

Appendix A

Environmental Management Plan Report (EMP)

Environmental Impact Assessment (EIA) for
RTIP at Jubail II

[Operator]

Kingdom of Saudi Arabia

| Rev No. | Approved By | | Issue Date |
|---------|-------------|-----------|------------|
| | Name | Signature | |
| 001 | | | |

I agree to implement the environmental requirements detailed in this Construction and Operation Environmental Management Plan.

Title: Senior Site Manager

Name:

Signature:

Date:

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ABBREVIATIONS & ACRONYMS

| | |
|-----------------|---|
| BAT | Best Available Techniques |
| CCP | Contractor Control Plans |
| CIP | Contractor Implementation Plans |
| CLM | Community Liaison Manager |
| dBA | Decibels (A weighted) |
| DOW | Dow Chemical Company |
| DRP | Decommissioning and Rehabilitation Plan |
| EH&S | Environmental Health and Safety |
| EHS | Environment, Health and Safety |
| EIA | Environmental Impact Assessment |
| ESP | Electrostatic Precipitator |
| ERP | Emergency Response Plan |
| EMP | Environmental Management Plan |
| EMS | EH&S Management System |
| EPO | Environmental Permit to Operate |
| FGD | Flue Gas Desulphurization |
| HAP | Hazardous Air Pollutants |
| HAZID | Hazard Identification |
| HAZOP | Hazard and Operability Analysis |
| IFC | International Finance Corporation |
| IPIECA | International Petroleum Industry Environmental Conservation Association |
| ISO | International Standard Organization |
| IWTP | Marafiq's Industrial Wastewater Treatment Plant |
| KBR | Kellogg Brown & Root |
| KFIP | King Fahd Industrial Port |
| KSA | Kingdom of Saudi Arabia |
| LNB | Low NO _x burners |
| KPI | Key Performance Indicators |
| L ₉₀ | Sound Level Exceeded 90% Of Measurement Period |
| L _{eq} | Equivalent Noise Level |
| Mbgs | Meter below Ground Surface |
| ODS | Ozone Depleting Substances |
| OECD | Organisation for Economic Co-operation and Development |
| QRA | Quantitative Risk Analysis |
| psia | Pounds per square inch absolute |
| RCER | Royal Commission Environmental Regulations |
| RCJY | Royal Commission for Jubail and Yanbu |
| ROPME | Regional Organisation for the Protection of the Marine Environment |
| SCR | Selective Catalytic Reduction |

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| | |
|------|-----------------------------|
| SRB | Surface Retention Basins |
| SRO | Surface run-off |
| TBD | To Be Determined |
| ULNB | Ultra low burners |
| VOC | Volatile Organic Compounds |
| VP | Vapour Pressure |
| WB | World Bank |
| WWTP | Waste Water Treatment Plant |

APPENDIX A. ENVIRONMENTAL MANAGEMENT PLAN

A.1. Introduction

A.1.1. Background

CH2M HILL has developed this Environmental Management Plan (EMP) to address and manage the environmental aspects and impacts related to the RTIP development in Jubail, Kingdom of Saudi Arabia (KSA). RTIP will be built, owned and operated by a joint venture between Saudi Aramco and The Dow Chemical Company (DOW) and comprises the development and installation of a new grassroots integrated petrochemical complex.

RTIP consists of process units, utilities and interconnecting piping, associated feedstock and refined product storage/logistics facilities, as well as the offsite services necessary to support the safe and efficient operation of the complex.

This EMP shall be used as an umbrella plan in conjunction with the action plans such as the Waste Management Plan to be developed in order to specifically address identified risks and impacts.

In compliance with the IFC (International Finance Corporation) Performance Standard 1-V2 (Assessment and Management of Social and Environmental Risks and Impacts; December 2010), the EMP should consist of some documented combination of operational procedures, practices, plans, and related supporting documents (including legal agreements) that are managed in a systematic way.

A.1.2. Context of the Environmental Management Plan

The EMP builds upon the mitigation measures outlined within the Environment Impact Assessment (EIA) that was prepared for RTIP at Jubail II (CH2M HILL, 2011). The EIA details:

- The existing environment;
- The process used in the development and evaluation of engineering alternatives for the design of the Project;
- The description of the Project; and
- An assessment of the potential impacts of RTIP in all its phases, including a statement of measures that are recommended for implementation to mitigate those impacts to ensure that environmental impacts are minimised.

This EMP has been prepared to provide a tool for ensuring all commitments recommended within the EIA (which are summarised below, in Table A-2) are identified and implemented during all phases of RTIP. The EMP outlines environmental management responsibilities, statutory obligations, incident management, corrective action procedures, complaint handling responsibilities, auditing requirements and training programs. The EMP is one of a

suite of documents that will be prepared to guide the implementation of RTIP so that it is undertaken in a safe, cost effective, planned and environmentally responsible manner.

An EH&S Management System (EMS) framework has been proposed as part of the EH&S Strategy for the Overall RTIP Program, which includes FEED, EPC, Commissioning and Operation of the RTIP Facility. The framework for the EMS is based on the ISO 14001 standard and Responsible Care® (RC 14001) principles. The EMS will be designed to address all EH&S aspects for the RTIP facilities and operations, including chemical production, utilities, infrastructure, logistics, EH&S protection facilities, and other facilities as developed.

The five primary components of the EMS framework or structure are:

1. EH&S Policy and Commitment;
2. Planning;
3. Implementation and Operation;
4. Checking and Corrective Action; and
5. Management System Review.

The EMP will follow the EMS framework. The EMP will be in accordance with the Policy developed for the Project, which, according to the IFC Performance Standard 1 Version 2 (2010) defines the social and environmental objectives and principles that guide the project to achieve sound social and environmental performance.

An EMP for the Operations phase of RTIP will be developed in detail during the subsequent phase of the project. The EPC contractors will develop a detailed EMP for the construction phase which will have to be approved by the RTIP team.

This document provides the outline or draft structure of the EMP that will be further developed over the life of the project. It has therefore been designed as a dynamic document that will be periodically reviewed and amended and will incorporate complementary documents such as action plans and procedures. Changes to the project team and organisational structures and responsibilities or improvements to procedures and methodologies as they develop will be incorporated.

Contractor(s) selected for construction, commissioning and decommissioning will be required to draw on the requirements of the EMP (mitigation measures, and monitoring measures, and other general issues applicable to contractors) and incorporate these into their Contractors Environmental Management Plan.

A Construction EMP framework which provides the summary of minimal environmental requirements to be observed and implemented by contractors during construction and should serve as a guide for contractors in developing their Construction EMP. Contractors EMP should be part of their EH&S Management Plan, to be developed following the

document “Construction EHS Management Plan” (KBR, 2010 b) for RTIP, created to be used as a guide for contractors.

A specific team responsible for the EMP implementation has been defined (see Section A.4).

It is essential that prior to the commencement of each phase, the manager assigned as being responsible for the implementation of the EMP ensure that all personnel are aware of their environmental and social management responsibilities. EH&S responsibilities for all personnel will be defined in their job descriptions and through training communications.

A.1.3. Objectives of the Environmental Management Plan

The primary objectives of this EMP are to provide an environmental management manual for use by management and staff involved in RTIP and to provide information to regulatory authorities regarding the environmental management practices that will be implemented throughout the life of the Project. The EMP has the following objectives:

- To describe mitigation measures that will be applied during all the phases of the Project;
- To identify the policies and principles that are to be put in to place to ensure that the proposed mitigation measures are implemented and effective including managerial arrangements that will be applied in the event that the mitigation measures prove ineffective or unforeseen environmental impacts arise;
- To describe the environmental monitoring programs that will be implemented to verify and manage predicted effects, confirm performance of mitigation measures and improve environmental protection strategies;
- To describe resources that will be made available to implement the recommendation of the EIA including staffing and training requirements; and
- To describe the arrangements that will be put in place for consultation and participation of interested and affected parties during project implementation.

The present document provides an outline of the EMP, as well as brief description of the project and a summary of the applicable regulations. The purpose of this document is to describe the structure of the final EMP and to provide a guideline for completing it as the project develops. It also includes an outline for a Decommissioning and Rehabilitation Management Plan, which according to the RCER should also be part of the RTIP EMS. The EMP is intended to be a working document during the various phases of the Project and as such will require periodic review and updates.

The final EMS applicable to the project, in accordance to IFC Performance Standard 1-V2, 2010 should incorporate the following elements (IFC, 2010): Policy; Identification of Risks and Impacts; Management Programs; Organizational Capacity and Competency; Emergency Preparedness and Response; Stakeholder Engagement; and Monitoring and Review.

As stated before, a Policy to which the identification of risks and impacts, and to which the EMP should adhere has been developed in accordance to the IFC performance standards for RTIP.

The Identification of Risks and Impacts was covered in the RTIP EIA (CH2M HILL, 2011), and references are made in this document as appropriate.

A Consultation Plan has been developed for the project and is attached to the EIA as Appendix F. An Environmental Emergency Response Plan (EERP) as described in RCER 2010 Volume II will be developed for RTIP and included as a supplement.

A.2. Project Description

A.2.1. Project Overview

RTIP represents a program to develop a petrochemical complex to be built, owned and operated by the proposed JV between Saudi Aramco and The Dow Chemical Company.

The RTIP project combines multiple petrochemical process units together on a greenfield site to produce a broad range of chemicals and polymers. In total the site has about thirty different process units, more than half of which are based on technologies licensed from The Dow Chemical Co., and the remainder from various third-party providers. Also the Project will include the utilities and infrastructure facilities required to support the process units.

The primary feedstocks to the Project are ethane and naphtha. The overall complex is configured with a mixed feed steam cracker and an aromatics plant as the core process units producing ethylene, propylene, benzene, and toluene as the four major hydrocarbon intermediate product streams. In addition, a chlor-alkali facility will produce chlorine, caustic soda and some hydrogen, from the electrolysis of brine, for use by the downstream derivative units.

Chemical and polymer products from the complex include polyethylenes, propylene glycols, amines, polyols, and urethane chemicals. Products from RTIP will be sold to companies in the Middle East and Asia where they are converted to consumer products such as plastic containers and toys, insulation, antifreeze, adhesives and sealants, and paints.

The project comprises the following components that will be described in subsequent sections:

- Hydrocarbon and Chlorine Core Units;
- Chemicals and Plastics Derivative Units;
- Utilities, Infrastructure and Site Logistics; and
- Value Parks (outside the scope of this impact assessment).

A.2.2. Location and Site Description

The complex will occupy an area of about 576 hectares (ha), on a greenfield site identified as part of the future Jubail II Industrial City, at approximately 3 km to the west of the existing Jubail Industrial City (JIC) in Saudi Arabia. The land area comprising the RTIP site is designated as industrial.

The project will also occupy a tank farm and loading and unloading facilities at the Jubail King Fahd Industrial Port (KFIP).

The RTIP site is surrounded by the following installations and infrastructures:

- Jubail Export Refinery (SATORP) under construction to the north-east;
- Jubail II undeveloped areas to the west and south;
- Road 274 to the south-east; and
- BeeA'h industrial / chemical landfill facility to the east corner of the RTIP site.

JIC is located approximately 3 km from the RTIP site, has a total of 176 industries in operation and as many as 76 in construction or at the design stage. The industrial city also comprises infrastructure support utilities such as the Saudi Electric Company (SEC) for electric power, Marafiq for water desalination and distribution, sea water cooling pumps and network and waste water treatment facilities for sewage and process water (RCJY, 2010). Other infrastructure support utilities or neighbouring industries in the area include the Berri Gas Plant, Jubail airport, Jubail Commercial Port (JCP) and King Fahad Industrial Port (KFIP).

Power and Utilities needed for the project, such as industrial water and potable water will be imported into the RTIP complex. Industrial gases such as high purity hydrogen, carbon monoxide, oxygen, nitrogen, and ammonia will be supplied by third party Industrial Gas Provider (IGP). The JV's scope includes the site steam generation, demineralised water generation, electrical distribution, cooling water systems, site fire water system, condensate return system and the distribution of site utilities.

Other facilities necessary to support RTIP and within the JV's scope are:

- Hydrocarbons Infrastructure: Offsite pipelines (between Main site and Port Facilities), main pipe racks and storage for feedstock, return streams and finished products;
- Personnel Facilities: facilities for administration, quality control (including laboratories), maintenance, health, firefighting, canteen and security;
- Environmental facilities for wastewater pre-treatment, thermal treatment, and solid waste handling for offsite disposal;

- Port Facilities: raw materials and products loading and unloading docks, and tank farm at the KFIP;
- Temporary Facilities and Early Works: camps, lay down areas, office areas, and other support requirements and Early Works activities needed to support the mobilization of EPC contractors to the site;
- Site Security: fences, access control and similar facilities;
- Transportation: roads, parking areas;
- Industrial and Sanitary wastewater from the RTIP facility will be sent to Marafiq's Industrial Wastewater Treatment Plant and Sanitary Wastewater Treatment, respectively; and
- The site logistics services: Finished Products Packaging Centre Facilities (receiving, storage and shipping facilities) will be provided by a third party, but will be located within the RTIP site.

A.2.3. Duration and Schedule of Works

The overall project schedule includes approximately 50 months of Engineering, Procurement and Construction (EPC), with site preparation starting in July 2011. Start-up and commissioning is due to start by end of 2013 and is expected to last approximately 20 months, and the plant is expected to be in full operation by September 2015. A life of 25 years has been considered, and it has been estimated that decommissioning will require an equivalent time to that needed for construction of RTIP.

A.2.4. Construction Hours

Working hours will comply with KSA and Saudi Aramco labour rules and regulations.

Under emergency circumstances, certain weather conditions or times when an operation must be completed for safety reasons, it may be necessary to prolong construction activities beyond the normal hours of operation.

A.2.5. Operation Hours

The RTIP complex will sustain continuous operation (24-hours per day, 365 days per year). Normal operations will be continuous unless affected by either plant operations or emergencies. Day personnel will work between the hours of 7:00am and 16:00pm.

A.2.6. Staffing

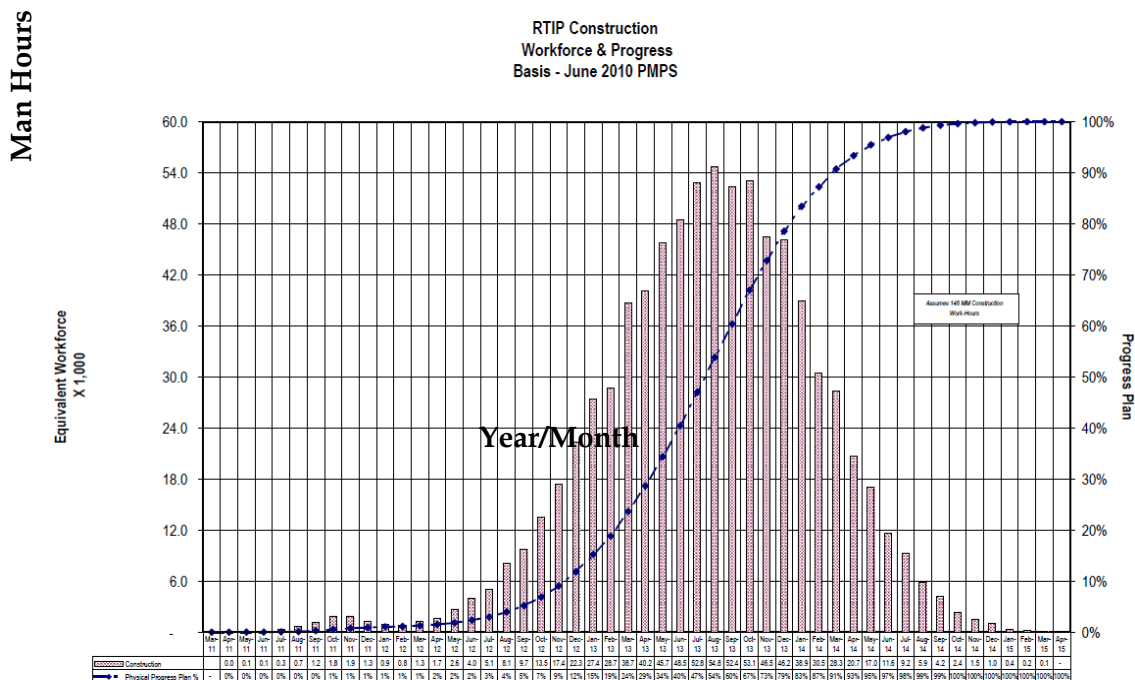
The number of personnel associated with the construction of the complex will fluctuate depending upon the particular work stage. The current estimate of construction labour is provided in Figure A-1.

Workforce during the peak will be reaching 55,000 personnel and this includes field labour, Owner, Project Management Contractor (PMC) and Subcontractor staff.

It is estimated that about 5% of the total workforce will be Western Expats (including US and Europeans), 75% will be global expats (including Asian, North African, and Middle Eastern), and about 20% will be locals (Saudi Nationals).

The daily work schedule will be proposed by the construction Contractor and will comply with Saudi Arabian Government regulations. Currently 6-10 hour shifts are being discussed. A 7th work day will only be utilized on an as needed basis. Special work schedules may be implemented to minimize the impact of heat, including night work and split schedules.

Figure A-1 Distribution of Manpower during the Construction Phase



Source: Figure Provided by KBR

The various Units comprising the RTIP project will be commissioned in a staggered manner. The early start-up Units such as Utilities, Mixed Feed Cracker and Polyethylene Units will be commissioned while construction of the other downstream Units is still ongoing. Thus, at this stage of the project the number of workers during the commissioning and start-up phase is not yet defined. However, it can be assumed that a workforce is required that is similar to that during the operation phase. Thus, approximately 3,600 persons are estimated during the commissioning and start-up phase.

Approximately 3,600 persons will be employed during the operations phase. Further information on projected staff numbers by type and nationalities is not available at this stage of the project.

On completion of the final design and detailed specifications of the RTIP works, this section of the EMP will be updated to reflect any modifications to the construction and operation activities and amendments will be made in the Final EMP.

