

KINGDOM OF SAUDI ARABIA
ROYAL COMMISSION FOR JUBAIL AND YANBU



ROYAL COMMISSION ENVIRONMENTAL REGULATIONS

2015

Volume I

Regulations and Standards

Environmental Protection and Control Department

FOREWORD

The Royal Commission (RC) for Jubail and Yanbu enters its fifth decade with great success, international recognition and major achievements in the industrial and infrastructure development for cities namely Jubail, Yanbu and Ras Al Khair. Jubail and Yanbu were developed since 1975 as hydrocarbon based industrial cities while Ras Al Khair has been added recently in RC jurisdiction in the year of 2009, as a mineral based industrial city.

The Royal Commission is committed to excellence and strives continually to improve and increase its capacity in achieving superior results that surpass all expectations. The Royal Commission always supports the development of the community under a healthy and clean environment; and the wise stewardship of natural resources of the Kingdom in conjunction with the sustainable development directives.

The Royal Commission for Jubail and Yanbu has always been recognized as a leader in environmental performance management and has encouraged industrial growth in the industrial cities of Jubail and Yanbu, while maintaining a fine-tuned balance and harmony between the environmental protection and heavy industrialization. The RC continues to refine its environmental management system to better support decision making and to enhance the ability to protect the environment and the public health.

The Royal Commission issues the fourth revision of the environmental regulations, titled as “Royal Commission Environmental Regulations-2015” (RCER-2015) which supersedes the last version RCER-2010. All the regulations and standards in the RCER-2015 has been revised and updated to cover all the environmental aspects of a industrial city and thus, shall be followed by all industries in Jubail, Yanbu, Ras Al Khair and other industrial cities to be given under the RC jurisdiction in future.

It is to be noted that the industries and environment in Jubail and Yanbu have always co-existed in an integrated fashion through transparency and accountability with increasing use of cleaner and energy efficient technology, reducing potential environmental impacts, influencing positively on local community and upholding the highest ethical standards. Same policy is being followed in Ras Al-Khair Industrial city which is, at present, under initial stage of development with few industries.

It is indeed a great pleasure to see that industries in Jubail, Yanbu and Ras Al-Khair have been showing much commitment for the environment and have always cooperated closely with Royal Commission. It is expected that such cooperation between industries and Royal Commission will continue in future.

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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
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
MW	-	Megawatt (equivalent to 10 ⁶ watts of electricity)
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
POHC	-	Principal Organic Hazardous Constituent
POM	-	Polycyclic Organic Matter
PME	-	Presidency of Meteorology & Environment.
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)
s	-	second
SAR	-	Sodium Adsorption ratio unit
scm	-	standard cubic meter
t	-	tonne (equivalent to 1000 kilograms)
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 sulfide and other acidic gases derived from natural gas sweetening processes
Affected facility	any stationary source that is affected by a standard regulation
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.
Central Treatment Facility	the city Industrial Wastewater Treatment Plant (IWTP) or the city Sanitary Wastewater Treatment Plant (SWTP)
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 (OCI ⁻), 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.
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.
Day	refers to working day
Dredged Material	material excavated from the marine waters, including rock, gravel, sand, silt/clay, and mud
Dredging	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

GLOSSARY (Continued)

	gases enter a heat recovery steam generating unit.
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
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 nonliving 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.
Industrial City	all Industrial Cities under RC jurisdiction
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 plowing 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 the immediate or adjacent areas.

GLOSSARY (Continued)

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
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 units.
POM	Polycyclic Organic Matter.
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.
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.
Pyro metallurgical processes	heating processes such as smelting, melting, roasting and refining used for the recovery of metals.
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.
Source	the point of emission or discharge of an air pollutant or effluent.

GLOSSARY (Continued)

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.
Third Party	the “Third Party” contractor is one who shall be selected on the basis of ability and absence of any conflict of interest.
Type I 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. Type I facility typically includes primary industries and some larger secondary industries.
Type II Facility	a facility that has potential for moderate impacts to public health or the environment during construction or operation. Type II facility typically includes secondary industries and some larger support industries.
Type III Facility	a facility that has negligible or no impact on public health or the environment during construction or operation. Type III facility is typically support industries and commercial establishments.
True vapor 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.
VOC	<p>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.</p> <p>The following have been determined to have negligible photochemical reactivity, and are not VOCs:</p> <ul style="list-style-type: none"> • 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); trichlorotrifluoromethane (CFC-11); dichlorodifluoromethane (CFC-12); chlorodifluoromethane (HCHC-22); trifluoromethane (HFC-23); 1,2-dichloro 1,1,2,2-tetrafluoroethane (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: <ul style="list-style-type: none"> • cyclic, branched or linear completely fluorinated

GLOSSARY (Continued)

	<ul style="list-style-type: none">• alkanes• cyclic, branched or linear completely fluorinated ethers with no unaturations• cyclic, branched or linear completely fluorinated tertiary amines with no unaturations• sulphur containing perfluorocarbons with no unaturations 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 (RC) is the sole governmental and an independent body, established by Royal decrees in 1975, with an authority within the boundaries of industrial cities, Jubail, Yanbu and Ras Al Khair (given under RC jurisdiction in 2009) having a wide array of responsibilities including regulating environment, community, industrial and other related services.

The RC is also an environmental regulating body, responsible for controlling pollution associated with the development and operation of the industrial city. The Royal Commission has, thus, developed and adopted regulations, standards and guidelines to control all types of substances emitted, discharged, or deposited, and noise generated within the industrial cities.

The RC issues the Royal Commission Environmental Regulations-2015 (RCER-2015) providing regulations, standards and guidelines which are specific to the Industrial City. These are intended to clearly state the environmental protection regulations and to formally define the requirements for adherence to them.

The RCER-2015, Volume I includes all regulations, standards and guidelines required to protect the environment of the industrial city from adverse impacts. The Volume II of the RCER-2015 presents the Environmental Permit Program which covers procedures and forms for applying for an "Environmental Permit to Construct" (EPC) and "Environmental Permit to Operate" (EPO). The Volume III describes a Penalty System which has been designed to ensure compliance with regulations to further assist in accomplishing the goals of the Royal Commission by deterring violations and encouraging voluntary compliance with the Environmental Regulations.

This document (Volume I) is divided into eight sections:

- Section 1 – Environmental Regulatory System.
- Section 2 – Air Environment.
- Section 3 – Water Environment.
- Section 4 – Hazardous Materials Management.
- Section 5 – Waste Management.
- Section 6 – Dredging.
- Section 7 – Noise.
- Section 8 – Reporting and Record Keeping.

SECTION - 1

Environmental Regulatory System

This section covers all the general regulations stating the policies to control the environment of industrial city from potential adverse impacts from industrial activities.

1.1 General Regulations

- 1.1.1 The Royal Commission Environmental Regulations-2015 (RCER-2015) supersede the Royal Commission Environmental Regulations-2010 with effective date of 1st September, 2015 (17th Dhu'al Qidah, 1436).
- 1.1.2 The effective date of these regulations for all new, modified, reconstructed and existing facilities is 1st September, 2015 (17th Dhu'al Qidah, 1436) unless otherwise stated in specific sections of these regulations or an exemption has been granted in accordance with Clause 1.1.6.
- 1.1.3 The Royal Commission requires all operators of industrial facilities located in Jubail Industrial City, Yanbu Industrial City and Ras Al Khair Industrial City, hereinafter referred to as "the Industrial City", to operate their facilities in accordance with the environmental regulations of the Royal Commission.
- 1.1.4 The operator of a facility shall take all reasonable steps to minimize releases to the environment and shall carry out such measures as are reasonable to prevent adverse impacts to public health and the environment.
- 1.1.5 The operators of all facilities are obligated to be knowledgeable of the Environmental Regulations applicable to their facilities.
- 1.1.6 The operator of an existing facility may apply to the Royal Commission for an exemption to any specific regulation or standard for which their current facilities or operations are non-compliant. In this case, the following procedures shall apply:
- a) The operator shall submit all claims for exemption in writing to the Royal Commission. The operator shall provide a separate justification for each regulation or standard subject to a claim. To be considered by the Royal Commission, the operator must demonstrate that, based on conditions unique and peculiar to the facility's situation, compliance will impose a substantial financial, technological, or safety burden on the facility.
 - b) The operator shall provide the Royal Commission with a compliance plan, which shows how and when compliance with the subject regulation or standard will be achieved in the future.
 - c) The Royal Commission shall assess the application and the compliance plan. The Royal Commission shall issue its decision to accept or reject each exemption claim following consultation with the operator. The decision shall stipulate the period during which an accepted exemption is valid.
 - d) The Royal Commission shall exempt the affected facility from the regulations and standards covered by the application for the period between the date of receipt of the exemption application and the date of the Royal Commission decision regarding the application.

- 1.1.7 All facilities shall submit Environmental Screening Questionnaire (ESQ) / Permit Application Package (PAP) to obtain Environmental Permits (EPC and EPO) as per the procedure described in RCER-2015, Volume II.
- 1.1.8 In addition to submitting the completed PAP forms, Type I and Type II facilities shall prepare and submit Environmental Impact Assessment (EIA) as per RC requirements to obtain EPC.
- 1.1.9 Any EIA shall be conducted by the RC accepted “Third Party” as per criteria provided in RCER-2015 Volume II, Appendix C. The facility shall submit to RC a list of consultants with their details of experience including previous EIA activities for RC acceptance.
- 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, minerals manufacturing, others), the consultant shall 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.*
- 1.1.10 All facilities shall prepare and submit a general operational Environmental Emergency Response Plan (EERP) covering issues as per Section 4.3 particularly to Clause 4.3.20, and guidelines provided in RCER-2015, Volume II, Appendix D.
- 1.1.11 The operator of a facility shall utilize Best Available Techniques (BAT) for environmental control. The Royal Commission applies the concept of BAT as follows:
- 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. The criteria to perform BAT analysis shall be as follows (refer Volume II, Appendix B for details):*
- 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 Table 2A*
 - c. *Any source emitting greater than 10 t/y before control of any hazardous air pollutants identified in Table 2C*
 - d. *Any industrial wastewater pre-treatment prior to discharge to the Industrial Wastewater Treatment Plant.*
- 1.1.12 BAT assessment shall be conducted for new, reconstructed and modified facilities as per the procedures given in Volume II (Appendix B) of these regulations.
- 1.1.13 At the request of the Royal Commission (if the Operator is not in compliance with RCER), the operator of a facility shall provide an assessment of BAT to address environmental issues that are identified by the Royal Commission as posing a direct detrimental environmental or public health impact. The BAT assessment should follow the procedure given in Volume-II.
- 1.1.14 The operator of a facility shall operate, inspect and maintain all facilities, systems, equipment and related appurtenances for measurement and control that are installed or used to achieve compliance with these Regulations.

- 1.1.15 The operator of a facility shall have established procedures that outline the management practices within the facility as they relate directly to environmental control and environmental compliance.
- 1.1.16 The operator of a facility shall apply or utilize methods and procedures for compliance monitoring, sampling and analyses in accordance with internationally accepted standards for the specific procedure in question such as those of the American Standard Test Methods (ASTM), U.S. Environmental Protection Agency (USEPA), or Standard Methods for the Analysis of Water and Wastewater (APHA, AWWA, WEF, Latest Edition).
- 1.1.17 The Royal Commission has the right to enter and access to the facility, upon reasonable prior notice of at least 24 hours, for the purpose of regular surveillance, monitoring, sampling and inspection to verify compliance with these Regulations.
- 1.1.18 The Royal Commission has the right to enter the facility without prior notice for inspection and collecting samples in the case of any complaint or abnormal situation relating to environmental issues.
- 1.1.19 The operator shall facilitate the Royal Commission, upon reasonable request, to review all environmental related records, methods and procedures to verify compliance with these Regulations.
- 1.1.20 The operator shall submit a compliance plan for any non-compliance issues as per Section 8.
- 1.1.21 The operator in violation of RCER shall be subject to penalty according to the Royal Commission Penalty System.
- 1.1.22 The operator shall furnish to the Royal Commission, within a reasonable time, any relevant information that the Royal Commission may request to determine compliance with these Regulations
- 1.1.23 Special conservation areas have been designated within the industrial city. Information on such areas is available in the Royal Commission Master Plan. These areas are protected, and hence any activity leading to ecological degradation shall be restricted and penalized.
- 1.1.24 Terms used in these Regulations have the meanings as defined in the Glossary.
- 1.1.25 In case of abnormal situation, the RC has the right to conduct any testing of any source or any other area inside the facility boundaries with the prior coordination of the operator.
- 1.1.26
 - a) All existing facilities shall comply with the energy efficiency standards and requirements as per Saudi Energy Efficiency Center (SEEC).
 - b) All new facilities including facilities to be reconstructed, modified or expanded are required to comply with the SEEC's standards and requirements at the time of applying to obtain Environmental Permit to Construct (EPC).

1.2 Environmental Permit to Construct Regulations

This section applies to new, reconstructed and modified facilities requiring construction only. The application procedures for obtaining an Environmental Permit to Construct (EPC) are presented in Volume II of these regulations "Environmental Permit Program".

- 1.2.1 The operator shall obtain an EPC from the Royal Commission before starting any construction activity related to process of a new facility (refer Appendix-A).

- 1.2.2 The operator of an existing facility shall obtain an EPC from the RC in the form of EPC authorization letter or EPC certificate on a case by case basis for the reconstruction, modification or expansion in the existing facility.
- 1.2.3 The Royal Commission shall issue an EPC for an individual facility, or group of inter-related facilities which, under normal operating conditions, result in the production or manufacture of a common product and provided they are owned and operated by the same owner(s).
- 1.2.4 The operator shall start the preparation of PAP (and EIA if required) immediately after signing the Conditional Site Allocation (CSA). However, the PAP (including a report as per Clause 1.1.26 b) shall be submitted for getting EPC at least six months before starting any construction activity related to process of a new, reconstructed and modified facility.
- 1.2.5 The EPC shall, by reference, authorize construction of only those facilities as described in the Permit Application Package (or any other construction activities) submitted under Clause 1.2.4.
- 1.2.6 The operator shall notify the Royal Commission when process construction of the facility is approaching 30 days to final completion.
- 1.2.7 In event of change of ownership / operator, sublease or closure of all or any part of a facility under construction, the operator shall notify the Royal Commission to obtain appropriate amendment to or cancellation of the EPC. In case of surrender of EPC, the application to RC shall accompany a site report describing all the environmental related changes resulting during the construction and all the steps that have been adopted to avoid any pollution risk resulting from the construction of the facility.
- 1.2.8 The facility which fails to comply with the conditions of an EPC shall be subject to penalty as per the Royal Commission Penalty System including the revocation of the permit and / or any other legal actions deemed necessary by the Royal Commission. However, any change in EPC conditions shall be mutually prior agreed by RC and the facility.

1.3 Environmental Permit to Operate Regulations

This section applies to all facilities. The application procedures for obtaining an Environmental Permit to Operate (EPO) are presented in Volume II of these Regulations "Environmental Permit Program".

- 1.3.1 The operator of a facility shall not operate it or carry out process commissioning without a valid EPO issued by the Royal Commission (refer Appendix-B). For new facilities, an EPO will be issued only if all EPC conditions are complied.
- 1.3.2 The operator of a modified or reconstructed facility shall not operate it without obtaining an amendment to the existing EPO or a new EPO if needed.
- 1.3.3 The Royal Commission shall issue an EPO for an individual facility, or group of inter-related facilities which, under normal operating conditions, result in the production or manufacture of a common product and provided they are owned and operated by the same owner(s).
- 1.3.4 An EPO shall, by reference, authorize the operation of only those processes and facilities as described in the permit application package. All information submitted in the permit application package shall, unless otherwise specified by the Royal Commission, be considered as a condition of the EPO.
- 1.3.5 The Royal Commission shall issue an EPO to the operator of a new facility or amendment to existing EPO (or a new EPO) for reconstructed or modified facility provided that the process

construction is in conformance with the EPC and that the operator has complied with all requirements of the EPC.

- 1.3.6 An EPO issued by the Royal Commission shall be valid for a period of five (5) years from the date of issue. The Operator shall apply for the renewal of the permit 6 months before its expiration, along with duly filled PAP and other relevant documents. Once the application is submitted within this period, the facility will be in compliance with RCER.
- 1.3.7 The operator of modified facility shall apply for a new or amended EPO using the procedures specified in Volume II of these Regulations for any of the following modifications:
- Production increases above the previously approved value by 10% or more
 - Emissions or discharges from a facility increase by 10% or more
 - New pollutants are emitted or discharged.
- 1.3.8 Renewal of EPO shall be granted following Royal Commission review, evaluation and approval of the following information:
- permit conditions
 - facility compliance status / exemptions
 - updated permit application
 - air emission inventory (refer Clause 2.11.1)
- 1.3.9 The operator of a facility shall operate in accordance with the terms and conditions of the EPO. These terms and conditions shall include:
- Operation in accordance with the design basis and procedures described in the EPO application
 - Facility upgrade requirements
 - Industry monitoring, record keeping and reporting schedules.
 - Approved variances or exemptions to regulations
 - Corrective action
- 1.3.10 All conditions, exemptions or limitations contained in the Environmental Permit to Operate can be amended by the Royal Commission, based on reliable data, following consultation with the operator of a facility, if such amendments are required to assure:
- compliance with applicable environmental regulations
 - protection of public health and safety
 - prevention of direct detrimental impact to the environment
 - ensuring the proper functioning of infrastructure facilities.
- 1.3.11 The facility which fails to comply with the conditions of an EPO shall be subject to penalty as per the Royal Commission Penalty System including the revocation of the permit and / or any other legal actions deemed necessary by the Royal Commission.
- 1.3.12 In event of change of ownership / operator, sublease or closure of all or any part of the facility, the operator shall notify the Royal Commission to obtain appropriate amendment to or cancellation of the EPO. In case of surrender of EPO, the application to RC must accompany a site report describing all the environmental related changes resulting during the operation and all the steps that have been adopted to avoid any pollution risk resulting from the operation of the facility.
- 1.3.13 All information submitted to the Royal Commission by the facility shall be treated as confidential and shall not be released to any other party without prior consent from the Operator.

1.4 Corrective Action

- 1.4.1 The operator of a facility shall be responsible for corrective action required by the Royal Commission following:
- a) non-compliance with these Regulations
 - b) non-compliance with any conditions of the Environmental Permit to Construct
 - c) non-compliance with any conditions of the Environmental Permit to Operate
 - d) a pollution which is harmful to the public, property, infrastructure or environment.
- 1.4.2 Corrective action is defined as all activities, both inside and outside the facility boundary, which are necessary to:
- a) comply with these Regulations
 - b) comply with any conditions of the Environmental Permit to Construct
 - c) comply with any conditions of the Environmental Permit to Operate
 - d) isolate and control the source of any harmful release from the facility
 - e) prevent future occurrence of the harmful release
 - f) investigate the extent of any potentially harmful release
 - g) mitigate and render harmless the impacts of any harmful release
 - h) monitor the effect of any mitigation measures
- 1.4.3 Corrective action falling under categories Clauses 1.4.2f, 1.4.2g and 1.4.2h shall be subject to Royal Commission review and approval.
- 1.4.4 The Royal Commission, in agreement of the operator of the facility responsible for a harmful release, shall establish the point at which the agreed mitigation measures have rendered harmless the impact of any harmful release.
- 1.4.5 If the operator of a facility responsible for a harmful release fails to take the necessary corrective action, the Royal Commission will, following prior notification to the affected facility, initiate corrective action and recover associated costs from the operator of the responsible facility.

1.5 Rulemaking Process

- 1.5.1 Prior to amendment, revision, deletion or other change to these Regulations, the Royal Commission shall transmit the proposed change(s) to the RCER to industries for their review and comments. Any comment from industries shall be sent to RC within a period of no more than sixty (60) days. After this period, the Royal Commission will implement the proposed changes. The RC reserves the right to reject any comment from industries, and the official version of the proposed changes will be transmitted officially to all industries for compliance.
- 1.5.2 The Royal Commission shall provide a written response to received comments within sixty (60) days from the closing date of the industry comment period. This response shall include any final revision of the change(s) to the Regulations or its effective date.
- 1.5.3 Unless otherwise stated by the Royal Commission in any final revision, the proposed change(s) to the Regulations made under Clause 1.5.1 shall become part of the Royal Commission Environmental Regulations (see Appendix F).
- 1.5.4 In the event that these Regulations, or their amended version, do not specify a standard for a specific emission source, discharge or environmental management practice, then the Royal Commission shall use for reference other recognized regulations as a basis for technical justification or establishment of a change (as per Clause 1.5.1) in the following order:

- a) Saudi National / PME Standards
 - b) U.S. Environmental Protection Agency (US EPA)
 - c) U.S. State environmental protection rules and guidelines
 - d) European Union members environmental rules and guidelines
 - e) Other internationally recognized and accepted regulatory bodies
- 1.5.5 All industries shall comply with treaties, protocols and agreements signed by the Government of Saudi Arabia related to the Environment.

SECTION - 2

2. Air Environment

Ambient air quality standards are set at levels, which are determined by the threshold of observable health effects on humans. Air pollution source standards are designed to prevent, control, or abate air pollution and to attain and maintain ambient air quality within standards.

2.1 Ambient Air Quality Standards

2.1.1 Ambient air is defined as any air on the external side of a pollution source's boundary fence to which the public have access. This includes industrial areas neighboring a pollution source.

2.1.2 Table 2A lists the ambient air quality standards for the Industrial City areas. The standards for each pollutant consist of one or more concentration limits, each with an associated averaging period. These standards do not apply to individual facilities or sources, but are considered an objective, which should be met in order to protect the health and well being of the general public. Table 2A-I lists ambient air quality guidelines for additional compounds which present desirable concentration of contaminants in air, based on protection against adverse effects on health or the environment. The effects considered may be health, odor, vegetation, soiling, visibility, corrosion or others. These ambient air quality guidelines data shall be followed, particularly, in the air dispersion study conducted during EIA as per Clause 1.1.8.

2.1.3 The Royal Commission reserves the right to modify emission and discharge standards, based on evaluation of reliable data, following the procedures in Section 1.5 to prevent significant deterioration of ambient air quality.

2.2 Source Emission Standards

2.2.1 Table 2B lists the source emission standards that apply to individual facilities or point sources.

2.2.2 The source emission standards are applicable to all facilities in the Industrial City from the effective date of regulations unless otherwise specified in Table 2B.

2.3 General Air Quality Regulations

The following air quality regulations apply to facilities that emit air pollutants:

2.3.1 The operator of a facility shall not emit at any time air contaminants in such concentration and of such duration as to be injurious to, adversely affect, or cause nuisance to public health or welfare, animal life, vegetation, or property.

2.3.2 The operator shall use BAT, as defined in Clause 1.1.11, to control emissions to atmosphere.

2.3.3 The operator of a facility shall not conceal or appear to minimize the effects of an emission to achieve compliance with the Regulations. This includes the introduction of dilution air or incorrect operation of monitoring equipment.

2.3.4 The operator of a facility shall phase out chlorofluorocarbons (CFC) and halons or any other substances defined in the Montreal Protocol (and subsequent amendments) which are capable of depleting stratospheric ozone. The total phase out of ozone depleting substances shall be completed in accordance with the schedule and deadline stated within the protocol. Venting of

CFC's and other ozone depleting substances to the atmosphere is prohibited except in the case of firefighting.

- 2.3.5 Use of all types of Asbestos Containing Materials (ACM) is prohibited in the industrial city. The existing facilities shall make a phase out plan to remove asbestos as per RC approved guidelines and methodology (refer RCER, Volume II, Appendix I).
- 2.3.6 Any facility, having potential of dust emissions from loading/unloading activity or during storing raw materials, shall take necessary measures such as: closed hanger, shield spraying system etc, to avoid dust emissions from the sources with RC prior approval.
- 2.3.7 All quarries, crushers, ready-mix concrete plants, landfills and other similar facilities shall install appropriate dust control devices as per RC prior approval.
- 2.3.8 All facilities (including landfills) shall follow appropriate dust control measures during construction/site preparation phase to control dust emission to less than Ambient Air Quality Standard (Table 2A) for particulate matters.
- 2.3.9 All the facilities (including pretreatment plants, sanitary and industrial wastewater treatment plants, pumping stations, waste management plants / systems) shall employ appropriate environmental practices and measures (based on best available techniques) to control the emissions of odors from their operating units.

2.4 Point Source Regulations

- 2.4.1 The operator of a facility shall not emit from any source air contaminants in excess of the Source Emission Standards described in Section 2.2. Exceeding the source emission standards (beyond six hours) during major upsets, emergencies, startups, or shutdowns will be evaluated by RC on a case by case basis to determine the significance of the incident and also to assess whether such emission has violated the Source Emission Standards or not. The evaluation will be based on several factors such as: duration and frequency of emissions, quantities and characteristics of pollutants emitted, designs of equipments, preventive and maintenance plans and other relevant parameters.
- 2.4.2 The operator of a facility shall not emit from any source quantities of air pollutants that result in ground level concentrations exceeding the ambient air quality standards in Table 2A.
- 2.4.3 The operator of an affected facility shall provide performance testing facilities, including:
 - a) Sampling ports adequate for test methods applicable to the facility as per USEPA Procedure
 - b) Safe sampling platform(s)
 - c) Safe access to the sampling platform(s)
 - d) Provision of utilities for sampling and testing equipment.
- 2.4.4 Flares shall be operated with a flame present at all times which is to be monitored by a thermocouple or an equivalent device to detect the presence of a flame. In addition, the continuous imaging (digital recording) of all new flares (the existing flares, if possible) with date and time shall be maintained. All facilities, having flares, shall install flare flow monitoring device (like Ultrasonic Flow Meter) on the vapor line after liquid knock-out drum. All Facilities shall submit a monthly report to RC for the quantity and estimated composition of the gases flared.
- 2.4.5 Elevated flare heights (for new facilities) shall be established based on the American Petroleum Institute recommended Practice 521.

- 2.4.6 All the regulated new facilities shall design their stacks using the USEPA Good Engineering Practice guidelines and air dispersion modeling results starting with a minimum stack height 30 meters and using the formula as given below:

$$H_s = H + 1.5 L$$

Where H_s = Stack height measured from the ground-level elevation at the base of the stack
 H = Height of nearby structure(s) measured from the ground-level elevation at the base of the stack
 L = Lesser dimension, height or projected width of nearby structure(s)- Nearby means that the distance up to five times the lesser of the height or the width dimension of a closest structure but not greater than 0.8 Km

2.5 Air Emission Testing Regulations - Point Sources

- 2.5.1 The operator of a facility shall undertake annual stack emission testing of the following point sources:
- a) Affected sources that, before the use of abatement equipment, have the potential to emit more than 100 t/y of any air pollutant listed in Table 2A, or
 - b) Affected sources that, before the use of abatement equipment, have the potential to emit more than 10 t/y of any hazardous air pollutant listed in Table 2C.
 - c) Affected sources combusting hazardous materials (see Section 2.7).

- 2.5.2 The operator of a facility subject to Clause 2.5.1 shall, at a minimum, measure for the applicable parameters that are regulated in Table 2B for the affected sources at the facility. Testing of sources subject to Clause 2.5.1b) shall include individual measurement of each applicable hazardous air pollutant.

- 2.5.3 The operator of an affected facility with several identical process streams each with similar point source emissions which are subject to Clause 2.5.1 may restrict the annual emission testing to the following number of sources providing all sources are tested at least once every 4 years:

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

- 2.5.4 The operator of new facilities subject to Clause 2.5.1 shall undertake initial performance testing of all point sources within 60 days of the facility achieving the normal production rate or within 180 days of initial start up, whichever is earlier. The parameters to be determined shall be as specified in Clause 2.5.2 and any other parameters specified in conditions of the Environmental Permit to Operate.
- 2.5.5 All emission testing shall be conducted by the RC accepted "Third Party" and reported in accordance with methods and procedures that are approved by the U.S. EPA or equivalent RC approved international standard.
- 2.5.6 All Performance Guarantee tests including other stack testing shall be conducted as per technical supplier specifications under conditions of maximum designated use (max. design capacity) of the affected source. Operations during periods of shutdowns, startups, and malfunctions shall not constitute representative conditions for the purpose of the emission tests.

- 2.5.7 The operator of an affected facility shall provide the Royal Commission at least fourteen (14) days prior notice of any emission testing required by Clause 2.5.1. The Royal Commission may elect to witness all or part of the required emission test. The electronic raw data (or hard copy) shall be initialed by all parties at the end of each run.
- 2.5.8 The operator of a facility shall, within 60 days of conducting any required emission testing, submit a written report to the Royal Commission. The report shall contain all applicable information as given below :
- a) Analytical data - pollutants, moisture content, oxygen content
 - b) Physical data – flow rate, stack emission velocity, temperature, pressure, stack dimensions, isokinetic flow conditions
 - c) Process operating conditions at time of testing
 - d) One example calculation for each method
 - e) Emission results with raw data (electronic or hard copy)- emission data in same unit as the relevant emission standard in Table 2B, mass emission data and concentration emission data.
 - f) Calibration
- 2.5.9 The operator of an affected facility shall undertake additional emission tests deemed necessary by the Royal Commission to demonstrate the facility's current compliance status.
- 2.5.10 The Royal Commission may waive or reduce the frequency of the emission testing requirements if the operator of the affected facility can demonstrate to the satisfaction of the Royal Commission that the source is consistently in compliance with the applicable standard.

