# CONTINGENCY PLAN FOR THE EIA

# LNG EXPORT PROJECT,

# PAMPA MELCHORITA

# PERU

## JULY 2003

## INSPECTRA S.A.

# CONTINGENCY PLAN

## LNG EXPORT PROJECT, PAMPA MELCHORITA

## PERU

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# CONTINGENCY PLAN
# LNG EXPORT PROJECT, PAMPA MELCHORITA
# PERU

## 1. INTRODUCTION

A Contingency/Emergency Plan of the project is a prevention tool to counteract the effects that may arise from emergencies caused by accidents, fires, natural phenomena or sabotage. The event must be controlled during all stages of the project's development and within its area of influence.

This Contingency Plan establishes general criteria on the organization and duties of the personnel who will be in charge of controlling emergencies so as to enable them to adopt measures to reduce potential damage to own personnel, third party personnel, the public in general and facilities. It also establishes guidelines for communicating with the competent Authorities and making arrangements to obtain foreign assistance if required.

Pursuant to Article 23 of Supreme Decree 046-093-EM, in the future the referred Contingency and Emergency Plan must be developed in detail, containing specific procedures, personnel and equipment to control spills, fires and emergencies and shall be submitted to the General Hydrocarbon Bureau of the Ministry of Energy and Mines for its approval through the respective Ministerial Resolution; to OSINERG for its information and to the General Harbor Masters' and Coastguard Bureau who will approve the respective Contingency Plan for the case of spills in the sea.

## 2. OBJECTIVES

The main objective of this Plan is to establish the general guidelines for the 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 Complex.
- 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 storage and dispatch, industrial services, administration buildings and residential housing area, in view that they are 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.

## 3. RISK SITUATIONS

The future natural gas liquefaction plant will be located off Km. 167 and 170 of the South Pan American Highway and will be built in accordance with the applicable international standards and the national Legislation currently in force.

The natural gas will be received at the plant through a branch of the main pipeline coming from Camisea to Lima. Once received, the gas will undergo the following processes: purification, refrigeration, liquefaction, compression, LGN storage and dispatch for exportation through its own maritime terminal located at Playa Melchorita.

The Plant is located in an area of high seismic activity in accordance with the zoning of the Geographical Institute of Peru.

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

### 3.1 Internal Risks

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

- Uncontrolled gas leak (non-liquefied natural gas, liquefied natural gas, refrigerant gases, ethylene and propane) into the atmosphere.
- Fire / explosions.
- Hydrocarbon or by-product spills (gasoline, diesel).
- Chemical product spills (Methyl Dietanolamine aMDEA, Amerel 1500 foam, Therminol 55 heating fluid, Sodium Hypochlorite).
- 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 an in the sea).

### 3.2 Natural Risks

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

- Strong earthquake
- Tsunamis (floods)

### 3.3 External risks

Risks arising from delinquent actions, terrorism or vandalism.

### 3.4 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 centers but also to external support institutions (National Police, Fire Fighters, etc.).

### 3.5 Risk management

The management of contingencies at the natural gas liquefaction export 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

## 4. DESCRIPTION OF THE ORGANIZATION AND FUNCTIONS

### 4.1 Scope

The organization chart to be prepared must include the personnel working in the Plant (operations, maintenance and administration, vigilance personnel and external communications with institutions from the area of influence of the Province of Cañete, such as, the Voluntary Fire Fighters Corps, Civil Defense and Assistance Centers or a quick means of evacuation to protect the lives of personnel through the use of a helicopter or ambulance to a larger hospital such as the Rebagliati or Almenara Hospitals in the City of Lima (since they are more implemented and have adequate infrastructure for helicopter landing).

Depending on the magnitude of the emergency, it must be first controlled using the adequate means available in each area of the Plant, with the assistance of other areas and, in more serious cases, external assistance will be requested such as the Fire Fighters, Civil Defense, the National Police and Assistance Centers from the Province of San Vicente de Cañete, who will determine whether it is necessary to obtain support from other larger hospitals in the city of Lima.