A.3. Statutory Environmental Regulations

The Senior Site Manager shall ensure compliance with all listed applicable Acts and Regulations, and shall ensure that new regulations are monitored and implemented as applicable and required. Table A-1 provides a summary of current relevant environmental legislation and policies that apply to the Project.

| Table A-1 Summary of Environmental Legislation & Policies | |
|---|--|
| Legislation | Description |
| Local Policies | |
| Royal Commission Environmental Regulations (RCER), 2010 | Issued by the Royal Commission for Jubail and Yanbu (RCJY). It is composed of two volumes: Volume I includes all regulations, standards and guidelines which industries operating in any of the industrial cities shall comply with, and Volume II covers procedures and forms for applying to obtain “Environmental Permit to Construct” and “Environment Permit to Operate” permits. The RCER provides standards on air and water environments, hazardous materials management, waste management, dredging, and noise. The RCER-2010 supersedes the last version RCER-2004. |
| Regional Policies | |
| Arab Declarations and statements made by the Arab or Islamic region. The most relevant for the project are: the Abu Dhabi Declaration on Environment and Energy (2003) and the Abu Dhabi Declaration on Arab Corporate Responsibility (2007). | Declarations and statements that globally support environmental international law. |
| National Policies | |
| General Environmental Regulations and its Rules for Implementation, 2001 | Designed by the Presidency of Meteorology and Environment. Appendix 2 establishes the auditing process for the environmental impact assessment. Comprises of Environmental Protection Standards issued in 2001. They provide the basis for the evaluation and regulation of existing industrial and urban activities in the KSA and to help in the planning, design, implementation, and operation of facilities to be established in the future. |
| International Agreements | |
| <i>Protection of the Ozone Layer</i> | |
| The Vienna Convention for the Protection of the Ozone Layer, 1985 | Acts as a framework for the international efforts to protect the ozone layer. However, it does not include legally binding reduction goals for the use of CFCs, the main chemical agents causing ozone depletion. |
| The Montreal Protocol on substances that deplete the ozone layer and its Amendments, 1987 | An international treaty designed to protect the ozone layer by phasing out the production of a number of substances believed to be responsible for ozone depletion. It has undergone seven revisions, in 1990 (London), 1991 (Nairobi), 1992 (Copenhagen), 1993 (Bangkok), 1995 (Vienna), 1997 (Montreal), and 1999 (Beijing). Due to its widespread adoption and implementation it has been hailed as an example of exceptional |

| Table A-1 Summary of Environmental Legislation & Policies | |
|---|---|
| Legislation | Description |
| | international cooperation. Although the use of ODS is not expected in the RTIP, this protocol must be taken into account in the case that they become necessary, as the RCER establishes that: "the operator of a facility within the industrial cities shall phase out CFC's and halons or any other substances defined in the Montreal Protocol which are capable of depleting stratospheric ozone". |
| <i>Hazardous Wastes Control</i> | |
| Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, 1989 | International treaty designed to reduce the movements of hazardous waste between nations, and specifically to prevent transfer of hazardous waste from developed to less developed countries. The aim of the Convention is to protect the environment against the adverse effects resulting from the generation, management, transboundary movements and disposal of hazardous and other wastes. |
| <i>Protection of Biodiversity</i> | |
| Convention on Biological Diversity, 1992 | First global agreement on the conservation and sustainable use of biological diversity. The Convention recognises that the conservation of biological diversity is "a common concern of humankind". |
| <i>Combat Climate Change</i> | |
| United Nations Convention to Combat Desertification, 1977 | The Convention is related to the significant proportion of arid, semi-arid and dry sub-humid areas that act as the habitat and source of livelihood for a large segment of the Earth's population. Saudi Arabia is particularly concerned about this issue. The Convention adopted a Plan of Action to Combat Desertification. |
| United Nations Framework Convention on Climate Change, 1992 | This treaty is aimed at reducing emissions of greenhouse gases in order to combat global warming. One of its first achievements was to establish a national greenhouse gas inventory, as a count of greenhouse gas emissions and removals. The treaty originally set a voluntary "non-binding aim" to reduce atmospheric concentrations of greenhouse gases with the goal of "preventing dangerous anthropogenic interference with Earth's climate system". |
| Kyoto Protocol to the United Nations Framework Convention on Climate Change, 1997 | The Kyoto Protocol is an agreement under which industrialised countries will reduce their collective emissions of six greenhouse gases (carbon dioxide, methane, nitrous oxide, sulphur hexafluoride, hydrofluorocarbons) by 5.2% compared to the levels in 1990. |
| The Copenhagen Accord, 2009. | The Copenhagen Accord was agreed in order to establish a framework for climate mitigation beyond 2012 endorsing the continuation of the Kyoto Protocol. |
| <i>Marine environment</i> | |
| Kuwait Regional Convention for Co-operation on the Protection of the Marine Environment from Pollution, 1978 | This is the basic legal instrument binding the eight states in the region to coordinate their activities towards protection of their common marine environment. It provides general guidance for the protection and the preservation of the marine environment to ensure that development projects and human activities do not cause any damage to the environment. |
| Protocol on the Control of Marine Transboundary Movements and Disposal of Hazardous Wastes and Other Wastes, 1998 | Designed to provide protection against marine pollution resulting from exploration and production on the continental shelf of the Arabian Gulf and from land-based discharges. |
| Protocol Concerning Regional Co-operation in Combating Pollution | Requires the parties of the Convention to supply emergency responses in the event of accidental oil spills. |

| Table A-1 Summary of Environmental Legislation & Policies | |
|--|--|
| Legislation | Description |
| by Oil and Other Harmful Substances in Cases of Emergency, 1978 (Included in the Regional Organisation for the Protection of the Marine Environment) | |
| <i>Sustainable Development</i> | |
| United Nations Brundtland Report, 1987 | The Brundtland Report, which defines sustainable development as “development which meets the needs of the present without compromising the ability of future generations to meet their own needs”. |
| Agenda 21 of the UN Conference on Environment and Development, 1992 | Establishes a framework for member states to operate in an environmentally compatible manner with a focus on sustainable development. |
| Equator Principles, 2003 | Promotes responsible environmental stewardship and development in a socially responsible manner. The principles are a set of voluntary guidelines developed by leading banks that serve as a framework for financial institutions for the managing of social and environmental issues. |
| Recommendations and standards developed by the OECD. | Although Saudi Arabia is not a member of the OECD, RTIP at Jubail will use as far as is practicable, the recommendations and standards developed by the OECD committee, as reference guidelines, for keeping the project within international sustainable development standards. |
| <i>World Bank and IFC Publications</i> | |
| Environmental, Health, and Safety (EHS) General Guidelines, 2007 | Provides project developers, financiers, facility managers, and other decision makers with relevant industry background and technical information. |
| Environmental, Health and Safety Guidelines for Large Volume Petroleum-based Organic Chemicals Manufacturing, 2007 | Completes the EHS General Guidelines, 2007. Provides performance levels and measures that are generally considered to be achievable in new facilities by existing technology at reasonable costs. |

A.4. Organisational Structure

A.4.1. Introduction

This section of the EMP may be amended and/or updated to reflect additional information obtained from the completion of the detailed design phase of the program.

The JV between Saudi Aramco and The Dow Chemical Company (DOW) will be the Operator of the RTIP Facility.

Project activities will be performed by a mixture of JV and contractor personnel.

During construction and pre-commissioning the EPC contractors will perform the work with their own dedicated personnel. JV staff will take oversight and assurance roles during the EPC phase of the project. For commissioning, members of the operation team will manage the activities.

Once commissioned and handed over, “Operations” will run the facilities and associated infrastructure on a day-to day basis and will be responsible for production, first line maintenance, dealing with hazards and for the control of emergencies.

It is the responsibility of operator and contractors’ managers to ensure that work under their control is carried out in a safe and environmentally conscious manner. Managers shall ensure that their staff are equipped with the necessary training, competency levels and tools, to conduct their work in line with environmental requirements and regulations.

This EMP has been developed so that it provides instructions to the operator and contractors for implementing all mitigation, recommendations, and control measures considered necessary following the conclusions drawn in the EIA.

EPC Contractors will develop and implement an EMP which will guarantee the effective implementation of the actions included in Section A.6 of this document. However, the works will be conducted under the supervision of the JV.

It is important that the distribution of responsibilities at all levels is clearly established.

The actions included within Section A.6 of this EMP affect all the staff working in the RTIP project, regardless of their roles and the company they work for. The information relating to EMP requirements will flow down to each staff member involved in the activities. Each manager will require compliance with applicable actions from the level below before reporting to the manager at the level above.

The EH&S organization for the RTIP comprises several levels of responsibility and action fields (environment, health, safety, communication...) that will be involved in the EMP development, update, implementation and auditing, as the EMP will be part of the RTIP EMS.

The Contractors are required to outline the distinct roles of the activity’s (construction, commissioning...) Manager, Supervisors, Foreman of the Work Team and the Work Team with specific reference to roles and responsibilities as they relate to the specific tasks to be performed and the environmental management of these tasks.

The organisational structure for the operational phase has been outlined following the general EH&S organizational structure defined for the RTIP facility.

The following sections outline roles and responsibilities recommended to be covered by the personnel working in the RTIP organization.

A.4.2. EPC Contractors’ Organization: Structure and Responsibilities for the EMP Development and Implementation

The EPC contractors will define the structure and responsibilities for the EMP Development and Implementation during the construction phase and for those activities performed during commissioning. The organizational structure for the construction phase should follow that described in the RTIP Construction EMP framework (KBR, 2010 a).

The general environmental management functional relationship scheme described in the RTIP Construction EMP framework is shown in Figure A-2.

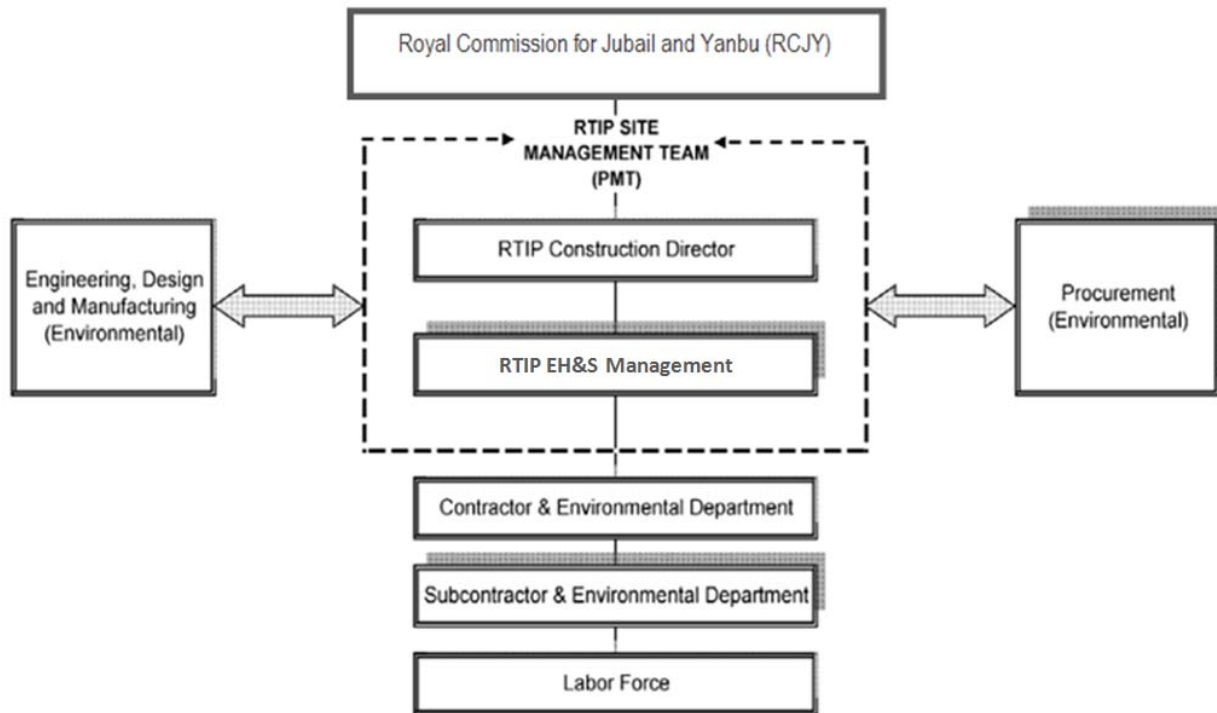


Figure A-2 RTIP Construction Management Functional Relationship Scheme

The EMP will be implemented by the EPC Contractor Environmental, Health and Safety (EH&S) Lead. The RTIP EH&S Management Team will review the EPC Contractors EMP, as well as its implementation.

The main organizational roles are described below.

A.4.2.1. RTIP Site Project Management Team (PMT)

The responsibilities of the Project Management Team should include but are not limited to the following:

- Accountable for overall delivery and compliance with regulatory requirements including the RCJY conditions of approval;
- Hold Project Management Team meetings (frequency to be established) to conduct regular reviews of progress and to devise actions and processes for continual improvement for the RTIP;
- Provide direction and feedback on progress as required;
- Review the RTIP objectives;

- Review and approve the Contractor's EMP;
- Review and approve the Construction Managers induction and training program for all persons involved in the construction activities and monitor implementation;
- Approve compliance reports and environmental performance reports to be submitted to relevant authorities;
- Provide input into works scheduling;
- Monitor and report licence compliance; and
- Attend EH&S Management meetings as required.

A.4.2.2. Construction Team

Construction Director

The Construction Director's role includes but is not limited to the following:

- Prepare a Constructor's EMP to the satisfaction of the Project Management Team and EH&S Manager;
- Obtain all relevant licences that are the responsibility of the Contractor;
- Coordinate and manage training of all staff prior to the commencement of construction activities including coordination of the EH&S Manager to train personnel in their respective project aspects;
- Manage day-to-day implementation of the EMP;
- Undertake audits of all contractors in accordance with the Contractor's EMP;
- Manage all monitoring in accordance with the Contractor's EMP;
- Report directly and promptly to the EH&S Manager on all environmental and occupational health and safety (OH&S) matters including incidents, non-conformances;
- Conduct site inspections to ensure environmental management measures are effectively in place;
- Liaise with the EH&S Manager and Community Liaison Manager on an as-needed basis and respond pro-actively to requests and instructions from these managers;
- Advise the Community Liaison Manager of community impacts of all scheduled and un-scheduled works;
- Attend routine meetings (frequency to be established) with the EH&S Manager and Community Liaison Manager and report any construction issues that could impact upon

environmental, health and safety and/or community and communication aspects at these meetings;

- Organise and document EMP review meetings at the request of the EH&S Manager or the Project Management Team; and
- Attend Environmental Management meetings as required; and
- Interface with the Security Manager for all relevant issues

Construction Managers and Supervisors

The Construction Managers and Supervisors roles and responsibilities include but are not limited to:

- Complete the induction and environmental awareness training;
- Effectively manage environmental issues associated with the construction site;
- Manage the implementation of environmental protection measures in accordance with the contract;
- Report any serious environmental or OH&S incidents directly and promptly to the EH&S Manager;
- Report any environmental or OH&S issues and non-conformances to the Construction Director;
- Report all communications with the community (including complaints and inquiries) and report the incident directly and promptly to the Community Liaison Manager;
- Coordinate all corrective action requests given by the Construction Director;
- Implement environmental improvements arising from EMP review meetings; and
- Notify the Construction Director and Community Liaison Manager of forthcoming activities that may affect the community.

A.4.2.3. RTIP Environment, Health & Safety Manager

The Environment, Health & Safety (EH&S) Manager is responsible to the Project Management Team on matters directly relevant to the EH&S components of the Project and on matters relating to the implementation of the EMS and the EMP throughout construction. The responsibilities of the EH&S Manager will be more clearly defined in the final EMP.

The EH&S Manager will have responsibilities that include:

- Ensure a monitoring system is in place to track and report all health, safety and environmental incidents;

- Carry out a thorough initial site inspection of environmental controls prior to works commencing;
- Audit the Construction Director's environmental activities to evaluate the implementation, effectiveness and level of compliance of onsite construction activities with the EMP and associated plans and procedures, including carrying out site inspections on a frequency to be established;
- Record and provide a written report to the Construction Director and the Project Management Team of non-conformances with the EMP and require the Construction Director to undertake mitigation measures to avoid or minimise any adverse impacts on environment or report required changes to the EMP;
- Direct the Contractor to stop work immediately where considered necessary, if in the view of the EH&S Manager, an unacceptable impact on the environment is likely to occur or an unsafe activity is occurring or likely to occur. The EH&S Manager will provide prior written advice to the Project Management Team where possible, or if not, as soon as practicable, to advise of any direction given to the Construction Director. All cost and schedule impacts relating to a stop work will be borne by the Construction Contractor;
- Review corrective and preventative actions to ensure the implementation of recommendations made from the audits and site inspections. In the event that a direction is not complied with satisfactorily, the EH&S Manager shall escalate the issue to the PMT;
- Implement strategies/techniques to improve the EH&S performance;
- Report to the Project Management Team (frequency to be established);
- Review and approve minor revisions to the EMP. Broad-scale revisions are to be approved by the Project Management Team;
- Liaise with the Construction Director and the Community Liaison Manager on an as-needed basis and respond pro-actively to requests and instructions from these managers; and
- Attend routine meetings (frequency to be established) with the Construction Director and the Community Liaison Manager and report any issues of health, safety or environmental concern at these meetings.

A.4.3. EH&S Operational Organization: Structure and Responsibilities for the EMP Development and Implementation

In this section, an overview of the key components of the RTIP EH&S Operational Organization that will be involved in the EMP development and implementation is included. Figure A-3 represents the EH&S Operational Chart defined for RTIP.

The main responsibilities associated to the EMP are described below.

