

# 8 ENVIRONMENTAL MANAGEMENT PLAN

## 8.1- Introduction

Environmental protection planning is an important component of overall planning and implementation of mega-projects. Industrial activities, including those associated with the construction of the PGPL's LNG terminal, are reviewed and approved by Government agencies through a variety of approvals, authorisations and permits addressing issues ranging from human health and sanitation to fisheries and wildlife habitat avoidance or protection. The Environmental Management Plan (EMP) is an important integration document between the various approvals, authorisations and permits issued for specific components and/ or activities of the undertaking.

This EMP outlines the contents of construction and operational phases both. It constitutes a contract document for use in the field by the contractor(s) and their personnel during construction as well as by the personnel of PGPL during operations.

PGPL and its construction contractor, through its engineering and environmental consulting team, is responsible for implementing the EMP and ensuring that all personnel are informed about the EMP and the requirement to implement the procedures it contains. The EMP is intended as a quick reference for Project personnel and regulators to monitor compliance, and is structured to allow updates and revisions as work continues.

### 8.1.1- PGPL's Commitment to Environment, Health and Safety

PGPL is committed to manage and operate its assets in a manner consistent with its core values to protect the health and safety of people and the environment and to comply with applicable

Environment Health and Safety (EHS) laws, regulations and internal EHS standards. In this regard a sketch of environmental policy is being given here which may be a part of PGPL's corporate level policy once management of PGPL approves it.

- The management and staff of PGPL are committed to preserving and protecting the quality of port area's environment. A clean environment is important for the success of our business and for that future generations can also enjoy these precious resources.

In support of this commitment, we strive to conduct clean material and goods export/import practices at Port area and educate our staff, customers and guests on sound practices. Our overall goal is to create awareness among the PGPL staff and protect the environment due to LNG Jetty and Pipeline operations. We will achieve this goal by using a team oriented management approach to help ensure responsible use of our air, land, and water resources.

To achieve this goal as a PGPL's management and staff will put their all practicable efforts to meet or go beyond compliance with all applicable federal, local and international environmental rules and regulations.

We endeavour to continually improve our environmental performance and to prevent pollution before it is produced. All our employees are expected to support our environmental goals while providing clean and environment friendly means of working practices and minimum incident rate".

PGPL is a sister organisation of Associated Group which has a structured environmental program that involves environmental assessment, monitoring, protection and rehabilitation of its different projects. This EMP will strive for

continual improvement in the LNG jetty activities and its operations to maintain a healthy port environment.

### 8.1.2- Purpose of the EMP

The primary purpose of this EMP is to establish the Environmental Protection Procedures to be implemented by PGPL staff, consultants and contractors. PGPL has committed to developing and implementing a comprehensive EMP to help ensure a high level of environmental protection throughout this undertaking. This EMP provides the protection procedures associated with both planned activities anticipated for the construction and operations of the terminal as well as for accidental events.

The purpose of the EMP is to:

- outline environmental protection measures to be followed during construction of jetty / pipeline and operations of the facilities owned by PGPL such as the storage vessel, pipeline, jetty, etc;
- ensure that commitments to minimise environmental effects are met;
- document environmental concerns and appropriate protection measures;
- provide concise and clear instructions to Project personnel such as PGPL staff and contractors regarding procedures for protecting the environment and minimising environmental impact;
- provide a reference document for personnel when planning and/or conducting specific activities;
- provide contingency plans for accidental events;
- communicate changes in the program through the revision process; and
- Provide a reference to applicable legislative requirements.

### 8.1.3- Scope of the EMP

The initial focus of the EMP is the protection of aquatic habitat and traffic management due to increase in visiting people as well as those activities under the direct control of PGPL management where activities may give rise to significant environmental impacts, the EMP includes a number of priority strategies and actions relating to these locations. The EMP also supports collaboration and joint actions with affiliated organisations, tenants and contractors within the PGPL's sphere of influence.

In line with the Environment Policy, the following criteria will be used to determine priorities for attention:

- Impact on the physical and biological environment;
- Contribution to innovation and definition of best environmental practice;
- Compliance with statutory requirements and other environmental commitments;
- Availability of resources.

The EMP acknowledges the social and cultural dimensions of responsible environmental management alongside the biological and physical, reflecting a holistic view of the PGPL as a "human ecosystem".

The scope of the EMP includes the following functional areas:

- **Management systems:** Those systems employed in the management of the PGPL's operational activities. It will include financial systems; engagement and supervision of contractors; purchasing policies, etc.
- **Knowledge systems:** Those processes which build knowledge and capacity on environmental issues, principles and sustainable behaviours. It will include training; communications; campaigns; links with operational departments, etc.

- **Energy management:** The energy-related aspects of the planning, design, construction, operation and maintenance of the PGPL's facilities.
- **Water management:** Aspects of supply, usage and disposal of water pertinent to the planning, design, construction, operation and maintenance of the PGPL's facilities.
- **Materials management:** Those services and activities which support the avoidance, resource recovery (e.g. reuse and recycling) and environmentally responsible disposal of solid and liquid waste materials.
- **Planning, design and development:** The planning, design and development of the PGPL's built form and associated infrastructure.
- **Pollution prevention:** Those aspects of planning and management which support minimisation of air and water pollution and contamination of land resulting from daily routine activities.
- **Transport:** Programs, projects, systems and procedures which promote and support walking, cycling and public transport for trip-to-work, accommodation and other related travel.
- **Biodiversity and open space:** Those aspects of management and maintenance which support conservation and enhancement of biodiversity and environmentally sustainable use of open space across PGPL and other properties.

The proposed scope of the Project subject to the EMP includes all the main components of the Project

- Marine facilities and tanker approach lane out to existing shipping channel;
- LNG terminal and storage facilities;
- Pipeline lateral and directly associated facilities (natural gas and natural gas liquid

laterals);

- Access roads; and
- Supporting facilities and infrastructure.

### 8.1.4- Organisation of the EMP

The EMP will provide the procedures, organization and instruction to ensure Project personnel understand and implement Environmental Protection Procedures for routine activities associated with the construction and commissioning of marine and land based facilities. The organization, style and format of the EMP is intended to enhance its use by Project personnel in the field and to provide an important support document between overall environmental management of the Project and various permits and authorizations issued for specific construction and commissioning related Project components and activities.

### 8.1.5- Maintenance of the EMP

This section will outline the responsibilities and activities associated with the maintenance of the EMP. The responsibilities of the Environmental Monitor will be detailed and procedures for requesting EMP revisions will be outlined. EMP revision procedures will include requirements for notification of the appropriate government agencies and First Nations.

## 8.2- Health & safety

### 8.2.1- Environmental health and safety management system

This section will outline an Environmental Health and Safety Management System which will outline mitigative measures and best management practices. This management is recommended to carry out a complete assessment, evaluate, monitor, identify and control all potential hazards and risks arise during the construction, operation and dissertation phases of the proposed project. The management needs to ensure that the Health

and Safety Plan (HSP) along with the Plant Health and Safety Rules is established and enforced. The Plan will outline roles, responsibilities and expected outcomes with respect to the environmental health and safety management of the construction phase of the Project. These measures should be implemented to ensure that no significant adverse environmental health and safety impacts are created by activities associated with the construction of the Project.

Protection of the public and workforce health and safety during both construction and operations is paramount to PGPL. Utilising expert personnel and the (PGPL) Environment, Health and Safety Management System (EHSMS), the potential health and safety hazards and risks will be identified and assessed, then the subject of substantial planning, organisation and procedural/facility development.

The LNG facility will be designed to include spill containment systems, fire protection systems, multiple gas, flame, smoke and low- and high-temperature detectors and alarms, and automatic and manual shut-down systems. The efficiency and stability of operations will be maximised by the use of a high level of automation, regular preventative maintenance, and safeguards such as back-up systems and the provision for safe emergency shut-downs. Prior to project commissioning, all personnel will be required to undertake an extensive training program to ensure safe operating practices. The training program and subsequent regular refresher programs will involve issues covering operations, hazards, safety and emergency procedures and environmental management.

The Plant Health and Safety Rules should include provisions for, impediment of and response to noxious chemicals and gases. It is also the responsibility of the management to provide the following basic information:

- Description of all potential hazards/ risks.

- Health and Safety implications about all hazards.
- Description about management techniques including inspections, maintenance follow-up, reports, personnel protective gears and medical monitoring.
- Outline of emergency response procedures including organisational structure of key trained personnel to act as emergency responders action steps for entering and working within zone of hazards, evacuation procedures, protective gear requirements, decontamination procedures, lines of communication, emergency call centres' telephone numbers, map of nearest medical centres' route, etc.

### 8.2.2- Worker health and safety plan

This section will outline a Worker Health and Safety Management System which will outline mitigative measures and best management practices. Roles, responsibilities and expected outcomes will be defined. The Plan should be implemented to ensure that no significant adverse worker's health and safety issues arise from activities associated with the construction of the Project. The Plan will apply to all PGPL personnel, employees and contractors.

- Provide adequate worker training.
- Use proper personnel protective equipment.
- Follow fire protection measures.
- Arrange availability of appropriate emergency response, rescue, and first-aid personnel and services.

### 8.2.3- Emergency response plan

Emergency may be defined as a sudden event causing or has the potential to cause serious human injury and /or environmental degradation of large magnitude. The best "cure" for an emergency is, of

course, "prevention".

The probable emergency situation can be:

- Serious fire or explosion
- Release of LNG in large quantities
- Spillage of large quantity of acid/solvent or major gas leakage.
- Natural calamity such as heavy rain, flooding, dust storm or earthquake, tsunami, cyclone, etc.
- Bomb threat or any sabotage / terrorist activity
- Any other incident involving all or large part of the premises and its workers.

A Project-specific Emergency Response Plan will be developed which primarily relates to the different construction activities of the Project as well as risks and hazards identified in QRA. It supports the EMP and addresses actions and required responses all PGPL personnel, employees and contractors.

Emergency response management will be provided by a small team of senior managers (the control committee) who in turn will direct all response activities through the Emergency response unit, plant security, communications, public relations, safety and environmental affairs and material procurement departments. Each of these departments will have specific responsibilities to perform in the event of an emergency.

When the Emergency Response Plan is put into effect, Terminal Personnel will assume designated positions, each with specific duties as depicted in the following chart.

### A- Objectives

The main objective of this plan is to establish the general guidelines for actions to be taken in the event of fires, explosion, emergencies, accidents or hydrocarbon spills/leaks and spills of process chemicals, natural disasters and sabotage, aimed at minimizing their effects and consequences, in order to protect:

The physical integrity or the lives of own or third-party personnel present in the company's facilities.

- The physical integrity or the lives of the residents of the Company's Housing on board FSRU.
- The physical integrity or the lives of the residents of the geographical areas near the project's area of influence.
- The physical integrity of the Company's properties or assets.
- The physical integrity or the lives of the ecological systems located in the surroundings of the company's facilities.

The Contingency Plan will be applied in the process area, the natural gas receiving area, LNG

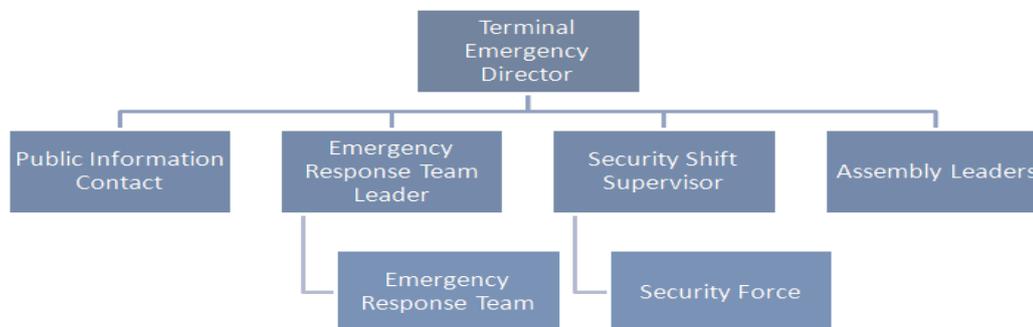


Figure 8.1: Emergency Organization

storage and dispatch, industrial services and administration in view that they are not located in the area of influence.

A complementary objective is to establish the Notification Procedure to be followed between Company personnel and with Government Entities.

### B- Risk Situations

Due to the characteristics of the project, the contingencies that could arise are the following:

Once received, the gas will undergo the following processes: compression, LNG storage, re-gasification and dispatch for exportation through submerged pipeline on board the FSRU vessel permanently stationed along the jetty.

Due to the characteristics of the project, the contingencies that could arise are the following:

### C- Internal Risks

Risks arising from operational conditions or human error that could result in personal accidents, spills or fires, such as:

- Uncontrolled gas leak (RLNG, liquefied natural gas, and propane) into the atmosphere.
- Fire / explosions.
- Hydrocarbon or by-product spills (gasoline, diesel).
- Chemical product spills
- Occupational accidents (serious or fatal), due to product contamination, failure to comply with operating rules and procedures, negligence of the personnel, falls, internal traffic accidents, burns, acts of God, bad use of equipment and personal protection items.
- Environmental Contamination (due to gas leaks into the environment, product spills on land and in the sea).

### D- Natural Risks

Natural risks that may affect the facilities and their resulting damage to property and the personnel.

- Strong earthquake
- Tsunamis (floods)

### E- External risks

Risks arising from delinquent actions, terrorism or vandalism.

### F- Personnel Transportation Risks

All personnel of the Plant must be instructed that in the event of automobile accidents while the personnel is being transported to/from the Plant, using own or third-party transportation contracted by the company, they must immediately notify the Environment, Health and Safety Environment Department (EHS) so that it will provide the necessary assistance for the injured, and proceed to issue notices not only to the health care centres but also to external support institutions (National Civil Defence, Police, Fire Fighters, etc).

### G- Risk management

The management of contingencies at the natural gas re-gasification LNG import terminal plant is based on:

- Early detection (alarms, detectors, setting off of safety elements);
- Immediate automatic reaction (feed shut-off valves, either of the fluid, electric process or other).
- Confinement of emergency area.
- Application of the adequate response procedure
- Follow-up and monitoring
- Schedule maintenance

**H- Evacuation Plan**

The following alarm signal(s) will be used to begin evacuation of the facility (check all which applies):

- Bells
- Horns/Sirens
- Verbal (i.e. shouting)
- Other (specify)
- Evacuation map is prominently displayed throughout the facility.

**Note:** A properly completed Site Plan satisfies contingency plan map requirements. This drawing (or any other drawing that shows primary and alternate evacuation routes, emergency exits, and primary and alternate staging areas) must be prominently posted throughout the facility in locations where it will be visible to employees and visitors.