The organization must group the personnel in accordance with their authority and duties.

**4.2 Response levels**

Two levels of response must be contemplated:

a) With own personnel

b) With external government cooperation, such as Civil Defense, Fire Fighters, National Police, High Ranking Assistance Centers and the Government Attorney General's Office.

**4.3 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 |

**4.3.1 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

a) The following official OSINERG forms must be used:

| Form | Description |
|---|---|
| OSINERG-SGUR-0002-GH | Minor or serious accident report within 72 hours following the occurrence thereof. |
| OSINERG-SGUR-0003-GH | Fatal Accident Preliminary Report within 24 following the occurrence thereof. |
| OSINERG-SGUR-0004-GH | Preliminary report of crude oil or by products spill or leak |
| OSINERG-SGUR-0005-GH | Report of crude oil or by products spill or leak |
| OSINERG-SGUR-0006-GH | Preliminary Report of Threat-Fire – Fire/Explosion |
| OSINERG-SGUR-0007-GH | Report of Threat-Fire – Fire/Explosion |

b) In the event of spills, leaks or discharges into the sea or the beach, the Harbor 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 Harbor Master's and Coast Guard Bureau.

c) Local Authorities will be advised by telephone (both Fire Fighter's Company No. 49 of Cañete, Civil Defense, Essalud Hospital, Rezola Hospital).

d) 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.

e) The relatives of the injured person, as soon as he is evacuated to a hospital.

f) To the extent possible, the press will be notified after the accident has been investigated and by the person designated by Management.

g) 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.

**4.3.2 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.

**4.3.3 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 LNG 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 an mitigation plan.

**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.

#### 4.3.4 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.

## 5. TRAINING AND COACHING

The Plant and Terminal will have a: (i) Distributed Control System to monitor and control the plant process and operation, (ii) a 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.

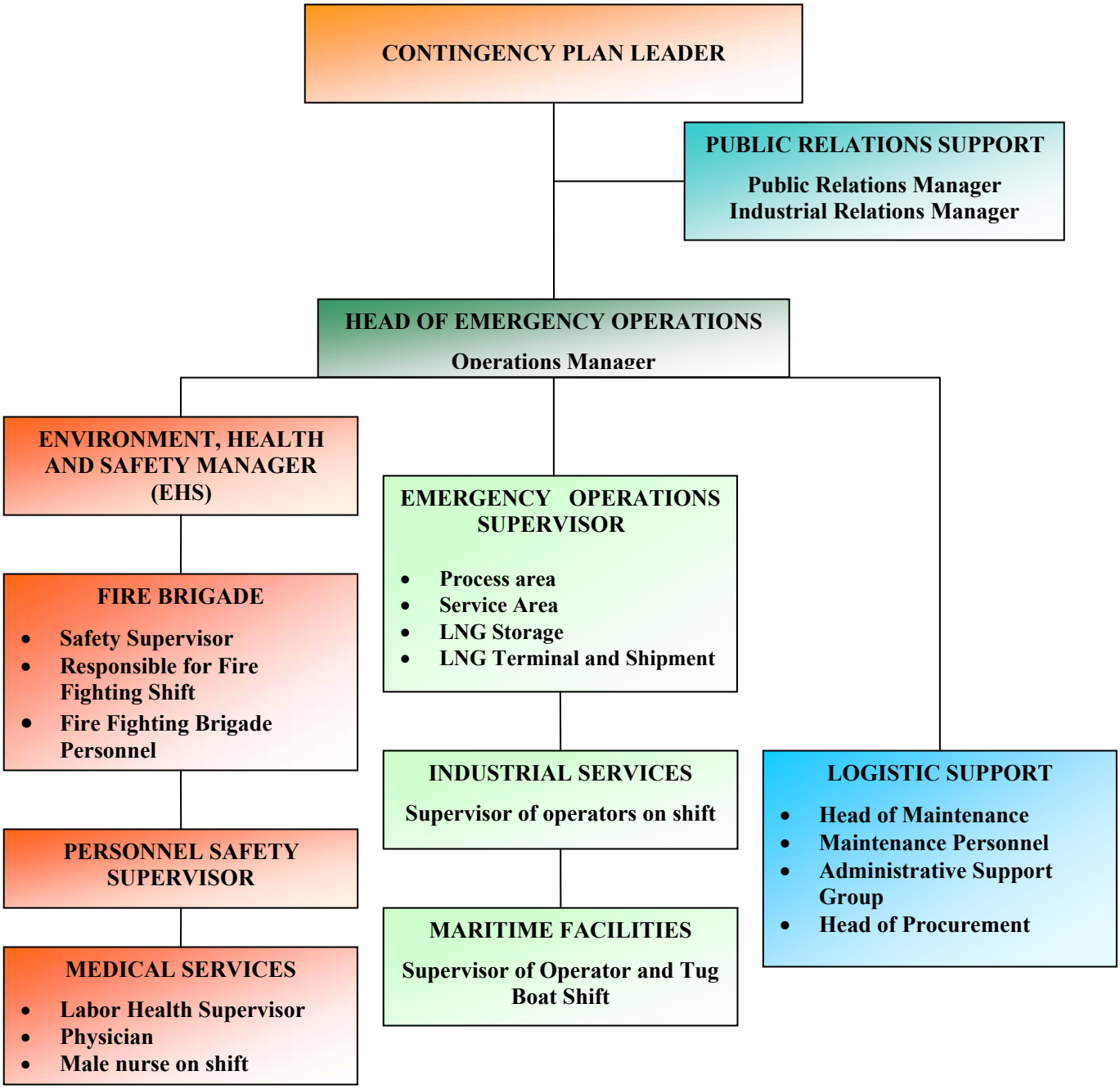
A permanent fire fighting system will be installed, which shall include fire fighting water, foam generators and CO2 extinguishers. The personnel will be trained in the use and operation of said systems.