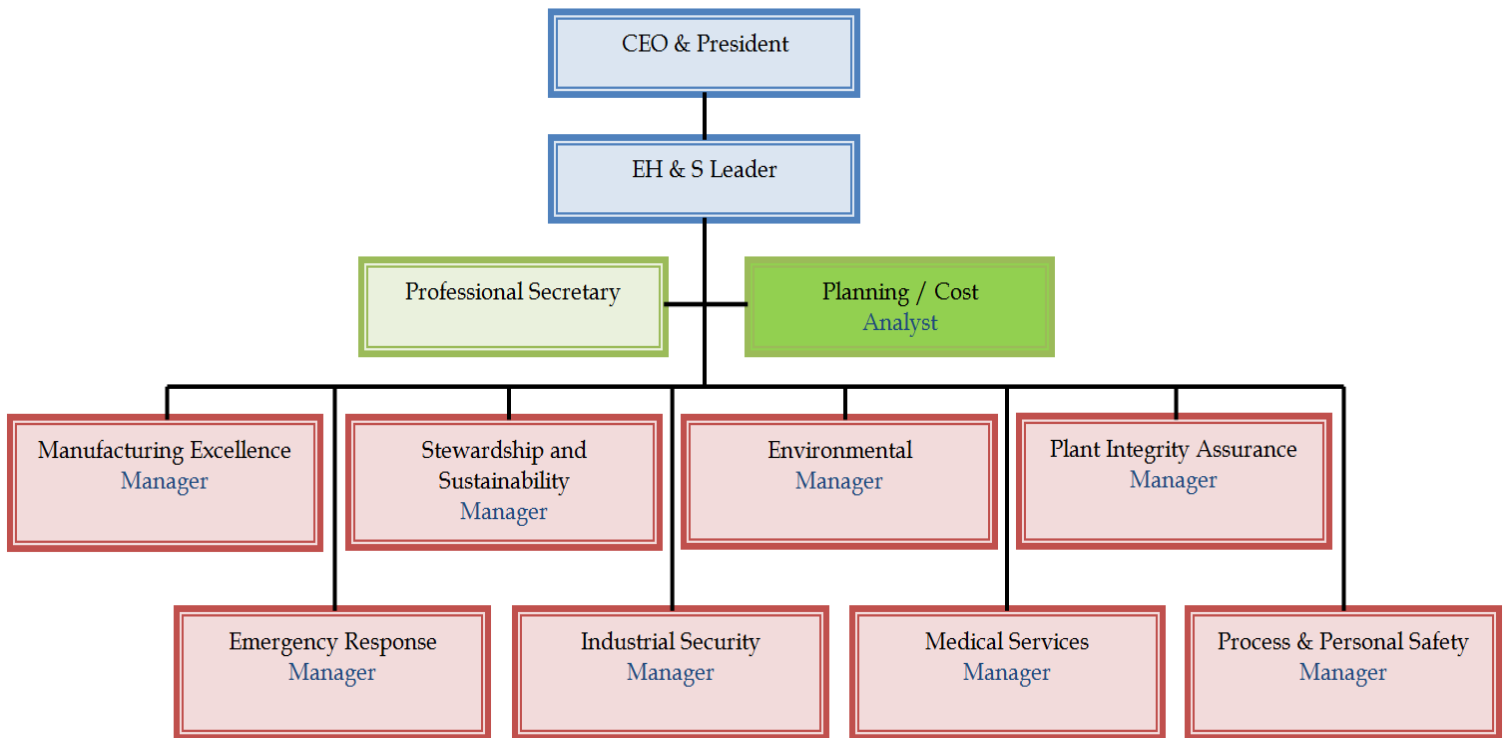


Figure A-3 RTIP EH&S Operational Structure

A.4.3.1. EH&S Leader

The EH&S Leader is responsible for the overall EH&S compliance and performance at the Site - implementing, improving and maintaining the EMS, administratively responsible for all EH&S personnel, accountable for establishing and leading achievement of all EH&S related compliance and performance goals. Therefore it is the ultimate responsible for the EMP development and implementation. The Environmental Manager will report to him in matters related to the EMP.

A.4.3.2. EH&S Element (Managers)

EH&S Element Managers are responsible for the implementation of the EH&S management system within the assigned EH&S elements namely, Environmental, Health, Safety, etc. in order that business and site objectives are met and the license to operate is maintained. They will report to the EH&S Leader.

Managers shall equip their staff with the necessary training, competency levels and tools, to conduct their work in line with environmental requirements and regulations.

Various Managers will be involved in the development and implementation of the EMP. A summary of those element leaders is provided below:

Environmental Manager

The Environmental Manager will be responsible for the selection and application of technology, management systems, and environmental risk assessment tools that will help ensure that the facility has no adverse environmental impact to the air, water, land or community. This position will also be responsible for maintaining the facility in full compliance with applicable environmental regulatory and company requirements.

He / She will be therefore be directly responsible for the development and implementation of the EMP and will be the contact point with the EH&S Leader in terms of issues related to the EMP.

For certain issues such as the emergency response plan or sustainability issues, the Environmental Manager will coordinate with other Element Managers and supervise their performance on issues relating to the EMP.

He / She will also coordinate with the Manufacturing EH&S Excellence Leaders in order to ensure that the EMP is correctly implemented in each of the units.

Manufacturing EH&S Excellence Manager

The Manufacturing EH&S Excellence Manager will be responsible for the implementation of the EH&S management system (work processes, standard, procedures), and therefore, the EMP, in each processing unit within the facility in order to add value to the business by meeting business objectives and maintaining the license to operate. The Manager will work closely with Manufacturing Senior VP to ensure EH&S areas are adequately addressed. A team of Manufacturing EH&S Excellence Leaders, Specialists and Technicians will be designated for each Unit and will report to the Manufacturing EH&S Excellence Manager. Each Unit specific team will be responsible for their Unit's EH&S performance. They provide hands-on Environmental, Industrial Hygiene, Health & Safety and Reactive Chemicals program activities for a specific Unit.

Process and Personal Safety Manager

Process and Personal Safety Manager will be responsible for the selection and application of technology, management systems, and hazard assessment tools that will enable the protection of people, property, and the environment by controlling the risks of unplanned events such as fires, explosions, reactive chemical incidents and chemical releases. This role has a corporate stewardship responsibility to assure that process safety technology, management systems and hazard assessment tools are appropriately applied in all the businesses that make up the RTIP facility.

The Stewardship and Sustainability Manager

The Stewardship and Sustainability Manager will be responsible for liaison with the government regulatory authorities (e.g. Royal Commission) for timely approvals and compliance requirements, and to maintain a communication channel with the local community for EH&S aspects. The position will also be responsible for Product Stewardship, such as product-related compliance requirements and chemicals/product transportation

safety. He / She will also be responsible to establish, implement and maintain Responsible Care® objectives, targets and programs, including maintaining effective communication with internal and external stakeholders; and recognizing the Responsible Care® performance of employees.

The Emergency Response Manager

The Emergency Response Manager will be responsible to develop and maintain emergency response systems throughout the facility to respond to any emergency or crisis events to mitigate adverse impact to people and assets. The leader will also be responsible for developing response systems to maintain zero impact to the local community during cases of emergency.

A.5. Communication

RTIP will develop a procedure to manage internal and external communications including regulatory reporting requirements. The procedure will ensure effective and timely communication of the EMS and EH&S related information within the RTIP facility and for managing relevant communication to and from external interested parties. All communications shall be documented.

Communication structure for the EMP, covering all the project phases, will be established in further phases of RTIP and will follow the above mentioned procedure. It must be noted that among the key contacts to define would be first aid teams, fire fighting teams, ambulances, hospitals, fire stations and police (contact details, indication of the circumstances under which each contact should be initiated., etc).

The procedure's scope will cover:

- Internal EH&S communication within RTIP and internal stakeholders;
- External communication between RTIP and external stakeholders, parent companies, government/ regulatory authorities and public/local community entities;
- Internal EH&S communications shall be implemented to ensure those personnel at each relevant level and functions are aware of the following:
 - The EH&S Management System;
 - The importance of conformance with the EH&S policies, procedures, and system;
 - The potential consequences of system non-conformances;
 - Individual roles and responsibilities in achieving conformance with procedures, including emergency preparedness and response;
 - The significant EH&S aspects associated with work activities and the benefits of improved personal performance;

- Changes to legal and other requirements on employees, related to EH&S elements; and
- Involvement, development and implementation of Responsible Care® programs for employees.

English will be considered as the official language for the RTIP facility. RTIP personnel will be proficient in English to ensure adequate communication and personal safety.

During operations, external communications concerning the EH&S aspects of the facility should be directed to the Stewardship and Sustainability Manager or his/her designees. All formal responses to inquiries from stakeholders and regulatory agencies shall be the responsibility of the Stewardship and Sustainability Manager. The Procedure for Emergency Preparedness and Response shall be implemented when community concerns are related to an EH&S emergency. The Stewardship and Sustainability Manager, or his/her designee, is responsible for determining the need for and preparation of any notification to regulatory agencies on an as needed basis. Regarding external communications during operations, the procedure will be publicly available and will include methods to (i) receive and register relevant external communications; (ii) screen and assess the issues raised by the communication and determine how to address them; (iii) develop and implement procedures and timelines for providing responses; and (iv) track and document response, if any. Further information on external communication is provided in the Stakeholder Plan (Appendix F).

A.6. Mitigation Measures Management- Environmental Action Plans

Mitigation measures (including measures to prevent, mitigate and compensate impacts) have been discussed in Sections 12 to 19 and summarized in Section 21 (Table 21.1) of the EIA, and in Table A-2 of this EMP. The mitigation measures have been proposed following the hierarchy criteria by which measures to avoid impacts have been favoured over minimization, or compensation/off-set, wherever technically and financially feasible. Monitoring activities proposed to control those mitigation measures are summarized in section 22 of the EIA and in Table A-2 of this EMP.

As the Project proceeds through detailed design and a clearer indication of the environmental management challenges for the construction and operation phases develops, described control measures will be modified and updated accordingly.

It is essential that prior to the commencement of the construction and operation phases, the Construction and Operation Managers ensure that all subcontractors are aware of their environmental management responsibilities. All subcontractors must also ensure that personnel responsible for implementing environmental control measures are aware of their designated tasks.

In order to avoid impacts and risks associated with certain activities, such as waste management, water discharge... action plans will be developed (waste management plan, spill prevention and containment plan...). Those action plans are considered in the impact assessment sections (Sections 12 to 19) and in Table A-2. Additionally, as well as the mitigation measures described in the Environmental Impact Assessment (CH2M HILL, 2011),

all good practices as recommended in Section 24-Sustainable Development Assessment should be implemented.

A.6.1. Summary of Environmental Impacts and Management Process

Table A-2 includes a summary of the mitigation and monitoring measures defined for each identified impact. For each mitigation measure, the priority of implementation has been defined as per the following characterization:

- Low: recommended measures to mitigate impacts of low significance;
- Medium: measures to implement to mitigate impacts of medium significance;
- High: measures to implement to mitigate impacts of high significance;

For each monitoring measure, timing/frequency and responsibility for implementation is included.

Table A-2 Summary of Environmental Impacts & Management Process

| Item No. | Potential Impact | Potential Mitigation Measures and/or Recommendations | Priority Level | Monitoring Measure | Timing/Frequency | Responsibility |
|--------------------------------------|---|--|---|--|---|----------------|
| Air Quality & Meteorology | | | | | | |
| A1 | Dust emissions during construction activities | <ul style="list-style-type: none"> Covers and water suppression; Increased moisture content for open material storage piles; Each EPC contractor to develop and submit a dust control plan, an Air Quality Management Plan and Emissions Monitoring/Testing Plan. Follow guidance on fugitive sources as per World Bank Group EHS Guidance, p. 8 (2007). | High (close to RTIP) Low (Outside the industrial city) | Routine visual assessment of dust during initial site preparation work and periodically thereafter, depending on the nature of the work activity | Continuous | EPC Contractor |
| A2 | Exhaust emissions from vehicle movements | <ul style="list-style-type: none"> Specify use of modern properly maintained vehicles. Follow guidance on mobile sources - land based as per World Bank Group EHS Guidance, p. 9 (2007). | High (close to the RTIP complex and industrial city) Low (Outside the industrial city) | Routine vehicle maintenance and check of vehicle's inspection records | Continuous and upon manufacturers indications | EPC Contractor |

Table A-2 Summary of Environmental Impacts & Management Process

| Item No. | Potential Impact | Potential Mitigation Measures and/or Recommendations | Priority Level | Monitoring Measure | Timing/Frequency | Responsibility |
|----------|---|--|----------------|---|------------------------|--|
| A3 | NO _x emissions from major combustion sources | <p>Reduction of process heater NO_x emissions by means of:</p> <ul style="list-style-type: none"> Use of Low NO_x burners (LNBS) for steam boilers and mixed feed cracking unit ethylene furnaces, to minimise the NO_x formation via means of enhanced combustion designs such as combustion temperature reduction and reducing oxygen concentration; Use of Selective Catalytic Reduction (SCR) for steam boilers, thermal treatment units, and Nitric Acid Unit to reduce NO_x emissions that have been formed during the combustion process. | Low | <ol style="list-style-type: none"> Stack emission testing to be undertaken in accordance with RCER 2010 requirements. According to the RCER 2010, the following sources should install continuous emissions monitoring systems for the following parameters: <ul style="list-style-type: none"> Combustion Devices >73 MW heat input capacity: Opacity⁽¹⁾, SO₂⁽¹⁾, and NO_x⁽²⁾ Thermal Treatment Unit: CO downstream of combustion zone, Combustion temperature, Waste feed rate, NO_x, SO₂, HCl, PM and Oxygen Nitric Acid Plant: NO_x | As stipulated by RCER. | <p>Project EH&S Lead & JMP EH&S Manager during project stage</p> <p>EH&S Lead during the operation stage</p> |

Table A-2 Summary of Environmental Impacts & Management Process

| Item No. | Potential Impact | Potential Mitigation Measures and/or Recommendations | Priority Level | Monitoring Measure | Timing/Frequency | Responsibility |
|---|------------------|--|----------------|--|------------------|----------------|
| A3 Cont | | | | 3. Fugitive Emissions Monitoring Requirements: LDAR program to be implemented in accordance with the RCER. All components in VOC or HAP component should be monitored as follows depending on the vapour pressure: Vapour Pressure @ 20C (psia) > = 0.147, monitoring method: USEPA CFR 40 Part 60 App A Method 21 Vp < 0.147, Physical / Visual Inspection Vp < 0.04, No inspection required | | |
| <p>Notes:</p> <ol style="list-style-type: none"> Combustion sources that burn natural gas or hydrogen ONLY shall be exempt from the continuous emission monitoring requirements for opacity and SO₂. 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 or less than 43 ng/l 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: <ul style="list-style-type: none"> 2 results < 50% standard 3 results < 60% standard 4 results < 70% standard 30 days < 70% standard using portable continuous emission monitor <p>All spot sampling tests shall be separated by at least 3 months and completed within 2 years.</p> | | | | | | |

Table A-2 Summary of Environmental Impacts & Management Process

| Item No. | Potential Impact | Potential Mitigation Measures and/or Recommendations | Priority Level | Monitoring Measure | Timing/Frequency | Responsibility |
|----------|---|---|---|--------------------|------------------|------------------|
| A4 | SO ₂ emissions from major combustion sources | <ul style="list-style-type: none"> The project design includes use of Flue Gas Desulphurization (FGD) systems to treat the boiler flue gas as it is a well established technology and has a high SO₂ removal rate (up to 95% removal) | Low | As per impact A3 | As per impact A3 | As per impact A3 |
| A5 | CO emissions from major combustion sources | <ul style="list-style-type: none"> The project design includes techniques such as complete combustion via furnace design, monitoring, process control, and maintenance to ensure complete combustion from the boilers; Application of design operating temperature of 1100°C with more than 2 seconds of residence time for Thermal Treatment Units (TTU) at normal operating conditions | Low | As per impact A3 | As per impact A3 | As per impact A3 |
| A6 | PM ₁₀ emissions from RTIP complex | <ul style="list-style-type: none"> Design includes use of FGD to treat the boiler flue gas; Excluding liquid wastes in the TTUs from manufacturing units that contain inorganic chemical constituents that could produce PM; Gaseous emission control devices used for the TTUs such as water spray quench, HCl water absorber tower, and caustic scrubber also contribute to PM reduction; During loading/unloading activities and/or during storing of raw materials, the project will apply measures such as closed hanger, shield spraying system etc., to avoid dust emissions from the sources with RC prior approval | High (note that contribution of RTIP is well below the RCJY standard but the high baseline makes the priority level high) | As per impact A3 | As per impact A3 | As per impact A3 |

Table A-2 Summary of Environmental Impacts & Management Process

| Item No. | Potential Impact | Potential Mitigation Measures and/or Recommendations | Priority Level | Monitoring Measure | Timing/Frequency | Responsibility |
|----------|---|--|---|--------------------|------------------|------------------|
| A7 | PM _{2.5} emissions from RTIP complex | As per Impact A6 | High (note that contribution of RTIP is well below the RCJY standard but the high baseline makes the priority level high) | As per impact A3 | As per impact A3 | As per impact A3 |

Table A-2 Summary of Environmental Impacts & Management Process

| Item No. | Potential Impact | Potential Mitigation Measures and/or Recommendations | Priority Level | Monitoring Measure | Timing/Frequency | Responsibility |
|----------|---|---|---|--------------------|------------------|------------------|
| A8 | Benzene emissions from point and fugitive sources | <ul style="list-style-type: none"> Loading or discharging of aromatics (or aromatics-rich streams) from road tankers, rail tankers, ships and barges should be provided with a closed vent systems will be connected to a flare system; All equipment and piping systems should be designed to ensure a high level of containment and to minimise fugitive emissions. This involves seal-less or double/tandem sealed machinery, low loss valve packing, use of spiral wound jointing materials, and minimum use of flange connections. Equipment that handles benzene shall be designed to limit the exposure risk to an acceptable level; Fugitive emissions from piping and equipment will be mitigated by using LDAR and monitoring program as required by RCER 2010. Tankage of benzene will be a fixed roof with a flare system | Medium close to RTIP site and low outside the industrial city | As per impact A3 | As per impact A3 | As per impact A3 |

Table A-2 Summary of Environmental Impacts & Management Process

| Item No. | Potential Impact | Potential Mitigation Measures and/or Recommendations | Priority Level | Monitoring Measure | Timing/Frequency | Responsibility |
|----------|--|---|----------------|--------------------|------------------|------------------|
| A9 | Formaldehyde emissions from point and fugitive sources | <ul style="list-style-type: none"> In Formalin Unit (Unit 345) point source emissions (process tail-gas and product tank losses) are controlled by catalytic oxidation; For fugitive emissions, equipment specifications include high-integrity sealing systems for pumps, compressors, and valves and use of proper types of O-ring and gasket materials for formaldehyde service; From the Ethylene Oxide Unit, formaldehyde vapours originating from process is sent to the TTU for incineration; A Leak Detection and Repair (LDAR) Program to monitor and control fugitive emissions will be implemented as required by RCER 2010; Some of these measures are recommended by the IFC. No additional mitigation measures were feasible | Low | As per impact A3 | As per impact A3 | As per impact A3 |
| A10 | Toluene emissions from point and fugitive sources | As per impact A9 | Low | As per impact A3 | As per impact A3 | As per impact A3 |