**i- Emergency Contacts\*:**

**Fire/Police/Ambulance**

Phone No. \_\_\_\_\_

**State Office of Emergency Services**

Phone No. \_\_\_\_\_

**National Response Centre**

Phone No. \_\_\_\_\_

**ii- Post-Incident Contacts\*:**

**Fire Department Hazardous Materials Program**

Phone No. \_\_\_\_\_

**EPA Department of Toxic Substances Control**

Phone No. \_\_\_\_\_

**Cal-OSHA Division of Occupational Safety and Health**

Phone No. \_\_\_\_\_

**Bay Area Air Quality Management District**

Phone No. \_\_\_\_\_

**Regional Water Quality Control Board**

Phone No. \_\_\_\_\_

\* These telephone numbers are provided as a general aid to emergency notification. Be advised that additional agencies may be required to be notified.

**iii- Emergency Resources:**

**Poison Control Centre**

Phone No. \_\_\_\_\_

**Nearest Hospital: Name:** \_\_\_\_\_

Phone No. \_\_\_\_\_

Address: \_\_\_\_\_

City: \_\_\_\_\_

**iv- Arrangements with Emergency Responders:**

If you have made special (i.e. contractual) arrangements with any police department, fire department, hospital, contractor, or State or local emergency response team to coordinate emergency services, describe those arrangements on the lines below:

**I- Emergency Procedures:**

**i- Emergency Coordinator responsibilities:**

(a) Whenever there is an imminent or actual emergency situation such as an explosion, fire, or release, the emergency coordinator (or his/her designee when the emergency coordinator is on call) shall:

- Identify the character, exact source, amount,

and areal extent of any released hazardous materials.

- Assess possible hazards to human health or the environment that may result from the explosion, fire, or release. This assessment must consider both direct and indirect effects (e.g. the effects of any toxic, irritating, or asphyxiating gases that are generated, the effects of any hazardous surface water run-off from water or chemical agents used to control fire, etc.).
- Activate internal facility alarms or communications systems, where applicable, to notify all facility personnel.
- Notify National Disaster Management & Rescue Operations Authority as well as the Environment Protection Agency (EPA) Sindh.
- Notify the City as well as PQA Fire Brigade/Emergency Services
- Monitor for leaks, pressure build-up, gas generation, or ruptures in valves, pipes, or other equipment shut down in response to the incident.
- Take all reasonable measures necessary to ensure that fires, explosions, and releases do not occur, recur, or spread to other hazardous materials at the facility.

(b) Before facility operations are resumed in areas of the facility affected by the incident, the emergency coordinator shall:

- Provide for proper storage and disposal of recovered waste, contaminated soil or surface water, or any other material that results from an explosion, fire, or release at the facility.
- Ensure that no material that is incompatible with the released material is transferred, stored, or disposed of in areas of the facility affected by the incident until cleanup procedures are completed.
- Ensure that all emergency equipment is cleaned, fit for its intended use, and available

for use.

- Notify the PQA Fire Department that the facility is in compliance with requirements b-i and b-ii, above.

#### ii- Post-Incident Reporting/Recording:

The time, date, and details of any hazardous materials incident that requires implementation of this plan shall be noted in the facility's operating record.

Within 15 days of any hazardous materials emergency incident or threatened hazardous materials emergency incident which triggers implementation of this plan, a written Emergency Incident Report, including, but not limited to a description of the incident and the facility's response to the incident, must be submitted to the Sindh Environmental Protection Agency's Department of Toxic Substances Control, Fire Department Hazardous Materials Division.

The report shall include:

- Name, address, and telephone number of the facility's owner/operator;
- Name, address, and telephone number of the facility;
- Date, time, and type of incident (e.g. fire, explosion, etc.);
- Name and quantity of material(s) involved;
- The extent of injuries, if any;
- An assessment of actual or potential hazards to human health or the environment, where this is applicable;
- Estimated quantity and disposition of recovered material that resulted from the incident;
- Cause (s) of the incident;
- Actions taken in response to the incident;
- Administrative or engineering controls designed to prevent such incidents in the

future.

**iii- Emergency Equipment:**

The Hazardous Materials Storage Ordinance requires that emergency equipment at the facility be listed. Completion of the Emergency Equipment Inventory tabel (Table-7.1) meets this requirement.

**J- Training:**

Check all boxes which apply.

**i- Personnel**

General workers will be trained as per following procedures:

**ii- Chemical Handlers**

Chemical Handlers will be annually trained in the following manner:

**iii- Emergency Response Team**

Members are capable of and engaged in the following:

**K- Emergency response training**

Develop and practice a spill clean-up procedure including where to find emergency equipment and how to use it. Make sure all people on site are aware of emergency telephone numbers to call in the case of a large spill. Spill kit equipment on site should include: booms to contain liquids, material to prevent spills into drains, and material to absorb spills. Keep this absorbent material in a clearly labeled and easily accessible place.

Personnel Training Procedures
<input type="checkbox"/> Internal alarm/notification
<input type="checkbox"/> Evacuation/ re-entry procedures & assembly point locations
<input type="checkbox"/> Emergency incident reporting
<input type="checkbox"/> External emergency response organization notification
<input type="checkbox"/> Location(s) and contents of Emergency

Chemical Handling Training Procedures
<input type="checkbox"/> Safe method for handling and storage of hazardous materials
<input type="checkbox"/> Location(s) and proper use of fire and spill control equipment
<input type="checkbox"/> Spill procedures/emergency procedures
<input type="checkbox"/> Proper use of personnel protective equipment
<input type="checkbox"/> Specific hazard(s) of each chemical to which they may be exposed, including route of exposure(i.e. inhalation, ingestion, absorption)
<input type="checkbox"/> Hazardous waste Handlers/Managers are trained in all aspects of hazardous waste management specific to their job duties (e.g. container time requirements, manifesting requirements, etc.)

Emergency Response Training Procedures
<input type="checkbox"/> Personnel rescue procedures
<input type="checkbox"/> Shutdown of operations
<input type="checkbox"/> Use, maintenance, and replacement of emergency response equipment
<input type="checkbox"/> Refresher training which is provided annually
<input type="checkbox"/> Emergency response drills which are conducted at least quarterly

**L- Response levels**

Two levels of response must be contemplated:

- With own personnel
- With external government cooperation, such as Civil Defence, Fire Fighters, National Police, High Ranking Assistance Centres and the Government Attorney General's Office.

**M- Response Strategy**

Upon the occurrence of the emergency, the Plan will be developed under the following conditions:

- First Stage: Notification
- Second Stage: Initial assistance/rescue
- Third Stage: Response operations
- Fourth Stage: Evaluation of the Plan and damages

Table 8.1: Emergency Equipment Inventory			
Equipment Category	Equipment Type	Location	Description
Personal Protective Equipment, Safety, and First Aid Equipment	<input type="checkbox"/> Cartridge Respirators		
	<input type="checkbox"/> Chemical Monitoring Equipment (describe)		
	<input type="checkbox"/> Chemical Protective Aprons/Coats		
	<input type="checkbox"/> Chemical Protective Boots		
	<input type="checkbox"/> Chemical Protective Gloves		
	<input type="checkbox"/> Chemical Protective Suits (describe)		
	<input type="checkbox"/> Face Shields		
	<input type="checkbox"/> First Aid Kits / Stations (describe)		
	<input type="checkbox"/> Hard Hats		
	<input type="checkbox"/> Plumbed Eye Wash Stations		
	<input type="checkbox"/> Portable Eye Wash Kits (i.e. bottle type)		
	<input type="checkbox"/> Respirator Cartridges (describe)		
	<input type="checkbox"/> Safety Glasses / Splash Goggles		
	<input type="checkbox"/> Safety Showers		
	<input type="checkbox"/> Self-Contained Breathing Apparatuses (SCBA)		
<input type="checkbox"/> Other (describe)			
Fire Extinguishing Systems	<input type="checkbox"/> Automatic Fire Sprinkler Systems		
	<input type="checkbox"/> Fire Alarm Boxes / Stations		
	<input type="checkbox"/> Fire Extinguisher Systems (describe)		
	<input type="checkbox"/> Other (describe)		
Spill Control Equipment and Decontamination Equipment	<input type="checkbox"/> Absorbents (describe)		
	<input type="checkbox"/> Berms / Dikes (describe)		
	<input type="checkbox"/> Decontamination Equipment (describe)		
	<input type="checkbox"/> Emergency Tanks (describe)		
	<input type="checkbox"/> Exhaust Hoods		
	<input type="checkbox"/> Gas Cylinder Leak Repair Kits (describe)		
	<input type="checkbox"/> Neutralizer (describe)		
	<input type="checkbox"/> Over-pack Drums		
	<input type="checkbox"/> Sumps (describe)		
<input type="checkbox"/> Other (describe)			
Communications and Alarm Systems	<input type="checkbox"/> Chemical Alarms (describe)		
	<input type="checkbox"/> Intercoms / PA Systems		
	<input type="checkbox"/> Portable Radios		
	<input type="checkbox"/> Telephones		
	<input type="checkbox"/> Underground Tank Leak Detection Monitors		
<input type="checkbox"/> Other (describe)			
Additional Equipment (Use Additional Pages if Needed)			

**i- First Stage: Notification**

**Internal Communication**

Radio communication systems, channels and

frequencies will be established for the command post, alternative posts and for the personnel that forms part of the response Brigade.

Furthermore, message forms will be established to record at least the following information:

Name of informant, location and place of the emergency, number of people affected and, if possible, an estimate of the type of injuries and/or damages, among others.

### External Communication

In the event of spills, leaks or discharges into the sea or the beach, the Harbour Master's Office of the area of influence must be informed through the fastest means: telephone and fax; and also using the forms of the General Harbour Master's and Coast Guard Bureau.

- Local Authorities will be advised by telephone.
- In the case of serious or fatal accidents, the Government Attorney General's Office and the National Police will be notified in coordination with the Legal Counsel.
- The relatives of the injured person, as soon as he is evacuated to a hospital.
- To the extent possible, the press will be notified after the accident has been investigated and by the person designated by Management.
- In the case of an accident that has affected the facilities; the Insurance Company will be notified in Coordination with the Administration and Finance Management.

### ii- Second Stage: initial assistance/ rescue

A joint evaluation will be made of the status of the event, the conditions of the site, the environmental characteristics that warrant a safe development of rescue actions, first aid and transportation of the injured to a medical unit.

Strategies will be adopted to determine own material and human resources to be required, the deployment of the resources to the emergency location, as well as the estimated response time.

Trained emergency teams must be prepared to act as required, and a reserve team must be available. All personnel who are not essential to fight the

emergency must be evacuated to a safe place where there must be communication equipment available to count the number and condition of the personnel.

In the event of fire, the execution or fighting phase will be implemented immediately.

### iii- Third stage: Response Operations

Response Operations refer to:

- Fire fighting using extinguishers or pressure water network or foam.
- Spill control (of lubricants or fuel using absorbing material) or confinement.
- Dispersion of gas clouds. Access control to affected area.
- Medical assistance and evacuation of injured personnel.
- Evacuation of all personnel if their lives are in danger (in the event of earthquakes, tsunamis or other factors).
- Application of a monitoring program and a mitigation plan.

a) Response guide. In the future, the Contingency/Emergency Plan will apply the specific response procedure for each emergency, which procedure will be described in detail and in a language that is easy to understand. It will form part of the documents to be delivered during the induction process and there will be at least 2 drills per year in order to keep the personnel trained.

The communication chain with information on contacts and notifications must be established and maintained.

Furthermore, the logistic chain to replace equipment and consumables must be established, determining a minimum stock at the Plant, which for the case of fire must be in line with the risk study and the list of suppliers containing the contact name, address and telephones available on a 24-hour basis the 365 days of the year.

#### iv- Fourth Stage: Evaluation of the Plan and of damages

Once response operations have concluded, the development and results of the Plan must be evaluated in order to issue recommendations that allow correcting deficiencies for the purpose of improving response operations. These recommendations will then form part of revision and subsequent annual approval of the Contingency and Risk Prevention Manual.

A record of damages will be prepared as part of the final emergency report. The resources used, lost and recovered will be detailed in said register.

#### N- Emergency Response Manuals

Including the proponent's commitment to prepare written emergency plans for the pipeline, plant and marine terminal to cover emergency situations that could occur, based on the results of a Quantitative Hazard and Risk Assessment. It was agreed that Emergency Response Manuals will be developed for:

- LNG Plant Accident Response;
- Loading Facility and LNG Carrier Accident Response;
- Pipeline Rupture Contingency Plan; and
- Platform Emergency Response.

#### O- Responses to Emergencies within the Terminal

##### i- Emergency Classification Determination

**Controllable Emergency:** This is an emergency in which the Terminal Operations Personnel can prevent harm to personnel or equipment by taking reasonable and prudent actions such as valve manipulations, shutting down equipment, or initiating the Emergency Shutdown System. Examples of Controllable Emergencies that may

occur at the Terminal include:

- LNG spills that are contained within the LNG spill containment system and do not result in fire;
- LNG spills that are contained within the LNG spill containment system and result in a fire within the containment system;
- Overpressure of gas or liquid process piping;
- Collapse of buildings or systems and equipment that does not result in or does not have the potential to result in the loss of containment of LNG or flammable gases;
- Building fires that do not involve flammable gases;
- Electrical fires that do not involve flammable gases;
- Loss of electrical power;
- Emergency LNG carrier departure – unexpected LNG carrier disconnect;
- Vehicle accidents;
- Severe weather conditions; and
- Breaches of site security that do not result in or have the potential to result in substantial damage to the Terminal.

**Uncontrollable Emergency:** An Uncontrollable Emergency involves situations that have the potential to result in exposure of personnel or property to natural gas in a liquid, cold vapor, or gaseous state or may result in fire or explosion. Examples of Uncontrollable Emergencies that may occur at the Terminal include:

- LNG spills that are not contained by the LNG spill containment system and do not result in fire;
- LNG spills that are not contained by the LNG spill containment system and result in an unconfined fire;
- Flammable gas leaks from significant failure

of a pipeline or equipment;

- Building or equipment fires that contain or have the potential to contain flammable gases
- Structural failure of an LNG storage tank;
- Major fire aboard an LNG Carrier;
- Bomb threats; and
- Severe weather conditions that cause wide-scale damage to equipment and systems that result in or have the potential to result in a loss of containment of LNG or flammable gases.
- In addition, a Security Breach that results in a high probability of substantial damage to the Terminal that may create an Uncontrollable Emergency will be considered an Uncontrollable Emergency, even if no damage has yet occurred.

Examples of this situation include:

- Discovery of an explosive device in close proximity to an LNG tank or major LNG pipeline or natural gas pipeline; and
- An act of sabotage that may result in structural failure of an LNG storage tank or rupture of an LNG tank or major LNG pipeline or natural gas pipeline.
- An Uncontrollable Emergency is then further classified as a Site Emergency or a General Emergency.

**Uncontrollable Emergency – Terminal Emergency:** This is an Uncontrollable Emergency that threatens personnel or equipment with exposure to natural gas (liquid, cold vapor, or gaseous state) or involves a fire or explosion of a magnitude that involves a large portion of the facility.

