regard to sample volume, containers, and preservation. The following quality control samples shall be collected for each batch of samples (a batch may not exceed 20 samples).

- Blind duplicate
- Trip blank (VOCs)

Trip blanks are required for the VOC samples at a frequency of one per sample cooler. Trip blanks are used to determine whether any of the sample containerization or transportation methods could have compromised the investigation samples.

Blind duplicates (split samples) are collected to determine the precision of the analytical process. For this procedure, collect an exact duplicate for a random analyte (for best results, split a sample into 2). Label the blind duplicate 'BD1'. Make a note of from which sample the duplicate is taken. If there is a significant difference in the analytical result, it can be said that the analytical process is not precise.

Chain of Custody Form (COC)

The chain of custody form is used as a tool to trace the sample collection, transportation, receipt and scheduling processes. Their use helps to understand what may have caused erroneous lab results in the event of receiving unexpected data. The form lists the client, lab, sample identification, state (soil, water, gas), type of tests to be run, and signature lines with date and time showing when they were transferred to the lab. The chain of custody form must be prepared by the sampling technician. A copy of the form should accompany the samples to the laboratory, but the original chain of custody form should stay with the field technician. Only if this procedure is followed can the field technician check that the instructions, he gave regarding sampling are followed and all the samples that were packaged and transported are tested as per the original schedule. The chain of custody document shall be included with the groundwater sampling report.

Analysis

After the analysis, the "Groundwater Standard Reporting Form" (Annexure 4) shall be completed and submitted to RC. The following is a list of parameters regulated under the RC regulations:

- pH
- Salinity
- Conductivity or TDS
- Total Suspended Solids (TSS)
- Turbidity
- Total Organic Carbon (TOC)
- Phenols
- Cyanide
- Sulfide
- Ammonia
- Metals
  - Arsenic (As)
  - Cadmium (Cd)
  - Chromium (Cr)
  - Copper (Cu)
  - Lead (Pb)
  - Mercury (Hg)
  - Nickel (Ni)
  - Zinc (Zn)
  - Cobalt (Co)
  - Barium (Ba)
  - Iron (Fe)
- Monocyclic Aromatic Hydrocarbons (BTEX)
  - Benzene, Toluene, Ethylbenzene, Xylene
- Total petroleum Hydrocarbons (TPH)
- TPH fractions (C6 – C9) and (C10-C40)
- Volatile Organic Compounds (VOCs) –BTEX and other process VOCs. The RC reserves the right to request and amend the list of compounds required for analysis.
- Semi Volatile Organic Compounds (SVOCs) if required
  - Naphthalene,
  - Pyrene,
  - Benzo-a–pyrene
  - Benzo-a-anthracene
  - Phenanthrene.
  - Fluorene.
- Biological Analysis (e.g., Coliform & E-Coli etc.)

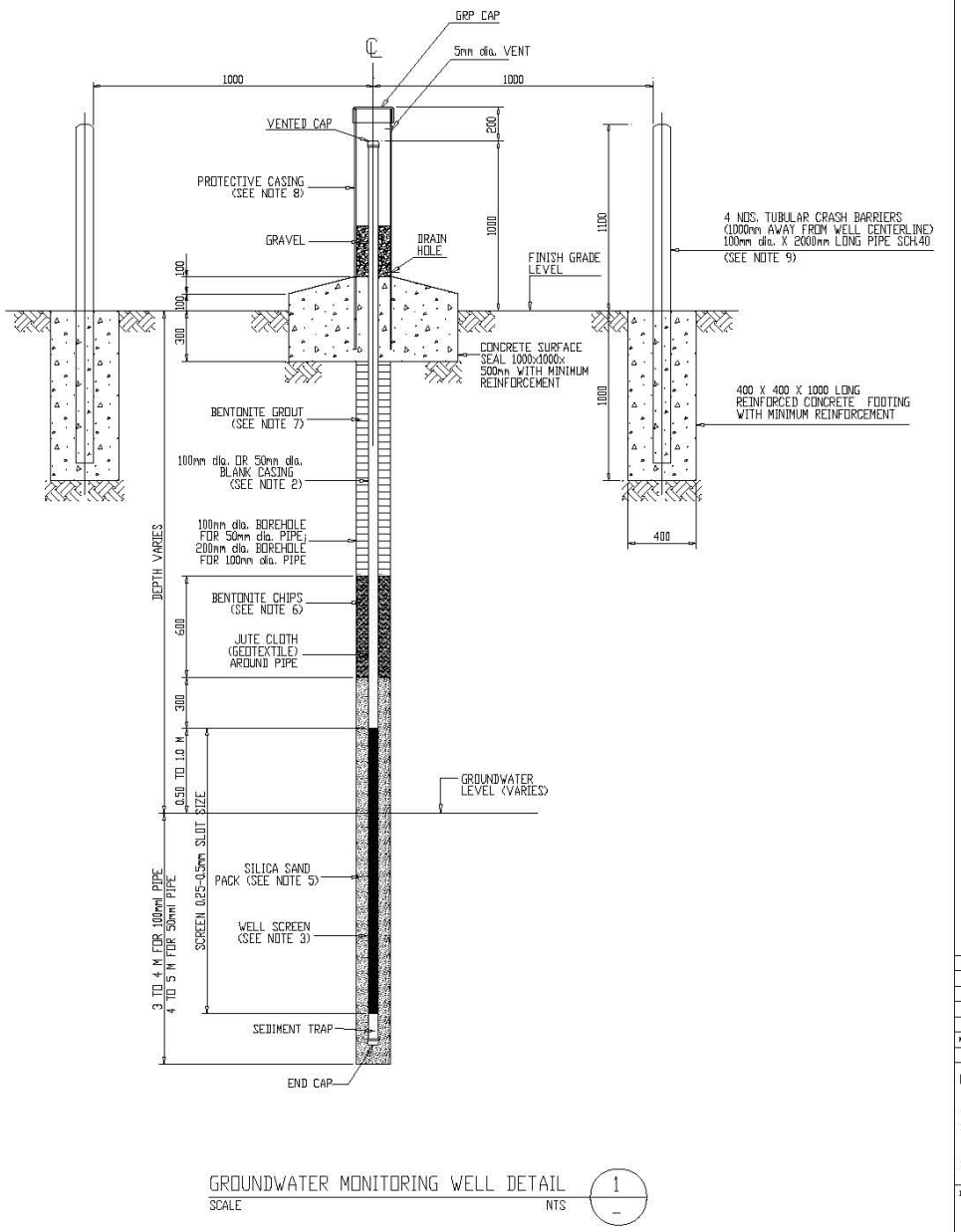
For each industry, the RC will designate the parameters which are required to be monitored for in accordance with the requirement of the Environmental Permit to Operate (EPO). The chosen parameters requiring monitoring will depend on the type of industry and the potential contaminates associated with the processes associated with that industry.

- The general parameters are **pH, Salinity, TSS,** and **TOC.**
- The important **heavy metals** e.g., arsenic, chromium, lead etc. Metals cause a range of serious health problems and are also known to 'bioaccumulate' meaning that concentrations within an organism will increase over time through continued exposure.
- **Benzene, Toluene, Ethylbenzene and Xylene (BTEX for short)** are common constituents in petroleum products and are toxic. Benzene is known to cause cancer in humans thus most groundwater programs will include these parameters.
- **Total petroleum Hydrocarbon (TPH)** which is the total concentration of all petroleum fractions (C6>C35). Petroleum hydrocarbons are broadly divided into paraffinic, naphthenic and aromatic types. TPH is a measure of all types from Naphtha and Kerosene which are the lightest fractions, up to the heaviest fractions of crude oils (residuals, bitumen etc.).
- In special cases, **VOCs** and **SVOC's** will be monitored especially if the industry Third Category's associated with these types of compounds.

Annexure

1. Groundwater Monitoring Well Standard Drawing (Minimum Construction Requirements)
2. Groundwater Monitoring Well Installation Record.
3. Groundwater Monitoring and Sampling Record.
4. Groundwater Standard Reporting Form.

Annexure 1
Groundwater Monitoring Well Standard Drawing
(Minimum Construction Requirements)



GROUNDWATER MONITORING WELL DETAIL 1
SCALE NTS

NOTES:

1. DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.
2. GROUNDWATER WELL SHALL BE 100mm dia. OR 50 mm dia. SCHEDULE 40 PVC, FLUSH JOINT THREADED. PVC SHALL CONFROM TO ASTM F-480 STANDARD SPECIFICATION FOR THERMOPLASTIC WATER WELL CASING PIPE AND COUPLINGS. THE USE OF SOLVENTS, GLUES OR RUBBER SEALANTS IS PROHIBITED.
3. WELL SCREEN SHALL BE INSTALLED AT AN ELEVATION TO STRADDLE THE WATER TABLE (TO ALLOW FOR THE RISE AND FALL OF WATER TABLE) SUCH THAT ANY FLOATING CONTAMINATION (FUEL PRODUCTS AND THEIR DERIVATIVES) MAY BE MONITORED. ACCEPTABLE SCREEN SLOT SIZE SHALL RANGE FROM 0.25mm TO 0.50mm.
4. UPON COMPLETION OF BOREHOLE, THE WELL CASING AND WELL SCREEN SHALL BE ASSEMBLED ABOVE GROUND INTO MANAGEABLE SECTIONS AND INSERTED INTO THE BOREHOLE.
5. THE SILICA SAND SHALL HAVE CONSISTENT GRAIN SIZE WITH A UNIFORMITY COEFFICIENT OF LESS THAN 2.5 OR LESS. THE GRAIN SIZE SHALL BE SELECTED TO FILTER OUT FINES PRESENT IN THE GEOLOGICAL FORMATION AND SHALL TYPICALLY BE WITHIN 0.70mm TO 1.25mm.
6. INSTALL BENTONITE CHIPS ABOVE SAND PACK TO PREVENT INGRESS OF SURFACE WATER WHICH MAY CONTAMINATE UNDERLYING GROUNDWATER AND MONITORING SMAPLES. BENTONITE CHIPS SHALL BE UNTREATED, PELLET FORM, PREMIUM GRADE, SODIUM BENTONITE.
7. INSTALL CEMENT BENTONITE GROUT ABOVE BENTONITE CHIPS UP TO BOTTOM OF CONCRETE SURFACE SEAL. NATIVE MATERIALS ARE NOT ACCEPTABLE AS BACKFILL.
8. PROTECTIVE CASING OF RISER PIPE SHALL BE GRP PIPE ATTACHED WITH TAG OR PLATE FOR MARKINGS OR IDENTIFICATION.
9. INSTALLATION OF CRASH BARRIERS IS OPTIONAL AND IS RECOMMENDED ONLY IN AREAS WHERE THERE IS POTENTIAL DAMAGE BY VEHICULAR MOVEMENT ETC.
10. AFTER COMPLETION OF MONITORING WELL CONSTRUCTION, THE WELL SHALL BE DEVELOPED (REMOVAL OF ALL WATER) BY SURGING AND PUMPING. ALTERNATIVELY, FRESH CLEAN WATER CAN BE USED TO DISPLACE THE DIRTY SEDIMENT LADEN WATER WITHIN THE WELL. THIS PROCESS SHOULD CONTINUE UNTIL THE WELL WATER IS CLEAN AND FREE OF SILT, SAND AND CLAY.
11. WELL DEVELOPMENT WATER CAN BE DISCHARGED TO THE GROUND SURFACE UNLESS IT CONTAINS VISIBLE EVIDENCE OF CONTAMINATION.

NO.	DATE	BY	DESCRIPTION	APPROVED BY
0	22SEP2010		INITIAL APPROVED ISSUE PER EWR NO. 84041	

KINGDOM OF SAUDI ARABIA — المملكة العربية السعودية
Royal Commission For Jubail and Yanbu — الهيئة الملكية للجبيل وينبع
Directorate General for Yanbu Project — الادارة العامة لمنطقة ينبع
MADINAT YANBU AL-SINAIYAH — مدينة ينبع الصناعية

DRAWING TITLE
STANDARD DRAWING
GROUNDWATER MONITORING WELL DETAIL

DESIGNED BY:	RTL		
DRAWN BY:	DDV		
CHECKED BY:	AZK/RM		
PROJ. MGR.:			
ENG. MGR.:			
A/E APPROVAL:		WBS NO.:	DRAWING NO. RC-EN-1
R. C. APPROVAL:		CONT. NO.:	
DATE: 22 SEP 2010	SCALE: NOT TO SCALE	REV. NO.	SHEET OF

Annexure 2
Groundwater Monitoring Well Installation Record

- Facility name _____Date _____/_____/_____
- Contractor _____
- Well ID _____ Borehole (drilling) Depth _____(m)
- Length bottom casing _____(m) length of screen _____(m)

Length of blank casing _____(m) Length of riser _____(m)

Total well depth (TWD) _____(m) Screen slot size_____(mm)

Filter pack (type)_____thickness _____(m)

Bentonite pack (type)_____thickness _____(m)

Grouting material (type)_____thickness _____(m)

- Depth to groundwater (GWL)_____(m)
- GPS coordinates (WGS 1984 UTM Zone 37N)

_____N _____ E

GPS Coordinate system used (if not UTM 37N)_____

Elevation (meters above sea level) _____(m)

- Crash barrier installed Yes / No
- Signs of contamination Yes / No

If yes describe _____

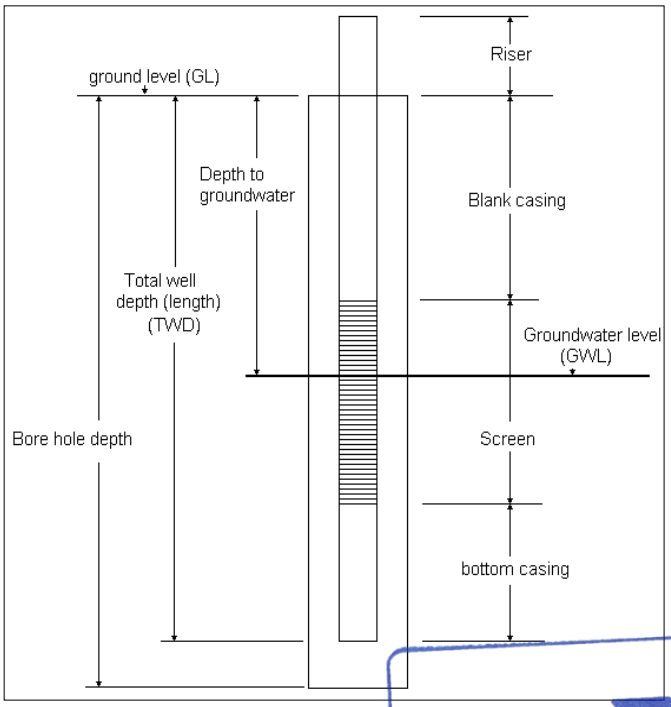
_____

_____

Name (Engineer) _____

Signed _____

Date _____/_____/_____



Annexure 3
Groundwater Monitoring and Sampling Record

Facility name_____ Date _____/_____/_____

Sampler name _____

Well ID _____ Well Diameter _____(mm)

Total well depth (from ground level) _____(m)

Total depth to groundwater_ _____(m)

Approximate Volume of water in well_____(litre)

General Condition of well _____

GPS coordinates (WGS 1984 UTM Zone 37N)

_____N _____ E

GPS Coordinate system used (if not UTM 37N)_____

Elevation (meters above sea level)_____(m)

Sampling method (Pump or Bailer)_____

Weather Conditions _____

Signs of contamination (Yes / No). If yes describe_____

_____

Time (min)	Water Level	Volume Pumped	Pumping Rate	Temperature	pH	Cond

Quality control samples taken (tick)

Blind duplicate ☐ Trip blank (VOCs) ☐

Sample Delivered to _____

By _____

Signed (Sampler)_____Date_____

Annexure 4
Groundwater Standard Reporting Form

Company Name: ----------Periodic Groundwater Monitoring Results
(EXAMPLE ONLY)

GWW #	pH	Salinity (ppt)	TSS (mg/L)	TOC (mg/L)	Phenols (mg/L)	Ammonia Nitrogen (mg/L)	Metals (µg/L)								Monocyclic Aromatic Hydrocarbons (BTEX) (mg/L)				(TPH) (mg/L)	TPH fractions (mg/L)		VOCs (Total)
							As	Cd	Cr	Cu	Pb	Hg	Ni	Zn	Benzene	Toluene	Ethylbenzene	Xylene		C6 – C9	C10-C40	
1																						
2																						
3																						
4																						
5																						
6																						
7																						
8																						
9																						
10																						
11																						
12																						

Abbreviations
TPH = Total petroleum Hydrocarbon
TSS = Total Suspended Solids
TOC = Total Organic Carbon

APPENDIX F
GUIDELINES FOR STACK TESTING AND FUGITIVE EMISSIONS

Stack Testing

A stack is a type of chimney, a vertical pipe, channel or similar structure through which gaseous or particulate emissions including combustion gases (called flue gases) are exhausted to the atmosphere. Flue gases are produced when fuel oil, natural gas, coal or any other fuel is combusted in an industrial furnace or a power plant's steam-generating boiler or any other large combustion device such as incinerator. Stack emissions are typically comprised of gaseous emissions such as carbon dioxide (CO_2) and water vapors as well as, nitrogen, oxygen. It also contains air pollutants such as carbon monoxide (CO), nitrogen oxides (NOx) and sulfur oxides (SOx), unburnt hydrocarbons, particulate matters (PM), etc.

A compliance stack test measures the amount of a specific pollutant or pollutants being emitted through source stacks at a facility against regulatory or permit limit to demonstrate compliance with an emission limit.

A performance stack test measures the amount of a specific pollutant or pollutants being emitted through source test to demonstrate performance guarantee for an emission control equipment according to its technical specifications guaranteed by the equipment vendor.

The facility which is required to conduct stack test/performance test shall submit a “Test Plan” for RC approval `at least one month before testing date. The test plan shall be developed by a RC accepted third party for each source to be tested under RC regulation and EPO condition. The test plan shall include the testing methodology (from US EPA federal regulations or other international regulatory body).

1. General Description:

A range of methods for conducting stack tests were developed in response to the requirements as provided in US Environmental Protection Agency Clean Air Act Title-I “Air Pollution Prevention and Control”.

Title-I Part A (Air Quality and Emission Limitations) Section 103 with U.S. Code 7403 further contains information on research, investigation, training and other activities.

The need to monitor and report as required in Title 1, has led to the EPA’s research and development group crafting the tools and techniques to accurately measure pollutant discharges. US EPA Code of Federal Regulations (CFR) Title 40 (Protection of Environment) sub-Parts 60, 63, etc. contain information on standards of performance for new and existing stationary sources. A list of US EPA approved stack test methods is provided at the end of stack testing guidelines. In this list, the reference methods are linked with each other, particularly reference methods 1, 2 and 4 for flow, velocity, probe placement, and moisture content.

This guideline will mainly address some important points on the following reference methods as an example. However, the applicant is required to refer the test methods listed at the end of this Appendix-F, for detailed information as per their requirement. For example:

US EPA Method 6C: Determination of Sulfur Dioxide Emissions from Stationary Sources (Instrumental Analyzer Procedure)

US EPA Method 7E: Determination of Nitrogen Oxides Emissions from Stationary Sources (Instrumental Analyzer Procedure)

US EPA Method 10: Determination of Carbon Monoxide Emissions from Stationary Sources (Instrumental Analyzer Procedure)

For example, probe placement and velocity measurements are some of the important factors to ensure that the gas stream is being measured at the correct location in the gas stream. Further, some of the equations needed for stack test calculations are found in 40 CFR Part 60 Appendix A –Reference Method 19 (Determination of Sulfur Dioxide Removal Efficiency and Particulate Matter, Sulfur Dioxide, and Nitrogen Oxide Emission Rates), and Appendix D (Required Emission Inventory Information),in addition to those as provided in Reference Methods 7E of Appendix A.

The various calibration and analyzer check which are provided in this Appendix are required as mandatory. If these checks are not performed by the applicant, it will not be accepted by the Royal Commission.

Electronic analyzers for HCL and HF are preferable for analysis. Reference Method 26 (Determination of Hydrogen Halide and Halogen Emissions from Stationary Sources Non-Isokinetic Method) is only approved on a case-by-case basis.

In the electronic analyzer sampling methods, an electronic analyzer is used to measure stack gases extracted through a sampling system that has been checked for influencing the test results, (system bias), zero baseline, and span (range of analysis). Three runs are typically done, with sample periods of one hour each during a run. Calibration checks are done between runs to check for accuracy and drift.

Adjustments to boilers, incinerators, or pollution control devices are not permitted during a sampling run. If the boiler or incinerator is operating outside of permissible permit limits during a sampling run, stop the run, correct the operational error, and start a new sample run.

Facilities equipped with continuous emissions monitoring system (CEMS) shall be operating in specified limits and cannot be adjusted during the stack test. The CEMS will be verified for accuracy at the same time the stack test is run. This is referred as the RATA- Relative Accuracy Test Audit in US EPA.

2. Equipment.

Analyzers with EPA approved measuring principle shall be used to measure stack exhaust gases. Calibration gasses must be within the manufacturer's approved time frame for use.

