مدينة راس لفان الصناعية
RAS LAFFAN INDUSTRIAL CITY

Environmental Regulations
for
Ras Laffan Industrial City

Revision 1, 2005

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1.1 General

The procedure described herein is designed to enable Qatar Petroleum (QP/RLC) to assess the impact of sources of environmental pollution and to ensure that the environmental protection criteria for Ras Laffan Industrial City will be achieved. This procedure calls for enduser operators/owners/asset holders/developers/tenants and their contractors/sub-contractors/agents (herein referred to as "**Entity**" or "**Entities**") to:

submit environmental impact assessments before commencing a new development, executing a policy or plan or making any major modifications to existing facilities.

- perform environmental quality monitoring (for parameters specific to the nature of their operations and/or as agreed with QP/RLC); and
- prepare data analyses and report to QP/RLC.

The Environmental Guidelines and Environmental Protection Criteria for Ras Laffan Industrial City may be periodically updated, as new regulations, permits or standards are issued by an appropriate regulatory authority such as the Supreme Council for the Environment & Natural Reserves (SCENR). The listed criteria are minimum values and are provided for guidance only. The absolute limits/criteria values (applied limits) shall be decided/provided after review of an Entity's EIA, and taking into consideration the nature of processes and operations of such Entity.The criteria values, limits or levels not specifically addressed in the document will be decided on case by case basis. Where clarification and/or variance/exemption is required QP/RLC should be contacted. Environmental issues specific to a certain Entity or Entities will be addressed as specific environmental clauses/requirements within their contractual document(s).

Entities shall adopt measures to develop and present their environmental monitoring plan, waste management plan, environmental emergency plan and an environmental management system; and shall undertake annual/seasonal ecological monitoring in the region of their effluent outfall.

Any violation/exceedance of the criteria/procedure shall be penalised as per the environmental non-compliance penalty system (Appendix I).

1.2 Environmental Impact Assessments (EIAs)

At least six months prior to any new development (i.e. award of engineering & construction contract) or two months prior to any major modification, relocation or alteration of existing sites, Entities shall prepare and submit an environmental impact assessment that meets the requirements of the SCENR & QP/RLC. The report shall demonstrate that environmental control procedures shall be applied in order that the environmental criteria set forth by SCENR and/or in this document will be adhered to. It shall also describe the proposed provisions for testing, monitoring and reporting. Entities shall coordinate the scoping, execution, and submittal of the EIA with QP/RLC.

Entities are advised to include the processed infrared imagery (both for summer & winter seasons) of the coastal areas of Ras Laffan Industrial City within the scope of their environmental impact assessment in addition to any other aerial (vector) image of the site.

1.3 Environmental Impact Factors and Areas of Consideration

The choice of impacts to be considered in performing an environmental impact analysis generally varies according to the type of project, development, or action under evaluation. However, the effects to be considered should include the following as applicable: air quality and air pollution control; energy development, conservation, generation, and transmission; toxic materials; transportation and handling of hazardous materials; aesthetics; coastal area; soil and plant life; erosion and hydrologic conditions; noise control and abatement; chemical contamination of food products; radiation and radiological health; sanitation and waste systems; rodent control; water quality and water pollution control; marine pollution; and wildlife preservation.

1.4 Top Soil

QP/RLC reserves its right to require any Entity to remove, collect and transport the top soil from its allocated/assigned area/s prior to commencing its earthwork/s to a QP/RLC designated site without any cost to QP/RLC. QP/RLC shall allocate/assign a site for the Entity to remove, collect and transport an equivalent amount of free backfill material (if required). After the completion of their works the Entity shall return the collection area to its original state to the satisfaction of QP/RLC.

Areas, where the top soil is considered good and recoverable (approximately 15 to 20 cm), are shown on a map (Figure 1). It is the responsibility of all Entities to ensure that all good top soil is transferred and placed on an allocated area to promote growth of natural wild flora unless an exemption is granted by QP/RLC.

1.5 Excavated Material

Any excess excavated material (rock, desertfill etc.) is the property of QP/RLC and the excess material from any contract or activity should not be transferred to other third party or outside the premises of RLC. RLC will allocate an area for the material to be deposited by the party responsible for initiating the excavation work or importation of backfill material. All cost related to collection, transportation and dumping for such works is to the account of the party.

1.6 Natural Vegetation

Entities are required to exercise all due care not to disturb any natural vegetation unnecessarily that may exist within their right-of-way (ROW). Any plant/bush measuring 50cm or above (height) and/or any plant specifically identified by QP/RLC shall be removed and transplanted (including minimum water necessary to sustain such plants in arid conditions) to an area allocated by QP/RLC. All costs related to the removal transplantation and watering shall be to the account of the Entity. Plants watering by Entities should be necessary during the initial stages (6 months) of plant settling to mitigate stress of transplantation.

1.7 Natural Resources

Entities shall exercise all due care to avoid damaging environmentally sensitive habitat such as coral reefs, tidal lagoons, mangrove swamps, turtle nesting, birds feeding/breeding areas that may exist within their right-of-way.

Entities causing disturbance (through trenching, dredging etc.) in coastal/marine areas shall be liable to place minimum of one reef ball, having minimum available exposed (excluding bottom side)

surface area of 5m2 for every 50m2 of area of pipeline trench or backfill in water depths between LAT 1.5 –10m. The determination of area of impact and exact number of reef balls required will be at QP/RLC's sole judgement. QP/RLC shall allocate/identify/approve the site for the placement of reef balls (artificial reef structure).

A detailed ecological survey (flora & fauna) shall be carried as part of project EIAs. QP/RLC's prior approval shall be obtained on the scope, timing and duration of such surveys.

1.8 Environmental Association

It is mandatory for Entities to join (unless exempted by QP/RLC) Ras Laffan Environmental Association. The exemption will be based on the nature of the impact of the development on the environment and the quantity/nature of emission & discharges.

1.9 Landscaping

Entities shall allocate a minimum of 3.5% of the total leased land area for landscaping either within RLC or within the leased areas. The vegetation/ plantation shall be preferably of indigenous evergreen species requiring least amount of water and are compatible with the prevailing environmental conditions such as salinity, soil composition, wind speed and temperature. Enduser operators/owners/asset holders/ developers/ tenants shall be responsible to maintain the plantation through out the period of their lease or ownership of the facility. QP/RLC's prior approval is required on selecting plants for landscaping. QP/RLC's review requires information on the common & scientific name, a brief description of the plant or plants and a photograph of the matured plant species.

1.10 Environmental Data

Entities shall make available to QP copies of all data collected prior to, during and after any environmental impact assessment and environmental quality monitoring, in each case as applicable. QP shall have the right to use such data, for use in QP/RLC sponsored studies, and to provide such information to third parties, provided that if such data includes confidential information belonging to the Entity, that appropriate undertakings to preserve confidentiality are given by the recipient.

1.11 Environmental Co-ordination

All entities may address their environmental issues directly with the SCENR and any other governmental environmental agencies. QP/RLC shall be provided copies of all correspondence to or from SCENR and any other environmental agencies on environmental issues related to RLC.

1.12 Environmental Incident Reporting

The objective of these requirements is to enable SCENR and QP/RLC to assess environmental impacts from excess emissions or releases.

1. For process upsets or breakdowns that lead to exceedances of State standards, an incident notification shall be submitted to SCENR and QP/RLC within 24 hours of an incident such as chemical spills or gas release. If it has caused injuries or harm to human health or the environment, the incident must also be followed with a written report within 5 working days.

2. Oil or chemical releases over 5 barrels or those that have the potential to reach coastal or groundwaters shall be controlled immediately and remediated. Written reports shall be filed with SCENR and RLC within 5 working days. The report shall include the nature of the incident, the extent of the impact and possible hazards to human health and the environment. The report shall also identify remedial action taken immediately; and more extensive action to minimize any future potential hazards.

3. An incident shall include, but is not limited to: exceedance of an QP/RLC or SCENR criteria; oil / chemical release to the port or coastal waters; onshore oil / chemical spills with potential to reach and degrade groundwater; smoking flare (> Ringlemann #2) for more than 5 minutes per hour; and flaring of sour gas for more than 30 minutes per day. The report shall include the nature of the incident, the extent of injuries, possible hazards to human health and the environment. The report (by completing environmental incident reporting form given in Appendix II) shall also identify remedial action taken immediately; and, if needed, more extensive action to eliminate any future potential hazards within thirty (30) days. Any discharge parameter, regulated or unregulated, that could cause harm to human health, environment, odour or create nuisance shall be monitored and reported.

4. Planned process start-up or shutdown activities that may lead to exceedances of State standards shall be reported to SCENR and QP/RLC at least 48 hours prior to the planned event.

5. QP/RLC may require an Entity to obtain such information as is necessary to initiate and complete special studies on environmental matters. Such information may include, without limitation, non-proprietary process, monitoring, operation, maintenance, or other records that are needed in the calculation of parameters that may effect emissions or environmental impact of any regulated pollutant.

2.0 Water Environment

2.1 General

The water quality criteria have been developed/adopted to protect the long term resources of marine life and water supply in Ras Laffan Industrial City. These criteria have been established to minimise the impact on ground and Gulf water quality, the Gulf ecosystem and the local fisheries.