A Security Breach that results in a high probability of substantial damage to the Terminal is considered a Terminal Emergency.

**Uncontrollable Emergency – General**

**Emergency:** This is an Uncontrollable Emergency that threatens the public with exposure to natural gas (liquid, cold vapor, or gaseous state) or involves a fire or explosion of a magnitude that affects persons or property off-site. At the instruction of the Terminal Emergency Director, emergency help will be requested by the Public Information Contact from off-site emergency organizations during a General Emergency.

Additionally, the Terminal Emergency Director may recommend an evacuation of the local community in accordance with Section 3.3.2 of this Emergency Response Plan.

## ii- Emergency Classification Summary

In summary, there are ultimately three types of emergencies:

- Controllable Emergency;
- Uncontrollable Emergency resulting in a Terminal Site Emergency; or
- Uncontrollable Emergency resulting in a General Emergency.

## iii- Terminal Alarm System, Hazard Detection and Mitigation System and Shutdown System

The following describes the hazard detection and mitigation system that is installed on board and which will be used to alert to and mitigate the impact from the Controllable Emergency and Uncontrollable Emergency situations.

**Hazard Detection Systems:** A Hazard Detection and Mitigation System (HDMS) are installed to prevent the occurrence of physical situations that have the potential to result in injury to personnel and/or damage to property and the environment. The HDMS accomplishes this by detecting and alerting operating personnel to the presence of fire and flammable gas leak hazards.

The hazard detection system consists of a combination of heat detectors, flame detectors,

smoke detectors, high and low temperature detectors and flammable gas leak detectors.

**Emergency Shutdown Systems:** An Emergency Shutdown System (ESD) is installed to initiate closure of valves and the shutdown of process drivers during emergency situations. All other shutdowns that are not ESD are designated as process related trips.

LNG Carriers that arrive at the Terminal have their own ESD system, which will be connected to the Terminal ESD system through an umbilical link, which will be established prior to unloading LNG.

## 8.3- Responsibilities, training and communication

### 8.3.1- Responsibilities

The roles and responsibilities of PGPL's Project Manager, the Engineer, the environmental inspection/quality assurance team, the contractors, all EMP holders and all personnel will be defined in this section. An organizational chart of the LNG Terminal Project Environmental Management Roles and Responsibilities will be included in this section.

#### A- General Manager (Operations)

Environmental management plan will be regulated by the General Manager (Operations) of PGPL. Some of the key role and responsibilities are described below:

- To consider and react to issues and solutions proposed by the HSE department.
- To cooperate and consult with relevant environmental agency in order to perform in better way.
- To approve any change in decision making and authorities in consultation with Manager HSE, if appropriate.

#### B- HSE Manager

The role of HSE manager is vital. The success of an EMP always depends on Proper and effective management provided by HSE manager. Following are some of the roles and responsibilities given should be provided by HSE manager:

- To identify issues and where possible propose solutions for inclusion in the management plan review process.
- To ensure that the points of view of staff, contractor and HSE officers are considered and placed in the EMP accordingly.
- To improve coordination and exchange of information between top management, employees, contractors etc.
- To contribute towards the actions to deliver the management plan and ensure its continual development.
- To review EMP every year under the supervision of top management, taking issues and change EMP accordingly with the solutions and suggestions.
- To monitor the progress, development and implementation of this management plan.

#### C- HSE Officer

The role of HSE manager will be empowered by HSE manager. The superficial responsibilities which an HSE officer will have to perform include:

- To integrate, as far as possible, the aims and objectives of different users within an agreed plan.
- To maintain balanced, holistic approach to the solution of concerned issues in accordance with the compliance to the legislative requirements.
- To provide professional guidance on questions relating to the environmental

management and issues raised by contractors/relevant personals.

- To progress the EMP process through development towards implementation.

#### D- Construction Contractor

On behalf of chief construction contractor, the main responsibilities for all matters pertaining to environment will be looked after by field Construction Contractor and he will be responsible to report directly to HSE Manager. Major roles to be performed by construction contractor are given below:

- To carry out construction activities in environmentally sound manner.
- To coordinate with the HSE officer to resolve issues arise during construction phase.
- To manage construction crew and reduce the environmental impacts.
- To appoint a dedicated environment officers that will understand and tackle environmental issues more easily.
- To discuss weekly progress report with HSE Manager and issues concerned to environmental management.

#### E- Environmental Inspector

- An Environmental Inspector (EI) is responsible to supervise the environmental compliance and inspection process.
- Environmental inspector is also responsible to communicate with Environmental manager and the chief constructions officers.
- Environmental inspector provide key liaison role in coordinating attendees and facilitating agreements in the field, as appropriate, with agency representatives.
- Coordinate daily with construction inspectors, the contractor, when construction

activities are scheduled in all requiring monitors.

- The EI will play a significant role suggesting methods to bring construction activity into compliance and/or to temporarily halt certain activities that may cause damage to sensitive environmental resources.

- In addition to these responsibilities, the environmental inspector contributes to the Environmental Management Team by developing swift and innovative solutions to unanticipated environmental issues which develop during construction.

#### F- Site (Operation) Manager

- The site manager is responsible and accountable for the site's HSE performance.
- Establishes, implements, and maintains a formal written plant-HSE program that encompasses applicable areas of loss prevention and is consistent with corporate policy.
- Establishes controls to assure uniform department performance to the HSE management system. The establishment of controls should include corrective action and follow-up. Develops, by action and example, a positive HSE culture and a clear understanding of specific responsibilities for direct reports.
- Approves and adopts local HSE policies, rules and procedures.
- Chairs the Executive HSE Committee (or its equivalent).
- Personally investigates fatalities, serious Lost Workday cases, environmental incidents or major property losses.
- Assigns management members to serve on various HSE committees.
- Reviews monthly HSE activity report and performance statistics.

- Reviews Lost Workday Injury/Illness Investigation Reports.
- Reviews loss-control reports submitted by outside agencies.
- Makes plant-HSE audits on a regular basis in order to appraise program effectiveness and to correct and reinforce behavior.
- Reviews annually the program effectiveness and makes adjustments where necessary.
- Evaluates the functional performance of the HSE staff and provides guidance training where necessary.
- Personally reviews, signs, and approves of corrective action planned for Lost Workday cases.

#### **G- Department Manager (Department Head; Area Superintendent)**

- Contacts each supervisor/foreman/lead person frequently (daily) on HSE.
- Includes HSE as a meeting topic in staff meetings.
- Makes daily observations of supervisor/foreman/lead person's HSE activities.
- Reviews and approves all job procedures growing out of Job Safety Analysis; installs approved procedures; requires direct reports to check on use of procedures.
- Approves all departmental HSE rules and regulations and reviews annually; maintains strict enforcement; and develops plan to ensure employee instruction and re-instruction.
- Establishes acceptable housekeeping standards, defining areas of responsibility; assigns areas to supervisor/foreman/lead persons; makes daily spot check of some area; holds formal inspection with supervisor/foreman/lead persons at least once per month; submits written report with assignments and deadlines for correction.
- Authorizes purchases of tools and equipment to comply with plant specifications and governmental regulations as required.
- Develops an indoctrination plan, which includes specific job instruction, for new or transferred employees; issues protective equipment and follow-up checks by supervisor/foreman/lead persons.
- Reviews the HSE performance of his area of responsibility.
- Personally investigates all "Lost Workday" cases and significant losses and reports to plant manager. Follows-up on corrective action.
- Adopts standards for assigning protective equipment to employees; insists upon strict enforcement; and makes spot field checks to determine compliance. Also reinforces safe behavior.
- Evaluates supervisor/foreman/lead persons' HSE performance.
- Develops strong HSE culture and a clear-cut understanding of specific duties and responsibilities in each member of management.

#### **H- Supervisor/Foreman/Lead Person**

- Makes daily safety observations of the work area and corrects unsafe behavior and reinforces safe behavior.
- Arranges for development of job safety analysis; reviews all job safety analysis; and submits to department manager for approval.
- Develops a workable housekeeping program, defining areas assigned to work teams; makes daily spot checks of an assigned work area; makes periodic housekeeping inspections, reporting results of inspection to department

manager and indicating condition and corrective action.

- Ensures the indoctrination of new or transferred employees.
- Develops protective apparel requirements, according to occupation; and makes spot fields checks to determine compliance.
- Reports all injuries or illnesses of employees to department manager as soon as practical; reviews Accident Report with employees and, in case of injury, submits reports to department manager after taking corrective action.
- Makes thorough investigation of all accidents and serious incidents occurring to employees in assigned work area; makes personal inspection; and develops preliminary information.
- Conducts scheduled and assigned HSE training meetings.
- Participates on HSE committees as specified by plant policy.
- Reviews unsafe conditions and unsafe behavior and directs daily HSE activities to correct these causes.
- Instructs employees in HSE rules and regulations; records instruction; and enforces all HSE rules and regulations at all times.
- Makes daily inspections of assigned work area and takes immediate steps to correct unsafe or unsatisfactory conditions; reports to department manager those conditions which cannot be immediately corrected; instructs employees on housekeeping standards.
- Instructs each new employee personally on job HSE requirements in assigned work areas.
- Enforces the plant's medical department recommendations with respect to an employee's physical limitations; reports an employee's apparent physical limitations to department manager.
- Enforces wearing of protective equipment; makes spot checks to determine that protective apparel is being used; and makes periodic checks to appraise condition of equipment.
- Sees to it, in case of serious injury, that injured employee receives prompt medical attention; isolates area or shuts down equipment, as necessary; and immediately reports to the department manager the facts regarding employee's accident or illness and the action taken. In serious incident cases, the supervisor/foreman/lead person determines cause, takes immediate steps to correct condition, and isolates area and/or shuts down equipment, as necessary. Supervisor/foreman/lead person immediately reports facts and action taken to the department manager.
- Checks changes in operating practices, procedures and conditions at the start of each shift and before relieving the "on-duty" supervisor/foreman/lead person, noting facts related to HSE which have occurred since his last working period.
- Makes, at the start of each shift, an immediate check to determine absentees. If plant injury is claimed, an immediate investigation is instituted and department manager notified.
- Makes daily spot checks and takes the necessary corrective action regarding housekeeping; spills and storage of hazardous waste & materials; unsafe behavior or practices; unsafe conditions, tools, ladders, wire rope, chains, clevises, pins, spreaders, etc.; job procedures, and adherence to HSE rules.
- Instructs personally or provides on-the-job instruction in HSE and efficient performance of assigned jobs.

- Takes action on all employee HSE complaints and suggestions.
- Maintains HSE signs and bulletin boards in a clean and legible condition, in assigned area.

#### I- HSE Supervisor/Manager

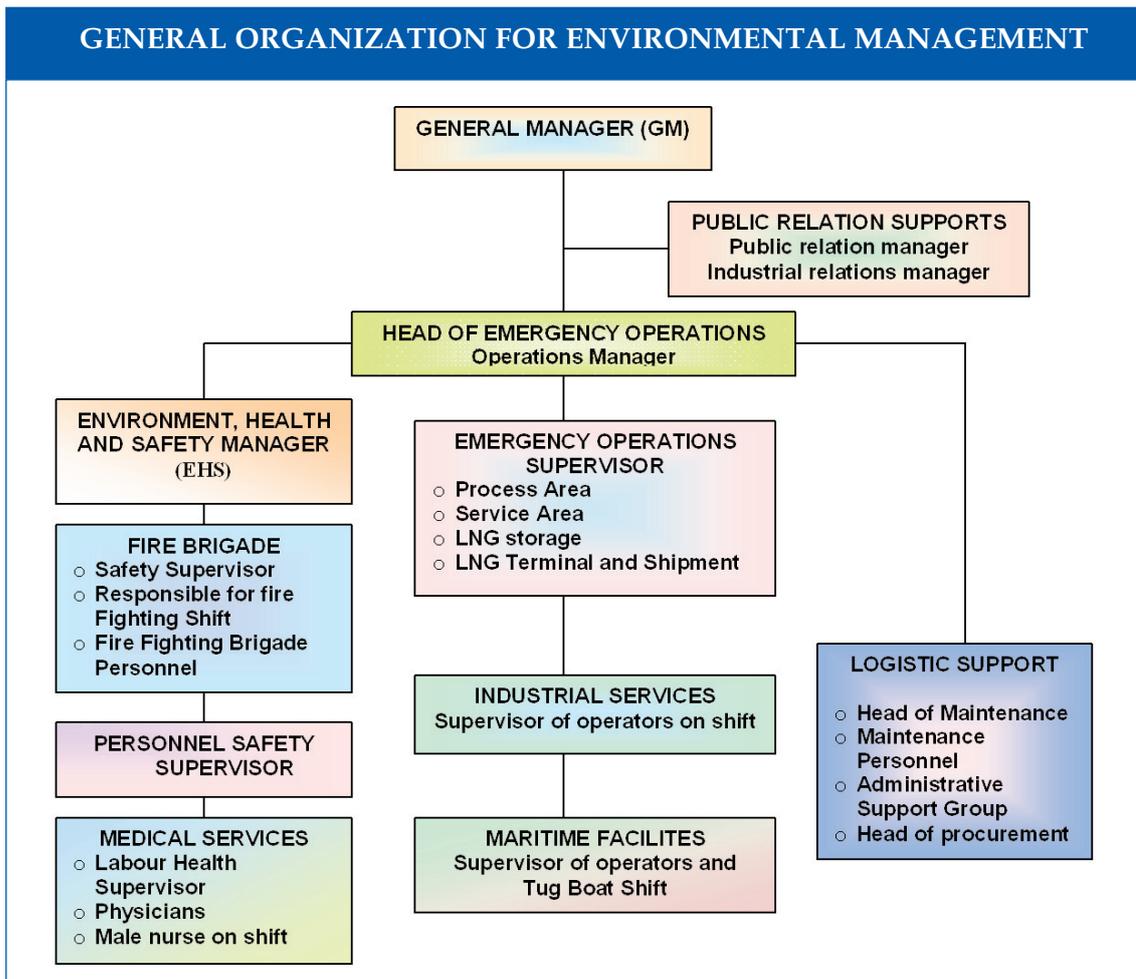
- Provide overall coordination and guidance to the site HSE efforts.
- Develop programs that are designed to reduce exposure to loss via personal injury or illness, loss by fire, loss due to spill of hazardous materials or waste, and comply with governmental regulations.
- Supervise and coordinate the efforts of the HSE department staff.
- Collaborate on a routine basis with the site manager in appraising the performance of all departments.
- Develop recommendations for improvement of procedures, practices and activities directly or indirectly involved in effective execution of HSE functions by site management.
- Advise and/or represent site management in all matters concerning compliance with federal and state HSE regulations.
- Audit the site from a regulatory and management system perspective and recommend actions to address deficiencies.
- Maintain membership in necessary outside HSE organizations.
- Participate in the review of all serious incidents, fatalities, and major disasters.
- Collaborate with the site manager in the development and preparation of Executive HSE Committee Meeting agenda.
- Serve as a member of site committees for special HSE studies and program development.