The sample line, which connects the stack to the gas analyzers, must be properly equipped to accept the calibration gas at the stack intake port via a valve arrangement, or by moving the cylinder to the intake port. This is done in order to conduct the system bias test.
The valve array in the sample trailer shall also be tested for leaks before any sampling is done.

3. Discussion of Procedures

3a. Calibration.

Interference check:
The interference check is done to ensure that the analyzers are not affected by other gases in the sample stream. For NOx, single calibration gases of SO_2, CO, NH_3, and any other gases the analyzer is expected to be exposed to are passed through the analyzer. There should be no response from the analyzer. The next step is to add SO_2 to the feed and look for changes in the NOx reading.

This is done by using a calibration gas consisting of only NOx and SO2 to check for SO_2 interference of the NOx reading. The analyzer reading should not vary more than that allowed by the manufacturer. The same is done for NOx and CO, and similarly for NOx and NH_3.This is done only once in the lab. It does not have to be repeated unless the detector in the analyzer is repaired or replaced. Repeat for SO_2, CO, NH_3 and any other gases measured.

3b. System Bias.

The purpose of the system bias test is to see if the sample train has an influence on the readings. Start by introducing the calibration gas directly entered into the analyzers and note the response. Next, the same gas is entered into the sample line at the stack, with the stack flow cut off. Given enough time for the calibration gas to purge the line before having the gas enter the analyzer. Any difference between the two is the system bias, and the equation for the calculation is to be found in the specific method. This is done before and after each run. The error must be no more than 5% of the calibration gas value for lower and upper span values.

3c. Drift.

Drift is the difference between the pre and post run system bias, or system calibration error check for a specific calibration gas concentration level at the low, mid or high-level gas concentration. It is done after each run.

3d. Calculations.

Emissions are reported in units of ng/j. F factors for this calculation is found in Reference Method 19 (Determination of Sulfur Dioxide Removal Efficiency and Particulate Matter, Sulfur Dioxide, and Nitrogen Oxide Emission Rates) and in 40 CFR Part 60 Appendix D. Appendix D is for fossil fuel fired steam generators. Use these formulas for calculating ng/j of NOx and SO_2 emissions.

3e. RATA (Relative Accuracy Test Audit)

Operations that have CEMS as a permit requirement shall run their analyzers during the stack test and include in the report to fulfill the relative accuracy test audit (RATA) for CEMS.

4. Procedural Checklist

This Appendix has adopted the Summary Table of QA/QC in Section 9 of Reference Method 7E (Determination of Nitrogen Oxides Emissions from Stationary Sources (Instrumental Analyzer Procedure) as a checklist for what is to be done before and during the stack test. Appropriate QA/QC procedures shall be followed for all the tests as described in the EPA test methods. The following table summarizes the QA/QC requirement.

Summary Table of QA/QC

Status	Process or element	QA/QC specification	Acceptance criteria	Checking frequency
S	Identify Data User		Regulatory Agency or other primary end user of data	Before designing test.
S	Analyzer Design	Analyzer resolution or sensitivity	<2.0% of full-scale range	Manufacturer design.
M		Interference gas check	Sum of responses ≤2.5%of Calibration span. Alternatively, sum of responses: ≤0.5ppmv for Calibration spans of 5 to 10 ppmv. ≤0.2ppmv for calibration spans < 5 ppmv.	
M	System Performance	NO_2–NO conversion efficiency	≥90%of certified test gas concentration	Before or after each test
M	Calibration on Gases	Traceability protocol (G1, G2)	Valid certificate required. Uncertainty ≤2.0% of tag value	
M		High-level gas	Equal to the calibration span	Each test.
M		Mid-level gas	40 to 60% of calibration span	Each test.
M		Low-level gas	<20% of calibration span	Each test.
S	Data Recorder Design	Data resolution	≤0.5%of full-scale range	Manufacturer design.
S	Sample Extraction	Probe material	SS or quartz if stack >500 °F	Each test.
M	Sample Extraction	Probe, filter and sample line temperature	For dry-basis analyzers, keep sample above the dew point by heating, prior to sample conditioning For wet-basis analyzers, keep	Each run.

			Sample above dew point at all times, by heating or dilution.	
S	Sample Extraction	Calibration valve material	SS	Each test.
S	Sample Extraction	Sample pump material	Inert to sample constituents	Each test.
S	Sample Extraction	Manifolding material	Inert to sample constituents	Each test.
S	Moisture Removal	Equipment efficiency	<5% target compound removal	Verified through system bias check.
S	Particulate Removal	Filter inertness	Pass system bias check	Each bias check.
M	Analyzer & Calibration Gas Performance	Analyzer calibration error (or 3-point system calibration error for dilution systems)	Within ±2.0% of the calibration span of the analyzer for the low-, mid-, and high-level calibration gases. Alternative specification: 0.5 ppmv absolute difference.	Before initial run and after a failed system bias test or dilution drift test.
M	System Performance	System bias (or pre- and post-run 2-point system calibration error for dilution systems)	Within ±5.0% of the analyzer calibration span for low-scale and upscale calibration gases. Alternative specification: 0.5 ppmv absolute difference.	Before and after each run.
M	System Performance	System response time	Determines minimum sampling time per point	During initial sampling system bias test.
M	System Performance	Drift	3.0% of calibration span for low-level and mid- or high-level gases. Alternative specification: 0.5 ppmv absolute difference.	After each test run.
M	System Performance	NO_2–NO conversion efficiency	≥ 90% of certified test gas concentration	Before or after each test.

M	System Performance	Purge time	≥2times system response time	Before starting the first run and when probe is removed from and re- inserted into the stack.
M	System Performance	Minimum sample time at each point	Two times the system response time	Each sample point.
M	System Performance	Stable sample flow rate (surrogate for maintaining system response time)	Within 10% of flow rate established during system response time check	Each run.
M	Sample Point Selection	Stratification test	All points within: ±5% of mean for 1-point sampling. ±10% of mean for 3-point. Alternatively, all points within: ±0.5 ppm of mean for 1-point sampling. ±1.0 ppm of mean for 3-point sampling.	Prior to first run.
A	Multiple sample points simultaneously	No. of openings in probe	Multi-hole probe with verifiable constant flow through all holes within 10% of mean flow rate (requires Administrative approval for Part 75)	Each run.
M	Data Recording	Frequency	1 minute average	During run.
S	Data Parameters	Sample concentration range	All 1-minute averages within calibration span	Each run.
M	Data Parameters	Average concentration for the run	Run average ≤calibration span	Each run.

S=Suggested, M=Mandatory, A=Alternative

5. Reporting Requirements

5a. Reporting Schedule

The currently enforced RCER regulations require the following under Section 2.5:

The operator of facility shall, within **60** days of conducting any required emission test, submit a written report to the Royal Commission. The report shall contain all applicable information which shall include as minimum:

a) Analytical data – pollutants, moisture content, oxygen content,
b) Physical data – flow rate, stack emission velocity, temperature, pressures, stack dimensions, isokinetic flow conditions,
c) Process operating conditions at time of testing,
d) One example calculation for each method,
e) Emission results, raw data with final emission data in same unit as the relevant emission standard in Table 2B and mass emission data.
f) Calibration Records.

NOTE: Temperature readouts must be available in the vehicle to provide RC staff the ability to see the stack temperature real time.

RC requires electronic copies to be submitted. Penalties for late submittals will be enforced.

5b. Reporting Format

The following format is the only acceptable format to be used in submitting reports. If this format will not be followed, Royal Commission will reject the submitted report.

The report shall be organized in the sections shown below:

1) Introduction/project description: To include at a minimum:
   (a) Description of the facility and details about the process that generates the emissions being monitored by the stack test.
   (b) Date of last stack test and stack test approval letter from the RC
   (c) Location of the stacks, both by site plan and latitude-longitude.
   (d) Test methods employed.
      (i) Name and model number of analyzers used
      (ii) Interference gas test results
      (iii) Reference methods used
      (iv) definitions
      (v) Log of technician- hours on site, name and title of the technicians for the consultant.

(2) Process flow and or process instrumentation diagrams.
   (a) Include legible 11inch by 14inch or 14 by 18 drawings for PI&Ds.

(3) Summary.

The summary section shall include the following:

a) NOx and or SO2 emission numbers for each emission source identified

b) Deviations (if any) from US EPA/Equivalent RC approved standards
c) Heat rates as BTU/kw-hr (for all combustion sources)
d) Fuel consumption per run and percent of maximum load of the equipment being tested.
e) Failed runs due to analyzer or unit operating equipment problems with dialog describing the problem and corrective measures.
f) The permit limit for the particular emission source.
g) The summary is to be located at the front of the report after Section 2 - Process flow and or process instrumentation diagrams

(4) Calculations.

(a) Stratification test results
(b) Analyzer Calibrations- before each run –low, mid, and high level gas concentrations
(c) System bias - before and after each run
(d) Drift
(e) NOx, CO, and or SO_2emission numbers
(f) Heat rates as BTU/kw-hr (NOx, SO_2, CO)
(g) Fuel consumption per run
(h) Per cent load the unit being tested is operating at during the test.

5) Data.

Calibration results used for run checks, bias, and drift shall be reported in Section 4 for calculations. The data is needed to show calibration calculations and results. Analyzer data: A sixty-minute run shall have 60 samples in it. Runs are typically sixty minutes in length. Calibration gas certifications and fuel analysis:

a) Include a copy of calibration gas certificates for all calibration gases used on site.
b) Gas/oil BTU and sulfur content (for power generating operations)
c) Feed rate and identification of other gases/liquids going into an incinerator being tested.

6) **Formatting and Binding**

a) Multiple locations or operating units
   i) Calculations and results for all units shall be put into the Calculation section only.
   ii) Analyzer data for all units shall be put into the Data section only.
   iii) Description of the various unit operating units shall be put into Section 1a in the Introduction/project description section only.
   iv) Results for all emissions monitoring runs to be put into the **Summary** section to summarize the results of the runs and whether or not they meet RC emissions limits (see 6e).
b) Spreadsheets and tables shall have only one entry per cell.
c) The calculated result shall be colored coded blue. Red ink is to be used if the reported value is in exceedance of the RC emission limit.
d) Include the appropriate permit limit in the tables or spreadsheets.

e) Each run result shall be calculated in the Calculation Section with the result printed there, and the results shown in the Summary Section as well.
f) Additional sections or divisions may be added to the required format as subsections if needed.
g) Fonts shall be no smaller than 12 points unless the text is reduced to fit tables.
h) The name of the company and consultant shall be visible on the cover.
i) Contact information for the company and consultant shall be found in the front of the report.
j) Bindings must be able to be laid flat.
k) Electronic copies are to be submitted.

REFERENCE METHOD 21 FUGITIVE EMISSIONS

1. General Description of Method

INTRODUCTION.

With the passing of the Clean Air Act, the EPA began to quantify emissions from petrochemical, pharmaceutical, pulp and paper, and other facilities that emit hydrocarbons from valves and fittings in the plants. The Leak Detection and Repair (LDAR) program was promulgated in the 1980's with the Synthetic Organic Chemicals Manufacturing Industry regulations. The method to quantify and identify the leaks is found in 40 CFR Part 60, Appendix A, and is known as Reference Method 21.

The various calibration and analyzer checks which are provided in this Appendix are required as mandatory. If these checks are not performed by the applicant, it will not be accepted by the Royal Commission.

REFERENCE METHOD 21

Reference Method 21 is the standard for fugitive emissions monitoring.

2. Equipment

Use an instrument with detector capable of responding to the compounds being monitored. Detector types that may meet this requirement include, but are not limited to, catalytic oxidation, flame ionization, infrared absorption, and photoionization.

3. Discussion of Procedures.

3a. Calibration

Calibration checks are done daily to check for accuracy. Calibration gases must be within the manufacturer's approved time frame for use.
Zero gas, also called zero air is used to both purge the instrument between calibration gases and check base line reading for the instrument. Introduce zero gas into the instrument sample probe. When the meter reading has stabilized, switch quickly to the specified calibration gas. After switching, measure the time required to attain 90 percent of the final stable reading. Perform this test sequence three times and record the results. Calculate the average response time. The instrument response time shall be equal to or less than 30 seconds. A longer period is indicative of a problem with the analyzer, which should be serviced at that point.

4. Procedural Checklist

This Appendix has adopted the Summary Table of QA/QC, which is given on next page:

Summary Table of QA/QC Procedures

STATUS	PROCESS/ELEMENT	QA/QC SPECIFICATION	ACCEPTANCE CRITERIA	CHECKING FREQUENCY
M	analyzer design		PID or FID	
M		intrinsically safe	Class 1 Div.1 or Class 2 Div. 1	checked before purchasing or after modifications
M	system performance	flow rate	0.1 to 3.0 L/min	daily
		response factor	record variation between meter reading and reference compound	daily
M	calibration gases	response time	less than 30 seconds	continuous observations during testing
		zero gas	valid certificate	before mobilization
			less than 10 ppmv VOC	daily
		reference compound	cal gas for each compound to be detected	daily
		A cal gas is made up with each chemical being sampled for, or as alternate-follow 7.4 in RM21 and calculate conversion factor	RCER Limit of 500 ppm HAP - 10,000 ppm VOC for each chemical	check certificate on reception of the calibration gas
M	analyzer calibration	zero reading between samples or background reading level	zero or manufacturers' allowable variation	continuous observations during testing
M		precision tests	manufacturer's specification	quarterly

Status: M means mandatory requirement.

5. Reporting Requirements

5a. Reporting Schedule

The currently enforced RCER regulations require the following under Section 2.5.8:
The operator of facility shall, within **60** days of conduction any required emission testing, submit a written report to the Royal Commission. The report shall contain all applicable information which shall include as minimum:

g) Analytical data- types of chemicals that pass through the valves and fittings being tested.
h) Emission results with raw data
i) Calibration.

RC requires both electronic and hard copies to be submitted. Penalties for late submittals will be enforced.

5b. Reporting Format

The following format is the only acceptable format to be used in submitting reports. If this format will not be followed, Royal Commission will reject the submitted report.

The report shall be organized in the sections shown below:

i. Introduction/project description.
To include at a minimum:
a) Description of the facility and details about the process that generates the emissions being monitored by the fugitive emissions test.
b) Date of last test and test approval letter from the RC
c) Location of the equipment being surveyed, by site plan
d) Test methods employed.
i) Name and model number of analyzers used
ii) Log of technician- hours on site, name and title of the technicians for the consultant.

ii. Process flow diagrams.
a) Include legible 11inch by 14inch or 14 by 18 drawings for PFDs.

iii. Summary.
The summary section shall include the following:
a) Emission numbers for each emission source identified
b) The permit limit for the particular emission source.
c) The summary is to be located at the front of the report after Section 2 - Process flow and or process instrumentation diagrams

iv. Calculations.

Documented/determined response factor (RM 21-8.1.1) used for conversion factor calculation.

v. Data.
a) Calibration results. The data is needed to show calibration calculations and results.
b) Analyzer data.

vi. Formatting and binding.

a) Multiple locations or operating units

i) Calculations and results for all units shall be put into the **Calculation** section only (excel format only).

ii) Analyzer data for all units shall be put into the Data section only. Results for all emissions monitoring runs to be put into:

a) The Summary section to summarize the results of the runs and whether or not they meet RC emissions limits.
b) Spreadsheets and tables shall have only one entry per cell.
c) The calculated result shall be colored coded black. Red ink is to be used if the reported value is in exceedance of the RC emission limit.
d) Include the appropriate permit limit in the tables or spreadsheets.
e) Each run result will be calculated in the Calculation Section with the result printed there, and the results show in the Summary Section as well.
f) Additional sections or divisions may be added to the required format as subsections if needed.
g) Fonts shall be no small than 12 points unless the text is reduced to fit tables.
h) The name of the company and consultant shall be visible on the cover.
i) Contact information for the company and consultant shall be found in the front of the report.
j) Electronic copies are to be submitted

GUIDELINE FOR A PRE-TEST STACK/RATA SAMPLING MONITORING PLAN.

Cover Page

Pre-Test Site Monitoring Plan

Name of Consultant

Address of Consultant

Name of Facility

Address of Facility

Facility EPO Number

Reference Number of Pre-Test Stack/RATA Sampling Monitoring Plan (xxx)

Proposed Dates of Monitoring

Prepared By	Reviewed By	Approved By	Dates	Revision No.

Section 1

Contact Details of Facility Representative

	1st Contact	2nd Contact
Name		
Designation		
Contact Number		
Email		

Pre-Site Visit

(Include details of any pre-site visit conducted)

Name	Designation	Date of Visit
A. N Other		
A. N Other		

Add Delete as Necessary

Stack Emission Monitoring Engineers/Technicians who will be Performing the Work

Name	Designation	QSTI Groups	QSTI Qualification Number
A. N Other	Team Leader	I, II, II, IV, V	2019-4444
A. N Other	Technician	N/A	N/A
A. N Other	Technician	N/A	N/A

Add Delete as Necessary

Brief Introduction of 3rd Party Service Provider

(Provide a brief description of your company here)

Brief Description of Facility

(Provide a brief overview of the facility, location, process description, etc.)

Health and Safety Statement

(Provide your company health and safety statement here)

Section 2

Total number of Emission Points to be monitored

Provide a full list of all monitoring points.

No.	Stack Identification Number	Brief Description	Parameters Measured
1	XXX/XXX	Boiler, SRU, GT, Incinerator etc.	SO2, NOx, O2
2	XXX/YYY	Boiler, SRU, GT, Incinerator etc.	PM, Heavy Metals, PAH, D&F

Add Delete as Necessary

Section 3

Detailed Description of Each Individual Monitoring Point and Relevant Information

Complete a detailed description for each additional monitoring location in section 3.

1.	Provide Unique Facility Identification Number/Name here

Brief description of the process to be monitored

(Provide a brief description of the process to be monitored)

Process Information	Details
Type of Process	
Fuel Type	
Operating Load	
Continuous or Batch Process	
Expected Velocity	
Temperature at Monitoring Location	
Expected Moisture	
Process Details	
Type of Abatement (If available)	
Type of CEMS (If available)	

Sampling Location Details	Details
Stack Type or Shape	Circular etc.
Diameter at sampling location	2.5m
Number of sampling ports available	1, 2, 4
Description of sampling ports	Flange/BSP etc.
Diameter of sampling ports	100mm, 125mm etc.
Sample port length	150mm etc.
Number of sampling lines available	2, 4, etc.
Stack duct diameters upstream	10 etc.
Stack duct diameters downstream	10 etc.
Height of measurement location above ground	45m etc.
Total Stack Height	75m etc.
Does the sampling location satisfy USEPA Requirements	Yes/No
Orientation of Stack	(Vertical/Horizontal)
Number of sampling points/lines	12/2

Provide description sampling platform	(permanent/scaffolding/sufficient area)
Provide description of access	(Ladders, monkey ladders, rest platforms)
Provide details of power supply available	220V, 110V
Location of Power Supply	Platform, Ground Level,
Lifting Points available	Yes/No
Is there a requirement for mobile crane	Yes/No
Any other Useful Information.	

Provide a description of the sampling platform and access.

Make reference to sampling measurements as per USEPA and reference any Health and Safety issues. Provide any deviations to the methods due to inadequate working area, port sizes, location of disturbances, duct diameters upstream and downstream etc.

Provide a site diagram/sketch of the stack and sampling platform.

Include a diagram of the stack and platform with reference to port locations, platform area, disturbances, number of ports, access etc.

If available provide brief details of any previous monitoring performed.

(Dates of measurements, flow, temperature, moisture, emission values.)

Sampling Requirements/Manual Methods

Include Reference Conditions Here. (293K, 101.3kPa, dry gas)

Modify as necessary.

Parameter	Number of Runs/Duration and Blanks	Reporting Unit (mg/m3), (ng/J) etc.	Emission Limit as per EPO or RCER	Expected Emission	Standard Reference Method	Method Uncertainty	Consultant SOP
Particulate Matter	3 x Runs 60 mins each 1 Blank	ng/J	43 ng/J	20 ng/J	Method 5 Method 17	+/- 15%	AA/123
Oxides of Nitrogen	3 x Runs 60 mins each	ng/J	86 ng/J	35 ng/J	Method 7E	+/- 10%	AA/124
Sulphur Dioxide							
Carbon Monoxide							
Oxygen							
Carbon Dioxide							
Heavy Metals							
Moisture							

Add/Delete as appropriate

Provide details of the equipment to be used.

(M2, 3, 4 and 5 equipment, probe and probe liners, glassware, absorption solutions required, type of gas analyzers used, manufacturer and model with measuring principle, use pictures if required)

Provide details for sample analysis and accreditation of laboratory.

Provide details of the calibrations to be performed during instrumental gaseous monitoring.
(Concentrations, high value, medium value, low value, Bias, Drift, Performance criteria etc.)

Process details that need collecting during the monitoring.
(Fuel flow, throughput, operating load, CEMS data etc.)

Provide details of any RATA to be performed.

(Number of Runs, Performance Specification, Parameters (O_2, CO_2, NOx, SO_2, CO, PM), Range of Analyzers to be used etc.)