General guidelines are as follows:

- Industrial and municipal wastewater shall be segregated to increase the potential for use of each stream. All treated wastewater shall be used for landscaping. Discharge into the sea is not allowed except as permitted under section 2.1.5;
- Entities are encouraged to have adequate capacity for storage of process wastewater on site on short term basis; such storage should be in an impermeable tank or lagoon;
- Industrial wastewater stream shall be pre-treated (if exceeds the relevant discharge criteria) to an acceptable level before discharge; and
- Direct discharge of untreated or partially treated water, if exceeds the relevant criteria values, (including polluted ballast and ship wastewater, hazardous materials, and contaminated storm water) is prohibited.
- Rregional Organisation for the Protection of Marine Environment (ROPME) protocols shall apply

2.1.1 General Discharge Quality Criteria

The receiving water shall be adequate to maintain marine life, fisheries, human health and other amenities. All receiving waters shall be free from substances attributable to wastewater or other discharges that:

- Settle or form objectionable deposits;
- Floats as debris, scum, oil or other matter to form nuisance;
- Produce objectionable colour, odour or turbidity;
- Result in impact on the adjacent open Gulf waters in violation of Gulf water quality criteria.

2.1.3 Seawater Cooling Intake

To minimise the impact of the withdrawal of harbour water for cooling purposes, biological material that is screened and filtered should not be returned to the sea except for alive aquatic organisms.

2.1.4 Storm Water Runoff

The impact of storm water runoff may be significant because the dry period proceeding precipitation is usually long, potentially resulting in accumulation of pollutants in the collection system. The first-flush from this system could have an unacceptable impact on the receiving water body (recommended monitoring parameters are listed in Table 2-F). General guidelines are as follows:

- Entities shall have adequate ability to monitor potentially contaminated storm water and skim free oil;
- Contaminated storm waters which run off from areas surrounding process units and from areas around shipping points shall be directed through appropriate treatment facilities; and
- All discharge points shall be equipped with shut-off mechanism.

2.1.5 Water Point Source Discharges

Waters used as cooling water for once through non-contact cooling or desalinization unit brine or cooling tower blowdown may be discharged to cooling water outfall provided that the chemical characteristics of the water are not altered above the background characteristics except for temperature, dissolved solids and residual chlorine (Table 2-B). Prior approval from QP/RLC is required for the use of additives, corrosion inhibitors and or any other chemical. It requires submission of MSDS, concentration at discharge point and assessment of environmental impacts. Direct discharge of industrial wastewater to the cooling canal or Gulf is not allowed unless prior written approval from QP/RLC is obtained.

2.1.6 Groundwater Quality

The objectives of groundwater quality monitoring include the determination of background water quality characteristics and determination of potential sources of contamination and contaminants. Entities are required to install a sufficient number of groundwater monitoring wells (at least one well at each property corner, within their facility) and monitor the quality of the groundwater and provide QP/RLC with the following information as a minimum:

- Location maps, location coordinates, and cross section detailing the geologic structures, geologic settings (lithologs), direction of groundwater movement, and background quality of groundwater in aquifer/s; and
- Quarterly groundwater quality monitoring data (recommended parameters are listed in Table 2-D).

2.1.7 Landscaping Practices

The intent of these criteria is to establish acceptable levels of constituents of reclaimed water and to prescribe means for assurance reliability in the production and use of reclaimed water. This will ensure that the use of reclaimed water for the specified purpose does not impose undue risks to health.

Landscaping practices must ensure that treated wastewater used for irrigation purposes is not injurious to the public health or vegetation (recommended monitoring parameters for vegetation are listed in Table 2-G). The following conditions shall be observed:

- Treatment plant effluent shall conform to the point source discharge criteria (Table 2-C) or as agreed with QP/RLC;
- Distribution system designed for landscaping shall be well marked;
- Water utilised for irrigation shall be applied to landscaping vegetation only, and shall not be used for food crops or forage production;
- Application of irrigation water shall not result in the contamination of other water bodies contamination of soils, groundwater resources etc. (recommended monitoring parameters are given in Tables 2-G and 2-E).

All GTL (Gas to Liquid) projects shall treat wastewater to meet the criteria for food crops specified in Table 2-C.

2.1.8 Marine -Related Discharges

With the establishment of Ras Laffan Port, there will be a resultant impact in the area from ships calling at the port. To minimise the impact that these ships will have on the surrounding marine environment, the marine discharge guidelines include:

- The discharge of untreated contaminated shipboard wastes and refuse from vessels into coastal waters is not permitted;
- Contaminated ballast water should not be discharged into coastal waters. The wastewater discharges from marine vessels should conform to the criteria specified in Table 2-A and discharge of ballast sludges into the Gulf is not allowed. Clean segregated ballast water meeting the criteria presented in Table 2-A may be discharged into the Gulf waters;
- Slop oils or machinery drippings shall be collected and discharged to appropriate onshore Entities and therefore are not to be discharged into coastal waters. Catch pans shall be installed at all valve and hose connections; and
- Floating booms and cleanup equipment shall be available to contain, collect and clean oil spills from these vessels at all times.

2.1.9 Septic Disposal Systems

It is prohibited to construct or operate septic disposal systems within Ras Laffan Industrial City and the closure of the existing septic disposal systems requires an approval from QP/RLC.

2.1.10 Holding & Storage Tank Sites

Below-grade holding tank storage sites shall be lined with provisions for leak monitoring in order to prevent seepage of holding substance/s into the soil and/or groundwater. Placement of below-grade gasoline and diesel fuel tanks requires prior written approval from QP/RLC and are generally discouraged. Transfer and loading points for all chemical or hydrocarbon tanks shall have appropriate

spill containment basins or curbs. New Fibreglass tanks shall be placed on a concrete pad/slab with walls (block work) and plaster/sealant inside or an equivalent technically acceptable system subject to prior approval of Qatar Petroleum, Ras Laffan City. This is to ensure that any leakage/spillage shall not contaminate the groundwater/soil. Holding tanks will be emptied on regular basis. Tanks shall be inspected on a daily basis to avoid overflow or spillages. Entities are required to ensure that all effluent holding and other storage tanks are designed and constructed to comply with these requirements.

2.2 Environmental Reporting & Monitoring

2.2.1 Introduction

This section establishes reporting, testing, monitoring and analyses requirements for sources of water pollution located or proposing to locate at Ras Laffan Industrial City. The objective of these requirements is to enable QP/RLC to assess water quality impacts.

2.2.2 Discharge Monitoring

Entities producing process wastewater are required (unless exempted):

- To continuously monitor the flow, temperature, and wastewater parameters characteristic to their operation; and
- To develop a monitoring protocol for wastewater parameters characteristic to their operation.

2.3 Water Injection for Disposal

Subject to prior written approval from QP/RLC, Entities whose projects process sour, highly alkaline or formation-produced water may utilize underground injection for primary disposal of these wastewaters in lieu of extended waste treatment processes. Disposal shall be into the Yamama / Sulaiy Formations underlying Ras Laffan. Reservoir modelling and injection well planning shall be coordinated with QP/RLC to analyse pressure inference between other water disposal projects in RLC. Wastewater and disposal zone formation water compatibility shall be assessed prior to initiating injection. All casing and tubing strings (except the structural 30 or 20 inch casing) shall be designed for maximum injection pressure or surface . All wellheads, valves, well tubulars, packers and down-hole tools shall be rated for sour service. At least one continuous casing string shall cover the Um Ar Raduma Formation and shallow groundwater formations. All casing shall be cemented fully to the surface. Cement integrity shall be verified with cement bond and evaluation tool cased hole-logging techniques. Voids and poor bonding shall be remedied. Injection well pumps and filtration shall be designed with adequate on-line spares to assure very high availability (100%). All critical equipment shall have 100% spares prior to start-up and during operation. Emergency plans shall be prepared for credible emergency scenarios and integrated with other RLC emergency plans. Provision shall be made to monitor injection volumes, injection pressures and casing anulus pressures. Entities must obtain a permit from QP/RLC to inject their wastewater stream and must comply with the permit conditions. Endusers shall submit their injection facility design and operational plan with 100% injection facility reliability, equipment & system criticality analyses to QP/RLC for approval.

TABLE 2-A: BALLAST WATER DISCHARGE CRITERIA [a]

Variable	Units	Maximum Allowable
Ammonia, Total (as N)	mg/l	3.0
Biochemical Oxygen demand (5 day) [c]	mg/l	75
Chemical Oxygen Demand	mg/l	470
Floatable Oil and Grease	mg/l	NIL
pH	pH units	6-9[b]
Suspended solids	mg/l	35
Total Oil (Hexane Extractable)	mg/l	15
Total Organic Carbon	mg/l	150

NOTES :

a) There are no restrictions on discharges of clean segregated ballast water which meet these criteria.

b) Inclusive range not to be exceeded.

c) Empirically estimated value

Table: 2-B Desalination Water/Blowdown Discharges

Parameters	Unit	Maximum Value/limit
pH	pH Units	6-9
Residual Chlorine differential	ppm	None or less
TSS differential	ppm	None or less
Oil and Grease differential	ppm	None or less
TDS	ppm	To be determined on a case by case basis during the EIA process in consultation with the SCENR.