2.6 Continuous Air Emission Monitoring Regulations - Point Source(s)

- 2.6.1 Operators of all point sources listed in Table 2D shall install appropriate continuous emission monitoring systems (CEMS). The Royal Commission may specify other pollution sources to be continuously monitored for specific pollutants or performance parameters.
- 2.6.2 Each applicable facility shall integrate all their CEMS data system with RC On-Line Data Management System taking all necessary measures at their end to ensure smooth integration and to capture all data. Until the above integration is completed and in operation, CEMS report shall be submitted as per Clause 2.6.7.
- 2.6.3 All continuous monitoring systems shall be installed and operational prior to conducting the emission testing required in Section 2.5. The use of continuous monitoring systems does not waive the emission testing requirements under Section 2.5.
- 2.6.4 All continuous emission monitoring systems (CEMS) shall be in continuous operation except for system breakdowns, repairs, calibration checks, and zero and span adjustments.
- 2.6.5 The operator of continuous monitoring systems shall maintain the following records on site for a minimum period of three years. These records shall be available for inspection by the Royal Commission or its designee at any time, and shall include as a minimum:
- a) All measurements
 - b) All performance evaluations
 - c) Verification of calibration and maintenance checks
 - d) Manufacturers' recommended maintenance and calibrations frequencies.
 - e) Occurrences and duration of any startups, shutdowns or malfunctions in the operation of the affected source or emission control device
 - f) Periods when the continuous monitoring system is inoperative
 - g) Type of fuel used along with specification and consumption (upon request)

h) Vendor manual with calibration details and technical specification of equipment used.

2.6.6 All new facilities shall install Continuous Opacity Monitoring System (COMS) as per requirement given in Table 2-D or EPO conditions. However the existing facilities, having frequent opacity exceedance problems, shall install COMS as required by RC on a case by case basis. Additional requirements for COMS are provided in RCER Volume-II Appendix-G Guidelines for CEMS.

2.6.7 Before completion of facility's CEMS Data Acquisition System integrated with RC On-Line Data Management System and the system becomes fully operational, the facility shall submit a report (a soft copy with electronic signature) and also electronically to the Royal Commission every month summarizing the continuous emission monitoring data for affected sources at their facility. The report shall include, as a minimum, the following information:

- a) Monitoring period
- b) Actual Monitoring data along with results of the Statistical analysis including average, minimum, maximum and standard deviation.
- c) The number of times that the specific pollutants being monitored exceeded the source emission standards established in Table 2B or specified in conditions of EPO.
- d) An explanation for the occasions when the source emission standards were exceeded and the corrective action taken to prevent recurrence
- e) Occurrences and duration of any startups, shutdowns or malfunctions in the operation of the affected source or emission control device
- f) Periods when the continuous monitoring system was inoperative

2.7 Combustion of Hazardous Materials

This section applies to boilers and industrial furnaces (BIF) and incinerators that burn hazardous materials other than fossil fuels. The hazardous materials, as defined in Section 4.1, may be but not limited to waste, by-products of a process or used oil.

2.7.1 The operator of an incinerator shall only burn hazardous materials specified in the facility Environmental Permit to Operate.

2.7.2 The operator of a BIF shall only burn hazardous materials generated at their facility and specified in the facility Environmental Permit to Operate.

2.7.3 The operator of a BIF or incinerator shall operate such a unit with a system that automatically cuts off hazardous material feed when operating conditions deviate from those established in the Environmental Permit to Operate for the specific unit.

2.7.4 The operator of a BIF may be exempted from the requirements to determine destruction and removal efficiency (DRE) and particulate emissions under Section 2.5.4 provided that all of the following low risk waste exemption conditions apply:

- a) > 50% of the heat input to the BIF is derived from a primary fossil fuel.
- b) Primary fuels and co-incinerated hazardous materials both have heat inputs >8,000 Btu/lb.
- c) Hazardous materials are introduced directly into the primary fuel flame zone of the combustion chamber.
- d) Compliance with the CO emission standard in Table 2B is demonstrated by the provision of a continuous emission monitor as specified in Table 2D.
- e) If the above items are not in compliance, the operator shall demonstrate that the burning will not result in unacceptable adverse health effects

- 2.7.5 The operator of a BIF or incinerator shall keep records of the composition and quantity of all hazardous materials burnt in these facilities. Information on process vent gases will also be provided, if possible.

2.8 Fugitive Emission Regulations

This section is applicable to all components in VOC service or organic hazardous air pollutant (HAP) service (see Table 2C), unless stated otherwise.

- 2.8.1 All affected components in VOC or organic HAP service shall be individually identified by a specific number, service and location (e.g. metal tags, bar code, P&ID's). An updated master list containing all of the affected components shall be kept on site at all times.
- 2.8.2 Open-ended valves shall be equipped with a cap, blind flange, plug, or a second valve. The second valve shall always be closed except during sampling.
- 2.8.3 Pressure relief valves equipped with rupture disks shall be equipped with a sensor between the valve and the disk to detect leaks.
- 2.8.4 The operator of a facility shall monitor all affected components in VOC service or in organic HAP service, except as stated in Table 2E, on a minimum of *semi-annual* basis, starting within 180 days of initial startup of operations. Following two (2) consecutive *semi-annual* leak detection periods when the number of leaking components is found to be less than 2% of the total, the operator revert to *annual* leak detection monitoring. If the total number of leaking components ever exceeds 2%, then the facility shall revert to *semi-annual* monitoring. The RC has the right to witness any fugitive monitoring testing, if required, on prior advance notice as per mutually agreed schedule.
- 2.8.5 Less frequent monitoring of difficult or unsafe to monitor components shall be permitted as determined by the operator, subject to verification and approval by the Royal Commission.
- 2.8.6 All components in VOC service or organic HAP service that register more than 10,000 ppmv VOC and valves, flanges or connectors in organic HAP service which register more than 500 ppmv VOC shall be defined as leaking components.
- 2.8.7 All leaking components shall be tagged immediately and replaced or repaired within 15 calendar days or, if a unit or plant shutdown is required, at the next scheduled shutdown.
- 2.8.8 All leaks from pressure relief valves shall be stopped within 24 hours of detection.
- 2.8.9 All leaking or returned to service components shall be monitored after maintenance is performed.
- 2.8.10 The operator of a facility shall prepare an annual report (soft copy with electronic signature) for submittal to the Royal Commission summarizing the facility fugitive emissions. This report shall include the following information:
- a) Total number of each type of component monitored
 - b) Number of leaking components of each type
 - c) Number of components of each type awaiting repair
 - d) Number of components of each type repaired and returned to service
- 2.8.11 The operator of a facility shall maintain semi-annual records of fugitive emissions monitoring and maintenance activities. The records shall be maintained on site for a minimum period of three years.

- 2.8.12 Facilities which emit VOCs or odorous compounds (including WMF/WRF and sanitary and industrial wastewater treatment plants and their related systems) shall install a minimum of four fixed ambient air analysers around the fence line to monitor any affected pollutant & odorous chemicals specific to an individual facility. The results shall be submitted to RC on a monthly basis. Facilities which have difficulties in getting suitable fixed analysers can be considered for an alternate system on a case by case basis.

2.9 Storage of Volatile Organic Compounds Regulations

- 2.9.1 The operator of a facility shall not place, store, or hold in any stationary tank, reservoir, or any other container any volatile organic compound (VOC) unless such container is equipped with a control device as specified in Table 2F.
- 2.9.2 The operator of a facility storing VOC compounds in tanks or containers which fall under the following categories are exempt from this section of the Regulations and the requirements of Table 2F:
- All vessels at gasoline service stations.
 - All vessels that are permanently mobile.
 - All vessels which maintain a pressure of at least 204.9 kPa.
 - All vessels with capacities less than 75 m³.
- 2.9.3 The operator of facility installing or operating a fixed roof storage tank with an internal floating roof shall:
- Visually inspect the internal floating roof primary seals prior to initial filling of the tank. The primary seal shall be inspected each time the tank is taken out-of-service and at a minimum of once every ten (10) years.
 - Visually inspect the secondary seal from the nearest manway after the tank is placed in service and on an annual basis thereafter.
 - Repair any major defect discovered during an inspection within 45 days of the date of inspection or remove the tank from service. If the operator cannot complete the repair within the specified time frame then a written justification explaining the delay and expected completion date shall be provided to the Royal Commission.
- 2.9.4 The operator of a facility with storage equipment equipped with external floating roofs shall:
- Determine that the total gap width and areas for each of the primary and secondary seals are consistent with manufacturers' design and installation specifications. This determination shall be verified annually for secondary seals. For primary seals this shall be verified each time the tank is removed from service and at a minimum of once every ten (10) years.
 - Measure during hydrostatic testing or within sixty (60) days of initial fill the gaps between the tank wall and the primary seal (seal gaps) and the gaps between the tank wall and the secondary seal.
 - Repair any major defect discovered during an inspection within 45 days of the date of inspection or remove the tank from service. If the operator cannot complete the repair within the specified time frame then a written justification explaining the delay and expected completion date shall be provided to the Royal Commission.
- 2.9.5 The operator shall notify the RC (14 working days in advance) their schedule of routine seal inspection as described in Clause 2.9.3 and Clause 2.9.4.
- 2.9.6 All results of the visual inspections of storage tank primary and secondary seals shall be documented and records shall be kept in accordance with Section 8.3 of these Regulations.

2.9.7 The operator of any facility using VOC storage vessels shall retain on site the following records:

- a) Chemical name of VOC stored.
- b) VOC storage tank capacity.
- c) Details of periods when any required control device is not functional.
- d) True vapor pressure of the material stored.

2.10 Loading and Unloading of Organic Compounds Regulations

Unless otherwise specified, this section of the Regulations applies to both land and marine based loading and unloading operations.

2.10.1 The operator of a facility which is loading or unloading VOCs or organic HAP compound with a true vapor pressure greater than or equal to 1.5 psia, in quantities greater than 75 m³ per day averaged over any consecutive 30 day period, shall not permit any such material loading or unloading unless the vapors generated from such an operation are processed by a vapor control system.

2.10.2 The operator of a facility performing land-based loading and unloading subject to Clause 2.10.1 shall perform the operations such that:

- a) All liquid and vapor lines shall be equipped with fittings which make vapor-tight connections and which close automatically when disconnected.
- b) All liquid and vapor lines shall be equipped to allow residual VOC or organic HAP in the loading line after loading is complete to discharge to the control system.
- c) All loading effected through the hatches of a transport vessel shall provide appropriate pneumatic, hydraulic or other mechanical means to force a vapor tight seal between the loading arm and the vessel hatch.
- d) Transfer operations shall cease if a vapor leak is detected greater than 20% of the lower explosive limit of the material being transferred.
- e) If a leak is detected during the transfer operations of more than 10,000 ppm VOC or organic HAP, then repairs to the transfer system shall be made before the next loading operation.

2.10.3 The operator of a VOC loading or unloading vapor control system shall operate the system such that:

- a) Control efficiency of at least 95% is maintained for VOCs during loading when using a vapor recovery device.
- b) Control efficiency of at least 98% during loading is maintained when using a combustion device for HAPs as identified in Table 2C. However, in case of carcinogenic or acutely hazardous compounds, higher control efficiency may be applicable.

2.10.4 The operator of a facility that is affecting loading and unloading of VOC or organic HAP shall establish an inspection scheme to be implemented during each transfer operation. The operations inspection shall include inspection for visible liquid leaks, visible fumes, vapor leaks or significant odors resulting from the transfer operations.

2.10.5 The operator of a facility shall cease transfer operations if a liquid leak is detected and can not be repaired immediately.

2.10.6 The operator of a facility which is effecting loading and unloading of VOC or organic HAP shall maintain records and report emissions in accordance with the relevant point source and fugitive emission regulations as specified in Sections 2.5 and 2.8.

2.10.7 The operator of a facility involving Marine Tank vessel loading operations of crude oil with throughput of 200 Million barrels or more on a 24 month annual average basis or gasoline with throughput of 10 Million barrels or more on a 24 month annual average basis shall comply with the following:

- a) Equip each terminal with a Vapor Collection System (VCS) designed to collect VOC vapors displaced from marine tank vessels during loading and to prevent VOC vapors from passing through another loading berth or to the atmosphere.
- b) Limit marine tank vessel loading operations to those vessels that are equipped with Vapor Collection Equipment (VCE) compatible with the terminal's VCS.
- c) Limit marine tank vessel loading operations to those levels that are vapor tight and connected to the VCS
- d) Reduce emissions of captured VOC from marine tank vessel loading operations by 98 wt% when using a combustion device or by 95 wt% when using a recovery device.
- e) Requirement of above paragraph (d) may be met by reducing gasoline-loading emissions to, at most, 1000-ppmv outlet VOC concentration.

Note: The standards given in item (d) and (e) as above, do not apply to marine tank vessel loading operations where emissions are reduced by using a Vapor Balancing System.

2.10.8 All the loading racks at a bulk gasoline terminal with throughput of greater than 75 m3 per day which deliver liquid product in to gasoline tank trucks shall comply with the following standards:

- a) Each affected facility shall be equipped with vapor collection system designed to collect the total organic compounds vapors displaced from tank trucks during loading.
- b) The emissions to the atmosphere from the vapor collection system due to the loading of the liquid product into gasoline tank trucks are not to exceed 35 milligrams of total organic compounds per liter of gasoline loaded except as noted in item (c) of this section.
- c) For each affected facility equipped with an existing vapor processing system, the emissions to the atmosphere from the vapor collection system due to the loading of liquid product into gasoline tank trucks are not to exceed 80 milligrams of total organic compound per liter of gasoline loaded.

2.11 Air Emissions Inventory Regulations

2.11.1 Operators of facilities shall submit an air emissions inventory report as part of the application for Environmental Permit to Operate renewal (refer Clause 1.3.8). The inventory report shall contain the following information:

- a) Identification of all emission sources by facility
- b) Emission loads obtained from measured pollutant emissions for all point sources subject to Clause 2.5.1 or Clause 2.5.2.
- c) Estimated emission loads obtained from calculations or engineering design information for all other point sources.
- d) Fugitive emissions estimates based on calculations utilizing procedures, methodologies and appropriate air quality emission factors as provided in USEPA AP-42: Protocol for Equipment Leak Estimates (latest edition - <http://www.epa.gov/ttn/chief/ap42/>).
- e) An estimate of emissions from storage tanks and transfer operations.
- f) An estimate of emissions from wastewater treatment operations.
- g) All emissions data should be expressed in kg/h and t/y

- h) If the emissions data are calculated it shall be necessary to cite and include the calculations in support of such data.
- i) The inventory of VOC emissions may be combined as one pollutant (total VOCs) with the exception of emissions of any HAP as listed in Table 2C.
- j) Estimated inventory of six greenhouse gases--carbon dioxide, methane, nitrous oxide, hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulfur hexafluoride (SF6) from all point sources as per Kyoto Protocol

2.12 Tables

Table 2A : Ambient Air Quality Standards

S/N	Pollutant	Averaging Period	Maximum Concentrations ⁽¹⁾	
			µg/m ³	ppm
1	Ammonia (NH ₃)	Hourly	1800	2.6
2	Arsenic	Hourly	0.1 ⁽⁹⁾	-
		Annual	0.01 ⁽⁹⁾	-
3	Acrylonitrile*	Hourly	43 ⁽⁹⁾	0.02
		Annual	2 ⁽⁹⁾	0.0009
4	Benzene (C ₆ H ₆)	Hourly	30 ⁽⁹⁾	0.009
		Annual	3 ⁽⁹⁾	0.0009
5	Butadiene 1,3	24 Hours	10 ⁽¹⁰⁾	0.0045
		Annual	2 ⁽¹⁰⁾	0.0009
6	Carbon Monoxide (CO)	Hourly ⁽²⁾	40000	35
		8 Hours ⁽²⁾	10000	9
7	Chlorine (Cl ₂)	Hourly	300	0.21
		24 Hours	10	0.007
8	Formaldehyde	Hourly	65 ⁽⁹⁾	0.053
9	Fluorides	Monthly	1.0	0.001
10	Hydrogen Sulfide (H ₂ S)	Hourly ⁽³⁾	200	0.14
		24 Hours ⁽³⁾	40	0.03
11	Hydrogen Fluoride	Hourly	4.9 ⁽⁹⁾	0.006
12	Inhalable Particulates (PM 10) ⁽⁴⁾⁽⁵⁾	24 Hours	150	-
		Annual	50	-
13	Inhalable Particulates (PM 2.5) ⁽⁵⁾⁽⁶⁾	24 Hours	35	-
		Annual	15	-
14	Lead	Hourly	1.5 ⁽⁹⁾	-
		24 Hours	0.5 ⁽¹⁰⁾	-
		Monthly	0.2 ⁽¹⁰⁾	-
15	Nitrogen Oxides as (NO ₂)	Hourly ⁽²⁾	660	0.35
		Annual	100	0.05
16	Non-Methane Hydrocarbon ⁽⁷⁾ (NMHC)	3 hours	160	0.24
17	Nickel	24 Hours	0.1 ⁽¹⁰⁾	-
		Annual	0.02 ⁽¹⁰⁾	-
18	Ozone (O ₃)	Hourly ⁽²⁾	235	0.12
		8 Hours ⁽⁸⁾	160	0.075
19	Phosgene*	Hourly	4 ⁽⁹⁾	0.001
20	Sulphate	24 Hours	25	-
21	Sulfur Dioxide (SO ₂)	Hourly ⁽²⁾	730	0.28
		24 Hours ⁽³⁾	365	0.14
		Annual	80	0.03
22	Styrene	Hourly	215 ⁽⁹⁾	0.052
23	Toluene Diisocyanate (TDI)*	24 Hours	0.2 ⁽¹⁰⁾	0.00003
24	Vinyl Chloride ⁽¹²⁾	Hourly	130 ⁽⁹⁾	0.051
		24 Hours	26	0.01
		Annual	0.2 ⁽¹⁰⁾	0.00008

Notes: Refer next Table 2A-I

Table 2A-1 : Ambient Air Quality Guideline Values

S/N	Pollutant	Averaging Period	Maximum Concentrations ⁽¹⁾	
			µg/m ³	ppm
1	Acetaldehyde	Hourly	90 ⁽⁹⁾	0.05
2	Acrylic Acid	Hourly	60 ⁽⁹⁾	0.02
		Annual	1 ⁽⁹⁾	0.00034
3	Acetic Acid	Hourly	250 ⁽⁹⁾	0.102
4	Acetone	Hourly	5900 ⁽⁹⁾	2.4
5	Bromine	24 Hours	20 ⁽¹⁰⁾	0.006
6	Bromoform	24 Hours	55 ⁽¹⁰⁾	0.005
7	Cadmium	24 Hours	0.025 ⁽¹⁰⁾	-
		Annual	0.005	-
8	Carbon Disulfide	Hourly	30 ⁽⁹⁾	0.01
9	Carbon Tetrachloride	24 Hours	2.4 ⁽¹⁰⁾	0.0004
10	Chloroform	24 Hours	1 ⁽¹⁰⁾	0.0002
		Annual	0.2 ⁽¹⁰⁾	0.00004
11	Cumene	Hourly	500 ⁽⁹⁾	0.1
12	Ethylbenzene	24 Hours	1000 ⁽¹⁰⁾	0.23
13	Ethylene	24 Hours	40 ⁽¹⁰⁾	0.035
14	Ethylene Oxide	24 Hours	0.2 ⁽¹⁰⁾	0.00011
		Annual	0.04 ⁽¹⁰⁾	0.00002
15	Ethylene Dibromide	24 Hours	3 ⁽¹⁰⁾	0.0004
16	Ethylene Dichloride	24 Hours	2 ⁽¹⁰⁾	0.0005
		Annual	0.4 ⁽¹⁰⁾	0.0001
17	Hydrogen Cyanide	24 Hours	8 ⁽¹⁰⁾	0.0072
18	Hydrogen Chloride	Hourly	75 ⁽⁹⁾	0.05
19	Hydrogen Iodide	Monthly	5 ⁽¹³⁾	-
20	Manganese	Hourly	2 ⁽⁹⁾	-
		Annual	0.2 ⁽⁹⁾	-
21	Methanol	Hourly	2600 ⁽⁹⁾	2
22	Methylene Bisphenyl diisocyanate (MDI)	Hourly	0.51 ⁽⁹⁾	0.00005
23	Napthalene	24 Hours	22.5 ⁽¹⁰⁾	0.0043
24	PAH as Benzo[a] Pyrene ⁽¹¹⁾	Annual	0.001	-
25	Phenol	Hourly	100 ⁽⁹⁾	0.026
		24 Hours	30 ⁽¹⁰⁾	0.0078
26	Propylene	24 Hours	4000 ⁽¹⁰⁾	2.324
27	Propylene Oxide	24 Hours	1.5 ⁽¹⁰⁾	0.0006
		Annual	0.3 ⁽¹⁰⁾	0.0001
28	Pyridine	24 Hours	150 ⁽¹⁰⁾	0.463
29	Polymeric Methylene diphenyl diisocyanate(PMDI)	24 Hours	0.7 ⁽¹⁰⁾	0.0006
30	Tetrachloroethylene	24 Hours	250	-
31	Toluene	Hourly	1880 ⁽⁹⁾	0.499
		24 Hours	400 ⁽⁹⁾	0.106
32	Vanadium	24 Hours	1	-
33	Xylene	Hourly	2300 ⁽⁹⁾	0.53
		24 Hours	700 ⁽⁹⁾	0.161

Notes (For Table 2A & Table 2A-I):

* Not applicable to Yanbu Industrial City.

- 1) Reference conditions are 25 C and 760 mm Hg.
- 2) Not to be exceeded more than twice per thirty days.
- 3) Not to be exceeded more than once per year.
- 4) Inhalable particulates: < 10 microns equivalent aerodynamic diameter.
- 5) The exceedance of the 24-hour or annual inhalable particulate standard as a result of abnormal natural background concentrations shall not be considered a violation of the standard.
- 6) Inhalable particulates: < 2.5 microns equivalent aerodynamic diameter.
- 7) There is no adopted standard for NMHC; this level is a goal to aid in the control of ambient ozone concentrations. Sampling period 0600 - 0900 hours.
- 8) Maximum daily 8 hours.
- 9) Alberta Ambient Air Quality Objectives and Guidelines Issued in August 2012.
- 10) Ontario's Ambient Air Quality Criteria, Standards development branch Ontario Ministry of the Environment, April 2012. PIBS # 6570e01.
- 11) Air Quality Standards European Commission.
- 12) USEPA value is provided as WHO Guideline Value is given in terms of unit risk of liver cancer in humans i.e. one person in million under $1 \mu\text{g}/\text{m}^3$ concentration for life time exposure.
- 13) Expert Panel on Air Quality Standards – Addendum to Guidelines for Halogens and Hydrogen Halides in Ambient Air, Dept. for Environment, Food and Rural Affairs, Scottish Executive, National Assembly of Wales, Dept. of Environment in Northern Ireland, 2009.

Table 2B: Air Pollution Source Standards ⁽¹⁾

S.N	INDUSTRY	SOURCE	POLLUTANT	EMISSION STANDARD ⁽²⁾
1	General ⁽³⁾ All facilities	All sources	Particulate	20% Opacity above background
			Asbestos	No emissions allowed
		Stockpiles	Particulate	10% Opacity above background
		Cooling Towers	Particulate	< 0.0005% Drift Losses of Total Circulated Water
		Point sources	Visible Emissions	20% maximum opacity except for 6 minutes for any continuous 60 minutes period and except for water vapor
		Sources emitting >100g/h organic HAP ⁽¹⁹⁾ ⁽⁴⁾ <i>Constructed after September 1, 2005</i>	VOC (Total)	20 mg/m ³⁽⁵⁾
		Sources emitting >2kg/h or 5t/y non-HAP VOC ⁽⁴⁾ <i>Constructed after September 1, 2005</i>	VOC (Total)	80 mg/m ³⁽⁵⁾
		For components in VOC service	Fugitive VOC	10,000 ppmv
		For valves, connectors and flanges in organic HAP ⁽¹⁹⁾ service (see Table 2C)	Fugitive organic HAP	500 ppmv
		Acid gas flares	Visible emissions	No more than 20% opacity for 6 min. within any one hour period
		Process flares	Visible emissions	No more than 5 minutes of visible emission within any two hour period
		Flares: steam assisted ⁽⁶⁾	VOC	$H_t \geq 11.2 \text{ MJ/scm}$ $V_{\max} < 122 \text{ m/s}$ if $H_t > 37.3 \text{ MJ/scm}$ $\log_{10} (V_{\max}) = < (H_t + 28.8) / 31.7$ if $H_t < 37.3 \text{ MJ/scm}$
		Flares: air assisted ⁽⁶⁾	VOC	$H_t \geq 11.2 \text{ MJ/scm}$ $V_{\max} = < 8.706 + 0.7084(H_t)$
		Flares: non-assisted ⁽⁶⁾	VOC	$H_t \geq 7.45 \text{ MJ/scm}$ $V_{\max} < 122 \text{ m/s}$ if $H_t > 37.3 \text{ MJ/scm}$ $\log_{10} (V_{\max}) = < (H_t + 28.8) / 31.7$ if $H_t < 37.3 \text{ MJ/scm}$

Table 2B: Air Pollution Source Standards (cont.)

S.N	INDUSTRY	SOURCE	POLLUTANT	EMISSION STANDARD ⁽²⁾
2	Abrasive Blasting	Sandblasting	Silica	<5% silica in abrasives used in outdoor blasting
3	Aluminum Reduction Plants	Potlines	Total fluorides	0.6 kg/t of aluminum produced
			Opacity	10 percent
		Potlines at soderberg plants	POM ⁽¹⁸⁾	0.32kg/t of aluminum produced
		Paste production plants (continuous)	POM ⁽¹⁸⁾	0.175 kg/t of paste produced
		Paste production plants (batch)	POM ⁽¹⁸⁾	0.38 kg/t of paste produced
		Anode bake plants	Total fluorides	0.01 kg/t of green anode produced
		Bauxite grinding Calcining of aluminum hydroxide	POM ⁽¹⁸⁾ Particulates Particulates Opacity	0.025 kg/t of green anode produced 0.06 kg/t 2.00 kg/t 20 percent
	Pitch Storage Tanks ⁽²¹⁾	POM ⁽¹⁸⁾	Reduce inlet emissions by 95% or more	
4	Ammonia Fertilizers (including urea)	Granulators and others	Particulates ⁽⁷⁾	0.25 kg/ t 0.35 kg / t (Constructed before September 1, 2005)
			Ammonia	50 mg/Nm ^{3 (7)} 150 mg/Nm ^{3 (7)} (Constructed before September 1, 2005)
		Prilling towers	Particulates ⁽⁷⁾	0.5 kg/ t 1.25 kg / t (Constructed before September 1, 2005)
			Ammonia	50 mg/Nm ^{3 (7)} 85 mg/Nm ^{3 (7)} (Constructed before September 1, 2005)
		Primary Ammonia Reformer ⁽²²⁾ For new facilities (constructed after Sep 2005) For existing facilities (constructed before Sep 2005)	NOx (as NO ₂ at 3% O ₂) NOx (as NO ₂ at 3% O ₂)	150 mg/Nm ³ (75 ppmv) , 0.45 kg/t of product ⁽²⁶⁾ 300 mg/Nm ³ (150 ppmv) , 0.9 kg/t of product ⁽²⁶⁾
5	Ammonium Sulphate manufacturing	Ammonium Sulphate dryer	Particulates	0.15 kg/t of ammonium sulphate produced
			Opacity	15 percent
			Ammonia	50 mg/Nm ³
6	Asphalt / Concrete Plants	All emission points	Particulates	90 mg/dscm
		Fuel gas combustion	Opacity	20 percent

Table 2B: Air Pollution Source Standards (cont.)

S.N	INDUSTRY	SOURCE	POLLUTANT	EMISSION STANDARD ⁽²⁾
7	Beverage Can Surface Coating Industry	Coating operations	VOC	0.29 kg/l of coating solids from each two-piece can exterior base coating
			VOC	0.46 kg/l of coating solids from each two-piece can clear base coating operation AND from each over-varnish coating operation
			VOC	0.89 kg/l of coating solids from each two-piece can inside spray coating operation
8	Boilers and Industrial Furnaces (BIF) Burning Hazardous Materials	Stack gases	Organic Emissions	99.99% Destruction and removal efficiency
			CO	Not to exceed 100 ppmv on an hourly rolling average basis, corrected to 7% oxygen, dry gas basis
			NO _x	As Combustion Device standards (modified facilities constructed after September 1,2005- Facilities not combusting chlorinated organics)
			SO ₂	As Combustion Device standards (modified facilities constructed after September 1,2005)
			Particulate	180 mg/dscm after correction to 7% oxygen stack gas concentration
			Chlorinated Organics	99.9999% Destruction and removal efficiency
			Metals	Sb - 1500 g/h; Pb - 430 g/h Ag - 1.5x10 ⁴ g./h; Ba - 2.5x10 ⁵ g/h Hg - 1500 g/h; Tl - 1500 g/h As -11 g/h; Cd - 28 g/h Cr - 4.2 g/h; Be - 21 g/h
9	Brick & Clay Products	Raw material handling - grinders	Particulates	38 kg/t of product ⁽¹⁷⁾
		Raw material handling - dryers	Particulates	35 kg/t of product ⁽¹⁷⁾
		Raw material handling - storage	Particulates	17 kg/t of product ⁽¹⁷⁾
10	Chlorine Manufacturing	Exit gases	Chlorine gas ⁽⁸⁾	30 mg/m ³

Table 2B: Air Pollution Source Standards (cont.)