Table A-2 Summary of Environmental Impacts & Management Process

| Item No. | Potential Impact | Potential Mitigation Measures and/or Recommendations | Priority Level | Monitoring Measure | Timing/Frequency | Responsibility |
|----------|--|--|----------------|--------------------|------------------|------------------|
| A11 | Ammonia emissions from point and fugitive sources | <ul style="list-style-type: none"> For fugitive emissions, equipment specifications include high-integrity sealing systems for pumps, compressors, and valves and use of proper types of O-ring and gasket materials for ammonia service; A Leak Detection and Repair (LDAR) Program to monitor and control fugitive emissions will be implemented as required by RCER 2010 | Low | As per impact A3 | As per impact A3 | As per impact A3 |
| A12 | Chlorine emissions from point and fugitive sources | <ul style="list-style-type: none"> Connection of vent streams from absorber, storage and loading/unloading systems to a recovery system (e.g., condensation, water scrubber) and/or to a vent gas treatment (e.g., thermal/catalytic oxidizer, TTUs); Minimization of vent streams from storage tanks by backventing on loading/unloading and treating the polluted streams by thermal or catalytic oxidation; For fugitive emissions, equipment specifications include high-integrity sealing systems for pumps, compressors, and valves and use of proper types of O-ring and gasket materials for chlorine service; A Leak Detection and Repair (LDAR) Program to monitor and control fugitive emissions will be implemented as required by RCER 2010 | Low | As per impact A3 | As per impact A3 | As per impact A3 |

Table A-2 Summary of Environmental Impacts & Management Process

| Item No. | Potential Impact | Potential Mitigation Measures and/or Recommendations | Priority Level | Monitoring Measure | Timing/Frequency | Responsibility |
|----------|---|--|----------------|--------------------|------------------|------------------|
| A13 | Xylene emissions from point and fugitive sources. | As per impact A9 | Low | As per impact A3 | As per impact A3 | As per impact A3 |
| A14 | Aniline emissions from point and fugitive sources | <ul style="list-style-type: none"> Point source emissions of aniline are controlled by Thermal Treatment in Unit 779 and alternatively Flare; In regards to fugitives, equipment specifications include high-integrity sealing systems for pumps, compressors, and valves and use of proper types of O-ring and gasket materials for aniline service; A Leak Detection and Repair (LDAR) Program to monitor and control fugitive emissions will be implemented as required by RCER 2010 | Low | As per impact A3 | As per impact A3 | As per impact A3 |

Table A-2 Summary of Environmental Impacts & Management Process

| Item No. | Potential Impact | Potential Mitigation Measures and/or Recommendations | Priority Level | Monitoring Measure | Timing/Frequency | Responsibility |
|----------|--|---|----------------|--------------------|------------------|------------------|
| A15 | Ethylene Oxide emissions from point and fugitive sources | Design features for the Project includes: <ul style="list-style-type: none"> Ethylene & Methane are flashed off from the carbonate solution in to minimize HC emission from the CO2 vent to atmosphere; Pumps with double mechanical seals or sealless pumps are utilized for the Ethylene Oxide (EO) service. Vents from seal system are captured and sent to waste gas header to TTU; Ethylene Oxide storage tanks are equipped with a vent recovery collection system to route the EO containing gas back to the process using the vent gas compressor; Minimization of the number of flanged connections, and installation of metal strips around flanges with vent pipes sticking out of the insulation to allow monitoring of Ethylene oxide release; EO detectors are used at potential leak area and building HVAC intake to buildings. Examples : EO storage tanks, transfer pumps as well as HVAC intake to MCC building A Leak Detection and Repair (LDAR) Program to monitor and control fugitive emissions will be implemented as required by RCER 2010. | Low | As per impact A3 | As per impact A3 | As per impact A3 |

Table A-2 Summary of Environmental Impacts & Management Process

| Item No. | Potential Impact | Potential Mitigation Measures and/or Recommendations | Priority Level | Monitoring Measure | Timing/Frequency | Responsibility |
|----------|---|---|----------------|--------------------|------------------|------------------|
| A16 | Hydrogen Chloride emissions from point and fugitive sources | <p>The project design includes equipment and piping systems with a high level of containment to minimise point and fugitive emissions.</p> <ul style="list-style-type: none"> In the Isocyanates Units, the point source emissions are controlled primarily by Thermal Treatment in Unit 779 and alternatively by a Mitigation Scrubber System including a Process Scrubber and a backup Emergency Scrubber, both using a strong caustic solution to react/destroy HCL. A backup option when Thermal Treatment is not available is routing scrubber exhaust to Flare; In regards to fugitives, equipment specifications include seal-less or double/tandem sealed machinery, and minimum use of flange connections; Process equipment that handles HCL shall be designed to limit the exposure risk; A Leak Detection and Repair (LDAR) Program to monitor and control fugitive emissions will be implemented as required by RCER 2010. | Low | As per impact A3 | As per impact A3 | As per impact A3 |

Table A-2 Summary of Environmental Impacts & Management Process

| Item No. | Potential Impact | Potential Mitigation Measures and/or Recommendations | Priority Level | Monitoring Measure | Timing/Frequency | Responsibility |
|----------|--|---|----------------|--------------------|------------------|------------------|
| A17 | Phosgene emissions from point and fugitive sources | <p>The project design includes equipment and piping systems with a high level of containment to minimise point and fugitive emissions.</p> <ul style="list-style-type: none"> Point source emissions are controlled primarily by Thermal Treatment in Unit 779 and alternatively by a Mitigation Scrubber System including a Process Scrubber and a backup Emergency Scrubber, both using a strong caustic solution to react/destroy phosgene. A backup option when Thermal Treatment is not available is routing scrubber exhaust to Flare; In regards to fugitives, equipment specifications include seal-less or double/tandem sealed machinery, low loss valve packing, use of spiral wound jointing materials, and minimum use of flange connections; Process equipment that handles phosgene shall be designed to limit the exposure risk and is ultimately backed up by the TDI & PMDI Containment Domes which provide for equipment isolation and conveying significant fugitive emissions to the Emergency Caustic Scrubber for reaction/destruction; A Leak Detection and Repair (LDAR) Program to monitor and control fugitive emissions will be implemented as required by RCER 2010. | Low | As per impact A3 | As per impact A3 | As per impact A3 |

Table A-2 Summary of Environmental Impacts & Management Process

| Item No. | Potential Impact | Potential Mitigation Measures and/or Recommendations | Priority Level | Monitoring Measure | Timing/Frequency | Responsibility |
|----------|---|--|----------------|--------------------|------------------|------------------|
| A18 | SO ₂ Emissions from Flares during Emergency Scenario and Process Upset | <p>The RTIP complex design has included the following measures to minimize flare emissions:</p> <ul style="list-style-type: none"> • Appropriate consideration, through technical evaluation, should be given with respect to flare design to ensure safe operation and minimize impact on the community; • Flares shall be designed for smokeless operation through as much of the operating range as technically feasible; • Flares primary function shall be to manage unplanned events and startup and shutdown of units; • The use of flares as control devices for continuous vent streams is acceptable after other alternatives have been evaluated, considering process safety, cost, etc. For flares used as control devices, the flares shall be designed and operated such that the combined assist fuel gas and waste steam is in accordance with RCER Table 2B specifications; • Flaring shall be minimised during start-up and shut-downs; <p>Mitigation measures for A21 are also applicable.</p> | Low | As per impact A3 | As per impact A3 | As per impact A3 |
| A19 | NO _x Emissions from Flares during Emergency Scenario and Process Upset | As per impact A19 | Low | As per impact A3 | As per impact A3 | As per impact A3 |

Table A-2 Summary of Environmental Impacts & Management Process

| Item No. | Potential Impact | Potential Mitigation Measures and/or Recommendations | Priority Level | Monitoring Measure | Timing/Frequency | Responsibility |
|----------|--|---|----------------|--------------------|------------------|------------------|
| A20 | CO Emissions from Flares during Emergency Scenario and Process Upset | <ul style="list-style-type: none"> Mitigation measures for A19 and A20 are also applicable; Cameras shall be used as a means of flame detection/confirmation for flares. In addition, the continuous imaging (digital recording) of all flares with date and time shall be maintained. Cameras shall also be considered for monitoring other critical equipment, remote loading operations, etc. <p>Other measures recommended to minimize flare emissions are as follow:</p> <ul style="list-style-type: none"> Minimization of flaring via an overall emissions reduction strategy. The following flare minimization activities are suggested: flares to be designed in accordance with applicable standards, installing a gas recovery system, using high-integrity relief valves, applying advanced process control, and reducing relief gas to flare by management/good housekeeping practices. | Low | As per impact A3 | As per impact A3 | As per impact A3 |

Table A-2 Summary of Environmental Impacts & Management Process

| Item No. | Potential Impact | Potential Mitigation Measures and/or Recommendations | Priority Level | Monitoring Measure | Timing/Frequency | Responsibility |
|----------|----------------------------------|---|----------------|---|---|----------------------|
| A21 | Benzene Storage Tanks Spills | HAZID, HAZOP, etc. assessments will be used throughout the design process. A Spill Prevention and Containment plan needs to be developed and recommendations implemented. | Medium | Conduct periodic visual assessments of tanks and pipes racks checking for the presence of leaks. Check that all the measures included in the Spill Prevention and Containment Plan are being implemented and maintain all the associated records. | Continuous and whenever stated in the Plan. | EH&S Manager of RTIP |
| A22 | Benzene Pipe Rack Failure Spills | As per impact A22 | Medium | As per impact A22 | As per impact A3 | As per impact A3 |

Table A-2 Summary of Environmental Impacts & Management Process

| Item No. | Potential Impact | Potential Mitigation Measures and/or Recommendations | Priority Level | Monitoring Measure | Timing/Frequency | Responsibility |
|-------------------------------------|---|--|----------------|---|--|---|
| Onshore Physical Environment | | | | | | |
| O2 | Alteration of drainage characteristics (including dewatering) and modification of the storm water flow and recharge regime. | <ul style="list-style-type: none"> Provide a temporary or alternative pathway for stormwater drainage during the construction phase, avoiding the elimination or the temporary closure of the natural run-off pathways. Careful design and planning of construction is suggested to as the depth to the shallow groundwater ranges from 2 to 12 mBGS. Careful design of the final land elevations could reduce the requirement to dewater and excavate below the water table. If dewatering is required, then appropriate site specific design and disposal of groundwaters is needed. Although the baseline data do not suggest the presence of contaminants in groundwater, sampling and analysis of groundwater is recommended prior to disposal. Develop and initiate a groundwater monitoring programme to monitor groundwater quality. Ensure that the drainage system is cleaned from time to time, so it is always able to carry the volume of storm water for which it was designed. | Low | <ul style="list-style-type: none"> Ensure that the drainage system is cleaned from time to time, so it is always able to carry the volume of storm water for which it was designed. Develop and initiate a groundwater monitoring programme to monitor groundwater quality. | Regular checks, and always after a wind / sand storm or a storm flow. Quarterly for groundwater monitoring Programme | EPC contractor & EH&S Manager (Cons, Com)/RTIP Environmental Manager (Op, Decom). |

Table A-2 Summary of Environmental Impacts & Management Process

| Item No. | Potential Impact | Potential Mitigation Measures and/or Recommendations | Priority Level | Monitoring Measure | Timing/Frequency | Responsibility |
|---|--|---|----------------|--|------------------|---|
| O3 | Degradation of soil and groundwater quality due to minor accidental releases and spills of hazardous materials during construction | <ul style="list-style-type: none"> Develop a comprehensive Spill Prevention and Containment Plan (in accordance with RCJY environmental regulations) to ensure safe onsite storage of hazardous materials; handling and containment of accidental spills and releases. The plan shall also address the transfer and disposal of spilled materials as hazardous waste and mitigating measures documented to contain any spills. Continually monitor and re-evaluate the effectiveness of the plan. Implement procedures indicating the characteristics of the transportation vehicles to be used, trying to minimize as much as possible potential release/spills related to the bad condition of the materials (valves, pumps in the trucks, etc). Pre-casting of concrete structure will be conducted in paved areas, with a large enough extent and gradient to prevent spillage of concrete or cement onto bare soil. Keeping the amounts of stored hazardous materials to a minimum and always within controlled areas. | Low | Develop and implement a groundwater monitoring programme to monitor groundwater quality. | Quarterly | EPC contractor & EH&S Manager (Cons, Com)/RTIP Environmental Manager (Op, Decom). |
| <p>Notes:</p> <p>Abbreviations: Cons (Construction); Com (Commissioning); Op (Operation); Decom (Decommissioning); Precon (Preconstruction)</p> | | | | | | |

Table A-2 Summary of Environmental Impacts & Management Process

| Item No. | Potential Impact | Potential Mitigation Measures and/or Recommendations | Priority Level | Monitoring Measure | Timing/Frequency | Responsibility |
|------------|------------------|--|----------------|--------------------|------------------|----------------|
| O3 Cont | | <ul style="list-style-type: none"> • During construction, designate an offsite fuel distribution facility (for construction and transportation vehicles and equipment) that is equipped with spill containment and prevention measures including integrity tested double-wall storage tanks, distribution lines and equipment. If due to project requirements, the re-fuelling of construction vehicles and equipment needs to take place on the RTIP site, a fuel storage and distribution facility with appropriate spill containment and prevention measures should be built as part of the facilities' temporary infrastructure, and an integrity testing programme (which includes integrity tests and volume balance) should be put in place. • Develop and initiate a groundwater monitoring programme to monitor groundwater quality | | | | |

Table A-2 Summary of Environmental Impacts & Management Process

| Item No. | Potential Impact | Potential Mitigation Measures and/or Recommendations | Priority Level | Monitoring Measure | Timing/Frequency | Responsibility |
|----------|---|--|----------------|--------------------|------------------|----------------|
| O4 | Degradation of soil and groundwater quality due to minor accidental releases and spill during occasional maintenance of construction equipment and vehicles | <ul style="list-style-type: none"> • The RTIP site will have a designated site for the occasional maintenance activities of vehicles and construction equipment. The maintenance area will have a comprehensive spill prevention and containment plan to ensure the safe handling and containment of accidental spills and releases, onsite storage of hazardous materials and the transfer and disposal of spilled materials. Continually monitor and re-evaluate the effectiveness of the plan. • Keep onsite vehicle and equipment maintenance activities to a minimum or within the appropriate designated maintenance areas. Only emergency repairs (such as those needed to stop a spill of hazardous material) should be conducted outside the maintenance area. <p>Washing of concrete mixers and trucks should only take place in paved or lined areas with appropriate wastewater collection measures. It is recommended that the wastewater generated during washing of concrete mixers and trucks be given sufficient time to allow for the settlement of solids, prior to its treatment and/or disposal. Treatment of the remaining wastewater should take into consideration its pH and dissolved solids load.</p> | Low | None | - | - |

Table A-2 Summary of Environmental Impacts & Management Process

| Item No. | Potential Impact | Potential Mitigation Measures and/or Recommendations | Priority Level | Monitoring Measure | Timing/Frequency | Responsibility |
|----------|---|---|----------------|--------------------|------------------|----------------|
| O5 | Degradation of soil and groundwater quality due to minor accidental releases and spills of hazardous materials during commissioning | <ul style="list-style-type: none"> Develop a comprehensive spill prevention and containment plan (in accordance with RCJY regulations) to ensure safe onsite storage of hazardous materials; handling and containment of accidental spills and releases. The comprehensive spill prevention and containment plan shall also address the transfer and disposal of spilled materials as hazardous waste. Continually monitor and re-evaluate the effectiveness of the plan. Keeping the amounts of stored hazardous materials to the minimum and control access to said materials. Perform the majority of repairs within the maintenance complex. <p>Designate an offsite fuel distribution facility for vehicles and mobile equipment that is equipped with spill containment and prevention measures including integrity tested double-wall storage tanks, distribution lines and equipment. If, due to project requirements, any refuelling of construction vehicles and equipment needs to take place on the RTIP site, a fuel storage and distribution facility with appropriate spill containment and prevention measures should be built as part of the facilities' temporary infrastructure</p> | Low | None | - | - |

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| Item No. | Potential Impact | Potential Mitigation Measures and/or Recommendations | Priority Level | Monitoring Measure | Timing/Frequency | Responsibility |
|------------|---|---|----------------|--|---|---|
| O5 Cont | | An integrity testing programme (that includes integrity tests and volume balance) should be put in place. Underground storage and distribution equipment should be avoided to the maximum extent possible | | | | |
| O6 | Degradation of soil and groundwater quality due to accidental releases and spills of hazardous materials during normal operations at the process plants, maintenance of equipment and storage and internal distribution through the utility infrastructure. | <ul style="list-style-type: none"> Develop a comprehensive spill prevention and containment plan (in accordance with RCJY regulations) to ensure safe onsite storage of hazardous materials; and handling and containment of accidental spills and releases. The comprehensive spill prevention and containment plan shall also address the transfer and disposal of spilled materials as hazardous waste. Continually monitor and re-evaluate the effectiveness of the plan. Visual monitoring of the Surface Drainage System. Prompt repair of malfunctioning equipment. Minimize the volumes of SRO stored at SRBs. Implementation of spill detection systems. Develop and implement a groundwater monitoring programme to monitor groundwater quality. Perform the majority of repairs within the maintenance complex. | Medium | Continuous monitoring of the Surface Drainage System. Continuous monitoring of spill detection systems. Develop and implement a groundwater monitoring programme to monitor groundwater quality. | Regular checks, and always after a wind / sand storm or a storm flow. Quarterly for groundwater monitoring Programme. | EPC contractor & EH&S Manager (Cons, Com)/RTIP Environmental Manager (Op, Decom). |

Table A-2 Summary of Environmental Impacts & Management Process

| Item No. | Potential Impact | Potential Mitigation Measures and/or Recommendations | Priority Level | Monitoring Measure | Timing/Frequency | Responsibility |
|----------|---|---|----------------|--------------------|------------------|----------------|
| O7 | Degradation of soil and groundwater quality due to accidental releases and spills during the transportation of raw materials, feed stock and products on or off-site. | <ul style="list-style-type: none"> • Develop a comprehensive spill prevention and containment plan (in accordance with RCER) to ensure safe onsite storage of hazardous materials; handling and containment of accidental spills and releases, and transfer and disposal of spilled materials as hazardous waste. Continually monitor and re-evaluate the effectiveness of the plan. • Integrate spill prevention and containment measures into the transportation plans for third-party vendors. | Low to Medium | None | - | - |