TABLE 2-C: **Quality Criteria for Treated Wastewater Used for Landscaping**

PARAMETER	SYMBOL	UNITS	MAXIMUM ALLOWABLE	
			Landscaping	Food Crops[1]
Total Dissolved Solids	TDS	mg/l	1750	1750
Total Suspended Solids	TSS	mg/l	50	50
pH	pH	pH units	6-9	6.5-8.5
Floating Particles / Oil		mg/m^2	Nil	Nil
1- Metallic species [3]				
Aluminium	Al	mg/l	15	5
Arsenic	As	mg/l	0.1	0.1
Barium	Ba	mg/l	2	2
Boron	B	mg/l	1.5	1.5
Cadmium	Cd	mg/l	0.05	0.01
Chromium, total	Cr	mg/l	0.2	0.01
Cobalt	Co	mg/l	0.5	0.05
Copper	Cu	mg/l	0.5	0.2
Iron	Fe	mg/l	1	1
Lead	Pb	mg/l	0.2	0.1
Manganese	Mn	mg/l	0.05	0.05
Mercury	Hg	mg/l	0.001	0.001
Nickel	Ni	mg/l	0.5	0.2
Zinc	Zn	mg/l	0.5	0.5
Sodium Absorption Ratio	SAR	mg/l	10	10
2- Non-Metallic Species				
Ammonia	NH_4^+	mg/l	5[2]	15
Chlorine Residual	Cl	mg/l	0.5[4]	0.1
Cyanide	CN^-	mg/l	0.2	0.05
Dissolved Oxygen	DO	mg/l	-	-
Fluoride	F^-	mg/l	15	15
Phosphate	PO_4^{-3}	mg/l	30[2]	30
Sulphate	SO_4^{-2}	mg/l	400	400
Sulfide	S^{-2}	mg/l	0.1	0.1
Biochemical Oxygen Demand	BOD_5	mg/l	50	30
Total Kjeldahl Nitrogen (as N)	TKN	mg/l	75	35
Chemical Oxygen Demand	COD	mg/l	250	150
3- Organic Species				
Oil & Grease (Hexane Extractable)		mg/l	10	10
Phenols		mg/l	0.5	0.5
Total Organic Carbon	TOC	mg/l	150	75
Biological Test				
Total Coliform		MPN/100ml	23	0

NOTE:

1. *The given food crops limits are agreed with the SCENR, MMAA and Ministry of Health (Preventive Health Dept.) as per the miniute of the meeting held on 27/01/2004.*
2. *The State of Qatar Environmental Standards limit*
3. *Depending on the nature of the process the selected heavy metals and its monitoring frequency will be determined in coordination with QP/RLC and on case-by-case basis.*
4. *This limit or SCENR limit shall apply whichever more stringent.*

* The concentration of any identifiable chlorinated hydrocarbon or pesticide shall not exceed 10% of the 96 h LC_{50} value for the commercial shrimp *(Penaeus Semisulcatus).*

** The criteria value, limits or levels not specifically addressed will be decided on case by case basis. Where clarification and / or variance / exemption is required SCENR will be contacted.*

5. TABLE 2-D

RECOMMENDED GROUNDWATER QUALITY MONITORING PARAMETERS

PARAMETER	PARAMETER
Temperature	Arsenic
pH	Barium
Specific Conductance	Chromium (Hexavalent)
Ammonia –– Total Nitrogen	Lead
Nitrate-Nitrogen	Mercury
Total Phosphorus	Selenium
Chlorides	Silver
Total dissolved Solids	Copper
Total Petroleum Hydrocarbon	Sodium
Sulphate	Nickel
Coliforms, if applicable	Zinc
Cobalt	Boron
Iron	Manganese

TABLE 2-E

RECOMMENDED PARAMETERS FOR SOIL ANALYSIS

Parameter	Parameter
pH	Copper
Cation Exchange Capacity	Lead
Total Nitrogen	Nickel
Total Phosphorus	Zinc
Total Potassium	Chromium
Total Organic Carbon	Mercury
Petroleum Hydrocarbon	Cobalt
Sodium Absorption Ratio	Boron
Cadmium	Arsenic

TABLE 2-F

RECOMMENDED PARAMETERS FOR STORM WATER RUNOFF MONITORING

Parameter	Parameter
pH	Arsenic
Specific Conductance	Cadmium
Total Suspended Solids	Chromium
Chloride	Copper
Total Nitrogen	Mercury
Total Phosphorus	Lead
Chemical Oxygen Demand	Cobalt
Oil (Hexane Extractable)	

TABLE 2-G
RECOMMENDED PARAMETERS FOR VEGETATION MONITORING

Parameter	Parameter
Boron	Molybdenum
Cobalt	Nickel
Cadmium	Zinc
Copper	Mercury

NOTE : Additional parameters may be necessary depending on the materials applied to the soil and specific types of vegetation.

3.0 Waste Management

3.1 General

A waste is any refuse, garbage, other discarded materials or waste including any solids, semisolids, liquid material resulting from industrial, commercial or community activities which is discarded, removed or intended to be discarded. The waste management incorporates the handling, storage, collection and disposal of wastes and encompasses the handling, storage, collection, removal and disposal of hazardous wastes. Further specific requirements regarding the management of wastecan be found in "RLC Waste Management Procedure" as amended from time to time, on www.raslaffan.com.

3.2 Classification of wastes

All wastes shall be characterized prior to shipment out of RLC.

Non-hazardous Waste

A non-hazardous waste is any waste that is not hazardous and can be classified as:

Municipal Waste

Municipal wastes include garbage, refuse, office waste and other materials resulting from operations of residential, commercial and municipal, institutional establishments and from community activities.

Inert Waste

Inert wastes are neither bio-degradable nor chemically active in the natural environment such as excavated soil, construction and demolition wastes, etc.

Industrial Waste

Industrial waste means solid waste generated by manufacturing or industrial processes. The forms of such wastes are exemplified y but not limited to: uncontaminated iron scrap, electric cable, processed or treated wastewaters, sludge (semi solid substances) resulting from process or treatment operations, tank deposit, paints or pigments, tyres, empty metal and plastic drums and containers, th eby-product of incineration or other form of combustion etc. This term does not include oil or gas drilling, production, and treatment wastes (such as brines, oil and frac fluids).

Hazardous Waste

Hazardous wastes are classified as those wastes which by the virtue of their concentration of constituents and characteristics (such as ignitible, flammable, combustable, corrosive, reactive, toxic, poisonus, and radioactive etc.) pose a potential hazard to human health and / or the environment if improperly managed. Any solid for which extract concentration exceeds the U.S. EPA leachate concentration limits for toxicity of a particular chemical species (Table 3-B) will be considered toxic and therefore shall be classified as hazardous.

3.2.1 Non-hazardous Waste Management

The collection of non-hazardous waste include specification for containers, storage procedures, collection frequency, method of collection and responsibility for disposal of waste.

3.2.2 Storage

Storage areas shall be selected and designated to prevent the accumulation of refuse and outbreak of health and fire hazards. The following guidelines shall apply:

- The storage area shall be readily accessible to collection vehicles;
- The reception areas shall be designed to prevent the spread of fire, emission of airborne pollutants, odour and vectors throughout the area;
- Storage areas shall be of adequate size and capacity to accommodate required number of containers consistent with waste generation routine and collection schedules;
- Containers shall be marked and selected for the specific intended service and equipped with lids;
- Containers and storage area shall be cleaned on a regular basis; and
- The waste material shall be removed to the disposal site at the earliest opportunity and as the waste is generated.

3.2.3 Collection Frequency

The waste collection frequency shall be in line with the prevailing health and safety regulations.

3.2.4 Disposal

Inert and non-hazardous industrial waste shall be disposed of at duly approved locations within RLC and the Entity shall be liable to pay an associated fee (subject to change by QP/RLC, from time to time). Where clarification is required QP/RLC should be contacted.

3.3 Collection of Hazardous Waste

Improperly managed hazardous wastes pose a potential hazards to human and environmental health. These materials have the potential to create flammable, ignitable, combustable, explosive, toxic, radioactive, corrosive, reactive and poisonus conditions.

3.3.1 Storage

The following guidelines shall apply for the storage of hazardous wastes:

- Hazardous waste storage areas shall be designed to have spill containment systems;
- Hazardous waste storage areas shall be protected to avoid run off to and from the storage area and have facilities to monitor and pre treat any run off;
- Containment curbs shall be maintained around the loading and unloading area;
- Containers and storage tanks shall be comprised of suitable / compatible material to permanently contain the hazardous waste and have an identification label;

- Storage facilities shall be inspected regularly for leakage;
- Incompatible materials (as defined by the IMO Dangerous Goods Code) should not be stored or placed in either common containment areas or containers;
- The storage facilities for volatile substances shall be covered;
- The surface impoundment used to store hazardous wastes shall be adequately lined and leakage monitoring and detection systems installed;
- Where groundwater pollution potential exists the monitoring of the aquifer shall be carried out and contingency plans shall be established to deal with emergencies arising from the accidental discharge of hazardous wastes;
- The storage areas shall be paved, fenced, marked and illuminated;
- Hazardous wastes shall not be stored in the storage area more than 90 days. To store hazardous waste for more than 90 days prior permission to extend the allowable storage time from QP/RLC is required; and
- At the expiry of the storage time-limit, Entities shall transport/remove the material to a suitable hazardous waste management facility. If such facility is not available within the State of Qatar the hazardous waste shall be taken out of the State in accordance with the provisions of the Basel Convention.

3.3.2 Transportation

The transportation of hazardous wastes shall be carried out in accordance with the following requirements, as a minimum:

- Entities shall label and mark the consignments of hazardous wastes before their transportation.
- The storage, handling and transportation of all hazardous wastes shall be documented with records of quantities, characteristics, associated hazards and emergency procedures.

Hazardous waste transportation requires State (SCENR) approval.

3.4 Waste Manifest System

Entities shall maintain a manifest system to provide QP/RLC with a thorough trail of waste movement leaving the Entity's facilities. This shall include the documentation of the following minimum information:

- Manifest Document Number
- Waste Classification
- Quantity
- Hazardous Properties
- No. & type of containers
- Compositional Data
- Hazard Class (Basel Convention)
- Safety Handling Procedures

3.4.1 Records

Entities shall conduct waste storage area inspections on a regular basis and make these findings available to the QP/RLC as and when requested. Entities shall track and summarize all offsite shipments of waste.