- Consult with the Manufacturing Engineering department on original plans; see that all plans and specifications for new or proposed changes in processes, equipment or methods are reviewed from compliance with HSE standards before being accepted.

- Function as liaison with insurance companies, Corporate HSE, local fire and rescue organizations, etc.
- Provides leadership to the site for the implementation of new technologies such as behavioral-based safety management concepts.
- Reinforces safe behavior and corrects unsafe behavior.

#### J-HSE Coordinator

- Assist the site manager in coordinating all HSE activities.
- Reinforces behavior and corrects unsafe behavior.
- Be constantly alert for unsafe conditions and bring such conditions to the attention of the supervisor and, if necessary, the site manager, without delay.
- Participates on the site's Executive HSE Committee.
- Accompany outside inspectors representing insurance carriers of fire, casualty, and workers' compensation insurance.
- See that HSE promotional and reference literature, such as monthly handouts, are available.
- Be thoroughly familiar with company HSE standards and assist the site manager in implementing them.
- Maintain injury and incident statistics.
- Assist the site manager in analyzing incident records, develop supervisory and employee educational programs and stimulate a high



level of interest in HSE through various employee-involvement activities.

- Understand current Federal and state HSE regulations.
- Serves as the liaison between Corporate HSE and the site.
- Provides leadership to the site for the implementation of new technologies such as behavioral-based safety management concepts.
- Regardless of the position the HSE Coordinator holds in the plant organization, his function as HSE Coordinator must be only advisory. Any corrective actions must be taken by the concerned line supervisor. It is most important that the HSE Coordinator's position

be recognized as one of guidance not enforcement

### K- Personnel Safety Supervisor

Every supervisor has at least three responsibilities with which Environmental Safety can provide assistance. These responsibilities are employee training, provision of personal protective equipment and accident & injury reporting.

#### i- Employee Training

Supervisors are responsible for ensuring that each new employee, whether temporary or permanent, receives appropriate safety training at the start of employment. Supervisors are responsible for ensuring that their employees receive the necessary safety training based on the work that their employees perform.

### ii- Personal Protective Equipment

OSHA requires each supervisor assess the hazards of the work area to determine the type of protective equipment needed and to provide training on its use. This review must be documented. Completing the Hazard Assessment Form meets this documentation requirement. The Personal Protective Equipment Plan includes detailed information to assist in selecting the proper protective equipment.

### iii- Accident and Injury Reporting

It is the supervisor's responsibility to report all accidents or injuries that occur to their employees while at work. Each supervisor must ensure that any employee who is injured while at work completes and signs the Employee's Report of Work-Related Injury Form. Additionally, the supervisor must receive the employee form, Accident Witness Statement Form (if the accident was witnessed by another person), and fill out a corresponding Supervisor's Report of Work-Related Injury Form.

### L- Public Relation (PR) Manager

The Public Relations (PR) Manager will have responsibility for managing client's corporate public relations efforts, reporting to the Vice President of Corporate Communications. The Public Manager will develop and execute an integrated public relations plan based on marketing strategy and reflecting the individual divisional (service line) public relations objectives. The role requires careful cross company collaboration and will necessitate both strategic leadership and practical execution. This is a corporate role with broad responsibility for managing both corporate and product PR programs, also responsible for collaborating with and advising international public relation Public Relation PR teams/agencies.

### M- Individual Employees

- Employees must assume a high level of responsibility to work safely and strive for an

incident-free workplace by:

- Considering the consequences of their acts on their safety and that of fellow employees.
- Following all general and job related HSE work procedures and practices.
- Detecting, reporting and correcting unsafe work behavior or conditions.
- Applying HSE work practices both on and off the job.
- Making or suggesting enhancement to the jobs at hand to reduce or eliminate the risk or stresses associated with job performance.
- Reinforcing safe behavior.
- Working safely and with regard for the environment is a condition of employment and no employee should ever consciously perform an unsafe act.

### 8.3.2- Training

It's an important step for the implementation of the EMP. All the employees will require to be trained to work appropriately on EMP. Training coordinator will organize trainings in consultation with HSE Officer. It will make sure that employees understand the issues associated with the proposed activities. Trainings should be arranged on regular basis with notification that it should be attended all respective employees.

HSE Officer will determine the training requirements during both construction and operation phases. Induction will be the basis of all training courses for contractor and subcontractor during construction phase.

Trainings identified in EMP are given below:

- Site induction course
- Training for emergency response and preparedness
- Training for familiarization with site environmental controls

- Specific environmental training for relevant employees e.g. installing erosion and sedimentation controls, daily checks to maintain controls, cleaning up spills, waste minimization.

The Plant and Terminal will have (i) Distributed Control System to monitor and control the plant process and operation, (ii) Fire and gas detection and alarm system, and (iii) an emergency shut off system. Each of these systems will be separated from each other, to provide data and communication transmission.

A permanent fire fighting system will be installed, which shall include fire fighting water, foam generators and CO<sub>2</sub> extinguishers. The personnel will be trained in the use and operation of said systems.

Equipment such as fire trucks, fire fighting equipment, medical hospital equipment, ambulances and environmental protection and spill control equipment will also be provided so that they will be available in the event of an emergency.

The aim is to instruct all personnel on the operation of this equipment and on the procedure to be followed in the event of spills, fire or explosions.

#### A- Personnel training

Both the personnel in charge of unloading operations at the LNG jetty terminal and on shore LPG terminal, as well as the Terminal personnel, are conveniently trained to carry out their work and respond to any emergency.

#### i- Identification of training requirements

##### a) Procedure to respond to a spill in the wharf

- Any spill that takes place in the wharf area, originating from a Ship or from connection hoses, will be immediately reported to the Safety Area.

- Unloading operations must be immediately halted in coordination with the Ship.
- Every possible ignition source in the area must be eliminated.
- If a spill occurs on the wharf, the plan must be always activated because there is a possibility that the product might spill into the water, or there may be other situations that could jeopardize other facilities within the Terminal.
- Containment equipment must be readily available to contain as much as possible the spill of the product onto the wharf or adjacent areas.

##### b) Procedure to respond to a spill on the ground

- The area must be isolated and unauthorized people should not be allowed to enter the spill site.
- Every possible effort should be made to stop the spill, if at all possible, without running any major risks.
- Every possible effort should be made to contain the spill and thus prevent the spill from spreading on the ground. In this case, makeshift dams will be constructed or containment booms will be installed, if possible.
- For large spills, every possible effort should be made to contain the spill with makeshift dams or fences, or with absorbent material or containment booms, in order to then be collected.
- Flammable substances that could explode or catch fire, located in areas surrounding the spill, should be taken out of the area.
- Basic fire-fighting procedures.
- Three basic procedures should be borne in mind in fighting a fire.
- Fuel should stop being supplied (valves

should be closed, transfers should stop, etc.).

- Air should not come into contact with the fuel; therefore, the fire area should be covered with foam.
- The heat produced by the evaporation of the product should be eliminated, because vapour is combustible, and water is the most effective agent for this purpose.
- To control any fire at the Terminal, the first step will be to isolate and evacuate the area, besides taking the following precautions:
  - Remove all containers from the area exposed to fire and heat, if it is possible to do it in a safe manner.
  - Cool the sides of the containers that are exposed to the flames or heat, using water.
  - If the fire is intense in the loading areas, support-mounted hoses operated at a distance or monitor guns should be used.

#### c) Procedures to respond to a fire on the ship

- If a fire breaks out on a ship, then, besides the basic fire fighting procedures, the following steps will be taken:
  - If the fire breaks out next to the mooring wharf, loading operations must be interrupted immediately and the ship must get ready to weigh anchor.
  - If the fire breaks out aboard the ship, then the captain and the crewmembers should give immediate notice thereof to the technical personnel working at the Terminal for the latter to halt all operations.
  - Crewmembers must identify the type of fire in order for the personnel working at the Terminal to mobilize the appropriate internal or external resources required to promptly respond to the incident.

#### d) Procedures for flammable substances

#### (methane).

To respond to a seepage involving a flammable product, the following steps should be taken:

- Isolate the area.
- Eliminate every source of ignition in the area.
- Use duly grounded armoured equipment in the Hot Area.
- Try to seal the seepage, if it is possible to do it in a safe manner.
- Try to contain the product to prevent it from filtering into drainage networks or other places.
- Monitor flammability indices in the risk area to analyze the need to isolate a broader area.
- Remove the product with absorbent material or other mechanical means in order for wastes to be properly disposed of.

#### e) Procedures for toxic substances

In situations involving the seepage of liquid substances classified as toxic, the most important thing to do is to wear appropriate breathing equipment.

If there is any doubt regarding the concentration of the substance in the environment, breathing equipment that affords the highest possible protection will be worn, that is, self-contained compressed-air breathing masks and appropriate clothing.

In addition, the following steps will be taken:

- Isolate and evacuate the area that poses a danger immediately.
- Try to seal the seepage, if it is possible to do it in a safe manner.
- Try to contain the product to prevent it from filtering into drainage networks or other places.
- Permanently monitor the concentration of

vapors in the risk area to analyze the need to isolate a broader area.

- Remove the product with absorbent material or other mechanical means in order for wastes to be properly disposed of. Decontaminate all clothing, equipment, materials and areas reached by the product. In addition to the above training, workers should be aware of the following:

### **ii- Operations involving oily substances**

#### **a) Person in charge**

The person in charge of the plant will personally supervise all operations involving oily substances. Said person will closely cooperate with and remain in close contact with the person in charge of the loading of oily substances in the vessel and with the wharf personnel.

#### **b) During loading operations**

Loading will begin at the minimum pumping rate, in order to be able to quickly stop the supply if there is any problem. The pressure of supply pipes will be checked to make sure that the maximum working pressure is not being exceeded. The hydrocarbon supply tank will be frequently measured.

Upon completion of loading operations upon completion of loading operations, and once all flexible pipes have been drained, a drip tray will be left below the flexible pipe connections, when loading hydrocarbons. Flanges will then be disconnected and a blind flange will be installed on one end of the hose.

### **iii- Check list**

#### **a) Before loading Hydrocarbons**

- There should be a clear signalling system in place to report the commencement of loading operations, reduction in the loading rate, the end of loading operations, and emergency

shutdowns.

- All intake and discharge valves in the sea should be closed.
- Blind flanges should be connected to all valves that are not going to be used.
- High-capacity drip trays should be placed below pipe connections.
- Flexible pipes and loading arms should be in a good condition, properly connected, and correctly supported.
- There should be sufficient and readily available absorbent material in place.
- The valve in the tank where the product is to be loaded should be open and duly aligned.

#### **b) While loading Hydrocarbons**

- There should be no leaks in flexible pipes or pipe connections.
- The reduction in the pumping rate during the last phase of loading operations should be reported well in advance.
- Proper notice should also be given when loading operations are intended to be brought to a full halt.
- Sufficient room should be left in the tanks in order to be able to drain flexible pipes and the entire pipeline system used in the respective loading operations.

#### **c) Upon completion of loading operations, check whether:**

- Distribution valves have been closed.
- Flexible pipes and loading arms have been drained before being disconnected.
- Blind flanges have been installed in the aforesaid pipes.
- The valves in the loading system have been closed, including intakes in the hydrocarbon

supply tank.

#### **iv- Training schedule**

As part of its policy, emergency drills will be carried out at least twice a year, which will allow the personnel to carry out and learn the actions they must take and the attitude they must have in the face of real emergency situation

During training, consideration of following areas of knowledge and experience are essential:

- Appreciation of properties of hazardous substances e.g., toxic, flammable, reactive etc, as well as, levels at which they pose a considerable menace requiring protective measures.
- Knowledge of early-warning indicators, hazard/risk identification and ability to recognise potentially hazardous situations.
- Acquaintance with engineering control to evade the incidence of hazardous situations.
- Familiarity with capability and restraints of facility to respond the hazardous emergencies, ventilating systems, plumbing systems, shut off systems, containment strategies and emergency response measures.
- Awareness of use, repair/ maintenance of emergency response equipments as well as routine equipments to health and safety monitoring and protection.
- Awareness of methods and trials for decontamination personnel equipments and facility following potential chemical contaminations.

### **8.3.3- Communications**

For effective monitoring, management and documentation of the environmental performance during the operation, the Health, Safety and Environmental (HSE) matters will be discussed during daily meetings held on site. Environmental concerns raised during the meetings will be mitigated after discussions between the HSE officer and the contractor. Any

issues that require attention of higher management of PGPL will be communicated to them for action. The HSE officer and the contractor will also prepare a weekly environmental report. Duplicates of the report will be provided to the higher managements of PGPL and of the contractor. Communication will play a vital role in good management practices. Steps given below will assist in effective communication and documentation.

#### **A- Kick-off Meeting**

The aim of organising the kick-off meeting is to define the environmental responsibilities, awareness to EMP to the managing staff and to streamline the work plan according to the EMP. This meeting will be arranged prior to commencement of activities.

#### **B- Quarterly Meetings**

Initially quarterly meetings will be held after kick-off meeting however if situation demands for monthly meetings, it will be rearranged accordingly. Aim of this meeting is to review the progress of activities performed, explore ideas and problems, and discuss about the progress in acquisition and analysis of information. Dead lines are re-evaluated in it and if necessary, the project program is revised in these meetings.

#### **C- Peer Review**

The aim of this review is to predict and modify the conclusions and interpretation of assessment phases in the light of other professional opinions that mainly not involved in the proposed project, but just for the provision of a critical appraisal of the style and expression of documentation produced.

#### **D- Minutes of Meetings**

In the end of quarterly meetings, minutes will be issued which comprises of the discussion made in the meeting, issues discussed and decisions taken with the time frame for their implementation. Main points of

minutes for general employees may be incorporated in the record register. These meeting minutes will also be provided to the higher authorities of PGPL and the contractor for their own record.

## 8.4-Regulatory requirements

### 8.4.1- Approvals, authorisations and permits

The list of potential approvals, authorizations and permits required for the Project from various agencies including, federal, provincial, municipal are given below:

- Sindh Environment Protection Agency, for which this document would be submitted for grant of permission and approval of the project.
- Port Qasim Authority
- Maritime Security Agency
- Sanction of utilities from concern department such as KESC, SSGC, KW&SB, PTCL and other civic agencies including City District Government of Karachi, etc.

### 8.4.2- Environmental quality objectives

This section will outline criteria for management's quality objectives related to generation of solid waste and wastewater quality, air and noise quality. The management of PGPL shall make Environmental Objectives every year and try to complete them in the stipulated time frame.

This will also include any applicable treatment criteria meeting the National Environmental Quality Standards (NEQS) as per Pakistan Environment Protection Act 1997.