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.

In order to fulfill this objective, 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 situations.

## GENERAL ORGANIZATION FOR CONTINGENCIES



**EMERGENCY TELEPHONE DIRECTORY**

**EXTERNAL NOTIFICATION**

| ENTITY | TELEPHONE NO. |
|---|---|
| COMPAÑÍA DE BOMBEROS N°49 DE CAÑETE SWITCHBOARD<br><br>CAPTAIN (José Navarro Fernández) | 581-2004, 581-1144<br><br>9-864-6365 |
| DEFENSA CIVIL CAÑETE SWITCHBOARD<br><br>CIVIL DEFENSE TECHNICAL SECRETARY (Mr.Carlos Reyes Jiménez).<br><br>CIVIL DEFENSE PRESIDENT – MAYOR SAN VICENTE DE CAÑETE MUNICIPALITY (Mrs. Rufina Levano Quispe) | 581-2387<br><br>581-2963<br><br>581-2583 |
| PERUVIAN NATIONAL POLICE (Head Col. Miguel Angel Zuloeta Gutierrez) | 581-2024, 581-3231 |
| ESSALUD CAÑETE (Level No. 2 Hospital) SWITCHBOARD<br>DIRECTOR ESSALUD (Dr. Carlos Cuadros Luncor) | 581-2168, 581-2062<br><br>581-2047 |
| REZOLA HOSPITAL<br>EXECUTIVE DIRECTOR (Dr.José Zolano Gutierrez). | 581-1349<br>581-2010 |
| REBAGLIATI HOSPITAL (ESSALUD)<br>ALMENARA HOSPITAL (ESSALUD)<br>(Higher Rank Hospitals) | 265-4901<br>324-2983 |
| OFFICE OF THE PROVINCIAL PROSECUTOR'S OFFICE CAÑETE (Government Attorney's Office) | 581-2354, 581-3305 |
| GENERAL HYDROCARBON BUREAU (DGH) | 475 - 7674 |
| OSINERG | 219 - 3400 |

Note: The names of the individuals presiding over these Institutions will be updated in the Operations Contingency Plan.