Provide any deviations expected during the measurement, unusual occurrences, or any other comments.

(Use this to explain any deviations that might occur that will deviate from the reference method)

US EPA Approved Stack Test Methods - 40 CFR Part 60, Appendix A
https://www.epa.gov/emc/emc-promulgated-test-methods

Sr. No.	Method	Title
1.	Method 1	Traverse Points
2.	Method 1A	Small Ducts
3.	Method 2	Velocity - S-type Pitot
4.	Method 2A	Volume Meters
5.	Method 2B	Exhaust Volume Flow Rate
6.	Method 2C	Standard Pitot
7.	Method 2D	Rate Meters
8.	Method 2E	Landfill Gas Production Flow Rate
9.	Method 2F	Flow Rate Measurement with 3-D Probe
10.	Method 2G	Flow Rate Measurement with 2-D Probe
11.	Method 2H	Flow Rate Measurement with Velocity Decay Near Stack Walls
12.	Method 3	Molecular Weight
13.	Method 3A	Oxygen and Carbon Dioxide Concentrations - Instrumental
14.	Method 3B	Oxygen and Carbon Dioxide Concentrations - Orsat Analyzer
15.	Method 3C	Carbon Dioxide, Methane, Nitrogen and Oxygen Concentrations - Thermal Conductivity Detector
16.	Method 4	Moisture Content
17.	Method 5	Particulate Matter - Stationary Sources
18.	Method 5A	Particulate Matter Asphalt Roofing
19.	Method 5B	Particulate Matter Nonsulfuric Acid
20.	Method 5D	Particulate Matter Baghouses
21.	Method 5E	Particulate Matter Fiberglass Plants
22.	Method 5F	Particulate Matter Fluid Catalytic Cracking Unit
23.	Method 5G	Particulate Matter Wood Heaters from a Dilution Tunnel
24.	Method 5H	Particulate Matter Wood Heaters from a Stack

Sr. No.	Method	Title
25.	Method 5I	Low Level Particulate Matter Emissions
26.	Method 6	Sulfur Dioxide - Stationary Sources
27.	Method 6A	Sulfur Dioxide and Carbon Dioxide
28.	Method 6B	Sulfur Dioxide and Carbon Dioxide - Daily Average Emissions
29.	Method 6C	Sulfur Dioxide - Instrumental Analyzer Procedure
30.	Method 7	Nitrogen Oxide - Stationary Sources
31.	Method 7A	Nitrogen Oxide - Ion Chromatographic Method
32.	Method 7B	Nitrogen Oxide - Ultraviolet Spectrophotometry
33.	Method 7C	Nitrogen Oxide - Colorimetric Method
34.	Method 7D	Nitrogen Oxide - Ion Chromatography
35.	Method 7E	Nitrogen Oxide - Instrumental Analyzer
36.	Method 8	Sulfuric Acid Mist
37.	Method 9	Visual Opacity
38.	Method 10	Carbon Monoxide - Instrumental Analyzer
39.	Method 10A	Carbon Monoxide in Certifying Continuous Emission Monitoring Systems
40.	Method 10B	Carbon Monoxide from Stationary Sources
41.	Method 11	Hydrogen Sulfide Content in Fuel
42.	Method 12	Inorganic Lead
43.	Method 13A	Total Fluoride - SPADNS Zirconium Lake
44.	Method 13B	Total Fluoride - Specific Ion Electrode
45.	Method 14	Fluoride for Primary Aluminum Plants
46.	Method 14A	Total Fluoride Emissions from Selected Sources at Primary Aluminum Plants
47.	Method 15	Hydrogen Sulfide, Carbonyl Sulfide, and Carbon Disulfide
48.	Method 15A	Total Reduced Sulfur Emissions from Sulfur Recovery Plants in Petroleum Refineries
49.	Method 16	Sulfur – Semi-continuous Determination
50.	Method 16A	Total Reduced Sulfur - Impinger
51.	Method 16B	Total Reduced Sulfur - Gas Chromatography
52.	Method 16C	Total Reduced Sulfur - Real Time Data
53.	Method 17	In-Stack Particulate
54.	Method 18	Volatile Organic Compounds - Gas Chromatography
55.	Method 19	Sulfur Dioxide Removal and Particulate, Sulfur Dioxide and Nitrogen Oxides from Electric Utility Steam Generators
56.	Method 20	Nitrogen Oxides from Stationary Gas Turbines
57.	Method 21	Volatile Organic Compound Leaks
58.	Method 22	Visual Determination of Fugitive Emissions
59.	Method 23	Dioxins and Furans
60.	Method 24	Surface Coatings
61.	Method 24A	Publication Rotogravure Inks and Related Publication Rotogravure Coatings
62.	Method 25	Gaseous Nonmethane Organic Emissions
63.	Method 25A	Gaseous Organic Concentration - Flame Ionization
64.	Method 25B	Gaseous Organic Concentration - Infrared Analyzer
65.	Method 25C	Nonmethane Organic Compounds Landfill Gases
66.	Method 25D	Volatile Organic Concentration of Waste Samples
67.	Method 25E	Vapor Phase Organic Concentration in Waste Samples
68.	Method 26	Hydrogen Halide and Halogen
69.	Method 26A	Hydrogen Halide and Halogen - Isokinetic Method
70.	Method 27	Vapor Tightness of Gasoline Tank - Pressure Vacuum
71.	Method 28	Certification and Auditing - Wood Heaters

Sr. No.	Method	Title
72.	Method 28A	Air to Fuel Burn Rates - Wood Fired Appliances
73.	Method 28R	Certification and Auditing of Wood Heaters
74.	Method 28 WHH	Measurement of Particulate Emissions and Heating Efficiency of Wood-Fired Hydronic Heating Appliances
75.	Method 28 WHH PTS	Certification of Cord Wood-Fired Hydronic Heating Appliances with Partial Thermal Storage
76.	Method 29	Metals Emissions from Stationary Sources
77.	Method 30A	Mercury Instrumental Procedure
78.	Method 30B	Mercury Sorbent Trap Procedure
79.	Method 101	Mercury from Chlor-Alkali Plants
80.	Method 101A	Mercury from Sewage Sludge Incinerators
81.	Method 102	Mercury from Chlor-Alkali Plants - Hydrogen Streams
82.	Method 103	Beryllium Screening Method
83.	Method 104	Beryllium Emissions Determination
84.	Method 105	Mercury in Wastewater Treatment Plant Sewage Sludge
85.	Method 106	Vinyl Chloride - Stationary Sources
86.	Method 107	Vinyl Chloride Content of In process Wastewater Samples
87.	Method 107A	Vinyl Chloride Content of Solvents
88.	Method 108	Particulate and Gaseous Arsenic Emissions
89.	Method 108A	Arsenic Content in Ore Samples from Nonferrous Smelters
90.	Method 108B	Arsenic Content in Ore Samples from Nonferrous Smelters
91.	Method 108C	Arsenic Content in Ore Samples From Nonferrous Smelters - Molybdenum Blue Photometric Procedure
92.	Method 111	Polonium-210 Emissions
93.	Method 114	Radionuclides - Stationary Sources
94.	Method 115	Radon-222 Emissions
95.	Method 201	PM10 Emissions - Exhaust Gas Recycle Procedure
96.	Method 201A	PM10 and PM2.5 - Constant Sampling Rate Procedure
97.	Method 202	Condensable Particulate Matter
98.	Method 203A	Opacity Determination for Time-Averaged Regulations
99.	Method 203B	Opacity Determination for Time-Exception Regulations
100.	Method 203C	Opacity Determination for Instantaneous Regulations
101.	Method 204	Permanent (PTE) or Temporary Total Enclosure (TTE) for Determining Capture Efficiency
102.	Method 204A	Volatile Organic Compounds in Liquid Input Stream
103.	Method 204B	Volatile Organic Compounds in Captured Stream
104.	Method 204C	Volatile Organic Compounds in Captured Stream - Dilution Technique
105.	Method 204D	Fugitive Volatile Organic Compounds from Temporary Total Enclosure (TTE)
106.	Method 204E	Fugitive Volatile Organic Compounds from Building Enclosure
107.	Method 204F	Fugitive Volatile Organic Compounds from Liquid Input Stream - Distillation
108.	Method 205	Gas Dilution Calibration
109.	Method 207	Pre-survey for Corn Wet-Milling Facilities
110.	Method 207.1	Determination of Ammonia Emissions from Stationary Sources
111.	Method 301	Validation Protocol - Various Waste Media
112.	Method 303	By-product Coke Oven Batteries
113.	Method 303A	Non-recovery Coke Oven Batteries
114.	Method 304A	Biodegradation Rates - Vent Option
115.	Method 304B	Biodegradation Rates - Scrubber Option

Sr. No.	Method	Title
116.	Method 305	Potential Volatile Organic Compounds in Waste
117.	Method 306	Chromium Emissions - Electroplating and Anodizing
118.	Method 306A	Chromium Emissions Electroplating and Anodizing - Mason Jar Method
119.	Method 306B	Surface Tension for Tanks Electroplating and Anodizing
120.	Method 307	Emissions from Solvent Vapor Cleaners
121.	Method 308	Methanol Emissions
122.	Method 310A	Residual Hexane
123.	Method 310B	Residual Solvent
124.	Method 310C	Residual N-Hexane in EDPM Rubber
125.	Method 311	Hazardous Air Pollutant Compounds in Paints and Coatings
126.	Method 312A	Styrene in Latex Styrene-Butadiene Rubber by Gas Chromatography
127.	Method 312B	Styrene in Latex Styrene-Butadiene Rubber by Capillary Gas Chromatography
128.	Method 312C	Styrene in Latex Styrene-Butadiene Rubber Produced by Emulsion Polymerization
129.	Method 313A	Residual Hydrocarbon in Rubber Crumb
130.	Method 313B	Residual Hydrocarbon in Solution Polymers by Capillary Gas Chromatography
131.	Method 315	Particulate and Methylene Chloride Extractable Matter from Aluminum Production Facilities
132.	Method 316	Sample and Analysis for Formaldehyde Emissions in the Mineral Wool and Wool Fiberglass Industries
133.	Method 318	Extractive FTIR Method for Measurement of Emissions from the Mineral Wool and Wool Fiberglass Industries
134.	Method 320	Vapor Phase Organic and Inorganic Emissions by Extractive FTIR
135.	Method 321	Gaseous Hydrogen Chloride Emissions at Portland Cement Kilns by FTIR
136.	Method 323	Formaldehyde Measurement Using Derivatization
137.	Method 325A	Volatile Organic Compounds from Fugitive and Area Sources: Sampler Deployment and VOC Sample Collection
138.	Method 325B	Volatile Organic Compounds from Fugitive and Area Sources: Sampler Preparation and Analysis
139.	Method 326	Determination of Isocyanates in Stationary Source Emissions

APPENDIX G
COTINUOUS EMISSION MONITORING SYSTEM (CEMS) GUIDELINES

COTINUOUS EMISSION MONITORING SYSTEM (CEMS) GUIDELINES

These guidelines are intended to provide a better understanding of the requirements for installation, operation and maintenance of CEMS in accordance to the Royal Commission Environmental Regulations-2025 (RCER-2025). This appendix should be used by all facilities where it has been established that a regulated source requires a CEMS.

CEMS guidelines and quality assurance protocols detailed in this appendix are based on US EPA 40 CFR Part 60 and Part 75.

1. General CEMS Requirements

The facility operator of a source requiring a CEMS shall obtain system (analyzer, sample line, heating system, specifications etc.) approval from the RC prior to installation.

The monitoring plan submitted to the RC for review and approval should include, as a minimum, the following information:

- Source identification, description of process, pollution control (abatement system), duct/stack dimensions and layout
- Regulatory requirements of RCER-2025
- Parameters required to satisfy regulatory compliance
- Proposed timeline including installation, testing, and certification of CEMS
- Proposed sampling location including diagrams of sample probe position in relation to duct/stack wall
- Expected normal and maximum concentrations of each parameter
- CEMS analyzer details including manufacturer, model, measuring principal, performance specifications
- Data Acquisition and Handling System (DAHS) including software, storage and backup procedures, reporting units and format
- CEMS QA/QC procedures necessary for satisfying the requirements of the RCER-2025 including certification and calibration procedures
- Maintenance schedules including, documents and checklists used by technicians

The facility operator of a CEMS shall ensure that it is installed, operational and certified by the date of the initial performance test, detailed in clause 2.5.4, RCER-2025, Vol I - within 60 days of facility achieving the normal production rate or within 180 days of initial startup, whichever is earlier. For existing sources, CEMS must be installed, operated and certified within 180 days of EPO renewal or notification from the RC or at the first annual stack monitoring after installation of CEMS.

The facility operator of a CEMS shall develop, implement and maintain a site-specific Quality Assurance Plan (QAP). The QAP must be submitted to the RC for review and approval and should include, as a minimum, the following information:

- Cover Page (Facility Name, Units etc.)
- Introduction
- Organization and Responsible Individuals
- Communication of Information, Data and Reports
- Emission Data and Emission Reports
- QC Data and Reports
- QA Audit Data and Reports
- QA Results and QA Reports
- Description of Facility
- Continuous Emission Monitoring System (CEMS)
- Data Acquisition and Handling System (DAHS)
- Quality Assurance Training

- Calibration Gases
- Calibration Check
- Systems Audit
- Cylinder Gas Audit (CGA)
- Opacity Audit, if applicable
- Data Recording and Reporting
- Preventive Maintenance
- Daily Calibration Check with calibration gas certificate
- Attachments

It is the facilities responsibility to ensure their CEMS is operated in accordance with the regulations and guidelines stated in RCER-2025. The RC may conduct audits on the CEMS systems and data records.

2. Equipment

All CEMS must meet the applicable performance specifications in US EPA 40 CFR Parts 60 and 75.

CEMS must be able to facilitate drift checks (preferably automated daily drift checks) that pass through all components of the sampling system, including as much of the probe as is practical.

Where practicable, CEMS pollutant and diluent analyzer ranges shall be set to a scale such that concentrations recorded during normal operation are between 20% and 80% of the full range.

CEMS must be continuously operated and recording data at all times including periods of abnormal operation, and during startups and shutdowns. The CEMS shall capture minimum 75% data.

A DAHS is required for all CEMS to record and report data submitted to the RC.

CEMS Quality Assurance and Quality Control

This section details the main requirements for quality assurance and quality control procedures for the operation of all CEMS. Once initial certification has been carried out, CEMS performance testing (RATA) is required, periodically to validate the data being reported to the RC.

2.1 Certification Requirements After Installation or Major Repair Work

Certification test requirements after installation or any major repair work are detailed in Table 1.

Table 1 Certification of CEMS

Monitoring System	Required Tests	Procedure
NOx, SO_2, O_2 and CO_2	7 Day Calibration Error Test	US EPA 40 CFR Part 75
	Linearity check	US EPA 40 CFR Part 75
	RATA and Bias test[1]	US EPA 40 CFR Part 75
	Cycle Time Test	US EPA 40 CFR Part 75
CO	7 Day Calibration Drift	US EPA 40 CFR Part 60
	Calibration Gas Audit	US EPA 40 CFR Part 60
	RATA	US EPA 40 CFR Part 60
Flow	7 Day Calibration Error Test	US EPA 40 CFR Part 75
	RATA and Bias test	US EPA 40 CFR Part 75

[1]Bias test not required for O_2 and CO_2 monitoring systems.

7 Day Calibration drift / 7-day calibration error tests shall be performed on seven consecutive days, at 24-hour intervals. During this period no corrective maintenance or unscheduled adjustments shall be made to the CEMS.

Calibration gas audits / linearity checks shall be carried out by challenging each system three non-consecutive times with calibration gas at multiple points across the range.

RATA shall be performed on each monitoring system during specific operational conditions detailed in US EPA 40 CFR Part 60 and Part 75, using US EPA reference methods. Each RATA run must be at least 21 minutes in duration, and at least 9 runs completed for a valid RATA.

Cycle time tests shall be carried out by challenging each system three non-consecutive times with calibration gas at zero-level and high-level.

3.2 Performance Requirements After Installation or Major Repair Work

On-going performance requirements on existing CEMS are essential to validate and prove the accuracy of the data submitted to the RC. Table 2 details the minimum performance tests required for existing CEMS.

Table 2 CEMS Performance Test Schedule

Monitoring System	Required Tests	Frequency	Procedure
NOx, SO_2, O_2 and CO_2	Calibration Error Test	Daily	US EPA 40 CFR Part 75
	Linearity Check	Quarterly	US EPA 40 CFR Part 75
	RATA and Bias Test[1]	Annual	US EPA 40 CFR Part 75
CO	Calibration Drift	Daily	US EPA 40 CFR Part 60
	Calibration Gas Audit	Quarterly	US EPA 40 CFR Part 60
	RATA	Annual	US EPA 40 CFR Part 60
Flow	Calibration Error Test	Daily	US EPA 40 CFR Part 75
	Leak Check	Daily	US EPA 40 CFR Part 75
	RATA	Annual	US EPA 40 CFR Part 60

[1]Bias test not required for O_2 and CO_2 monitoring systems.

Calibration error tests / calibration drifts shall be conducted on a daily basis and carried out during normal operating conditions in accordance with the relevant procedures as stated in Table 2.

3. Reporting Requirements

Reporting requirements and frequency are detailed in RCER-2025, Volume I, and Section 9 and must be strictly adhered to.

All CEMS data recorded must be kept for a period of 3 years.

Data reported to the RC shall be expressed in the same units as the emission standard and include any invalid data or exceedances. An explanation for any invalid data or exceedances should be included in the summary section of the reports. Reports submitted to the RC shall be accompanied by a soft copy of the 'raw data' collected from the DAHS in excel format.

Valid performance tests and calibrations for the data reported shall be included in the reports to the RC.

APPENDIX H
GUIDELINES FOR INSTALLING AUTO SAMPLING SYSTEM INSIDE FACILITY FENCE

Guideline for Installing Auto Sampling System Inside Facility Fence

1. Goal

1.1. To provide an effective system for RC to monitor compliance of a facility with RCER wastewater standards.

1.2. To counter check efficiency of facility's auto sampler and ensure that results consistently represent wastewater quality.

2. Auto Sampler Cabin

2.1. The auto sampler cabin shall be installed by the facility.

2.2. The auto sampler cabin shall be installed at the following location

a. Nearest location inside the facility to have easy access by regulatory authority to collect samples
b. Near the wastewater discharge pipe
c. Located where wastewater from the facility is well mixed.

2.3. The auto sampler cabin shall be constructed as per specification in figures 1 & 2.

2.4. The wastewater from the facility shall be routed through the auto sampler cabin inside the facility. No open channel is allowed in between the auto sampler cabin inside the facility and Marafiq discharge line to prevent contamination.

2.5. The wastewater pressure along the wastewater discharge pipe where sample will be taken shall be maintained at zero to facilitate auto sampling.

2.6. The cabin shall be provided with power connections with ready power outlets.

2.7. In cases where a facility has two or more wastewater discharge pipe leading to IWTP, two (2) cabins shall be constructed.

3. Auto sampler

3.1. Auto sampler shall be equipped with refrigeration system to preserve sample.
3.2. The auto sampler must be able to collect at least 1 liter sample for all parameters to be analyzed.
3.3. If auto sampler uses a peristaltic pump, the auto sampler must be capable of taking individual sample aliquot of at least 100 ml.
3.4. The auto sampler shall be capable of pumping samples from the wastewater discharge pipe through a head (vertical height) of at least 20 feet and sample volume can be adjustable since the volume is a function of a pumping head.
3.5. The pumping velocity shall be at least 2 ft/sec to prevent the settling of solid component of sample during pumping thus ensuring a reliable TSS sample.
3.6. The minimum inside diameter of the auto sampler intake line should be half of an inch (1/2 inch).