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| Item No. | Potential Impact | Potential Mitigation Measures and/or Recommendations | Priority Level | Monitoring Measure | Timing/Frequency | Responsibility |
|--------------|---|---|----------------|---|--|--|
| Waste | | | | | | |
| O11 | Potential for soil contamination resulting from On-Site Storage of Non-Hazardous Solid Waste | <ul style="list-style-type: none"> Developing a comprehensive waste management plan which complies with internationally accepted industry standards to ensure safe handling, onsite storage, transfer and disposal. Continually monitor and re-evaluate the effectiveness of the plan; The Waste Management Plans should encompass all phases of the waste management process under the good industry practice requirements of duty of care and protect the corporate image of the proponents. Keeping storage times on RTIP site to the minimum and control access to stored wastes (no longer than 180 days after waste generation, according to the 2010 RCER); Segregating scrap plastic, glass, metal and wood for recycling where possible; | Low | Perform internal audits to ensure that wastes arising from the RTIP units are compliant with the waste management guides. | One audit per quarter or per phase of the project, whichever is the shorter period | RTIP EH&S Manager (Cons, Com)/RTIP Environmental Manager (Op, Decom) |
| O12 | Potential for soil contamination resulting from On-Site Storage of Non-Hazardous Waste from Construction Camp | None | Low | As per impact O11 | As per impact O11 | As per impact O11 |

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| Item No. | Potential Impact | Potential Mitigation Measures and/or Recommendations | Priority Level | Monitoring Measure | Timing/Frequency | Responsibility |
|---|--|--|----------------|---|---|---|
| O13 | Potential for soil contamination resulting from On-Site Storage of Hazardous Solid Waste | <ul style="list-style-type: none"> Developing a comprehensive waste management plan as described for impact O11; Providing secondary containment to tanks, to capture any spills and equip tanks with a contents level indicator; Keeping storage times at the EPC Contractor camp to the minimum and controlling access to stored wastes; Providing secure means of transferring wastes safely into and out of the tank to minimise spills. Any shipment of wastes outside of JIC must be previously authorised by the RC. Any shipment of hazardous wastes outside of KSA must conform to the requirements of the Basel Convention; Undertaking an audit of the waste management facility as per impact O11; Covering trucks where appropriate to prevent wind-blown losses during transport; Following other procedures established in the RCER (2010) for appropriate waste transport and disposal. | Low | <ol style="list-style-type: none"> Maintain a catalogue of waste composition and Material Safety Data Sheets (MSDS) where available. Wastes sent for storage should be accompanied by identifying documentation. Keep waste transfer documents, and follow all procedures established in the RCER (2010) for transport and disposal of hazardous wastes. When uncertain, analyse wastes to ascertain concentration of hazardous chemicals in wastes. Perform internal audits to ensure that wastes arising from the RTIP units are compliant with the waste management guides. | <ol style="list-style-type: none"> Make monthly stock check of wastes in storage. Continually Any necessary analyses should be undertaken on wastes with uncertain composition. One audit per quarter or per phase of the project, whichever is the shorter period. | EPC Contractor/RTIP EH&S Manager (Cons, Com)/RTIP Environmental Manager (Op, Decom) |
| <p><i>Notes:</i></p> <p><i>Abbreviations: Cons (Construction); Com (Commissioning); Op (Operation); Decom (Decommissioning); Precon (Preconstruction)</i></p> | | | | | | |

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| Item No. | Potential Impact | Potential Mitigation Measures and/or Recommendations | Priority Level | Monitoring Measure | Timing/Frequency | Responsibility |
|---|---|--|----------------|---|--|--|
| O14 | Potential for soil contamination resulting from On-Site Storage of Hazardous Liquid Waste | As per impact O13. | Low | As per impact O13 | As per impact O13 | As per impact O13 |
| O15 | Potential for soil contamination resulting from On-site Storage and Off-Site Disposal of Non-Hazardous Liquid Waste | None | Low | <ol style="list-style-type: none"> 1. Audit the waste management facility, and/or waste transportation vehicle to ensure that they are operational, licensed and capable of handling the wastes to be generated; 2. Audit the procedures used for the collection, transport and disposal of wastes to ensure they are in line with industry and regulatory standards; 3. Ensure that the SWTP and IWTP Operators (Marafiq) regularly monitor the quality of treated wastewater and makes regular checks for leaks. | <ol style="list-style-type: none"> 1, 2. Prior to each phase of the project and once every 5 years during the operation phase. 3. Prior to each phase of the project and every year during the operation phase | <ol style="list-style-type: none"> 1,2. RTIP EH&S Manager (Cons, Com)/RTIP Environmental Manager (Op, Decom) / External audit 3. Authorized waste disposal/ treatment facility |
| <p>Notes:</p> <p>Abbreviations: Cons (Construction); Com (Commissioning); Op (Operation); Decom (Decommissioning); Precon (Preconstruction)</p> | | | | | | |

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| Item No. | Potential Impact | Potential Mitigation Measures and/or Recommendations | Priority Level | Monitoring Measure | Timing/Frequency | Responsibility |
|---|---|---|-------------------------------------|--|--|---|
| O16 | Potential for soil contamination resulting from Off-Site Disposal of Non-Hazardous Solid Waste | <ul style="list-style-type: none"> Developing a comprehensive waste management plan as described for impact O11; Undertaking an audit of the waste management facility as per impact O11. Following the procedures established in the RCJY regulations for appropriate waste transport and disposal. | Medium (Cons, Decom), Low (Com, Op) | <ol style="list-style-type: none"> Audit the waste management facility, and waste transportation vehicle as per monitoring measure 1 for impact O15; Audit the procedures used for the collection, transport and disposal of wastes as per monitoring measure 2 for impact O15; Ensure that the Landfill Operator monitors groundwater around Class I & Class II landfill sites | <ol style="list-style-type: none"> 1, 2. Prior to each phase of the project and once every 5 years during the operation phase. 3. Prior to each phase of the project and every year during the operation phase | <ol style="list-style-type: none"> 1,2. RTIP EH&S Manager (Cons, Com)/RTIP Environmental Manager (Op, Decom)/ External audit 3. Authorized waste disposal/ treatment facility |
| O17 | Potential for soil contamination resulting from Off-Site Disposal of Non-Hazardous Waste from Construction Camp | None | Low | <ol style="list-style-type: none"> Audit the waste management facility, and waste transportation vehicle as per monitoring measure 1 for impact O15; Audit the procedures used for the collection, transport and disposal of wastes as per monitoring measure 2 for impact O15; Ensure that the Landfill Operator monitors groundwater around landfill sites. | <ol style="list-style-type: none"> 1, 2. Prior to each phase of the project and once every 5 years during the operation phase. 3,4. Prior to each phase of the project and every year during the operation phase | <ol style="list-style-type: none"> 1,2. RTIP EH&S Manager (Cons, Com)/RTIP Environmental Manager (Op, Decom)/ External audit 3,4. Authorized waste disposal/ treatment facility |
| <p><i>Notes:</i></p> <p><i>Abbreviations: Cons (Construction); Com (Commissioning); Op (Operation); Decom (Decommissioning); Precon (Preconstruction)</i></p> | | | | | | |

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| Item No. | Potential Impact | Potential Mitigation Measures and/or Recommendations | Priority Level | Monitoring Measure | Timing/Frequency | Responsibility |
|----------|--|---|----------------|--|---|--|
| O18 | Potential for soil contamination resulting from Off-Site Disposal of Hazardous Waste | <ul style="list-style-type: none"> Developing a comprehensive waste management plan as per impact O11; Undertaking an audit of the waste management facility as per O11; Following other procedures established in the RCER (2010) for appropriate waste transport and disposal. | Low | <ol style="list-style-type: none"> Maintain a catalogue of waste composition and Material Safety Data Sheets (MSDS) where available; Wastes sent for storage should be accompanied by identifying documentation; Keep waste transfer documents, and follow all procedures established in the RCER (2010) for transport and disposal of hazardous wastes; When uncertain, analyse wastes to ascertain concentration of hazardous chemicals in wastes; Audit the waste management facility, and/or waste transportation vehicle as per monitoring measure 1 for impact O15; Audit the procedures used for the collection, transport and disposal of wastes as per monitoring measure 2 for impact O15; Ensure that the Landfill Operator monitors groundwater around Class I & Class II landfill sites; | <ol style="list-style-type: none"> Make monthly stock check of wastes in storage; Continually; Any necessary analyses should be undertaken on wastes with uncertain composition; Prior to each phase of the project and once every 5 years during the operation phase; Prior to each phase of the project and once every year during the operation phase | <ol style="list-style-type: none"> EPC Contractor/RTIP EH&S Manager (Cons, Com)/RTIP Environmental Manager (Op, Decom); RTIP EH&S Manager (Cons, Com)/RTIP Environmental Manager (Op, Decom)/ External audit; Authorized waste disposal/ treatment facility |

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| Item No. | Potential Impact | Potential Mitigation Measures and/or Recommendations | Priority Level | Monitoring Measure | Timing/Frequency | Responsibility |
|----------|--|--|----------------|--|--|-------------------|
| O19 | Potential for subsurface contamination resulting from transport of hazardous wastes off-site | <ul style="list-style-type: none"> Developing a comprehensive waste management plan as per impact O11; Providing secure means of transferring wastes as per impact O13; Covering trucks where appropriate to prevent wind-blown losses during transport; Following other procedures established in the RCER (2010) for appropriate waste transport and disposal. | Low to Medium | As per impact O18 except for groundwater monitoring at landfill sites. | As per impact O18 except for groundwater monitoring at landfill sites. | As per impact O18 |

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| Item No. | Potential Impact | Potential Mitigation Measures and/or Recommendations | Priority Level | Monitoring Measure | Timing/Frequency | Responsibility |
|----------|--|--|----------------|--|---|--|
| O20 | Accidental release of solid hazardous wastes within the RTIP Complex | As per impact O6. | High | <ol style="list-style-type: none"> 1. Maintain a catalogue of waste composition and Material Safety Data Sheets (MSDS) where available; 2. Wastes sent for storage should be accompanied by identifying documentation; 3. Keep waste transfer documents, and follow all procedures established in the RCER (2010) for transport and disposal of hazardous wastes; 4. When uncertain, analyse wastes to ascertain concentration of hazardous chemicals in wastes. 5. Monitoring of Solid Waste Handling Unit (Unit 778) to ensure appropriate status; 6. Periodical check of containment and segregation, and training to all staff involved in waste management practices; 7. Installation of a network of monitoring wells in accordance with RCER (2010), including the implementation of a groundwater monitoring program. | <ol style="list-style-type: none"> 1, 2. Make monthly stock check of wastes in storage. 3. Continually 4. Any necessary analyses should be undertaken on wastes with uncertain composition. 5, 6. Regular checks. Checking the material used in the restraint and collection of spills at least once every 3 months. 7. Monitoring of GW wells quarterly for visually detecting the presence of free product and groundwater sampling + analysis at least once every year. | EPC Contractor/ RTIP EH&S Manager (Cons, Com)/RTIP Environmental Manager (Op, Decom) |

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| Item No. | Potential Impact | Potential Mitigation Measures and/or Recommendations | Priority Level | Monitoring Measure | Timing/Frequency | Responsibility |
|------------------------------|---|---|----------------|---|--|-------------------|
| O21 | Accidental release of liquid hazardous wastes within the RTIP Complex | As per impact O6. | High | As per Impact O20, except for monitoring of Solid Waste Handling Unit (Unit 778) | As per Impact O20 except for monitoring of Solid Waste Handling Unit (Unit 778) | As per Impact O20 |
| O22 | Accidental release of solid hazardous wastes during transport offsite | As per impact O7 | Medium to High | As per Impact O20 , except for monitoring of Solid Waste Handling Unit (Unit 778) | As per Impact O20, except for monitoring of Solid Waste Handling Unit (Unit 778) | As per Impact O20 |
| O23 | Accidental release of liquid hazardous wastes during transport offsite | As per impact O7 | Medium to High | As per Impact O20 , except for monitoring of Solid Waste Handling Unit (Unit 778) | As per Impact O20, except for monitoring of Solid Waste Handling Unit (Unit 778) | As per Impact O20 |
| Ecology - Terrestrial | | | | | | |
| B1 | Removal of vegetation and potential foraging sites for nocturnal animals (habitat loss) | <ul style="list-style-type: none"> • During the construction period, the land based works should to be assessed in relation to the following issues: <ul style="list-style-type: none"> – The impact on vegetation within the footprint of the RTIP operational site; – The impact on vegetation at locations which are to be used as temporary compounds or storage areas; – The effects of construction on other aspects of terrestrial ecology. | Low | None | - | - |

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| Item No. | Potential Impact | Potential Mitigation Measures and/or Recommendations | Priority Level | Monitoring Measure | Timing/Frequency | Responsibility |
|---|---|--|----------------|------------------------|--------------------------|---|
| B2 | Effects of noise on fauna onsite and offsite especially on breeding, wintering and migrant birds offsite (e.g. Sabkhat Al-Fasl Lagoons) | As per impact B1 | Low | None | - | - |
| B3 | Effects of dust and noise from earth moving and vehicle movements, etc. on vegetation and fauna onsite or adjacent to RTIP | The use of modern properly maintained vehicles together with other driving policy measures like minimising off road driving and transporting materials in bulk to minimise trips, should reduce the local impact of emissions on the biological environment from vehicle movement to and from the site during all phases of the project. | Low | None | - | - |
| B5 | Potential effects of elevated air pollution on offsite vegetation (protected areas) from major combustion sources. | <ul style="list-style-type: none"> Minimise air emissions during commissioning and operation of the RTIP using the BAT approach, which is adopted in the design, to reduce cumulative effects of emissions on flora and fauna outside the project site. As per impact B3-B7 | Low | Refer to impacts A3-A7 | Refer to impacts A3 - A7 | EPC Contractor/RTIP EH&S Manager (Com); RTIP Environmental Manager (Op) |
| <p><i>Notes:</i></p> <p><i>Abbreviations: Cons (Construction); Com (Commissioning); Op (Operation); Decom (Decommissioning); Precon (Preconstruction)</i></p> | | | | | | |

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| Item No. | Potential Impact | Potential Mitigation Measures and/or Recommendations | Priority Level | Monitoring Measure | Timing/Frequency | Responsibility |
|-------------------------|---|--|----------------|---|--------------------------------|--|
| Ecology - Marine | | | | | | |
| M1 | Impact to the marine environment in the area of KFIP from increased vessel movements at KFIP. | RTIP Project Team to work with the Saudi Ports Authority to review and update routing and operating protocols currently in effect at KFIP to ensure that the increase of vessel movements associated to the RTIP activities is adequately managed. | Low | None | | - |
| M2 | Impact resulting from untreated effluent from batching plant, hydrotest water or surface run entering the marine environment, damaging marine ecosystems, and local fisheries industry. | Waste water monitoring of the sources prior to their discharge to Marafiq IWTP, RC Drainage Channel or Marafiq Sewatewer Cooling Return Header will be undertaken following RCER 2010 and EPO requirements. The following effluents will be monitored in order to ensure compliance with the EPO and RCER applicable limits: <ul style="list-style-type: none"> Concrete Batching Plant wastewater prior to discharge to the RC Drainage Channel. Unit 785 - Site Outfall wastewater prior to discharge to the Marafiq Seawater Cooling Return Header. | Low | Auto-sampling systems (24-hour composite sample) and sample points for all discharges of wastewater at the point of discharges from RTIP will be installed and maintained per EPO and RCER requirements: <ol style="list-style-type: none"> Concrete Batching Plant. If wastewater is not compliant with the EPO or RCER requirements, wastewater will be collected and transferred to Marafiq IWTP Unit 785. If wastewater is not compliant with the EPO or RCER requirements, wastewater will be collected and transferred to Marafiq IWTP Analysers to be checked and maintained at intervals prescribed by manufacturer to ensure they are in working order, | Construction and Commissioning | EPC Contractor, Project EH&S Lead & JMP EH&S Manager during project stage EH&S Lead during the operation stage and EH&S Manager of RTIP |

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| Item No. | Potential Impact | Potential Mitigation Measures and/or Recommendations | Priority Level | Monitoring Measure | Timing/Frequency | Responsibility |
|----------|---|---|----------------|--|--|--|
| | | | | fixed or replaced as required. | | |
| M4 | Impact resulting from untreated contaminated stormwater entering the marine environment, damaging or killing marine organisms, including important species for local fisheries. | Surface Runoff Basins sampling prior to discharge to the Royal Commission drainage channel. If surface runoff in surface runoff basins does not comply with EPO or RCER 2010 requirements, it will be diverted to Unit 773 for collection and transfer to Marafiq IWTP. | Low | <ol style="list-style-type: none"> 1. Surface Runoff Basins sampling system prior to discharge to the Royal Commission drainage channel; 2. Analysers to be checked and maintained at intervals prescribed by manufacturer to ensure they are in working order, fixed or replaced as required. | Commissioning, Operation and Decommissioning | <p>EPC Contractor, Project EH&S Lead & JMP EH&S Manager during project stage</p> <p>EH&S Lead (Vice President) during the operation stage and EH&S Manager of RTIP</p> |

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| Item No. | Potential Impact | Potential Mitigation Measures and/or Recommendations | Priority Level | Monitoring Measure | Timing/Frequency | Responsibility |
|----------|---|--|----------------|--------------------|------------------|------------------|
| M5 | Impact resulting from a major fire onsite and contaminated firewater runoff enters the marine environment, damaging or killing marine organisms, including important species for local fisheries. | As per impact M4 | Medium | As per impact M4 | As per impact M4 | As per impact M4 |
| M6 | Impact from a direct fuel or chemical spill to sea during transportation by a third-party transporter. | <ul style="list-style-type: none"> • RTIP to utilise third-party transport providers that abide by operating procedures that ensure secure containment, appropriate materials management, and adequate equipment and vessel maintenance. In addition transporters must abide by all applicable international codes and guidelines. Third-party emergency and spill response plans must be adequate to accommodate RTIP materials and products. • Decisions regarding preferred transport providers should consider the condition of a transport provider's fleet and equipment, and the appropriateness of their operating and emergency procedures. | High | None | - | - |

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| Item No. | Potential Impact | Potential Mitigation Measures and/or Recommendations | Priority Level | Monitoring Measure | Timing/Frequency | Responsibility |
|----------|--|---|----------------|--------------------|------------------|----------------|
| M7 | Impact from fuel or chemical spill from trucks, Port Tank Farm, pipelines or jetty topside handling equipment at Port Facilities | <ul style="list-style-type: none"> RTIP Project Team to work with the Saudi Ports Authority to review and update the port Emergency Plans to ensure capacity for spill response and emergency conditions is adequate for RTIP operations, particularly the shipping, loading, unloading and transportation of raw materials and finished product via truck and pipeline; RTIP Project Team to liaise with the Saudi Ports Authority to assess the adequacy of the existing Spill Response Plan. This plan to be amended and/or expanded to ensure that the existing mutual aid arrangements, established for the response in the event of a spill, are expanded to include RTIP and that appropriate protection measures are in place for other facilities should a spill occur that could impact Marafiq or other water intake canals. This is to be undertaken in accordance with requirements of WB, EHS Guidelines (2007) and IPIECA guidelines, 2000 & 2006; RTIP Project Team to prepare a project specific Spill Prevention and Containment Plan which will include contingency measures. This plan should be implemented in combination with oil response equipment (e.g. spill kits) prior to construction and regularly reviewed and maintained. | Medium | None | - | |