3.4.2 Waste Oil

Entities that produce waste oils are required to ensure proper disposal of waste oil and seek an approval from RLC prior to transporting waste oils from RLC. RLC may assist waste oil generators finding an environmentally acceptable solution through the provision of central collection / accumalation tanks, oil analyses, and shipment to recyclers.

3.5 Landfill Disposal Guidelines

The following materials shall not be used for landfill disposal:

- Ignitable wastes with a flash point of less than 60°C; any material which is liable to cause fire through friction, absorption of moisture, spontaneous chemical change or retained heat from the manufacturing process; an ignitable compressed gas; or an oxidizer;
- Corrosive waste with pH less than or equal to 4, or greater than or equal to 12.5;
- A reactive waste which is normally unstable, reacts violently with water, generates toxic gases, vapours or fumes when mixed with water, is a sulphur or cyanide bearing waste which can generate toxic gases, fumes or vapours when exposed to mild acid or basic conditions, or is capable of detonation or explosion;
- Toxic waste whose extract exceeds the limits as mentioned in Table 3-B;
- Radioactive wastes with greater than 20,000 pCi/g of activity;
- Pathogenic and infectious (medical) wastes ;
- Wastes containing more than 5mg/kg Total Polychlorinated biphenols (PCBs);
- Liquid wastes;
- Process Sludges that fail the U.S. EPA paint filter test for moisture; and
- Sanitary wastes or sludges.

The landfill sites shall be designed to prevent the spread of pollutants from one medium to another medium.

3.5.1 Hazard Minimisation

The waste handling, storage, transportation and disposal procedures should prevent the occurrence of the following hazards as minimum safety levels:

- Contamination of surface water and groundwater;
- Emission of airborne pollutants;
- Nuisance created by noise, dust and odour;
- Health hazards created by breeding vector; and
- Injuries to workers and public health & safety.

3.6 Specific Criteria for Sediments and Supernatant Water

The U.S. EPA leachate concentration limits for toxicity (Table 3-B) will serve as guidelines in evaluating the state of pollution in sediments to be dredged. The level of pollution shall either not exceed these limits or not exceed ten percent of the toxic levels as determined by bioassay. The permitted level of pollutants, not contained in the Table 3-B, will be determined on a case by case basis.

Supernatant water containing high levels of suspended fine material, even if not polluted, shall not be disposed of directly to the nearshore water. Such water shall be retained with impermeable dikes until obtaining visual clarity of at least 1m and then returned to the coastal water. Silt or mud will not be disposed of directly to the nearshore water.

3.7 Dredging Material Disposal Criteria

Dredging and dredged material disposal activities originating within Ras Laffan Industrial City will be subjected to environmental impact evaluation for the protection of natural environment. The criteria will serve two purposes:

- They assure the physical features, sediment qualities, and biological communities are identified, so dredging can proceed without significant impact on the environment; and
- They assure that off-shore and on-shore disposal sites are identified which can accept dredged material with minimal environmental impact.

If it is established that an environmentally significant community is likely to be damaged, or the dredged material is contaminated, pre-operational site screening of alternative sites to determine baseline site conditions, and/or characteristics of the dredged material shall be conducted. The operational screening shall:

- Determine the practicality of optional dredging and disposal sites, methods and equipment;
- Characterise the dredged material;
- Determine the seasonal factors such as weather, spawning, migration and so forth, that could influence the timing of dredging and disposal;
- Establish the estimate volume of dredge material and the duration of the proposed activity; and
- Determine the physical variables which will affect the distribution of sediments during the proposed dredging and disposal operations, including water currents and circulation, and wave action where applicable.

The dredged material may be considered clean if it meets the following criteria:

- The dredged material is composed of sand and/or gravel, or any other sedimentary material composed of particles larger than 0.50 mm;
- The water at or near the dredging site is capable of supporting fish, shellfish and other aquatic organisms and the associated biota;
- The material is subjected to a series of chemical and bioassay analyses, and found to be environmentally safe at the disposal site.

3.8 Excavated Waste Material

Minimum reinforced concrete, non-reinforced concrete, cement blocks, material waste generated from either construction, demolition/clearing operations, and concrete test cubes generated from batching plants or concrete casting operations may be allowed to be recycled into either land reclamation operations or filling low areas inside RLC boundaries provided that the concrete solid waste material is within acceptable dimensions. QP/RLC may allocate/assign a site for the Entity to deposit the material for a nominal charge. These charges will be based on the quantity, quality, size of the waste material and will be decided on case by case basis mainly to cover the administration and suppression overheads. Only concrete waste material within an acceptable size, i.e. approximately 80% of total material pieces shall be equal or less than 50 cm in any dimension per piece and free from any other waste material such as organic or domestic or hazardous waste. All cost related to collection, transportation, dumping, disposal and levelling of such works is deemed to be to the account of the Entity. Where clarification is required QP/RLC should be contacted.

3.9 Recycling

Entities shall develop their waste management plan to ensure that waste materials are segregated (paper, wood, glass, plastic, metal, oil etc.) to facilitate material re-use and recycling to their maximum extent.

3.10 Pollution Prevention

Efforts must minimize the use of hazardous material in order to replace persistant organic pollutant that do not breakdown easily in the environment and can bio-accumulate.

Typical examples of avoiding hazardous materials are

(1) use of environmentally-friendly grit material used in sandblasting which contain low concentration of heavy metals;
(2) use of non-mercury lamps;
(3) use of environment-friendly refrigerant R-134a over refrigerants which harm the ozone layer.

The United Nations Environment Programme or UNEP has initiated a protocol to ban 12 persistent organic pollutants. The purchase of any of these persistent organic pollutants must be avoided. The 12 persistent organic pollutants are summarized herein:

3.10.1 Pesticides

- Aldrin
- Chlordane
- DDT (Dichloro diphenyl trichloro ethane)
- Dieldrin
- Endrin
- Heptachlor
- Mirex
- Toxaphene

3.10.2 Industrial Chemicals

- Hexachlorobenzene (also a pesticide)
- Polychlorinated Biphenyls (PCBs) and Polychlorinated Terphenyls (PCTs)

3.10.3 Unintended By-Products

- Dioxins
- Furans

3.11 Environmental Nuisance

All entities operating in operating in RLC shall implement the following minimum operational standards at their sites to prevent environmental nuisance

- Confinement of solid waste-Blowing litter must be confined to waste holding and operating areas by fencing or other suitable means. Waste must be confined to an area that can be effectively maintained, operated and controlled. Waste during transportation must be adequately covered or confined in the vehicle transporting the waste to prevent dust, and blowing litter.

- Dust control. Dust must be effectively controlled so that it does not constitute a nuisance or hazard to health, safety, or property. The facility owner or operator must undertake all measures as required to maintain and control dust at and emanating from the facility.

- Vector control- The facility must be maintained to prevent or control on-site populations of vectors using techniques appropriate for protection of human health and the environment and prevent the facility from being a vector breeding area.

- Odor control- Odors must be effectively controlled so that they do not constitute nuisances or hazards to health, safety or property.

3.12 Source Seperation

Entities shall develop a source separation plan for managing waste at their site. Source separation shall include paper, wood, glass, plastic, metal and oil, separation of putrescible waste including kitchen waste to ensure better waste management and enable recycling.

40 CFR§261.24 Toxicity characteristic.

A solid waste exhibits the characteristic of toxicity if, using the Toxicity Characteristic Leaching Procedure, test Method 1311 in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," EPA Publication SW-846, the extract from a representative sample of the waste contains any of the contaminants listed in Table 3-B at the concentration equal to or

greater than the respective value given in that table. Where the waste contains less than 0.5 percent filterable solids, the waste itself, after filtering using the methodology outlined in Method 1311, is considered to be the extract

Table 3-B--Maximum Concentration of Contaminants for Toxicity Characteristic

EPA HW No.\1\	Contaminant	CAS No.\2\		Regulatory Level (mg /L)
D004	Arsenic.....	7440-38-2		5.0
D005	Barium.....	7440-39-3		100.0
D018	Benzene.....	71-43-2		0.5
D006	Cadmium.....	7440-43-9		1.0
D019	Carbon tetrachloride.....	56-23-5		0.5
D020	Chlordane.....	57-74-9		0.03
D021	Chlorobenzene.....	108-90-7		100.0
D022	Chloroform.....	67-66-3		6.0
D007	Chromium.....	7440-47-3		5.0
D023	o-Cresol.....	95-48-7	\4\	200.0
D024	m-Cresol.....	108-39-4	\4\	200.0
D025	p-Cresol.....	106-44-5	\4\	200.0
D026	Cresol.....		\4\	200.0
D016	2,4-D.....	94-75-7		10.0
D027	1,4-Dichlorobenzene.....	106-46-7		7.5
D028	1,2-Dichloroethane.....	107-06-2		0.5
D029	1,1-Dichloroethylene.....	75-35-4		0.7
D030	2,4-Dinitrotoluene.....	121-14-2	\3\	0.13
D012	Endrin.....	72-20-8		0.02
D031	Heptachlor (and its epoxide).	76-44-8		0.008
D032	Hexachlorobenzene.....	118-74-1	\3\	0.13
D033	Hexachlorobutadiene.....	87-68-3		0.5
D034	Hexachloroethane.....	67-72-1		3.0
D008	Lead.....	7439-92-1		5.0
D013	Lindane.....	58-89-9		0.4
D009	Mercury.....	7439-97-6		0.2
D014	Methoxychlor.....	72-43-5		10.0
D035	Methyl ethyl ketone.....	78-93-3		200.0
D036	Nitrobenzene.....	98-95-3		2.0
D037	Pentrachlorophenol.....	87-86-5		100.0
D038	Pyridine.....	110-86-1	\3\	5.0
D010	Selenium.....	7782-49-2		1.0
D011	Silver.....	7440-22-4		5.0
D039	Tetrachloroethylene.....	127-18-4		0.7
D015	Toxaphene.....	8001-35-2		0.5
D040	Trichloroethylene.....	79-01-6		0.5
D041	2,4,5-Trichlorophenol.....	95-95-4		400.0
D042	2,4,6-Trichlorophenol.....	88-06-2		2.0
D017	2,4,5-TP (Silvex).....	93-72-1		1.0
D043	Vinyl chloride.....	75-01-4		0.2