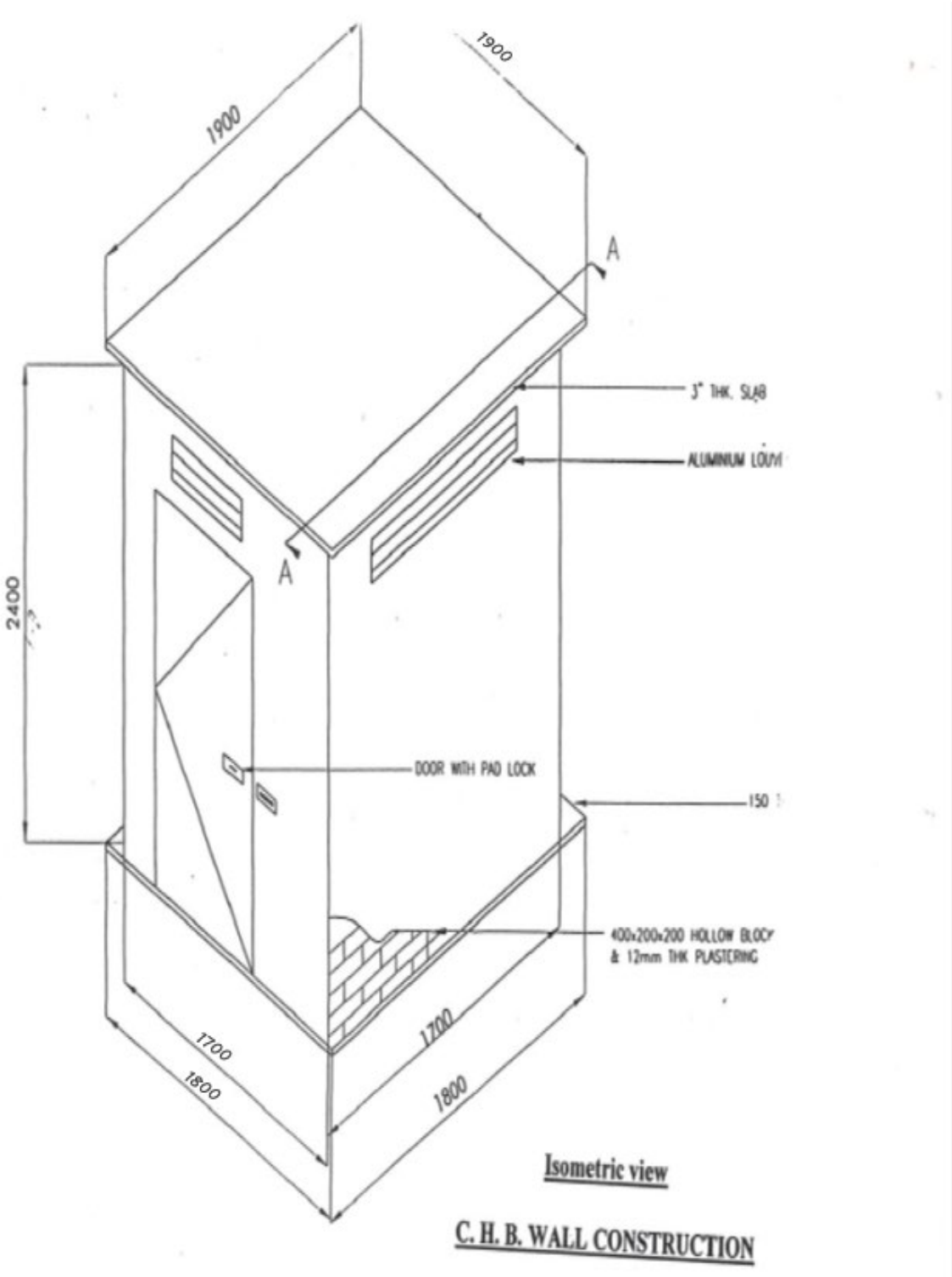

1900
1900
A
A
3" THK. SLAB
ALUMINIUM LOUVI
2400
DOOR WITH PAD LOCK
150
400x200x200 HOLLOW BLOCK
& 12mm THK PLASTERING
1700
1800
1700
1800
Isometric view
C. H. B. WALL CONSTRUCTION

Figure 1

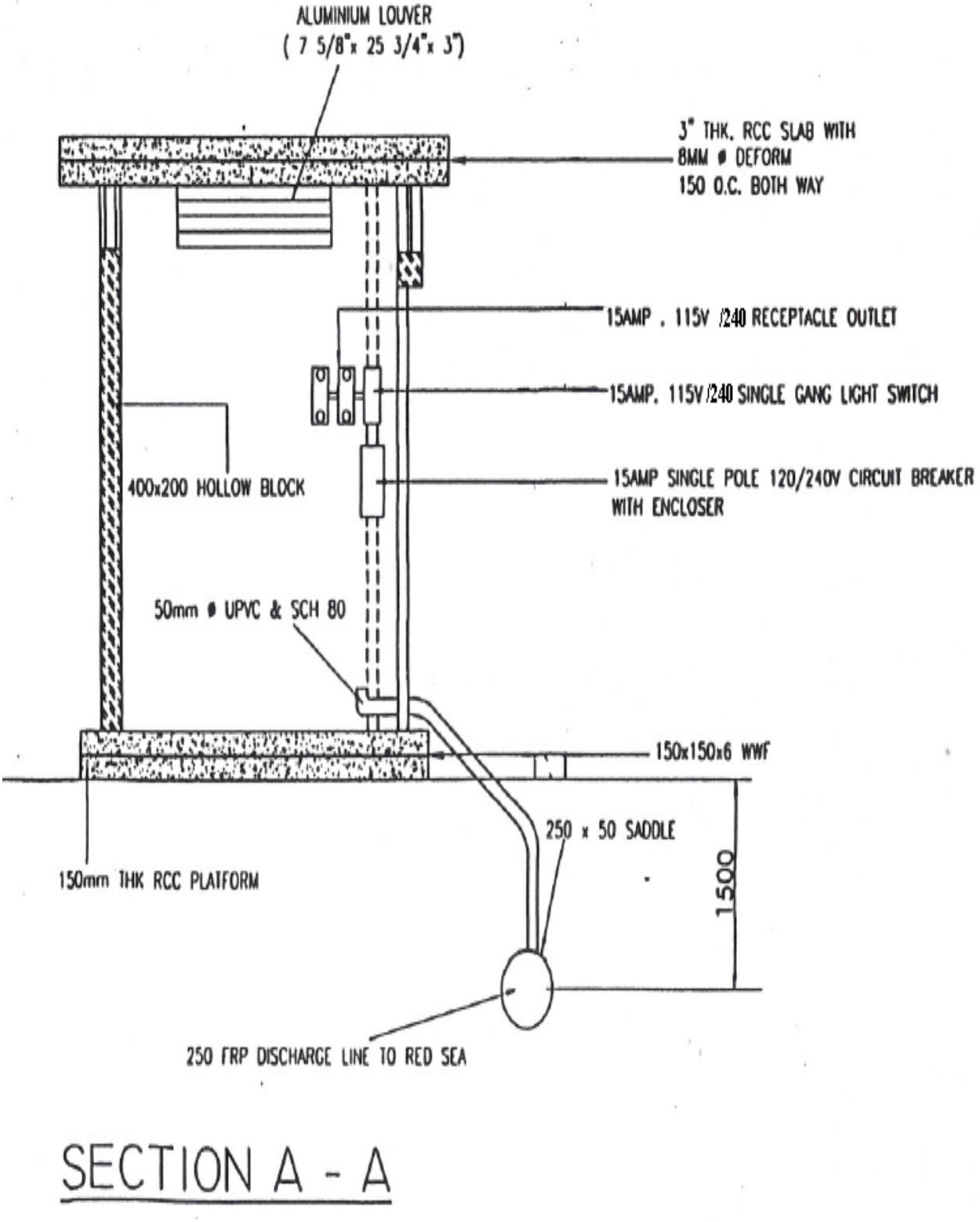

ALUMINIUM LOUVER
(7 5/8"x 25 3/4"x 3")
3" THK. RCC SLAB WITH
8MM ø DEFORM
150 O.C. BOTH WAY
15AMP . 115V /240 RECEPTACLE OUTLET
15AMP. 115V/240 SINGLE GANG LIGHT SWITCH
400x200 HOLLOW BLOCK
15AMP SINGLE POLE 120/240V CIRCUIT BREAKER
WITH ENCLOSER
50mm ø UPVC & SCH 80
150x150x6 WWF
250 x 50 SADDLE
150mm THK RCC PLATFORM
1500
250 FRP DISCHARGE LINE TO RED SEA
SECTION A - A

Figure 2

APPENDIX I
GUIDELINES FOR ASBESTOS DISMANTLING, REMOVAL, TRANSPORT AND DISPOSAL

Table of Contents

1. INTRODUCTION

Asbestos is a special type of waste which is extremely hazardous, and it is a naturally occurring magnesium silicate minerals in fibrous form composed of bundles of fibers. Worldwide, asbestos is known for killing more people than any other single work-related illness.

Asbestos products have proven to be superior over other materials as long as it remained intact. However, if asbestos becomes air-borne and an individual inhaled it, severe health problems could result. Since the 1970's, there have been stricter rules regulating the removal and disposal of asbestos materials.

Exposure to asbestos fibers causes serious incurable diseases such as asbestosis, fibrosis and other carcinogenic and fatal diseases. Inhalation of asbestos fibers can lead to asbestos related lung diseases that can take 15 - 60 years to develop.

Dealing with Asbestos requires a specialized degree of professionalism and is subject to high operational standards in order to protect both ambient and working environments, maintain the safety of workers, and ensure that all workers have undergone extensive training in accordance with the referenced occupational safety requirements (OSHA). In depth knowledge of PPE requirements, safety rules, containment methods, and site cleanup techniques is necessary to avoid environmental impacts due to the dispersion of asbestos fibers.

The objectives of this document are to ensure all asbestos is removed before any major work begins, *and* control and regulate the removal/demolition, containment, transport, and disposal of asbestos in accordance with the referenced standards in this document to protect public health, safety, and the environment.

2. LEGAL FRAMEWORK

In Saudi Arabia, since 2001 there has been an all-out ban on all asbestos material in the Kingdom by a Council of Ministers Royal Order. The Royal Commission has declared asbestos as a hazardous air pollutant and is banned as per the currently enforced RCER, Volume I, Serial No. 1, Table 2B, and with a general ban on its usage as per RCER Clause 2.3.5.

Both US EPA and Occupational Safety and Health Administration (OSHA) strictly regulate the removal and final disposal of asbestos waste. The US EPA has declared asbestos unsafe and listed it as a hazardous air pollutant. The Occupational Safety and Health Administration, OSHA, has regulations in effect to protect employees working with or around asbestos. In 1995, OSHA issued revised regulations for asbestos with stricter requirements.

3. DEFINITIONS

ACM	Any material that contains greater than 1% asbestos fibers *(Asbestos Containing Material.)*
EPA	The United States Environmental Protection Agency
FIBER	The particulate form of asbestos. A fiber is at least 5 microns with a length to width ratio of at least 3:1.
FRIABLE	Asbestos containing materials that can easily generate airborne fibers
HEPA	Filter that can trap and retain greater than 99.7% of 0.3-micron diameter particles (*High Efficiency Particulate Air).*
NESHAP	United States regulation for limiting hazardous air pollutant emissions, including asbestos (*National Emission Standards for Hazardous Air Pollutants).*
NONFRIABLE	Asbestos containing materials that do not generate fibers unless damaged.
OHSA	Covers ACM removal and classification of removal activities. (*U.S. Occupational and Health Safety Administration).*
MEWA	Ministry of Environment, Water & Agriculture

4. GENERAL CONTRACTOR REQUIREMENTS

Prior to works commencement, contractor shall submit his credentials for review and assessment by the Royal Commission and profile with a track record of successfully executed projects and shall include documentation on the following:

a) Contractor shall be licensed by the MEWA for this type of activity.
b) Procedure (method) to detect the presence of asbestos in materials to be removed
c) Description of work practices and engineering controls to measure and control the dispersion of asbestos fibers.

Including, but not limited to preventing excess exposure to workers in the containment area and prevent emission of fibers outside the containment area.

d) Methodology of packing and wrapping of asbestos sheets and other non-friable ACM for disposal to avoid rendering it friable.

e) Name of RC approved transporter and license to transport such type of material.

f) Specifications of protective clothing should be approved by RC.

g) Warning signs and labels at the working site and in surrounding areas.

h) Procedure and methodology for safe disposal.

i) CV of supervisors and other engineers working on this project.

j) Training certificates of workers for safe handling and removal of asbestos from an independent asbestos training provider. State that only trained workers with current training shall do asbestos removal work.

k) Time schedule for all project tasks with completion dates for each job and details on how the removal plan will be communicated to workers.

l) Emergency Response Plan (ERP) for all phases of removal and disposal of asbestos. The ERP shall contain procedures to be followed in the event that unexpected ACM is found during demolition or removal.

m) Scope of work for safe dismantling, disposal, and landfilling shall be submitted to the RC for prior approval

n) Waste generator should supervise all phases of asbestos removal and disposal and make sure that all work has been done according to the referenced standards.

o) Contractor's classification of asbestos work activities according to OSHA standard.

5. PROCEDURES

The currently enforced Royal Commission Environmental Regulations (RCER), Volume I, section 5, requires waste generator to obtain prior RC EPCD approval (*by giving full details about the wastes and planned disposal methodologies*) for disposal of their waste materials.

The contractor should provide a detailed procedure prior to work start up in accordance with the currently enforced RCER, Volume I provision, with reference to USEPA appendix D to Subpart E of Part 763 - Transport and Disposal of Asbestos Waste

The goal of this document is to ensure that all asbestos is removed before any major work begins. This statement shall be included in the contractor's submission.
Asbestos waste requires implementation of special procedures prior to removal mainly as follows:

1) Surveying
   a) Identification of the type of asbestos.
   b) Quantity of asbestos.
2) Material Risk Assessment
   a) Determination of friability.
   b) Percentage of asbestos fibers in the building material.
3) Quality Assurance and Quality Control.
   a) Use of a third-party coordinator to monitor compliance with methods in this procedure.
   b) The third-party coordinator conducts all air monitoring and is empowered to shut down the work or modify procedures.
   c) The third-party coordinator reports directly to the RC.
4) Decontamination facilities for workers and tools.
   a) Don and doff areas, showers, equipment room.
   b) Areas for rest and food consumption shall be isolated from don and doff areas.
5) Personal and Respiratory Protective Equipment.

a) The use of PAPR- pressurized air purifying respirator is mandatory for jobs larger than glove bag work.
b) Fit testing of respirators with records of fit testing all employees doing removal work.
c) Details of the medical surveillance policy for workers exposed to asbestos including frequency of examinations.

6) Protect / enclose.
   a) Use of plastic to cover floors, windows, and doorways.
   b) Use of negative air blowers with HEPA filters.
   c) Air monitoring both inside and outside containment area.
7) Seal / encapsulate area.
   a) Containerizing or wrapping of asbestos materials and designated storage area.
8) Repair and maintenance if required.
   a) Conduct a negative exposure assessment before suspending respirator use for repair and maintenance of ACM insulation or other materials.
9) Handling of asbestos.
10) Removal works.
   a) Air in work area to have less than 0.1fiber per cc of air sampled TWA 8 hours or less. 1.0 fiber per cc in a 30-minute interval is the maximum excursion–not to exceed 3 excursions in a week (ACGIH guideline). Work will be stopped if either limit is exceeded.
   b) Clearance air sampling is done before removing containment structure.
11) Loading/unloading.
12) Transport to disposal site.
13) Final disposal.

6. ASBESTOS DEMOLITION AND REMOVAL

a) Asbestos shall be removed wet with special chemicals to prevent fibers release into atmosphere; double wrapped in polyethylene sheet, minimum 1000 gage. (Any broken parts should be double bagged with a yellow-colored interior bag. Do not use red, it is strictly for biohazard) and safely disposed in lined landfill and properly covered. Containerize loose materials and HEPA vacuum exterior of asbestos containers before transport.

b) Isolate the area where removal work is to be conducted from all other areas by means of constructed walls and or fencing. Install plastic sheeting on floors and walls to prevent contamination of non-asbestos surfaces.

c) Install barrier tape and warning signs in proximity to the work area. Post signs around the removal area to restrict access. Post enough signs to warn of the hazard.
d) Removal methods shall include: HEPA vacuum, water spraying, no dry sweeping, mechanical chipping to be done in negative pressure enclosure areas only, intact removal, if possible, especially for roofing materials.

7. HANDLING AND TRANSPORTING

a) Transport is defined as all activities from receipt of the containerized asbestos waste at the generation site until it has been unloaded safely at the disposal site.

b) Before accepting the wastes, the transporter should ensure that the asbestos waste is properly contained in leak-tight containers with appropriate labels, and that the outside surfaces of the containers are not contaminated with asbestos debris.

c) The transporter shall insure that the waste is properly containerized and marked as per RCER Regulations, Section 5.3.

d) The contractor shall insure that the transporter is trained to handle ACM waste and is included and trained in the Emergency Response Plan in Section 4.L.

e) If condition of asbestos waste may cause fiber release, the transporter shall not accept the waste.

f) Improper containerization of wastes is a violation to RC environmental standards.

g) Once the transporter is satisfied with the condition of the asbestos waste and agrees to handle it, the containers shall be loaded into the transport vehicle in a careful manner to prevent breaking of the containers.

h) At the disposal site, the asbestos waste containers should be transferred carefully to avoid fiber release.

i) Vehicles used for transport of containerized asbestos waste shall have an enclosed carrying compartment covering sufficiently all parts to contain the transported waste, prevent damage to containers, prevent fiber release, and can be locked.

j) Transport of large quantities of asbestos waste is commonly conducted in a 20m^3 "roll off" box, which shall also be covered.

k) Vehicles that use compactors to reduce waste volume shall not be used in order to avoid damage to the containers holding the asbestos.

l) Disposal involves the full isolation of asbestos waste material in order to prevent fiber release to air or water.

8. RECEIVING ASBESTOS WASTE AT DISPOSAL FACILITY

a) Both the landfill approved for receipt of asbestos waste and the approved trucking company should be notified that waste load contains asbestos.

b) Landfill operator should inspect the loads to verify that asbestos waste is properly contained in leak-tight containers and labeled appropriately.

c) RC should be notified if landfill operator believes that the asbestos waste is in a condition that may cause significant fiber release during disposal.

d) In situations when the wastes are not properly containerized, the disposal facility operator shall contact the contractor.

e) In case of breakage during transport, the contractor shall immediately send out a crew with proper PPE to thoroughly soak the asbestos with a water spray prior to unloading, rinse out the truck, HEPA vacuum the truck, and immediately cover the wastes with non-asbestos material prior to compacting the waste in the landfill.

9. DISPOSAL SITE

a) Prior to sending to landfill, demolition waste containing asbestos may be accepted without testing according to the following conditions:

b) Asbestos wastes approved for landfilling shall not contain additional hazardous wastes other than asbestos fibers or asbestos fibers packed in plastic.

c) All asbestos wastes (demolition wastes-asbestos pipes-household asbestos-and any other asbestos wastes) shall only be accepted in designated and enclosed landfill.

d) All asbestos materials placed in the landfill shall be containerized or covered in plastic to prevent dispersion of fibers.

e) Fill material shall be of particles with standard size and composition that is stable and fireproof.

f) Prohibition of any type of work in the area that may disrupt landfill or cell and cause dispersion of asbestos fibers.

g) Maintain a site plan at all times indicating the actual location of asbestos fibers throughout operation period till time of closure.

10. LANDFILLING

a) Landfilling is an environmentally sound containment method for asbestos waste material because asbestos fibers are virtually immobile in soil.

b) There must be no visible emissions to the outside air during waste transport.

c) However, recognizing the potential hazards and subsequent liabilities associated with exposure, the following additional precautions are recommended:

d) Other disposal techniques such as incineration or chemical treatment are not feasible due to the unique physical/chemical properties of asbestos.

e) Asbestos shall be safely disposed in lined landfill and properly covered.

f) Disposed area must not be disturbed later on in the future.

g) Workers handling asbestos shall wear all necessary PPE including breathing apparatus to protect workers and to avoid any inhalation of asbestos fibers.

h) Disposal involves the full isolation of asbestos waste material in order to prevent fiber release to air, water, or soil.

i) Royal Commission has provisions to dispose asbestos waste in a single lined landfill which meets EPA asbestos disposal requirements for active and inactive disposal sites under NESHAPs (40 CFR Part 61, subpart M).

j) Record the following information:

1. Capacity of the asbestos landfill
2. Quantity received from date of operation till last asbestos load
3. No. of cells that have been filled
4. Asbestos containing cells are located on a site map
5. Dates of receipt of asbestos
6. Expected lifetime of landfill
7. Closure date
8. Post-closure Plan
9. Details of PPE assigned to workers
10. Worker training programs
11. Details of groundwater monitoring wells (landfill site)

11. ASBESTOS WASTE DEPOSITION AND COVERING

The following procedure must be followed:

a) Designate a separate area for asbestos waste disposal.

b) Provide a record for future planning purposes, indicating that asbestos waste has been buried there and that it would be hazardous to attempt to excavate that area. (Future regulations may require certain property procedures to identify the location of any asbestos wastes and warn against excavation.)

c) Prepare a separate trench to receive asbestos wastes. The size of the trench will depend upon the quantity and frequency of asbestos waste delivered to the disposal site. The trenching technique allows application of soil cover without disturbing the asbestos waste containers.

d) The trench should be ramped to allow the transport vehicle to back into it, and the trench should be as narrow as possible to reduce the amount of cover required. If possible, the trench should be aligned perpendicular to prevailing winds.

e) Place asbestos waste containers into the trench carefully to avoid breaking them. Particular care is needed with plastic wrapped asbestos panels. If broken under pressure, asbestos fibers can be emitted.

f) Completely cover the containerized waste within 24 hours with a minimum of

g) 1 meter (39 inches) of non-asbestos material.

h) Improperly containerized waste is considered as an environmental violation.

i) If improperly containerized waste is received at the disposal site, it shall be covered immediately after unloading. The asbestos contractor shall be called to be onsite and correct the situation.

j) Only after properly containerized wastes are completely covered, can the wastes be compacted, or other heavy equipment run over it.

k) During compacting, avoid exposing wastes to the air or tracking asbestos material away from the trench.