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| Item No. | Potential Impact | Potential Mitigation Measures and/or Recommendations | Priority Level | Monitoring Measure | Timing/Frequency | Responsibility |
|----------|---|--|----------------|---|-------------------------------------|------------------------------|
| M8 | Impact to the marine environment resulting from fuel or chemical spills from vessel collision or breach at Port Facilities. | As per impact M7 | High | None | - | - |
| M9 | Impact of regular, small volume fuel or chemical leakage from Port Tank Farm and associated equipment and pipelines at Port Facilities. | As per impact M7 | Medium | None | - | - |
| M10 | Impact to marine organisms from noise at Port Facilities. | <ul style="list-style-type: none"> The Engineering, Procurement and Construction (EPC) contractor shall ensure that all construction equipment has appropriate noise suppression devices installed, and is maintained appropriately. On-site mechanics to properly maintain the construction equipment and noise suppression devices | Low | Ensure that all construction equipment has appropriate noise suppression devices installed, and is maintained appropriately. | Construction | EPC and EH&S Manager of RTIP |
| M12 | Impact to marine environment from dust | <ul style="list-style-type: none"> The Engineering, Procurement and Construction (EPC) contractor shall develop and implement a Sedimentation and Siltation Monitoring Plan for construction activities at Port Facilities; | Low | <ol style="list-style-type: none"> Road dust will be monitored in the jetty area and water applied to roads to minimize dust reaching the marine environment. Stockpiles will be visually | During the lifetime of the project. | EPC and EH&S Manager of RTIP |

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| Item No. | Potential Impact | Potential Mitigation Measures and/or Recommendations | Priority Level | Monitoring Measure | Timing/Frequency | Responsibility |
|----------|------------------|---|----------------|---|------------------|----------------|
| | | <ul style="list-style-type: none"> • Water will be sprayed regularly on road surfaces and in material storage areas to prevent dust generation by vehicles; • Stockpiles will be visually monitored and relevant staff will be notified when dust management is required; • Stockpiles will be managed in an appropriate manner (such as covering stockpiles and installing sediment traps around base of stockpiles) to prevent dust, erosion and sediment runoff; • Sweeping of hard surfaces to capture and dispose of dust and debris appropriately; and Sandblasting will take place utilizing appropriate shielding mechanisms. | | <p>monitored and relevant staff will be notified when dust management is required.</p> <p>3. Ensure sandblasting takes place utilizing appropriate shielding mechanisms</p> | | |

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| Item No. | Potential Impact | Potential Mitigation Measures and/or Recommendations | Priority Level | Monitoring Measure | Timing/Frequency | Responsibility |
|---|--|---|----------------|--|--|---|
| Noise | | | | | | |
| N1 | Temporary increases in noise levels at the nearest residential receptors and mixed use area (peaking during construction phase). | <ul style="list-style-type: none"> Select inherently quiet equipment wherever possible; RTIP will use low noise design construction equipment typical for a world-scale facility of this magnitude. Ensure machinery is properly maintained, particularly engine exhaust silencers; Ensure that all rotary driven construction equipment has appropriate noise suppression devices installed, and is well maintained. Machinery should be turned off when not in use (not left idling); Where practicable, make use of screening afforded by spoil stockpiles for high noise activities; The construction site will be staffed with on-site mechanics to properly maintain the construction equipment and noise suppression devices; The construction personnel will be required to wear hearing protection when necessary in the construction site. Ear plugs and earmuffs are considered as proper personnel hearing protection devices; | Low | Monitor noise at site boundaries, confirm noise predictions at local sensitive receptors and document status of compliance with applicable standards. At a minimum, L_{eq} and L_{10} shall be measured and two measurements conducted at each selected monitoring location. | Annually during normal operations, daytime (7:00 to 19:00), evening (19:00-22:00) and night time (22:00 to 07:00). Minimum duration of each measurement shall be 15 minutes. | EPC Contractor/RTIP EH&S Manager (Cons, Com)/RTIP Environmental Manager (Op, Decom) |
| <p>Notes:</p> <p>Abbreviations: Cons (Construction); Com (Commissioning); Op (Operation); Decom (Decommissioning); Precon (Preconstruction)</p> | | | | | | |

Table A-2 Summary of Environmental Impacts & Management Process

| Item No. | Potential Impact | Potential Mitigation Measures and/or Recommendations | Priority Level | Monitoring Measure | Timing/Frequency | Responsibility |
|----------|---|---|----------------|------------------------------------|------------------------------------|-------------------------------------|
| N1 Cont | | <ul style="list-style-type: none"> Should any Pile driving happen it should be restricted to day time hours, which according to the World Bank Noise Guidelines (World Bank, 2007a) comprise the period between 7:00 am to 10:00 pm. | | | | |
| N2 | Potential increases in traffic noise levels at locations near roadways. | Traffic in or near residential areas, especially during night time hours should be minimized. | Medium | None | - | - |
| N3 | Increased noise at nearest residential receptors and mixed use area due to high-pressure steam blows and flaring. | <ul style="list-style-type: none"> Where practical, limiting high-pressure steam blows to daytime hours. Temporary portable vent silencers will be used to control the vent noise from these activities to manageable levels. | Medium | Same as that defined for Impact N1 | Same as that defined for Impact N1 | EPC Contractor/RTIP EH&S Manager |

Table A-2 Summary of Environmental Impacts & Management Process

| Item No. | Potential Impact | Potential Mitigation Measures and/or Recommendations | Priority Level | Monitoring Measure | Timing/Frequency | Responsibility |
|----------|--|--|----------------|------------------------------------|------------------------------------|----------------------------|
| N4 | Increased noise levels at nearby residential areas and mixed use areas due to operation of the RTIP new installations. | <ul style="list-style-type: none"> To meet Occupational Health and Safety standards and protect workers' hearing, use of hearing protection devices, warning signage, and work training shall be required in specified work areas; Installation of Class C acoustic insulation (Specified in ISO 15665) on all compressor suction/ discharge/ recycle piping; Installation of vibration isolation pads, such as Fabreeka or equivalent on compressor suction/ discharge pipe supports to reduce the noise transmission to the pipe supports; Insulation of control valves, if any, and their downstream piping; Areas in plant where sound pressure levels exceed 85dBA need to be designated as "Restricted Areas", and personnel hearing protection is mandatory; | Low | Same as that defined for Impact N1 | Same as that defined for Impact N1 | RTIP Environmental Manager |

Table A-2 Summary of Environmental Impacts & Management Process

| Item No. | Potential Impact | Potential Mitigation Measures and/or Recommendations | Priority Level | Monitoring Measure | Timing/Frequency | Responsibility |
|---|--|--|--|--|-------------------------------------|---|
| Socio-Economic | | | | | | |
| S1 | Increased traffic resulting from worker and equipment/material transport. This impact may cause disruptions in accessing industrial facilities and utilities, residential settlements and leisure to existing infrastructure (peaking during construction) | <ul style="list-style-type: none"> Develop and implement a traffic management plan (and logistics) for the project in partnership with the RCJY and port authorities, addressing conditions, access management, routing, scheduling, and operational procedures that contribute to traffic hazards as envisaged in the traffic study prepared for the project. Supporting regional road safety programmes and providing input into management of the road work network within the RCJY authorities can further reduce the impact of RTIP; Determine the waste and material truck circulation at certain hours to avoid annoyance and congestion; Coordinate with RCJY to promote traffic safety in the community. This coordination and outreach should be included in the stakeholder consultation program; Disseminate traffic safety information to road users; | High (Construc), Low to Medium (Commiss, Operations, Decomm) | <ul style="list-style-type: none"> Perform a periodic evaluation of traffic issues and keep a record of vehicle accidents; Support RCJY in their communications with community leaders to discuss traffic issues during construction | During the lifetime of the project. | EPC Contractor/RTIP EH&S Manager (Cons, Com)/RTIP Environmental Manager (Op, Decom) |
| <p>Notes:</p> <p>Abbreviations: Cons (Construction); Com (Commissioning); Op (Operation); Decom (Decommissioning); Precon (Preconstruction)</p> | | | | | | |

Table A-2 Summary of Environmental Impacts & Management Process

| Item No. | Potential Impact | Potential Mitigation Measures and/or Recommendations | Priority Level | Monitoring Measure | Timing/Frequency | Responsibility |
|----------|------------------|--|----------------|--------------------|------------------|----------------|
| S1 Cont | | <ul style="list-style-type: none"> • Support RC in the communication with community leaders to inform stakeholders of the impact, schedule, and routing, thereby minimising negative impacts; • Give preference to local sources for foods and services, in order to minimize offsite traffic and provide positive economic impacts. Integrate into the project design the measures suggested in the traffic study conducted for the operation phase. Some of the recommendations made by this study are listed below: <ul style="list-style-type: none"> - Modifications of the RTIP site south-west and south-east entrances to help optimize the flow of traffic to and from the RTIP site; - Establish an additional bus stop at the RTIP north entrance (for 14 buses), the RTIP south entrance (for 9 buses) and at the KFIP (for 1 bus); - Staggered or flexible start times for personnel of day shifts. | | | | |
| | | <ul style="list-style-type: none"> • | | | | |

Table A-2 Summary of Environmental Impacts & Management Process

| Item No. | Potential Impact | Potential Mitigation Measures and/or Recommendations | Priority Level | Monitoring Measure | Timing/Frequency | Responsibility |
|---|---|---|----------------|--|--|---|
| S5 | Decreased income. Reduction in number of immigrant workers post peak. | <ul style="list-style-type: none"> Coordinate with RCJY to arrange a workshop with the community to inform them about project activities and potential employment opportunities. An appropriate decommissioning plan should be developed and implemented. | Low | Conducting focus groups or workshops workers and community in coordination with RCJY to gauge feedback from workers and the community on expectations towards employment opportunities and project duration. | During the lifetime of the project. | RTIP HSE EH&S Manager (Cons, Com)/RTIP Environmental Director Manager (Op, Decom) |
| S7 | Impact of immigrant workers. Foreign workers separated from their families. | Improve communication systems between workers and families by installing pay telephones at the workers accommodation. | Low | Keep a record of the influx of foreign workers. | Annually during the lifetime of the project. | EPC Contractor/RTIP EH&S Manager (Cons, Com)/RTIP Environmental Manager (Op, Decom) |
| <p><i>Notes:</i></p> <p><i>Abbreviations: Cons (Construction); Com (Commissioning); Op (Operation); Decom (Decommissioning); Precon (Preconstruction)</i></p> | | | | | | |

Table A-2 Summary of Environmental Impacts & Management Process

| Item No. | Potential Impact | Potential Mitigation Measures and/or Recommendations | Priority Level | Monitoring Measure | Timing/Frequency | Responsibility |
|----------|--|--|--|--|--|--|
| S10 | Incidence of disease transmission between the workers and the population of the local communities. | <ul style="list-style-type: none"> • Provide employee counselling, health screening, health and cultural training and awareness, and vaccination programmes. • Pre employment physical and inoculation for contagious diseases • Develop an awareness and prevention programmes and health policies and procedures as well as an integrated programme addressing the health and social implications; • Management of workers' accommodation in ways that reduce risky behaviours, including provision of recreational facilities; • Epidemiological statistics at JIC or in the Region were not accessible when the baseline was performed. A health survey campaign to collect data on the most common communicable diseases in the area is recommended. Tracking and monitoring of incidence rates throughout project implementation would provide valuable information for the design of health programs for RTIP; | Medium to High (Construc), Low to Medium (Commiss, Operation, Decom) | Monitoring of incidence rates and prevalence statistics of relevant contagious diseases. | Frequency of disease testing amongst workers should range from every 6 months to annually depending on the disease being tested and circumstances of the worker. Increases in reported incidents should result in reducing the interval between tests. | EPC Contractor/ RTIP EH&S Manager (Cons, Com)/RTIP Environmental Manager (Op, Decom) The operator should ensure that the requirement to monitor and screen for communicable diseases is incorporated into the EPC contractor's contract. The operator should enforce and audit against the contract. |

Notes:

Abbreviations: Cons (Construction); Com (Commissioning); Op (Operation); Decom (Decommissioning); Precon (Preconstruction)

Table A-2 Summary of Environmental Impacts & Management Process

| Item No. | Potential Impact | Potential Mitigation Measures and/or Recommendations | Priority Level | Monitoring Measure | Timing/Frequency | Responsibility |
|---|--|--|----------------|--|-------------------------------------|--|
| S10 Cont | | <ul style="list-style-type: none"> Ensure that the requirement to monitor and screen for communicable diseases is incorporated into the EPC contractor's contract. The operator should enforce and audit against the contract; Ongoing commitment to health education and support of local programmes to control the spread of communicable diseases is recommended. | | | | |
| S11 | Potential increase in road traffic accidents | <ul style="list-style-type: none"> A structured approach to traffic management and vehicle standards should be specified and safety measures should be implemented. A road transport safety programme for the RTIP should be developed and implemented over the lifetime of the project. Supporting regional road safety programmes and providing input into management of the road work network can further reduce the impact of the RTIP. Coordinate with the local authorities to promote traffic safety and coordination on transport is recommended. This coordination should be included in the stakeholder consultation program. | High | Support RCJY in their communications with community leaders to discuss traffic issues during construction. | During the lifetime of the project. | EPC Contractor/RTIP EH&S Manager (Cons, Com)/RTIP EH&S Lead (Op, Decomm) |
| <p>Notes:</p> <p>Abbreviations: Cons (Construction); Com (Commissioning); Op (Operation); Decom (Decommissioning); Precon (Preconstruction)</p> | | | | | | |

Table A-2 Summary of Environmental Impacts & Management Process

| Item No. | Potential Impact | Potential Mitigation Measures and/or Recommendations | Priority Level | Monitoring Measure | Timing/Frequency | Responsibility |
|----------|--|--|----------------|--|--|---|
| S12 | Fire and explosion hazards generated by process operations | <ul style="list-style-type: none"> • Major hazards should be prevented through the implementation of a Process Safety Management Program that includes: <ul style="list-style-type: none"> - Facility wide risk analysis, including a detailed consequence analysis for events with a likelihood above 10⁻⁶/year (e.g., HAZOP, HAZID, or QRA); - Train employees on operational hazards; - Develop and implement procedures for management of change in operations, process hazard analysis, maintenance of mechanical integrity, pre-start review, hot work permits, and other essential aspects of process safety; - Develop and implement a Safe Transportation Management System for the transport of raw or processed materials; and - Develop and implement procedures for handling and storage of hazardous materials. • On-site and off-site emergency planning, which should include, at a minimum, the preparation and implementation of an Emergency Management Plan and a Communication Plan prepared with the participation of local authorities and potentially affected communities. | Medium to High | Perform Audits to evaluate the effectiveness of the EH&S procedures implemented for the RTIP and to take measures where necessary. | As requested by the EH&S plan implemented. | RTIP EH&S Manager (Cons, Com)/RTIP EH&S Lead (Vice President) (Op, Decom) |

Table A-2 Summary of Environmental Impacts & Management Process

| Item No. | Potential Impact | Potential Mitigation Measures and/or Recommendations | Priority Level | Monitoring Measure | Timing/Frequency | Responsibility |
|---|---|---|----------------|---|---|----------------------------------|
| Archaeological & Cultural Heritage | | | | | | |
| AC1 | Degradation of archaeological wealth which may exist on RTIP area and its vicinity and which is discovered during earth movement activities or vehicle movements. | <ul style="list-style-type: none"> Develop and implement an “archaeological chance find procedure” before starting construction work that includes a trained supervisor to oversee the excavation phase and provision of a simple discovery action card to workers as part of the site orientation. The “archaeological chance find procedure” should involve an appropriate briefing of workers and a notification system. To ensure awareness of employees and contractors, once developed the procedures will be part of the site induction process. If a worker discovers archaeological artefacts, work in that area shall be stopped and the EH&S Manager and site representative shall be notified. The competent authority should be informed, so that the artefacts can be investigated and the area released. | Low | Routine observation by a trained observer for undiscovered archaeological resources during excavations; audits (every three months) during site preparation and excavation activities to verify that all new workers received training on archaeological chance find procedures; and reporting and monitoring procedures for the discovery of unknown archaeological resources during excavations and earth moving activities, including vehicle movements. | Project Planning /Construction /Decommissioning | EPC Contractor/RTIP EH&S Manager |
| AC2 | Possibility of finding intact archaeological artefacts during earth movement & ground clearance activities on RTIP Site area. | As per impact AC1 | Low | Same as per impact AC1 | As per impact AC1 | As per impact AC1 |

Table A-2 Summary of Environmental Impacts & Management Process

| Item No. | Potential Impact | Potential Mitigation Measures and/or Recommendations | Priority Level | Monitoring Measure | Timing/Frequency | Responsibility |
|----------|---|---|----------------|--|-------------------------------|-------------------|
| AC3 | Interaction between persons (expatriate workers) from diverse cultural backgrounds with the local community resulting in cross-cultural tension, specifically related to differences in dress, behaviour, and tradition. In addition, expatriate workers are likely to make tourist expeditions to cultural heritage and archaeology sites of interest, which could impact archaeological resources if artefacts are found and kept as souvenirs or if they disturb archaeological sites visited. | <ul style="list-style-type: none"> • Provide training to workers to increase awareness and provide an introduction to local culture and traditions. This would include disseminating educational and informative materials promoting cross-cultural understanding. • Regarding the influx of workers during the construction impacts to the local population should be managed through the stakeholder engagement process (Appendix E). | Medium | Routine audits and reporting of complaints regarding the influx of workers during the construction | Project Planning / Continuous | RTIP EH&S Manager |