### 8.4.3- Compliance monitoring

It would be required by the management of PGPL to comply with the Environmental Monitoring Plan laid in the subsequent section. The compliance shall also

required periodic reporting of the monitoring results in form of report submitted to the Environmental Protection Agency. During the construction phase, it will be on bimonthly basis and during the operation phase it will be done on quarterly basis.

It is also understood that monitoring shall be done by an independent consultant/ organisation. It would be further required to make the annual environmental report public as laid under the Equator Principles.

Equator Principles (EP) requirements were taken care off in this EIA report and it is one of the mandatory requirement of EP to report all the stakeholders and announces their EHS performance publically atleast once a year.

## 8.5- Standard Operating Procedures

### 8.5.1- Barge and supply ship operations

#### A- Purpose

- To achieve the desired productivity.
- To delineate the method for handling of cargo from and to vessel efficiently, effectively and safely.

#### B- Scope

This procedure applies to all vessels calling the terminal.

#### C- Definitions

A barge is a flat-bottomed boat, built mainly for river and canal transport of heavy goods. Most barges are not self-propelled and need to be moved by tugboats towing or towboats pushing them.

#### D- Procedure

##### i- Information Required

Shipping efficiency is highly dependent upon the

quality and timing of information made available to the Terminal Planning Section. This section is responsible for, amongst other activities, preparing quay crane utilization plans and container discharge and load sequences.

Information sources are:

**a- Shipping Line:** responsible for providing inward bay plan information, container status lists, reefer container information, dangerous cargo declarations and any particular information which may be useful in ensuring smooth operations. For planning purposes this information should be available to the terminal at least 24 hrs prior to vessels arrival with updates from the last port of call at least 12 hours prior to vessel arrival. Communications should be through fax or emails.

**b- Shipping Line Agents:** responsible for providing details of containers to be received for export. For planning purposes initial indicative information should be made available to the terminal seven days prior to vessel arrival with general indications of containers to be handled by size, port of discharge, weight classification, commodity classification, reefers, dangerous cargo etc. The initial information is to be regularly updated as more specific information becomes available. Communications with the terminal may be either using fax or emails.

- The Operations Superintendent: is responsible for ensuring the best information is available concerning availability of cargo handling equipment and manpower availability (by driver skills); and
- The Terminal Yard Planner: is responsible for managing and providing and monitoring yard area allocations for the optimum utilization of the cargo space at time of receiving at the terminal.

## ii- Planning for Operations

In all cases the start position for operations occurs when, through the Vessel Planner, the SPARCS system generates off-loading working programs and sequence sheets for storage facility to be

worked. These planned ship-working programs will have taken into account:

- Vessel stability requirements
- Disposition of cargo to be discharged from the vessel
- The yard stacking disposition of cargo to be loaded to the vessel
- Resource availability by way of cargo handling equipment and manpower
- Conditions of contract with the client.

## iii- Ship Working Systems

Ship working systems at a terminal may feature a number of methodologies. The two most commonly used are shown below:

An ECH system whereby containers are moved between the quay gantry cranes and container yard stack using internal transfer vehicles. ECH are used for yard stacking.

## 8.5.2- Watercourse crossings

### A-Purpose

The main purpose of watercourse crossing is not to disturb the sea water flow in the nearby channels. Care must be taken to ensure that jetty construction, laying of pipeline and LPG extraction area do not cause erosion or have a negative effect on aquatic habitat. Fish passage should not be obstructed as a result of watercourse crossing installations.

### B- Scope

The scope of watercourse crossing is to construct watercourse crossing and to ensure minimization of harmful effects of watercourse crossings on the aquatic environment.

### C- Definitions

It is natural or artificial channel through which

water flows.

## D- Procedure

### i- Construction of Watercourse Crossings

The location of all watercourse crossings is to be inspected and approved prior to construction. The chosen location of the watercourse crossing should:

- Cross watercourses at right angles;
- Select crossing points which:
  - Are immediately downstream of straight and stable watercourse sections;
  - Have easy high bank access;
  - Do not require deep box cuts;
  - Require minimum alteration or disturbance to the high bank;
  - Have stable beds.

A series of monitoring studies were undertaken to evaluate the effectiveness of the applied crossing techniques, to limit sediment release into the watercourse and subsequent changes to habitat conditions during, and after in-stream construction.

## E- Watercourse Crossings Management Options

Full compliance to all legislation protecting aquatic habitat is ensured. All necessary permits and approvals will be obtained before any in-stream work is initiated.

The potential harmful effects of watercourse crossings activity within a water body can be eliminated or minimized by identifying the objectives that are to be met when such an activity is undertaken. Objectives set out in the Code of Practice are based on the principles of sustainable water management.

These principles are:

- Sustainable management of water
- Water is a vital component of the environment.
- Water plays an essential role in a prosperous economy and balanced economic development.
- Water must be managed using an integrated approach with other natural resources.
- Water must be managed in consultation with the public.
- Water must be managed and conserved in a fair and efficient manner.

The Code of Practice establishes the objectives, standards and conditions to be met when undertaking the activity of constructing watercourse crossing.

## 8.5.3- Wastewater/ storm water management

### A- Purpose of Wastewater/storm water Management

The purpose of the adopted procedure is to provide guidelines and simplify the process of categorizing, quantifying, managing, and disposing of wastewater wherever and whenever arising during the project's construction and operation phase. Wastewater management is a critical component of company's operating policies. Wastewater management includes the proper disposal / recycling and reuse of the wastewater generated during construction and operation phase. The procedure is designed to assist in a company's wide effort to provide protection for the environment and to comply with company's corporate requirement, environmental laws and regulations regarding proper wastewater management.

### B- Scope

Wastewater as part of drilling and construction,

production shall be managed as per this procedure. An integrated wastewater management system for the LNG jetty and storage terminal is essential to reduce wastewater.

Substitute techniques must be investigated, including source reduction, recycling and reuse wherever possible with a view towards maximizing the benefits and minimizing the cost of each method of wastewater management.

Guidelines for proper handling, categorization, recording, minimization, and disposal of all types of wastewater associated with company operations and projects are part of this procedure that need to be documented.

This procedure shall be followed at all construction sites by all company personnel and contractors working for this proposed project.

## C- Definitions

### (i) Wastewater

Any water arising after use/ consumption shall be including of liquid waste discharged by domestic residences, commercial properties, industry, and/or agriculture and can encompass a wide range of potential contaminants and concentrations. In the most general terms, it refers to the municipal wastewater that contains a wider range of pollutants arising due to the mixing of wastewaters from different sources.

### (ii) Hazardous Wastewater

Plant wastewater comes in the category of hazardous wastewater. If it has one or more of the following properties:

- Oily water
- Toxicity (may cause risk of injury to health of organisms or the environment)
- Concentration of contaminants too high above safe acceptable limits

### (iii) Non-hazardous Waste:

The wastes are categorized as non-hazardous wastes, if they do not possess any of the hazardous contaminant mainly comprising of consumed water arising from washing area and sanitary wastewater.

## D- Procedure

Main concern to manage the wastewater is listed below:

- Eliminate wastewater production wherever possible.
- Minimize wastewater production.
- Recycle or Reuse
- Wastewater disposal in an environmentally safe manner through adequately designed facility

### i- Wastewater Minimization

Generation of wastewater will be minimized through the following steps taken by working personnel at the facility:

- Through efficient use of raw water (minimizing the wastewater).
- Extensive management schemes will be formulated for both phases during construction and operations (water management).
- It is expected that segregated and /or treated wastewater will be made available for subsequent use during operations phase (recycling and reuse).

### ii- Storage and Handling

Wastewater shall be stored / retained in lined ponds or storage tanks till proper onsite treatment or remote disposal.

### iii- Recycling

Reuse of wastewater is a best way to reduce the

**Table-8.2: Wastewater Data Sheets Guidelines for Wastewater Management**

Plant Wastewater	
Description	■ General water from washings, etc.
Components	■ Water
	■ Total Dissolved Solids (TDS) and total suspended solids
	■ Oil
Waste Category	Non-hazardous
Analysis	Refer Monitoring procedure for analysis requirements (PRO/ENV/02).
Ownership / Responsibility	Production Team Leaders
Accumulation/ Storage	Stored in lined ponds or storage tanks till proper disposal.
Waste Handling direct	When handling plant wastewater, protect yourself from contact by using appropriate personal protective equipment
Waste Reduction	■ Reduce water use
Disposal Options	■ Recycle free oil back into the production stream
	■ Dispose water into lined evaporation ponds or skim pits
	■ Oily water from yards should be treated in oil/water separator
Sanitary Wastewater	
Description	Wastewater from camps.
Waste Category	Non-hazardous
Analysis	Refer Monitoring procedure for analysis requirements (PRO/ENV/02).
Ownership / Responsibility	Camp Administrator / PTLs
Waste Handling	When handling sanitary wastewater/ sludge, protect yourself from direct contact by using appropriate personal protective equipment.
Waste Reduction	Reduce water use.
Disposal Options	■ Treat wastewater in Redfox or in septic tanks before disposal
	■ Sludge removed from Redfox or septic tank during cleaning should be buried in burial pits.

**Table-8.2: Wastewater Data Sheets Guidelines for Wastewater Management**

Water produced from ground sources	
Description	Water brought up from the hydrocarbon-bearing strata during the extraction process.
Components	<ul style="list-style-type: none"> <li>■ Formation water</li> <li>■ Injected water</li> <li>■ TDS</li> <li>■ Petroleum hydrocarbons.</li> <li>■ Naturally occurring metals.</li> <li>■ Additive chemicals.</li> </ul>
Waste Category	Non-hazardous may be fairly contaminated
Analysis	Refer Monitoring procedure for analysis requirements (PRO/ENV/02).
Ownership / Responsibility	Production Team Leaders / Subsurface Operation Team Leader / Well Works Team Leader
Waste Reduction	<ul style="list-style-type: none"> <li>■ Use rock plugging with gel slugs to block off water production in completions where there is a separation of the oil and water zones</li> <li>■ Dually complete the oil zone and water zone to allow water to be produced simultaneously but separately from oil and allow control of water coning</li> <li>■ Carefully plan completions of bored well</li> <li>■ Re-perforate / re-inject wells to reduce water production</li> <li>■ Drill wells to minimize water production</li> <li>■ Optimize production rate to minimize influx of water</li> </ul>
Disposal Options	<ul style="list-style-type: none"> <li>■ Inject produced water into disposal or injection wells</li> <li>■ Reuse produced water whenever possible</li> <li>■ Use produced water for hydro-testing pipelines, equipment, tanks, well killing and or drilling mud preparation</li> </ul>

**Table-8.2: Wastewater Data Sheets Guidelines for Wastewater Management**

Water produced from ground sources	
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Disposal Options	<ul style="list-style-type: none"> <li>■ Inject produced water into disposal or injection wells</li> <li>■ Reuse produced water whenever possible</li> <li>■ Use produced water for hydro-testing pipelines, equipment, tanks, well killing and or drilling mud preparation</li> </ul>

quantity of the wastewater that requires subsequent treatment and disposal.

#### iv- Treatment

- Biological treatment of wastewater through retention in septic tanks prior to disposal
- Sludge produced as a by-product of biological treatment be disposed off properly through burial pits
- Some of the wastewater will be reused for cleaning or washing purpose. The treated water should comply with National Environmental Quality Standards (NEQS).

#### v- Disposal

Proper disposal should be done following the treatment through discharge into water bodies or sewerage system where available.

#### E- Waste Management Options

- All storm water run-off and pump-out from facility construction-sites will be inspected and directed to sedimentation basins to remove suspended solids (e.g., silt);
- Sewage will be collected and temporarily stored in tank(s) until it is transported to a designated wastewater treatment facility;
- Standard mobile sewage tankers should be engaged to collect and transport sewage from portable latrines and temporary storage tanks
- Oil spills in port waters could result from a variety of sources including on-shore industries; unsupervised bilge pump-outs; collisions and sinking of vessels; illegal discharges from vessels; accidents when transferring waste oil to storage facilities on shore and accidents when refueling vessels.
- To reduce the risk of oil spills occurring from a vessel, Maritime Safety Regulations ensure the safety of navigation, including the provision of navigation aids is maintained.

- Direct discharge will only be considered as a contingency option.
- During preparation of the final EMP, PGPL will undertake an evaluation of the proposed release of hydro-test water during construction of the storage tanks for LNG and condensate on-site. This will include an analysis of the additives which will be present, their fate and anticipated environmental effects

#### F- Recording & Reporting

Visually acquired wastewater management-related monitoring data will be recorded in field logbooks. These logbooks will be maintained as part of the Construction Spread Wastewater Management Records at each designated area or facility within a spread, wherever the stated wastewater management activities occur.

These monitoring data will include as applicable.

- Time, date and identify of individual performing the monitoring activity.
- Description of the process or activity being monitored.
- Findings or results of the monitoring activity.
- Description of activities to address deficiencies or problems; and
- Problems / Deficiencies, Remedial Measures.
- It is responsibility of the management to identify and implement appropriate remedial measures based on identified problems / deficiencies and to properly record and verify all EMP compliance initiatives.

### 8.5.4- Hydrostatic testing

#### A- Purpose of Hydrostatic Testing

The objective of performing hydrostatic testing of a pipeline is to check and eliminate any defect that might be potential threat for leaks and bursting of pipeline when sustaining maximum

operating pressures or sometimes accidental rise in pressure above normal. The key word is pressure which is regulated and when hydrostatic testing is performed through raising the pressure level above the operating pressure to check for any defects in the joining and failure of material due to excessive pressures above the normal operating pressures. If failure occurs then defects are eliminated or in case of no failure a safe margin of pressure above the operating pressure is demonstrated. Defects adversely affect the pressure-carrying capacity because excessive stress in the material leads to failure.

### B- Scope

Primary focus during any pipeline activity, including hydrostatic testing, is public safety and protecting the environment. Also it ensures that the material or substance being transferred from one point to another location is conserved and does not occur as waste from the system.

### C- Definitions

Hydrostatic Leak Testing is used to test components for leaks by pressurizing them inside with a liquid. This testing method can be used on piping, tanks, valves and containers with welded or fitted sections.

### D- Procedure

Hydrostatic testing of pipelines is one method to identify defects or damage in pipelines that could potentially cause a pipeline leak.

A hydrostatic test is a routine test to ensure the integrity of pipelines and distribution network. The information below outlined the hydrostatic testing process.

- The gas inside the pipeline is removed and replaced with water. This water contains an environmentally safe green dye to aid in determining the location of a defect, in the event of leak.