\1\Hazardous waste number.
\2\Chemical abstracts service number.
\3\Quantitation limit is greater than the calculated regulatory level. The quantitation limit therefore becomes the regulatory level.
\4\If o-, m-, and p-Cresol concentrations cannot be differentiated, the total cresol (D026) concentration is used. The regulatory level of total cresol is 200 mg/l.
[55 FR 11862, Mar. 29, 1990, as amended at 55 FR 22684, June 1, 1990; 55 FR 26987, June 29, 1990; 58 FR 46049, Aug. 31, 1993; 67 FR 11254, Mar. 13, 2002]

4.0 Noise

Noise criteria values are designed to protect the general public from physiological impairment resulting from excessive levels of noise. The criteria include environmental noise exposure limits to protect the general public and to provide guidance for land use planning.

4.1 Noise Criteria

Environmental noise criteria have been developed to protect sensitive human receptors from physiological and psychological harm or annoyance. The criteria are summarised in Table 4.

TABLE 4: NOISE CRITERIA FOR RESIDENTIAL, BUSINESS & INDUSTRIAL AREAS[a]

Category of Zoning District	Maximum Noise Measured at Property Line; No to be Exceeded More than 10% of the Time (dBA) – 15 minute time-weighted average
1. Residential and Institutional	50
2. Small Business and Commercial	65
3. Industrial	75

[a]Road side Areas Excluded.

5.0 Air Environment

5.1 Ambient Air Quality Criteria

Ambient air is defined as any air on the external side of Entity's boundary fence to which the public have access. An industrial facility is entitled to receive ambient air which meets the QP/RLC's environmental guidelines and must ensure that their own emissions do not cause pollution or nuisance to a neighbouring facility. Table 5-A lists the ambient air quality criteria.

An air emissions inventory shall be prepared (as a part of EIA) and maintained including, as a minimum, the following items:

- Site plan showing location of all major emission sources and points;
- Type of pollution control equipment methods proposed for each major source;
- An ambient air dispersion analysis using the proposed rates of emission of all regulated pollutants (the dispersion model/computer programme shall be described and estimated maximum ground level concentrations shown);
- 10 years meteorological data shall be used for dispersion analyses. However, based on data availability and QP/RLC prior approval, sufficient meteorological data could be used in computer modelling as specified by the specific modelling package guidelines.
- For modelling use inventory of all existing and permitted & planned sources.

- The characterisation of each process material and fuel to be used including the percentage of sulphur for solid or liquid fuel and hydrogen sulphide & total reduced sulphur compound concentrations by volume (ppm) for gaseous fuel; and

- An emission inventory identifying all emission points and emission rates

5.2 Abrasive Blasting

Entities involved in abrasive blasting shall operate such that they are able to meet the clean air requirements for the ambient (as well as occupational) environments. An abrasive blasting medium must contain no more than 2% free silica (crystalline silicon dioxide) e.g. garnet. If abrasive blasting medium is to re-used, it must first be separated from dust and other particles which contaminate the abrasive medium from previous blasting. Metal contents must not exceed TCLP limits (Table 3-B)

If abrasive blasting is performed in other than a blasting enclosure i.e. outdoors, measures shall be taken by the owner or operator to ensure that ambient air and occupational standards for dust are met. This will require that fugitive dust from abrasive blasting activities shall not cause a nuisance or health risk to employees, and neighbours. Blasting activities shall be contained in an area, which will substantially reduce the incidence of airborne dust in the workplace.

The outdoor abrasive blasting area shall be hard surface with containment walls, which will reduce the loss of abrasive medium and where possible and allow its re-use. The height of the containment wall shall be such that it can retain abrasive blasting medium after use.

5.3 Flares

Flares shall be designed for non smoking emission except for periods not to exceed a total of five minutes in any hours. Flares shall be operated with a pilot flame present at all times during which there is a likelihood that waste gases will be combusted. Flares shall be used to combust only those gases which have a net heating value equal to or greater than 11.2 MJ/SCM (300 Btu/scf) if the flare is steam-assisted or air-assisted. If the flare is non-assisted, the gas being combusted must have a net heating value of equal to or greater than 7.45 MJ/SCM (200 Btu/scf). The maximum thermal radiation level (including solar radiation) at ground level shall not exceed 6.3 kW/m2 at the edge of the flare area and 3kW/m^2 at the property line. The thermad radiation levels from flares shall be monitored on a quarterly basis unless otherwise required by QP/RLC.

5.4 General

Entities with existing equipment shall phase-out all equipment and plant containing chloro-fluro-carbon (CFC) and halons and any other substance defined in the Montreal Protocol (and subsequent amendments to it) as an ozone depletant. The total phase-out of ozone depletants shall be completed in accordance with the schedule and deadline stated with the protocol. New equipment purchased should not contain ozone depletants. Venting of CFCs and other ozone depletants during service or disposal of air conditioners and refrigerators is prohibited.

With the exception of asbestos-cement water pipes, asbestos-containing materials should not be used for replacement in maintenance, when alternatives exist. New equipment purchased should not contain the banned asbestos parts when alternatives are available. Construction of new facilities shall be free of asbestos products expect as stated above.

Turbine, boiler and process heater combustion sources shall use low NOx technology. Emissions from NOx sources must comply with the criteria specified in Table 5-B. Oil fired process equipment is not allowed.

All flares shall comply to the State of Qatar Environmental Standards. Entities, shall provide a technical report based on atmospheric dispersion model and feld study demonstrating that the selected height ensures discharges from a stack do not result in excessive concentrations of any air pollutant in the surrounding environment and will meets regulated ground level concentrations. Any additional flares outside the Entities premises deemed to be considered as accessible and classified as working area. with consideration given to the heat radiation level to allow such classification.

Supject to prior approval of QP/RLC, Entities whose projects process sour (sulfur containing) natural or by-product gasses shall, as first priority, utilize underground injection for primary disposal of carbon dioxide, hydrogen sulfide, mercaptan, and other reduced sulfur gasses. As applicable, Entities shall apply & obtain a permit from QP/RLC to inject acid gas accordingly. Disposal shall be into the Arab Formation underlying Ras Laffan. Reservoir modeling and injection well planning shall be coordinated with QP/RLC to assure there is minimal pressure inference between other gas disposal projects in RLC. All casing and tubing strings (except the structural 30 or 20 inch casing) shall be designed for maximum injection pressure or surface pressure. All wellheads, valves, well tubulars, packers and down-hole tools shall be rated for sour service. At least two casing strings shall cover the Yamama - Sulaiy and shallow groundwater formations. All casing shall be cemented full to surface. Cement integrity shall be verified with cement bond and evaluation tool cased hole-logging techniques. Voids and poor bonding shall be remedied. Injection well compression and pumps shall be designed with adequate on-line spares to assure very high availability (100%). All critical equipment shall have 100% spares prior to start-up and during operation. All components must be of a leak free design. De-oderization capabilities for mercaptans shall be included. Emergency response plans for gas and mercaptan leaks shall be prepared for all credible emergency scenarios and integrated with other RLC emergency plans. Endusers shall submit their injection facility design and operational plan with 100% injection facility reliability, and equipment & system criticality analyses to QP/RLC for approval.

5.5 Environmental Inventory

To enable QP/RLC to assess ambient air quality, prior to commencing construction or modification all sources of air pollution are required to prepare and submit an ambient air quality analysis and provide an air emissions inventory.

After start-up large emission sources and potentially hazardous or nuisance-type sources such as turbines and sulfur recovery unit incinerators are required to perform source emission test and report the results. For sulfur recovery unit sources, continuous air emission monitoring is required. Operators are required to submit their formal quality assurance plan for all sources subject to continuous source monitoring. QP/RLC may request any industrial facility to prepare, update and report air emission inventory or provide other information relating to the sources in question.

The following sources are exempted from this section of the environmental guidelines:

- Boilers or fuel burning equipment with a maximum rate heat of less than 10MW and burning liquid fuel with sulphur less than 0.5% (by weight) or "sweet" gas (i.e., gas total Kjeldhal Nitrogen (TKN) per dry standard cubic meter of gas);

- Storage vessels of organic fluids having a capacity less than 10,000 liters;
- Restaurants, kitchens and bakeries; and
- Mobile (self propelled) and temporary equipment (installed/operated for less than 60 days).

Despite such exemption these sources shall not cause nuisance nor smoking violations.

5.5.1 Air Emission Performance Tests

Performance tests are required (unless exempted) for any source that could (taking into account use of pollution control equipment) have allowable emissions in excess of 50 tonnes per year of a regulated pollutant.