Table A-2 Summary of Environmental Impacts & Management Process

| Item No. | Potential Impact | Potential Mitigation Measures and/or Recommendations | Priority Level | Monitoring Measure | Timing/Frequency | Responsibility |
|----------|--|--|----------------|--------------------|------------------|----------------|
| AC4 | Commissioning phase activities, such as pipeline testing, and tank hydrotesting, impact to archaeological and cultural resources. In addition, the presence of expatriate workers, as discussed in impact AC3, may result in cross-cultural tension and disturbance to archaeological sites of interest and artefacts. | | Low | None | - | - |
| AC5 | Accidental damage during the operation phase to archaeological resources lying on surface during vehicle movements between the supply centres, camps, and project site. | As per impact AC1, AC2, and AC3. | Low | None | - | - |

Table A-2 Summary of Environmental Impacts & Management Process

| Item No. | Potential Impact | Potential Mitigation Measures and/or Recommendations | Priority Level | Monitoring Measure | Timing/Frequency | Responsibility |
|----------|--|--|----------------|--------------------|------------------|----------------|
| AC6 | Expatriate workers keeping archaeological resources as souvenirs or disturbing archaeological sites during their tourist expeditions. Expatriate workers living in JIC residential areas could result in cross-cultural tension, specifically related to differences in dress, behaviour, and tradition. | As per impact AC3. | Medium | None | - | - |

Table A-2 Summary of Environmental Impacts & Management Process

| Item No. | Potential Impact | Potential Mitigation Measures and/or Recommendations | Priority Level | Monitoring Measure | Timing/Frequency | Responsibility |
|----------|---|--|----------------|---------------------------|---------------------------|---------------------------|
| AC7 | Accidental damage during the decommissioning phase to archaeological resources lying on surface during vehicle movements from the removal of material to restore land to pre-project conditions. Expatriate workers living in JIC residential areas could result in cross-cultural tension, specifically related to differences in dress, behaviour, and tradition. | As per impact AC1, AC2, and AC3. | Low | As per impact AC1 and AC3 | As per impact AC1 and AC3 | As per impact AC1 and AC3 |

Table A-2 Summary of Environmental Impacts & Management Process

| Item No. | Potential Impact | Potential Mitigation Measures and/or Recommendations | Priority Level | Monitoring Measure | Timing/Frequency | Responsibility |
|-------------|---|--|----------------|--------------------|-------------------|-------------------|
| AC7 Cont | In addition, the presence of expatriate workers, as discussed in impact AC3, may result in the disturbance to archaeological sites of interest and artefacts. | | | | | |
| AC8 | Excavation of soil due to accidents and spills, which may result in the discovery of buried archaeological resources. | As per impact AC1 and AC2. | Low | As per impact AC1 | As per impact AC1 | As per impact AC1 |

Table A-2 Summary of Environmental Impacts & Management Process

| Item No. | Potential Impact | Potential Mitigation Measures and/or Recommendations | Priority Level | Monitoring Measure | Timing/Frequency | Responsibility |
|---------------------------|--|--|----------------|--------------------|------------------|-------------------|
| Cumulative Impacts | | | | | | |
| C11 | Cumulative impact of exceeding liquid waste management facilities' capacities. | <ul style="list-style-type: none"> Undertake a review prior to the commissioning phase of the Project to determine project infrastructure requirements for wastewater. This will allow existing capacity problems to be identified at an early stage and alternatives to be examined. | Low | None | - | RTIP EH&S Manager |
| C13 | Cumulative impact on community health care and housing/accommodation infrastructure. | <ul style="list-style-type: none"> Undertake a retrospective review to determine project social infrastructure requirements including health care and accommodation requirements. This will possibly allow existing capacity problems to be identified at an early stage and alternatives to be examined. In coordination with the RCJY, monitor social infrastructure requirements envisaged for this project and other future developments in the project area at the time the construction activities of RTIP will be undertaken. | Low | None | - | - |

A.6.2. Action Plans

It is recommended that a number of action plans be developed for all the project phases. The action plans should define desired outcomes and actions to address the issues raised in the risks and impacts identification process, as measurable events to the extent possible, with elements such as performance indicators, targets, or acceptance criteria that can be tracked over defined time periods, and with estimates of the resources and responsibilities for implementation.

During construction and pre-commissioning phase, the development of the plans will be responsibility of the EPC Contractors and the RTIP PMT will review and approve the plans before they are implemented.

Table A-3 include the plans/programs foreseen.

| Table A-3 Action Plans/Programs | |
|---|--|
| Plan/Program | Description |
| Air Quality Management Plan | It will comprise and describe the mitigation and monitoring measures referred to in Table A-2 related to impacts in air quality. |
| Emissions Monitoring/ Testing | A plan establishing the details of the monitoring/ testing measures for ensuring maintenance of the air quality conditions (air quality measurements, equipment inspection and maintenance...) will be developed following the generalities of the air quality plan. |
| Spill Prevention and Containment Plan | It will ensure safe onsite storage of hazardous materials; handling and containment of accidental spills and releases. The plan, applicable through all the phases of the project shall also address the transfer and disposal of spilled materials as hazardous waste. Effectiveness of the plan will be continually monitored and re-evaluated. |
| Chemical Management Plan | It will be focused mainly in establishing management practices that will avoid impacts in the environment (pollution due to chemical releases on soil, water or atmosphere) and in the health of workers and nearby population due to direct contact on skin, inhalation, etc... The chemical management plan will set chemical handling and storage procedures. In case of hazardous chemicals the plan will be linked to the spill prevention and containment plan and to the emergency response plan. |
| Groundwater monitoring programme | It will include control wells downgradient of SRBs and the wastewater treatment unit. It will be designed to be implemented during operation. |
| Water Optimization and Management Plan | According to the RTIP Construction EMP Framework (KBR 2010 a), a water optimization and management plan should be developed and implemented by the EPC contractor. The Plan will tailor the water management practices to implement in all the project phases (careful design and planning of construction in order to reduce the requirement to dewater and excavate below the water table, hydrotesting water abstraction and use, trying to reuse as much as possible) following applicable BAT as far as possible. |
| Waste Management Plan | It will comply with internationally accepted industry standards to ensure safe handling, onsite storage, transfer and disposal will be developed for the lifetime of the project. The effectiveness of the plan should be continually monitored and re-evaluated. Further information on the Plan is included in Table A-2. |
| Sedimentation and Siltation Monitoring Plan | According to the RTIP Construction EMP Framework (KBR 2010 a) it should be developed and implemented by the EPC contractor for the construction phase. It will be focused on minimization of sedimentation and siltation alterations due to the construction activities to be performed at the KFIP. |

| Table A-3 Action Plans/Programs | |
|---|--|
| Plan/Program | Description |
| Noise Monitoring/Testing Plan | It will tailor the monitoring measures defined in Table A-2 . It will be designed prior to construction and implemented during all the project phases. |
| Road Traffic Plan | A traffic management plan (and logistics) will be developed and implemented for the lifetime of the project in partnership with the RCJY and port authorities. Further information on the Plan is included in Table A-2. |
| Shipping traffic management plan | It will be developed for the lifetime of the project in partnership with the RCJY and port authorities and will include a monitoring plan involving periodic communication with affected stakeholders. |
| Road transport safety programme | It should be developed and implemented over the lifetime of the project. |
| Monitoring plan for biological components and “ <i>Legionella Bacteria</i> ” within the circulating cooling water system and effluent water and wastewater. | It will be developed as required. |
| Health policies and procedures | An integrated programme addressing the health and social implications should be developed as well as awareness and prevention programmes. |
| Process Safety Management Program | Further information on this Program which will prevent major hazards is included in Table A-2. |
| Handling and storage of hazardous materials Plan | It will tailor the development and implementation of procedures for handling and storage of hazardous materials as foreseen in Table A-2. |
| On-site and off-site emergency planning | As set in Table A-2, it should include, at a minimum, the preparation and implementation of an Emergency Management Plan and a Communication Plan prepared with the participation of local authorities and potentially affected communities. An Environmental Emergency Response Plan (EERP) for the RTIP will be prepared in accordance to clause 4.3.19 of RCER 2010 regulations Volume I and the guidelines provided in RCER-2010 volume II. A Hazardous Materials Contingency Plan to address emergencies involving those hazardous materials shall be included in the general ERP. |
| Archaeological chance find procedure | Should be developed prior to construction means to ensure awareness of employees and contractors of archaeological features of interest and on how to proceed in the event of an archaeological find. Supervisors to be trained. Further information is included in Table A-2. |
| Decommissioning Plan | It should be developed and implemented. Section A.10 describes the outline of the Plan. |

For potential impacts on the marine environment produced as a consequence of RTIP activities to be developed at KFIP, RTIP will review KFIP’s Plans (Environmental Management Plans, Operational Management Plans, and any other relevant plan of management arising from the KFIP environmental impact assessment) developed by the Port Authority in order to define if these are adequate to address those chemicals being handled by RTIP and if amendments/additions are needed. RTIP should work with the KFIP’s Port Authority to review and update the Port Emergency Plans to ensure capacity for spill response and emergency

conditions is adequate for RTIP operations, particularly the shipping, loading, unloading and transportation of raw materials and finished product via truck and pipeline.

RTIP should also liaise with the Saudi Ports Authority in order to assess the adequacy of the existing Port Authority's Spill Response Plan. If required, this plan should be amended and/or expanded to ensure that the existing mutual aid arrangements, established for the response in the event of a spill, are expanded to include RTIP, and that appropriate protection measures are in place for other facilities should a spill occur that could impact Marafiq or other water intake canals. This should be undertaken in accordance with requirements of World Bank Group, EHS Guidelines (2007a) and International Petroleum Industry Environmental Conservation Association (IPIECA) guidelines, 2000 & 2006.

A.7. Induction & Training

A.7.1. Operation

The RTIP EH&S organization will establish EH&S training procedures tailored for each of the EH&S elements that addresses management system and regulatory training requirements. The procedures will be designed to ensure that employees performing specific assignments are qualified on the basis of appropriate education, training, and/or experience.

The EMP for the operation phase will set induction and training following those procedures.

A Training Needs Analysis shall be performed to determine the specific education, training, and/or experience levels for all activities that have the potential for EH&S significance if not performed correctly.

All RTIP employees and site Contractors shall be given general EH&S awareness training. The objective of general awareness training is to ensure that all site personnel are aware of the requirements of the EH&S management system, their roles and responsibilities in ensuring conformance with EH&S policies and procedures, and the potential consequences of departures from established operating procedures.

EH&S elements competence training shall be given to only those employees engaged in activities that may directly create a significant EH&S impact. The objective of competency training is to ensure that these individuals have the requisite education, training and/or experience to properly perform their duties in accordance with the EH&S policies and procedures. EH&S elements competency training may take various forms depending on the specific activity, and may include:

- In-house training by RTIP staff or outside consultants;
- Outside training by outside consultants or regulatory agencies;
 - o Trade associations; and
 - o Certification agencies.

In some case, formal certification may be required or the use of certified Contractors may be warranted.

The individual EH&S element Manager is responsible for the approval of the each EH&S element training plan. The various EH&S element Managers and Coordinators are responsible for identifying the training needs of the Program and RTIP facility, and for the scheduling, tracking and recording of required training.

Department Supervisors are responsible for informing their employee(s) of any training they may need to achieve professional growth and to meet the responsibilities of their job function.

All employee training shall be recorded and the records maintained by the EH&S element Managers, or their designee. Training recorders shall, at the minimum, include the individual's name, the type of training received, the date training was completed, and the activity for which the training was given.

The training needs analysis and training schedule shall be formally reviewed on at least an annual basis, and updated as necessary to ensure continued adequacy.

A mechanism to assess whether the training objectives have been met will be established. It will include questionnaires to the attendants asking if the training was effective, etc.

A.7.2. Construction

RTIP Construction EMP framework (KBR, 2010 a), includes a general section on training, awareness and competence to be followed by the contractors when defining induction and associated training as part of their EMP:

Project personnel shall receive environmental awareness training, which will place emphasis on pollution prevention. The purpose of this training is to ensure that everyone on RTIP is aware of:

- The requirements of the Construction Environmental Management Plan;
- The importance of conformance with environmental policies and procedures and with the requirements of environmental management;
- The significant environmental impacts, actual or potential, or their work activities and the environmental benefits of improved personal performance;
- Their roles and responsibilities in achieving conformance with the environmental policy and procedures and with the requirements of the environmental management system, including emergency preparedness and response requirements;
- The potential consequences of deviation from specified procedures;
- Competent personnel and their roles and responsibilities.

Contractors will provide specialized training for those who handle hazardous materials and for those who will serve on the emergency spill control and containment teams.

A.7.2.1. Initial Site Induction and Training

The Senior Site Manager will be responsible for ensuring all personnel working onsite have received an initial site induction. Under no circumstances can anyone enter or work onsite without having first attended a formal induction session. Records of induction will be maintained in the Training Register (refer to Section A.8.5.3) and will be provided by the EPC Contractor to the Owners PMT prior to each employee commencing work onsite.

Visitors must undergo a short induction which includes basic environmental and Health and Safety considerations/procedures. , Visitors must be accompanied by a fully inducted employee or contractor at all times.

The Contractor is responsible for training all their employees in relation to their Constructor's EMP and all relevant environmental issues prior to the commencement of construction. Documented proof of this training is required to be presented to the Senior Site Manager prior to commencement of onsite works.

Training will be undertaken at three levels to cater for the range of personnel working on RTIP and will be consistent with Saudi Aramco and Dow respective Environmental Management Systems (where appropriate). All staff will receive Level 1 training while selected staff will also receive Level 2 and specific managers Level 3 training as described below.

Training Level 1

Required - All personnel including the Work Team, Foreman of Work Team, Supervisors, Management (Senior Site Manager, Health, Safety and Environment Manager and the Project Management Team).

Level 1 training will be structured to ensure all workers understand their obligation to exercise due diligence in relation to environmental matters as well as occupational, health and safety. Training will be undertaken as follows:

The Senior Site Manager will be responsible for training on the following:

- General site issues;
- Waste disposal and recycling;
- Traffic and access; and
- Reporting procedures including incident/emergency response procedures (HS&E) and reporting accountabilities.

The Health, Safety and Environment Manager will be responsible for training on the following:

- Relevant environmental legislation;

- Environmental Responsibilities and accountabilities;
- Air quality, including dust and odour;
- Noise and vibration;
- Visual aspects;
- Heritage and archaeology;
- Soils and geology including erosion and sediment control;
- Water quality;
- Flora and fauna;
- Hydrogeology; and
- Rehabilitation.

The EH&S Manager will also be responsible for training on hazards, risks, safety and emergency response. Further details regarding the training requirements for health and safety would be contained within the Project Health, Safety and Environment Plan which should be developed prior to construction activities.

Training Level 2

Required - Supervisors, Management and the Project Management Team

Level 2 training will be structured specifically for the Supervisors, Management and the Project Management Team and will incorporate lines of reporting and the links between the Contractors and RTIP in terms of incidents, accidents and non-conformances.

Training Level 3

Required - Managers and the Project Management Team

Level 3 training will be structured specifically for Managers and the Project Management Team and will focus on the interface between RTIP procedures including those for notifying authorities of incidents/accidents and media management.

Job Specific Training

Job specific training including competency assessment shall also be provided to staff carrying out activities with environmental implications such as waste or hazardous materials handling and disposal operations. This will be developed following a detailed training needs assessment and shall consider at least the following:

- Identification of relevant employment positions associated with the development that have an operational or management role related to environmental performance;
- Training module and tools in place;

- Details of appropriate training requirements for relevant employees; and
- Responsible persons in terms of compliance with training.

Training will also include internal meetings, seminars and courses and, if necessary, external courses. 'Toolboxes' shall be held on environment and social topics on a monthly basis and attendance is compulsory.

A Training Register will be maintained as a record for all personnel who have been trained.

The specific training requirements will be more clearly defined throughout the detailed design phase of project development.

A.7.2.2. On-going Training

The Senior Site Manager will be responsible for ensuring all personnel working onsite receive on-going (refresher) environmental training in relation to this EMP at regular intervals throughout the RTIP works or as need arises. Records of this training will be recorded on the Training Register which will be kept onsite.

A.7.3. Incident Management

An Emergency Response Plan (ERP) will be prepared for the project. The ERP will include procedures regarding incidents that can potentially impact worker safety, public health and/or cause environmental damage and will describe incident management for the RTIP.

A.8. Checking, Corrective Action & Reporting

This section of the EMP will be reviewed and updated at the end of each phase of the Project.

A.8.1. Monitoring and Measurement

A Monitoring and Measurement procedure that documents the method and responsibility to monitor and measure, on a regular basis, the key characteristics of the RTIP facility operations and activities that can have a significant impact on the environment will be prepared. Monitoring and measuring is required to demonstrate progress towards the Facility's objectives and targets as well as conformance to applicable laws and regulations.

The Monitoring and Measurement procedure will be part of the EMS. The correct implementation of the mitigation measures and compliance with applicable standards and regulations will be monitored as described in Section 22 of the EIA and summarized in Table A-2 of this document. The EMP will set a monitoring scheme for the operations phase that will follow the Monitoring and Measurement procedure set for the EMS.

Appropriate departments shall ensure that monitoring equipment necessary to develop the measures described in section 22 of the EIA and summarized in Table A-2 of this document are maintained and calibrated according to manufacturer specifications as appropriate. Records

regarding the facility's calibration and maintenance activities for monitoring equipment shall be maintained by EMP responsible and further, by the EH&S Department.

Each Department Manager, or designee, shall meet with the EH&S Team on a periodic basis to:

- Discuss and review the achievement of the objectives and targets and the progress of relevant programs and action plans;
- Review the monitoring data to determine whether the monitoring and operational control procedures are implemented properly;
- Review information to evaluate whether departmental operations and activities comply with applicable environmental legislation and other EH&S requirements to which RTIP subscribes;
- Review any EH&S non conformities, including those related with the EMP.

Contractors EMPs will include a monitoring and measurement method for ensuring that the measures proposed in the EIA (section 21), and summarized in Table A-2 are adequately implemented. Monitoring measures are summarized in Table 22 of the EIA and in Table A-2.

A.8.2. Audits & Reviews

The RTIP EH&S organization will develop an Internal and External EH&S Audit procedure that documents the method and responsibility to establish a program, including scope, frequency, method, and reporting requirements, for conducting EMS audits.

The EMP will be subject to audits and reviews under that same scheme which will be planned and implemented as a means to verify the effectiveness of the EH&S Management System. Audits are conducted to:

- Determine whether the individual EMP management tools (measures, action plans, structure) conform to the requirements of the EMP.
- Determine whether the EMP has been properly implemented and maintained.

The internal audits will be performed more frequently and can be scheduled either quarterly or semi-annually. External audits will be performed by independent third party organizations and will be conducted less frequently, either biennial or triennial audits.