- The water inside the pipeline is pumped up to a pressure much higher than the normal operating procedure of the pipeline (i.e. transporting petroleum while in full operation). This high pressure is typically held for at least 8 hours.
- During this test, which will likely occur during the late evening and early morning hours,
- In the event of sudden leak of water from the pipeline, the pressure will be reduced rapidly and the green water should be raised to the surface quickly.
- In the event of small leak of water from the pipeline; the pressure will be reduced slowly and the green water may not immediately reach the surface. To locate the leak, excavate the pipeline at determined locations for further investigation and testing.
- In the event that defect in the pipeline is identified, repair will be made as soon as possible and the testing will continue until the pressure remains intact for at least 8 hours.
- The pipeline will be refilled with the gas products and the distribution service to the area will be resumed.
- PGPL is committed to the continued safe operation of its pipelines and ensuring the efficient and reliable transportation of petroleum product.

### E- Management Options of Hydrostatic testing

Management of Hydrostatic testing consists of;

- Description of the pipeline to be tested. Include information such as the location, dimensions, and materials of construction, intended use.
- Identify the source of the water to be used for the test. (Should be a good quality water

source such as a municipal water supply, drinking water well, irrigation well, clean source of surface water, etc.) Note: The use of surface waters may require a temporary water use permit from the Pakistan environmental protection agency.

- Description of any chemicals to be added to the test water, the purpose for using the chemicals, and the concentrations used. Provide product literature and material safety data sheets.
- Estimate total volume of test water to be discharged in gallons and discharge rate.
- Description of how the test water will be settled, filtered, or otherwise treated to prevent erosion and remove suspended solids, oil and grease, and other pollutants.
- A description of how dissolved oxygen will be restored to the test water if it is going to reach any surface water body.
- No hydrostatic test water may be discharged within near drinking water supply intake.
- The operator's representative responsible for ensuring that the hydrostatic test water is disposed of properly.

### 8.5.5- Noise and air emissions

#### A- Purpose

The purpose of this guideline is;

- To monitor contents of polluting substances in the atmospheric air;
- To control observance of approved limiting permissible emissions at man-made sources;
- To monitor natural sources and a number of man-made sources of emission at work sites at the construction phase;
- To monitor noise emissions;
- Sources of noise emissions;

#### B- Scope

Scope of work include

- Evaluation of present ambient air quality and noise level at existing area.
- Evaluation of impact of impact of traffic movement at the proposed site and noise level.
- Evaluation of impacts on roads and in the adjacent area due to construction and operation.
- Recommendations for mitigation techniques to redress the expected impacts both for design phase and operational phase.

#### C- Definitions

In common use the word noise means unwanted sound or noise pollution. Excessive noise permanently damages hearing, but a continuous low-level sound can be dangerous too.

#### D- Procedure

Air emissions (continuous or non-continuous) from LNG facilities include combustion sources for power and heat generation (e.g. for dehydration and liquefaction activities at LNG liquefaction terminals, and regasification activities at LNG receiving terminals), in addition to the use of compressors, pumps, and reciprocating engines (e.g. boilers, turbines, and other engines).

Emissions resulting from flaring and venting, as well as from fugitive sources, Principal gases from these sources typically include nitrogen oxides (NO<sub>x</sub>), carbon monoxide (CO), carbon dioxide (CO<sub>2</sub>), and, in case of sour gases, sulfur dioxide (SO<sub>2</sub>). For LNG plants with important combustion sources, air quality impacts should be estimated by the use of baseline air quality assessments and atmospheric dispersion models to establish potential ground level ambient air concentrations during facility design and operations planning. These studies should ensure that no adverse

impacts to human health and the environment result.

Emissions of green house gases together with NO<sub>x</sub> and SO<sub>x</sub> are expected from power generation plants. All reasonable attempts should be made to maximize energy efficiency and design facilities to minimize energy use. The overall objective should be to reduce air emissions and evaluate cost-effective options for reducing emissions that are technically feasible.

The main noise emission sources in LNG facilities include pumps, compressors, generators and drivers, compressor suction/ discharge, recycle piping, air dryers, heaters, air coolers at liquefaction facilities, vaporizers used during regasification, and general loading / unloading operations of LNG carriers / vessels.

Atmospheric conditions that may affect noise levels include humidity, wind direction, and wind speed. Vegetation, such as trees, and walls can reduce noise levels. Installation of acoustic insulating barriers can be implemented, where necessary.

### E- Noise and air emissions Management Options

Noise and air emissions monitoring includes:

- Strategic environmental planning (e.g., plant siting and fatal flaw analyses)
- Pollution control device feasibility, troubleshooting, and cost evaluations
- Innovative solutions and flexible permitting.
- Regulatory tracking and rulemaking negotiation on behalf of corporations and trade associations including New Source Review (NSR) Reform, Maximum Available Control Technology (MACT) standard development
- Enforcement assistance, economic evaluations, expert testimony.

- Environmental Management System (EMS) development
- Air permitting such as Prevention of Significant Deterioration (PSD), New Source Review (NSR), and state construction permits
- Air quality modeling and monitoring of air and noise emissions.
- Risk Management Plans
- Emission release inventories (Toxic Release Inventories, Global Warming and Green House Gas Inventories)
- Leak Detection and Repair
- Pollution control technology assessment,
- emission inventory development,
- capture efficiency,
- control equipment performance and equipment specifications and warranties,
- compliance assessment,
- non-compliance resolution,
- negotiation of commercial terms for air pollution and control equipment and control systems, and
- Development of parametric monitoring, periodic monitoring, and compliance assurance monitoring.

### 8.5.6- Erosion protection requirements

#### A- Purpose Erosion Protection

Erosion control projects protect public and private land value and can help reduce sediment pollution by minimizing the degrading effects of erosion. Erosion control projects utilizing natural materials also conserve plant, fish, and wildlife habitat, as well as wildlife access to the land. Erosion control is necessary at the project sites which are interfacing with land and shore.

## B- Scope

Soil erosion by water and wind affects the natural environment. Soil loss, and its associated impacts, is one of the most important, yet probably the least well-known, of today's environmental problems. The scope of this activity is to control the erosion through practice of preventing or controlling wind or water erosion.

## C- Definitions

The natural process by which the surface of the land is worn away by the action of water, wind, or chemical action is termed as Erosion.

Shore erosion protection works are structures or measures constructed or installed to prevent or minimize erosion of the shoreline in the critical area i.e. is most likely to be the area influenced by the project.

## D- Procedure

The best erosion control methods involve the restoration of natural environments along the shoreline. Replanting bay grasses and shrubs and utilizing biodegradable materials as well as offshore breakwaters can stabilize soil while enhancing habitats at the same time. Structural barriers, such as bulkheads, compact soil, alter the composition of the land, and often undermine natural ecology.

**Mulching** - Applying plant residues or other suitable materials, not produced on the site, to the surface of the soil. This application will help conserve moisture; prevent surface compaction or crusting; reduce runoff and erosion; control weeds; and help establish plant cover.

## E- Management Options

Adequate management and/or structural best management practices to minimize accelerated erosion prevent sediment pollution to the waters of the coastal area and maintain the resource base. Generally this will require a conservation plan

that meets the soil loss tolerance. Soil loss tolerances denote the maximum level of soil erosion that allows high levels of sustainable economic crop productivity.

- Wherever possible, non-structural erosion control measures, such as marsh creation, should be used to stabilize eroding shoreline.
- Where no significant erosion is occurring, structural shore erosion control measures should not be encouraged.
- Structural erosion control measures should only be used in areas designated for this activity and when non-structural measures are impractical or ineffective.
- A conservation plan includes best management practices to address erosion and sedimentation control and protection of the soil resource. In the absence of a complete conservation plan, an erosion and sedimentation control plan consisting of appropriate numbers and locations of sediment removal best management practices, must be developed, installed and maintained.

## 8.5.7- Cleanup and re-vegetation

### A- Purpose

This involves removal of excess excavated material (not used as backfill), restoring the site surface to final contours, and stabilization of slopes. After cleanup, disturbed areas are stabilized, smoothed, mulched, reseeded, and fertilized as required. After construction is complete and cleanup is in progress, temporary erosion controls may be removed and permanent landscaping and erosion control measures installed where required as part of final facility reinstatement. It also involves the conservation of mangroves which will be taken away during construction activity.

### B- Scope

Topsoil is segregated from subsoils during this operation. Top soil is stored in temporary topsoil stockpile areas for later use in re-vegetation programs. Regular visual inspection is conducted to monitor the growth of vegetation and to ensure that no erosion occurs on slope areas while the trees and other vegetation get established to protect the slope surfaces. The re-vegetation programs will be continued by the Project.

Mangroves re-plantation will be conducted with a ratio of 1:5 i.e. for each mangrove removal five (5) mangroves will be planted.

### C- Procedure

To determine the number of protected species if any in or around the construction zone in order to assess damage inflicted on the natural environment through the loss of these species and the damage to their ecotopes in the course of clearing construction sites:

- To determine number of rare species growing within the determined populations in the clearance zone.
- To determine proximity of the rest of the species population to the pipeline route in order to assess the constructions possible impact on the whole of the population.
- To assess the condition of rare species in the impact zone prior to and in the course of the construction, as well as during commissioning of the facilities.
- To determine number of mangrove species/ total area over which mangrove area spread.
- To identify area for re-plantation of mangroves with consultation IUCN and regulatory authority.

### D- Management of Cleanup and re-vegetation

#### i- Responsibilities

The site environmental coordinator (SEC) is responsible for verifying that clearing and re-vegetation is performed in compliance with

applicable environmental requirements and specifications.

#### ii- Instructions

The site environmental coordinator (SEC) will verify that the layout at the facility work area and temporary use areas conform to project.

- The SEC will verify that clearing and re-vegetation is performed in accordance with construction Specifications, which include requirements for timber removal, slash disposal, and dust control.
- The SEC will verify that any debris resulting from clearing activities that may block stream flow, contribute to flood damage, or result in streambed scour or erosion is immediately removed from the stream area.
- The SEC will verify that all necessary measures are taken to minimise erosion and transport of sediment and silt from graded and disturbed work areas. Erosion control specifications and site specific erosion control plans will be followed to ensure that disturbed areas are stabilised and erosion is minimised to the greatest extent practicable.
- Environmental inspection will be conducted during clearing and grading activities and in coordination with Construction Superintendent.
- IUCN and regulatory authority will be in close contact by PGPL while managing/ replanting mangroves and their suggestions will be considered accordingly.

### E- Recording & Reporting

The site environmental coordinator (SEC) will document on a Daily Environmental Inspection Reports (DIR) the progress of clearing and re-vegetation activities and status of compliance.

## 8.5.8- Waste management plan

### A- Purpose of Waste Management

The purpose of this procedure is to provide guidelines and simplify the process of categorizing, quantifying, managing, and disposing of solid wastes. Waste management is a critical component of company's operating policies. Waste management includes the proper handling, collection, storage, manifesting, transportation, and disposal/recycling of the solid waste generated. The procedure is designed to assist in a company wide effort to provide protection to the environment and to comply with company's corporate requirement, environmental laws and regulations regarding proper waste management.

### B- Scope

The waste management plan has been developed by the pipeline / jetty construction contractors to ensure that the Management of solid waste generated as a result of the construction of the pipeline and associated activities is consistent, efficient, and in conformance with the laws and regulations.

With respect to monitoring, the waste management sets out the following objective:

- To monitor and inspect waste management-related facilities and activities directly resulting from executing the scope of the contract in order to ensure compliance with the WMP. Guidelines for proper handling, categorization, recording, minimization, recycling and disposal of all types of waste associated with company operations and projects are part of this procedure.

### C- Definitions

#### i-Waste

Any material, for which no further use is intended, is considered a waste. It can be solid,

semi solid or liquid. Additionally, abandoned materials and materials intended to be recycled are considered wastes. It is very important to understand this concept, because even though something is going to be recycled, it must be managed as a waste until it is actually recycled.

#### ii- Hazardous Waste

Waste is categorized as a hazardous waste if it has one or more of the following properties:

- Ignitability (flash point less than 60 0 C);
- Corrosivity (pH less than or equal to 2.0, or greater than or equal to 12.5);
- Reactivity (inherently unstable under ordinary conditions or when exposed to water);
- Irritability (when in contact with body causes inflammation)
- Toxicity (may cause risk of injury to health of organisms or the environment.)

#### iii- Non-hazardous Waste:

The wastes are categorized as non-hazardous wastes, if they do not possess any of the hazardous characteristics as defined above. However, non-hazardous waste may still present hazards to employees who handle them. All recommended safety and handling practices must be followed.

### D- Procedure

Priorities to manage the waste are listed below:

- Eliminate waste production whenever and wherever possible. Use the material only for its intended purpose on site
- Minimize waste production
- Reuse
- Recycle waste on site.
- Dispose of waste through properly designed

waste disposal facility.

#### **i- Waste Minimization**

To minimize waste, the following steps shall be taken by all personnel working on COMPANY sites:

- Only the needed amount of materials shall be ordered. Before purchasing hazardous material, all alternatives for non-hazardous material should be explored.
- Prior consideration shall be given to the sizes of containers available when ordering products that could potentially generate waste. The intent is to avoid unused products and / or their containers from becoming wastes that require special handling.

#### **ii- Waste Categorization**

All wastes generated at COMPANY facilities shall be categorized in two major categories (i.e. Hazardous wastes and Non-hazardous wastes) as per the definitions in section 3.0. Each category has different types of requirement for handling, storage and disposal.

#### **iii- Labeling**

- Name of the waste (e.g., waste oil, solvents).
- Waste category (e.g., toxic, ignitable).
- Facility name and address (disposal site, etc.).
- Date of waste accumulation: (date when waste was placed in drum).
- Wastes are segregated and located in designated areas to optimize control; storage areas.

#### **iv- Segregation**

Waste management becomes very complicated if different types of waste are mixed together. A small amount of hazardous waste, mixed with a non-hazardous waste or recyclable material, can make the whole mixture a hazardous waste. Disposal costs and liabilities for hazardous waste

are very high, so it is extremely important to identify wastes and keep them segregated.

The scheme of segregation is as follow:

- All hazardous waste shall be segregated from other types of hazardous wastes as well as non-hazardous wastes at the point of generation of waste.
- At all facilities, following types of containers, with colour coding for easy identification, shall be kept to collect and segregate common wastes:
- Food waste shall be collected in separate containers.
- All containers must be properly and clearly labeled. The label must clearly mention the name or type of waste. Also, if the waste is hazardous, it should be clearly labeled on the container along with its hazardous characteristics (e.g. flammable, toxic, radioactive, etc.). This is important to workers and to emergency response teams, who need to know what they are dealing with. Missing or unreadable labels must be replaced.

#### **v- Storage and Handling**

- Waste that will be sent for recycling or off-site disposal shall be temporarily stored at waste storage facilities available at different sites such as Junkyard, Scrap yard, pits, etc.
- The oily sludge, contaminated soil and other hazardous liquid waste (e.g. rinsate, chemicals, etc.) shall be stored in lined pits with HDPE liner. Liner shall be of sufficient thickness (at least 20mil) and adequate strength to withstand tears and punctures.
- All other wastes awaiting disposal shall be kept in closed containers separately. Care must be taken to prevent wastes giving rise to secondary environmental problems, such as odors or soil and groundwater pollution through rainwater leaching.