12. FINAL CLOSURE OF AN AREA CONTAINING ASBESTOS WASTE

Final cover, including vegetation and grading, will be in accordance with the currently enforced RCER, Volume I, Section 5.4.

13. RECORD KEEPING

For protection from liability, and considering possible future planning and investment requirements, the landfill operator shall maintain documentation of specific locations and quantities of the buried asbestos wastes. In addition, the estimated depth of the waste below the surface should be recorded whenever a landfill section is closed.

As mentioned previously, such information should be recorded regularly along with a notice warning against excavation of the area.

The transporter shall require a chain-of- custody form signed by the generator. A chain-of-custody form may include the name and address of the generator, the name and address of the pickup site, the estimated quantity of asbestos waste, types of containers used, and the destination of the waste.

The chain-of-custody form should then be signed over to a disposal site operator to transfer responsibility for the asbestos waste. A copy of the form signed by the disposal site operator should be maintained by the transporter as evidence of receipt at the disposal site.

14. REFERENCES

1. American Conference of Governmental Industrial Hygienists (ACGIH)
2. Asbestos NESHAP Adequately Wet Guidance EPA340/1-90-019.
3. EPA has established asbestos disposal requirements for active and inactive disposal sites under NESHAPs (40 CFR Part 61, subpart M) EPA asbestos disposal requirements for active and inactive disposal sites under NESHAPs (40 CFR Part 61, subpart M).
4. USEPA appendix D to Subpart E of Part 763 -- Transport and Disposal of Asbestos Waste
5. EPA: 40 CFR 763.121 (Regulatory Requirements)
6. EPA asbestos disposal requirements for active and inactive disposal sites under NESHAPs (40 CFR Part 61, subpart M)
7. General requirements for solid waste disposal under RCRA (40 CFR Part 257).
8. 52 FR 41897, Oct. 30, 1987, as amended at 62 FR 1834, Jan. 14, 1997]
9. OSHA 29 CFR 1910.1001(j)(4)(ii) or 1926.1101(k)(8)(iii).
10. OSHA: 29 CFR 1910.1200 (Hazard Communication)
11. Occupational Safety and Health Administration (OSHA) under 29 CFR 1910.1001(j)(4)(ii) or 1926.1101(k)(8)(iii); or WAC 296-62-07721(6)(c)
12. Medical surveillance guidelines for asbestos, non-mandatory – OSHA 29 CFR Par 1926.1101 App I
13. OSHA 3114 Hazardous Waste Operations and Emergency Response -Asbestos Hazard Emergency Response Act of 1986 (AHERA) EPA- Public Law 99-519, Oct 22,1986 ,15 USC Section 2651 TITLE II - ASBESTOS HAZARD EMERGENCY RESPONSE
14. The currently enforced RCER, Volume I
15. Technical Guidance Manual for the Safe Removal, Transport, and Disposal of Asbestos (DRAFT). RC-EPCD Aug. 22, 2013

APPENDIX J
GUIDELINES FOR NOISE MEASUREMENT

APPENDIX J
GUIDELINE FOR NOISE MEASUREMENT

1. The recommended sequence of steps for conducting noise measurements:
2. Noise measurements shall be undertaken by personnel properly trained to use noise equipment.
3. Set the microphone at 1.2 to 1.5 meters above the ground and, where feasible, avoid measurements within 3 meters of any walls, buildings and other reflecting surfaces. A tripod for mounting of the microphone must be used.
4. Ensure weather conditions are suitable: no rain and a wind speed of less than 5 m/s and note these prevailing conditions including ambient temperature in a logbook.
5. Measure the noise at the location where the impact occurs. Typically, this will be at a point on the boundary of the complainant's property closest to the noise source. Do a field calibration of the sound level meter to comply with standards using an acoustic calibrator.
6. Survey methodology shall be based on ISO 1996 Part II or equivalent standard using an instrument that meets the BS EN 61672-1:2013 or better.
7. A minimum of class 2 is required in environmental noise surveys. If the temperature is <40C, a minimum of Class 2 Sound Level Meter (SLM) shall be used. If the temperature is >40C, Class 1 SLM shall be used.
8. Parameter L10 shall be monitored, and the results shall be compared with the currently enforced RCER, Volume I noise standards.
9. The SLM must be configured to 'A' weighted result and the response time set as fast.
10. Samples shall be taken at appropriate locations around the facility perimeter for a minimum of 5 minutes per location.
11. Where noise other than that under consideration occurs during measurement, take another reading to avoid the readings being contaminated.
12. At the end of the measurements do another field calibration of the sound level meter. If there is more than a 1 decibel variation between the calibrated level and the first calibrated level, the measurements may be invalid, in which case the measurement procedure will need to be repeated.
13. Document observations of weather and noise that were heard during the measurements, including the time of specific events that may affect readings, such as a traffic etc.
14. Report format shall include the following at a minimum:
    a. Introduction
    b. Objective
    c. Methodology
    d. RC Noise Regulation
    e. Results
    f. Discussion
    g. Conclusion
    h. Appendix:
        i. Project Team
        ii. Noise Location Map
        iii. On-field Calibration Results
        iv. Equipment Calibration Certificates

Reference: Guidelines for Local Government Environmental Protection Authority and State of North South Wales 2013

GUIDELINE FOR A BOUNDARY NOISE MONITORING REPORT

Cover page

- Name of facility
- Name of 3rd Party (in case of baseline monitoring)
- Date of survey
- Report reference number

Approval page

- Signature of Author, Reviewer and Approver with dates and designations.

Table of Contents

Noise Terminology or Reference

Executive Summary

- A summary of the main findings of the noise report

1. Introduction

- Company Overview
- Consultant Overview
- Reference to RCER regulations and requirement for boundary noise survey
- RCER limits (include table of limits)

2. Noise Survey Scope and Methodology

- Time and date of noise survey
- General weather observations and general description of activities/areas that generate noise.
- Number of monitoring points required and time at each point
- Methodology followed
- Description of noise equipment used and brief description of set-up
- Names and position/designation of persons who performed the noise survey

3. Survey results

- Summary results table

Location Number	Start Time	End Time	Wind Speed (m/s)	LAeq Max (dB)	L10 (dB)	RCER Limit	Unusual Noise Comments

- Site calibration results (Table of Pre and Post-test calibrations performed, including required value, actual value, and offset)
- Graphical representation of noise data
- References and reasons/description to any noise values above RCER limit.

4. Conclusions and Recommendations

- Overall conclusion with compliance
- Results below and/or above RCER regulations

Annexure A: Raw data

Annexure B: Facility layout with location of monitoring points

Annexure C: Noise Meter, Noise Calibrator and Meteorological Calibration Certificates

Annexure D: RC Authorization Letter

Annexure E: EPCD noise witness inspection form (if available)

APPENDIX K

Required Forms to Obtain Authorization FOR

i. Stack & Cooling Tower Drift Loss Testing
ii. Conducting Environmental Impact Assessment
iii. Fugitive Emissions Testing
iv. Environmental Laboratory & Noise Testing

APPENDIX K- I
REQUIREMENTS TO OBTAIN AUTHORIZATION FOR STACK AND COOLING TOWER DRIFT LOSS TESTING

COOLING TOWER DRIFT LOSS TESTING APPLICATION:

(To be filled in by all existing/new companies to obtain authorization as a Cooling Tower Drift Loss Testing body.)

1. General

i. Name of Organization:

ii. Name of the Cooling Tower Drift Loss Testing body/wing:

iii. Address:

a) Postal Address:

b) Telephone:

c) Fax:

d) E-mail:

iv. Provide copy of the commercial registration

v. Year of establishment of the organization:

vi. Year of establishment of the Cooling Tower Drift Loss testing wing:

vii. Whether registered with MEWA/NCEC or any other Organization: Yes / No
If yes, mention Registration No. and date:

viii. Whether there is collaboration with any 3rd party: Yes / No
If yes, mention details:

ix. Objectives & scope of the organization:

x. Head of the Organization:

a) Name and Designation:

b) Address:

c) Telephone: _____ Fax: _____ Email: _____

xi. Operations In-charge:

a) Name and Designation:

b) Address:

c) Telephone: _____ Fax: _____ Email: _____

xii. Quality Control In-charge:

a) Name and Designation:

b) Address:

c) Telephone: _____ Fax: _____ Email: _____

xiii. Name of accreditation body(s)/organization i.e., CTI, ISO, MCERTS, SASO etc. from which the cooling tower testing body has been already recognized/accredited, give details.

S. No.	Name of the certification/recognition body/organization	Accreditation / recognition granted for the activities	Environmental Parameter covered	Validity up to

xiv. Provide a copy of the quality assurance plan.

xv. Provide a copy of the work safety procedures and standard operating procedures (SOPs).

xvi. If applying for renewal of authorization, give previous details:

a) Reference No.

b) Validity period: From: To:

2. Infrastructural Details of the Cooling Tower Drift Loss Testing Body:

i. Provide an organizational chart: Provide details of cooling tower drift loss testing projects that have been completed by the organization:

S. No.	Name of the Facility	Type of Facility	Total Cooling Tower Drift Loss Tests	Types of Cooling Tower
		(Petrochemical, Refinery, etc.)		

ii. Whether the cooling tower drift loss testing body has its own laboratory: Yes / No
If Yes, provide copy of its accreditation certificate(s).
If No, provide the name of the laboratory used by the organization to analyze its samples.

iii. Provide information along with certification of the organization from whether the Cooling Tower Drift Loss testing body receives its standard gases.

iv. Enlist all Cooling Tower Drift Loss testing methods utilized by the body and provide information whether these methods are US EPA or internationally approved.

v. Enlist all instruments/analyzers used for Cooling Tower Drift Loss testing along with their calibration certificates and whether these instruments operate on US EPA approved principles.

vi. Provide name, designation and qualifications of all staff involved in Cooling Tower Drift Loss testing:
(Enclose separate sheet if space is inadequate.)

S. No.	Name	Designation	Qualification	Total experience in cooling tower drift loss testing	Nature of present job assignment			
					Administrative	Supervisory	Cooling Tower Testing	Analysis/ sampling

vii. Provide details of training program(s) related with cooling tower drift loss testing attended within last five years by the staff listed in (vii) above:

S. No.	Name of the Staff	Training conducted by the institution /organization	Title/Topic	Duration

_____
Signature :(Authorized Representative)

Full Name: _____

Designation: _____

Date: _____

Seal of the Organization

الهيئة الملكية للجبيل وينبع
Royal Commission for Jubail & Yanbu

STACK TESTING APPLICATION:

1. General

(i) Name of Organization:

(ii) Name of the Cooling Tower Drift Loss Testing body/wing:

(iii) Address:

a) Postal Address:
b) Telephone:
c) Fax:
d) E-mail:

(iv) Provide copy of the commercial registration

(v) Year of establishment of the organization:

(vi) Year of establishment of the stack testing wing:

(vii) Whether registered with MEWA/NCEC or any other Organization: Yes / No
If yes, mention Registration No. and date:

(viii) Whether there is collaboration with any 3rd party: Yes / No
If yes, mention details:

(ix) Objectives & scope of the organization:

(x) Head of the Organization:

a) Name and Designation:
b) Address:
c) Telephone: _____ Fax: _____ Email: _____

(xi) Operations In-charge:

d) Name and Designation:
e) Address:
f) Telephone: _____ Fax: _____ Email: _____

(xii) Quality Control In-charge:

d) Name and Designation:
e) Address:
f) Telephone: _____ Fax: _____ Email: _____

(xiii) Name of accreditation body(s)/organization i.e., ISO, MCERTS, SASO etc. from which the stack testing body has been already recognized/accredited, give details.

S. No.	Name of the certification/recognition body/organization	Accreditation / recognition granted for the activities	Environmental Parameter covered	Validity up to

(xiv) Provide a copy of the quality assurance plan.

(xv) Provide a copy of the work safety procedures and standard operating procedures (SOPs).

(xvi) If applying for renewal of authorization, give previous details:

c) Reference No.
d) Validity period: From: To:

2. Infrastructural Details of the Stack Testing Body:

(i) Provide an organizational chart:

(ii) Provide details of stack testing projects that have been completed by the organization:

S. No.	Name of the Facility	Type of Facility	Total Stack Tests	Types of Equipment
		(Petrochemical, Refinery, etc.)		(Boilers, incinerators, furnaces, scrubbers, etc.)

(iii) Whether the stack testing body has its own laboratory: Yes / No
If Yes, provide copy of its accreditation certificate(s).
If No, provide the name of the laboratory used by the organization to analyze its samples.

(iv) Provide information along with certification of the organization from whether the stack testing body receives its standard gases.

(v) Enlist all stack testing methods utilized by the body and provide information whether these methods are US EPA or internationally approved.

(vi) Enlist all instruments/analyzers used for stack testing along with their calibration certificates and whether these instruments operate on US EPA approved principles.

(vii) Provide name, designation and qualifications of all staff involved in stack testing:
(Enclose separate sheet if space is inadequate.)

S. No.	Name	Designation	Qualification	Total experience in Stack Testing	Nature of present job assignment			
					Administrative	Supervisory	Stack Testing	Analysis/ sampling

(viii) Provide details of training program(s) related with stack testing attended within last five years by the staff listed in (vii) above:

S. No.	Name of the Staff	Training conducted by the institution /organization	Title/Topic	Duration

_____
Signature: (Authorized Representative)

Full Name: _____

Designation: _____

Date: _____

Seal of the Organization

الهيئة الملكية للجبيل وينبع
Royal Commission for Jubail & Yanbu

APPENDIX K-II-A
REQUIREMENTS TO CONDUCT ENVIRONMENTAL IMPACT ASSESSMENT (EIA)

(To be filled in by all existing/new companies to obtain authorization to conduct an Environmental Impact Assessment as Class A EIA Consultant for First, Second and Third Category facilities)

1. General

(ix) Name of Organization:

(x) Address:

a)Postal Address:

b) Telephone:

c) Fax:

d) E-mail:

(xi) Provide copy of the commercial registration.

(xii) Year of establishment of the organization:

(xiii) Submit NCEC/MEWA Permit to Conduct EIA Studies:

(xiv) Whether there is collaboration with any 3rd party: Yes / No
If yes, mention details:

(xv) Provide Scope of the organization:

(xvi) Head of the Organization:

a) Name and Designation:

b) Address:

c) Telephone: _____ Fax: _____ Email: _____

(xvii) Operations In-charge:

a) Name and Designation:

b) Address:

c) Telephone: _____ Fax: _____ Email: _____

(xviii) Quality Control In-charge:

a) Name and Designation:

b) Address:

c) Telephone: _____ Fax: _____ Email: _____

(xix) Name of accreditation body(s)/organization from which the organization conducting EIA has been already recognized/accredited, give details.

S. No.	Name of the certification/recognition body/organization	Accreditation / recognition granted for the activities	Environmental Areas covered	Validity up to

(xx) Provide a copy of the quality assurance plan.

(xxi) Provide a copy of the work safety procedures and standard operating procedures (SOPs) (if available).

(xxii) If applying for renewal of authorization, give previous details:

a) Reference No.
b) Validity period: From: To:

2. Details of the Organization:

i. Provide an organizational chart.

ii. Provide details of EIA projects that have been completed by the organization both inside and outside the Kingdom.

S. No.	Name of the Facility	Type of Facility	Total No. of EIAs	Areas Covered
		(Petrochemical, Refinery, etc.)		(e.g., air, water, marine, soil, noise, traffic, emergency response plan, etc.)

iii. Whether the organization has its own laboratory: Yes / No
If yes, provide copy of its accreditation certificate(s).
If no, please note that EIA consultant shall utilize only RC approved laboratory services.

iv. Enlist any US EPA recognized, or any other internationally approved EIA procedures followed by the organization.

v. Whether the organization outsource any of the specialist work (e.g. air modeling, noise assessment, thermal/chemical pollution in sea, groundwater modeling etc.) to a third party? If yes, provide details.
Yes / No

vi. Enlist the latest modeling software used by the organization while conducting EIAs e.g., AERMOD, thermal dispersion model, etc.

vii. Provide name, designation and qualification of all staff involved in conducting EIA:
(Enclose separate sheet if space is inadequate.)

S. No.	Name	Designation	Qualification	Total experience in Conducting EIA	Nature of present job assignment			
					Administrative	Supervisory	EIA assessment	Analysis/ sampling

viii. Provide details of training program(s) related with EIA attended within last five years by the staff listed in (vii):

S. No.	Name of the Staff	Training conducted by the institution /organization	Title/Topic	Duration

_____
Signature :(Authorized Representative)

Full Name: _____

Designation: _____

Date: _____

Seal of the Organization

APPENDIX K-II-B
REQUIREMENTS TO CONDUCT ENVIRONMENTAL IMPACT ASSESSMENT (EIA)

(To be filled in by all existing/new companies to obtain authorization to conduct an Environmental Impact Assessment as Class B EIA Consultant for First & Second Category facilities.)

1. General

(i) Name of Organization:

(ii) Address:

a) Postal Address:
b) Telephone:
c) Fax:
d) E-mail:

(iii) Provide copy of the commercial registration.

(iv) Year of establishment of the organization:

(v) Submit NCEC/MEWA permit to conduct EIA studies

(vi) Whether there is collaboration with any 3rd party:
Yes / No
If yes, mention details:

(vii) Provide scope of the organization:

(viii) Head of the Organization:

d) Name and Designation:
e) Address:
f) Telephone: _____ Fax: _____ Email: _____

(ix) Provide a copy of the work safety procedures and standard operating procedures (SOPs) (if available).

(x) If applying for renewal of authorization, give previous details:

a) Reference No.
b) Validity period: From: To:

2. Details of the Organization:

(i) Provide an organizational chart.

(ii) Provide details of EIA projects that have been completed by the organization both inside and outside the Kingdom.

S. No.	Name of the Facility	Type of Facility	Total No. of EIAs	Areas Covered
		(Petrochemical, Refinery, etc.)		(e.g., air, water, marine, soil, noise, traffic, emergency response plan, etc.)

(iii) Whether the organization has its own laboratory: Yes / No

If yes, provide copy of its accreditation certificate(s).

Please note that EIA consultant shall utilize only RC approved laboratory services.

(iv) Provide name, designation and qualification of all staff involved in conducting EIA:
(Enclose separate sheet if space is inadequate.)

S. No.	Name	Designation	Qualification	Total experience in Conducting EIA	Nature of present job assignment			
					Administrative	Supervisory	EIA assessment	Analysis/ sampling

_____
Signature :(Authorized Representative)

Full Name: _____

Designation: _____

Date: _____

Seal of the Organization

APPENDIX K-II-C
REQUIREMENTS TO CONDUCT ENVIRONMENTAL IMPACT ASSESSMENT (EIA)

(To be filled in by all existing/new companies to obtain authorization to conduct an Environmental Impact Assessment as Class C EIA Consultant for First Category facilities only.)

1. General

(xi) Name of Organization:

(xii) Address:

e) Postal Address:
f) Telephone:
g) Fax:
h) E-mail:

(xiii) Provide copy of the commercial registration.

(xiv) Year of establishment of the organization:

(xv) Submit NCEC/MEWA permit to conduct EIA studies

(xvi) Whether there is collaboration with any 3rd party:
Yes / No
If yes, mention details:

(xvii) Provide scope of the organization:

(xviii) Head of the Organization:

g) Name and Designation:
h) Address:
i) Telephone: _____ Fax: _____ Email: _____

(xix) Provide a copy of the work safety procedures and standard operating procedures (SOPs) (if available).

(xx) If applying for renewal of authorization, give previous details:

c) Reference No.
d) Validity period: From: To:

2. Details of the Organization:

(v) Provide an organizational chart.

(vi) Provide details of EIA projects that have been completed by the organization both inside and outside the Kingdom.

S. No.	Name of the Facility	Type of Facility	Total No. of EIAs	Areas Covered
		(Petrochemical, Refinery, etc.)		(e.g., air, water, marine, soil, noise, traffic, emergency response plan, etc.)

(vii) Whether the organization has its own laboratory: Yes / No

If yes, provide copy of its accreditation certificate(s).

Please note that EIA consultant shall utilize only RC approved laboratory services.

(viii) Provide name, designation and qualification of all staff involved in conducting EIA:
(Enclose separate sheet if space is inadequate.)

S. No.	Name	Designation	Qualification	Total experience in Conducting EIA	Nature of present job assignment			
					Administrative	Supervisory	EIA assessment	Analysis/ sampling

_____
Signature :(Authorized Representative)

Full Name: _____

Designation: _____

Date: _____

Seal of the Organization

APPENDIX K-III
REQUIREMENTS TO OBTAIN AUTHORIZATION FOR FUGITIVE EMISSIONS TESTING

(To be filled in by all existing/new companies to obtain authorization as a Fugitive Emissions Testing body.)