The aim of performance testing is to verify the reported emissions. Performance tests shall be done within six months of start-up but not earlier than three months after normal operational levels have been achieved, whichever comes first. These tests shall be conducted by an independent consultant, at the sole cost and risk of the Entity. Performance tests shall consist of the determination of exhaust gas temperatures, mass and volumetric flow rates and gas analyses for the pollutant (s) for which the test is required. These tests shall use approved U.S. EPA electronic methods where applicable.

5.6 Continuous Air Emission Monitoring

5.6.1 Source and Parameters to be Monitored

QP/RLC may, at any time, require that the sources listed in Table 5-B continuously monitor the specified pollutants or parameters. In addition to the sources listed in Table 5-B, continuous emission monitoring is required for any source deemed to have the potential to cause an odour nuisance, a health hazard, a detriment to the public welfare, or harm to the environment.

Monitoring shall be of the continuous monitoring type. With the exception of the particulate monitor, data shall be logged from the monitors at a minimum rate of 4 samples per hour. Hourly means shall be calculated from the arithmetic means of these samples. The particulate monitor may log one hour bulk concentrations. Any hour with less than 75% of the possible data capture will be discarded as bad data. A minimum annual data capture rate of 90% is required to demonstrate compliance. The 10% of lost data shall include calibration time and maintenance time.

5.6.2 Quality Assurance Program

Point-sources subjected to continuous source monitoring shall prepare a Quality Assurance Manual to instruct personnel involved in these activities. This manual shall:

- define standard operational procedures (SOPs) for instrumentation, installation, calibration and maintenance schedules;
- define calibration and preventive maintenance schedules;
- establish standard forms and check-list to be used during calibration and maintenance;
- define responsibilities for all personnel; and

- define criteria to be followed during review and validation of data (quality control criteria).

Certificates of traceability for all calibration equipment shall also be maintained in the central document file. Calibration equipment and standards shall conform to the U.S. National Bureau of Standards or its equivalent.

5.6.3 Emission Inventories

Entities are required to provide an updated emission inventory on quarterly basis. This shall contain the latest information available on each source within the plant.

TABLE 5-A: AMBIENT AIR QUALITY CRITERIA

Pollutant	Criteria Concentration Limit		Averaging Period
	ug/m3	ppm	
Sulphur Dioxide (SO_2)	1,300	0.5	1 hr *
	365	0.14	24 hrs *
	80	0.03	annual ave.
Ozone (O_3)	235		1 hr *
Carbon Monoxide (CO)	40,000	35	1 hr *
	10,000	9	8 hrs *
Nitrogen Dioxide (NO_2)	400	0.18	1 hr *
	150	0.07	24 hrs *
	100	0.05	annual ave.
Hydrocarbons (non-methane)	160	0.24	3 hrs *
Vinyl Chloride	26	0.01	24 hrs *
Ammonia	1,800	2.6	1hr
Chlorine	300	0.10	1 hr
Hydrochloric Acid	7	-	3
Hydrogen Fluoride	1	-	monthly ave.
Hydrogen Sulphide	40	0.029	1 hr
	20	0.014	24 hrs
Lead (Pb)	1.5	-	3 months
phosphates	25	-	24 hrs

* Maximum concentration not to be exceeded more than once/year.
\+ Maximum concentration not to be exceeded more than twice/month.
\# Inhalable Particles < 10 microns equivalent aerodynamic diameter.
Exceeding of 24-hours particulate criteria only if man-made.

TABLE 5-B SOURCE EMISSION CRITERIA

SOURCE	POLLUTANT	EMISSION LIMIT
GENERAL		
ALL FACILITIES	Asbestos	No emission
	Particulate	Best practicable control technology. For dusty stockpiles, water supply at suitable intervals.
FLARES	SMOKE	Smoke greater than 5 minutes per hour at density greater than Ringleman #2
INDUSTRIAL BROILERS & FURNACES Heat input capacity > 30 MW		
Gas-fired	Particulate	43 ng / j (0.1 lb/MBTU)
Gas-fired	Sulphur dioxideNitrogen oxides	340 ng / j (0.8 lb/MBTU) 80mg/m3 @3%)
Oil-fired (not allowed)		
SPECIFIC **ABRASIVE BLASTING**	Blasting medium	Blasting medium to contain no more than 2% free silica. Metal contants < TCLP limits (Table 3-B)
AMMONIA FERTILISER MANUFACTURER		
Prilling plant	NH_3	Limit point source < 25 ppm.
ASPHALT/CONCRETE MANUFACTURE		
Dryer; screening and weighing systems; loading	Particulate	90 mg/dsm3
dust handling equipment	Opacity	20%
CEMENT MANUFACTURE		
Kilns	Particulate	0.15 kg/tonne of cement produced.
Clinker coolers	Particulate	0.15 kg/tonne of cement produced.
FERRO ALLOY MANUFACTURE		
Electric arc furnace: Producing silicon metal, ferrosilicon, calcium silicon, silicomanganese zinrconism.	Particulate	0.45 kg/MW-hr
Other:	CO	Max 20% by volume of exhaust emissions

TABLE 5-B SOURCE EMISSION CRITERIA (CONTINUED)

SOURCE	POLLUTANT	SOURCE EMISSION
FORMALDEHYDE MANUFACTURE	CH_2O	For formaldehyde solutions with a vapour pressure of 570 mm Hg and less, 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. A floating roof may be permitted if the concentration of formaldehyde in the vent gas does not exceed 20mg/m3 (STP), otherwise a sealed storage tank with vapour recovery is required.
GLASS FIBRE MANUFACTURE	Particulate	Max. 5.5 kg/tonne of fibre glass produced.
LIME MANUFACTURING PLANTS		
Rotary Klins	Particulate	0.2 kg/tonnes and 20% opacity
PETROLEUM & PETROCHEMICAL ENTITIES		
Turbine Stack Emissions	Sulphur oxides	500 mg/Nm^3 (190 ppm) @ 15% O_2
	Nitrogen oxides	55 mg/Nm^3 (42 ppm) @ 15% O_2
Petroleum storage vessels (> 1000 bbl capacity)	VOC	a) For liquids with vapour pressure 78-570 mm (1.5-11 psi), floating roof with double seal or equivalent. b) For liquids with vapour pressure greater than 570 mm (11 psi), vapour recovery or equivalent. c) For crude oil (disregarding vapour pressure), floatting roof with double seals and inspection program is adequate.
FCC unit catalyst regeneration	Particulate	1.0 kg/tonne coke burn-off.
Fuel gas combustion	CO	500 ppm
	SO_2	Limit H_2S contents of fuel gas to 230 mg/dscf or use equivalent SO_2 removal system.
Sulphur removal / recovery plants (For existing plants; Acid gas injection is required for new projects)	SO2	At least 99% removal efficiency.
	H_2S	Limit hydrogen sulphide stack emissions to 10 ppm.

TABLE 5-B SOURCE EMISSION CRITERIA (CONTINUED)

Fugitive Sources (VOC) & H2S	Monitoring instrument reading (six-monthly) of 10,000 ppm or greater, or visible leak (monthly inspection) requires repair within 15 calendar days unless standards allowing delay are met.
o Pumps	Must be equipped with specified seal/barrier fluid system that has audible failure alarm or is checked daily, unless designated for no detectable emissions (less than 500 ppm) or equipped with closed-vent system. Any leak in the seal/barrier system must be repaired within 15 calendar days unless standards allowing delay are met.
o Compressors	No detectable emissions (less than 500 ppm) except during pressure releases.
o Pressure Relief Devices (gas/vapour services)	Each sampling system, other than insuite systems (non-extractive or in line), must be equipped with a closed purge or closed vent system.
o Sampling Systems	Must be equipped with a cap, blind flange, plug, or a second valve.
o Open-ended valves or lines	Monitoring instruments reading (monthly) of 10,000 ppm or greater requires repair within 15 calendar days unless standards allowing delay are met. Alternate standard of 2% or less of valves leaking may be elected.
o Valves	
o Pressure Relief Devices (Liquid services), flanges, and other connectors.	Same as “Valves”, except there is no provision for an alternate standard.
Product loading (LNG, LPG, Condensate & Refined Products)	95% minimum vapou capture and recovery

TABLE 5-B (Continued)
SOURCE EMISSION CRITERIA

SOURCE	POLLUTANT	EMISSION LIMIT
o Product Accumulation Vessels	Must be equipped with a VOC closed-vent system.	95% minimum efficiency, or residence time of 0.50 seconds or more at a temperature of 760^{o}C or higher.
o Vapour Recovery Systems (e.g. condensers and adsorbers)	VOC	No detectable emissions (less than 500 ppm above background). Leaks must be repaired no later than 15 days after detection.
o Closed Vent Systems	VOC	
Blowdown, purging draining, and wastewater separation		Minimise emissions by enclosure and recycling and/or flaring. (Flares to be operated within limitations.)
Fugitive emissions (general)		Use good maintenance and inspection procedure and monitoring of potential sources.

APPENDIX I

مدينة راس لفان الصناعية
RAS LAFFAN INDUSTRIAL CITY

Environmental Non-compliance Penalty System for Ras Laffan Industrial City

Qatar Petroleum
Ras Laffan Industrial City

Environmental Non-compliance Penalty System

Introduction

This policy is based upon the main theme of QP/RLC environmental codes, namely, to industrialise without degradation of the environment. The Environmental Guidelines and Environmental Protection Criteria for Ras Laffan Industrial City of which this is an attachment have been designed to minimise harm to the public health and the environment. A non compliance penalty may be needed upon Entities in Ras Laffan Industrial City (herein referred to as "Tenants" and "Facility Operators") to ensure compliance with such Environmental Regulations and to avoid operations or facilities wherein a violation is occurring ("Violation Source"). This penalty system is to be imposed in accordance with article 1.1 of the Environmental Guidelines and Environmental Protection Criteria for Ras Laffan Industrial City.