S.N	INDUSTRY	SOURCE	POLLUTANT	EMISSION STANDARD ⁽²⁾
11	Combustion Facilities (Constructed before September 1, 2005)	Fossil-fuel fired steam generating unit or furnaces with a heat input capacity more than 250 MBTU/h (73MW)	Particulates	43 ng/J (0.1 lb/MBTU)
			SO ₂	340 ng/J (0.8 lb/MBTU)
			NO _x	86 ng/J (0.2 lb/MBTU) gas fired 130 ng/J (0.3 lb/MBTU) oil fired
		Electric utility steam generating units operated on fossil fuel with more than 250 MBTU/h (73 MW) electrical output	Particulates	13 ng/J (0.03 lb/MBTU)
			SO ₂	340 ng/J (0.8 lb/MBTU)
			NO _x	86 ng/J (0.2 lb/MBTU) gas fired 130 ng/J (0.3 lb/MBTU) oil fired
		Industrial/commercial/institutional steam generating units or furnaces with a heat capacity more than 100 MBTU/h (29 MW)	Particulates	43 ng/J (0.1 lb/MBTU)
			SO ₂	215 ng/J (0.5 lb/MBTU) when <30% heat input derived from oil 340 ng/J (0.8 lb/MBTU) when >30% heat input derived from oil
			NO _x ⁽⁹⁾	86 ng/J (0.2 lb/MBTU) gas fired 130 ng/J (0.3 lb/MBTU) oil fired
		Small industrial/commercial/institutional steam generating units /furnaces with a heat capacity 100 MBTU/h (29MW) or less but greater than or equal to 10 MBTU/h (2.9MW)	SO ₂	215 ng/J (0.5 lb/MBTU)
		Stationery gas turbines with heat input > 3 MW	NO _x	NO _x = 0.0150 (14.4)/Y + F; percent by Volume calculated @ 15% O ₂ dry basis ⁽⁹⁾
			SO ₂	0.015% by vol. @ 15% O ₂ dry basis
			Turbine fuel	< 0.8% sulphur by weight
		Stationery gas turbines with heat input > 29 MW	NO _x	NO _x = 0.0075 (14.4)/Y + F; percent by volume calculated @ 15% O ₂ dry basis ⁽⁹⁾
SO ₂	0.015% by vol. @ 15% O ₂ dry basis			
Turbine fuel	< 0.8% sulphur by weight			

Table 2B: Air Pollution Source Standards (cont.)

S.N	INDUSTRY	SOURCE	POLLUTANT	EMISSION STANDARD ⁽²⁾
12	Combustion Facilities (Constructed or modified after September 1, 2005 facilities)	Fossil-fuel fired steam generating unit or furnaces with a heat input capacity more than 250 MBTU/h (73MW) (Note: HF, HCl and Heavy metals are not applicable for facilities using gaseous fuel.)	Particulates	43 ng/J (0.1 lb/MBTU)
			SO ₂	340 ng/J (0.8 lb/MBTU)
			NO _x	43 ng/J (0.1 lb/MBTU) gas fired 69 ng/J (0.16 lb/MBTU) oil fired
			Hydrogen Chloride	0.000050 ng / J ⁽²³⁾
			Hydrogen Fluoride	0.000050 ng / J ⁽²³⁾
			Heavy Metals	Heavy Oil Combustion Source ⁽²³⁾
			Antimony	0.001512 ng / J
			Arsenic	0.000378 ng / J
			Beryllium	0.000063 ng / J
			Cadmium	0.000025 ng / J
		Chromium	0.002520 ng / J	
		Cobalt	0.003780 ng / J	
		Lead	0.001008 ng / J	
		Manganese	0.002520 ng / J	
		Nickel	0.011340 ng / J	
		Selenium	0.002520 ng / J	
		Mercury	0.000013 ng / J	
		Electric utility steam generating units operated on fossil fuel with more than 250 MBTU/h (73 MW) electrical output	Particulates	13 ng/J (0.03 lb/MBTU)
			SO ₂	340 ng/J (0.8 lb/MBTU)
			NO _x ⁽¹¹⁾	43 ng/J (0.1 lb/MBTU) gas fired 69 ng/J (0.16 lb/MBTU) oil fired
Industrial/commercial/institutional steam generating units or furnaces with a heat capacity more than 100 MBTU/h (29 MW)	Particulates	43 ng/J (0.1 lb/MBTU)		
	SO ₂	215 ng/J (0.5 lb/MBTU) when <30% heat input derived from oil 340 ng/J (0.8 lb/MBTU) when >30% heat input derived from oil		
	NO _x ^(10,11)	43ng/J (0.1 lb/MBTU) gas fired 69ng/J (0.16 lb/MBTU) oil fired		
Small industrial/commercial/institutional steam generating units /furnaces with a heat capacity 100 MBTU/h (29MW) or less but greater than or equal to 10 MBTU/h (2.9MW)	SO ₂	215 ng/J (0.5 lb/MBTU)		
Stationery gas turbines with heat input > 100 MW	NO _x ⁽¹⁰⁾	9 ppmv @ 15 % O ₂ dry basis		
	SO ₂	0.015% by vol. @ 15% O ₂ dry basis		
	Sulfur contents of Turbine fuel	< 0.8% sulphur by weight		

Table 2B: Air Pollution Source Standards (cont.)

S.N	INDUSTRY	SOURCE	POLLUTANT	EMISSION STANDARD ⁽²⁾
12 Con.	Combustion Facilities (Continued)	Stationery gas turbines with heat input > 10 MW and <100MW	NO _x ⁽¹⁰⁾	25 ppmv @ 15 % O ₂ dry basis
			SO ₂	0.015% by vol. @ 15% O ₂ dry basis
			Sulfur contents of Turbine fuel	< 0.8% sulphur by weight
		Stationery gas turbines with heat input < 10 MW	NO _x ⁽¹⁰⁾	42 ppmv @ 15 % O ₂
			SO ₂	0.015% by vol. @ 15% O ₂ dry basis
			Sulfur contents of Turbine fuel	< 0.8% sulphur by weight
Duct burner	NO _x	86 ng/J (0.2 lb/MBTU) gas fired 130 ng/J (0.3 lb/MBTU) oil fired		
13	Ferroalloy Production Facilities (Electric Arc Furnaces)	Silicon metal, ferrosilicon, calcium Silicone or silico-manganese zirconium	Particulates	0.45 kg/MW-hr.
		High carbon ferrochrome, charge chrome, standard ferro-manganese, silicomanganese, calcium carbide or silvery iron	Particulates	0.23 kg/MW-hr.
		Ferrochromesilicon, or ferromanganese silicon	Opacity	15 percent
			CO	20 percent by volume
14	Formaldehyde	Storage of formaldehyde solutions with vapor pressure =< 570 mm Hg	Formaldehyde	A floating roof is allowable if it can be shown that the emissions from all vents of the storage tank do not exceed 0.1 kg/hour of gas/vapor OR if the emissions through the tank vents exceed 0.1 kg/hour, a floating roof may be permitted if the concentration of formaldehyde in the vent gas does not exceed 20 mg/m ³ (STP), OR a sealed storage tank with vapor recovery is required
		Storage of formaldehyde solutions with vapor pressure => 570 mm Hg	Formaldehyde	A sealed storage tank with a vapor recovery system
		Waste Gases ⁽²⁴⁾	Formaldehyde	60 mg/m ³
15	Glass Fibre Manufacturing Plants	Exit gases	Particulates	5.5 kg/t of glass fiber produced

Table 2B: Air Pollution Source Standards (cont.)

S.N	INDUSTRY	SOURCE	POLLUTANT	EMISSION STANDARD ⁽²⁾
16	Glass Manufacturing Plants	Glass melting furnace	Particulates	0.5 g/kg of glass produced
		Pressed and blown gas with borosilicate recipe melting furnace	Particulates	1.0 g/kg of glass produced
		Float Glass	NO _x ⁽²⁰⁾	5.5 lb/ston-24 hour (daily) average stack emission of 1000 mg/Nm ³ 4.1 lb/ston-30 day rolling average stack emission of 750 mg/Nm ³
			Ammonia ⁽²⁰⁾	≤5.0 ppm from any source using SCR Technology
		Textile/wool fiberglass melting furnace	Particulates	0.5 g/kg of glass produced
17	Grain Elevators	All sources except grain dryer	Particulates Opacity	0.023 g/dscm Zero percent
18	Graphic Arts Industry - Publication Rotogravure Printing and Flexographic Printing	Fugitive emissions	VOC	16 percent of total mass of VOC solvent and water contained in water borne Inks, used at a facility during one calendar month
19	Hazardous and Medical Waste Incineration ⁽¹²⁾ (Constructed before September 1, 2005 facilities)	Incinerator	Particulate	34 mg/dscm corrected to 7% oxygen
			Visible emissions	10% opacity except for no more than 6 minutes in any hour
			Sulphur dioxide	500 mg/dscm
			CO	100 mg/dscm
			Organics	>99.99% destruction and removal efficiency (DRE) for POHC ¹⁸
			Total Dioxins & Furans	30 ngTEQ/dscm @ 7% oxygen
			PCB	1 mg/kg PCB feed for a maximum one hour average concentration or >99.9999% destruction and removal efficiency (DRE)
			Hydrogen chloride	100 mg/dscm OR at least 99% removal efficiency if emission is > 1.8 kg/h
	Hydrogen fluoride		5 mg/dscm	
	Continue to next page	Continue to next page		

Table 2B: Air Pollution Source Standards (cont.)

S.N	INDUSTRY	SOURCE	POLLUTANT	EMISSION STANDARD ⁽²⁾
19 Con.	Hazardous and Medical Waste Incineration ⁽¹²⁾ (Constructed before September 1, 2005 facilities)	Incinerator (Continued)	Metals	Sb - 300 g/h; Pb - 90 g/h; Ag - 3000 g/h; Ba - 50,000 g/h; Hg 300 g/h; Tl - 300g/h; As -2.3 g/h; Cd - 5.4 g/h; Cr - 0.82 g/h; Cr - 0.82 g/h; Be - 4.0 g/h
		Incineration chamber	Minimum Temperature and Minimum Residence Time	850C for 1 second OR 1100C for 2 seconds where incineration of >1% halogenated organic substances (expressed as chlorine) takes place
20	Hazardous and Medical Waste incineration ⁽¹²⁾ (Constructed or modified after September 1, 2005 facilities) (Note: NO _x standard is applicable for facilities constructed after effective date of RCER-2015)	Incinerator	Particulate	34 mg/dscm corrected to 7% oxygen
			Visible emissions	10% opacity except for no more than 6 minutes in any hour
			NO _x ⁽²³⁾	400 mg/m ³ capacity < 6 tph 200 mg/m ³ capacity ≥ 6 tph
			Sulphur dioxide	50 mg/dscm
			CO	50 mg/dscm
			Chlorinated organics	>99.9999% destruction and removal efficiency (DRE) for POHC ¹⁸
			Organics	>99.99% destruction and removal efficiency (DRE) for POHC ¹⁸
			Total Dioxins & Furans	0.1 ngTEQ/dscm
			PCB	1 mg/kg PCB feed for a maximum one hour average concentration or >99.9999% destruction and removal efficiency (DRE)
			HCl	10 mg/dscm
			Hydrogen fluoride	1 mg/dscm
			TI + Cd	0.05 mg/dscm
			Sb + Pb + Co + As + Cr + Cu + Mn + Ni + V	0.5 mg/dscm
Hg	0.05 mg/dscm			
Continue to next page	Continue to next page			

Table 2B: Air Pollution Source Standards (cont.)

S.N	INDUSTRY	SOURCE	POLLUTANT	EMISSION STANDARD ⁽²⁾
20 Con.	Hazardous and Medical Waste incineration ⁽¹²⁾ (Constructed or modified after September 1, 2005 facilities)	Incineration chamber	Minimum post combustion Temperature and Minimum Residence Time	850C for 2 second OR 1100C for 2 seconds where incineration of >1% halogenated organic substances (expressed as chlorine) takes place
21	Hydrochloric Acid Plants	Hydrochloric acid plants Hydrochloric acid regenerating plants	HCl HCl Cl ₂	0.25 kg/t of acid produced 25 ppmv 6 ppmv
22	Industrial Surface Coating - Large Metal Appliances & Furniture	Coating	VOC	0.9 kg of VOC per litre of applied coating solids
23	Lead Acid Battery Manufacturing Plants	Lead reclamation facility	Lead Opacity	4.5 mg/dscm 5%
		Grid casting facility	Lead	0.4 mg/dscm
		Paste mixing facility	Lead	1.0 mg/dscm
		Other general operations	Lead	1.0 mg/dscm
		Lead oxide manufacturing	Lead	5 mg/kg of lead feed
		Any facility except lead reclamation	Opacity	0%
24	Lime Manufacturing Plants	Rotary lime-kiln emissions	Particulates	0.3 kg/t of stone feed
			Opacity	15 percent
25	Medical Waste Autoclave ⁽¹³⁾ (New) For regulated medical wastes	Gravity Flow Autoclave Vacuum Autoclave (subjected to a minimum of one pre-vacuum pulse to purge the autoclave of all air) Steam Sterilizer (subjected at 100% steam conditions and all air evacuated)		Temp. ≥121 C, Pres.=15 psig, R. T=>60mins Or Temp. ≥135 C, Pres.=31 psig, R.T =>45 mins Or Temp. ≥149 C, Pres.=52 psig, R.T =>30 mins Temp. ≥149 C, Pres.=15 psig, R. T=>45mins Or Temp. ≥135 C, Pres.=31 psig, R.T =>30 mins Temp. ≥121 C, Pres.=15 psig, R. T=>90mins Or Temp. ≥133 C, Pres.=27 psig, R.T =>45 mins Or Temp. ≥160 C, Pres.=80 psig, R.T =>16 mins

Table 2B: Air Pollution Source Standards (cont.)

S.N	INDUSTRY	SOURCE	POLLUTANT	EMISSION STANDARD ⁽²⁾
26	Metal Coil Surface Coating Paints	Fugitive emissions	VOC	0.28 kg/l of coating solids with no control 0.14 kg/l of coating solids with control
27	Mineral Processing Plants (Metallic)	Exit gases	Particulates	0.05 g/dscm
		Emissions from any source except wet scrubbing control device	Opacity	7 percent
28	Mineral Processing Plants (Non-Metallic)	Belt conveyors or other affected facility	Particulates Opacity	0.05 g/dscm 10 percent
29	Nitric Acid Plants	Exit gases	NO _x	1.5 kg/t of acid produced (expressed as 100 percent nitric acid)
			Opacity	10%
30	Petroleum Refineries	Fluid catalytic cracking unit catalyst Regenerator	Particulates	1.0 kg/t of coke burn-off
			Opacity	30 percent
			CO	500 ppm
			SO ₂ ⁽¹⁴⁾	50 ppm with an add-on control device OR 9.8 kg/t of coke burn-off without an add-on control device
		Fuel gas combustion	H ₂ S contents of fuel gas	<230 mg/dscm
		Claus sulfur recovery plants	SO ₂	250 ppm at zero percent oxygen on dry basis if emissions are controlled by an oxidation/reduction control system followed by incineration OR 300 ppm of reduced sulphur compounds and 10 ppm H ₂ S calculated as SO ₂ at 0% oxygen on a dry basis if emissions are controlled by reduction control system not followed by incineration
Continue to next page	Continue to next page	Reduced sulphur and H ₂ S		

Table 2B: Air Pollution Source Standards (cont.)

S.N	INDUSTRY	SOURCE	POLLUTANT	EMISSION STANDARD ⁽²⁾
30 Con.		Process Vent	Organic HAP ⁽¹⁹⁾	Reduce emissions of TOC by 98% by wt. OR to a concentration of 20 ppmv on a dry basis corrected to 3% oxygen OR combust the emissions in a flare
31	Pharmaceutical Plants	Process vents	Organic HAP ⁽¹⁹⁾	Reduce emissions of TOC by 98% by wt. OR to a concentration of 20 ppmv on a dry basis corrected to 3% oxygen OR combust the emissions in a flare
			Hydrogen halides and halogens	20 ppmv
32	Phosphate Fertilizer	Exit gases from any source	Total fluorides	10 g/t of equivalent P ₂ O ₅ feed
		Exit gases - super phosphoric acid plant	Total fluorides	5 g/t of equivalent P ₂ O ₅ feed
		Exit gases - diammonium phosphate plants	Total fluorides	30 g/t of equivalent P ₂ O ₅ feed
		Exit gases- triple super phosphate plants constructed after 1979	Total fluorides	100 g/t of equivalent P ₂ O ₅ feed
		Exit gases - granular superphosphate storage facilities	Total fluorides	0.25 g/hr/t of equivalent P ₂ O ₅ stored
33	Phosphate Rock Plants	Phosphorous plant	Polonium ⁽²⁵⁾	4.5 curies per year (Total emissions from plant)
		Phosphate rock dryer	Particulates	0.03 kg/t of rock feed
			Opacity	10 percent
		Phosphate rock calciner	Particulates	0.12 kg/t of rock feed
			Opacity	10 percent
			Polonium ⁽²⁵⁾	2 curies per year (same with nodulizing kiln)
		Phosphate rock grinder	Particulates	0.006 kg/t of rock feed
			Opacity	zero percent

Table 2B: Air Pollution Source Standards (cont.)

S.N	INDUSTRY	SOURCE	POLLUTANT	EMISSION STANDARD ⁽²⁾
34	Polymeric Coating (supporting Substrate Facilities)	Coating operation and coating mix operation	VOC	Install, operate and maintain a total enclosure around the coating operation and vent the captured VOC emissions from the total enclosure to a control device that is at least 95% efficient.
35	Polymer Manufacturing (Polypropylene; Polyethylene; Polystyrene)	All facilities with process vents	TOC ⁽¹⁵⁾	Reduce emissions of TOC by 98% by wt. OR concentration of 20 ppmv on a dry basis corrected to 3% oxygen OR combust emissions in a flare
36	Portland Cement Plants	Kiln gases	Particulates	150 g/t of feed to the kiln
			Opacity	20 percent
		Clinker cooler	Particulates	50 g/t of feed to the kiln
			Opacity	10 percent
		All other sources	Opacity	10 percent
		37	Primary Copper Smelters	Dryer gases
Roaster, smelting furnace or copper converter	SO ₂			650 ppm
	Opacity			20 percent
38	Primary Zinc Smelters	Sintering machine gases	Particulates	50 mg/dscm
		Roaster gases	SO ₂	650 ppm
		All units	Opacity	20 percent
39	Secondary Brass and Bronze Production	Exit gases from reverberatory furnace	Particulates	50 mg/dscm
			Opacity	20 percent
			Opacity	20 percent
40	Steel Plants - Electric Arc Furnace (EAF)	Electric arc furnace	Particulates	12 mg/dscm
		Exit gases from control device	Opacity	3 percent
		Exit gases from shop due to EAF	Opacity	6 percent during melting 20 percent during charging 40 percent during tapping
		Exit gases from dust handling system	Opacity	10 percent

Table 2B: Air Pollution Source Standards (cont.)

S.N	INDUSTRY	SOURCE	POLLUTANT	EMISSION STANDARD ⁽²⁾
41	Steel Plants - Basic Oxygen Furnaces for Making Molten Steel from Scrap	Furnace with a control device	Particulates	23 mg/dscm
			Opacity	10 percent
	Steel Pickling Plants	Pickling lines	HCl	18 ppmv or 97% control
42	Sulphuric Acid Plants	Exit gases	Acid mist including SO ₃ and H ₂ SO ₄ Vapors	75 g/t of acid produced (expressed as 100 percent sulphuric acid)
			Opacity	10%
			SO ₂	2 kg/t of acid produced (expressed as 100 percent sulphuric acid)
43	Synthetic Fibre Production Facilities	All facilities that produce acrylic and non-acrylic fibres	VOC	10 kg VOC/t of solvent (6 month rolling average)
		Facilities that produce only non-acrylic fibres	VOC	17 kg of VOC/t of solvent
44	Synthetic Organic Chemical Manufacturing Industry (SOCMI Processes):	1. Any air oxidation unit producing any of the chemicals listed in Table 2B (I) as a product or by-product 2. Any distillation operation producing any of the chemicals listed in Table 2B (II) as a product or by-product 3. Any reactor process ⁽¹⁶⁾ producing any of the chemicals listed in Table 2B (III) as a product or by-product	TOC ⁽¹⁵⁾	Reduce emissions of TOC by 98% by wt. OR to a concentration of 20 ppmv on a dry basis corrected to 3% oxygen OR combust the emissions in a flare
45	Titanium Dioxide Plant	Chlorinator, chlorine storage, chlorine	Chlorine ⁽¹⁷⁾	30 mg/m ³
		Material storage, material handling and bagging	Particulates	0.05 g/dscm
			Opacity	7% except for wet scrubbing system

Table 2B: Air Pollution Source Standards (cont.)

S.N	INDUSTRY	SOURCE	POLLUTANT	EMISSION STANDARD ⁽²⁾
46	Vinyl Chloride	Vents from equipment used in VCM formation; purification; and loading / unloading	Vinyl chloride	10 ppm (3 hourly average)
		Oxychlorination reactor	Vinyl chloride	0.2 g/kg of the 100% ethylene dichloride product from the oxychlorination process
47	Polyvinylchloride & Ethylene Dichloride Manufacturers (constructed or modified after September 1, 2005)	Polyvinyl chloride reactor; stripper; mixing, weighing and holding containers; and monomer recovery system	Vinyl chloride	10 ppm (3 hourly average)
		Ethylene dichloride unit	Vinyl chloride	10 ppm (3 hourly average)
		Oxychlorination reactor	Vinyl chloride	0.2 g/kg of the 100% ethylene dichloride product from the oxychlorination process

Notes:

1. The primary source of the standards is the United States Environmental Protection Agency (USEPA): Code of Federal Regulations (CFR) Title 40, Parts 60 - 63
2. Compliance with the standards will be determined by comparison with hourly average data, unless otherwise specified, that are corrected to standard temperature and pressure, moisture and oxygen content as specified by USEPA Methods.
3. General standards apply to all emissions sources unless individual facility standards are specified.
4. Standard derived from Benchmark Release Levels quoted in the IPC Guidance Note S2 4.04 Inorganic Chemicals, Environment Agency, UK September 1999.
5. Applies to facilities exempted by RC from conducting fugitive emission monitoring.
6. The maximum exit velocity of a flare (V_{max}) is calculated by dividing the maximum volumetric flow rate at STP by the cross-sectional area of the flare tip. (H_i) is the Net Heating Value of the gas being combusted.
7. Standard derived from European Fertilizer Manufacturers Association (EFMA)
8. Established from Federal Republic of Germany Environmental Law title Air Purity Regulations, Copyright 1978 by the Bureau of National Affairs
9. The value of F for Stationary Gas Turbines NO_x estimation shall be obtained using the following:

Y = manufacturer rated heat rate at manufacturer's rated peak load (kJ/Wh) OR actual measured heat rate based on lower heating value of fuel as measured at actual peak load for the facility. The value of Y shall not exceed 14.4 kJ/Wh

F = NO_x emission allowance for fuel bound nitrogen, defined below

N = fuel bound nitrogen

<u>Fuel Bound Nitrogen (Percent by weight)</u>	<u>F (NO_x by weight)</u>
N =< 0.015	0
0.015 <= N < 0.1	0.04(N)
0.1 < N < 0.25	0.004 + 0.0067(N - 0.1)
N > 0.25	0.005

10. Based on Best Available Control Technology 1991, TNRCC, Texas
11. For mixed fuel the standard is prorated according to the % heat input from derived from each fuel:

$$NO_x \text{ standard (ng/J)} = \frac{(\% \text{ heat input gas} \times NO_x \text{ standard gas}) + (\% \text{ heat input oil} \times NO_x \text{ standard oil})}{(\% \text{ heat input gas} + \% \text{ heat input oil})}$$

12. Additional guidelines for hazardous waste incineration are retained in the documents entitled "Emission Guidelines for Hazardous Waste Incineration Facilities" by PME.
13. New York State, Department of Environmental Conservation Regulations, Regulated Medical Waste Treatment Facilities, Subpart, Chapter IV, 360-17.5, 1999, 2000
14. The SO_2 limit shall be considered a seven-day rolling average
15. TOC = total organic compounds, less methane and ethane
16. Exemptions from the source standards for SOCM I reactor processes are as follows:
 - a) Any reactor process that is designed and operated as a batch operation
 - b) A process unit with a total design capacity for all chemicals produced within that unit of less than 1,000 tonnes per year
 - c) If the vent stream from an affected facility is routed to a distillation unit subject to the SOCM I standards and has no other releases to the atmosphere except for a PRV the facility is exempt
17. Based on EPA, compilation of Air Pollution Emission Factors, AP-42, 5th edition, Section 11.3, January 1995
18. POM = Polycyclic organic matter, POHC=Principal Organic Hazardous Constituent
19. Measured as individual organic Hazardous Air Pollutant(HAP) or as TOC⁽¹⁵⁾
20. Study on Controlling NO_x Emission from Float Glass Factory, RC-Yanbu ECD Study, May 31, 20070
21. USAEPA-Summary of Current MACT Emission Limits for New Sources Under 1997 NESHAP and Amendments 2005-Table 4

22. Best Available Techniques for Pollution Prevention and Control in European Fertilizer Industry Booklet No. 1 of 8: Production of Ammonia
23. USEPA-40 CFR 63.623-Table 1 to Subpart BB of Part 63-Emission Limits for New or Reconstructed Standards for New Sources
24. Germany's Federal Emission Control Act (Technical Instruction on Air Quality Control-TA Luft)
25. USEPA- 40 CFR 61.123, Subpart K, 54 FR 51699-National Emission Standards for Radionuclide
26. Best available techniques for pollution prevention and control in the European Fertilizer Industry, European Fertilizer Manufacturers' Association (EFMA)- 2000.

TABLE 2B (I)

**SYNTHETIC ORGANIC CHEMICAL MANUFACTURING INDUSTRIES (SOCMI) OXIDATION
 PROCESSES SUBJECT TO POINT SOURCE EMISSION STANDARDS**

CHEMICAL PRODUCT/BYPRODUCT	CHEMICAL PRODUCT/BY-PRODUCT
Acetaldehyde	Dimethyl terephthalate
Acetic Acid	Ethylene dichloride
Acetone	Ethylene oxide
Acetonitrile	Formaldehyde
Acetophenone	Formic acid
Acrolein	Glyoxal
Acrylic Acid	Hydrogen cyanide
Acrylonitrile	Isobutyric acid
Anthraquinone	Isophthalic acid
Benzaldehyde	Maleic anhydride
Benzoic acid; tech.	Methyl ethyl ketone
1.3-Butadiene	a-Methyl Styrene
1-Butyl benzoic acid	Phenol
N-Butyric acid	Phthalic anhydride
Crotonic acid	Propionic acid
Cumene hydroperoxide	Propylene oxide
Cyclohexanol	Styrene
Cyclohexanone	Terephthalic acid

TABLE 2B (II)
SYNTHETIC ORGANIC CHEMICAL MANUFACTURING INDUSTRIES (SOCMI)
DISTILLATION PROCESSES SUBJECT TO POINT SOURCE EMISSION STANDARDS

CHEMICAL PRODUCT/BY-PRODUCT	CHEMICAL PRODUCT/BY-PRODUCT
Acetaldehyde	Butylbenzyl phthalate
Acetaldol	Butylene glycol
Acetic Acid	tert-Butyl hydroperoxide
Acetic Anhydride	2-Butene-1,4-diol
Acetone	Butyraldehyde
Acetone cyanohydrin	Butyric anhydride
Acetylene	Caprolactam
Acrylic Acid	Carbon disulphide
Acrylonitrile	Carbon tetrabromide
Adipic Acid	Carbon tetrachloride
Adiponitrile	Chlorobenzene
Alcohols, C-11 or lower, mixtures	2-Chloro-4-(ethylamino)-6-(isopropylamino)-s-triazine
Alcohols, C-12 or higher, mixtures	Chloroform
Allyl chloride	p-Chloronitrobenzene
Amylene	Chloroprene
Amylenes, mixed	Citric acid
Aniline	Crotonaldehyde
Benzene	Crotonic acid
Benzenesulphonic acid	Cumene
Benzenesulphonic acid alkyl derivatives	Cumene hydroperoxide
Benzoic acid, tech.	Cyanuric chloride
Benzyl chloride	Cyclohexane
Biphenyl	Cyclohexane, oxidized
Bisphenol A	Cyclohexanol
Brometone	Cyclohexanone
1,3-Butadiene	Cyclohexanone oxime
Butadiene and butene fractions	Cyclohexene
n-Butane	1,3-Cyclopentadiene
1,4-Butanediol	Cyclopropane
Butanes, mixed	Diacetone alcohol
1-Butene	Dibutanized aromatic concentrate
2-Butene	1,4-Dichlorobutene
Butenes, mixed	3,4-Dichloro-1-butene
n-Butyl acetate	Dichlorodifluoromethane
Butyl acrylate	Dichlorodimethylsilane
n-Butyl alcohol	Dichlorohydrin
sec-Butyl alcohol	Diethanolamine
tert-Butyl alcohol	Diethylbenzene

**TABLE 2B (II) (cont.)
SYNTHETIC ORGANIC CHEMICAL MANUFACTURING INDUSTRIES (SOCMI)
DISTILLATION PROCESSES SUBJECT TO SOURCE EMISSION STANDARDS**

CHEMICAL PRODUCT/BY-PRODUCT	CHEMICAL PRODUCT/BY-PRODUCT
Diethylene glycol	Formaldehyde
Di-n-heptyl-n-nonyl undecyl phthalate	Glycerol
Di-isodecyl phthalate	n-Heptane
Diisononyl phthalate	Heptenes (mixed)
Dimethylamine	Hexadecyl chloride
Dimethyl terephthalate	Hexamethylene diamine
2,4 Dinitrotoluene	Hexamethylene diamine adipate
2,6 Dinitrotoluene	Hexamethylene tetramine
Diocetyl phthalate	Hexane
Dodecene	2-Hexenedinitrile
Dodecylbenzene, non-linear	3-Hexenedinitrile
Dodecylbenzenesulphonic acid	Hydrogen cyanide
Dodecylbenzenesulphonic acid, sodium salt	Isobutane
Epichlorohydrin	Isobutanol
Ethanol	Isobutylene
Ethanolamine	Isobutyraldehyde
Ethyl acetate	Isodecyl alcohol
Ethyl acrylate	Isooctyl alcohol
Ethyl benzene	Isopentane
Ethyl chloride	Isophthalic acid
Ethyl cyanide	Isoprene
Ethylene	Isopropanol
Ethylene dibromide	Ketene
Ethylene dichloride	Linear alcohols, ethoxylated, mixed
Ethylene glycol	Linear alcohols, ethoxylated, sulphated, sodium salt, mixed
Ethylene glycol monobutyl	Linear alkylbenzene
Ethylene glycol monoethyl ether	Magnesium acetate
Ethylene glycol monoethyl ether acetate	Maleic anhydride
Ethylene glycol monomethyl ether	Melamine
Ethylene oxide	Mesityl oxide
2-Ethylhexanol	Methacrylonitrile
2-Ethylhexyl alcohol	Methanol
2-Ethylhexyl amine	Methylamine
Ethylmethyl benzene	Methylbenzene diamine
6-ethyl-1,2,3,4-tetrahydro-9,10-anthracenedrone	Methyl chloride