- All stored wastes must be clearly labeled with type of waste and warning signs.
- Daily estimates of hazardous and no hazardous waste and volumes generated on site.
- Waste segregation, waste storage containers, general housekeeping and the provision of adequate resources will be monitored.
- All workers handling wastes shall use proper PPE.

### vi- Recycling

Recycling and reuse minimizes the quantity of waste requiring disposal. Some of the wastes can be reused within the facilities while others can only be recycled

Coding system for different type of waste	
Waste material	(Colour or code)
Glass	(blue); ■
Metals	(green); ■
Plastic	(white); ■
Oily rags	(black); ■
Used oil	(red); ■
Rubbish / trash	(yellow) ■

at off-site recycling centers. For example, recycling of used oil is possible in some of the Lube Oil Recycling companies; batteries may be sent back to manufacturer or distributor for recycling. Waste shall not be sold to the unauthorized contractors/companies, who may not have proper recycling facilities, to avoid misuse and to reduce associated liabilities. The possibilities of recycling of each waste are discussed in relevant documents.

### vii- Treatment

Some of the wastes, such as wastewater from camps, oily wastewater from process, etc., require proper treatment before disposal. The treated water should comply with National Environmental Quality Standards (NEQS).

### viii- Disposal

Disposal becomes the only available alternatives, if reuse and recycling options are exhausted. A material should be classified as a waste for disposal only if no other useful purpose can be identified and if the material cannot be beneficially reused or recycled. The choice of a suitable disposal option for any waste depends on both environmental and economic considerations. The final disposal can be either at on-site disposal facilities or at off-site disposal facilities.

#### (a) On-site Disposal Facilities

##### Burial Pits

Only segregated food waste shall be buried in burial pits. Buried waste should be covered with a thick layer of soil as 'daily cover' to reduce the environmental problems, such as odour from decaying / degrading waste, spreading of waste into other areas due to wind, vermin and disease vector, flies, mosquitoes, etc.

##### Reserve pits

These pits are used to temporarily store drilling waste, chemical waste, oily sludge and contaminated soil. The pits should be properly designed and lined to avoid soil, groundwater and surface water contamination.

##### Incineration

Incinerator will also be used for disposal of waste but before burning the trash, plastics, metal, glass and any other items that are not to be burned, should be segregated first. Ash of the incinerator shall be buried in the lined landfill as it may contain heavy metals.

##### Evaporation Ponds

The evaporation ponds are used to dispose of produced water at some facilities by evaporation. All evaporation ponds should be lined.

##### Off-site Disposal Facilities:

In Pakistan, properly designed and well-operated commercial waste disposal facilities are scarce. All

such facilities are being explored and evaluated for possible future use.

### E- Waste Management Options

Waste will be managed accordance with the following requirements.

- Garbage collection containers, which will be located on the land site and on board FSRU.
- Environmental inspectors/technicians will document, in their daily report, the compliance to measures outlined in this plan.
- Kitchen and food waste will be segregated from other waste materials; the main collection container for these wastes will be emptied at least twice a day in the interests of health and hygiene.
- Other wastes such as tins, glass, packaging, plastics, etc., will be placed in the appropriately designated collection container; the main waste containers will be emptied at an approved waste storage site.
- All wastes will be segregated upon receipt at the waste storage area.
- Inert waste will be segregated and stored to promote reuse; it will not be stored where it can be easily moved into a wetland or water body.
- The main garbage collection container(s) will be regularly collected and transported by a waste collection firm who specialise in waste disposal as per regulations.
- The impact caused by handling (including stockpiling, labeling, packaging & storage), collection, transportation and disposal of wastes shall be addressed in detail and appropriate mitigation measures shall be proposed. This assessment shall cover the following areas:
  - Potential hazards;
  - Air and odour emissions;

- Noise;
- Wastewater discharge;
- Public transport; and landscape and visual impacts, if any.
- Wildlife protection requirement
- Fisheries protection

### F- Recording & Reporting

PGPL has to record the information about source, composition, quantity, and final disposal of the waste. This information is needed for regulatory compliance, risk assessment and setting reduction targets and objectives as well as corporate statistics.

The **Waste Tracking Form**, as shown in Table-8.3 shall be used to record this information by all PGPL teams, while waste is being dispatched outside facility or PGPL's controlled location. It is the responsibility of the Team Leader to assign a suitable person (such as Lead Operator at all manned fields) to sign off the **Waste Tracking Form**, before the waste is dispatched outside.

## 8.5.9- Environmental monitor/inspector

### A- Purpose Environmental Monitor / Inspector

This procedure identifies environmental responsibilities for the project offices and for the construction site. It also provides procedural guidance for environmental training, inspection, monitoring functions during construction.

### B- Scope

Primary scope of environmental inspector/monitor is to comply with the environmental requirements of the project. PGPL is also responsible for inspecting, documenting, and ensuring that construction meets environmental responsibilities through an

integrated program of personnel orientation and training, and inspection of construction activities. In addition, the company will assist in implementing environmental management plans through its program of construction inspection.

### C- Definitions

Consists of examining construction activities in the field to verify and document that activities are carried out in compliance with construction and environmental Permits, specifications relating to environmental protection, and mitigation plans approved for the LNG project.

### D- Procedure

The company will establish a plan detailing the procedures and documents required for implementing environmental management plan thereby complying to the environmental legislations and regulations during the construction and operational phase of the project.

An environmental inspector will be assigned oversee the environmental compliance inspection process. In addition to performing duties, the environmental inspector (IE) will;

- Communicate with the Environmental Manager and the Chief Construction officers on daily basis.
- Provide key liaison role in coordinating attendees and facilitating agreements in the field, as appropriate, with agency representatives.
- Coordinate daily with construction inspectors, the contractor, and biological and culture monitors to ensure that required monitors are present when construction activities are scheduled in all requiring monitors.
- The EI will be on a peer status with other project construction inspection staff.
- The EI will act as a liaison between the

contractor and agency field representative and will coordinate regularly with the various construction inspectors are apprised of the status of environmental issues in their respective areas.

- The EI will be responsible for determining noncompliance activities and anticipating activities and situation that could result in noncompliance to plan of Development, environmental permits, and project stipulations.
- The EI will play a significant role suggesting methods to bring construction activity into compliance and/or to temporarily halt certain activities that may cause damage to sensitive environmental resources.

### E- Management Options

Functions and responsibilities that will be assigned to company's ES&H department include:

- Orientation of LNG project personnel in environmental requirements and procedures particularly in context to the sensitive resource issues at the construction site.
- Environmental training particularly in environmental monitoring is to be imparted to all project personnel.
- Inspection of facilities construction activities for compliance with environmental regulations,
- Specifications, stipulations, drawings, mitigation plans, and procedures.
- Documentation of all training, inspection, and monitoring activities should be exercised.
- Coordinate with the owner's environmental representatives and management personnel on environmental issues.
- Provide technical support to Owner for

**Table-8.3: Waste Tracking Form**

Location of Generation:			
Reporting Team:			
Submitted by (Name):			
Submitted on (Date):			
Waste	Approx. Quantity	Unit	Disposal Location
Aerosol Cans (Empty)			
Asbestos			
Batteries (Dry)			
Batteries (Lead Acid)			
Charcoal from Turk Amine Plant			
Clinical Waste			
Construction Waste			
Crude Oil or Condensate Waste			
Descaling Acids			
Diethanolamine (DEA)			
Drilling Fluids/Solids			
Drums and Containers (Empty)			
Filters			
Fluorescent Light Tubes			
Food Waste			
Glycols			
Laboratory Wastes			
NORM Containing Waste			
Oil Contaminated Soil			
Oily Rags (Used)			
Paint Waste			
Pigging Wastes			
Plant Wastewater			
Produced Water			
Rinsate			
Sanitary Wastewater			
Scale (Pipe and Equipment)			
Sludge			
Trash			
(i) Glass			
(ii) Metal			
(iii) Plastic			
(iv) General Trash			
Used Engine Oil			
Checked and Signed:		dated:	

obtaining environmental permits or other Authorizations as needed or modified during facilities construction.

## F- Recording & Reporting

Environmental compliance records will be completed daily (as applicable) on standard reporting forms. Other records may include daily logbooks, meeting notes, correspondence, or records of telephone conversations. Compliance reports and other appropriate records will be logged into the field ES&H office and copies transmitted to the project office.

Forms will be used to document field inspection activities. They become permanent documents when completed by the Site Environmental Coordinator (SEC) /trainer and reviewed and signed by the appropriate supervisor, as required. Documentation that will be used by field environmental compliance personnel is summarized below.

### i- Daily Environmental Inspection Checklist

The purpose of the checklist is to document the results of the environmental inspection activities conducted during the day with respect to compliance of observed construction activities relative to applicable environmental requirements.

The ES&H Manager reviews the report for adequacy and accuracy and identifies potential problem areas. Construction sign-off is required only if there is a non-compliance requiring action and/or acknowledgement by Construction. Copies of all checklists are filed in the site ES&H files.

The checklist is designed to be site specific and will remain dynamic through-out construction to ensure it remains relevant to current activities.

### ii- Weekly Inspection Report

A weekly inspection report is prepared by the SEC after completing a general inspection of site and submitted to the field ES&H Manger with copies to the Environmental Lead. The report

includes:

- Summary of inspection and monitoring efforts on the spread over the past week;
- Identification of any non-compliance and steps taken to correct non-compliance;
- Any other issues or problems encountered in carrying out inspection activities (e.g., schedule delays);
- Government representatives on-site during the week;
- Inspection and monitoring plans and schedules for the upcoming week.
- General site audit and completion of the "Weekly Inspection Checklist".

The Owner will have a standing invitation to accompany project personnel on this audit. The checklist will be modified over time to reflect pertinent issues related to the phase of construction presently occurring.

## 8.6- Contingency planning- accidents & malfunctions

### 8.6.1- Fire Contingency Plan

Because flammable / combustible materials are present at this site, fire is an ever-present hazard.

All personnel and subcontractors are not trained professional fire-fighters. Therefore, if there is any doubt that a fire can not be quickly contained and extinguished, personnel will notify the Site Superintendent by radio and vacate the area. The Site Superintendent will immediately notify the local Fire Department.

The following procedures will be used to prevent the possibility of fires and resulting injuries:

- Sources of ignition will be kept away from where flammable materials are handled or stored.

- The air will be monitored for explosivity before and during hot work and periodically where flammable materials are present. Hot work permits will be required for all such work.
- No Smoking" signs will be conspicuously posted in areas where flammable materials are present.
- Fire extinguishers will be placed in all areas where a fire hazard may exist.
- Before workers begin operations in an area, the foreman will give instruction on egress procedures and assembly points. Egress routes will be posted in work areas and exit points clearly marked.

The following procedures will be implemented in the event of a fire:

- Anyone who sees a fire will notify their supervisor who will then contact the Site Superintendent and the Health and Safety Officer by radio. The Health and Safety Officer will activate the emergency air horns and contact the local Fire Department.
- When the emergency siren sounds, workers will disconnect electrical equipment in use (if possible) and proceed to the nearest fire exit.
- Work crews will be comprised of pairs of workers (buddy system) who join each other immediately after hearing the fire alarm and remain together throughout the emergency. Workers will assemble at a predetermined rally point for a head count.
- When a small fire has been extinguished by a worker, the Site Superintendent and the Health and Safety Officer will be notified.

#### A- Evacuation Procedures

In the event on-site evacuation of remedial action personnel is necessary, the following actions will be taken:

- The emergency signal will be activated (one

single long blast on the air horn).

- No further entry of visitors, contractors, or trucks will be permitted. Vehicle traffic within the site will cease in order to allow safe exit of personnel and movement of emergency equipment.
- Shut off all machinery if safe to do so.
- All on-site personnel, visitors, and contractors in the support zone will assemble at the entrance to the site for a head count and await further instruction from the Site Superintendent.
- All persons in the exclusion zone and contamination reduction zone will be accounted for by their immediate crew leaders (e.g., foremen). Crew leaders will determine the safest exits for employees and will choose an alternate exit if the first choice is inaccessible.
- During exit, the crew leader will try to keep the group together. Immediately upon exit, the crew leader will account for all employees in his crew.
- Upon completion of the head count, the crew leader will provide the information to the Site Superintendent.
- Contract personnel and visitors will also be accounted for.

The names of emergency response team members involved will be reported to the Site Superintendent.

- A final tally of persons will be made by the Site Superintendent or designee. No attempt to find persons not accounted for will involve endangering lives of employees by re-entry into emergency.
- In all questions of accountability, immediate crew leaders will be held responsible for those persons reporting to them. Visitors will be the responsibility of those employees they are seeing. Contractors and truck drivers are the

responsibility of the Site Superintendent. The Health and Safety Officer will aid in accounting for visitors, contractors, and truckers by reference to sign-in sheets available from the guard shack.

- Personnel will be assigned by the Site Superintendent to be available at the main gate to direct and brief emergency responders.
- Re-entry into the Site will be made only after clearance is given by the Site Superintendent. At his direction, a signal or other notification will be given for re-entry into the Site.
- Drills will be held periodically to practice all of these procedures and will be treated with the same seriousness as an actual emergency.

### 8.6.2- Hazardous spill contingency plan

In the event of an emergency involving hazardous material spill or release, the following general procedures will be used for rapid and safe response and control of the situation.

Emergency contacts in Table-8.4 provide a quick reference guide to follow in the event of a major spill. Hazmat spill responses will be coordinated through the local Emergency Response Centre.

#### A- Notification Procedures

If an employee discovers a chemical spill or a vapour or material release, he or she will immediately notify the Site Superintendent.

The Site Superintendent will obtain information pertaining to the following:

- The material spilled or released.
- Location of the release.
- An estimate of quantity released and the rate at which it is being released.
- The direction in which the spill, vapour or smoke caused by the release is heading.

- Any injuries involved.
- Fire and/or explosion or possibility of these events.
- The area and materials involved and the intensity of the fire or explosion.

This information will help the Site Superintendent to assess the magnitude and potential Seriousness of the spill or release.

#### B- Procedure for Containing/Collecting Spills

The initial response to any hazardous spill or discharge will be to protect human health and safety, and then the environment. Identification, containment, treatment, and disposal assessment will be the secondary response.

If, for some reason, a chemical spill is not contained within a dike or sump area, an area of isolation will be established around the spill. The size of the area will generally depend on the size of the spill and the materials involved. If the spill is large (greater than 55 gallons) and involves a tank or a pipeline rupture, an initial isolation of at least 100 feet in all directions will be used. Small spills (less than or equal to 55 gallons) or leaks from a tank or pipe will require evacuation of at least 50 feet in all directions to allow cleanup and repair and to prevent exposure. When any spill occurs, only response personnel will be allowed within the designated affected area. If possible, the area will be roped or otherwise blocked off.