1. General

(i) Name of Organization:

(ii) Name of the Fugitive Emissions Testing body/wing:

(iii) Address:

i) Postal Address:

j) Telephone:

k) Fax:

l) E-mail:

(iv) Provide copy of the commercial registration

(v) Year of establishment of the organization:

(vi) Year of establishment of the fugitive emissions testing wing:

(vii) Whether registered with MEWA/NCEC or any other Organization: Yes / No
If yes, mention Registration No. and date:

(viii) Whether there is collaboration with any 3rd party: Yes / No
If yes, mention details:

(ix) Objectives & scope of the organization:

(x) Head of the Organization:

j) Name and Designation:

k) Address:

l) Telephone: _____ Fax: _____ Email: _____

(xi) Operations In-charge:

g) Name and Designation:

h) Address:

i) Telephone: _____ Fax: _____ Email: _____

(xii) Quality Control In-charge:

g) Name and Designation:

h) Address:

i) Telephone: _____ Fax: _____ Email: _____

(xiii) Name of accreditation body(s)/organization i.e., ISO, MCERTS, SASO etc. from which the fugitive emissions testing body has been already recognized/accredited, give details.

S. No.	Name of the certification/recognition body/organization	Accreditation / recognition granted for the activities	Environmental Parameter covered	Validity up to

(xiv) Provide a copy of the quality assurance plan.

(xv) Provide a copy of the work safety procedures and standard operating procedures (SOPs).

(xvi) If applying for renewal of authorization, give previous details:

e) Reference No.

f) Validity period: From: To:

2. Infrastructural Details of the Fugitive Emissions Testing Body:

(i) Provide an organizational chart:

(ii) Provide details of fugitive emissions testing projects that have been completed by the organization:

S. No.	Name of the Facility	Type of Facility	Total Tests	Type of Equipment
		(Petrochemical, Refinery, etc.)		(e.g., GC, IR, electrochemical, or PID based, etc.)

(iii) Enlist all fugitive emissions testing methods utilized by the body and provide information whether these methods are US EPA or internationally approved.

(iv) Enlist all instruments/analyzers used for fugitive emissions testing along with their calibration certificates and whether these instruments operate on US EPA approved principles.

(v) Provide name, designation and qualifications of all staff involved in fugitive emissions testing: *(Enclose separate sheet if space is inadequate.)*

S. No.	Name	Designation	Qualification	Total experience in Fugitive testing	Nature of present job assignment			
					Administrative	Supervisory	Fugitives Testing	Analysis/ sampling

(vi) Provide details of training program(s) related with fugitive emissions testing attended within last five years by the staff as listed in (v) above:

S. No.	Name of the Staff	Training conducted by the institution /organization	Title/Topic	Duration

_____
Signature :(Authorized Representative)

Full Name: _____

Designation: _____

Date: _____

Seal of the Organization

APPENDIX K-IV
REQUIREMENTS TO OBTAIN AUTHORIZATION FOR ENVIRONMENTAL LABORATORY

(To be filled in by all existing/new companies to obtain authorization for an Environmental Laboratory.)

Application to Obtain Approval for Environmental Services:

1. General

(i) Name of Organization:

(ii) Name of the Laboratory:

(iii) Address:

m) Postal Address:

n) Telephone:

o) Fax:

p) E-mail:

(iv) Provide copy of the commercial registration

(v) Year of establishment of the Organization:

(vi) Year of establishment of the Laboratory:

(vii) Whether registered with MEWA/NCEC or any other Organization: Yes / No
If yes, mention Registration No. and date:

(viii) Whether there is collaboration with any 3rd party: Yes / No
If yes, mention details:

(ix) Objectives & scope of the Organization:

(x) Head of the Organization:

m) Name and Designation:

n) Address:

o) Telephone: _____ Fax: _____ Email: _____

(xi) Laboratory In-charge, if different than (viii) above:

b) Name and Designation:

c) Address:

d) Telephone: _____ Fax: _____ Email: _____

(xi) Name of accreditation body(s)/organization i.e., ISO, SASO etc. from which the laboratory has been already recognized/accredited, give details.

S. No.	Name of the certification/recognition body/organization	Accreditation / recognition granted for the activities	Environmental Parameter covered	Validity up to

(xii) Provide a copy of laboratory quality assurance plan.

(xiii) Provide a copy of laboratory work safety procedures and standard operating procedures (SOPs).

(xiv) If applying for renewal of authorization, give previous details:

e) Reference No.

f) Validity period: From: To:

2. Infrastructural details of Laboratory

(i) Provide brief lay out plan map of laboratory with organizational chart:
(Provide scanned photograph of above with layout plan)

(ii) Provide details of laboratory services offered by the organization to various industries.

S. No.	Name of the Organization	Type of Services	Total Sample Count	Type of Parameters Tested

(iii) Which of the following analytical tests are being carried out in the laboratory [Mark YES (√) / NO (x)]

(a) Physical metallic
(b) Inorganics general and non-
(C) Inorganic (Trace metals)
(d) Organics (General)
(e) Trace Organics
(f) Microbiological
(g) Toxicity
(h) Biological
(i) Hazardous waste characterization
(j) Hazardous waste
(k) Ambient air
(l) Source emission

(m) Air toxics
(n) Hazardous Air Pollutants
(o) Volatile Organic Compounds
(p) Noise measurement
(q) Meteorological
(r) Soil, sludge, sediment

(iv) Provide the list of parameters which can be analyzed in the laboratory.

(v) Give details about the analytical method for each parameter.

(vi) Provide the list of equipment/instruments which are available in the laboratory.

(vii) Which of the methods given below are used for Water/Wastewater and Air analysis?

(a) APHA (b) ASTM

(b) US EPA (d) Any Other

2. Provide name, designation and qualifications of all staff involved in environmental analysis/testing:
(*Enclose separate sheet if space is inadequate.)*

S. No.	Name	Designation	Qualification	Total experience in Lab Work	Nature of present job assignment		
					Administrative	Supervisory	Analysis/ sampling

3. Provide details of training program(s) related with the laboratory/analytical work attended within last five years by the staff listed in (x) above:

S. No.	Name of the Staff	Training conducted by the institution /organization	Title/topic	Duration

_____
Signature :(Authorized Representative)

Full Name: _____

Designation: _____

Date: _____

Seal of the Organization/Laboratory

Application to Obtain Approval for Noise Monitoring Services:

1. General

(i) Name of Organization:

(ii) Name of the Noise Testing body/wing:

(iii) Address:

e) Postal Address:

f) Telephone:

g) Fax:

h) E-mail:

(iv) Provide copy of the commercial registration

(v) Year of establishment of the organization:

(vi) Year of establishment of the noise testing wing:

(vii) Whether registered with MEWA/NCEC or any other Organization: Yes / No
If yes, mention Registration No. and date:

(viii) Whether there is collaboration with any 3rd party: Yes / No
If yes, mention details:

(ix) Objectives & scope of the organization:

(x) Head of the Organization:

d) Name and Designation:

e) Address:

f) Telephone: _____ Fax: _____ Email: _____

Operations In-charge:
Name and Designation:

j) Address:

k) Telephone: _____ Fax: _____ Email: _____

(xi) Quality Control In-charge:

j) Name and Designation:

k) Address:

l) Telephone: _____ Fax: _____ Email: _____

(xii) Name of accreditation body(s)/organization i.e., CTI, ISO, MCERTS, SASO etc. from which the noise testing body has been already recognized/accredited, give details.

S. No.	Name of the certification/recognition body/organization	Accreditation / recognition granted for the activities	Environmental Parameter covered	Validity up to

(xiii) Provide a copy of the quality assurance plan.

(xiv) Provide a copy of the work safety procedures and standard operating procedures (SOPs).

(xv) If applying for renewal of authorization, give previous details:

g) Reference No.

h) Validity period: From: To:

2. Infrastructural Details of the Noise Testing Body:

(i) Provide an organizational chart:

(ii) Provide details of noise testing projects that have been completed by the organization:

S. No.	Name of the Facility	Type of Facility	Total Noise Tests Performed	Types of Equipment Tested

(iii) Enlist all noise testing methods utilized by the body and provide information whether these methods are US EPA or internationally approved.

(iv) Enlist all instruments/analyzers used for noise testing along with their calibration certificates and whether these instruments meet the BS EN 61672-1:2013 or above.

(v) Provide name, designation and qualifications of all staff involved in noise testing:
(Enclose separate sheet if space is inadequate.)

S. No.	Name	Designation	Qualification	Total experience in noise testing	Nature of present job assignment		
					Administrative	Supervisory	Noise Testing

(vi) Provide details of training program(s) related with noise testing attended within last five years by the staff listed in (vii) above:

S. No.	Name of the Staff	Training conducted by the institution /organization	Title/Topic	Duration

_____
Signature :(Authorized Representative)

Full Name: _____

Designation: _____

Date: _____

Seal of the Organization

APPENDIX L
GUIDELINES FOR ENVIRONMENTAL SITE ASSESSMENT AND REMEDIATION

Environmental Site Assessment & Remediation Guidelines

Contents

ANNEXES:

DEFINITIONS

For the purpose of the *Environmental Assessment and Remediation Guidelines,* the following definitions apply.

Environmental Site Assessment (ESA) Process: a phased approach of an investigation in relation to a site/land/facility to determine the environmental condition of a site/facility, whether a particular site is, or maybe, contaminated. It includes a phase I "Environmental Site Assessment-Screening", a phase II "Environmental Site Assessment-Confirmatory and Detailed Investigation, a phase III Remediation, and phase IV is Reclamation.

Area(s) of Potential Environmental Concern (APEC): any area on, in or under the site and surrounding area where one or more contaminants of potential concern may be present, as identified through an initial investigation, and that has not been ruled out through subsequent phase II investigations.

Contaminant(s) of Potential Concern (CoPC): any substance that is identified as potentially present on, in or under the site, and the surrounding area that, if released, has the potential for adverse effect.

Contaminated Sites: Areas of land, water, groundwater, or sediments that have levels of contaminants exceeding the Royal Commission's (RC) regulatory criteria. Contaminant sources can include on-site storage of substances/chemicals, burial of wastes, frequent drips and small spills, stockpiling, major spills, and releases during fires. Contamination may also be due to illegal dumping of contaminated soil. Contaminated sites may have short or long term consequences to the health of people or the quality of the environment.

Remediation: Treat, contain, remove, neutralize or manage chemical substances on or below the surface of the site to eliminate or prevent actual or potential harm to current or future adverse effects to the health or safety of human and the environment.

Reclamation: Prevent, contain, control, remove, or remedy any degradation or deterioration of the land's surface, conserve or replace soil to bring back the site to its original or intended state for re-use. It is the process of ensuring that the land and sea do not suffer any permanent effects from the industry/facility activities. Reclamation is the restoration of land to its original condition by regrading contours and replanting after the land has been remediated from the impacts.

ACRONYMS

ACMs	Asbestos-containing materials
APEC	Area(s) of Potential Environmental Concern
BTEX	Benzene, Toluene, Ethylbenzene and Xylene
CCME	Canadian Council of Ministers of the Environment
CoPC	Contaminant(s) of Potential Concern
CSM	Conceptual Site Model
DUA	Domestic Use Aquifers
EPA	United Stated Environmental Protection Agency
ESA	Environmental Site Assessment
F1	Petroleum Hydrocarbon F1 Fraction (nC6 to nC10)
F2	Petroleum Hydrocarbon F2 Fraction (nC10 to nC16)
F3	Petroleum Hydrocarbon F3 Fraction (nC16 to nC34)
F4	Petroleum Hydrocarbon F4 Fraction (nC34 to nC50)
MSDS	Material Safety Data Sheet
NORMs	Naturally occurring radioactive materials
PCBs	Polychlorinated biphenyls
RAP	Remedial Action Plan
RCC	Royal Commission City (Jubail, Yanbu, Ras Al Khair and Jazan)
RC	Royal Commission
RCER	Royal Commission Environmental Regulations
UFFI	Urea foam formaldehyde insulation
WHMIS	Workplace Hazardous Management Systems

1. INTRODUCTION

This document '*Environmental Site Assessment and Remediation Guidelines'* is intended to provide an outline of minimum requirements for Environmental Site Assessment (ESAs) in all Royal Commission Cities (RCC). This guideline document has been prepared for 'third party,' consultants and certified practitioners, undertaking the environmental assessment and remediation of site contamination to assist them in environmental investigations and remediation of contaminated sites. The primary purpose of this document is to develop a systematic approach for (i) contamination investigation (ii) environmental risk management, (iii) remediation and (iv) reclamation.

These guidelines have been developed to establish a risk assessment process for investigation of known or suspected site contamination, and remediation of sites with an appropriate standard in the Royal Commission City (RCC), where the Environmental Site Assessment and Remediation is a regulatory requirement for facility closures and decommissioning. As per lease contract, after the closure of a facility, the lessee is to reinstate the leased premises to its original conditions within a specified period.

The facility closure and decommissioning process may have other legislative requirements from the Royal Commission/ Ministry of Environment/ other Government regulatory agency. The operator of the facility/lessee of the premises using this document must ensure that all the applicable legislative requirements are followed.

This document does not take into account site-specific conditions or the development of improved practices in conducting ESAs. It is not a substitute for the use of professional ruling in conducting ESAs. The ESA requirements and procedures to be followed for any particular site depend on the site's specific circumstances and must be determined by the professional responsible for conducting the ESA.

The guidelines document should be read in conjunction with the currently enforced Royal Commission Environmental Regulations (RCER), MEWA regulations, US EPA guidelines for the assessment of background concentrations (2018), Site contamination policy: certification of practitioners (2018), Site contamination-regulatory and orphan site management framework and other relevant National and International documents.

Royal Commission is committed to updating the information in this document, as required when well established new practices for Environmental Site Assessment become available.

2. INVESTIGATION APPROACH

The site assessment process shall be viewed as a scientific hypothesis, based on historical and current land use, which is continually updated and modified as new information is obtained. The site assessment process is implemented in phases. The first stage of Environmental Site Assessment is the Phase I: Screening; and the second stage

is the Phase II: Confirmatory and Detailed Investigation, the third stage is the Phase III: Remediation, and the fourth stage is Phase IV: Reclamation.

3. PHASE I ESA - SCREENING

3.1 Overview

The first phase involves evaluating a site/facility based on its historical and current land use, site reconnaissance, and other information to assess the potential for site contamination. Phase I ESA should identify and analyze the following aspects of the facility based on the searches' review:

- Identification of areas of potential environmental concern (APECs)
- Associated contaminants of potential concern (CoPCs)

Phase I does not include a sampling and analysis component. The primary objective of a Phase 1 ESA is to determine whether a particular site is, or maybe, contaminated. This phase of work is carried out through an evaluation of information to identify the APECs. A comprehensive Phase 1 is critical for the next investigation and any subsequent remediation activity. The required components of a Phase 1 ESA report are described in the following sections.

3.2 Report Content

The introduction section must provide necessary information about the project, legal and physical address of the site/facility, and a brief description of the project. The introduction must include the purpose of this Phase I ESA and the name of the standard used for this work.

The scope of a Phase 1 ESA shall involve undertaking an investigation and interpreting and reporting on the information gathered. As a minimum, the scope shall identify:

- The party for whom the Phase 1 ESA is being prepared;
- The subject site information; and
- The activities planned or the components of the Phase 1 ESA.

The scope must be included in the report submitted to the Royal Commission City (RCC) as a part of the Environmental Site Assessment Report.

A general description of structures and other improvements to the site/facility shall be provided. This description shall include information on the number of buildings, the estimated age, size, number of story and location, and are to be confirmed with information from the records review. The current use or intended use of the site/facility.

The site and surrounding area's topographic conditions shall be observed and noted where exposure of the subsurface impact exists due to hazardous waste handling/generation, chemical storage, and chemical handling pose a threat to human health, soil, and

groundwater quality. These shall be described and compared with a general description of the geologic and hydrogeological conditions and drainage patterns.

A preliminary conceptual site model (CSM) should be prepared as part of the Phase I ESA. This will include a summary of the anticipated sources, pathways and receptors (considering CoPC) and will enable a preliminary assessment of the level of risk posed by the site condition.

3.3 Records Review

3.3.1 General

The records review shall be designed to collect data on past activities on the site that may have contributed to potential contamination. Efforts must be made to obtain available records related to known or possible contamination of the site/facility from the first developed use to the time of the Phase 1 ESA. Table 1 provides a summary of standard requirements for a Phase 1 ESA (Annex 1). There is potential that neighboring properties may affect the site/facility or be affected by the site being assessed, appropriate search distances must be determined and documented by considering:

- current and past land use on the subject site and neighboring properties;
- known or suspected contamination on the subject site and the neighboring properties;
- consideration shall be given to including the planned future use of the site, rezoning applications, or official development plans.

A general records review for the subject property shall include the following records from pre-development of the site to the time of the Phase 1 ESA: The supporting information may include but are not limited to: drawings, figures, tables, photographs, plans, logs, and appendices, as needed to describe and verify the information contained in the ESA report.

The property record search provides information on the chronology of the ownership, its intended use such as chemical storage, and chemical production. The facility record search summarizes information on the current and past owners of the site/facility. The following searches must be performed to assess the environmental condition of a site/facility.

- The record concerning environmental incidents, orders, offences, spills, discharges of contaminants
- Waste Management Records
- Reports submitted to local authorities
- Petroleum Tanks or related liquid, retail fuel storage present or historically been present
- Landfill sites (if any)
- Chemicals or related substances handled onsite
- Remediation and reclamation certificate

3.3.2 Previous Reports

All relevant previous reports, including any assessment report, risk management or confirmatory reports, must be reviewed and information shall be taken into consideration when preparing the final report. The amount of time and changes of the site condition since the previous report was prepared, types of activities that occurred at the site, conditions in the areas surrounding the site, and changes in environmental legislation need to be considered when evaluating the information with reference.

3.3.3 Site Plans

The site and building plans of past and current property use must be reviewed that are relevant to areas of potential concern. The records available in historically archived sources should be included here. Locations of chemical storage areas, chemical handling areas, Pits/Flare pits, ASTs/USTs, wellhead locations, hydraulic lifts, vehicle or equipment maintenance areas, etc., should be included in this inventory of APECs.

3.3.4 Land Use Plans

The review of the current land use plans shall determine the present use of the site/facility and the neighbouring properties. It is advisable to find the relevant areas of potential concern that are documented in other records available in archived sources i.e. lease agreements and or other sources. The records shall be reviewed for the site/facility of interest and the adjacent properties.

3.3.5 Physical Settings Review

The information shall be reviewed for the site/facility that is the subject of the Phase I investigation and for neighbouring area to a minimum of 300 m from the site/facility/property. The purpose for this review is to identify the likelihood of contamination at a neighbouring property that has a potential to migrate to the subject site.

3.3.6 Historic Aerial Photographs

Wherever available, aerial photographs shall be reviewed to evaluate the changes that occurred in the past. For sites where there are significant changes or disturbances, special attention must be paid to ensure that the changes are interpreted and reflected in the report from the periods prior to development to the current day.

3.3.7 Soil, Hydrogeological, Geological and Geotechnical Reports

This section shall provide the details of the soil characteristics, type, texture, color, grain size, using the any of geological data/ well data available with the Royal Commission City (RCC). The reports must attain the information from existing hydrology, geological, geotechnical reports and maps. The topographic maps shall be obtained and reviewed.

3.3.8 Well Records

Any pertinent well records available should be considered as part of the study. For all well data referenced, ID number, well location, the nature of the well use (such as domestic, agricultural or industrial) should be included in the report.

3.3.9 Landfills

Any information on existing or historical landfills. Available information on the landfill, category, landfill size, and issues related to the landfill to determine the likelihood of impacts to soil and groundwater due to leachate. The following information shall be reviewed for the property of interest.

3.3.10 Regulatory Records

The ESA consultant should make inquiries with local regulators to establish if site records can be obtained. Regulatory records might include information on past, pending or outstanding prosecutions or environmental violations that may impact the condition of the site/facility.

3.3.11 Waste Management Records

Review the records of waste generation, this includes both hazardous and non-hazardous material generation and methods to dispose of should be recorded.

3.3.12 Operations or Company Records

Review the operations and company records. The records/documents that would provide the environmental condition of the site. Useful documents include, but are not limited to:

- permit records;
- landowner/lease agreements;
- spill reporting records;
- asbestos surveys;
- waste handling records;
- site utility drawings;
- emergency response or contingency plans, including spill reporting plans;
- inventories of chemicals and their usage (e.g., Workplace Hazardous Management Systems (WHMIS), Material Safety Data Sheet (MSDS);
- environmental monitoring (air and water) data;
- environmental audit reports; and liability assessments.

3.4 Site Reconnaissance

3.4.1 Interior Inspections and Observations

After completion of the records review, site visits shall be conducted so that the site visit can be targeted based on the records review. Describe the methods used to make the observations, general limitations (physical obstructions like adjacent buildings, bodies of

water, and paved areas) and limiting conditions (wet areas, denied access, inaccessible areas, and safety considerations) shall be documented. Any disturbed areas revealed during the review of records must be visually inspected for evidence of contamination.