**TABLE 2-B (II) (cont.)
SYNTHETIC ORGANIC CHEMICAL MANUFACTURING INDUSTRIES (SOCMI)
DISTILLATION PROCESSES SUBJECT TO POINT SOURCE EMISSION STANDARDS**

CHEMICAL PRODUCT/BY-PRODUCT	CHEMICAL PRODUCT/BY-PRODUCT
Methylene chloride	Propylene glycol
Methyl ethyl ketone	Propylene oxide
Methyl iodide	Sodium cyanide
Methyl isobutyl ketone	Sorbitol
Methyl methacrylate	Styrene
2-Methylpentane	Terephthalic acid
1-Methyl-1-2-pyrrolidone	1,1,2,2-Tetrachloroethane
Methyl tert-butyl ether	Tetraethyl lead
Naphthalene	Tetramethyl lead
Nitrobenzene	Tetra (methyl-ethyl) lead
1-Nonene	Tetrahydrofuran
Nonyl alcohol	Toluene
Nonyl phenol	Toluene 2,4-diamine
Nonylphenol, ethoxylated	Toluene 2,4-(and 2,6)-diisocyanate (80/20 mixture)
Octene	Tribromomethane
Oil soluble petroleum sulphonate, calcium salt	1,1,1-Trichloroethane
Oil soluble petroleum sulphonate, sodium salt	1,1,2-Trichloroethane
Pentaerythritol	Trichloroethylene
n-Pentane	Trichlorofluoromethane
3-Pentene nitrile	1,1,2-Trichloro-1,2,2-trifluoroethane
Pentenes mixed	Triethanolamine
Perchloroethylene	Triethylene glycol
Phenol	Vinyl acetate
1-Phenylethyl hydroperoxide	Vinyl chloride
Phenyl propane	Vinylidene chloride
Phosgene	m-Xylene
Phthalic anhydride	o-Xylene
Propane	p-Xylene
Propionaldehyde	Xylenes, mixed
Prionic acid	m-Xylenol
Propyl alcohol	
Propylene	
Propylene chlorohydrin	

TABLE 2B (III)
SYNTHETIC ORGANIC CHEMICAL MANUFACTURING INDUSTRIES (SOCMI) REACTOR
PROCESSES SUBJECT TO POINT SOURCE EMISSION STANDARDS

CHEMICAL PRODUCT/BY-PRODUCT	CHEMICAL PRODUCT/BY-PRODUCT
Acetaldehyde	Butyraldehyde
Acetic Acid	Butyric anhydride
Acetic Anhydride	Caprolactam
Acetone	Carbon disulphide
Acetone cyanohydrin	Carbon tetrachloride
Acetylene	Chlorobenzene
Acrylic Acid	Chloroform
Acrylonitrile	p-Chloronitrobenzene
Adipic Acid	Citric acid
Adiponitrile	Cumene
Alcohols, C-11 or lower, mixtures	Cumene hydroperoxide
Alcohols, C-12 or higher, mixtures	Cyanuric chloride
Allyl chloride	Cyclohexane
Amylene	Cyclohexane, oxidized
Amylenes, mixed	Cyclohexanol
Aniline	Cyclohexanone
Benzene	Cyclohexanone oxime
Benzenesulphonic acid	Cyclohexene
Benzenesulphonic acid alkyl derivatives	Cyclopropane
Benzyl chloride	Diacetone alcohol
Bisphenol A	1,4-Dichlorobutene
Brometone	3,4-Dichloro-1-butene
1,3-Butadiene	Dichlorodifluoromethane
Butadiene and butene fractions	Dichlorodimethylsilane
n-Butane	Diethanolamine
1,4-Butanediol	Diethylbenzene
Butanes, mixed	Diethylene glycol
1-Butene	Di-isodecyl phthalate
2-Butene	Dimethyl terephthalate
Butenes, mixed	2,4 Dinitrotoluene
n-Butyl acetate	2,6 Dinitrotoluene
Butyl acrylate	Diocetyl phthalate
n-Butyl alcohol	Dodecene
sec-Butyl alcohol	Dodecylbenzene, non-linear
tert-Butyl alcohol	Dodecylbenzenesulphonic acid
Butylbenzyl phthalate	Dodecylbenzenesulphonic acid, sodium salt
tert-Butyl hydroperoxide	Epichlorohydrin
2-Butene-1,4-diol	Ethanol

TABLE 2B (III) (cont.)
SYNTHETIC ORGANIC CHEMICAL MANUFACTURING INDUSTRIES (SOCMI) REACTOR
PROCESSES SUBJECT TO POINT SOURCE EMISSION STANDARDS

CHEMICAL PRODUCT/BY-PRODUCT	CHEMICAL PRODUCT/BY-PRODUCT
Ethanolamine	Isopropanol
Ethyl acetate	Ketene
Ethyl acrylate	Linear Alcohols, ethoxylated, mixed
Ethyl benzene	Linear Alcohols, ethoxylated, sulphated, sodium salt, mixed
Ethyl chloride	Linear alkylbenzene
Ethylene	Magnesium acetate
Ethylene dibromide	Maleic anhydride
Ethylene dichloride	Mesityl oxide
Ethylene glycol	Methanol
Ethylene glycol monobutyl	Methylamine
Ethylene glycol monoethyl ether	Methylbenzene diamine
Ethylene glycol monoethyl ether acetate	Methyl chloride
Ethylene glycol monomethyl ether	Methylene chloride
Ethylene oxide	Methyl ethyl ketone
2-Ethylhexanol	Methyl isobutyl ketone
2-Ethylhexyl amine	Methyl methacrylate
6-ethyl-1,2,3,4-tetrahydro-9,10-anthracenedrone	1-Methyl-1-2-pyrrolidone
Formaldehyde	Methyl tert-butyl ether
Glycerol	Naphthalene
n-Heptane	Nitrobenzene
Heptenes (mixed)	1-Nonene
Hexadecyl chloride	Nonyl alcohol
Hexamethylene diamine	Nonyl phenol
Hexamethylene diamine adipate	Nonylphenol, ethoxylated
Hexamethylene tetramine	Octene
Hexane	Oil soluble petroleum sulphonate, calcium salt
2-Hexenedinitrile	Pentaerythritol
3-Hexenedinitrile	3-Pentene nitrile
Hydrogen cyanide	Pentenes mixed
Isobutane	Perchloroethylene
Isobutanol	Phenol
Isobutylene	1-Phenylethyl hydroperoxide
Isobutyraldehyde	Phenyl propane
Isopentane	Phosgene
Isoprene	Phthalic anhydride

**TABLE 2-B (III) (cont.)
 SYNTHETIC ORGANIC CHEMICAL MANUFACTURING INDUSTRIES (SOCMI) REACTOR
 PROCESSES SUBJECT TO POINT SOURCE EMISSION STANDARDS**

CHEMICAL PRODUCT/BY-PRODUCT	CHEMICAL PRODUCT/BY-PRODUCT
Propane	Tribromomethane
Propionaldehyde	1,1,1-Trichloroethane
Propyl alcohol	1,1,2-Trichloroethane
Propylene	Trichloroethylene
Propylene glycol	Trichlorofluoromethane
Propylene oxide	1,1,2-Trichloro-1,2,2-trifluoroethane
Sorbitol	Triethanolamine
Styrene	Triethylene glycol
Terephthalic acid	Vinyl acetate
Tetraethyl lead	Vinyl chloride
Tetramethyl lead	Vinylidene chloride
Tetra (methyl-ethyl) lead	m-Xylene
Tetrahydrofuran	o-Xylene
Toluene	p-Xylene
Toluene 2,4-diamine	Xylenes, mixed
Toluene 2,4-(and 2,6)-diisocyanate (80/20 mixture)	

**TABLE 2C
HAZARDOUS AIR POLLUTANTS (HAP)**

ORGANIC HAPs	ORGANIC HAPs
Acetaldehyde	p-Cresol
Acetamide	o-Cresol
Acetonitrile	Cumene
Acetophenone	2,4-D (salts & esters)
2-Acetylaminofluorene	DDE
Acrolein	Diazomethane
Acrylamide	Dibenzofurans
Acrylic Acid	1,2-Dibromo 3-chloropropane
Acrylonitrile	Dibutylphthalate
Allyl chloride	1,4-Dichlorobenzene
4-Aminodiphenyl	3,3-Dichlorobenzidine
Aniline	Dichloroethyl ether
o-Anisidine	1,3-Dichloropropane
Benzene	Dichlorvos
Benzidine	Diethanoloamine
Benzotrichloride	N,N-Diethylaniline
Benzyl chloride	N,N-Dimethylaniline
Biphenyl	Diethyl sulphate
Bis (2-ethylhexyl) phthalate (DEHP)	3,3-Dimethoxybenzidine
Bis(chloromethyl) ether	Dimethyl aminoazobenzene
Bromoform	3,3-Dimethyl benzidine
1,3-Butadiene	Dimethyl carbonyl chloride
Calcium cyanamide	Dimethyl formamide
Captan	1,1-Dimethyl hydrazine
Caprolactam	Dimethyl phthalate
Carbaryl	Dimethyl sulphate
Carbon disulphide	4,6-Dinitro-o-cresol; and salts
Carbon tetrachloride	2,4-Dinitrophenol
Carbonyl sulphide	2,4-Dinitrotoluene
Catechol	1,4-Dioxane (1,4-Diethylene oxide)
Chloramben	1,2-Diphenyl hydrazine
Chlordane	Epichlorohydrin
Chloroacetic acid	1,2-Epoxybutane
2-Chloroacetophenone	Ethyl acrylate
Chlorobenzene	Ethyl benzene
Chlorobenzylate	Ethyl carbamate (urethane)
Chloroform	Ethyl chloride
Chloromethyl methyl ether	Ethylene dibromide
Chloroprene	Ethylene dichloride
Cresols/Cresylic Acid	Ethylene glycol
m-Cresol	Ethyleneimine (Aziridine)

**TABLE 2C (cont.)
HAZARDOUS AIR POLLUTANTS (HAP)**

ORGANIC HAPs	ORGANIC HAPs
Ethylene oxide	N-Nitrosodimethylamine
Ethylene thio-urea	N-Nitrosomorpholine
Ethylene chloride	N-Nitroso N-methyl urea
Formaldehyde	Parathion
Glycol ethers ¹	Pentachloronitrobenzene
Heptachlor	Pentachlorophenol
Hexachlorobenzene	Phenol
Hexachlorobutadiene	p-Phenylenediamine
Hexachlorocyclopentadiene	Phosgene
Hexachloroethane	Phosphorus
Hexamethylene 1,6-diisocyanate	Phthalic anhydride
Hexamethylphosphoramide	Polychlorinated biphenyls
Hexane	Polycyclic Organic Matter ²
Hydrazine	1,3-Propane sulphone
Hydroquinone	Beta-propiolactone
Isophorone	Propionaldehyde
Lindane (all isomers)	Propoxur
Maleic anhydride	Propylene dichloride
Methanol	Propylene oxide
Methoxychlor	1,2-Propyleneimine
Methyl bromide (bromomethane)	Quinoline
Methyl chloride (chloromethane)	Quinone
Methyl chloroform	Styrene
Methyl ethyl ketone (2-Butanone)	Styrene oxide
Methyl hydrazine	2,3,7,8-tetrachlorodibenzo-p-dioxin
Methyl iodide	1,1,2,2-Tetrachloroethane
Methyl isobutyl ketone	Tetrachloroethylene
Methyl isocyanate	Titanium tetrachloride
Methyl methacrylate	Toluene
Methyl-tert-butyl ether	2,4-Toluene diamine
4,4-Methylene bis (2-chloroaniline)	2,4-Toluene diisocyanate
Methylene chloride (dichloromethane)	o-Toluidine
Methylene diphenyl diisocyanate	Toxaphene (chlorinated camphene)
4,4-Methylenedianiline	1,2,4-Trichlorobenzene
Napthalene	1,1,2-Trichloroethane
Nitrobenzene	Trichloroethylene
4-Nitrobiphenyl	2,4,5-Trichlorophenol
4-Nitrophenol	2,4,6-Trichlorophenol
2-Nitropropane	Triethylamine

**TABLE 2C (cont.)
HAZARDOUS AIR POLLUTANTS (HAP)**

ORGANIC HAPs	NON-ORGANIC HAPs
Trifluraline	Antimony Compounds
2,2,4-Trimethyl pentane	Arsenic Compounds
Vinyl acetate	Asbestos
Vinyl bromide	Beryllium Compounds
Vinyl chloride	Cadmium Compounds
Vinylidene chloride	Chlorine
Xylenes (isomers and mixtures)	Chromium Compounds
o-Xylenes	Cobalt Compounds
m-Xylenes	Coke oven emissions
p-Xylenes	Cyanide Compounds ³
	Fine Mineral Fibres ⁴
	Hydrogen chloride (Hydrochloric acid)
	Hydrogen fluoride (Hydrofluoric acid)
	Lead Compounds
	Manganese Compounds
	Mercury Compounds
	Nickel Compounds
	Phosphine
	Selenium Compounds
	Radionuclides (including radon)

Notes:

1. Includes mono- and di-ethers of ethylene, diethylene and triethylene glycol.
2. Includes organic compounds with more than one benzene ring and which have a boiling point greater than 100 C
3. Any cyanide (CN) compound where formal dissociation may occur.
4. Includes mineral fibre emissions from facilities manufacturing or processing glass, rock, slag or other mineral derived fibres of average diameter of one (1) micron or less.

**TABLE 2D
AIR EMISSION SOURCES SUBJECT TO CONTINUOUS
EMISSION MONITORING**

SOURCE (DESIGN BASIS)	PARAMETERS⁽¹⁾
Gas Turbines >50MW heat input capacity	NO _x
Combustion Devices >73 MW heat input capacity	Opacity ⁽²⁾ , SO ₂ ⁽²⁾ and NO _x ⁽³⁾
BIFs operating > 1000 hours per year	CO or Hydrocarbons
Hazardous waste incinerators	CO downstream of combustion zone Combustion temperature Waste feed rate, SO ₂ , HCl, PM and Oxygen
Nitric Acid Plants	NO _x
Petroleum Refineries: A. Fluid Catalytic Cracking Unit Catalyst Regenerators (with incinerator or waste heat boiler)	Opacity CO
B. Fuel Gas Combustion Devices ⁽⁴⁾	SO ₂ ⁽⁵⁾ O ₂
C. Claus Sulfur plants > 20 t/d with oxidation or reduction control system followed by Incinerator	SO ₂ O ₂
D. Claus Sulfur plants > 20 t/d with reduction control system not followed by incinerator	Reduced Sulphur Compounds O ₂
Steel Plants (electric arc furnaces) - Emission from the control device	Opacity
Sulfuric Acid Plants	SO ₂

Notes:

1. Pertains to exhaust gases except where noted
2. Combustion sources that burn natural gas or hydrogen ONLY shall be exempt from the continuous emission monitoring requirements for opacity and SO₂.
3. If the operator of the facility demonstrates during a performance test and subsequent point source monitoring tests that the emissions of NO_x are consistently less than 70% of the applicable standard for facilities constructed after 1st September 2005, then the source is exempt from the requirement for continuous emission monitoring of NO_x. Demonstration of consistent compliance will require one of the following number consecutive spot sampling tests:
 - 2 results < 50% standard
 - 3 results < 60% standard
 - 4 results < 70% standard
 - 30 days <70% standard using portable continuous emission monitor
 All spot sampling tests shall be separated by at least 3 months and completed within 2 years.
4. Fuel gas combustion devices having a common source of fuel gas may be monitored at only one representative location.
5. In lieu of monitoring SO₂ in combustion gases, H₂S in fuel gas may be monitored

**TABLE 2E
 FUGITIVE EMISSIONS MONITORING REQUIREMENTS**

VAPOR PRESSURE @ 20C (psia)	MONITORING METHOD
> = 0.147	USEPA CFR 40 Part 60 App A Method 21
< 0.147	Physical / Visual Inspection
< 0.04	No inspection required

EXEMPTIONS FROM FUGITIVE EMISSIONS MONITORING REQUIREMENTS

COMPONENT	EXEMPTION
General	<ul style="list-style-type: none"> • Aggregate partial pressure or vapor pressure of <0.04 psia at 20 C
	<ul style="list-style-type: none"> • Operation assumes >0.725 psi below ambient pressure
Pressure Relief Valves	<ul style="list-style-type: none"> • Connected to a control device or equipped with a rupture disc
Pumps	<ul style="list-style-type: none"> • Canned Pump
	<ul style="list-style-type: none"> • Magnetic Drive Pumps
	<ul style="list-style-type: none"> • Diaphragm Pumps
	<ul style="list-style-type: none"> • Double mechanical seals venting the barrier fluid seal port to a control device • Double mechanical seals operating at a higher pressure than the process • Double seal with dry run back-up/gas barrier with emission released to a control device
Valve	<ul style="list-style-type: none"> • Bellows valves welded to both the bonnet and stem
	<ul style="list-style-type: none"> • Diaphragm type valve
	<ul style="list-style-type: none"> • < 2 inch size valve in all service other than organic HAP service • < 0.5 inch valve in organic HAP service
Flanges and connectors	<ul style="list-style-type: none"> • Non-HAP service • < 0.75 inch size in organic HAP service • Welded around circumference and connection
Compressors	<ul style="list-style-type: none"> • Crankcase vents to control device • Compressors with emission from the packing case and valves released through a control device

**TABLE 2F
 REQUIRED CONTROL DEVICES FOR STORAGE TANKS FOR
 VOCs**

Tank Capacity (C) (m³)	True Vapor Pressure (kPa)	Control Devices Necessary for Storage⁽¹⁾
C < 75	any	None
C => 75	5.2 =< Tvp < 76.6	Fixed roof with internal floating roof OR External floating roof with double seals OR Closed vent system with control device
C => 75	Tvp => 76.6	Closed vent system with control device

Notes:

1. Internal floating roofs shall be designed and installed in accordance with U.S EPA 40 CFR Part 60 subpart Kb.

SECTION - 3

3. Water Environment

Standards on water quality includes ambient water quality criteria for both Red Sea and Arabian Gulf, wastewater pretreatment standards and guidelines at the point of discharge to the central treatment facilities, water quality standards for direct discharge to coastal waters, ballast water discharge as well as irrigation and potable water quality standards.

3.1 Coastal Water Quality Criteria

3.1.1 The criteria for the coastal water quality of the Red Sea and Arabian Gulf receiving water are established at levels which:

- a) do not harm public health
- b) do not impair the visual or aesthetic appearance of the water
- c) do not result in adverse impact on the adjacent Gulf / Red Sea waters
- d) maintain marine life
- e) protect fisheries
- f) maintain the amenity value of the waters
- g) are suitable for use as industrial cooling water
- h) do not interfere with the use as a source for desalination water

3.1.2 The coastal receiving water criteria for the Red Sea, Arabian Gulf and Harbour are specified in Table 3A for the Industrial City area.

3.2 Water Quality Discharge Standards

3.2.1 Discharge/Effluent Standards

Various discharge standards have been developed for the Industrial City depending on the source of the discharge and the discharge location. The standards are as follows:

- a) Wastewater Pretreatment Standards at the point of discharge to the Central Wastewater Treatment Facilities (refer Table 3B and Table 3B-1).
- b) Water Quality Standards for Direct Discharge to Coastal Waters (including Treated Effluent, Discharge to the Seawater Cooling Return Canal, Variance Streams and Surface Drainage Ditches) (refer Table 3C)
- c) Irrigation Water Quality Standards at the Point of Discharge to Irrigation System and Use Points (refer Table 3D).
- d) Ballast Water Discharge Standards (refer Table 3E).
- e) Drinking Water Standards at the Point of Supply to Drinking Water Distribution Network and Use (refer Table 3F)

3.3 General Water Quality Regulations

3.3.1 The operator of a facility shall not discharge any water or effluents which contain contaminants in such concentration and of such volume as to adversely affect, or cause nuisance to, public health or welfare, animal or aquatic life, vegetation or property.

3.3.2 The operator of a facility shall use BAT, as defined in Clause 1.1.11, to control all water discharges.

3.3.3 The operator of a facility shall not discharge to Storm Water Channels, Coastal receiving waters or Harbour receiving waters, any water (including hydrotesting water and dewatering water) without prior authorization from the Royal Commission.

3.3.4 No visible foreign floating material (including solids and liquid) shall be discharged into the sea.

3.4 Industrial Wastewater Regulations

3.4.1 The operator of a facility shall not discharge industrial wastewater to the Wastewater System if it exceeds the wastewater pretreatment standards at the point of discharge from their facility (refer Tables 3B and 3B-1). If necessary, the operator of a facility shall install and operate a pretreatment system at the facility to ensure that the wastewater meets the discharge standards.

3.4.2 All facilities shall have an emergency holding pond with a storage capacity to retain three days (72 hours) of industrial wastewater production. Also, the facilities shall meet the following:

- a) The holding pond should be lined with a minimum thickness of 1.5mm HDPE liner (Constructed after January 2011).
- b) Wastewater retained in the holding pond shall be discharged within 7 working days from the date of emergency, so that the ponds are normally kept empty to provide containment for emergencies and to minimize fugitive emissions (Applicable from effective date of RCER-2015 Regulations).

3.4.3 No industrial wastewater shall be discharged to the sanitary wastewater system unless specified in the EPO. Any such industrial waste water discharge to the sanitary waste water system shall meet the waste water quality standards in Table 3B.

3.4.4 All the wastewater other than sanitary wastewater shall be sent to IWTP after meeting criteria provided in Table 3B. In case not meeting criteria, the wastewater shall be sent (depending upon its quality) to the RC prior approved waste disposal facilities for its treatment and final disposal.

3.4.5 The operator of a facility shall not dilute industrial wastewater discharges with potable water, seawater or firewater.

3.4.6 Direct discharge of treated or untreated industrial wastewater to the following locations is prohibited without authorization from the Royal Commission:

- a) Surface water drainage channels outside the battery limits of a facility
- b) Lagoons or evaporation ponds without an impermeable barrier
- c) On open ground
- d) Below ground surface
- e) Arabian Gulf

3.4.7 The operator of a facility shall not discharge any treated or untreated industrial wastewater to the Red Sea unless it meets the discharge standards in Table 3C and prior authorization from the Royal Commission is obtained.

3.4.8 Surface impoundments or solar evaporation ponds may be utilized to treat or store industrial wastewater which cannot be pretreated to the quality required for discharge to the Industrial Wastewater Treatment Plant providing the following apply:

- a) Impoundments are lined with a compatible impervious material (such as: HDPE liner of minimum thickness of 1.5 mm subject to the RC prior approval-only for new facility)
- b) No wastewater containing greater than 100 mg/l of volatile organic compounds or odorous chemicals.
- c) No ignitable or reactive materials as defined in Clause 4.1.1 and 4.1.3 shall be present
- d) Surface water shall not be allowed to drain uncontrolled into the impoundment

- e) Adequate freeboard capacity is present to retain 100mm of rainfall
 - f) Sludge and residues are removed to appropriate waste disposal facilities before closure.
- 3.4.9 The operator of an industrial facility shall install and maintain a flow meter and flow totalizer on all discharges of treated or untreated industrial wastewater at the point of discharge from their facility. The total flow shall be given based on daily average flow.
- 3.4.10 The operator of an industrial facility shall install and maintain an auto-sampling system (24-hour composite sample) and also provide sample points for all discharges of treated or untreated industrial wastewater at the point of discharge from their facility. RC representative shall be allowed by the facility to collect the samples from the autosampling system as well as from other sampling points as per requirement.
- 3.4.11 Grab samples for specific parameters shall be detailed in the permit condition of a facility.
- 3.4.12 The operator of a facility discharging industrial wastewater to the common centralized Industrial Wastewater Treatment Plant (Marafiq IWTP) shall install, operate and maintain on-line monitoring system for Temperature, pH, Conductivity, TOC, Flow rate. Until their on-line system is integrated with RC on-line system, the facility shall continue submitting monthly reports to RC as per Clause 3.4.13.
- 3.4.13 The operator of a facility discharging industrial wastewater to the Industrial Wastewater Treatment Plant (IWTP) shall prepare and submit a report to the Royal Commission documenting these discharges. This report (soft with electronic signature) shall be prepared and submitted on a monthly basis. The submission of monthly report for all on-line monitored parameters (mentioned in Clause 3.4.12) shall be stopped only after the integration of facility's continuous monitoring system with the RC on-line system is completed and fully in operation. The information which shall be included in the report is as follows:
- a) Name of the facility
 - b) Date and time of sample collection
 - c) Flow rate of the industrial wastewater discharge as specified in the EPO
 - d) Analytical results for the facility discharge parameters as specified in the EPO and not monitored on line by RC
 - e) The number, frequency and justification for the non-compliance events
 - f) Actions taken to mitigate the non-compliance events
- 3.4.14 The operator of the wastewater treatment system/Plant shall install, operate and maintain on-line monitoring system for Temperature, pH, Conductivity, Flow rate, TOC. Until the implementation of on-line system is completed and in operation, the facility shall continue submitting monthly reports to RC as per Clause 3.4.15.
- 3.4.15 The Operator of the Wastewater System / Plant shall prepare and submit a report (soft copy with electronic signature) to the Royal Commission documenting the water quality of the influent and the treated effluent. This report shall be prepared and submitted on a monthly basis. The submission of monthly report for on-line monitored parameters (mentioned in 3.4.14) shall be stopped only after the integration of facility's continuous monitoring system with the RC on-line system is complete and fully in operation. The information which shall be included in the report is as follows:
- a. Date and time of sample collection
 - b. Composition and flow rate of the IWTP influent and effluent as specified in the EPO and not mentioned for on-line by RC
 - c. A summary of industrial wastewater discharges found to exceed the standards specified in Table 3B at the point of discharge to the Wastewater System.
 - d. A summary of the source, quantity and quality of all off-specification wastewater accepted.

- 3.4.16 The Operator of the Wastewater System / Plant shall not close any effluent line, discharged from the industrial facility to the IWTP, without prior coordination with the concerned facility and shall inform RC immediately.

3.5 Seawater Cooling Regulations

- 3.5.1 Any operator that utilizes seawater for non-contact cooling shall return the cooling water to the seawater cooling return canal only if the chemical characteristics of the water are not altered except for residual chlorine and temperature. The chemical and physical properties of the cooling water returned to the seawater cooling canal at the point of discharge shall meet the standards established in Table 3C.
- 3.5.2 The operator of a facility shall not discharge any water other than non-contact cooling water to the seawater cooling discharge without prior authorization from the Royal Commission.
- 3.5.3 Any authorized discharges shall be designated as variance streams in the Environmental Permit to Operate. The Royal Commission decision to authorize a variance stream discharge shall be based on the following criteria:
- a) the specific parameters which constitute the variance stream
 - b) compliance with Table 3C standards before dilution with the non-contact cooling water flow
 - c) the quantity of the variance stream discharge
 - d) the duration and frequency of the variance stream discharge
 - e) the non-contact seawater cooling usage
 - f) the absence of alternative treatment options
- 3.5.4 The operator of a facility shall provide and maintain flow measurement and sample points for variance stream and flow measurement of inlet cooling water stream from each facility prior to discharge to the seawater cooling water return canal.
- 3.5.5 The facility discharging cooling waters to the seawater cooling return canal shall install, operate and maintain on-line monitoring system for their cooling water discharge flow rate, Temperature (seawater intake and outlet), pH, conductivity. Until their on-line system is integrated with RC on-line system, the facility shall continue submitting monthly reports to RC as per Clause 3.5.6.
- 3.5.6 The operator of a facility discharging cooling waters to the seawater cooling return canal shall prepare and submit a report (soft copy with electronic signature) to the Royal Commission documenting these discharges. This report shall be prepared and submitted on a monthly basis. The submission of monthly report for all on-line monitored parameters (mentioned in Clause 3.5.5) shall be stopped only after the integration of facility's continuous monitoring system with the RC on-line system is complete and fully in operation. The information which shall be included in the report is as follows:
- a) Name of the facility
 - b) Date and time of sample collection
 - c) Analytical results for the facility parameters as specified in the Environmental Permit to Operate and not monitored on-line by RC
 - d) Inlet flow rate or return flow rate taking into account evaporation losses.
 - e) The number and frequency of non-compliance events
- 3.5.7 The operator of a facility discharging variance streams to the seawater cooling system shall prepare and submit a report (soft copy with electronic signature) to the Royal Commission separately documenting these discharges. This report shall be prepared and submitted on a monthly basis. The information which shall be included in the report is as follows:
- a) Name of the facility
 - b) Date and time of sample collection

- c) Composition and flow rate of the variance stream discharges as specified in the EPO
- d) The number and frequency of non-compliance events
- e) Sources of Variance Streams

3.6 Cooling Tower (CT) Regulations

- 3.6.1 The operator of the facility shall install only "Fan Assisted Natural Draught (FAND) cooling towers, except in special circumstances where Mechanical Draught (MD) cooling tower can be justified due to low cooling loads (less than 35000 cu. m/hour circulation water rate) requirement with the RC prior approval. For MD towers, external louvers and windwalls shall be installed in order to avoid problems associated with ground level spray from cross winds.
- 3.6.2 The operator of the Cooling Tower (CT) shall not use chromium-based water treatment chemicals in any affected tower.
- 3.6.3 The operator of the CT shall not use sulfuric acid as a scaling inhibitor. However, the polyphosphonates and other similar type scaling inhibitor shall be utilized during operation of the CT.
- 3.6.4 The blow-down (purge) water from the CT shall be designated as variance stream if it is in compliance with standards provided in Table 3C before dilution with the non-contact cooling water flow.
- 3.6.5 The sea water utilized in CT shall be dosed with sufficient chlorine to control legionella bacteria in the circulating water. Further, the (total) residual chlorine shall achieve the monthly averaged concentration of 0.2 mg/l in the cooling tower blow down.
- 3.6.6 The operator of CT shall be responsible to develop and implement a program to monitor annually for biological components and for "Legionella Bacteria" within the circulating and effluent water; and wastewater (settled in the basin during turnaround time) of the tower. All the monitoring data shall be maintained for RC inspection.
- 3.6.7 The operator of CT shall be responsible to dispose of the waste material from the cooling tower basin using the most appropriate method (after analyzing for the biological, organic and inorganic components of the waste) with the RC approval.
- 3.6.8 The operator of a CT shall perform Cooling Tower Drift Loss Test on the cooling towers at the time of the first issuance and renewal of the EPO. The CT drift loss test shall be performed using Cooling Tower Institute Protocols and Methodology (CTI Test Code ATC-140, Isokinetic Drift Measurement).