# "PERU LNG COMPANY"
# PAMPA MELCHORITA - PERU

# CONTINGENCY PLAN TO

# CONTROL AND FIGHT

# HYDROCARBON SPILLS AND LIQUEFIED NATURAL GAS (LNG) LEAKS IN THE MELCHORITA MARITIME TERMINAL

**APPROVED BY :** .....

**SIGNATURE:** .....

**TITLE** : .....

**DATE** : .....

**JULY 2003**

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# SECTION: A

# INTRODUCTION AND CONTENTS OF THE PLAN

## 1. INTRODUCTION

### The Project

**PERU LNG S.R.L.** is a company engaged in the performance of hydrocarbon activities in Peru, which includes the implementation of a project to export Liquefied Natural Gas ("LNG") to the US west coast, using for such purpose Natural Gas extracted from the Camisea fields.

In order to carry out this Gas export project (LNG), **PERU LNG S.R.L.,** plans to build a natural gas liquefaction plant and related export facilities in a 521-hectare plot of land known as Pampa Melchorita, located between the Pacific Ocean and the current South Pan American Highway, between km 167 and 170 thereof, in the district of San Vicente, province of Cañete, department of Lima.

### Contingency Plan

This Plan has been prepared in accordance with the guidelines for the preparation of contingency plans to address spills of hydrocarbons and other hazardous substances into the sea, rivers or navigable lakes, contained Directorial Resolution No. 0497– 98/DGH dated December 1, 1998, issued by the General Bureau of Harbor Masters' and Coastguards and the requirements of Regulation 26 of Annex I of the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of Annex I, 1978 relating thereto (**MARPOL** 73/78).

The purpose of the plan is to provide orientation and make the Terminal personnel and the personnel working in the tugboats familiar with the actions and procedures to be followed to prevent, mitigate and fight a spill of hydrocarbons and hazardous substances into the sea.

The Plan contains very useful information on LGN, since the main purpose of the terminal is to load this product onto ships berthing in its wharf. This information ranges from its physical properties to health care in the event of exposure thereto.

It is important to mention that this plan only applies to spills involving Diesel 2, which is supplied to the terminal tugboats, and not to LNG leaks, since it evaporates quickly into the environment. However, safety measures relevant to this product have been included.

The Plan contains the detailed organization, information and instructions for its implementation.

This Contingency Plan has been approved by the Administration; therefore every change will be registered in the Register of Changes and Revisions attached to this Plan. The Pisco Harbor Master's Office must be informed, as contemplated in the regulations on this matter.

## 2. CONTENTS OF THE PLAN

### 2.1 NAME OF THE TERMINAL

| | | |
|---|---|---|
| Name | : | Melchorita Maritime Terminal |
| Legal Address | : | Av. Víctor Andrés Belaunde Nº 147<br>Vía Principal 140<br>Torre Real 6, office 503<br>San Isidro, Lima 27 Peru |
| Telephone number | : | (51 - 1) 611 - 5115 |
| Fax Number | : | (51 - 1) 611 - 5102 |

### 2.2 LOCATION OF THE TERMINAL

| | | |
|---|---|---|
| Location | : | Offshore the Melchorita Beach<br>Cañete – Lima – Perú<br>Km 169 of the South Pan-American Highway |
| Telephone Number | : | |
| Fax Number | : | |

### 2.3 NAME OF THE TERMINAL SUPERINTENDENT

| | | |
|---|---|---|
| Operations Manager | : | |
| Address | : | |
| Telephone Number | : | |

## 2.4 CHANGE REGISTRATION FORM

| CHANGE NO. | Page(s) changed or Affected Party(ies) | Date of Change |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

# SECTION : B
# RESPONSE OPERATIONS

# 1. NOTIFICATION PROCEDURE

## 1.1. PARTIES TO BE NOTIFIED

**1.1.1 THE QUALIFIED PERSON** to be notified in the event of a spill or threatened spill will be:

Name :

Title : Terminal Superintendent

Telephone Number :

**1.1.2 THE ALTERNATES** to be notified are:

Name :

Title : Operations Superintendent

Telephone Number :

Name :

Title : Head of the Safety and Environmental Protection Unit

Telephone Number :

**1.1.3 RESPONSE PERSONNEL**

All personnel working in the Terminal, who shall be duly instructed to address spills or leaks; the Personnel from the THREE (03) tugboats that provide 24-hour support. They

will act in accordance with their duties and responsibilities described in item F of part 3 of Section B.