Observations shall include current uses or evidence of past uses, treatment, storage, disposal, and generation of hazardous materials, landfilling, or wastewater storage in impoundments. The current or past uses of the adjoining and surrounding site shall also be considered. The observation shall also include hazardous materials, including wastes and unidentified substances relative quantities of material, types of containers, and describe storage conditions. The approximate age, size, and, where possible, contents of storage tanks and containers (e.g., drums, totes, and intermediate bulk containers (IBCs)) shall be identified. Abandoned, former, and current aboveground and underground storage tanks, vent pipes, fill pipes, access ways, secondary containment, and other infrastructure associated with tank installations shall be identified and described. Odors, discoloration, and their possible sources shall be described. The sources of potable water and sewage disposal for the site shall be visually inspected and described. Potential receptors, distance to receptors, and impact to receptors shall be identified and described.

The site's structures shall be inspected for indicators of contamination, such as heavy stains, vapors from volatile chemicals, or large cracks on the floor or sump where process chemicals are used or stored. Buildings on industrial sites shall be inspected for spill containment and separation from the soil (e.g., concrete floors with grated sewers). Within reason, all accessible rooms within the structures shall be inspected.

3.4.2 Heating and Cooling Systems

Heating and cooling systems shall be identified and described in terms of the energy (fuel source) and methods used to release or dispose of waste products (e.g., combustion gases and ash).

3.4.3 Surface Staining

Stains on the ground shall be identified and described. An estimation of the extent of the staining shall be noted and the likely spill source shall be described. The presence of cracks, the proximity of floor drains and catch basins, or any other opportunities for CoPCs to migrate away from a source shall be described. Stained materials (e.g., soil and asphalt) shall be identified and described.

3.4.4 Floor Drains and Sumps

The location and condition of current and former floor drains and sumps shall be noted. The frequency of sediment removal from drains and sumps and the location of discharge shall also be described where known.

3.4.5 Equipment

The presence and the condition of equipment, such as hydraulic hoses, elevators, or in-ground vehicle hoists, shall be identified and described.

3.4.6 Exterior Observations

The exterior structures on the site shall be observed for the indication of contamination. This inspection shall include an inspection of the exterior surfaces of structures (e.g., the base of wall surfaces, the roof in some cases) and of the grounds in most cases.

3.5 Observations of Surrounding Land and Adjoining Properties

3.5.1 Wells/Production Well Heads

Visible boreholes (either in use or abandoned), wells and test pits shall be identified and described on site and off site. Evidence of drilling waste or soil cuttings shall be identified.

3.5.2 Pits/Flare Pits

Pits/Flare pits on the site and on adjoining properties shall be identified and described, particularly if they have been used in connection with waste disposal or waste treatment. It must also be noted if these structures have been constructed with geo-membranes or other containment techniques. This information may be corroborated from/with site file review information and/or interviews.

3.5.3 Fill

Areas that appear to have been filled or graded by non-natural causes (or filled with material of unknown origin) shall be identified and described and supported with analytical results confirming that any soil imported to the property meets applicable criteria and/or guidelines.

3.5.4 Wastewater

Wastewater or other liquid discharge shall be identified and described.

3.5.5 Watercourses, Ditches, Ponds or Standing Water

Surface water features (e.g., ditches, streams, rivers, ponds, and lakes) on and off site shall be identified and described (i.e., whether they are permanent or intermittent). Water bodies or low areas and depressions in the ground surface shall be noted, often using high water marks.

3.5.6 Special Attention Items

CoPCs which should be identified include, but are not limited to:

- Polychlorinated biphenyls (PCBs);
- Naturally occurring radioactive materials (NORMs);

- Asbestos-containing materials (ACMs);
- Lead (Pb);
- Mercury (Hg);
- BTEX, F1-F4
- Ozone-depleting materials; and
- Urea foam formaldehyde insulation (UFFI).

The other conditions/substances (e.g., radon, mould, noise, electric and magnetic fields, and vibration) must be noted because of public concern and specific environmental legislation.

3.6 Interviews

Interviews must be conducted to substantiate the information collected during the site visit and the records review. The interviewee/representative must be knowledgeable about the nature and history of the site/facility. These interviews must include, at a minimum, but are not limited to: the current lessee, occupant, and a facility operator who is familiar with the site. Additional interview participants may be included to gain additional information regarding current and past activities and the events that could impact the site's conditions. A general questionnaire shall be developed based on the industry's type to gather factual information.

The questions to be asked in interviews pertain to current and past activities and events that may affect the site's environmental conditions. Questions may be asked in person, by telephone, or in writing, at the discretion of the professional. However, face-to-face communication is the preferred method, as this reduces the possibility of misinterpretation. If the interview is incomplete or no response is provided, a reasonable effort shall be made to obtain a response with a follow-up telephone call or written request. Incomplete or nil answers shall be noted in the Phase 1 ESA report.

3.7 Reporting

The Phase 1 ESA report shall consist of a written document with a summary of the objectives, purpose, approach, findings, and conclusions and recommendations.

The report shall include an evaluation of the findings obtained in the records review, site visit, and interviews. The information shall be presented in a manner designed to help the reader (e.g., client, reviewer) understand the significance of the findings by:

- Identifying all APECs on the site that are associated with current and historical activities at the site and on neighboring properties. The CoPCs associated with each APEC must also be identified;
- Classifying areas of actual or potential contamination (APECs) and the basis for all findings, including nil findings;
- Identifying potential receptors at risk both on and off the site; and
- Recommending whether a Phase 2 ESA is necessary or not.

The report shall include detailed documentation, evaluation of the data so that it is a standalone document. The report shall document:

- rationale explaining any deviations from the main components of a Phase 1 ESA,
- any enhancements, as agreed upon in the scope of work, and
- all limitations encountered in the Phase 1 ESA, including those tasks that were not performed due to limiting conditions.
- The preliminary conceptual site model (see Section 3.8).

3.8 Conceptual Site Model

A preliminary conceptual site model (CSM) should be prepared as part of the Phase I ESA. This will include a summary of the anticipated sources, pathways and receptors (considering CoPC) and will enable a preliminary assessment of the level of risk posed by the site condition. A significant risk will only be presented at a site if a potential source (such as a chemical pollutant or physical source like noise), potential receptor and a potential pathway linking the source to the receptor are all present.

A well-developed CSM provides decision-makers with an effective tool to interpret existing data and identifying areas where additional data is required. As site information becomes available, the CSM gets refined. Updates can be made to: the type of contamination, the extent of the contamination (vertically and horizontally), transport mechanisms, possible subsurface migration pathways and potential receptors.

The CSM must show sufficient details and often the CSM is presented pictorially to help the reader grasp the concepts of the source/pathway/receptor relationships. All CSM drawings presented in the report should be drawn to scale or have the vertical and horizontal scales specified separately if appropriate.

The elements of the CSM

- A historical overview of land uses (e.g., commercial, industrial);
- Site description, its physical setting for developing hypotheses about the release of contamination and its extent at the site;
- Sources of contamination at the site, CoPC (s), and the media (e.g., soil, groundwater, surface water, soil vapour, indoor air) that may be affected;
- the distribution of chemicals within each medium, including information on the concentration;
- Migration of CoPCs from the sources, the media and pathways through which migration and exposure of potential human or environmental receptors could occur, and information needed to interpret CoPC migration, such as soil properties, geology, hydrogeology, hydrology, and possible preferential pathways;
- Information on climate and meteorological conditions that may influence contamination distribution and migration;
- Information pertinent to chemicals handled at the site and possible soil vapor
- intrusion into buildings (e.g., size, age, foundation depth and type, presence of

foundation cracks, entry points for utilities), building heating, ventilation and air conditioning (HVAC) design and operation, and subsurface utilities; and information on human and ecological receptors and land usage;

3.9 List of Professionals

A list of all professionals who oversaw or performed components of the Phase 1 ESA, including role undertaken, qualifications, organization, and contact information shall be provided.

3.10 Signatures and Qualifications

The original signature and stamp for the professional responsible for the Phase 1 ESA, confirming the findings and conclusions contained therein, shall be provided.

3.11 References and Supporting Documentation

The documentation, including references and key exhibits, to support the findings and conclusions contained in the report, shall be provided. Applicable legislation and published guidelines used as a basis for findings or conclusions in a Phase 1 ESA shall be referenced in the ESA report.

4. PHASE II ESA – CONFIRMATORY AND DETAILED INVESTIGATION

4.1 Overview

The second stage of assessment is an intrusive phase of the investigation referred to as 'Phase II ESA' is designed to assess whether contamination is present or absent and, to delineate contamination, mitigate risk and plan remediation. This investigation aims to obtain quantitative analytical data concerning the nature and extent of contaminants of potential concern (CoPC) and to confirm whether or not CoPC are present.

An empirical and science-based procedure is used to characterize site/facility conditions, whether there is the presence or the likely presence of substances including, but not limited to, hazardous substances, pollutants, contaminants, petroleum and petroleum products, and controlled substances and constituents. During this investigation, data collected are compared to appropriate soil, surface water, and groundwater remediation guidelines or standards. Exceedance of soil and groundwater guidelines is a trigger for focused remediation, risk management options, or further site investigation, risk characterization of CoPCs.

It is important to understand any physical constraints to conducting a Phase II assessment before planning the scope of the investigation.

4.2 Scope

4.2.1 Main Components

The scope shall outline the methods, parameters, tasks that achieve the Phase II ESA objectives. It must provide the rationale for selecting testing parameters, the number of sampling locations, the identification of selected methods, and appropriate QA/QC measures. The main components of a Phase II ESA include:

- Reviewing available reports; Phase 1 ESA and previous Phase II ESAs, if any, and other background information, any previous site remediation reports (information may require validation, and any limitations or inaccuracies in the previous information must be identified), and any other relevant information not included in previous ESAs or remediation reports;
- Ground clearance for utilities for drilling locations, development of sampling plans;
- Field investigation, soil and water sampling (see Annex 2 of this Appendix L), must be conducted during the Phase II ESA in all areas where the Phase 1 ESA identified APECs or has not been able to rule out CoPCs or areas of potential environmental concern;
- Interpreting and evaluating the data gathered during investigations;
- Summarizing conclusions based on data interpretation and comparing it with available standards of National, RC standards/MEWA; and
- Developing and improving the preliminary conceptual site model (CSM) constructed during the Phase I ESA.

4.2.2 Review of Existing Information

Review previous ESAs (Phase I and Phase II ESAs), any previous site remediation reports (any limitations or inaccuracies in the previous information must be identified), and any other relevant information not included in previous ESAs or remediation reports. It will help determine sampling locations if the site's impact still exists, or likely to have the residual impact or if the site has been adequately cleared and meet the current guidelines.

4.2.3 Enhancement of the Conceptual Site Model

The Phase II ESA investigation is used to collect information that will refine the CSM and site characterization, and will define the extent and concentration of any CoPCs. The proximity to receptors (e.g., surface water, Domestic Use Aquifers (DUAs), pathways, and setbacks need to be considered in this investigation. It also provides site soil texture, groundwater, and geology, barriers for excluding receptors pathways. This information is mandatory for the exclusion of DUA’s or any receptors. The more detailed the Phase II ESA, the more likely the CSM can be modified based on site-specific information.

4.3 Sampling Rationale and Design

4.3.1 Preamble

Sampling designs must be tailored to accommodate specific objectives of the Phase II ESA and the site conditions to be investigated. Clear rationale must be provided in all investigations for the medium being sampled and for each sample location. A sufficient number of sampling points must be established to delineate each APEC. Sampling must extend beyond the APEC in order to achieve vertical and horizontal CoPC delineation.

4.3.2 Ground Clearance Work

A key component of the investigation is the selection of right borehole locations. The selection of borehole locations should be made by reviewing background information/reports, phase I/Phase II ESA's, remediation, or other reports. Before the selection of the sampling locations, ground clearance must be performed to reduce the risk of encountering underground utilities. The ground clearance should be performed by certified personal for underground/buried utility detectors, e.g. power/gas/waterlines, sewerage lines and telephone lines.

Precautions must be also taken into account for operational restrictions such as keeping emergency routes clear or other possible traffic activities and for the locations of plant obstructions such as buildings/tanks.

4.3.3 Investigation Methodology, Sampling and Field Analysis

The field sampling methodologies, including any field testing/screening and sampling should be appropriate to the CoPC under investigation. The sampling and field analysis of soil, surface water and groundwater must be carried out using proper field methods/ analytical procedures by an appropriately qualified professional (refer Appendix E of currently enforced RCER, Volume II for Groundwater sampling and other procedures; National, US EPA or other internationally acceptable guidelines for soil sampling). In addition, it is critical that all field-testing instruments are calibrated as per the manufacturer’s guidance and properly decontaminated between sampling locations.

The media to be sampled, the locations, and a number of samples to be obtained and the parameters analyzed must be identified. The chemical analyses will depend upon site characteristics and must be sufficient to identify APECs and define the distribution of CoPCs (i.e., delineate areas of impact and concentrations).

Sample collection, preservation, and other handling practices must be described, and appropriate techniques must be used to minimize any changes to sample composition or concentration before analysis. Sampling and analysis must be consistent with the protocols of the accredited laboratory to be used for the investigation testing work.

A completed chain-of-custody document should accompany all samples submitted to a laboratory for analysis. The chain-of-custody document should detail the laboratory testing

that is required on each sample submitted. A copy of the chain-of-custody document should be dispatched with the samples. The master chain-of-custody document should be kept by the professional who collected the samples.

4.3.4 Laboratory Analysis

Laboratories to be used for chemical analysis of soil, groundwater samples must be accredited in accordance with *the International Standard ISO/IEC 17025 – General Requirements for the Competence of Testing and Calibration Laboratories* (2017, as amended) *General Requirements for Accreditation Bodies Accrediting Conformity Assessment ISO/IEC 17011* (2017, as amended).

4.4 Quality Assurance/Quality Control

Effective QA/QC principles and practices must be used throughout the major stages of the ESA and must address all aspects of the project, including project management responsibilities and resources, data quality objectives, sampling and analysis plans, data collection protocols, data quality control plans, data assessment procedures and requirements, and project quality output. A QA/QC program should be developed on a site-specific basis.

A quality sampling program benefits from the use of field-duplicate samples. A field-duplicate sample is a second sample taken from a sample location and submitted along with the initial sample. Field duplicates are collected and submitted to assess the potential for laboratory data inconsistency.

4.5 Data Validation and Interpretation

All findings, including results from the soil and groundwater investigations performed, shall be included in the report. The professional must interpret the data clearly and logically. Data must be compared to National, RC regulations, MEWA, and other applicable KSA regulations. Any CoPC concentrations exceeding National/RCER Guidelines must be highlighted and discussed.

Data shall be presented both in tabular format and on a detailed site plan. Sampling locations where CoPCs exceed applicable guidelines shall be identified in red on the site plan. Cross-sectional views depicting all relevant conceptual site model data, including lateral and vertical delineation points and groundwater monitoring wells, shall be presented. The report must include a discussion on the QA/QC procedures, and identify and discuss any anomalies in the data.

Hydrogeological reporting must also include a brief discussion and interpretation of the hydrogeological site setting, including a description of local aquifers, local groundwater flow direction (vertical and horizontal) and groundwater quality. The potential for CoPC off-site migration through any pathway must be assessed and discussed.

In some cases, sampling or laboratory analyses of samples may indicate other impacts from potential off-site CoPCs originating from a site other than the one under investigation (particularly in groundwater). If this is the case, the extent of possible off-site impacts must be identified and described in the Phase II ESA report(s), and the report must identify how the potential off-site source is shown to be distinct from sources on site.

4.6 Conclusions

The report shall present conclusions in a manner designed to help the client understand the significance of the findings and methods used to reduce uncertainty in not detecting contamination when it may have been present and, where contamination is present, follow-up actions.

After a Phase II ESA investigation, the professional must be able to conclude, at a minimum, that either:

- The ESA has provided sufficient information to support that there is no reasonable basis to suspect a substance release has occurred at the property that has caused, is causing, or may cause an adverse effect; or
- The ESA has confirmed a substance release has occurred at the site, and further assessment, remedial measures, or risk management on-site and off-site are required.

5. PHASE III ESA – REMEDIATION

5.1 Objectives

This phase of the assessment is designed to delineate and remediate the contamination associated with the site/facility to meet the most stringent applicable criteria/standard. Phase III assessment involves excavating test pits and borehole drilling to determine the extent of contamination and remediate the site contamination. The extent of the impact/contamination, characterization, and risk assessment may also be carried out during Phase II scope of work. If the required data has been obtained during phase II, the process may move directly to a remedial action plan. The remediation work involves in-situ, or ex-situ methods, confirmatory sampling and monitoring to meet the RC Facility Closure and Decommissioning Regulations/Ministry of Environment requirements.

The objectives of the Phase III investigation are:

- to target and delineate the boundaries, the extent of identified contamination vertically and horizontally through field investigation where the Phase II confirmed APECs;
- to confirm soil properties and or aquifer properties if required in order to be able to design the remediation program.
- Set and agree environmental quality remediation criteria;

- Determine the extent of contamination and costs associated with the remediation;

- to develop a remedial action plan and input to specifications and tender documents;
- to remediate (remove, neutralize or reduce concentrations of impacts to an acceptable land-use endpoint to prevent or minimize current or future adverse effects) the site with the applicable standards in satisfactory of the RC/ MEWA;
- to conduct confirmatory sampling to show the site has been remediated, and
- Prepare the remediation report.

5.2 Scope and Methodology

The scope should detail the methods, and tasks that are required to achieve the Phase III ESA objectives. It must provide the rationale for selecting testing parameters, the number of sampling locations along with the identification of selected methods, and appropriate QA/QC measures.

The end use of the site is an important consideration when establishing the scope of the Phase III ESA.

It is the intended future site use (end use), that governs the decision on the level of remediation that should be performed at a site. Identifying the type of site use will help assess the contaminants in the soil, and is essential for planning practical remediation programs. The end use of the site and the nature of any receptors found adjacent to the site should be taken into account when setting remediation cleanup criteria or target levels.

Using empirical and science-based procedures the Phase III ESA will delineate the site horizontally and vertically and confirm the occurrences of hazardous materials (contaminants) which require remediation.

5.3 Application of Remediation Criteria at Contaminated Sites

5.3.1 Three Approaches

Generally, there are three basic approaches that are used for the development of Site-Specific Remediation:

- Tier 1 Direct adoption of remediation criteria (Criteria-based Approach)
- Tier 2 Adoption of remediation criteria, with limited modifications; and
- Tier 3 The use of risk assessment (Risk-based Approach).

The criteria-based approach is designed to require fewer resources while providing a scientifically defensible basis for protection sufficiently flexible to account for certain site-specific factors. This approach is believed to provide an effective alternative to detailed risk assessment methods. The risk-based approach can be more complex and costly and is generally utilized when a criteria-based approach is not suitable for a site (e.g., large, complex industrial site). The utilization of any of the three approaches is subject to the approval of the Royal Commission.

5.3.2 Tier 1 - Criteria-Based Approach

In this approach, generic published screening criteria are adopted as the remediation objectives. In general, this method is most applicable, where site conditions, receptors, and exposure pathways are similar to those assumed in the development of the criteria. Other factors that may bear weight on the decision to adopt generic screening criteria directly include cost, time, simplicity, and technical considerations.

5.3.3 Tier 2 - Modified-Criteria Approach

In certain circumstances, remediation criteria may be modified within specified limits and adopted for use as the site's remediation objective. The acceptability of a Tier 2 approach for evaluating off-site impacts may be subject to review and the acceptance of other affected parties. In general, the method may be utilized in situations where site conditions, land use, receptors, or exposure pathways differ slightly from those assumed in the development of the "generic" assessment criteria. Specific guidance on situations where modifications are allowed to the criteria and details concerning the implementation of the approach can be negotiated with the Royal Commission.

5.3.4 Tier 3 - Risk-Based Approach

In the Risk-Based Approach, risk assessment procedures may be required in the development of Site-Specific Remediation Objectives. Site-specific objectives are developed from the results of the risk assessment to establish a concentration corresponding to an acceptable risk to humans and the environment or risk to receptors through pathways, e.g., pathways of exposure, target chemicals, receptors or other site characteristics. The Site-Specific Remediation Objectives for soil and/or groundwater should be developed using risk assessment when:

- There is a high degree of uncertainty about contaminant concentrations;
- There are unique site characteristics; a risk assessment is needed to provide a framework for site investigation to set remediation priorities;
- The site conditions, receptors, and exposure pathways differ significantly from those assumed in the derivation of generic screening criteria.

5.4 Preparation of a Remedial Action Plan (RAP)

At this point, the responsible party and qualified person will review the site assessment results and determine whether to remediate the site to the generic screening criteria or complete further work to develop site-specific remedial criteria using risk assessment approaches (Tier 2 or Tier 3).

Once the remediation criteria have been determined for the site, the qualified person must prepare a Remedial Action Plan (RAP) detailing the methodology for achieving these criteria as well as the proposed remedial action. The RAP must:

- Include contact information, including key personnel, consultants, contractors, telephone, email contact, and physical addresses;
- Summarize all data on contaminants identified during the site investigation(s);
- Identify the proposed clean up criteria and method(s) by which they have been derived;
- Identify, quantify and characterize the materials to be treated/removed;
- Summarize remedial options evaluated and the method used to select the preferred remedial strategy;
- Describe the selected clean up method and its technical feasibility; an implementation plan, including a schedule;
- Discuss control measures to minimize fugitive air emissions, surface water control, worker health, and safety;
- Identify the fate of residual contaminants; and identify remedial verification and long-term monitoring plans.