3.7 Storm Water Runoff Regulations

- 3.7.1 The operator of a facility shall discharge storm water run-off from access roads, non-process areas, grassed or recreational areas directly to the Royal Commission storm water drainage system.
- 3.7.2 The operator of a facility shall provide an impervious (such as: HDPE liner of minimum thickness of 1.5 mm subject to the RC prior approval-for new facility) storm water management system, independent of the industrial wastewater system, to collect the first flush storm water from industrial process areas and hazardous material storage and handling areas. The first flush shall be considered to be the first 30mm of rainfall from each storm event.

- 3.7.3 After collection of first flush storm water, any additional rain falling on industrial process areas and hazardous material storage and handling areas may be diverted directly to the Royal Commission storm water drainage system.
- 3.7.4 Any expansion in the existing facility shall construct another dedicated first flush storm water pond (or expand the existing one if possible) to receive the first 30mm of rainfall from each storm event, if the storm water pond constructed in the existing facility is not sufficient to hold first flush storm water from the expansion.
- 3.7.5 The operator of a facility retaining first flush storm water under Clause 3.7.2 and 3.7.4 shall discharge the water according to its chemical analysis as follows:
- a) If contained in a dedicated storm water pond, first flush storm water that is compliant with the discharge standards in Table 3C shall be discharged to the Royal Commission storm water drainage system
 - b) If not contained in a dedicated storm water pond or if it exceeds the standards in Table 3C but meets the water quality standards specified in Table 3B shall be discharged as industrial wastewater in accordance with Section 3.4. Any discharge of first flush storm water to the Wastewater System shall be made upstream of the flow measurement device specified in Clause 3.4.9.
 - c) First flush storm water that is not compliant with the water quality standards specified in Table 3B shall be pretreated on-site until compliant or removed off-site by tanker to waste disposal facilities according to the requirements of Section 5.

3.8 Sanitary Wastewater Discharge Regulations

- 3.8.1 All sanitary wastewater produced in the Industrial City shall be transported to the Sanitary Wastewater Treatment Plant (SWTP) via one of the following methods:
- a) Sewer
 - b) Tanker delivery to SWTP
 - c) Tanker delivery to the Wastewater Tankering Point
- 3.8.2 All sources of sanitary wastewater within 250m of an existing sewer system shall be connected to the sanitary wastewater system. Installation of holding sump (cesspool) is not permitted within 250m of the Wastewater System sewer network.
- 3.8.3 Direct discharge of untreated or partially treated sanitary wastewater to the following locations is prohibited without authorization from the Royal Commission:
- a) Surface water drainage channels
 - b) Unlined evaporation ponds or lagoons
 - c) On open ground
 - d) Below ground surface
- 3.8.4 All new Sanitary Wastewater Treatment Plants shall have an emergency holding pond lined with HDPE liner of minimum thickness of 1.5 mm with a storage capacity to retain three days (72 hours) of sanitary wastewater.
- 3.8.5 The operator of sanitary wastewater treatment facility shall install, operate and maintain on-line monitoring system for their treated water quality parameters such as flow rate, Temperature, pH, conductivity. Until their on-line system is integrated with RC on-line system, the facility shall continue submitting monthly reports to RC as per Clause 3.8.6

- 3.8.6 The operator of the Sanitary Wastewater Treatment Facility shall prepare and submit a report (soft copy with electronic signature) to the Royal Commission documenting the water quality of the influent and the treated effluent. This report shall be prepared and submitted on a monthly basis. The submission of monthly report for all the on-line monitoring parameters (mentioned in Clause 3.8.5) shall be stopped only after the integration of facility's continuous monitoring system with the RC on-line system is complete and fully in operation. The information which shall be included in the report is as follows:
- a) Date and time of sample collection
 - b) Results for the SWTP influent and effluent parameters as specified in the EPO and not monitored on-line by RC
 - c) A summary of the source, quantity and quality of all off-specification wastewater accepted under Clause 3.4.3.

3.9 Irrigation Water Regulations

- 3.9.1 All water used for irrigation purposes shall meet the irrigation water quality standards specified in Table 3D at both discharge and use points.
- 3.9.2 The treated effluent irrigation water distribution system shall be clearly marked and utilize unique fittings and materials to avoid cross-connection with drinking water or other water distribution systems.
- 3.9.3 Treated effluent shall only be used for irrigation of landscaping vegetation not for irrigation of food crops or forage production.
- 3.9.4 Treated effluent shall not be applied to landscaping vegetation at elementary schools and kindergartens.
- 3.9.5 Treated effluent shall not be applied for irrigation by spray distribution systems in areas of heavy public use or in other sensitive areas that may be designated by the Royal Commission.
- 3.9.6 Treated effluent shall only be applied for irrigation where the soil permeability is sufficient to allow drainage of the applied water to avoid ponding.
- 3.9.7 Treated effluent shall only be applied for irrigation where no adverse effect on the underlying aquifers or no contamination of surface water drainage channels can occur.

3.10 Marine-related Discharge Regulations

- 3.10.1 Discharge of any materials (toxic and non-toxic) other than water that meets the standards specified in Table 3C and 3E is prohibited.
- 3.10.2 Shipboard ballast sludge shall not be discharged to the Red Sea, Arabian Gulf or Harbor.
- 3.10.3 Ballast water, which does not meet the standards, specified in Table 3E shall not be discharged to coastal waters. Contaminated ballast water shall be pre-treated by either on-board or on-shore treatment facilities to the standards specified in Table 3E before discharge to coastal waters
- 3.10.4 The operator conducting loading or unloading operations with the potential of polluting the marine environment shall take all necessary precautionary measures to prevent any spillage from its operations and is responsible for the containment and clean up of any spills to the marine environment. The operator shall notify the Royal Commission and relevant agencies of any incident.

3.11 Groundwater Regulations

- 3.11.1 The contamination of groundwater is prohibited.
- 3.11.2 The operator of a facility shall not discharge to the Red Sea / Arabian Gulf receiving waters, Harbor receiving waters, Cooling Water Canal, surface water drainage channels or on open ground any extracted groundwater which contains contaminants in concentrations exceeding the limits in Table 3C, without prior authorization from the Royal Commission. Such authorization will only be granted in exceptional circumstances.
- 3.11.3 The operator of a new facility shall install a minimum of three (3) permanent groundwater monitoring wells prior to facility operation. These wells shall be located so that representative samples of the groundwater that may be impacted by the proposed facility operations can be obtained. The number of wells, design and installation of any groundwater monitoring wells shall be subject to review and approval by the Royal Commission as per RC guidelines provided in Appendix E, RCER-2015 Volume II.
- 3.11.4 The operator of a facility with groundwater monitoring wells installed shall monitor the groundwater quality annually (unless otherwise stated in the EPO) and report (soft copy with electronic signature) the results to the Royal Commission. The specific parameters to be monitored and reported shall be approved by the Royal Commission. The facility shall provide the Royal Commission at least 14 working days prior notice and Royal Commission may elect to witness all or part of the required groundwater sampling and collected samples may also be shared with RC.
- 3.11.5 Any new facility shall conduct baseline groundwater monitoring and sample analyses prior to operation of their facility in accordance with Appendix E, RCER-2015, Volume II and shall submit a comprehensive baseline groundwater monitoring report (soft and hard copy) to RC. The specific parameters to be monitored and reported shall be approved by the Royal Commission.

3.12 Drinking Water

- 3.12.1 Desalination plants (including RO plants) used for the generation of drinking water shall abstract water from the Arabian Gulf, Red Sea or groundwater. The water quality criteria for the desalination intake water are specified in Table 3A.
- 3.12.2 The operator of the Drinking Water System (including production and drinking water distribution network) shall ensure that all drinking water distributed through the Drinking Water System shall meet the Drinking water quality standards in Table 3F at the point of supply to Drinking Water Distribution network and use.
- 3.12.3 The operator of the Drinking Water System (including production and drinking water distribution network) shall prepare and submit a report (soft copy with electronic signature) to the Royal Commission documenting the drinking water quality at representative locations across the drinking water distribution network and use system. This report shall be prepared and submitted on a monthly basis. The information which shall be included in the report is as follows:
- a) Date and time of sample collection. The location of sample collection shall be as specified in the EPO.
 - b) Analytical results for the drinking water quality parameters as specified in the EPO
 - c) The number, frequency and explanation for the non-compliance events
- 3.12.4 Any maintenance activity relating to drinking water storage tanks such as painting, repairing, etc shall be undertaken using internationally approved methods and procedures. Facility shall submit the details of such activity including testing of water and obtain prior approval before starting the work.

- 3.12.5 Facilities which are intended to build re-mineralization plant of desalinated water for drinking purpose shall adopt internationally approved process with proven design; The facility shall submit the design details of the plant to the Royal Commission for prior approval.

3.13 Water Quality Monitoring Requirements

- 3.13.1 The operator of a facility shall undertake effluent and discharge monitoring of all sources prior to their discharge to either the Industrial Wastewater Treatment Plant, seawater cooling canals, drainage ditches, the Harbor, Arabian Gulf or Red Sea. Such monitoring shall be in accordance with the applicable standards established in these Regulations and any specific requirements established in the Environmental Permit to Operate.
- 3.13.2 The operator of a facility shall monitor variance streams prior to dilution by the main cooling water return.
- 3.13.3 The Royal Commission may waive or reduce the frequency of the effluent or discharge testing requirements if the operator of the facility can demonstrate to the satisfaction of the Royal Commission that the effluent is consistently in compliance with the applicable standard.
- 3.13.4 All continuous effluent or discharge monitoring systems as required in the Environmental Permit to Operate shall be in continuous operation except for system breakdowns, repairs, calibration checks; and zero and span adjustments.
- 3.13.5 The operator of all continuous effluent and discharge monitoring systems as required in the Environmental Permit to Operate, shall keep effluent and discharge monitoring records on site for a minimum period of five years. These records shall be available for inspection by the Royal Commission or its designee upon reasonable notice, and shall include:
- a) all measurements
 - b) verification of calibration and maintenance checks
 - c) manufacturers' recommended maintenance and calibrations frequencies
 - d) occurrence and duration of any startups, shutdowns or malfunctions in the operation of any effluent treatment system.
 - e) periods when the monitoring system is inoperative or was not conducted.

3.14 Tables

**TABLE 3A
AMBIENT WATER QUALITY CRITERIA FOR COASTAL WATERS**

VARIABLE	UNITS	LIMITS			
		Maximum Red Sea & Arabian Gulf	Monthly Average Red Sea	Monthly Average Arabian Gulf	Monthly Average Jubail and Ras Al Khair Harbour
PHYSICAL					
Floating Particles ⁽¹⁾	mg/l	1	0.5	0.5	0.5
Temperature ⁽²⁾	Δ°Centigrade	2.2 ⁽³⁾	< 1	2	10 ⁽⁴⁾
Total Suspended Solids	mg/l	5	1.5	-	-
Turbidity	N.T.U ⁽⁵⁾	5	1.5	5	5
CHEMICAL					
Aluminium	mg/l	0.05	0.001	-	-
Ammonia Free (as N) ⁽⁶⁾	mg/l	1.2	0.008	0.1	0.1
Arsenic	mg/l	0.05	0.001	0.005	0.01
Barium	mg/l	1	0.05	-	-
Cadmium	mg/l	0.005	0.0005	0.001	0.001
Chlorinated hydrocarbons	mg/l	0.01			
Chlorine Residual (Total)	mg/l	0.05	0.01	0.01	0.01
Chromium	mg/l	0.1	0.002	0.01	0.01
Cobalt	mg/l	0.05	0.001	-	-
Copper	mg/l	0.015	0.001	0.015	0.015
Cyanide	mg/l	0.1	0.005	0.005	0.05
Fluoride	mg/l	1.5	1.4	-	-
Iron	mg/l	1	0.001	-	-
Lead	mg/l	0.01	0.002	0.01	0.01
Manganese	mg/l	0.05	0.0005	-	-
Mercury	mg/l	0.0001	0.0001	0.0001	0.0001
Nickel	mg/l	0.1	0.002	-	-
Nitrate	mg/l	1	0.008	0.1	0.1
Oil & Grease	mg/l	5	2	2	2
Oxygen - Dissolved	mg/l	5(min)	5(min)	5(min)	5(min)
pH	pH units	7.8 - 8.5 ⁽⁷⁾	8 - 8.3 ⁽⁷⁾	8 - 8.5 ⁽⁷⁾	7.8 - 8.5 ⁽⁷⁾
Phenols	mg/l	0.12	0.1	0.1	0.1
Phosphate - total	mg/l	0.025	0.02	0.02	0.02
Salinity above ambient	ppt	1.4	1	-	-
Sulphide	mg/l	0.4	0.004	0.004	0.01
Total Kjeldahl Nitrogen (TKN)	mg/l		0.02	0.02	0.02
Total Organic Carbon (TOC)	mg/l	10	2	5	5
Vanadium ⁽⁸⁾	mg/l	0.08	0.007	0.007	0.007
Zinc	mg/l	0.1	0.001	0.1	0.1
BACTERIOLOGICAL					
Fecal Coliform ⁽⁹⁾	MPN/100 ml	-	35	35	35
Total Coliform ⁽⁹⁾	MPN/100 ml	-	200	200	200

Notes:

- 1) Waters shall be free of all floating particles which may be attributed to wastewater or other discharges
- 2) Temperature differential with respect to the water temperature at cooling water canal intake
- 3) Refers to maximum temperature at the edge of mixing zone
- 4) At the point of discharge from facility boundary to the seawater cooling canal
- 5) N.T.U: Nephelometric Turbidity Unit 6) Non-ionized concentration (pH and temperature dependent)
- 7) Inclusive range 8) Water Research Journal 1979, Volume 13, 905-910
- 9) USEPA Guidance for Recreational Water and Beaches-Appendix B, July 27, 2000

**TABLE 3B
WASTEWATER PRETREATMENT STANDARDS
AT THE POINT OF DISCHARGE TO THE
CENTRAL WASTEWATER TREATMENT FACILITIES ⁽¹⁾**

PARAMETER ⁽²⁾	UNITS	JUBAIL ⁵⁾ Maximum Limits	Yanbu ⁶⁾ Maximum Limit as Grab	YANBU ⁶⁾ Maximum 24h Average
PHYSICAL				
Temperature	°C	60	-	50
Total Dissolved Solids	mg/l	2000	2500	2500
Total Suspended Solids	mg/l	2000	-	500
CHEMICAL ⁽³⁾				
Aluminum	mg/l	30	-	30
Ammonia, Total as N	mg/l	120	-	40
Arsenic	mg/l	1.25	-	1
Barium	mg/l	2	-	2
BOD (5 days)	mg/l	-	900	800
Boron	mg/l	2.5	-	2.5
Cadmium	mg/l	0.5	-	0.5
Chloride	mg/l	1000	600	400
Chlorinated hydrocarbons	mg/l	0.5	-	0.5
Chromium - Total	mg/l	5	-	3
Chromium - Hexavalent	mg/l	0.25	-	1
Cobalt	mg/l	2	-	2
COD	mg/l	-	1800	1500
Copper	mg/l	1.2	-	1
Cyanide	mg/l	3.5	-	1
Fluoride	mg/l	30	-	25
Iron	mg/l	25	--	4
Lead	mg/l	0.5	-	0.5
Manganese	mg/l	2	-	1
Molybdenum	mg/l	0.01	0.01	-
Mercury	mg/l	0.015	-	0.01
Nickel	mg/l	2.5	-	0.25
Oil and Grease	mg/l	120	200	100
pH ⁽⁴⁾	pH Units	5 - 11	5-11	5 - 9
Phenols	mg/l	150	-	25
Phosphorus, Total P	mg/l	50	-	2
Selenium	mg/l	0.02	0.02	-
Silver	mg/l	0.25	-	0.25
Sodium	mg/l	1000	-	600
Sodium Adsorption Ratio	SAR units	20	-	20
Sulfate	mg/l	800	300	150
Sulfide	mg/l	6	-	10
Total Organic Carbon (TOC)	mg/l	800	-	400
Vanadium	mg/l	0.1	0.1	-
Zinc	mg/l	10	-	1.5

Notes:

- 1) Facilities owned by the Operator of the Wastewater System including the Industrial Wastewater Treatment Plant (IWTP), the Sanitary Wastewater Treatment Plant (SWTP) and the associated wastewater sewers and pumping stations. Applicable Pre-Treatment Standards for Ras Al Khair will be added after developing the Wastewater Treatment Plant for Ras Al Khair.
- 2) For any parameters not identified, specific standards will be determined on a case-by-case basis
- 3) Metals standards represent total metals concentrations except as indicated
- 4) Inclusive range not to be exceeded.
- 5) As per design conditions of the Jubail's IWTP (Marafiq)
- 6) As per design conditions of the Yanbu's IWTP (Marafiq)

**TABLE 3B-I
WASTEWATER PRE-TREATMENT GUIDELINE VALUES
AT THE POINT OF DISCHARGE
TO THE CENTRAL WASTEWATER TREATMENT FACILITIES ^{(1) (2)}**

Parameter	Pre-treatment Standards (µg/l) (unless otherwise specified)	
	Maximum for any One day	Maximum for Monthly Average
Total Volatile Organic Compounds (VOC) in mg/l	10	-
Benzene	134	57
Carbon Tetra Chloride	380	142
Chlorobenzene	380	142
Chloroethane	295	110
Chloroform	325	111
1,1-Dichloroethane	59	22
1,2-Dichloroethane	574	180
1,2-Dichlorobenzene	794	196
1,3-Dichlorobenzene	380	142
1,4-Dichlorobenzene	380	142
1,1-Dichloroethylene	60	22
4,6-Dinitro-O-Cresol	277	78
1,2-Dichloropropane	794	196
1,3-Dichloropropylene	794	196
Ethylbenzene	380	142
Hexachlorobenzene	794	196
Hexachlorobutadiene	380	142
Hexachloroethane	794	196
Methyl Chloride	295	110
Methylene Chloride	170	36
Nitrobenzene	6,402	2,237
2-Nitrophenol	231	65
4-Nitrophenol	576	162
Tetrachloroethylene	164	52
Toluene	74	28
1,2,4-Trichlorobenzene	794	196
1,1,1-Trichloroethane	59	22
1,2-Trans-dichloroethylene	66	25
1,1,2-Trichloroethane	127	32
Trichloroethylene	69	26
Vinyl Chloride	172	97

Notes:

- 1) Guideline Values derived from 40 CFR Part 414 Section 414.25. Applicable Pre-Treatment Standards for Ras As Al Khair will be added after developing the Wastewater Treatment Plant for Ras Al Khair.
- 2) Trigger level for the facility to consider carrying out BAT assessment.

TABLE 3C
WATER QUALITY STANDARDS FOR DIRECT DISCHARGE TO COASTAL WATERS
(INCLUDING TREATED EFFLUENT⁽¹⁾, DISCHARGE TO THE SEAWATER COOLING RETURN
CANAL, VARIANCE STREAMS⁽²⁾ AND SURFACE DRAINAGE DITCHES⁽³⁾)

PARAMETER ⁽⁴⁾	UNITS	Maximum Allowable	Monthly Average
PHYSICAL			
Floating Particles	mg/m ²	NIL	NIL
Temperature	Δ°C	10 ⁽⁵⁾	10 ⁽⁵⁾
Temperature - <i>Yanbu</i>	Δ°C	case-by-case	Case-by-case
Total Suspended Solids	mg/l	40	25
Turbidity – <i>Jubail & Ras Al Khair</i>	N.T.U	75 ⁽⁶⁾	50 ⁽⁶⁾
Turbidity - <i>Yanbu</i>	N.T.U	15	8
CHEMICAL			
Aluminum	mg/l	25	15
Ammonia, Total as N	mg/l	3.0	1.0
Arsenic	mg/l	0.5	0.1
Barium	mg/l	2.0	1.0
BOD ₅	mg/l	25	15
Cadmium	mg/l	0.05	0.01
COD	mg/l	150	75
Chlorinated Hydrocarbons	mg/l	0.5	0.1
Chlorine Residual (Total)	mg/l	0.3	0.2
Chromium (Total)	mg/l	0.5	0.1
Chromium (Hexavalent)	mg/l	0.1	0.05
Cobalt	mg/l	2.0	0.1
Copper	mg/l	0.5	0.2
Cyanide	mg/l	0.1	0.05
Fluoride	mg/l	25	15
Iron	mg/l	10	5
Lead	mg/l	0.5	0.1
Manganese	mg/l	1.0	0.2
Molybdenum	mg/l	0.01	-
Mercury	mg/l	0.005	0.001
Nickel	mg/l	0.5	0.2
Nitrate	mg/l	10	1
Oil and Grease	mg/l	15	8
Oxygen – Dissolved	mg/l	2.0 ⁽⁷⁾	5.0 ⁽⁷⁾
PAH ⁽⁸⁾	mg/l	0.01	-
pH	pH units	6 – 9 ⁽⁹⁾	6 - 9 ⁽⁹⁾
Phenols	mg/l	1	0.1
Phosphorus, total as P	mg/l	2	1
Salinity	Δ ppt	2	1
Selenium	mg/l	0.02	-
Sulfide	mg/l	0.1	0.05
Total Kjeldahl Nitrogen (TKN)	mg/l	10	5
Total Organic Carbon (TOC)	mg/l	75	-
Vanadium ⁽¹⁰⁾	mg/l	0.1	-
Zinc	mg/l	5	2

TABLE 3C (Continued)
WATER QUALITY STANDARDS FOR DIRECT DISCHARGE TO COASTAL WATERS
(INCLUDING TREATED EFFLUENT⁽¹⁾, DISCHARGE TO THE SEAWATER COOLING RETURN
CANAL, VARIANCE STREAMS⁽²⁾ AND SURFACE DRAINAGE DITCHES⁽³⁾)

PARAMETER⁽⁴⁾	UNITS	Maximum Allowable	Monthly Average
BIOLOGICAL			
Total Coliform	MPN/100ml	2400	1000

Notes:

- 1) Treated effluent discharge standards apply to wastewater at the end of an outfall pipe and before discharge to the Sea.
- 2) Permission to discharge variance streams subject to Section 3.5.3. Standards are applicable to variance stream discharges before dilution with the main non-contact cooling water flow.
- 3) Applicable to storm water discharges only, unless permission to discharge wastewater granted under Section 3.7
- 4) For any parameters not identified, specific standards will be determined on a case-by-case basis.
- 5) Differential temperature between seawater cooling intake and seawater cooling discharge.
- 6) Differential standard between seawater cooling intake and seawater cooling discharge for non-contact cooling water, absolute standard for all other discharges.
- 7) Dissolved oxygen requirement is a minimum concentration requirement.
- 8) PAH: Polycyclic Aromatic Hydrocarbons
- 9) Allowable range
- 10) Ministry of Environment and Climate Affairs, Advanced Regulatory Wiki Application (ARWA), Second Edition, Omani Environmental Regulations, International References Documents, Sohar Environmental Unit (SEU) Guidance notes

**TABLE 3D
IRRIGATION WATER QUALITY STANDARDS⁽¹⁾
AT THE POINT OF DISCHARGE TO IRRIGATION SYSTEM AND USE POINTS**

PARAMETER⁽²⁾	UNITS	Maximum Allowable	Monthly Average
PHYSICAL			
Floating Particles	mg/m ²	Nil	-
Total Suspended Solids	mg/l	10	10
Total Dissolved Solids	mg/l	2000	1750
Turbidity ⁽³⁾	N.T.U.	5	2
CHEMICAL			
Aluminum	mg/l	5	-
Ammonia, Total as N	mg/l	5	-
Arsenic	mg/l	0.1	-
Barium	mg/l	1	-
Beryllium	mg/l	0.1	-
BOD ₅	mg/l	10	-
Boron	mg/l	0.75	-
Cadmium	mg/l	0.01	-
COD	mg/l	50	-
Chloride	mg/l	1000	500
Chlorine Residual (Free)	mg/l	0.5 (min)	-
Chromium	mg/l	0.01	-
Cobalt	mg/l	0.05	-
Copper	mg/l	0.2	-
Cyanide	mg/l	0.05	-
Dissolved Oxygen ⁽⁴⁾	mg/l	2.0 (min.)	-
Fluoride ⁽⁵⁾	mg/l	15	5
Iron	mg/l	5	-
Lead	mg/l	0.5	0.1
Lithium	mg/l	2.5	-
Manganese	mg/l	0.2	0.02
Mercury	mg/l	0.001	-
Molybdenum	mg/l	0.01	-
Nickel	mg/l	0.02	-
Nitrate	mg/l	10	-
Oil and Grease	mg/l	Nil	-
pH	pH units	6 - 8.4	-
Phenols	mg/l	0.002	-
Phosphorus, total as P	mg/l	30	20
Selenium	mg/l	0.02	-
Silver	mg/l	0.5	-
Sodium	mg/l	1000	500
Sodium Adsorption Ratio (SAR)	SAR units	20	10
Sulfate	mg/l	600	-
Sulfide	mg/l	0.1	0.05
Total Kjeldahl Nitrogen	mg/l	60	35
Total Organic Carbon	mg/l	40	-
Vanadium	mg/l	0.1	-
Zinc	mg/l	2	-

**TABLE 3D (cont.)
IRRIGATION WATER QUALITY STANDARDS
AT THE POINT OF DISCHARGE TO IRRIGATION SYSTEM AND USE POINTS**

VARIABLE	UNITS	Maximum Allowable	Monthly Average
BACTERIOLOGICAL			
Total Coliform ⁽⁶⁾	MPN/100 ml	23	2.2 ⁽⁷⁾
Fecal Coliform	MPN/100 ml	1	-
PARASITOLOGICAL			
Nematodes (eggs)	No./1000 ml	1	-
Protozoan Cysts	No./10 ml	1	-
Platyhelminths-flatworms	No./10 ml	1	-

Notes:

- 1) Adopted from Ministry of Municipality and Rural Affairs (MOMRA) Standards (2014) and RCJY Studies
- 2) For any parameters not identified, specific standards will be determined on a case-by-case basis
- 3) Maximum turbidity not to be exceeded more than 5% of the time in the 24-hour period.
- 4) Dissolved oxygen level is a minimum concentration requirement
- 5) Fluoride levels assume well-drained sandy soil for irrigation which will not be used for forage
- 6) Reclaimed water shall at all times be adequately disinfected, oxidized, clarified and filtered.
- 7) The wastewater shall be considered disinfected if the median number of coliform organisms in the effluent does not exceed 2.2 total coliform MPN per 100 ml, as determined from the results of the last seven days for which analyses have been completed, AND if the number of coliform does not exceed 23 total coliform per 100 ml in any sample.