**1.2 WHEN TO NOTIFY:**

A notice must be given when there is knowledge of and/or when there is an actual or threatened hydrocarbon spill, that may affect the sea environment or other sensitive areas of the zone.

It must also be kept in mind that this notice will be given when there is an actual or probable spill.

**A. Actual Spill**:

A hydrocarbon or hazardous substance discharge resulting from damages to the transfer facilities found in the terminal bridge, wharf loading equipment or vessel equipment.

A hydrocarbon or hazardous substance spill during normal tugboat fueling operations.

**B. Probable Spill:**

Whenever damages or breakdowns occur in the plant or transfer facilities or in the dock's loading system that may affect its safety and that of the terminal, such as running aground, fire, explosion, floods, etc.

Structural damages to the facilities of the terminal bridge and in the dock itself, that may affect the equipment and necessary elements used in hydrocarbon transfer.

**1.3 HOW TO NOTIFY**

Any tugboat crew member as well as the personnel assigned to the Wharf and in the ship during LNG loading operations, and in the utility dock during diesel 2 loading operations, who notices a possible or actual spill, will immediately contact the Supervisors of the plant and terminal operations shift by radio or simultaneously giving a sound signal from the ship indicating an emergency due to a spill or leak in order to immediately stop pumping diesel 2 or LNG, as the case may be.

Once pumping has been stopped, the Plant Shift Supervisor will advise the Operations Manager and/or the Head of the Safety and Environmental Protection Unit of this event, who will verify the information and assess the magnitude of the spill an is projections as well as actual and potential damages. He will contact the Pisco Harbor Master's Office through the fastest means available, in order to apply the contingency Plan, if necessary.

The Superintendent of the Terminal will deliver to the Pisco Harbor Master's Office a preliminary report of the spill or leak in the duly completed Notification Form within a term of no more than 24 hours following the spill. Furthermore, the corresponding spill forms will be submitted to OSINERG, within the same term as above, and also advising of the incident by phone and fax.

### 1.4 AUTHORITIES AND ENTITIES TO BE NOTIFIED

| ENTITY | TEL. | VHF | FAX | EMAIL |
|---|---|---|---|---|
| **CALLAO Harbor Master's Office** | | | | |
| **PISCO Harbor Master's Office** | | | | |
| **Civil Defense of the CAÑETE Municipality** | | | | |
| **Civil Defense of the LIMA Municipality** | | | | |
| **Civil Defense of the CHINCHA Municipality** | | | | |
| **Civil Defense of the PISCO Municipality** | | | | |
| **CAÑETE Ecological Police** | | | | |
| **CHINCA Ecological Police** | | | | |
| **OSINERG** | | | | |