5.5 Remedial Action Plan Implementation

The responsible party and the qualified person shall proceed with the approved RAP from the Royal Commission and submit monitoring reports to RC. The responsible party must advise the Royal Commission if activities deviate from the approved RAP. The Royal Commission will assess the significance of any deviations and respond accordingly. In situations where predictions included in the RAP fail to be achieved, the responsible party may be required to re-evaluate the remediation approach and enhance the RAP.

5.6 Site Closure – Remediation Certificate

When the responsible party and qualified person are satisfied that all the RAP requirements have been met, a closure report will be forwarded to the Royal Commission. Upon receipt and acceptance of the closure report, the Royal Commission will conclude the management process by issuing a Remediation Certificate advising that no further remedial action is required.

5.7 Inspections

To ensure that companies meet the Royal Commission's remediation expectations and guidelines, RC will conduct regular inspections and audits during the site remediation and site closure process. RC may audit sites undergoing remediation at a minimum of once per year, either randomly or based on risk. The Royal Commission may perform two types of audits: desktop audits and field audits. If RC finds a company is providing false or misleading information or is not meeting remediation standards, RC may take enforcement action to bring the company back into compliance. Royal Commission's staff will audit/inspect the following:

- Remediation techniques and methods;
- Soil and groundwater quality analytical data;
- Laboratory testing methods;
- Site topography and landscape;
- Evidence of remaining infrastructure
- Visual and olfactory indicators of contamination
- Vegetation quality and quantity

RC may also inspect the site for contamination below the land surface (subsurface contamination). This work might include collecting soil samples for lab analysis or conducting electromagnetic surveys.

6. PHASE IV ESA – RECLAMATION

6.1 Overview

This phase was developed to guide a successful reclamation in bringing back the site to the original condition or an intended state acceptable to the Royal Commission. This guide describes the most common process by which a company can demonstrate that the contamination associated with the RC regulated site/facility has been appropriately remediated.

A company must start to prepare for reclamation at the very beginning of the project's life cycle. The company must understand the Royal Commission's reclamation requirements and the potential challenges of reclaiming its site, and it should continually review its reclamation plans throughout the life cycle of the project right up until the site has been suspended and abandoned.

Decommissioning involves removing as much infrastructure as possible from the site facilities, surface pipelines, wells, and any infrastructure that poses a risk to human and ecological health. The only infrastructure that is considered to be an improvement can be left on the land (e.g., an access road left in place for the next owner use). The company must receive written permission from the Royal Commission to leave infrastructure on the land.

6.2 Scope

The scope shall outline the methods, parameters, tasks that achieve the objectives of reclamation to prevent, contain, control, remove or remedy any degradation or deterioration of the land, conserve or replace soil to bring back the site to its original or intended state for re-use that is acceptable to the Royal Commission.

6.3 Reclamation

Reclamation is the process of making sure that a site surface and subsurface are restored to a suitable condition following the closure and decommissioning of a facility. Reclamation is the restoration of land to its original condition by re-grading the contours and the removal of all waste materials following decommissioning. Occasionally the RC may stipulate that replanting is required after the land has been remediated from the impacts.

Reclamation can take a considerable amount of time depending on the land type. The objectives of reclamation are as follows:

- to undo any land disturbances caused by the construction, operation and/or decommissioning of the facility;
- to salvage, store, and replace soil;
- to restore drainage;
- to revegetate (localized vegetation) if required by the Royal Commission, and

6.4 Certification

When a site has been reclaimed, an appropriately qualified professional should then apply to the RC (on behalf of the decommissioned Facility) for a reclamation certificate. A facility/company can apply for a reclamation certificate through the Royal Commission's Environmental Department after the following criteria have been met:

- All the requirements of the remedial action plan have been implemented,
- The site closure report has been accepted by the RC,
- All the reclamation work agreed with the RC has been completed,
- The site meets all reclamation criteria agreed with the RC (based on the end use of the site.

- A site reclamation report has been prepared by a suitably qualified professional, submitted to the RC and approved by the RC, site reclamation evidence through before and after photographs and associated documentation.

The company remains responsible for surface and subsurface issues related to remediation and reclamation, such as topography, vegetation, soil texture, and drainage, contamination and infrastructure for a period of **5 years** after the issue of the reclamation certificate.

6.5 Reclamation Inspection and Audits

Royal Commission personnel may visit the site to conduct a site inspection prior to issuing a reclamation certificate.

To ensure that companies meet the Royal Commission's reclamation expectations and guidelines, the RC may conduct regular inspections and audits during the reclamation works. If the RC finds a company is providing false or misleading information or is not meeting reclamation standards, it may take enforcement action to bring the company back into compliance.

6.6 Certificate Cancellation

Reclamation certificates may be canceled at any time up to 5 years after their issuance if it is determined that a company has:

- submitted an incomplete or inaccurate reclamation certificate application or one that contained inconsistent information;
- failed to assess the site for contamination, where required; or
- failed to comply with the remediation guidelines or reclamation criteria without adequate justification within the reclamation certificate application.

7. REFERENCES

1. AENV (Alberta Environment), 2001. Risk Management Guidelines for Petroleum Storage Tank Sites. Science and Standards Division, Pub No. T/570, October 2001.
2. AEP (Alberta Environmental Protection), 1994. Alberta Tier I Criteria for Contaminated Soil Assessment and Remediation, March 1994. Pub. No. T/475.
3. Alberta Environment and Parks (AEP), 2016. Alberta Tier 1 Soil and Groundwater Remediation Guidelines, Land Policy Branch, Policy and Planning Division. ISBN: 978-1-4601-2695-0 (on-line edition)
4. Alberta Environment and Parks (AEP). 2019. Alberta Tier 2 Soil and Groundwater Remediation Guidelines. Land Policy Branch, Policy and Planning Division. ISBN: (On-line Edition) 978-1-4601-2693-6.
5. CCME (Canadian Council of Ministers of the Environment). 2006. A Protocol for the Derivation of Environmental and Human Health Soil Quality Guidelines. PN 1332. Canadian Council of Ministers of the Environment, Winnipeg, Manitoba.
6. EPA (USA) - Title 40: Part 312—Innocent Landowners, Standards for Conducting All Appropriate Inquiries - Protection of Environment.
7. ESRD (Environment and Sustainable Resource Development), 2012. Assessing Drilling Waste Disposal Areas: Compliance Options for Reclamation Certification. Air, Land and Waste Policy Branch, Policy Division.
8. Morris, Michael W.; Comeau, Aimee; Ammons, John T.; Blair, Ryan; Lu, Changsheng; and Roberts, Caroline (2010) "A Comparison of Three Soil Characterization Methods on a Soil Formed in Sandy Glacial Outwash, "Proceedings of the Annual International Conference on Soils, Sediments, Water and Energy: Vol. 15, Article 28. Available at: https://scholarworks.umass.edu/soils proceedings/vol15/iss1/2
9. The American Society for Testing and Materials (ASTM E1527-13): Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process, ASTM International, West Conshohocken, PA, 2013.
10. USEPA (U.S. Environmental Protection Agency), 2002. Guidance for Choosing a Sampling Design for Environmental Data Collection (QA/G-58), EPA/240/R-02/005, December 2002.
11. USEPA (U.S. Environmental Protection Agency), 2020. US. Soil Sampling, Environmental Protection Agency Laboratory Services and Applied Science Division Athens, Georgia. LSASDPROC-300-R4 2020.

Annex 1
List of Records Search

Annex 1: List of Records/documents review required for Environmental Site Assessment (ESA).

Environmental Searches	Area Covered		
	Site/ Property	Adjacent Properties	Within 300 meters radius
General			
Land/Property Record	x		
Other Environmental Assessment reports or relevant information	x		
Site plans, other relevant information	x		
land use plans (wherever available)	x	x	
Source Information			
Records concerning environmental incidents, orders, offences, spills, discharges of contaminants or inspections	x		
Waste management records	x	x	x
Any reports submitted to relevant regulatory agency	x		
Petroleum Tanks information registration, retail fuel storage tank information	x		
Landfill information	x	x	x
Remediation certificates or other certificates	x	x	
Physical Settings Review			
Aerial Photographs (wherever available)			
Soil, Hydrogeological, Geological and Geotechnical Reports	x	x	x
Well records	x	x	x
Operation records			
Regulatory permits or records	x		
Material safety data sheets	x		
Underground utility drawings	x		
Inventories of chemical uses and chemical storage areas	x		
Inventory of aboveground and underground storage tanks	x		
Environmental monitoring data including soil or groundwater monitoring reports, as required	x		
Waste management records	x		
Process, production and maintenance documents related to APECs	x		
Any records of spills or discharges	x		
Emergency response or contingency plans	x		
Environmental inspection reports	x		

Annex 2
Soil Characterization and Sampling Procedure

SOIL CHARACTERIZATION AND SAMPLING PROCEDURES

1. Goal

To provide an effective system for characterization of impacted soil on a site within a facility as a result of any leakages, spills, accidental discharges, etc.

2. Purpose

This document describes general and specific procedures, methods, and considerations used and observed for collecting soil samples, field screening or laboratory analysis.

3. Scope

Develop procedures for field personnel to collect and handle soil samples for soil characterization for remediation purposes. Specialized sampling procedures to obtain composite soil samples and confirmatory soil samples for remediation of a site.

4. Soil Characterization

Soil characterization is an integral part of determining the nature and extent of contamination in soils. The characterization of the physical properties of soil can be critical in understanding how a contaminant can travel in three-dimensional space. The chemical testing of soil along with using field screening techniques and visual/olfactory observations helps to evaluate the lateral and vertical distribution of soil contamination.

5. Types of Soil Sample

Investigation samples are collected during a live ground investigation. Collection techniques will vary according to the drilling or excavation method being used. Care should be taken to understand from where the sample originates when a sample is collected ex-situ as opposed to in-situ.

Confirmatory soil samples are samples collected after remediation work is completed. Confirmatory samples are collected from the excavation base (bottom), the sidewalls of an excavation pit from which the contaminated soil has been removed. The purpose of this sampling to verify whether or not cleanup levels have been achieved.

Soil confirmation sampling is one of the critical elements of the remediation work, and it is a way to evaluate the effectiveness of cleanups and make decisions about the issuance of certificates of completion and other liability assurances.

Composite samples may be used in certain circumstances where an overall sense of soil quality is required and testing budgets may be more limited. As an example, composite sampling can be used to test the overall quality of a soil stockpile.

6. Soil Sampling Procedure

6.1 General Rules

Soil sampling requires technical skills and must be performed by certified and experienced personnel. The USEPA soil sampling manual (2020) provides a best practice methodology for conducting soil sampling. The manual includes measures required to avoid cross-contamination during soil sampling which is critical if the results of the analytical testing are to be relied upon for making remediation decisions.

6.2 Record Keeping

The following information should be recorded on containers which will be used to store soil samples, and on the chain of custody paperwork which will accompany the samples to the laboratory:

- Facility type, name, address, and project name/number;
- Date and time of sampling;
- Site area and demarcation of sampling locations (GPS) or point mark on a grid map;
- Testing parameters, if required by the laboratory.

6.3 Soil Sample Collection

Step I:

Follow Best Practice guidelines for soil sampling and laboratory guidance regarding the use of proper supplies for soil sampling. Follow best practice for wearing the required PPE to protect field staff. Ensure that all field-testing equipment, such as the photoionization detector (PID) is calibrated as per the manufacturer specification and maintained in accordance with the equipment operation manual.

Step II:

When drilling, collect soil samples directly from the auger flights with a vertical depth interval as per the investigation method statement. Before collecting the soil sample from an auger, scrape off the outer layer of soil to avoid cross-contamination. Drill cuttings should be classified and logged according to the Unified Soil Classification System and visually examined for hydrocarbon staining and odour.

When trial pitting, soil samples can be taken with a clean air-dry trowel from the sides or base of the excavation taking care to avoid smeared surfaces. When the trial pit is too deep to enter (generally considered greater than 0.8m), soil samples can be taken from the bucket of the excavator when the bucket is at rest on the surface at a safe distance from the pit.

As is the case for samples taken during drilling, the soil should be logged according to best practice on an excavation record sheet (log sheet) following a visual examination.

Step III:
Vapour headspace testing for volatile compounds should be conducted in accordance with the investigation methodology.

Screen a portion of the soil sample to quantify the concentration of headspace hydrocarbon vapour (HHV), using a PID. This technique involves filling a zip-lock type plastic bag one third full with soil, sealing the bag and crumbling the soil in the sealed bag to allow volatile hydrocarbon vapour to accumulate in the headspace above the soil sample, for approximately 10 minutes at room temperature. The Probe tube of the PID is then inserted into the Ziploc bag through as small an entry point as possible to prevent the escape of hydrocarbon vapors during the test. The PID provides a qualitative estimation of the petroleum hydrocarbon vapour (excluding methane) released by the sample in parts per million (ppm). The test result is dependent on temperature, soil sample type, as well as the presence of hydrocarbons in the sample.

The results of the volatile compounds headspace test should be recorded on the field log sheet. The PID should be regularly calibrated to maintain the accuracy of the instrument. In order to avoid cross-contamination, clean the probe every time before using it in another soil screening test.

Step IV:
Label sample jars before filling them up for laboratory analyses. Fill soil containers and jars as per the laboratory requirements according to the testing required. For organic tests, soil should be packed tightly into sampling containers to avoid air space/voids.

Note: samples used for headspace testing should not subsequently be placed into jars for laboratory analysis since samples on which headspace tests have been conducted will have had some of the volatile compound content driven off during the preparation for the headspace test.

Step V:
Store samples in insulated coolers containing ice to keep the temperature below 10°C. Follow Best Practices to Lift/Carry the sampling box/containers. Dispatch the samples to the laboratory for soil sampling within the time frame prescribed. Ensure that a copy of the chain of custody form accompanies the samples. The chain of custody form will list all samples contained in the batch along with the testing schedule.

7. Quality Assurance/Quality Control

The purpose of Quality Assurance/Quality Control (QA/QC) procedures is to ensure that data used to evaluate site conditions are reliable and accurate. The QA/QC measures which should be implemented during sample collection, storage, and transportation to the laboratory, including the following:

- Use new nitrile gloves for collection of samples;

- Use clean, laboratory supplied containers;
- Store soil samples immediately after collection in ice containing insulated coolers to keep the sample temperature below 10 °C;
- Clean all equipment (including the PID probe) before use and between sampling locations in order to prevent cross-contamination;
- Operate the PID according to the manufacturer's instructions in the field, and regularly calibrate it as per the manufacturer's specification;
- Collect QA/QC soil samples (duplicate) for analyses to ensure the integrity of sampling and analytical protocols; and
- Complete the chain-of-custody form in the field. The information must include identification, location, sampling date, and specific analyses to minimize documentation errors. A copy of the chain-of-custody form must be delivered to the laboratory together with the samples within the required time frame. The master chain of custody form should be kept with the field operative.

APPENDIX M
DUST MITIGATION PLAN

DUST MITIGATION PLAN

A general dust mitigation plan should consist of (this is just an example):

1. Introduction and purpose/objective/scope of the plan
2. Responsibilities (who will implement plan, chain of reporting, training to all)
3. Site description and activities
4. Describe specific locations where dust will be generated on site and how it's generated.
   - Estimated dust & supporting calculations
   - Process/Equipment
   - Storage
   - Loading/Unloading
   - Vehicle Movement
   - Other
5. The specific controls to be implemented at the site, how you will reduce and control dust emissions and ensure these controls are working
6. BAT (if applicable)
7. Monitoring and corrective actions.
8. Reporting

Annexure A: Forms/Records used.

Annexure B: Location Map, including identification of specific dust generating areas/locations. Include any monitoring locations also if applicable.

APPENDIX N
STACK/RATA TEST PLAN.

Cover Page

Stack/RATA Test Plan
Name of Consultant
Address of Consultant

Name of Facility
Address of Facility

Facility EPO Number
Reference Number of Stack/RATA Test Plan
Proposed Dates of Monitoring

Prepared By	Reviewed By	Approved By	Dates	Revision No.

Section 1
Contact Details of Facility Representative

	1st Contact	2nd Contact
Name		
Designation		
Contact Number		
Email		

Pre-Site Visit
(include details of any pre-site visit conducted)

Name	Designation	Date of Visit
A. N Other		
A. N Other		

Add Delete as Necessary

Stack Emission Monitoring Engineers/Technicians who will be Performing the Work

Name	Designation	QSTI Groups	QSTI Qualification Number
A. N Other	Team Leader	I, II, II, IV, V	xxxxxx
A. N Other	Technician	N/A	N/A
A. N Other	Technician	N/A	N/A

Add Delete as Necessary

Brief Introduction of 3rd Party Service Provider
(Provide a brief description of your company here)
Brief Description of Facility
(Provide a brief overview of the facility, location, process description, etc)

Section 2
Total number of Emission Points to be Monitored

Type of Test: Annual or Performance Test?
Provide a full list of all monitoring points.

No.	Stack Identification Number	Process Unit Name & ID	Parameters
1	XXX/XXX	e.g. Boiler, SRU, GT, Incinerator etc	e.g. SO2, NOx, O2
2	XXX/YYY	e.g. Boiler, SRU, GT, Incinerator etc	e.g. PM, Heavy Metals, PAH, D&F

Add Delete as Necessary

Section 3
Process & Sampling Details

Brief description of the process to be monitored
(Provide a brief description of the process to be monitored)

Process Information	Details
Type of Unit (e.g. boiler, heater, BIF, Incinerator, Turbine etc.)	
Unit Identification Number	
No. of Identical Units/Tested	e.g. Y identical/X tested
Fuel Type	
Design Load	
Continuous or Batch Process	
Flue Gas Temperature	
Type of Abatement (If available)	
Type of CEMS (If available)	
Sampling Location Details	**Details**
Stack Type or Shape	Circular etc
Diameter at sampling location	2.5m
Number of sampling ports available	1, 2, 4
Diameter/Size of sampling ports	100mm, 125mm etc
Stack duct diameters upstream	10 etc
Stack duct diameters downstream	10 etc
Height of measurement location above ground	45m etc
Total Stack Height	75m etc
Does the sampling location satisfy USEPA Requirements	Yes/No
Orientation of Stack	(Vertical/Horizontal)
Confined or Open Sampling Location	
Provide description of sampling platform	(permanent/scaffolding/sufficient area)
Provide description of access	(ladders, monkey ladders, rest platforms, elevators)
Any other Useful Information.	

Provide a description of the sampling platform and access.
Make reference to sampling measurements as per USEPA and reference any Health and Safety issues. Provide any deviations to the methods due to inadequate working area, port sizes, location of disturbances, duct diameters upstream and downstream etc.

Provide a site diagram/sketch of the stack and sampling platform.
Include a diagram of the stack and platform with reference to port locations, platform area, disturbances, number of ports, access etc.

Sampling Requirements/Manual Methods

Include Reference Conditions Here

Parameter	Number of Runs/Duration and Blanks	Reporting Unit (mg/m3), (ng/J) etc	Emission Limit as per EPO or RCER	Standard Reference Method
Particulate Matter	3 x Runs 60 mins each 1 Blank	ng/J	43 ng/J	Method 5 Method 17
Oxides of Nitrogen	3 x Runs 60 mins each	ng/J	86 ng/J	Method 7E
Sulphur Dioxide				
Carbon Monoxide				
Oxygen				
Carbon Dioxide				
Heavy Metals				
Moisture				

Provide details of the equipment to be used.
Manufacturer and model with measuring principal for each method
Provide details of RATA to be performed (if applicable).
(Number of Runs, Performance Specification, Parameters (O_2, CO_2, NOx, SO_2, CO, PM), Range of Analyzers to be used, calibration, linearity, RA criteria, stratification test etc.)

Provide any deviations expected during the measurement, unusual occurrences, or any other comments.
(Use this to explain any deviations that might occur that will deviate from the reference method)

APPENDIX O
ENVIRONMENTAL MANAGEMENT PLAN

1. Please provide brief introduction of the project i.e. process, location etc. (*add more, if required).*

---

2. Please provide site layout with names of each area/unit.

3. Please fill the below table for all the activities (which have potential environmental impacts) to be carried out during construction/installation (*add more rows, if required)*:

Table 3: Potential environmental risk of construction activities

Sr. No.	**Activity**	**Potential Environmental Risk**	**Measures/Actions/Controls to Prevent/Reduce the Potential Environmental Impact**
1.	Example Activity: Site grading & clearing	Dust Emissions	Regular water spray
2.			
3.			

4. Please fill the below table for all the activities (which have potential environmental impacts) to be carried out during operations (*add more rows, if required)*:

Table 4: Potential environmental risk of operational activities

Sr. No.	Activity	Potential Environmental Risk	Measures/Actions/Controls to Prevent/Reduce the Potential Environmental Impact
1.	Example Activity: Storage of liquid chemical in tank	Spillage on ground/soil	Secondary containment or dip tray
2.			
3.			