TABLE 3E
BALLAST WATER DISCHARGE STANDARD

VARIABLE	UNITS	Maximum Allowable	Average of all Samples⁽¹⁾
Ammonia, Total as N	mg/l	3.0	1.5
Floatables	mg/l	NIL	NIL
pH	pH units	6 - 9 ⁽²⁾	6 - 9 ⁽²⁾
Suspended Solids	mg/l	35	20
Total Oil & Grease	mg/l	10	8
Total Organic Carbon	mg/l	150	100

Notes:

- 1) Minimum of three (3) samples shall be collected per discharge event
- 2) Inclusive range not to be exceeded

TABLE 3F
DRINKING WATER QUALITY STANDARDS
AT THE POINT OF SUPPLY TO DRINKING WATER DISTRIBUTION NETWORK AND USE ⁽¹⁾

PARAMETER	UNITS	Minimum Concentration	Maximum Concentration
PHYSICAL			
Temperature	°C	--	30
Taste & Odour	-	-	Unobjectionable
Total Dissolved Solids	mg/l	100	500
Turbidity ⁽²⁾	N.T.U.	-	1
ALKALINITY			
Calcium	mg/l	30	-
CO ₂ (free)	mg/l	-	Nil
Magnesium	mg/l	5.0	-
PH	pH units	6.5	8.5
Total Alkalinity (as CaCO ₃)	mg/l	40	-
Total Hardness (as CaCO ₃)	mg/l	75	500
INORGANIC			
Aluminum	mg/l	-	0.1
Ammonium (as NH ₄ ⁺) ⁽³⁾	mg/l	-	0.5
Antimony	mg/l	-	0.02
Arsenic	mg/l	-	0.01 (A,T)
Barium	mg/l	-	0.7
Boron	mg/l	-	2.4
Bromate	mg/l	-	0.01 ^(a) (A,T)
Cadmium	mg/l	-	0.003
Chlorate	mg/l	-	0.7 (D)
Chloride	mg/l	-	250
Chlorite	mg/l	-	0.7 (D)
Chlorine Residual (Free)	mg/l	0.2	0.5
Chromium (Total)	mg/l	-	0.05 (P)
Copper	mg/l	-	2
Cyanide	mg/l	-	0.07
Dissolved Oxygen ⁽⁴⁾	mg/l	-	-
Fluoride	mg/l	-	1.5
Iron	mg/l	-	0.3
Lead	mg/l	-	0.01(A,T)
Manganese	mg/l	-	0.4 (C)
Mercury (Inorganic)	mg/l	-	0.006
Molybdenum	mg/l	-	0.07
Nickel	mg/l	-	0.07
Nitrate as NO ₃ ⁽³⁾	mg/l	-	50
Nitrite as NO ₂ ⁽⁵⁾	mg/l	-	0.2
Potassium	mg/l	-	10
Selenium	mg/l	-	0.04 (P)
Sodium	mg/l	-	30
Sulfate	mg/l	-	250
Sulfide	mg/l	-	0.002
Uranium	mg/l	-	0.03(P)
Zinc	mg/l	-	3.0

TABLE 3F (cont)
DRINKING WATER QUALITY STANDARDS
AT THE POINT OF SUPPLY TO DRINKING WATER DISTRIBUTION NETWORK AND USE ⁽¹⁾

PARAMETER	UNITS	Minimum Concentration	Maximum Concentration
ORGANIC			
Acrylamide	mg/l	-	0.0005 ^(a)
Alachlor	mg/l	-	0.02 ^(a)
Aldicarb	mg/l	-	0.01 applies to sulfoxide and sulfone
Aldrin and Dieldrin	mg/l	-	0.00003
Atrazine and chloro-s-triazine metabolites	mg/l	-	0.1
Benzene	mg/l	-	0.01 ^(a)
Benzo-a-pyrene	mg/l	-	0.0007 ^(a)
Bromoform	mg/l	-	0.1
Bromodichloromethane	mg/l	-	0.06 ^(a)
Carbofuran	mg/l	-	0.007
Carbon Tetrachloride	mg/l	-	0.004
Chloral Hydrate	mg/l	-	0.01
Chlordane	mg/l	-	0.0002
Chloroform	mg/l	-	0.3
Chlorotoluron	mg/l	-	0.03
Chlorpyrifos	mg/l	-	0.03
Cyanazine	mg/l	-	0.0006
Cyanogen Chloride	mg/l	-	0.07
2,4-D ^(b)	mg/l	-	0.03
2,4-DB ^(c)	mg/l	-	0.09
DDT ^(d) and metabolites	mg/l	-	0.001
Dibromoacetonitrile	mg/l	-	0.07
Dibromochloromethane	mg/l	-	0.1
1,2-Dibromo-3-chloropropane	mg/l	-	0.001 ^(a)
1,2-Dibromoethane	mg/l	-	0.0004 ^(a) (P)
Dichloroacetate	mg/l	-	0.05 ^(a) (D)
Dichloroacetic acid	mg/l	-	0.05
Dichloroacetonitrile	mg/l	-	0.02(P)
1,2-Dichlorobenzene	mg/l	-	1 (C)
1,4-Dichlorobenzene	mg/l	-	0.3 (C)
1,2-Dichloroethane	mg/l	-	0.03 ^(a)
1,1-Dichloroethene	mg/l	-	0.03
1,2-Dichloroethene	mg/l	-	0.05
Di(2-ethylhexyl)adipate	mg/l	-	0.08
Di(2-ethylhexyl)phthalate	mg/l	-	0.008
Dichloromethane	mg/l	-	0.02
1,2-Dichloropropane	mg/l	-	0.04 (P)
1,3-Dichloropropene	mg/l	-	0.02 ^(a)
Dichlorprop	mg/l	-	0.1
Dimethoate	mg/l	-	0.006
1,4-Dioxane	mg/l	-	0.05 ^(a)
Edetic acid (EDTA)	mg/l	-	0.6 (Free acid)
Endrin	mg/l	-	0.0006

TABLE 3F (cont)
DRINKING WATER QUALITY STANDARDS
AT THE POINT OF SUPPLY TO DRINKING WATER DISTRIBUTION NETWORK AND USE ⁽¹⁾

PARAMETER	UNITS	Minimum Concentration	Maximum Concentration
ORGANIC			
Epichlorohydrin	mg/l	-	0.0004 (P)
Ethylbenzene	mg/l	-	0.3 (C)
Fenoprop	mg/l	-	0.009
Formaldehyde	mg/l	-	0.9
Hexachlorobenzene	mg/l	-	0.0001
Hexachlorobutadiene	mg/l	-	0.0006
Hydroxyatrazine	mg/l	-	0.2 (Atrazine metabolites)
Isoproturon	mg/l	-	0.009
Lindane	mg/l	-	0.002
MCPA ^(e)	mg/l	-	0.002
Mecoprop	mg/l	-	0.01
Methoxychlor	mg/l	-	0.02
Metolachlor	mg/l	-	0.01
Molinate	mg/l	-	0.006
Monochloroacetate	mg/l	-	0.02
Monochloramine	mg/l	-	3
Monochlorobenzene	mg/l	-	0.3
Microcystin-LR (Total)	mg/l	-	0.001 (P)
N-nitrosodimethylamine (NDMA)	mg/l	-	0.0001
Nitrioltriacetic acid	mg/l	-	0.2
Pendimethalin	mg/l	-	0.02
Pentachlorophenol	mg/l	-	0.009 ^(a) (P)
Permethrin	mg/l	-	0.3
Phenol ⁽⁶⁾	mg/l	-	0.001
Simazine	mg/l	-	0.002
Sodium dichloroisocyanurate	mg/l	-	50 40 as Cyanuric Acid
Styrene	mg/l	-	0.02 (C)
Surfactants MBAS ⁽⁶⁾	mg/l	-	0.2
2,4,5-T ^(f)	mg/l	-	0.009
Terbutylazine	mg/l	-	0.007
Tetrachloroethene	mg/l	-	0.04
Toluene	mg/l	-	0.7 (C)
Total Trihalomethanes (THMs) ⁽⁷⁾	mg/l	-	0.08 ^(b)
Trichloroacetate	mg/l	-	0.2
Trichloroethene	mg/l	-	0.02(P)
Trichloroacetic acid	mg/l	-	0.1
Trichlorobenzene (total)	mg/l	-	0.02
1,1,1-trichloroethane	mg/l	-	2
2,4,6-Trichlorophenol	mg/l	-	0.2 ^(a) (C)

TABLE 3F (cont)
DRINKING WATER QUALITY STANDARDS
AT THE POINT OF SUPPLY TO DRINKING WATER DISTRIBUTION NETWORK AND USE ⁽¹⁾

PARAMETER	UNITS	Minimum Concentration	Maximum Concentration
ORGANIC (cont)			
Trifluralin	mg/l	-	0.02
Vinyl chloride	mg/l	-	0.0003 ^(a)
Xylenes	mg/l	-	0.5 (C)
BACTERIOLOGICAL ⁽⁹⁾			
Total Coliform	Per 100 ml	0	0
E-coli or thermotolerant coliform bacteria ⁽¹⁰⁾	Per 100 ml	-	0

Notes:

- 1) World Health Organization, Guidelines for Drinking-water Quality Second Edition (Volume 2) Health criteria and other supporting information (1999); WHO Guidelines for Drinking-water Quality Fourth Edition (2011).
- 2) Median turbidity value shall not exceed 1 NTU and not exceeding 5NTU in any single sample.
- 3) Department for Regional Development, European and National Drinking Water Standards, Northern Ireland Environment Agency.
(http://www.doeni.gov.uk/niea/water-home/drinking_water/public_water/regulations_guidance.htm)
- 4) DO level shall be maintained as near saturation as possible.
- 5) Drinking-Water Standards for New Zealand (Revised 2008), Ministry of Health, Wellington, New Zealand.
- 6) Handbook of Drinking Water Quality, Second Edition (1997) by John De Zuane, John Wiley & Sons, Inc.
- 7) Where elevated levels of THMs are found in any sample, other disinfection by-products (as Table 3F) shall be analyzed.
- 8) National Primary Drinking Water Regulations, US EPA 816-F-09-004, May 2009.
- 9) Immediate investigative action must be taken if E. Coli or total coliform are detected. The minimal action in the case of total coliform bacteria is repeat sampling, if these bacteria are detected in the repeat sample, the cause must be determined by immediate further investigation.
- 10) E-Coli shall be used as indicator for the presence of pathogens arising faecal contamination from a water supply.

Foot-notes as per WHO Document:

P =Provisional guideline value, because of uncertainties in the health database

T =Based on provisional guideline value because calculated guideline value is below the level that can be achieved through practical treatment methods, source protection, etc.

A =Based on provisional guideline value because calculated guideline value is below the achievable quantification level

D=Based on provisional guideline value because disinfection is likely to result in the guideline value being exceeded

C=Concentrations of the substance at or below the health-based guideline value may affect the appearance, taste or odor of the water, leading to consumer complaints.

- a. For substances that are considered to be carcinogenic, the guideline value is the concentration in drinking water associated with an upper-bound excess lifetime cancer risk of 10^{-5} (one additional cancer per 100,000 of the population ingesting drinking water containing the substance at guideline value for 70 years). Concentrations associated with upper-bound estimated excess lifetime cancer risks of 10^{-4} and 10^{-6} can be calculated by multiplying and dividing respectively, the guideline value by 10.
- b. 2,4-Dichlorophenoxyacetic acid
- c. 2,4-Dichlorophenoxybutyric acid
- d. Dichlorodiphenyltrichloroethane
- e. 4-chloro-2-methylphenoxyacetic acid (MCPA)
- f. 2,4,5-trichlorophenoxyacetic acid

SECTION - 4

4. Hazardous Materials Management

A hazardous material is defined as any material in a quantity or concentration that, if improperly managed, may pose a hazard to public health or the environment. Hazardous materials may be solids, semi-solids, liquids or gases and include hazardous wastes.

4.1 Hazardous Materials Classification

The classification of hazardous materials includes materials with the following characteristics:

4.1.1 **Ignitable** - a material is considered ignitable if a representative sample of the material has any of the following properties:

- a) It is a liquid, other than an aqueous solution which contains less than 24% alcohol by volume; and has a flash point less than 60 °C (140°F).
- b) It is not a liquid and is capable under standard temperature and pressure, of causing fire through friction, absorption of moisture or spontaneous chemical changes, and when ignited, burns so vigorously and persistently that it creates a hazard.
- c) It is an ignitable compressed gas.
- d) It is an oxidizer that can cause or contribute to the combustion of other materials by yielding oxygen or other oxidizing substances, whether or not the substance is itself combustible.

4.1.2 **Corrosive** - a material is considered corrosive if a representative sample of the material has either of the following properties:

- a) It is aqueous and/or its aqueous solution has a pH less than or equal 2 or greater than or equal to 12.5.
- b) It is a liquid and corrodes steel (SAE 1020) at a rate greater than 6.35 mm per year at a test temperature of 55 °C (130°F).

4.1.3 **Reactive** - a material is considered reactive if a representative sample of the material has any of the following properties:

- a) It is normally unstable and readily undergoes violent change without detonating.
- b) It reacts violently with water.
- c) It forms a potentially explosive mixture with water.
- d) When mixed with water, it generates toxic gases, vapors or fumes in a quantity sufficient to present a danger to public health or the environment.
- e) It is a cyanide or sulfide bearing material which, when exposed to pH between 2 and 12.5 can generate toxic gases, vapors or fumes in quantity sufficient to present a danger to health and the environment.
- f) It is capable of detonation, explosive decomposition or reaction at standard temperature or pressure.

4.1.4 **Toxic** - a material is considered toxic if it is present in quantities and concentrations, which based on available human, animal or botanical toxicity testing data have the potential to be harmful to human health or living organisms in their natural environment.

- 4.1.5 **Radioactive** - radioactive materials are any materials which spontaneously emits either alpha particles, beta particles, gamma or x-rays, neutrons and or other atomic particles above natural background levels.
- 4.1.6 **Biohazard** - biohazard materials are those materials which contain biological materials that are capable of causing harm to human health or the environment. Included in the classification of biohazard materials are etiologic materials, which are capable of harboring or transmitting disease. Also included in the classification of biohazard materials are materials which contain plants, animals, or other organisms that would cause harmful effects if released into the environment.

4.2 Hazardous Materials Inventory Regulations

- 4.2.1 The operator of a facility shall retain on file current Material Safety Data Sheet (MSDS) information for all hazardous materials present at the facility.
- 4.2.2 The operator of a facility shall develop and maintain an inventory of hazardous materials stored at the facility in quantities greater than 50 kg for highly toxic materials and 5000 kg for other hazardous materials. The inventory shall summarize the following information for each hazardous material present at the facility:
- a) The chemical name, trade name and CAS number of the hazardous material
 - b) Chemical composition including concentration of hazardous components
 - c) Physical form of the material
 - d) Storage Temperature (C) and true vapor pressure (kPa) for liquids and gases.
 - e) Storage quantity (annual average and maximum values)
 - f) Associated hazard classification
 - g) End use
- 4.2.3 The use of PCBs in any facility is prohibited.
- 4.2.4 The operator of a facility shall provide an annual hazardous material inventory report to the Royal Commission summarizing the information as identified in Clause 4.2.2 for the preceding calendar year.

4.3 Hazardous Materials Storage and Handling Regulations

- 4.3.1 Any hazardous material including hazardous wastes shall be managed in such a manner as to minimize to the fullest extent possible the potential for harm to human health or the environment
- 4.3.2 Containers, storage tanks, storage areas and impervious barriers used to contain or store hazardous materials shall be designed, constructed and maintained to permanently contain the hazardous materials.
- 4.3.3 All solvents and volatile organic chemicals drums and pails shall be kept under designated shaded areas with proper spill containment arrangement and proper labelling and signs posted.
- 4.3.4 All containers used to hold hazardous materials shall be kept closed at all times except when adding or removing materials from the container.
- 4.3.5 Access to a hazardous material storage area shall be controlled to prevent entry of unauthorized persons or vehicles.
- 4.3.6 Incompatible materials shall not be placed in common containment areas, the same containers or on the same vehicles. Table 4 provides a list of materials that are presumed to be incompatible.

- 4.3.7 The operator of hazardous material drum or other moveable container storage areas shall provide these areas with secondary containment. The secondary containment shall be provided by:
- a. an outer shell or multiple-wall tank, where the volume of secondary containment shall be at least 100% of the volume held in the primary container, or
 - b. a bunded or bermed area which is impervious to the hazardous material being stored and where the volume inside the secondary containment shall be the greater of either 10% of the total volume of hazardous material storage within the containment area plus water accumulation from a 100mm storm event; or 110% of the volume of the largest container within the containment area plus the water accumulation from a 100mm storm event.
- 4.3.8 The operator of the facility (constructed before September 1, 2005) having fixed hazardous material storage tanks containing materials which are liquid at standard conditions (OC, 101,325 Pa) shall provide secondary containment as follows:
- a. an outer shell or multiple-wall tank, where the volume of secondary containment shall be at least 100% of the volume held in the primary container, or
 - b. a bunded or bermed area where the volume inside the secondary containment shall be the greater of either 10% of the total volume of hazardous material storage within the containment area plus water accumulation from a 100mm storm event; or 100% of the volume of the largest tank within the containment area plus the water accumulation from a 100mm storm event.
- 4.3.9 The operator of fixed hazardous material storage tanks (constructed after September 1, 2005) containing materials which are liquid at standard conditions (OC, 101,325 Pa) shall provide secondary containment and leak protection as follows:
- a. an outer shell or multiple-wall tank, where the volume of secondary containment shall be at least 100% of the volume held in the primary container, or
 - b. a bunded or bermed area which is impervious (such as:HDPE liner of minimum thickness of 1.5 mm subject to the RC prior approval-for new facility) to the hazardous material being stored and where the volume inside the secondary containment shall be the greater of either 10% of the total volume of hazardous material storage within the containment area plus water accumulation from a 100mm storm event; or 110% of the volume of the largest tank within the containment area plus the water accumulation from a 100mm storm event.
 - c. tank overspill protection and tank leak detection systems including monitoring wells around the tank to detect leakage. These shall be examined for any spills or leakage annually or as per EPO conditions.
- 4.3.10 All valves, fittings, and other appurtenances associated with hazardous materials storage tanks or hazardous materials transfer (other than those associated with fill and discharge pipelines) shall be located within secondary containment.
- 4.3.11 Stockpiles of solid hazardous materials which may produce a hazardous leachate with hazardous properties as defined in Sections 4.1 or 5.1a(ii) shall be stored, loaded and unloaded in impervious areas equipped with dikes, berms, curbs or collection systems designed to retain leachate and precipitation. The containment system shall be of sufficient size to retain the accumulation from a 100mm storm.

- 4.3.12 Any spilled materials collected by secondary containment shall be removed in a timely manner and recycled or disposed in accordance with the requirements of Section 5.
- 4.3.13 The operator of a facility shall maintain hazardous material stockpiles to prevent wind dispersion of the material.
- 4.3.14 Hazardous materials stored in drums or other moveable storage containers shall be stored with sufficient aisle spacing to allow inspection and movement of the drums or containers. Drums may be stacked on pallets or skids, no more than two (2) drums high.
- 4.3.15 Containers holding hazardous materials shall be individually labeled to reflect the actual contents of the container. The labeling shall include either:
- a) contents and associated hazards using the United Nations chemicals hazard classification; or
 - b) a unique identification which is cross-referenced to a document which lists the contents and the hazards
- 4.3.16 Hazardous material storage areas shall be labeled. The labeling shall at a minimum include the following information:
- a) the type of material being stored within the area;
 - b) identification of the hazard classification of the stored material in accordance with the U.S. National Fire Protection Association standard No. 704
 - c) the United Nations chemicals hazard classification
- 4.3.17 The operator of a facility may utilize surface impoundments to store hazardous liquid materials providing the following apply:
- a) The material does not contain more than 100 mg/l of volatile organic or odorous compounds.
 - b) No ignitable or reactive hazardous materials as defined in Clauses 4.1.1 and 4.1.3 are stored.
 - c) Impoundments are lined with a compatible impervious material (such as: HDPE liner of minimum thickness of 1.5 mm subject to the RC prior approval-for new facility)
 - d) The surface impoundment shall be equipped with leakage detection systems and groundwater monitoring wells
 - e) Incompatible materials are not placed in the same impoundment
 - f) Surface water is diverted away from the impoundment
 - g) The impoundment is securely fenced and signs placed to prevent unauthorized access
 - h) Adequate freeboard capacity is present to retain a 100mm storm
 - i) Sludge and residues are removed to appropriate waste disposal facilities before closure
- 4.3.18 All operators having radioactive materials/devices/equipments/others shall obtain the necessary approvals from King Abdullah City for Atomic and Renewable Energy (KACARE) and a copy of approval shall be submitted to the RC.
- 4.3.19 All operators of facilities storing and handling hazardous materials shall maintain on-site adequate spill control equipment and chemicals to cope with realistic and probable emergencies associated with the hazardous materials.
- 4.3.20 All operators of facilities storing, handling or transporting hazardous materials in the Industrial City shall prepare and implement a contingency plan to address emergencies involving those hazardous materials. At a minimum the contingency plan shall include (refer Volume II, Appendix D for more details):

- a) realistic and probable accident, spill or emergency scenarios
- b) procedures for accessing emergency services
- c) identification of safety, control and alarm equipment associated with the storage, transport or disposal of hazardous materials
- d) nominated responsible individuals and roles for the facility emergency response team and facility contact personnel
- e) nominated responsible individuals for co-ordination with external emergency services
- f) procedures for initial and annual update training to address plant emergencies
- g) procedures for inspection and maintenance of emergency and spill control equipment
- h) provisions for review and update of the contingency plan

- 4.3.21 The operator of a facility shall develop and follow a written schedule for inspecting all hazardous material storage areas and associated monitoring, safety and emergency equipment. The schedule of the inspection shall address the probable risks, which are associated with the type of hazardous material storage.
- 4.3.22 All operators of facilities storing and handling hazardous materials shall immediately notify the Royal Commission of any emergency involving the hazardous materials stored at the facility, consistent with Clause 8.2.7 of these Regulations.
- 4.3.23 Relabelling of materials whose original labels have been obliterated or lost shall be conducted with care to avoid mislabeling. Unidentified substances shall be tested or analyzed to confirm the identity of the material, prior to relabelling.
- 4.3.24 The contents of compressed gas cylinders shall be clearly marked.
- 4.3.25 The possibility of leakage arising from chemical attack on metal containers or dissolution of fiber cartons must be avoided by providing protection against wetting.
- 4.3.26 Containers stored in out door areas shall be stored in an fenced enclosure or otherwise protected against damage or deterioration by elements.
- 4.3.26 Areas where hazardous liquids are transferred by pouring from one container to another shall be diked, or otherwise contained to prevent the escape of any material from the area.

4.4 Hazardous Material Transportation Regulations

- 4.4.1 All the facilities shall ensure that the transporter of a hazardous material under transportation shall be responsible for the safety of the shipment. This responsibility includes implementing emergency response contingency plans (Clause 4.3.20) and any corrective action (Section 1.4) following accidental spillage or release within the Industrial City. The facility shall communicate such requirements to the transporter/owner. The RC has the right to obtain information and data concerning details of transportation of hazardous materials.
- 4.4.2 All the facilities shall ensure that the transportor of hazardous materials in the Industrial City shall clearly placard the vehicle with the hazard classification of the material being transported in accordance with the United Nations chemical hazard classification system for the transport of dangerous goods.
- 4.4.3 All the facilities shall ensure that no transporter shall accept a consignment of hazardous materials without the following:
- a) Proper containerization of the hazardous material
 - b) Clear labeling of the hazardous material in Arabic and English

- c) Documentation identifying the name address and contact details of the owner, transporter, consignor and consignee of the hazardous material
 - d) Documentation in Arabic and English identifying the technical name, quantity and hazard classification of the hazardous material
 - e) All the above documents shall be kept in the vehicle during the transportation.
- 4.4.4 All vehicles and containers used to transport hazardous materials shall be operated and maintained such that the release of liquids, litter, dust, solids or odor are prevented while in transit
- 4.4.5 Containers of hazardous materials shall be secured during transport to prevent movement or dislodgment under normal operating conditions.
- 4.4.6 All the facilities shall ensure that all drivers transporting hazardous materials shall be trained in hazard awareness and emergency response procedures.
- 4.4.7 The facility ensure that the transporter shall notify the Royal Commission Industrial Security and Safety Department (ISSD) and EPCD immediately in the event of an accident, spill or discharge involving hazardous materials within the Industrial City. The following information shall be reported to the Royal Commission Industrial Security Department:
- a) Spill/accident location
 - b) Name of hazardous substance released
 - c) Transporter's company name
- 4.4.8 In the event of any spill during transit outside the industrial city, the facility shall ensure that the driver of the transit vehicle shall notify to the local authority, consignor and consignee.

4.5 Underground Storage Tank Regulations

- 4.5.1 An underground storage tank (UST) system is defined as any one tank or combination of tanks, inclusive of the underground piping connected to such tanks and any associated containment system, that is used to contain hazardous materials, and the volume of which, inclusive of the connected underground piping volume, is 10% or more beneath the surface of the ground.
- 4.5.2 The underground storage tank regulations apply to all operators of UST's except as provided below:
- a) any wastewater treatment tank system that is part of a wastewater treatment facility
 - b) oil sumps
 - c) a septic tank
 - d) pipeline system carrying single use feedstock for process or other use
 - e) surface impoundment, pit, pond or lagoon
 - f) storm water or wastewater collection system
 - g) liquid traps or associated gathering lines directly related to oil or gas production operations
 - h) flow through process tank
 - i) any UST system with capacity of 2000 litres or less
 - j) any emergency spill or overflow containment system that is emptied immediately after use
- 4.5.3 No person, facility or commercial enterprise shall install a UST system, for the purposes of storing a hazardous material unless the UST system is provided at a minimum with the following:

- a) leak detection and secondary containment provisions in accordance with
Clauses 4.3.7 (a) and 4.3.8 (a) and 4.3.9
- b) corrosion protection
- c) overfill and overspill protection

- 4.5.4 Operators of UST systems which are not equipped with secondary containment and leak detection shall perform tank tightness testing at a minimum of once every three years. Such tightness testing shall include the entire tank system, as defined in Clause 4.5.1, and shall be capable of detecting a leak of 12.5 ml/min or greater from the UST system. The results of the latest tank tightness testing shall be kept on record at all times.
- 4.5.5 Operators of UST systems (constructed before September 1, 2005) shall, provide a method or combination of methods of release detection that can detect a release from any portion of the tank and the connected underground piping that routinely contains product. The leak detection system shall be installed, calibrated, operated and maintained in accordance with manufacturer's instructions, including routine maintenance and service checks for operability.
- 4.5.6 Operators of UST system (constructed before September 1, 2005) that cannot apply a method of release detection or containment in accordance with Clause 4.5.5 shall remove the tank from service and complete closure following procedures approved by the Royal Commission.
- 4.5.7 At least thirty days before permanently closing a UST or removing it from service, operators shall notify the Royal Commission of their intent to permanently close the system and the methods or procedures to be used to close or remove the system from service.

4.6 Tables

**TABLE 4
POTENTIALLY INCOMPATIBLE MATERIALS**

The mixing of Group A materials with those identified Group B materials may produce the noted hazardous reactions resulting in unsafe or unhealthy conditions.

Group I: Potential Consequences: Heat generation, violent reaction	
Group I - A	Group I - B
Acetylene sludge	Acid sludge
Alkaline caustic liquids	Acid and water
Alkaline cleaner	Battery acid
Alkaline corrosive liquids	Chemical cleaners
Alkaline corrosive battery fluid	Electrolyte acid
Caustic wastewater	Etching acid liquid or solvent
Lime sludge; other corrosive alkalis	Pickling liquor; other corrosive acids
Lime wastewater	Spent acid
Lime and water	Spent mixed acid
Spent caustic	Spent sulphuric acid

Group II : Potential Consequences: Fire or explosion; generation of flammable hydrogen gas	
Group II - A	Group II - B
Aluminium	Any waste in Group I-A or I-B
Beryllium	
Calcium	
Lithium	
Magnesium	
Potassium	
Sodium	
Zinc powder; other reactive metals and metal hydrides	

Group III : Potential Consequences: Fire, explosion, or heat generation; generation of flammable or toxic gases	
Group III - A	Group III - B
Alcohols	Any concentrated waste in Group I-A/I-B
Water	

TABLE 4
POTENTIALLY INCOMPATIBLE MATERIALS (cont.)

The mixing of Group A materials with those identified Group B materials may produce the noted hazardous reactions resulting in unsafe or unhealthy conditions.

Group IV : Potential Consequences: Fire, explosion or violent reaction	
Group IV - A	Group IV - B
Alcohols Aldehydes Halogenated hydrocarbons Nitrated hydrocarbons Unsaturated hydrocarbons Other reactive organic compounds and solvents	Concentrated Group I-A or I-B wastes or Group II-A wastes

Group V : Potential Consequences: Generation of toxic hydrogen cyanides or hydrogen sulphide gas	
Group V- A	Group V - B
Spent cyanide and sulphide solutions	Group I-B wastes

Group VI : Potential Consequences: Fire, explosion or violent reaction	
Group VI - A	Group VI - B
Chlorates Chlorine Chlorites Chromic Acid Hypochlorites Nitrates Nitric acid, fuming Perchlorates Permanganates Peroxides Other strong oxidisers	Acetic acid; other organic acids Concentrated mineral acids Group II-A wastes Group IV-A wastes Other flammable and combustible wastes

Group VII: Potential Consequences: Release of toxic substances in case of fire or explosion	
Group VII - A	Group VII - B
Asbestos waste, other toxic waste Beryllium wastes Un-rinsed pesticide containers Waste pesticides	Cleaning solvents Data processing liquid Obsolete explosives Refinery or petroleum waste Retrograde explosives Solvents Waste oil; other flammable and explosive wastes

SECTION - 5

5.

Waste Management

This section covers regulations and standards to govern the proper transportation, treatment, storage and disposal of waste.

5.1 General Regulations for Waste Management

5.1.1 Waste generated in the Industrial City shall be classified into one of the following categories:

- a) **Hazardous Industrial Waste:** These wastes are defined as any solid, semi-solid, liquid, or contained gaseous waste, or combination of such wastes, which may because of its quantity, concentration, physical or chemical characteristics pose a hazard or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of or otherwise managed. These wastes shall also include:
 - i. All wastes with properties as defined in Section 4.1 of these Regulations, including chemical wastes identified as discarded commercial chemical products, off-specification products/chemicals, container residues and spill residues.
 - ii. Any waste, if after application of the test method 1311 Toxic Characteristic Leachate Procedure (TCLP), as established in U.S. EPA 40CFR Part 261 Appendix II the extract from the waste contains contaminant concentrations equal to or greater than those listed in Table 5A
 - iii. any wastes identified as hazardous by PME.
- b) **Non-hazardous Industrial Waste:** These wastes include solid, liquid, semi-liquid or contained gaseous materials or wastes resulting from industrial, mining, and agricultural operations and sludge from industrial, agricultural or mining, water supply treatment, wastewater treatment or air pollution control facilities, provided that they are not hazardous, municipal or inert wastes as otherwise defined in these Regulations.
- c) **Municipal Waste:** Municipal wastes include garbage, refuse, food waste, office waste, waste vegetation and other decomposable material resulting from operation of residential, commercial, municipal, industrial or institutional establishments and from community activities.
- d) **Inert Waste:** Inert wastes are those wastes which are not biologically or chemically active in the natural environment, such as glass, concrete and brick materials, broken clay and manufactured rubber products.

5.1.2 Waste generators shall, through testing of the waste or knowledge of the process by which the waste is generated, classify their wastes according to Clause 5.1.1.

5.1.3 A hazardous waste or its container may be reclassified as non-hazardous provided it is treated in such a way that the resulting material or container no longer exhibits the characteristic that made it hazardous

5.1.4 A hazardous waste or its container is not considered a waste once it has been acceptably recycled.

5.1.5 All facilities shall submit to RC a "Waste Reduction Plan" at the time of EPO renewal to show data pertaining to significant reduction in the existing amount of wastes being generated by their

facilities by effective operational measures, maximizing recycling of wastes (inside) and retrofitting of cleaner best available process technology into the existing process streams. No waste generator shall send their waste for disposal such as landfilling, incineration, etc unless the waste is evaluated for recycling, reusing and regeneration option as a first choice.