## 1.5 NOTIFICATION FORM

Ministry of Defense
General Harbor Masters' and Coastguard Bureau

Report on Crude Oil and by-products Spill

| |
|---|
| DATE<br>REPORT<br>OFFICE DATE (INDICATE EQUIPMENT) |

**THE OCCURRENCE**

| |
|---|
| DATE TIME TYPE<br>PRODUCT<br>CHARAC. QTY. SPILLED<br>(M3)<br>TIME OF LOSS AND TENSION OF AREA INVOLVED (M2)<br>**ENVIRONMENTAL CONDITIONS**<br>AIR (Temp) WINDS (Speed) KNOTS<br>(Direction)<br>WEATHER FORECAST<br>CURRENTS (Speed) KNOTS<br>(Direction)<br>**SPILL POSITION**<br>Location<br><br>LONGITUDE LATITUDE<br><br>DIRECTION AND SPEED (Degrees and Knots)<br>LENGTH AND WIDTH OF THE STAIN (Miles)<br>SPILL SOURCE (Well, submarine line, B/T, etc.)<br>HOW WAS IT DETECTED<br><br>PRIMARY CAUSES OF THE SPILL<br><br>OPERATING CONTROL AND RECOVERY ACTIONS ADOPTED<br><br>QUANTITY RECOVERED<br>ACTION TAKEN IN RESPECT OF RECOVERED PRODUCT<br><br>DESCRIPTION OF THE AREA AFFECTED (JUNGLE, BEACHES, ROCKS, RIVERS, etc.).<br><br>MITIGATION WORK CARRIED OUT AND FINAL CONDITION OF THE AREA<br><br>REHABILITATION PROGRAM TO BE IMPLEMENTED<br><br>RECOMMENDATIONS AND/OR WARNING<br><br>COULD THE SPILL HAVE BEEN AVOIDED YES ( ) NO ( ) |

| | | |
|---|---|---|
| COULD IT HAVE BEEN DETECTED EARLIER | YES ( ) | NO ( ) |
| IS THERE A CONTINGENCY PLAN IN PLACE | YES ( ) | NO ( ) |
| ARE CONTROL AND CLEAN-UP TECHNIQUES KNOWN | YES ( ) | NO ( ) |
| IS CONTROL EQUIPMENT IN CONDITIONS FOR USE | YES ( ) | NO ( ) |
| IS THE PERSONNEL FAMILIAR WITH THE CONTINGENCY PLAN | YES ( ) | NO ( ) |
| WHERE DISPERSANTS APPLIED | YES ( ) | NO ( ) |
| WAS COORDINATION MADE WITH THE HARBOR MASTER'S OFFICE | YES ( ) | NO ( ) |

**COST IN DOLLARS**

| DIRECT | INDIRECT |
|---|---|
| PRODUCT SPILLED | DEFERRED PRODUCTION |
| EQUIPMENT OR SYSTEM REPAIR | LOSS OF PROFIT |
| CLEAN-UP AND RECLAMATION WORK | FINES |
| INDEMNITY TO THIRD PARTIES | OTHERS (SPECIFY) |
| TOTAL: | TOTAL |

| |
|---|
| COMPANY |
| REPRESENTATIVE (NAME AND SIGNATURE) |

**1.6 PRELIMINARY REPORT OF THE SPILL OR LEAK OF CRUDE OIL OR BY-PRODUCTS OSINERG**

| | |
|---|---|
| N | |
| Year | |

| | |
|---|---|
| OSINERG Code | |

**1. TYPE**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| RIVER | ( ) | IN THE SEA | ( ) | ON LAND | ( ) | OTHERS | ( ) Explain |

**2. COMPANY DATA**

| | |
|---|---|
| Firm name: | RUC: |
| Activity: | Location: |
| Legal Address | |

**3. SPILL OR LEAK INFORMATION**

| | | |
|---|---|---|
| DATE: | TIME: | TYPE OF PRODUCT: |
| PLACE | | QUANTITY (Bbl) (cubic feet) |
| TIME OF THE LOSS: | | AREA INVOLVED (m2) |
| HOW WAS THE SPILL DETECTED | | |
| DESCRIBE HOW IT OCCURRED: | | |

**4. THE REPORT**

| | |
|---|---|
| RESPONSIBLE ENGINEER:<br>SIGNATURE:<br><br>----------<br>Names and Surnames | LEGAL REPRESENTATIVE:<br>SIGNATURE:<br><br>----------<br>Names and Surnames |

**OSINERG SGUR 004 G11**

**NOTES:**

1.- According to Article 27 of Supreme Decree 029-97-EM, emergencies (hydrocarbon leaks or spills) must be reported to OSINERG by phone or fax within 24 hours following the occurrence (Form OSINERG-SGUR-004-GH)