If the spill results in the formation and release of a toxic vapour cloud, further evacuation will be enforced. In general, an area at least 500 feet wide and 1,000 feet long will be evacuated downwind if volatile materials are spilled.

If an incident may threaten the health or safety of the surrounding community, settlement, etc., it will be consulted and determine if the public will be informed and possibly evacuated from the area. The Site Superintendent will inform the proper agencies in the event of its being necessary (refer to Table-8.5).

All petroleum product spills on the water will be reported to the Environment Protection Agency Sindh.

As called for in regulations developed under the Comprehensive Environmental Response, designated Response personnel will take the following measures:

- Avoid breathing vapors of spilled material.
- If possible and safe to do so, turn off any ignition source or gas emergency shutoff valve.
- Make sure all unnecessary persons are evacuated from the hazard area.
- Put on protective clothing and equipment.
- If a flammable material is involved, remove all ignition sources, and use spark and explosion proof equipment for recovery of

material.

- Determine the major components in the waste at the time of the spill and remove all surrounding materials that could be reactive with the spilled material.
- If wastes reach a storm sewer; try to dam the outfall by using sand, earth, sand bags, etc. If this is done, pump this material out into a temporary holding tank or drums as soon as possible.
- If volatile emissions may occur, spray the spill area with foam, if available.
- Apply appropriate spill control media to absorb discharged liquids.
- For large spills, establish diking around leading edge of spill using booms, soil or other appropriate material. If possible, use a

**Table-8.4: Emergency Telephone Number**

Emergency Response Dept.	Numbers
Local Fire Department	
Local Police	15
Hospital Emergency Room	
Site Superintendent	
Site Safety Officer	
Project Manager	
Vice President, Health and Safety	

**Table-8.5: Contingency and Response Team**

Team Member Title	SES Title	Individual Name
Health and Safety Officers	Site Superintendent	
Alternate Health and safety Officers	Health and Safety Officer	
Alternate No.2	Project Manager	
Response Team Support Personnel	Operation on-site	
Public Relations	Project Manager	

diaphragm pump to transfer discharged liquid to drums or a holding tank.

### C- Emergency spill response cleanup materials and equipment

The supply of appropriate emergency response cleanup and personal protective equipment on hand will be inventoried and visually inspected on a weekly basis.

The materials listed below will be kept on-site for spill control depending on the types of hazardous materials present. The majority of this material will be located in the support zone, in a supply trailer or storage area.

- Activated charcoal (carbon) to adsorb organic solvents (hydrocarbons) and to reduce flammable vapors.
- Appropriate solvents, e.g. CITRIKLEEN, for decontamination of structures or equipment.

The following equipment will be kept on-site and dedicated for spill cleanup:

- Plastic shovels for recovering corrosive and flammable materials.
- Sausage-shaped absorbent booms for diking liquid spills, drains, or sewers.
- Sorbent sheets (diapers) for absorbing liquid spills.
- Over pack drums for containerizing leaking drums.
- 55-gallon open-top drums for containerization of waste materials.

Once a hazard has been recognized, take immediate action to prevent the hazard from becoming an emergency. This may be accomplished by the following:

- Daily safety meeting
- Task-specific training prior to commencement of activity
- Lock-out/tag-out

- Personal protective equipment (PPE) selection/use
- Written and approved permits for hot work, confined space
- Air monitoring
- Following all standard operating procedures
- Practice drills for fire, medical emergency, and hazardous substances spills.

### 8.6.3- Housekeeping

In order to reduce the possibility of accidental spills and safety hazards, good housekeeping practices will be followed. They include prompt removal of small spills, regular maintenance of walking areas, regular removal of refuse, and staging of similar materials together.

### 8.6.4- Security

All rules and regulations set up by landowner will be followed by all personnel on site.

### 8.6.5- Training

All site personnel are trained to operate the equipment that is present at the site.

### 8.6.6- Fire Detection and Warning

Portable Fire extinguishers will be used in buildings and as protection during "Hot Work" activities throughout the site. As construction progresses and systems are commissioned within specific buildings, personnel will be informed of the differential of alarm sounds.

- Large office accommodation will be protected by the use of hard-wired smoke detection devices with battery backup.
- A suitable means of raising the alarm in the event of a fire or other emergency at the LNG terminal will be established. The alarm system will be appropriate to ensure all personnel can be notified immediately of any

emergency situation and evacuation, or other actions required. The alarm system will be tested on a regular basis.

### 8.6.7- Site accommodation

Site accommodation (all temporary facilities) shall be designed and laid out in such a manner so as to reduce the risk of fire to the minimum.

- Good housekeeping shall be observed at all times throughout buildings with desks cleared at the end of each working day and sensitive documents locked away in flame proof cabinets/ lockers.
- All site accommodation shall have sufficient multi purpose dry powder extinguishers located at the access door with signs indicating their positions.
- Additional CO<sub>2</sub> extinguishers shall be provided to cover other electrical equipment.
- All fire extinguishers are visually checked on a regular basis through weekly area inspections and quarterly in accordance with equipment tagging process.

### 8.6.8- Fire drills

- The Fire Safety Co-ordinator shall ensure that monthly drills are carried out that ensure all personnel are familiar with the evacuation procedure and their respective muster points.
- Simulated fires shall be carried out to ensure the readiness and competency of the fire brigade to fight a major fire. During the drill equipment shall be tested and shall adequately work. In the event any piece of equipment should fail it shall be immediately replaced.
- Review of brigade competency shall be determined during the drills. Brigade members shall be retrained if any evidence of in-competency exists.

### 8.6.9- Materials storage

- The Site ES&H Manager must be informed of all flammable gases and liquids being brought onto site.
- Oxygen and fuel gas cylinders shall not be stored together. The minimum distance between cylinders is to be 3 meters. Singular oxygen, acetylene carts will be acceptable as long as they are in use together.
- No flammable materials including solids, gases or liquids shall be stored next to any temporary facilities.
- Storage of flammable gases shall be a minimum of 5 meters from any occupied building suitably secured and with a prominent sign stating "DANGER HIGHLY FLAMMABLE".
- Storage facilities for flammable gases will be inspected by the Site ES&H Manager prior to being used.
- Material storage within the warehouse facility will maintain an excellent standard of housekeeping at all times. Flammable material packaging shall be removed to a safe location as it becomes redundant. Sprinkler systems shall be investigated in warehousing facilities, and where possible installed.
- Materials shall be stored in compliance with OSHA and SEPA regulations.

### 8.6.10- Fire fighting equipment

The following fire fighting equipment shall be maintained in good order at the Project and Equipment will also be suitable for fighting bush fires in and around the LNG Project:

- Fire Extinguishers of adequate size and number
- Fire hose and nozzles
- Bunker gear

- Air packs
- 1 pumper truck with internal tank
- 1 water tanker with pumping capabilities
- Fire pumps of sufficient size to fill tanker or pumper
- Assorted accessories for connecting hoses and fighting fires (wrenches, hose clamps, axes, etc.
- Rescue gear for high level rescue (if this is assigned to this group)
- Equipment shall be maintained and tested to ensure serviceability in the event of a fire.
- Tests shall be conducted monthly.
- A water fill station including a storage tank of adequate size to meet construction fire requirements shall be installed to facilitate the filling of the pumper truck and tanker.
- The plant fire suppression system shall be prioritised and serviceable as soon as practical during construction.

### 8.6.11- Training

All employees shall receive general fire fighting training (i.e. fire extinguisher use). Employees who are members of the fire brigade shall receive at a minimum the following training:

- Use and limitations of the fire fighting equipment
- Fire fighting strategies and methods
- Use of respiratory equipment and its limitations
- Donning bunker gear and its care
- Care and maintenance of fire fighting equipment and hoses
- Confined space entry and fire fighting in a

confined space

- First aid
- High level rescue (if the site assigns this responsibility to this group)

## 8.7- Environmental compliance

As confirmed in the Preliminary EMP, Proponent will be responsible for regular audit and review of environment and safety management of the LNG facility. This will include both on-site auditing and review of performance reports. Additional onsite inspections and investigations will be undertaken in the event of significant environmental incidents. These will be undertaken in conjunction with the relevant government agencies.

Plant management will participate in the audits and inspections and investigations. Plant management will also be responsible for regular review of the environmental performance of the site and site personnel, and for the reporting on the implementation of commitments made in the EMP.

There is also likely to be some compliance auditing associated with the licensing of the LNG Plant, for each government recommendation and proponent commitment, the following information:

- The recommendation or proponent commitment being addressed;
- The issue to be addressed by the proponent;
- How the issue is to be addressed by the proponent;
- Where the issue is addressed in the EMP;
- When the issue is to be addressed by; and
- To whose satisfaction the issue is to be addressed.

The finalisation of the EMP will see the completion of Compliance Audit Table, which

will record dates of compliance by the proponent with recommendations and Commitments and a reference to appropriate documentation from the relevant approving authority. The Compliance Table is meant to be a live document and will be updated periodically throughout the life of the project.

### 8.7.1- Audits

In particular, there will be:

- Annual audit reports.
- A triennial review and improvement of the EMP.

Proponent recognises that periodic external compliance audits and inspections will be made to monitor, assess and validate the level of Proponent performance and compliance pursuant to the commitments made in the accepted Environmental Management Plan.

### 8.7.2- Site Internal Environmental Audit

To enable site management to assess the day-to-day environmental management of activities at the site. Environmental activities include all aspects of operations that result in emissions, effluent or wastes.

### 8.7.3- Environmental Management Systems Audit

To assess the implementation and operational success of the EMS at the site. This is achieved by assessing the objectives, organisational structure, responsibilities,

Procedures, processes and resources available at the site. The EMS Audit is a systems assessment, rather than an audit of environmental compliance, which is assessed through the Site Internal Environmental Audit.

Potential areas of concern for audit during construction of LNG plant mainly include:

- Jetty and unloading arms
- Process Area
- Low Pressure and High Pressure pumping systems
- Vaporizers (Regasification Area)
- Vent or flare systems (low pressure and high pressure)
- Maintenance Workshop
- Administration Building
- Guard House
- Utility Area
- Control Room
- Gas Metering Station
- Offshore Pipeline launching area
- Gas pipeline
- Gas Receiving Station

Stage	Monitoring areas	Parameters and techniques to monitor	Monitoring frequency	Reason to monitor parameter	Responsibility
Construction	Dredging	<ul style="list-style-type: none"> <li>Benthic Community</li> <li>Erosion and Sedimentation</li> <li>Vegetation</li> <li>Disposal of Dredge Material</li> </ul>	Continuous	<ul style="list-style-type: none"> <li>Dredging results in disturbance of benthic community.</li> <li>Causes soil erosion and sedimentation.</li> </ul>	Health, Safety & Environment Department.
	Marine Ecology	<ul style="list-style-type: none"> <li>Biodiversity</li> </ul>	Continuous	Unmitigated operations may result in loss of biodiversity	Health, Safety & Environment Department
	Air Emissions	<ul style="list-style-type: none"> <li>CO</li> <li>SO<sub>x</sub></li> <li>NO<sub>x</sub></li> <li>PM<sub>10</sub></li> <li>PM<sub>2.5</sub></li> <li>SPM</li> </ul>	<ul style="list-style-type: none"> <li>Before start of construction activity</li> <li>Monthly monitoring during construction and operation</li> </ul>	Emissions from construction machinery and power production and operation of FSRU may result in deterioration of air quality	Health, Safety & Environment Department
	Solid Waste	Solid waste quality and quantity	Continuous	Improper disposal may result in deterioration of marine ecology	Health Safety & Environment Department
	Wastewater	Primary Pollutants of NEQS	Monthly	Improper disposal may result in deterioration of marine ecology	Health, Safety & Environment Department
	Noise	Noise Intensity	<ul style="list-style-type: none"> <li>Start of construction</li> <li>Monthly</li> </ul>	Uncontrolled noise may cause nuisance	Health, Safety & Environment Department
	Soil	<ul style="list-style-type: none"> <li>Soil contamination</li> <li>Soil erosion</li> <li>Soil sedimentation</li> </ul>	Monthly	Surface and sea water pollution	Health, Safety & Environment Department
	Occupational Safety	<ul style="list-style-type: none"> <li>Accidents</li> <li>PPEs</li> <li>Annoyance</li> </ul>	Continuous	Occupational safety and legal obligations	Health, Safety & Environment Department
	Land reclamation	<ul style="list-style-type: none"> <li>Soil Quality</li> </ul>	Continuous	Legal obligations and structure protections, Prevention of soil erosion and sedimentation to the port.	Health, Safety & Environment Department

Table 8.6: Environmental Monitoring Plan						
Stage	Monitoring areas	Parameters and techniques to monitor	Monitoring frequency	Reason to monitor parameter	Responsibility	
End of construction	Restoration of sites	<ul style="list-style-type: none"> <li>Visual analysis</li> <li>Photographic records</li> </ul>	End of construction	Compliance of Environmental Approval Conditions	Health, Safety & Environment Department.	
	Waste water	<ul style="list-style-type: none"> <li>Waste water minimisation</li> <li>Storage and handling</li> <li>Recycling and reuse</li> <li>Treatment before disposal</li> <li>Primary Pollutants of NEQS</li> </ul>	Monthly	Compliance of Environmental Approval Conditions	Health, Safety & Environment Department	
Operations	Solid waste	<ul style="list-style-type: none"> <li>Solid waste quality and quantity</li> <li>Solid waste disposal</li> </ul>	Monthly	Compliance of Environmental Approval Conditions	Health, Safety & Environment Department	
	Fire & Safety	<ul style="list-style-type: none"> <li>Fire Hazards &amp; Safety Protocols</li> </ul>	Continuous	Compliance of Environmental Approval Conditions	Health, Safety & Environment Department	
	Air Emissions	<ul style="list-style-type: none"> <li>CO</li> <li>SOX</li> <li>NOX</li> <li>PM10</li> <li>PM2.5</li> <li>SPM</li> </ul>	Monthly	Compliance of Environmental Approval Conditions	Health, Safety & Environment Department	
	Noise	Noise intensity measurement	Monthly	Compliance of Environmental Approval Conditions	Health, Safety & Environment Department	
	Hazardous spill	<ul style="list-style-type: none"> <li>Spill on Land</li> <li>Spill on Water</li> </ul>	Continuous	Compliance of Environmental Approval Conditions	Health, Safety & Environment Department	
	Traffic management	Standard Operating Procedures	Continuous	Compliance of Environmental Approval Conditions	Health, Safety & Environment Department	
	Compliance monitoring	<ul style="list-style-type: none"> <li>EIA Commitments</li> <li>Mitigation Measures</li> <li>Conditions of Environmental Approval</li> <li>SOPs</li> </ul>	Monthly	<ul style="list-style-type: none"> <li>EIA Commitments</li> <li>Mitigation Measures</li> <li>Conditions of Environmental Approval</li> <li>SOPs</li> </ul>	Independent Monitoring Consultant (IMC)	