- 5.1.6 All the waste generated in industrial city shall be transported by RC approved transporter to RC approved Waste Management Facility (WMF)/ Waste Recycling Facility (WRF).
- 5.1.7 Waste generator is responsible for declaring all wastes that will be generated during construction and operation
- a. Waste generator shall ensure (at time of operations) that estimated waste information shall be in consistent with the information declared in PAP form PA-H2 (Volume II).
 - b. If any discrepancies due to changes in design or process are observed by waste generator, then waste generator shall report to RC and update form PA-H2 immediately.
- 5.1.8 Hiring maintenance contractors for cleanup-works/shutdown/turnaround/emergencies for tanks, equipment and other units shall be limited to maintenance works only and shall not be permitted to undertake waste management and transportation works unless authorized by RC.
- 5.1.9 All generated waste within the facility premises by maintenance contractor shall be under the responsibility of waste generator and the waste generator shall be liable for any illegal transport/disposal/recycle of waste as per RCER.
- 5.1.10 The operator of a facility shall submit to RC for any temporary hazardous material storage requirements during major shutdown / turnaround activities and get approval. Further, a temporary storage shall address the following requirements:
- a. The storage area shall be accessible in case of emergency and for purposes of inspection and monitoring;
 - b. The storage shall be enclosed but adequately ventilated;
 - c. The storage area shall properly be secured and not easily accessed by unauthorized persons;
 - d. Drums shall be in pallets to allow passage of water and circulation of air;
 - e. All containers shall be checked regularly for leaks;
 - f. The waste containers shall be properly labeled and segregated.
- 5.1.11 All wastes shall be properly segregated prior to transport to WMF.

5.2 Waste Manifest Regulations

- 5.2.1 No waste material (industrial hazardous/ non-hazardous) shall be transported from any facility to WMF/WRF without prior approval by RC and without waste manifest.
- 5.2.2 Each facility is required to obtain prior approval from RC for sending any waste material to WMF/WRF by using RC Electronic Waste Tracking System. Until the implementation of this, the waste generator shall provide the following information in order to obtain the RC approval:
- a) Name of each waste, quantity, important properties including physical and chemical composition, source of generation, proposed recycle, treatment or disposal methods including safety and precautionary measures for handling hazardous wastes and the proposed Waste Management Facility(WMF) /Waste Recycle Facility (WRF).
 - b) Name of the RC authorized waste transporter(s).

- 5.2.3 The generator shall sign the manifest certifying that the waste is properly classified, described, packaged, marked and labeled according to the requirements of these Regulations.
- 5.2.4 RC will evaluate generator's request and may require additional information as needed. If found satisfactory, RC will provide approval / manifest for transporting waste materials to the designated WMF/WRF.
- 5.2.5 Before transportation of hazardous and non-hazardous industrial waste away from a generator's facility, either for recycle, reuse, treatment, storage or disposal the generator shall complete a waste manifest containing, as a minimum, the following information (see Appendix - D)
- a) A unique, sequential manifest number
 - b) The company name, address, telephone number and contact name of the generator
 - c) The company name, address, telephone number and contact name of the transporter
 - d) The company name, address, telephone number and contact name of the disposer
 - e) For non-hazardous industrial waste, a description of the waste including compositional data
 - f) For hazardous waste a detailed chemical and physical analysis, safety and hazardous material handling precautions, and hazard class consistent with Section 4.1
 - g) Proposed recycle, reuse, treatment or disposal method
 - h) The total quantity of waste being transported, and the number and type of containers being transported to the designated disposal facility.
 - i) All industrial waste transportation activities shall be undertaken by RC approved transporters.
- 5.2.6 The generator shall, prior to transporting the waste, obtain the signature of the waste transporter on the manifest acknowledging acceptance of the waste by the transporter.
- 5.2.7 The generator shall retain a copy of the manifest for record purpose at their facility for a period of time not less than five (5) years from the date of transportation of the waste from the generator's facility.
- 5.2.8 The RC approved transporter shall maintain the manifest with the corresponding waste at all times (one manifest for each truck load) until such time as possession of the waste passes to either another transporter or to the permitted WMF/WRF.
- 5.2.9 If the transporter transfers the waste to another RC approved waste transporter, the first transporter shall write the date of transfer and obtain the signature of the responsible individual of the second transporter on the manifest. The second transporter shall assume responsibility for the waste and for the transmittal of the manifest to the WMF/WRF.
- 5.2.10 Upon delivery of the waste to the designated WMF/WRF, the transporter shall write the date of delivery and obtain the signature of the responsible individual at the WMF/WRF on the manifest. The WMF/WRF shall be responsible for the waste until it is disposed of permanently/recycled in an environmentally safe and sound manner.
- 5.2.11 A designated WMF/WRF accepting hazardous and non-hazardous industrial waste, shall adhere to the waste manifest procedures as follows:
- a) Upon arrival at the WMF/WRF, the WMF/WRF shall certify that the wastes as delivered are consistent with the description of the accompanying manifest documentation.
 - b) If any discrepancies exist between the wastes described on the manifests and those to be received, they shall be noted on the manifest documentation

- c) The WMF/WRF shall return a completed copy of the manifest to the generator within thirty (30) days after acceptance and signature for receipt of the waste material from the transporter
- d) The WMF/WRF shall retain a signed copy of the used manifest for a period not less than five (5) years from the date of receipt of the waste shipment at their facility.

5.2.12 The operator of a hazardous or non-hazardous industrial waste disposal facility which rejects waste delivered to its site shall notify the Royal Commission within 24 hours of the following:

- a) The names of the generator and transporter
- b) Date and time when waste was rejected
- c) A copy of the manifest
- d) The reason for not accepting the waste

5.2.13 If the generator has not received a completed manifest from the designated disposal facility within thirty (30) days of initial transport, the generator shall contact the disposal facility to determine the waste disposition and to request a copy of the completed manifest.

5.2.14 If the generator has not received a completed manifest from the disposal facility within forty five (45) days of initial transport, the generator shall provide the Royal Commission with a copy of the original manifest and any other pertinent information relating to the waste disposition. This shall not relieve the generator from determining the waste disposition and obtaining a copy of the completed manifest.

5.3 Waste Transportation Regulations

5.3.1 No wastes generated within the Industrial City shall be transported outside the boundary of Industrial City for storage, treatment or disposal.

5.3.2 No wastes generated within the Industrial City shall be transported to a WRF located outside the boundary of Industrial City for recycle / reuse, or recovery without Royal Commission prior approval (to be approved on a case by case basis) and in compliance with PME regulations. The RC will not approve transportation of waste outside of industrial city for recycle / reuse, or recovery if this process can be accomplished by an existing WRF being operated inside the industrial city. RC approval to the WRF located outside industrial city will be based on the following conditions:

- a) The WRF is employing internationally recognized design/process, RC accepted best available technology and techniques/ operating procedures to recycle the industrial wastes
- b) The outside WRF shall follow in general the standards and guidelines covered in PME and RCER for their emissions and discharge control.
- c) The outside WRF accepts the right of RC for inspection as per Clauses 1.1.17 and 1.1.18 of RCER-2015, Volume I.
- d) The outside WRF submits a monthly report to RC which includes the followings:
 - i. Date of receiving the waste and completion of its processing and recycling
 - ii. Recycling and process used in recycling the waste from industrial city
 - iii. Quantity and characteristics of waste
 - iv. Quantity of recovered material
 - v. Process employed to dispose the residue
 - vi. Utilization of the recovered material

- e) The WRF shall be capable to recycle/recover the recyclable materials as per RC requirement specific to a particular waste from the total volume of the waste and shall prove the usage of recovered materials viable.
 - f) The WRF shall be capable to manage the residual waste in accordance with this regulation.
- 5.3.3 No wastes generated outside the Industrial City shall be transported inside the boundary of Industrial City for any activity.
- 5.3.4 A transporter shall not transport hazardous or non-hazardous industrial waste from a generator unless it is accompanied by the following documentation:
- a) RC approval to the generator for transfer and disposal of the waste.
 - b) A manifest completed and signed in accordance with Section 5.2.
 - c) A copy of the Waste Transportation Registration Certificate in accordance with Section 5.8
- 5.3.5 The generator shall ensure that all wastes are placed in waste compatible containers that properly contain the waste to prevent any spillage or leakage during transportation.
- 5.3.6 The generator shall clearly label all industrial and hazardous waste containers with the following minimum information regarding the waste to be transported:
- a) Name of industrial or hazardous waste
 - b) Generator's name
 - c) Date of waste generation
 - d) Manifest number
 - e) Hazard classification as per Section 4.1 and hazardous labeling as per Section 4.3.14. The identification system shall correlate to the waste manifest.
- 5.3.7 The WMF/WRF shall only utilize waste transporters/accept wastes from waste transporters that are registered and authorized by the Royal Commission to transport hazardous and non-hazardous industrial waste from the generator. Such transporters shall meet the requirements as established in Section 5.8 of these Regulations.
- 5.3.8 All motor vehicles transporting hazardous wastes shall carry placards in accordance with the United Nations chemical hazard classification system for the transport of dangerous goods.
- 5.3.9 All vehicles and containers used to transport waste shall be operated and maintained such that the release of liquids, litter, dust, solids or odor are prevented while in transit.
- 5.3.10 Containers of hazardous waste shall be secured during transport to prevent movement or dislodgment under normal transportation conditions.
- 5.3.11 Totally enclosed compactor-type vehicles and skips shall be used for collection of municipal wastes. Vehicles and container systems for industrial non-hazardous and hazardous wastes shall be suitable for the specific materials being transported.
- 5.3.12 In the event of an accident, spill or discharge involving hazardous waste in transit, and where the integrity of the container(s) has been compromised, transfer of the waste material shall occur using collection methods and containers compatible with the hazardous material being collected. Any transfer shall be documented on the manifest document accompanying the waste.

- 5.3.13 In the event of an accident, spill or discharge involving waste in transit, both the generator and transporter shall be responsible to clear and dispose the waste material from accident site to the RC approved disposal facility in an environmentally sound manner.
- 5.3.14 The transporter shall deliver the entire quantity of the waste that they accepted from a generator, or other transporter, to the designated WMF/WRF.
- 5.3.15 A transporter of hazardous waste shall deliver the waste to the designated disposal facility within 48 hours of acceptance of the waste material from the generator if the disposal facility is situated within the Industrial City.
- 5.3.16 A transporter of hazardous waste shall deliver the waste to the WRF within 6 days of acceptance of the waste material from the generator, if the RC approved WRF (as per Clause 5.3.2) is situated outside Industrial City.
- 5.3.17 Upon delivery of the waste to the WMF/WRF, the transporter shall write the date of delivery and obtain the signature of the responsible individual at the WMF/WRF on the manifest. The WMF/WRF shall assume responsibility for the waste once received from the transporter.
- 5.3.18 Municipal waste shall not remain in collection vehicles for more than 24 hours, and shall only be left in a collection vehicle overnight when this practice does not constitute a fire, health or safety hazard to workers or the public.
- 5.3.19 In the event that the WMF/WRF cannot accept the waste, the transporter shall return the waste to the generator within 48 hours and shall inform the RC immediately..
- 5.3.20 Waste transporters shall submit quarterly reports to the RC giving full details of wastes transported during the period.
- 5.3.21 Waste transporter shall assume responsibility for safe transport of shipment from time of receiving waste load from waste storage site at generator facility, till shipment reaches to the WMF/WRF. After that, responsibility shall be on WMF/WRF until the waste is treated/disposed/recycled as per approved methodology.

5.4 Hazardous and Non-Hazardous Industrial Waste Treatment and Disposal Regulations

- 5.4.1 All hazardous and non-hazardous industrial wastes generated within the Industrial City and not intended for recycle or reuse shall be treated and / or disposed of at the Royal Commission approved WMF located inside the Industrial City within one hundred and eighty (180) days of the waste being generated, unless otherwise approved by the Royal Commission. The 180 days shall include the storage period of wastes at the premises of generating facility and the disposal facility.
- 5.4.2 Any hazardous and non-hazardous industrial waste found to be disposed of illegally shall be retrieved by the generator and disposed of at the generators cost in accordance with these Regulations.
- 5.4.3 Operators of hazardous and non-hazardous industrial WMF/WRF shall have an updated operational manual (s) and shall follow standards for the selection of the most appropriate pretreatment and disposal/recycle techniques for industrial and hazardous waste in their control in accordance with the regulations, methodologies and techniques established by the U.S. EPA in Title 40 CFR Parts 261, 264, 266, 268, 270 and their updated versions and the Royal Commission.
- 5.4.4 The following hazardous industrial wastes shall be disposed by incineration:

- a) Waste containing organic solvents in excess of five wt. percentage
- b) Wastes containing in excess of 50ppm of PCB or 1000mg/kg of Halogenated Organic Compounds (HOC)

5.4.5 Landfill disposal of hazardous industrial wastes shall only take place at a Class 1 disposal site which has, as a minimum the following characteristics:

- a) All landfill operations shall be performed by RC approved WMF/(if allowed) WRF
- b) Hazardous industrial waste is isolated from the ground or groundwater by means of a double liner system
- c) Surface water runoff is prevented from entering the landfill cell.
- d) Leachate and runoff water from the landfill cells are collected and treated before being allowed to leave the boundary limits of the landfill area. The treated leachate/runoff effluent shall meet the relevant water quality criteria provided in Section 3, dependent upon final point of discharge.
- e) The disposal site has impermeable and stable foundations and embankments.
- f) The site is fenced and designated as off limits to the public.
- g) Each landfill cell is equipped with leachate monitoring wells.
- h) The site is surrounded with a minimum of one up gradient and three down gradient groundwater monitoring boreholes.
- i) No liquid/slurry wastes shall be disposed at landfill

5.4.6 Small containers of compatible hazardous industrial waste in overpack drums (laboratory packs) may be placed in a Class I (double lined) landfill without pretreatment if the following requirements are met:

- a) The waste shall be packaged in non-leaking containers, which are of a material that will not react dangerously with, be decomposed by or ignited by the waste.
- b) The containers shall be tightly sealed and overpacked in a compatible drum.
- c) The drum shall be provided with sufficient quantity of absorbent material to completely absorb all the liquid contents of the inside containers.
- d) The absorbent material used shall be of a material that will not react dangerously with, be decomposed by or ignited by the waste.

5.4.7 A label on the outer container or overpack shall clearly identify each hazardous substance within the container.

5.4.8 All Class I landfill shall be operated such that:

- a. Wastes deposited in the landfill are compatible with the landfill liner.
- b. Only physically, chemically and biologically compatible wastes are deposited in the same landfill cell.
- c. Adequate equipment is to be maintained on-site to control fire, dust and odor problems.
- d. Operating procedures including monitoring, safety and emergency procedures approved by the Royal Commission are followed.
- e. Reporting of operating landfill shall be in accordance with EPO conditions and Section 8 of this volume

5.4.9 Non-hazardous industrial waste shall be disposed of in a Class II (single lined) landfill site which have, as a minimum, the following characteristics:

- a) All landfill operations shall be performed by RC approved WMR/(if allowed) WRF.
- b) The landfill cells are lined with an impervious material (such as: HDPE liner of minimum thickness of 1.5 mm subject to the RC prior approval) to prevent direct contact of the wastes with surface water and groundwater.

- c) The disposal site is above the highest groundwater elevation.
- d) Separate landfill cells exist to segregate non-hazardous industrial waste from municipal waste.
- e) Surface water is diverted from entering the landfill cell.
- f) A leachate and runoff collection system is installed
- g) Leachate and runoff water from the landfill cells are collected and treated before being allowed to leave the boundary limits of the site. The treated leachate/runoff effluent shall meet the relevant water quality criteria given in section. 3 depend upon the final point of discharge
- h) Each landfill cell is equipped with landfill gas venting and monitoring system.
- i) The disposal site has stable foundations and embankments.
- j) The site is fenced and designated as off limits to the public.
- k) Each landfill cell is equipped with landfill gas monitoring and venting system.
- l) The site is surrounded with a minimum of one up-gradient and three down gradient groundwater monitoring boreholes.

5.4.10 All Class II landfill shall be operated such that:

- a. Wastes deposited in the landfill are compatible with the landfill liner.
- b. Municipal wastes are segregated from non-hazardous industrial wastes.
- c. Only physically, chemically and biologically compatible wastes are deposited in the same landfill cell.
- d. Waste is immediately spread and compacted and a daily cover of inert materials is applied to the waste to minimize problems associated with litter, odor and vermin.
- e. No unauthorized burning of waste takes place.
- f. No feeding of farm or domestic animals within the site boundaries shall be permitted
- g. Sludge and other wet materials are pretreated to reduce moisture before landfill disposal.
- h. Adequate equipment is to be maintained on-site to control fire and dust problems.
- i. Operating procedures including monitoring, safety and emergency procedures approved by the Royal Commission are followed.
- j. No liquid / slurry waste shall be disposed of in the landfill.

5.4.11 Upon completion of Class I and Class II landfill cells, the cells shall be covered with an impermeable liner and capped to prevent erosion.

5.4.12 Monitoring of groundwater around a Class I and Class II landfill sites shall be undertaken during the operation and for 30 years after site closure according to a schedule approved by the Royal Commission.

5.4.13 The operator of WMF/ (if allowed) WRF shall conduct stability and integrity study of the landfill once every five years or as per requirement by RC approved contractor.

5.4.14 The operator of a hazardous and non-hazardous industrial WMF/WRF shall develop an updated operational manual/procedures and follow a written schedule for inspecting all waste storage and treatment areas and associated monitoring, safety and emergency equipment. The schedule of the inspection shall address the probable risks that are associated with the type of industrial and hazardous material storage and treatment.

5.4.15 The operator of a facility generating hazardous industrial waste shall provide the Royal Commission with a completed waste audit form (see Appendix E) once every six (6) months. The following information regarding the waste generated at their facility shall be included:

- a) Name of facility generating the waste
- b) Description of the waste generated,

- c) Waste classification,
 - d) Quantity of waste generated for the time period in question,
 - e) Dates of disposal
 - f) Manifest number
- 5.4.16 The operator of a WMF/WRF shall report to the Royal Commission quarterly the following information:
- a) Name of facility generating the waste
 - b) Description of the waste disposed,
 - c) If required by RC: analysis or literature data on the physical and chemical composition, hazardous properties
 - d) Quantity of waste disposed for the time period in question,
 - e) Dates of disposal
 - f) Manifest number
 - g) Method of treatment and disposal for the waste streams
 - h) Final disposal method/ deposition amount of residual materials after recovery of recycling materials
- 5.4.17 All the facilities are required to submit a waste generation report during the major planned shutdowns and turnaround Maintenance activities. The waste report shall include quantity, type of waste, method of treatment, disposal/ recycling of waste, name and address of WMF/WRF, name and address of waste transport company, etc.
- 5.4.18 Any oily waste or other type of waste-generated from the industrial city shall not be allowed to be treated / disposed by land farming method either within the industrial city or outside the industrial city.
- 5.4.19 Dismantling, removal, transportation and disposal of asbestos wastes shall be carried out by licensed/certified companies only in accordance with the guidelines and procedures provided in RCER, Volume II, Appendix F and as per latest USEPA and OSHA guidelines. Further, prior approval shall be obtained from RC before proceeding with any of these activities.

5.5 Municipal Waste Collection

- 5.5.1 Containers, on-site collection systems, and storage areas for municipal waste shall be selected and designed to prevent the accumulation of refuse and the creation of health and fire hazards or nuisance.
- 5.5.2 Containers for municipal waste shall be of adequate size and provided in sufficient numbers to contain all food wastes, rubbish, ashes and municipal waste(s) that a residence or other establishment generates in the period of time between collections.
- 5.5.3 Containers shall be selected for the specific service intended, and shall be equipped with tightly fitting lids for all municipal wastes except for those used for inert, non-blowing wastes. The selected containers shall be reusable and be constructed of corrosion resistant metal or other material that shall not absorb water, grease, or oil. The containers shall be leakproof. Lightweight plastic or paper bags shall not be used as containers.
- 5.5.4 Suitable containers shall be provided to hold the municipal waste awaiting collection, and disposal.
- 5.5.5 The minimum municipal waste collection frequency shall be as follows:
- | | |
|---|----------------------|
| a) Residential Areas | Three times per week |
| b) Commercial establishments generating putrescible food wastes (restaurants, hotels) | Daily |
| c) Other commercial establishments | Twice per week |

d) Litter containers Daily

5.5.6 Owners of the vehicles (voluntarily abandoned or damaged) shall remove such vehicles from streets, roads, and vacant properties fourteen (14) days from the time the owner of either the vehicle or the property where the vehicle is located, have received notification from the Royal Commission to remove the vehicle.

5.6 Municipal Waste Disposal Regulations

5.6.1 All municipal waste generated within the Industrial City and not intended for recycle or reuse shall be disposed of at Royal Commission Sanitary Landfill located within the Industrial City.

5.6.2 Open burning of waste is prohibited in the Industrial City.

5.6.3 Operators of facilities that deliver municipal waste to the Royal Commission Sanitary Landfill shall follow the Royal Commission Sanitation Department procedures before disposal of such materials.

5.6.4 Municipal waste and inert waste shall be segregated at all times.

5.6.5 Disposal of municipal waste from industrial facilities shall be the responsibility of the generator. The minimum collection and delivery frequency for such wastes shall, unless otherwise approved by the Royal Commission, be as follows:

- | | |
|--|----------------|
| a) Municipal waste - putrescible materials | Daily |
| b) Municipal waste – other
(e.g office waste and packaging waste) | Twice per week |
| c) Sewage sludge, grit, screenings | Daily |

5.6.6 Any municipal waste found to be disposed of illegally shall be retrieved by the generator and disposed of at the generators cost in accordance with these Regulations.

5.6.7 Municipal waste shall be disposed of in a Class II (single lined) landfill site which have, as a minimum, the following characteristics:

- The landfill cells are lined with an impervious material (such as: HDPE liner of minimum thickness of 1.5 mm subject to the RC prior approval) to prevent direct contact of the wastes with surface water and groundwater.
- The disposal site is above the highest groundwater elevation.
- Surface water is diverted from entering the landfill cell.
- A leachate and runoff collection system is installed
- Leachate and runoff water from the landfill cells are collected and treated before being allowed to leave the boundary limits of the site. The treated leachate/runoff effluent shall meet the relevant water quality criteria given in section. 3 depend upon the final point of discharge
- Each landfill cell is equipped with landfill gas venting and monitoring system.
- The disposal site has stable foundations and embankments.
- The site is fenced and designated as off limits to the public.
- Each landfill cell is equipped with landfill gas monitoring and venting system.
- The site is surrounded with a minimum of one up gradient and three down gradient groundwater monitoring boreholes.

5.6.8 All Class II landfill sites shall be operated such that:

- Wastes deposited in the landfill are compatible with the landfill liner.
- Only physically, chemically and biologically compatible wastes are deposited in the same landfill cell.

- c) Waste is immediately spread and compacted and a daily cover of inert materials is applied to the waste to minimize problems associated with litter, odor and vermin.
 - d) No unauthorized burning of waste takes place.
 - e) No feeding of farm or domestic animals within the site boundaries shall be permitted
 - f) Adequate equipment is to be maintained on-site to control fire and dust problems.
 - g) Operating procedures including monitoring, safety and emergency procedures approved by the Royal Commission are followed.
- 5.6.9 Scavenging of municipal waste shall be only be permitted by parties authorized by the Royal Commission or their designee.
- 5.6.10 Completed portions of the Class II landfill sites shall be finished with final cover to support vegetation, and vegetation shall be established. Post-closure control shall include maintenance of fill areas and vegetation to minimize erosion.
- 5.6.11 Monitoring of landfill gas production, and groundwater around the landfill shall be undertaken for 30 years after site closure according to a schedule approved by the Royal Commission.
- 5.6.12 The operator of a facility generating municipal waste shall provide the Royal Commission with a completed waste audit form (see Appendix E) once every six (6) months. The following information regarding the municipal waste generated at their facility shall be included:
- a) Name of facility generating the waste
 - b) Description of the waste generated,
 - c) Waste classification,
 - d) Quantity of waste generated for the time period in question,
 - e) Dates of disposal

5.7 Inert Waste Disposal Regulations

- 5.7.1 All inert waste shall be disposed of at Royal Commission approved waste disposal facilities located in the Industrial City.
- 5.7.2 Operators of facilities that collect and deliver inert waste to the Royal Commission Sanitary Landfill shall follow the Royal Commission Sanitation Department procedures before disposal of such materials.
- 5.7.3 Construction debris and demolition waste shall be collected and removed to the designated solid waste disposal area on a regular basis. These wastes shall not be allowed to accumulate such that the material presents a safety hazard for workers or members of the public, or create a nuisance to the community.
- 5.7.4 Any inert waste found to be disposed of illegally shall be retrieved by the generator and disposed of at the generators cost in accordance with these Regulations.
- 5.7.5 Inert wastes shall be deposited in a Class III Disposal site with, as a minimum the following characteristics:
- a) The disposal site is above the highest groundwater elevation.
 - b) The site is fenced and designated as off limits to the public.
 - c) The site is fenced to prevent small objects from being blown away from the site.
- 5.7.6 All Class III landfill sites shall be operated such that:
- a) Only inert solid waste material is deposited in a Class 3 cell.

- b) Operating procedures including monitoring, safety and emergency procedures approved by the Royal Commission are followed.
- c) No unauthorized burning of waste takes place.

5.7.7 Scavenging of inert waste shall be only be permitted by parties authorized by the Royal Commission or their designee.

5.7.8 Completed portions of the Class III landfill sites shall be finished with final cover to support vegetation, and vegetation shall be established. Post-closure control shall include maintenance of fill areas and vegetation to minimize erosion.

5.8 Waste Transporter Registration Regulations

5.8.1 The transporter of hazardous and non-hazardous industrial waste shall obtain an authorization certificate from the Royal Commission before transporting hazardous and non-hazardous industrial waste. The permit application procedure is specified in Volume II of these Regulations.

5.8.2 The waste transportation authorization shall be valid for a period of three (3) years, at which time it shall be renewed by the submission of revised or new information in accordance with Section 5.8.1 of these Regulations.

5.8.3 The operator of a waste transport facility shall be responsible for compliance with RCER specifically of Section 5. Demonstrated failure to comply with the Regulations related to waste transport and disposal may lead to the Royal Commission revoking the waste transport authorization.

5.9 Waste Disposal Facility Closure/ Post Closure Care Regulations

5.9.1 When closing the disposal facility, the operator shall leave the wastes, the disposal units and equipment in such a manner that they will not pose a future threat to human health or the environment, soil and structures.

5.9.2 The operator shall have facility closure plan approved by the Royal Commission. The closure plan shall contain description of process for closing the facility units, closure start/ completion dates, description of closure methods and steps to comply with closure standards such as groundwater monitoring, leachate collection and monitoring of gas emission control. The closure and post-closure requirements shall be in accordance with USEPA 40 CFR Part 264/265 and other applicable international standards.

5.9.3 The operator must give a timetable 60 days in advance of beginning of facility closer activities. Within 90 days of beginning closure, all waste on-site shall be removed or disposed of. Within 180 days of beginning the closure, all closure activities must be completed. Further, the owner shall certify that they have completed closure of the facility as per approved plan.

5.9.4 The disposal facility operator shall implement post closure care plan approved by the Royal Commission.

5.9.5 After closing the disposal facility, the operator shall be responsible for its maintenance and monitoring in the post closure care phase for about 30 years or until the waste is stabilized and poses no further hazard to the environment, whichever is longer. The activities that shall be performed include:

- a) Maintaining the final cover, the Leachate Detection System and groundwater monitoring systems, gas emission monitoring

- b) Preventing migration of liquid in to the closed unit by providing drainage and accommodating settling of waste in the unit
 - c) Protecting final covers, liners, monitoring systems from any disturbance
 - d) Monitoring groundwater to detect any release of hazardous constituents
- 5.9.6 The disposal facility operator shall demonstrate that they have the financial resources to pay for both bodily injury and property damage that may result from waste management and that they are able to properly conduct closure and post closure activities in a manner that protect human health and the environment.
- 5.9.7 The facility may demonstrate through trust fund, surety bond, letter of credit, insurance or corporate guarantee that fund are available to pay for closure, post closure and liability requirements.
- 5.9.8 The facility shall prepare a cost estimate through hiring a third party for closing the facility and conducting post closure activities for a period of about 30 years. Cost estimate shall reflect the maximum possible cost of the activities and shall be adjusted for yearly inflation.