This penalty policy will be applied based on the following considerations:

- the harm or risk of harm to which the public health or the environment is exposed;
- the economic benefit gained by the violating Tenant or Facility Operator;
- the degree of recalcitrance of the violating Tenant or Facility Operator;
- any unusual or extraordinary enforcement costs thrust upon QP/RLC; and
- cost of correction of the violation incurred by QP/RLC.

This policy will recognise appropriate mitigating circumstances or factors in its application. While fulfilling its primary objective to deter violators and encourage compliance, this policy also has the following very significant additional justifications and benefits:

1. This policy is fair in an ethical sense, because it will ensure that any Tenant or Facility Operators who violate the Environmental Regulations do not benefit economically from their violation. It is also fair in an economic sense, because it will ensure that violating Tenants and Facility Operators do not gain an economic advantage over other Tenants or Facility Operators who incurred costs by obeying the Environmental Regulations.

2. This policy will improve the operation of the market sector of the economy by more fully imposing onto violating Tenants and Facility Operators costs otherwise thrust upon Tenants and Facility Operators who are in compliance or upon QP/RLC.

3. The removal of the economic incentive to violate the environmental regulations will maintain a high rate of voluntary compliance, therefore, possibly eliminating the need, eventually, for penalty enforcement and the cost thereof.

Degree of Violations

QP/RLC's environmental non-compliance violations are classified as the following:

a - Minor non-compliance Violations ("Minor Violations") are those causing minimum potential or actual harm to the public health or the environment or mere violation of procedural requirements. Examples are: minor spillage of oil on ground, littering, poor housekeeping, smoke emission from vehicles, odour, noisy operations, non-or delayed reporting of minor environmental incidents, minor

nuisance, etc. Such violations may subject Tenants or Facility Operators to a penalty of not less than QR. 250, per day, per transgression. The penalty is to be assessed against the violating Tenant or Facility Operator in addition to any Corrective Cost and Enforcement Cost (defined below) incurred by QP/RLC.

b - Major non-compliance violations ("Major Violations") are those causing major potential or actual harm to the public health or the environment. An accumulation of frequent minor violations could also amount to a Major Violation. Major Violations may subject Tenants or Facility Operators to a penalty of not less than Q.R. 5,000, per day, per transgression to be paid, by the violator in addition to any Corrective Cost and Enforcement Cost incurred by QP/RLC. Depending on the degree of such Major Violation, the economic benefit to Tenant or Facility Operator from delayed compliance, Tenant's or Facility Operator's recalcitrance and the potential and actual risk to public health or the environment, in addition to the monetary penalty, QP/RLC may also be required to shut down all or any part of the Violation Source.

Goal of the Penalty Policy is Enforcement.

QP/RLC enforcement actions will seek expeditious compliance with the Environmental Regulations by means of the imposition of this non-compliance penalty system. The penalties sought in accordance with this policy are in no way to be interpreted as a substitute for compliance nor do they relieve the offender of its immediate requirement to bring the Violation Source into compliance by necessary expenditure. The goals of this enforcement action are to obtain immediate compliance with the Environmental Regulations. The penalties are not intended as a revenue source for the State of Qatar or QP/RLC. Further, any penalties imposed or collected hereunder shall have no mitigating effect on the rights of the Sate of Qatar or QP/RLC to enforce any other rights and remedies which it may otherwise have at law or in contract against the Tenants or Facility Operators or owners of the Violation Source.

This penalty policy is structured to provide a strong economic (market-based) incentive for rapid compliance. The more rapid the compliance, the lower the actual penalty to be imposed by QP/RLC. Mitigating factors such as minor harm or no actual harm to the public health or the environment and lack of recalcitrance or indifference by the violating Tenant or Facility Operator may also lead to penalty reductions in proportion to the speed of compliance. In cases of Major Violations, the requirement of administratively assessed non-compliance penalties adds additional economic incentive for rapid compliance.

Penalties will be imposed to deter violations and encourage compliance. Penalties will not be treated as effluent or emission fees. Payment of penalties does not give any right or privilege to Tenants or Facility Operators to continue operations in violation of the Environmental Regulations, nor does it authorise a delay in compliance.

QP/RLC, in setting the methodology of this penalty policy is intending to establish daily penalty rates which will typically be the appropriate penalty to be imposed. The policy will allow enforcement officials to arrive at fair, consistent and rationally based penalty sums.

Factors Considered in Determining the severity and classification of the Penalty

1. Harm or Risk of Harm to Health or the Environment

The extent that the Tenant or Facility Operator's violation harms or poses risks of harm to the public health or the environment will be carefully considered in setting the appropriate penalty for violations. For example, a violation involving discharges of toxic chemicals into the air in violation of the Environmental Regulations would certainly cause or threaten to cause serious harm to local

population and harm wildlife. This violations would therefore be a Major Violation. All pollutants introduced into the environment, however, can potentially create some harm or risk. QP/RLC's discretion will therefore be needed in many cases to quantify the harm or risk caused by the violation in question at the onset. The eventual penalty imposed shall be revised in proportion to the actual exposure by the public and environment to harm or risk and shall be determined based on the facts of each specific case as such facts are developed by QP/RLC.

2. Economic Benefit of Delayed Compliance

Violations will often be caused by a failure to install and operate required pollution control equipment within time limits set by QP/RLC, or a failure to utilise fuels or raw materials with lower pollutant content. Delaying the purchase and operation of pollution control equipment results in economic savings or gains to the Tenant or the Facility Operator. These savings or gains arise from three distinct sources:

1. The opportunity to invest the capital funds not spent to purchase and install pollution control equipment during the period of non-compliance;

2. The avoidance of the operation and maintenance expenses associated with the pollution control equipment during the period of delayed compliance (labour, materials, energy, etc.). These avoided costs represent a permanent savings to the Tenant or Facility Operator. Further, the amount saved may be invested into income producing activities; and

3. The lack of depreciation of pollution control equipment during the period of non-compliance.

4. These potential benefits to the Tenant and Facility Operator due to the delayed compliance and the actual benefit determined under the facts by QP/RLC will be taken into account in determining the severity of the penalty.

3. Violator's Recalcitrance, Defiance or Indifference to the Requirements of the Environmental Regulations

Efforts expended in good faith to obey the Environmental Regulations are expected of all Tenants and Facility Operators. Good faith alone will not be used as a basis for reducing a penalty. QP/RLC will consider the degree of the violator's recalcitrance, defiance, purposeful delay or indifference in its failure to comply with the Environmental Regulations when setting the penalties. The fact that a Tenant or Facility Operator is exercising its lawful rights to challenge QP/RLC's determination of the penalty will not, however, be utilised by QP/RLC in determining the degree of the penalty.

4. Enforcement Cost

There will be costs incurred by QP/RLC in detecting the violation, defining its extent and bringing the penalty enforcement action ("Enforcement Cost"). Where, for example, a Tenant has disregarded its obligation to identify its own pollutant discharges and applies for an environmental approval certificate, then QP/RLC must undertake the work. The costs in identifying the discharges will be included in the assessed penalty. As an additional example, where the violator's sampling and analytical procedures are so deficient that QP/ RLC must conduct significant sampling on its own to confirm discharge levels, the expense of such sampling will be added to the sum of penalties sought.

Further, upon the failure of a Tenant or Facility Operator to respond to the Notice of non-compliance or in the event a Tenant or Facility Operator submits incorrect information in its reply to the Notice

of Non-compliance, or in any other circumstance wherein the violating Tenant or Facility Operator's recalcitrance or indifference delayed or prevented QP/RLC's ability to obtain notice or information on a violation, QP/RLC may enter into a contract with any qualified consultant, who is not an affiliated entity, and who has no financial interest in the Tenant, Facility Operator or in the Violation Source to assist in determining the amount of the penalty assessment, to confirm that compliance has been obtained and payment schedule with respect to such Violation Source, Tenant or Facility Operator. Such cost of this service will be included in the Enforcement Cost and will form part of the penalty element. The data used in calculating the penalty shall be sent to the Tenant or Facility Operator at the time that the penalty calculation is reported.

Routine costs incurred by QP/RLC in its administration and supervision of Ras Laffan Industrial City and in its general efforts to obtain compliance with the Environmental Regulations will not be included as part of the penalty. However, all cost which are specific to a Tenant or Facility Operator and incurred by QP/RLC in determining whether a violation has occurred and in obtaining compliance by such Tenant or Facility Operator with the Environmental Regulations which has been violated will be included in such Enforcement Cost.

5. Corrective Cost

Certain corrective cost will generally be incurred by the Tenant or the Facility Operator due to its eventual compliance with the Environmental Guideline. However, certain additional direct costs may be thrust upon QP/RLC to cure the Violation Source and to obtain compliance of such Violation Source with the Environmental Regulations ("Corrective Costs"). This cost is often frustrated by the violating Tenant or Facility Operator's delay in compliance. These cost will also be assessed by QP/RLC and shall be added to the actual penalty.

6. Mitigation for Non-compliance Caused by QP/RLC Itself.

When failure to comply or compliance delay was caused by, or attributable to QP/RLC, the penalties may be reduced proportionately.

Other Mitigating Factors

If a violation is voluntarily reported by the violating Facility Operator or Tenant by submission of QP/RLC's environmental incident reporting procedure detailing acceptable corrective action to be taken within an agreed time period, QP/RLC may defer the Notice of Non-compliance pending compliance.