Audit results are recorded and brought to the attention of personnel having responsibility in the area audited. Personnel responsible for the area will take timely corrective action on deficiencies found during the audit. Follow-up audit activities verify and record the implementation and effectiveness of corrective action taken.

Contractors are responsible for developing and implementing audit programmes consistent with the site's requirements to ensure that their actions and those of their subcontractors comply with the environmental requirements of RTIP and that mitigation and monitoring measures set in the EIA (sections 21 and 22) and summarized in Table A-2 of this document, are

adequately implemented. The contractor's audit programmes will be approved by the RTIP PMT.

Site auditing will review personnel understanding and implementation of procedures and protocols. Site Management will determine the frequency of audits and will review throughout the Project.

Results of auditing will be used to indicate any areas of non-compliance and to allow for corrective measures.

Each contractor is required to monitor its environmental performance against Key Performance Indicators (KPIs). The contractor is required to ensure that KPIs are communicated to all relevant parties. Site management will review the individual Contractor's Implementation Plans and monitoring programme by periodically reviewing time series results, auditing procedures and spot check monitoring. This should be performed both randomly and in response to questionable results.

A.8.3. Site Environmental Inspections & Checklist

A site environmental checklist is a simple means for checking the day-to-day environmental controls at a site and recording the details in a manner that is available for inspection. It provides a series of items that can be quickly examined to provide an accurate indication of the effectiveness of safeguards contained in the EMP. An environmental checklist will be created and should be revised as necessary to ensure that it is site, work and project phase specific. A sample of a typical checklist used in Site Environmental Inspections has been included as Table A-4.

A.8.4. Non conformance and Corrective/Preventive Action

RTIP will develop a Non conformance and Corrective/Preventive Action procedure for handling and investigating EH&S Management System non conformance, taking action to mitigate any impacts caused, and for initiating and completing preventive and corrective action. This procedure will document the method and responsibility to identify, take immediate action to mitigate impacts, and subsequently investigate and propose corrective actions for EH&S non-conformances. It also has provisions to initiate and implement preventive actions to prevent the occurrence of potential non-conformances.

That same procedure will be applicable for the EMP during the operation phase.

Causes of non-conformance of the EMP can include, but would not be limited to:

- Poor communication;
- Faulty or missing procedures;
- Equipment malfunction or lack of maintenance;
- Lack of training;
- Lack of understanding of requirements;

- Failure to enforce rules;
- Inadequate management systems and leadership; and
- Corrective actions fail to address root causes of problems.

Cases of non-compliance will be identified as a result of audits, inspections or environmental monitoring. Non-compliances are ranked according to three levels. Early identification can reduce incidents by pre-empting any problems before any environmental damage is caused. Non-compliance ranking is generally assigned as follows:

- **Level 1:** A non-compliance situation not consistent with the original requirements but not presenting an immediate threat to an identified resource, community or employee health and safety. If left unattended, a Level 1 non-compliance may become a Level 2 concern. If repeated or not corrected in a timely manner, a formal non-compliance may be generated.
- **Level 2:** A formal non-compliance situation that has not yet resulted in clearly identified damage or irreversible impact to a sensitive resource, but to prevent such an occurrence requires prompt corrective action and site-specific attention. If left unattended or continuously recurring, a Level 2 non-compliance may become a Level 3 concern. A corrective action request and formal non-compliance notice will be issued to the contractor.
- **Level 3:** A critical non-compliance situation which typically damages a sensitive resource or has reasonable expectation of the same. A Level 3 non-compliances may result in a stop work order.

The EMP preventive and corrective action process will include the following:

- Identifying the root cause of the non conformance;
- Identifying and implementing the necessary corrective action;
- Implementing or modifying controls necessary to avoid repetition of the non conformance;
- Recording any changes in written procedures resulting from the preventive or corrective action;
- Identifying and implementing actions to eliminate potential non conformance situations;
- Reporting internal audit non conformances to senior management during management reviews; and
- Reporting key findings and associated corrective and preventive actions with relevant internal and external stakeholders.

Any corrective and preventive actions taken to eliminate the cause of non-conformance to RTIP's EMP will be implemented to the degree appropriate to the magnitude of the problem and correspond to the impact encountered. Any resulting changes to procedures from corrective and preventive actions will be implemented and documented.

Any changes to the procedures of the EMP will be implemented strictly in accordance with the Management of Change procedures for RTIP and the facility.

During operation, a “Balance of Consequence” analysis will be considered as part of corrective action to eliminate non-conformance with the facility’s EH&S Management System. This is a behavioural analysis tool, in which “driving forces” and “restraining forces” are used in a dynamic balance to change the personal behaviour from a current state to a desired state.

A.8.5. Documentation

A.8.5.1. EMS Documentation

A manual for documentation of the EH&S management system (EMS) and related EH&S element management programs, including the EMP will be developed. This manual will provide a blueprint and a general understanding of the relationships within the RTIP’s EMS and a general direction to the documentation of the EMS.

This facility’s documentation system consists of four tiers described below:

- Tier One Document: The EMS. This document will be a summary of the core element of the EMS.
- Tier Two Documents: RTIP facility procedures that define specific steps of a procedure that is summarized or referenced in the EMS Manual. A Tier Two Procedure describes what is to be done, where, when and by whom within a system or process.
- Tier Three Documents: Operational Controls and Plans that provide specific instructions for those activities that have the potential for significant aspects if not performed correctly.
- Tier Four Documents: Records such as completed forms, reports, and inspection results.

A.8.5.2. Document Control

Effective communication of information is paramount in assessing, controlling and responding to environmental issues, in particular for those responsible for managing the environmental impacts related to the project. Information shall be made readily available and accessible to personnel requiring it.

The management of documents should be consistent with the project’s overall documentation system. It is expected that documents be legible, dated and readily identifiable using the project’s documentation numbering system. Controlled documents shall be input into a document register, which will identify the current version, the date of issue and the owner. Such records shall be held by a designated controller and made available to project personnel for viewing.

A document control procedure will be developed for the RTIP as part of the EMS. Document management procedure should address creating, modifying, controlling, and maintaining both paper and electronic documents required by the RTIP so that:

- They can be located;
- They are periodically reviewed, revised as necessary, and approved for adequacy by authorized personnel;

- The current versions of relevant documents are available at all locations where operations essential to the effective functioning of the EMP are performed;
- Obsolete documents are promptly removed from all points of issue and points of use, or otherwise assured against unintended use;
- Any obsolete documents retained for legal and/or knowledge preservation purposes are suitably identified.

The EH&S organization identifies, controls, and maintains all EH&S documents related to the EH&S Management System and those required by regulations, including the EMP and related action plans.

A.8.5.3. Records

A Records procedure will be developed as part of the RTIP EMS that documents the method and responsibility to identify, maintain and dispose of environmental records associated with the implementation of the EMS. The procedure will specify how to index and organize environmental records and facilitate their retrieval and protect them against loss or damage. These records shall include reports to regulatory agency (i.e. Royal Commission), training records and the results of audits and interviews.

EMP records will be managed according to this procedure.

The following general categories of EMP Records should be maintained:

- Records relating to compliance by EMP elements with applicable laws, regulations or other EH&S requirements;
- Records relating to any complaints received by facility on EMP matters;
- Training records;
- Monitoring records: Inspection, maintenance and calibration records;
- Pertinent contract and supplier information;
- EH&S incident reports;
- Information on emergency preparedness and response measures;
- Information concerning the significant EH&S aspects of the facility's operations, products and services;
- Audit results;
- Management reviews; and
- Records of communication with internal and external stakeholders, government/ regulatory agencies and public/ local community entities.

Records shall be legible, identifiable and traceable to the activity, product or service involved. Records shall be stored and maintained in such a way that they are readily retrievable and

protected against damage, deterioration or loss. Their retention times shall be established and recorded. They must be reproduced in a legible form to any relevant Authority upon request.

Monitoring records should be maintained with at least the following details for each sample required to be collected:

- Type of sample (soil/water, grab/composite etc.);
- The date(s) on which the sample was collected;
- The time(s) at which the sample was collected;
- Sample method;
- The point at which the sample was collected; and
- The name of the person who collected the sample.

A.9. Management Review

A.9.1. Environmental Management Review

The EMP implementation and its effectiveness shall be reviewed at least annually. Review will be undertaken by the EH&S Lead/Environmental Manager under the direction of the Senior Site Manager. Participation from other project staff, specialist consultants, and stakeholders, as appropriate, will be included.

The Site Management Team will:

- Review the results of audits at least annually;
- Undertake a system critique during which improvements and corrective actions will be sought; and
- Undertake an operational critique during which the operation of the EMP will be examined.

Any changes to the EMP as a result of its review will be certified by the EH&S Lead/Environmental Manager.

A.9.2. Continual Improvement

This EMP seeks to ensure that throughout the life of the Project the environment associated with the site is maintained or improved. Continual improvement of the EMP will be achieved by continually evaluating environmental management performance against environmental policies, objectives and targets for the purpose of identifying opportunities for improvement. The continual improvement process for the scheme will be designed to:

- Identify areas of opportunity for improvement of environmental management which leads to improved environmental performance;
- Determine the root cause or causes of non-conformances and deficiencies;
- Develop and implement a plan of corrective and preventative action to address root causes;

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- Verify the effectiveness of the corrective and preventative actions;
- Document any changes in procedures resulting from process improvement; and
- Make comparisons with objectives and targets.

Table A-4 Checklist For Site Environmental Inspections (Sample)

| PROJECT NAME: RTIP at Jubail II | | | Project Phase: Construction | | |
|---------------------------------|--|--|---|--|--|
| | | | Date: | | |
| Item Number | Action Description | Documents Generated | Responsible | Comments | Issue Closed/opened |
| A1 | Dust control measures. <ul style="list-style-type: none"> • use of covers, • water suppression for control of loose material or unpaved road surfaces, or increased moisture content for open material storage piles. • Each EPC contractor to develop a dust control plan. | No, unless it is necessary to record an anomaly and file a note. | EPC Contractor | <i>(To be completed during the site visit)</i> | <i>(To be completed during the site visit)</i> |
| N1, N3, N4 | Monitor noise at site boundaries, confirm noise predictions at local sensitive receptors and document status of compliance with applicable standards. At a minimum, L_{eq} and L_{10} shall be measured and two measurements conducted at each selected monitoring location. | Noise campaign report, including campaign description; noise measurement results; field logs including measurement data such as coordinates, date, time, measurement duration, meteorological conditions (wind speed, relative humidity, temperature), height, significant events (such as traffic, close by activities, dogs barking, | EPC Contractor/RTIP EH&S Manager (Cons, Com)/RTIP Environmental Manager (Op, Decom) | <i>(To be completed during the site visit)</i> | <i>(To be completed during the site visit)</i> |

Table A-4 Checklist For Site Environmental Inspections (Sample)

| PROJECT NAME: RTIP at Jubail II | | | Project Phase: Construction | | |
|--|---------------------------|---|------------------------------------|------------------|----------------------------|
| | | | Date: | | |
| Item Number | Action Description | Documents Generated | Responsible | Comments | Issue Closed/opened |
| | | aeroplanes passing by)...; calibration certificates; result analysis focusing on compliance with applicable standards, comparison with predicted levels, and if necessary, a proposal of mitigation measures. | | | |
| Completed by: _____ | | Date: _____ | | Signature: _____ | |

A.10. Decommissioning and Rehabilitation Management Plan

A.10.1. Context

RTIP recognizes that environmental rehabilitation and closure is an essential requirement of a responsible petrochemicals company. Decommissioning and rehabilitation is an important step in the life cycle of a petrochemical complex. Regular review based on operational monitoring of environmental impacts throughout the life of RTIP, incorporation of changes in regulatory requirements and reflecting developments and changes in technical approaches will support a continuous improvement approach to environmental management.

The development and continual updating of this conceptual Decommissioning and Rehabilitation Plan (DRP) over an assumed 25 year operational life for RTIP will enable all aspects of closure to be identified, researched and developed. The final detailed DRP will ensure that final land uses are acceptable to RCYJ, sustainable and minimize long term liabilities.

Periodically throughout the life of RTIP this DRP will be revised and updated. It will be updated a final time prior to the start of decommissioning.

A.10.2. Decommissioning and Rehabilitation Objectives

The overall objective of the decommissioning and rehabilitation phase will be to return the site to its pre-project condition. Specific objectives include:

- Meet all legal requirements;
- Protect public, staff and contractors health and safety;
- Ensure long term site maintenance is eliminated as far as practicable;
- Remove any waste or potentially dangerous substances from site;
- Ensure that residual environmental and social impacts are acceptable;
- Minimise long term liabilities;
- Rehabilitate the land to an environmentally stable and sustainable condition; and
- Meet end land uses agreed to by both the government and key stakeholders.

In addition to these objectives, RTIP will also consider any stakeholder commitments and all relevant legislation.

The plan should anticipate social and economic consequences of the project abandonment and consider options to minimise adverse impacts from loss of employment and income.

A.10.3. Decommissioning and Rehabilitation Management Structure

The same management structure used during previous phases of the project will be employed during the decommissioning and rehabilitation phase. It is anticipated that with a reduced work load during decommissioning the workforce will also be reduced to match the load. Should adjustments to the organizational structure be required, they will be applied in subsequent updates to this plan. The proposed management structure for RTIP is defined in Section A.4.

A.10.4. Planning and Consultation

Guiding principles to be considered for the final DRP are presented in Table A-5.

| Table A-5 Summary of Preliminary Closure Principles for RTIP | |
|---|---|
| Aspect | Principles |
| Topography | <ul style="list-style-type: none"> - Physically stable. - Aesthetically acceptable landforms capable of sustaining vegetation. - Vegetative cover compatible with the surrounding area (if applicable). |
| Water and Soil Resources Protection | <ul style="list-style-type: none"> - Analytical validation by sampling and analysis with appropriate levels of quality control and independent verification. |
| Environmental Issues | <ul style="list-style-type: none"> - Identification, characterisation and remediation of potentially contaminated areas. |
| Wastes | <ul style="list-style-type: none"> - Waste valorisation. - Minimisation of wastes to be disposed to landfill (reuse and recycle as much as feasible). - Appropriate treatment and disposal of liquid effluents and solid wastes existing at site, and those generated during the cleaning process. |
| Liability | <ul style="list-style-type: none"> - Development of a management plan for any long term issues. - Agreement with the community and RCYJ for the infrastructure to be left in place in the event that is deemed beneficial. |
| General Land Use | <ul style="list-style-type: none"> - Rehabilitation of the RTIP lease area to be able to support multiple uses. |

Detailed consultation with government agencies and an extensive community consultation process would be initiated as closure planning progresses. Additionally, the final DRP will be subject to stakeholder review.

A.10.5. Decommissioning and Rehabilitation Activities

The DRP will provide for a phased approach, starting from a detailed assessment of existing infrastructure to a general review of the condition of the project site. The stages of a decommissioning and rehabilitation work considered significant are described below.

Stage 1 - Site Assessment: During this stage, the state of existing infrastructure and the general condition of the complex will be assessed. Data obtained from this assessment will be used for the design of the final DRP. Some of the issues that would be considered in the assessment include:

- Preliminary identification, classification and condition of machinery, equipment, piping, containers, structures, etc. to establish homogeneous material groups;
- Identification of potential impacts of disposal of equipment, buildings/structures on operation areas;
- Identification of potential social and economic consequences of the project abandonment, mainly adverse impacts from loss of employment and income;
- Definition of relevant legislation including specific constraints and/or incentives for site reuse or redevelopment areas; and
- Identification and development of scenarios for re-use of the site.

Stage 2 - Design of the Final Decommissioning and Rehabilitation Plan for the project site:

The final DRP would include at least the following:

- Objectives, disposal, reuse and recycling planning phases, and timeframe of activities;
- Priorities for intervention;
- Health and safety plan for all the planned activities;
- Definition of control criteria to be applied during the different stages of the decommissioning and rehabilitation phase;
- Technical specifications for activities and contractors;
- Establishment of sustainability targets for the demolition contractor, for example relating to the reuse of materials;
- Permits and authorisations for decommissioning and rehabilitation activities;
- Definition of waste streams and costs associated with disposal, including an assessment of transportation and disposal choices.
- Definition of measures to minimise adverse impacts from loss of employment and income. (e.g. outplacement plan)

Stage 3 - Implementation of the Decommissioning and Rehabilitation plan:

During the implementation of the DRP, the following would be undertaken:

- Preparation of areas for intervention (delimitation, signs), including the identification of preparation areas (within the project site) to be used for the storage of resulting materials;
- Definition of internal transit routes to be used during the demolition activities;

- Removal of machinery and equipment;
- Controlled demolition of buildings, tanks, ponds etc. with the objective of optimising the recovery of material;
- Sampling and analysis of material to classify prior to disposal;
- Remediation of contaminated areas;
- Appropriate management of all liquid effluents and solid wastes (including specific management for hazardous wastes);
- Monitoring of the security conditions and public health, of the operators and the environment; and
- Implementation of the measures to minimise adverse impacts from loss of employment and income.

Stage 4 - Site Restoration: The last stage of this process is the restoration of the site which would consider the following:

- Stability of any structure or /and building left at the site for future reuse;
- Filling of excavations and depressed areas (e.g. collection/retention basins) with clean inert material;
- Levelling the topography of the project site with clean inert material; and
- Defining the rehabilitation programme in accordance with existing legislation, based on the RCYJ master plan or additional programs planned for the concerned area.

A.10.6. Monitoring and Maintenance

A monitoring program will be developed to address closure risks including (but not be limited to):

- Erosion control and stabilisation (re-vegetation);
- Site contamination;
- Surface Water quality; and
- Groundwater quality.

Monitoring criteria will be set and reviewed throughout the life of the RTIP. However, in principle the site will be left in a condition that does not cause environmental degradation and meets future land use criteria. The monitoring program will be designed to determine whether the rehabilitation complies with detailed decommissioning and rehabilitation objectives.

A.11. References

- IFC Performance Standard 1-V2, 2010 (IFC, 2010).
- IPIECA (2000 & 2006), International Petroleum Industry Environmental Conservation Association Guidelines.
- KBR, RTIP Construction EMP Revision 2, October 2010 (KBR, 2010 a).
- KBR, RTIP Construction EHS Management Plan Revision 3, November 2010 (KBR, 2010 b).
- ROYAL COMMISSION ENVIRONMENTAL REGULATIONS (RCER), Volumes I and II, 2010 (RCER, 2010).
- WORLD BANK (2007a) Environmental, Health, and Safety General Guidelines, April 2007.