5.10 Tables

**TABLE 5
MAXIMUM CONCENTRATIONS OF CONTAMINANTS
FOR THE TOXICITY CHARACTERISTIC
LEACHING PROCEDURE (TCLP)**

Contaminant	Concentration Level (mg/l)
Arsenic	5.0
Barium	100.0
Benzene	0.5
Cadmium	1.0
Carbon Tetrachloride	0.5
Chlordane	0.03
Chlorobenzene	100.0
Chloroform	6.0
Chromium	5.0
Cresol (total)	200.0
2,4-D	10.0
1,4-Dichlorobenzene	7.5
1,2-Dichloroethane	0.5
1,1-Dichloroethylene	0.7
2,4-Dinitrotoluene	0.13 ¹
Endrin	0.02
Heptachlor (and its epoxide)	0.008 ¹
Hexachlorobenzene	0.13 ¹
Hexachlorobutadiene	0.5
Hexachloroethane	3.0
Lead	5.0
Lindane	0.4
Mercury	0.2
Methoxychlor	10.0
Methyl ethyl ketone	200.0
Nitrobenzene	2.0
Pentachlorophenol	100.0
Pyridine	5.0
Selenium	1.0
Silver	5.0
Tetrachloroethylene	0.7
Toxaphene	0.5
Trichloroethylene	0.5
2,4,5-Trichlorophenol	400.0
2,4,6-Trichlorophenol	2.0
2,4,5-TP (Silvex)	1.0
Vinyl Chloride	0.2

Notes:

1. Denotes the detection limit for the specific analyte of concern

SECTION - 6

6. Dredging

6.1 Dredging Regulations

- 6.1.1 No dredging or disposal of dredged material shall take place outside the Harbor without specific approval being granted by the Royal Commission. Approval will be subject to an assessment of the environmental impact of the proposed dredging and dredged material disposal activities, which will be based on information provided to the Royal Commission on Permit Application Package (PAP-M2) form included in RCER-2015, Volume II.
- 6.1.2 Dredging, dewatering, and disposal of dredged material shall not cause any form of pollution of the marine ecology, including siltation, odors, and fugitive dust.
- 6.1.3 Silt curtain or any floating barrier shall be placed prior to the dredging operation, particularly in sensitive marine areas, such as: seagrass bed, coral reef, mangrove community and other areas of concern.
- 6.1.4 Offshore disposal of dredged material is prohibited unless authorized by the RC (for area under its jurisdiction) or other concerned legal authority in special cases.
- 6.1.5 No dredged materials shall be disposed of within enclosed bays, inlets or within the 20m low tide depth contour unless the dredged material is being used for approved construction purposes.
- 6.1.6 Dredged material that does not meet the standards in Table 6A shall not be disposed of at offshore locations. Such materials may be disposed of at RC approved WMF in accordance with Sections 4 and 5.
- 6.1.7 Dredged materials proposed for beach nourishment or landscaping shall not exceed the criteria provided in Table 6B.
- 6.1.8 Dredged materials can be classified according to the level of pollution as Non-Polluted, Moderately polluted and Heavily polluted as given in Table 6C.
- 6.1.9 Supernatant water decanted from dredged material shall not be disposed of within enclosed bays or inlets or within the 20m low tide depth contour unless a visual clarity of at least 0.5m has been achieved. Supernatant water quality parameters shall meet the maximum pollutant level standards established in Section 3.2.
- 6.1.10 The use of surface impoundments to retain and settle dredged materials shall conform to the standards given in Clause 3.4.8 of these Regulations.

6.2 Tables

**TABLE 6A
MAXIMUM POLLUTANT LEVELS FOR DREDGED MATERIAL DISPOSAL**

PARAMETER	DRY SEDIMENT (mg/kg)
Volatile Solids	8 %
Chemical Oxygen Demand (COD)	50,000
Total Kjeldahl Nitrogen (TKN)	1,000
Oil and Grease	1,500
Mercury	1
Lead	50
Zinc	75
Arsenic	5
Cadmium	2
Chromium	100
Copper	50
Nickel	50

**TABLE 6B
MAXIMUM POLLUTANT LEVELS OF DREDGED MATERIAL FOR BEACH NOURISHMENT**

PARAMETER	DRY SEDIMENT (mg/kg)
Oil and Grease	Nil
Silt and Clay	10 %
Sediment Moisture	25 %
Mercury	0.5
Lead	25
Zinc	25
Arsenic	1.7
Cadmium	1.0
Chromium	10
Copper	10
Nickel	5.0

**TABLE 6C^{a)}
GUIDELINES FOR CLASSIFYING SEDIMENTS ACCORDING TO LEVELS OF SELECTED HEAVY METALS ($\mu\text{g/g}$ dry wt)**

Metal	Non-Polluted	Moderately Polluted	Heavily Polluted
Arsenic	<3	3-8	>8
Cadmium	-	-	>6
Chromium	<25	25-75	>75
Copper	<25	25-50	>50
Lead	<90	90-200	>200
Mercury (Total)	<1	-	>1
Nickel	<20	20-50	>50
Silver	-	-	-
Tin	-	-	-
Zinc	<90	90-200	>200

a)US. EPA, Region V, Guidelines for Classifying Sediments According to Levels of Selected Heavy Metals

SECTION - 7

7. Noise

The following regulations and standards have been established to ensure that noise levels are maintained within limits that do not cause nuisance or harm to the citizens or the environment.

7.1 Environmental Noise Standards

7.1.1 Noise level standards for residential, business and industrial areas, and roadside areas are specified in Table 7A. Environmental noise standards apply to the noise levels measured at the outside of the facility's fence adjacent to the source of the noise or to noise levels in public areas.

7.2 Environmental Noise Regulations

7.2.1 No person, facility, agency or contractor shall operate equipment that creates, noise levels at their boundary fence in excess of the environmental noise standards in Table 7A.

7.2.2 The operator of a facility with equipment operating at noise levels in excess of 85 dBA shall conduct a perimeter noise survey at their facility at a frequency of at least once per year. The results of the noise survey shall be reported to the Royal Commission within thirty (30) days of completion of the monitoring.

7.2.3 The Royal Commission may waive or reduce the frequency of noise monitoring requirements if the operator of the facility can demonstrate to the Royal Commission that the facility is consistently in compliance with the applicable standard.

7.3 Tables

**TABLE 7
 NOISE CRITERIA FOR
 OCCUPIED AND ROADSIDE AREAS**

OCCUPIED AREAS	Maximum Noise Measured at Property Line - Not to be exceeded >10% of Measured Time (dBA)
Zoning District	
1. Residential and Institutional	50
2. Small Business and Commercial	65
3. Industrial	75
Roadside Areas⁽¹⁾	L₁₀ 18 hours in dBA⁽²⁾
Residential Areas	70 ⁽³⁾
Building Interior, Closed Window	50

Notes:

- 1) Roadside criteria based on freely or peak flowing traffic
- 2) L₁₀ (18 hrs) represents the noise level which is exceeded 10% of the time over 18 hrs.
- 3) Noise level measured at a distance of one meter from the building facade

SECTION - 8

8. Reporting and Record Keeping

8.1 Quality Control/ Quality Assurance

8.1.1 The operator of a facility shall establish a Quality Control/Quality Assurance program for the reporting, monitoring and recordkeeping requirements established in these Regulations. Elements of such a program shall include but not be limited to:

- a) Defining standard operating procedures for instrumentation installation, calibration, and maintenance.
- b) Define calibration and preventive maintenance schedules and establish recordkeeping procedures to be used during calibration, maintenance and reporting of results and data.
- c) Define responsibilities for all personnel
- d) Define quality control criteria to be followed during review and validation of data
- e) Establishing documentation on specified forms for all laboratory and field activities

8.2 Reporting Requirements Regulations

8.2.1 The operator of a facility shall provide the Royal Commission with at least thirty (30) days advance notice of any start-up of a new or modified facility.

8.2.2 The operator of a facility shall submit periodic monitoring reports (soft copy with electronic signature) in accordance with any monitoring schedules developed in conjunction with the Environmental Permit to Operate.

8.2.3 The operator of a facility shall submit to the Royal Commission all relevant reports (soft copy with electronic signature) and at the specific frequency referenced in Table 8A. The submitted reports shall contain as a minimum all of the specific information requested in the relevant sections of these Regulations.

8.2.4 The operator of a facility shall report all required monitoring data in units specified in the relevant standards.

8.2.5 Facility Compliance Status Reporting

Operators of all existing facilities shall submit a compliance status report for their facilities Quarterly. The report shall:

- a) identify the regulations and standards in this document which cannot be met consistently by the facility at the time of reporting.
- b) include a schedule of actions proposed to correct the non-compliance issues identified in a).
- c) identify any measures specifically taken to bring the facility into compliance with these Regulations.

8.2.6 Reporting of Non-Compliance Events

The operator of a facility shall report to the Royal Commission all non-compliance events as follows:

- a) All planned start-ups, shutdowns and maintenance activities shall be reported in 15 working days advance.

- b) All major upsets and emergencies shall be reported immediately. A written report more fully explaining the circumstances of the event shall be provided to the Royal Commission within one week of occurrence of the event.

As a minimum the reports shall contain the following.

- i. Description of the non-compliance event
- ii. Duration.
- iii. Estimated quantity and type of emissions or discharges.
- iv. Action to be undertaken to minimize releases

8.2.7 Reporting of Hazardous Material Releases

The operator of a facility shall report immediately to the Royal Commission all incidents which result in spills or releases of hazardous materials in quantities which may impact groundwater or the environment outside the plant boundaries. The report shall contain as a minimum the following:

- a) Description of the incident
- b) Duration.
- c) Estimated quantity and type of emissions, discharges or hazardous waste
- d) Action to be undertaken to minimize releases
- e) Action to be undertaken to clean up these releases

A written report more fully explaining the circumstances of the event shall be provided to the Royal Commission within one week of the occurrence.

8.3 Recordkeeping Requirements

8.3.1 The operator of a facility shall, as a minimum, maintain true and correct records required by these Regulations in accordance with the relevant sections of these Regulations. All data and records required by these Regulations shall be maintained on site in an organized and legible fashion.

8.3.2 Records for monitoring information shall include as a minimum the following information:

- a) The dates, places and time of sampling or measurements.
- b) The date analyses were performed,
- c) The analytical techniques used

8.3.3 The operator of the subject facility shall retain records of all monitoring information, copies of all records required by these Regulations for a period of at least three (3) years from the date of the information.

8.3.4 The operator of a facility shall upon reasonable notification make available for inspection all data and records required in connection with compliance with these Regulations.

8.4 Tables

**TABLE 8A
REPORTING REQUIREMENTS**

The following table summarizes the required reports and their frequency as dictated in the relevant parts of these Regulations.

REQUIRED REPORT	FREQUENCY OF REPORTING	REFERENCE SECTION	REPORTING DUE DATE
PROCESS CONSTRUCTION			
1. Notification of completion date	Once	1.2.6	30 days before construction completion
AIR:			
1. Qty. & Estimated Composition of gases flared (Facilities having flares)	Monthly	2.4.4	Two weeks after the end of the month
2. Stack Emission Testing Notification	Each Time	2.5.7	14 working days in advance
3. Point Source Emission Data	Annually for each source	2.5.8	60 days after completion test
4. Continuous Monitoring Summary	Monthly	2.6.7	Two weeks after the end of the month
5. Fugitive Emission Report	Annual	2.8.10	April for previous year
6. Affected pollutants & odorous chemicals Report	Monthly	2.8.12	Two weeks after the end of the month
7. Seal Inspection Notification	Each Time	2.9.5	14days in advance
8. Air Emission Inventory	Each EPO renewal	2.11.1	Each EPO renewal
WATER:			
1. Industrial Wastewater Discharges	Monthly	3.4.13 or 3.4.15	2 weeks following end of the calendar month
2. Seawater Cooling Discharge	Monthly	3.5.6	2 weeks following end of the calendar month
3. Variance Streams	Monthly	3.5.7	2 weeks following end of the calendar month
4. Cooling Tower Drift Loss Test	First EPO and each EPO renewal	3.6.8	First EPO and each EPO renewal
5. Treated Effluent (SWTP)	Monthly	3.8.6	2 weeks following end of the calendar month
6. Groundwater Monitoring	Annually	3.11.4	90 days after sampling
7. Base Line Groundwater Analysis	Prior to First time Operation	3.11.5	New Facility
7. Drinking Water Monitoring	Monthly	3.12.3	2 weeks following end of the calendar month
HAZARDOUS MATERIALS			
1. Hazardous Substances Inventory	Annually	4.2.4	January of the following year
2. Tank Tightness Test-UST	Every three years	4.5.4	Once every three years
WASTE MANAGEMENT			
1. Disposal Facility - Rejected Waste	Each occurrence	5.2.12	Within 24 hours
2. Waste Manifest - not returned to Generator	Each occurrence	5.2.13/ 5.2.14	Within one month of due date
3. Waste Transporter Report (Notification for Disposal Facility not accepting waste)	Each Occurrence	5.3.19	Immediately
4. Waste Transporter's Report	Quarterly	5.3.20	Within a month following end of the Quarter

**TABLE 8A
 REPORTING REQUIREMENTS (Contd.)**

5. Industrial /Municipal Waste Audit/Disposal – Generator Report	Once every six months	5.4.15/ 5.6.12	Jan/Jul for previous six months
6. Waste disposal Report – Disposal Facilities	Quarterly	5.4.16	Within a month following end of the Quarter
7. Waste Disposal Facility Closure Notification	Each Occurrence	5.9.3	60 Days in advance of beginning closure activities
PERMIT APPLICATION PACKAGE			
1. New Facilities	As proposed	1.2.4	Six months before starting any construction
2. Existing facility(Permit Renewal)	Once every five years	1.3.6	Six months before EPO expiry date
3. Modified Facilities	As proposed	1.3.7	Six months before starting any construction
COMPLIANCE REPORTING			
1. Hazardous Materials Release	Each occurrence	4.3.22 / 4.4.7 / 8.2.7	Immediately + report in 7 days
2. Start up and Commissioning of New and Modified Facilities	Each occurrence	8.2.1	30 days advance notice
3. Facility Compliance Status	Once within six months after the effective date of this regulation and then quarterly	8.2.5	Once within six months after the effective date of this regulation and then quarterly
4. .Non-Compliance Events	Each occurrence	8.2.6	Planned events in advance. Upsets & emergencies within 24h & detailed report within one week.
NOISE:			
1.Boundary Noise Survey	Annually	7.2.2	Within 30 days after completion of test

**TABLE 8B
 RECORD KEEPING REQUIREMENTS**

The following table summarizes the record keeping requirements specified in the relevant parts of these Regulations.

REQUIRED RECORDS	REFERENCE SECTION
AIR:	
Continuous Air Monitoring Operations	2.6.5
BIF hazardous material composition / quantity	2.7.5
Fugitive Emissions - Components Inventory	2.8.1
Fugitive Emissions - Monitoring and Maintenance	2.8.11
Storage Tank Inspections	2.9.6
VOC Storage Information	2.9.7
VOC Loading and Unloading	2.10.6
WATER:	
Seawater Cooling Tower Operation	3.6.6
Continuous Water Monitoring Operations	3.13.5
HAZARDOUS MATERIALS:	
Material Safety Data Sheet (MSDS)	4.2.1
Hazardous Materials Inventory	4.2.2
Hazardous Materials Contingency Plan	4.3.20
Hazardous Materials Inspection Schedule	4.3.21
Underground Storage - Tank Tightness Testing	4.5.4
WASTE	
Waste Disposal Manifests - Generator	5.2.7
Waste Disposal Manifests - Disposal Facility	5.2.8

APPENDIX-A
ENVIRONMENTAL PERMIT TO CONSTRUCT

Kingdom of Saudi Arabia
Royal Commission for Jubail and Yanbu
Directorate General at Yanbu
Technical Affairs Division

المملكة العربية السعودية
الهيئة الملكية للجبيل وينبع
الادارة العامة للهيئة الملكية ببنبع
قطاع الشؤون الفنية

Environmental Permit to Construct

تصريح بيئي للانشاء

This Environmental Permit is issued to :

تم إصدار هذا الترخيص البيئي إلى :

under the authority of the Royal Commission for Jubail and yanbu,
and authorizes construction of the facility cited above in accordance
with the general conditions,limitations, and other requirements of
the environmental regulations of the Royal Commission for Jubail
and Yanbu and the laws of the Kingdom of Saudi Arabia

ان الهيئة الملكية للجبيل وينبع بما لها من صلاحيات تسمح بموجبه إنشاء المرفق
المذكور أعلاه طبقا للشروط العامة والقيود والمتطلبات الاخرى من التنظيمات البيئية
الخاصة بالهيئة الملكية للجبيل وينبع وتلك التي تنص عليها نظم وقوانين المملكة
العربية السعودية .

Facility I.D No. _____

المرفق رقم : _____

Certificate No. _____

رقم الشهادة : _____

Effective Date _____

تاريخ بدء السريان : _____

Expiry Date _____

تاريخ انتهاء التصريح : _____

Area _____

المساحة : _____

Location _____

الموقع : _____

General Manager for Technical Affairs

مدير عام الشؤون الفنية

Date

التاريخ

**Environmental Permit
to Construct**

**رخصة بيئية
للإنشاء**

Permit No.: **EPC ##-###** رقم الرخصة: **EPC ##-###**
Effective Date: تاريخ بدء السريان:
Revision No. رقم الإصدار:

The Royal Commission for Jubail and Yanbu issues this Environmental Permit to Construct to: تمنح الهيئة الملكية للجبيل وينبع رخصة بيئية لإنشاء مرفق صناعي للسادة:

The above company is permitted to construct the following facility in accordance with the Royal Commission Environmental Regulations and the conditions attached to this permit: الشركة المشار إليها أعلاه مرخص لها بإنشاء المرفق الصناعي التالي وفقاً للوائح المعايير البيئية للهيئة الملكية و الاشتراطات المرفقة مع هذه الرخصة:

Facility : المرفق الصناعي :

Royal Commission Representative: ممثل الهيئة الملكية المفوض :

Name: الاسم:
Title: الوظيفة:
Signature: التوقيع:

الختم
Stamp

I certify that ???? will abide by the conditions attached to this Environmental Permit to Construct. تتعهد ؟؟؟؟ بتطبيق الاشتراطات المرفقة بالرخصة البيئية للإنشاء.

Company Representative: ممثل الشركة المفوض :

الختم
Stamp

Name: الاسم:
Title: الوظيفة:
Signature: التوقيع:

APPENDIX-B
ENVIRONMENTAL PERMIT TO OPERATE

Kingdom of Saudi Arabia
Royal Commission for Jubail and Yanbu
Directorate General at Yanbu
Technical Affairs Division

المملكة العربية السعودية
الهيئة الملكية للجبيل وينبع
الادارة العامة للهيئة الملكية بينبع
قطاع الشؤون الفنية

Environmental Permit to Operate

تصريح بيئي للتشغيل

This Environmental Permit is issued to :

تم إصدار هذا الترخيص البيئي إلى :

under the authority of the Royal Commission for Jubail and Yanbu, and authorizes operation of the facility cited above in accordance with the general conditions, limitations, and other requirements of the environmental regulations of the Royal Commission for Jubail and Yanbu and the laws of the Kingdom of Saudi Arabia.

ان الهيئة الملكية للجبيل وينبع بما لها من صلاحيات تصرح بموجب العمل في المرفق المذكور أعلاه طبقا للشروط العامة والقيود والمتطلبات الاخرى من التنظيمات البيئية الخاصة بالهيئة الملكية للجبيل وينبع وتلك التي تنص عليها نظم وقوانين المملكة العربية السعودية .

Facility I.D No. _____ المرفق رقم :
Certificate No. _____ رقم الشهادة :
Effective Date _____ تاريخ بدء السريان :
Expiry Date _____ تاريخ انتهاء التصريح :
Area _____ المساحة :
Location _____ الموقع :

General Manager for Technical Affairs

مدير عام الشؤون الفنية

Date

التاريخ

Attached Conditions Are Mandatory part of this certificate

الشروط المرفقة جزء لا يتجزء من هذه الشهادة .

Environmental Permit
to Operate

رخصة بيئية
للتشغيل

Permit No.: EPO ##-### رقم الرخصة: EPO ##-###
Effective Date: تاريخ بدء السريان:
Expiry Date: صالحة لغاية:
Revision No. رقم الإصدار:
The Royal Commission for Jubail and Yanbu issues this Environmental Permit to Operate to: تمنح الهيئة الملكية للجبيل وينبع رخصة بيئية لتشغيل مرفق صناعي للسادة :

The above company is permitted to operate the following facility in accordance with the Royal Commission Environmental Regulations and the conditions attached to this permit:

الشركة المشار إليها أعلاه مرخص لها بتشغيل المرفق الصناعي التالي وفقاً للائحة المعايير البيئية للهيئة الملكية و الاشتراطات المرفقة مع هذه الرخصة:

Facility : المرفق الصناعي :

Royal Commission Representative: ممثل الهيئة الملكية المفوض :
Name: الاسم:
Title: الوظيفة:
Signature: التوقيع:

الختم
Stamp

I certify that ???? will abide by the conditions attached to this Environmental Permit to Operate.

تتعهد ؟؟؟ بتطبيق الاشتراطات المرفقة بالرخصة البيئية للتشغيل.

Company Representative: ممثل الشركة المفوض :
Name: الاسم:
Title: الوظيفة:
Signature: التوقيع:

الختم
Stamp

APPENDIX C

ENVIRONMENTAL AUTHORIZATION TO TRANSPORT INDUSTRIAL AND HAZARDOUS WASTE

Kingdom of Saudi Arabia

Royal Commission for Jubail and Yanbu

Directorate General for Royal Commission at Yanbu

Environmental Protection & Control Department



المملكة العربية السعودية
الهيئة الملكية للجبيل وينبع
الإدارة العامة للهيئة الملكية ببنبع
ادارة حماية و مراقبة البيئة

Environmental Authorization to Transport Industrial Waste

This Environmental Authorization is issued to :

under the authority of the Royal Commission for Jubail and Yanbu, and authorizes The Transporter/Facility cited above to transport Industrial Waste in accordance with the general conditions, limitations, and other requirements of the Royal Commission for Jubail and Yanbu, and the laws of the Kingdom of Saudi Arabia .

Transporter/Facility I.D No. : _____

Certificate No. : _____

Effective Date : _____

Expiry Date : _____

تصريح بيئي لنقل النفايات الصناعية

تم إصدار هذا التصريح البيئي إلى :

إن الهيئة الملكية للجبيل وينبع وبما لها من صلاحيات تصرح بموجبه العمل للناقل / المرفق المذكور أعلاه لنقل النفايات الصناعية طبقاً للشروط العامة والقيود والمتطلبات الأخرى من الأنظمة البيئية الخاصة بالهيئة الملكية للجبيل وينبع وتلك التي تنص عليها نظم وقوانين المملكة العربية السعودية .

الناقل / المرفق رقم : _____

رقم الشهادة : _____

تاريخ بدء السريان : _____

تاريخ إنتهاء التصريح : _____

Royal Commission Authorized Representative

ممثل الهيئة الملكية المفوض

MYAS EC-06 11 May 04

Date

التاريخ

**Environmental Permit
to Transport
Industrial Waste**

**رخصة بيئية لنقل النفايات
الصناعية**

Registration No.: **WT- ###**

رقم الرخصة: **WT- ###**

Effective Date:

تاريخ بدء السريان:

Expiry Date:

صالحة لغاية:

The Royal Commission for Jubail and Yanbu issues this Environmental Permit to Transport Industrial Waste to:

تمنح الهيئة الملكية للجبيل وينبع رخصة بيئية لنقل النفايات الصناعية للسادة:

The above company is permitted to transport hazardous / non-hazardous industrial waste within Madinat Al-Jubail Al-Sinaiyah in accordance with the Royal Commission Environmental Regulations.

الشركة المشار إليها أعلاه مرخص لها بنقل النفايات الصناعية الخطرة وغير الخطرة داخل مدينة الجبيل الصناعية وفقاً للائحة المعايير البيئية للهيئة الملكية.

Royal Commission representative:

ممثل الهيئة الملكية المفوض:

Name:

الاسم:

Title:

الوظيفة:

Signature:

التوقيع:

الختم
Stamp

I certify that ???? will follow the Royal Commission Environmental Regulations when transporting waste in Madinat Al-Jubail Al-Sinaiyah.

تتعهد ؟؟؟ بتطبيق لائحة المعايير البيئية للهيئة الملكية عند نقل النفايات في مدينة الجبيل الصناعية.

Company representative:

ممثل الشركة المفوض:

Name:

الاسم:

Title:

الوظيفة:

Signature:

التوقيع:

الختم
Stamp

APPENDIX D

INDUSTRIAL AND HAZARDOUS WASTE MANIFEST



INDUSTRIAL & HAZARDOUS WASTE MANIFEST

PART A: TO BE COMPLETED BY WASTE GENERATOR

Waste Generator Name and Address:			Facility ID No:		Manifest No:
Contact Person Name:			E-mail Address:		Telephone No:
Transporter Name and Address:			Transporter ID No:		Telephone No:
Treatment, Storage & Disposal (TSD)/ Recycle Facility Name & Address:			TSD/ Recycle Facility ID No:		Telephone No:
Industrial/ Hazardous Waste Name	Important Properties	Quantity	Unit (ton / drum)	Container Type	TSD/ or Recycle Method
Description of pre-treatment completed on the waste(s):					
Royal Commission's Approval Letter No. with Date:					
Generator's Certification: This is to certify that above named waste materials are properly described, packaged, marked, and are in proper condition for transportation according to the applicable regulations. These waste materials were consigned to the transporter named.					
Name (Print or Type) _____ Signature _____ Date Consigned _____					
Transporter's Certification when receiving Waste(s) Shipment: To the best of my knowledge, the contents of the shipment I have accepted for transport conform to the description on this manifest.					
Name (Print or Type) _____ Signature _____ Date Received _____					

PART B: TO BE COMPLETED BY TRANSPORTER

Transporter's Certification when delivering the Waste(s) to the Designated TSD/ Recycle Facility: I hereby certify that I have not tampered with or altered the contents of this shipment.
Name (Print or Type) _____ Signature _____ Date Delivered _____

PART C: TO BE COMPLETED BY TSD/ RECYCLE FACILITY

Indicate any differences between description on this manifest and actual shipment:
TSD/ Recycle Facility's Certification: I hereby certify that upon visual inspection, the contents of this shipment conform to the description on this manifest except for those differences noted above.
Name (Print or Type) _____ Signature & Seal _____ Date Received _____

Original (White) – RC Environmental Control Dept
 Copy 2 (Green) – TSD/ Recycle Facility
 Copy 3 (Gold) – Transporter

Copy 4 (Blue) – Waste Generator
 Copy 5 (Pink) – Waste Generator (Initial Copy)

INSTRUCTIONS

This manifest shall be used by all the facilities operating in Madinat Yanbu Al-Sinaiyah (MYAS) for transporting industrial and hazardous waste materials for Treatment, Storage & Disposal (TSD)/ or Recycling.

1. The waste generator shall apply to the Environmental Protection & Control Department, Royal Commission for proper approval well in advance before the actual shipment of the waste to the designated TSD/ Recycle facility.
2. The waste generator shall complete **Part "A"** of the manifest and shall have transporter sign and certify the receipt of the shipment. The waste generator shall then retain **Copy 5 "Initial Copy"** of this manifest before handing over manifest and waste shipment to the transporter.
3. Upon delivery of the waste shipment to the designated TSD/ Recycle facility, the transporter shall sign and certify in **Part "B"** the delivery of the shipment.
4. The TSD/ Recycle facility shall complete, sign and certify in **Part "C"** of the manifest and retain **Copy 2**.
5. The TSD/ Recycle facility shall give **Copy 3** to the transporter. The TSD/ Recycle facility send **Copy 1** and **Copy 4** to the waste generator.
6. The generator shall retain **Copy 4** and send **Copy 1**, containing all original signatures, to the Environmental Protection & Control Department, Royal Commission, Yanbu.
7. If more than five (5) waste materials are involved in the shipment, additional manifest(s) must be used.
8. Royal Commission approval letter and manifest(s) shall always be carried along with the shipment while transporting the waste to the designated TSD/ Recycle facility.

GENERATOR				TRANSPORTER	DISPOSAL FACILITY
Company Address				Name 1st transporter Address	Name Address
Tel / Fax Contact				Tel / Fax Contact	Tel / Fax Contact
Waste Description	Class	Quantity	Packing	Date accepted	Date accepted
				Transferred to 2nd transporter yes / no	Date of disposal
				This is to certify that the described materials have been accepted from the generator for transportation and delivery to the identified disposal facility in accordance with the applicable regulations of PME and the Royal Commission Signature Name Title Date	Final disposal location
					Address Tel / Fax
Special Instructions				Name 2nd transporter Address	Discrepancies between waste and manifest
				Tel / Fax	
Analysis attached yes / no				Date accepted	
Date removed from site				Transferred to 3rd transporter yes / no	
This is to certify that the above materials are properly classified, described, packed and labeled and are in proper condition for transportation and disposal in accordance with the applicable regulations of PME and the Royal Commission				This is to certify that the described materials have been accepted from the first transporter for transportation and delivery to the identified disposal facility in accordance with the applicable regulations of PME and the Royal Commission	This is to certify that the described materials have been delivered by the named transporter, that the manifest details are correct and that the wastes have been disposed of properly in accordance with the applicable regulations of PME and the Royal Commission
Signature Name Title Date				Signature 2nd transporter Name 2nd transporter Title Date	Signature Name Title Date

APPENDIX E

WASTE AUDIT FORM



**ROYAL COMMISSION FOR JUBAIL AND YANBU
MADINAT AL-JUBAIL AL-SINAIYAH
INDUSTRIAL WASTE MANAGEMENT
WASTE AUDIT FORM**

GENERATOR QUARTERLY REPORT FOR THE _____ QUARTER 19 _____

1. NAME OF INDUSTRY/INSTALLATION: _____

2. ROYAL COMMISSION CONTRACT NUMBER: _____
(IN THE CASE OF INDUSTRY, THE LEASE NUMBER)

3. INSTALLATION MAILING ADDRESS: _____

4. LOCATION OF INDUSTRY/INSTALLATION (STREET NO.): _____

5. INDUSTRY/INSTALLATION CONTACT (NAME, PHONE, PAGER NO.):

6. TRANSPORTATION SERVICE USED (NAME OF TRANSPORTERS WHOSE SERVICES WERE USED DURING THE REPORTING PERIOD):

7. WASTE IDENTIFICATION:

INDUSTRY (a) WASTE NO. (RC)	DESCRIPTION OF WASTE	CLASSIFICATION (b)	AMOUNT OF WASTE IN MT. Or Cu.M (c)	DATE OF GENERATION	DATE OF DISPOSAL	DISPOSAL FACILITY

AUTHORIZED OFFICER

SIGNATURE

DATE

NOTE: USE ADDITIONAL SHEETS (SHEET NO. 2) IF NECESSARY.

APPENDIX F

AMENDMENTS TO REGULATIONS

Regulation Number	Amended Regulation