2. Thereafter, once the investigation has been made, an amplified report of the spill and its consequences must be delivered to OSINERG within five (5) business days following the occurrence(form OSINERG-SGUR-005-GH)

## 1.7 REPORT OF THE SPILL OR LEAK OF CRUDE OIL OR BY-PRODUCTS OSINERG

| | |
|---|---|
| N | |
| Year | |

| | |
|---|---|
| OSINERG Code | |

**1. TYPE**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| RIVER | ( ) | IN THE SEA | ( ) | ON LAND | ( ) | OTHERS | ( ) Explain |

**2. COMPANY DATA**

| | |
|---|---|
| Firm name: | RUC: |
| Activity: | Location: |
| Legal Address | |

**3. SPILL OR LEAK INFORMATION**

| | | |
|---|---|---|
| DATE: | TIME: | TYPE OF PRODUCT: |
| PLACE | | QUANTITY (Bbl) (cubic feet) |
| TIME OF THE LOSS: | | AREA INVOLVED (m2) |
| HOW WAS THE SPILL DETECTED | | |
| DESCRIBE HOW IT OCCURRED: | | |
| PRIMARY CAUSE(S) OF THE SPILL | | |
| OPERATIVE ACTIONS FOR CONTROL AND RECOVERY ADOPTED | | |
| QUANTITY RECOVERED (Bbl) | | |
| ACTION TAKEN WITH REGARD TO PRODUCT NOT RECOVERED | | |

| OTHERS: | YES | NO( ) |
|---|---|---|
| COULD THE SPILL OR LEAK HAVE BEEN AVOIDED | | |
| COULD IT HAVE BEEN DETECTED EARLIER | | |
| IS THERE A CONTINGENCY PLAN IN PLACE | | |
| WAS THE CONTINGENCY PLAN APPLIED | | |
| WHERE DISPERSANTS APPLIED | | |
| WERE ARRANGEMENTS MADE WITH THE HARBOR MASTER'S OFFICE | | |
| ( ) EXPLAIN | | |
| | | |

**4. ENVIRONMENTAL IMPACT**

| MINIMAL | ( ) | SEVERE | ( ) | SERIOUS | ( ) |
|---|---|---|---|---|---|

| DESCRIPTION OF THE AFFECTED AREAS (JUNGLE, BEACHES, ROCKS, RIVERS, ETC.) |
|---|
| DESCRIPTION OF THE MITIGATION WORK PERFORMED AND FINAL CONDITION OF THE AREA |
| DESCRIPTION OF THE REHABILITATION PROGRAM TO BE IMPLEMENTED (INDICATE SCHEDULE) |

**5. THE PERSONNEL**

| | YES | NO ( ) |
|---|---|---|
| IS THE PERSONNEL FAMILIAR WITH THE CONT. PLAN | | |
| ARE THE ACTION AND JOB DESCRIPTION INDICATED | | |
| ARE THEY FAMILIAR WITH CONTROL AND CLEAN-UP TECHNIQUES | | |
| DO THEY KNOW HOW TO CORRECTLY USE THE EQUIPMENT | | |
| ( ) EXPLAIN | | |

**6. THE EQUIPMENT**

| | YES | NO ( ) |
|---|---|---|
| IS THERE CONTROL AND RECOVERY EQUIPMENT | | |
| IS THE EQUIPMENT IN PLACES OF EASY USE | | |
| WAS THE EQUIPMENT ADEQUATELY USED | | |
| LAST MAINTENANCE DATE: | | |
| LAST TRAINING IN THE USE OF EQUIPMENT DATE: | | |
| ( ) EXPLAIN | | |

**7. THE REPORT**

| DATE OF ISSUANCE: | YES | NO |
|---|---|---|
| WAS THE COMPETENT AUTHORITY REPORTED (REF. ART. 251 OF SD 055-93-EM) | | ( ) |
| AN ADDITIONAL TERM TO ISSUE THE FINAL REPORT IS REQUESTED | ( ) | |

| RESPONSIBLE ENGINEER: | LEGAL REPRESENTATIVE: |
|---|---|
| SIGNATURE: | SIGNATURE: |
| ---------- | ---------- |
| Names and Surnames | Names and Surnames |