In determining the severity of the penalty, QP/RLC will take into consideration, in addition to other factors, the size and nature of the business and activity of the violating Tenant or Facility Operator in relation to the QP/RLC's intent in this policy as well as the economic impact of the penalty on such business in relation to the seriousness of the threatened or potential harm to the public health or the environment.

Notice of Non Compliance

QP/RLC shall issue a notice of non-compliance to the Tenant or Facility Operator of any Violation Source and of the applicable violated provision ("Notice of Non Compliance") as soon as reasonably possible under the circumstances after such violations have been discovered by QP/RLC. This assumes that QP /RLC was provided with reasonable opportunity to make such a discovery. Failure of QP/RLC to issue a Notice of non-compliance within 30 days after discovery of a violation, however, shall not absolve the violating Tenant or Facility Operator of its non-compliance penalty. It may,

however, affect the date from which the penalty is calculated. The penalty shall be calculated from the earliest date that the Tenant or Facility Operator received a Notice of Non-Compliance. If either the discovery of the violation or the receipt of Notice of Non-Compliance was delayed due to the action or inaction of the violating Tenant or Facility Operator, the penalty notice date shall be delayed accordingly.

Calculation of the penalty

The penalty will accrue with the passage of time. The number of days that the Violation Source is not in compliance shall be that number of days from the date of receipt of Notice of Non-Compliance to the date that the Violation Source is returned to or brought into compliance. The number of transgressions shall be based on each distinct harm or distinct potential harm to which the public health or environment was exposed. The Notice of Non-Compliance should also include an assessment of Enforcement and Corrective Cost, if any is due.

Payment

Arrangements for payments to QP/RLC must be made by the violating Tenant or the Facility Operators immediately upon receipt of the Notice of Non-Compliance. The first instalment of the penalty shall be paid on the date one (1) calendar month after the receipt of the Notice of Non-Compliance. Payments shall be made to QP/RLC by any reasonable method.

Non-payment Penalty

Any owner or operator, who fails to make timely payments shall pay, in addition to the penalty owed, a quarterly non-payment penalty ("Non-Payment Penalty"). The Non-Payment Penalty shall be calculated as of its due date and shall be equal to 20% of the aggregate amount of the non-compliance penalties and Non-Payment Penalties due and owing from the Tenant or Facility Operator on the due date and accrued quarterly. Partial payments shall be credited first against the Non-Payment Penalty, then against the non-compliance penalty.

Determination of Compliance

A Tenant or Facility Operator with a Violation Source, who is paying a non-compliance penalty shall notify QP/RLC in writing at such time as the Violation Source has come into compliance and is maintaining compliance with the Environmental Regulations. This notice shall be accompanied by any factual data, analytical materials and legal arguments which the Tenant or Facility Operator believes support such claim.

Within 60 days of receipt of such written notice from the violating Tenant or Facility Operator QP/RLC shall determine whether the Violation Source has achieved and is maintaining compliance, and shall notify the Tenant or Facility Operator of this determination in writing. If QP/RLC is unable to conclude on the basis of the information submitted whether the Violation Source has achieved and is maintaining compliance, it shall inform the Tenant or Facility Operator of any additional material that is needed. Within 30 days of receipt of such additional material, QP/RLC shall once again determine whether the Violation Source has achieved and is maintaining compliance and shall notify the Tenant or Facility Operator of this determination in writing. If QP/RLC determines that the Violation Source has not yet achieved or is not yet maintaining compliance with applicable requirements, the Tenant or Facility Operator may petition for reconsideration within 30 days of the receipt of determination. The Tenant or Facility Operator shall include in this petition any necessary supporting material. If the reconsideration review once again results in a dispute, the

dispute shall be resolved in accordance with the relevant Dispute Resolution provision of the contract between Tenant or Facility Operator and QP/RLC.

APPENDIX II

Environmental Incident Reporting Form

RLC - ENVIRONMENTAL INCIDENT REPORT

INCIDENT No. RLC / ☐☐☐☐

DATE: ...../...../.....

TIME: .....:.....hrs

SUBJECT:(Gas Release [H_2S, SO_2, NH_3, HC etc.], Oil spill, Chemical spill, Smoke, Dust , Odour etc.)

LOCATION OF INCIDENT:

CAUSE OF INCIDENT:(e.g. Flaring, Leaking Pipes, Vehicle Collision/Accident, Operational, Process, etc.)

DESCRIPTION OF INCIDENT: (Source, Released/Spilled Quantity/Volume, Concentration, Composition, etc.)

DOMAIN OF INCIDENT: (Air, Water or Soil)

DURATION OF INCIDENT:

I**MMEDIATE ACTION TAKEN:** (Control Measures, Recovery Measures, Evacuation, etc.)

ORIGINAL LABORATORY ANALYSES TAKEN ? YES/NO (ATTACH RESULTS IF YES)

EXTERNAL ASSISTANCE REQUESTED:LOCATION OF INCIDENT:

TYPE OF ASSISTANCE REQUESTED: (Manpower, Equipment, Containers, Boom, etc.)

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REMARKS: (Impact Assessment [and assessment method], Posed Hazard,Toxic, Explosive, Flammable, etc.)

ACTIONS TAKEN TO PREVENT RECURRENCE: (Plant/Process/Operational Changes detail as appropriate)

HAS THE INCIDENT BEEN REPORTED BEFORE ?: (Provide Case History ifapplicable)

RESPONSIBLE PARTY: (Party responsible for Causing the Incident)

REPORTED BY: (Name, Designation, Company Name, Contact No., Date and Time of Initial Report)

ACTIONS, RECOMMENDATIONS & COMMENTS: (by RLC Management & REE)

Report Read/Assessed & Actioned: .....(REE) Date: ...../...../.....

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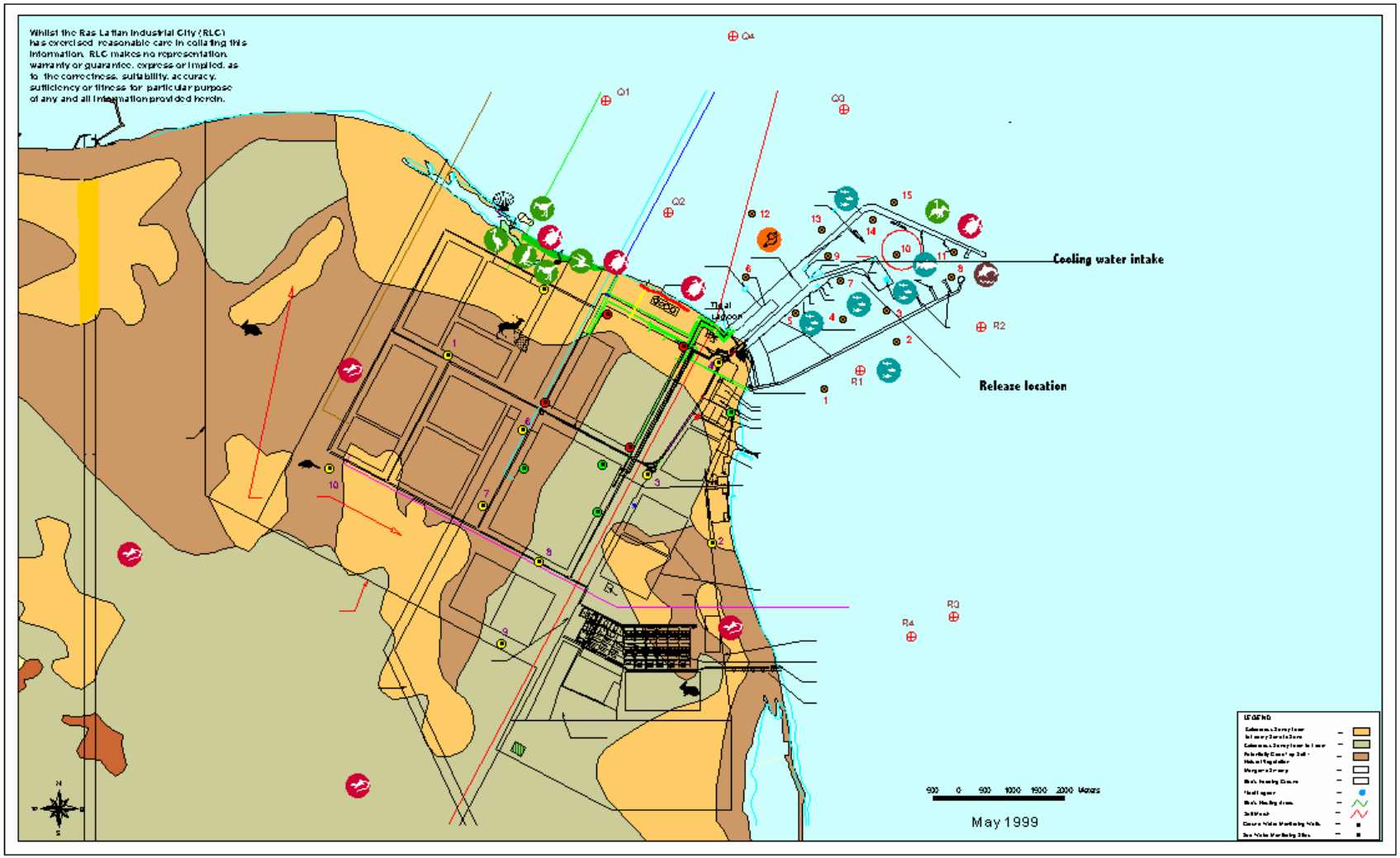
Figure I
Soil Classification

Environmentally Sensitive Areas in Ras Laffan Industrial City



Date: 14/12/2022

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