**OSINERG SGUR 005 G11**

**NOTES:**
1.- According to Article 27 of Supreme Decree 029-97-EM, emergencies (hydrocarbon leaks or spills) must be reported to OSINERG by phone or fax within 24 hours following the occurrence (Form OSINERG-SGUR-004-GH)
2. Thereafter, once the investigation has been made, an amplified report of the spill and its consequences must be delivered to OSINERG within five (5) business days following the occurrence(form OSINERG-SGUR-005-GH)

## 2. SPILL MITIGATION PROCEDURE

### 2.1 SUBSTANCES INVOLVED AND AVERAGE DISCHARGE:

A. The substances involved are Diesel 2 and LNG.

B. The Diesel 2 loading regime to supply the THREE (03) tugboats is 50 gallons per minute, with a maximum of approximately 200 m3 (200 tons) each.

C. The LNG loading regime oF vessels is 11,000 m3 per hour, with a maximum of 160,000 m3, which is the total capacity of the vessels that will be moored in the terminal.

The vessels and their auxiliary machinery are gas fired, and boilers use fuel oil. To this end, each one has two (02) 5,700 m3 tanks.

### 2.2 SPILL PREVENTION AND MITIGATION

#### A. ACTIONS TO PREVENT A SPILL

- The condition of the pipes, flanges, hoses, connections, valves and expulsion pumps will be inspected periodically to make sure that they are not worn out or malfunctioning.

- Circulation signs will be kept inside the plant, so that they will be visible at all times, by personnel in charge of mitigating the spill or leak.

- Signs showing the emergency telephone numbers of entities and authorities to be notified will be updated at all times and placed where they may be easily seen.

- The list of immediate action to be taken in the event of spills or leaks will be posted in a visible place.

- Immediate action drills will be held periodically, so that the personnel will be conveniently prepared.

## B. ACTIONS TO MITIGATE A SPILL

### B.1 Operational Spill:

- These occur during hydrocarbon loading operations; in the utility dock there is a 200 gallon oil tank for the fire pump, to provide diesel to the tugboats. The tanks are located in the plant. The first action to be taken by the Shift Supervisor is to order the immediate stoppage of pumping operations, being able to later isolate the damaged area of the plant or maritime area.

- At the plant, the hydrocarbons contained in the tanks in the event of a spill remain within the containment walls that have the capacity to store all the fuel from the tank. Thereafter, using submergible absorbing pumps, the fuel is extracted to be sent to the API tanks arranged in the plant.

- The tugboats will go to the place where the spill equipment and materials are found, arranged on the utility dock in order to mitigate a spill that has occurred, taking containment barriers, absorbing cloth and drums to temporarily place the oil wastes collected. These actions will be advised to and coordinated with the loading head of the plant.

### B.2 Spill caused by an occurrence

- Depending on the cause, the safety of the personnel will have priority over the facilities.

- In the plant, in the event an earthquake has affected the tanks' structures, efforts will be made to prevent the fuel from exiting the containment walls.

- In the Terminal, if damage occurs due to the roughness of the sea or an earthquake affecting the pipes causing a leak, pumping will be immediately stopped.

## C. ACTION TO BE TAKEN IN THE EVENT OF A SPILL

- If hydrocarbons have spilled into the sea, the tugboats will immediately proceed to the spill equipment storage area, which equipment has been conveniently placed in a compartment in the utility platform. They will then proceed to the spill area with all the assigned personnel and the material and equipment ready and deployed. The actions to be taken are the following:

  - Placement of containment barriers
  - Recovery of hydrocarbons or oily substances, as the case may be, with absorbing cloth to be poured into the temporary storage drums.

- Once most of the spilled oily substance has been extracted, a surfactant will be used, which is a spill contractor. The use of dispersants should be avoided at all times, since these are more hazardous in time than the spill itself.

- If dispersants are used, they must be authorized by DICAPI and according to the criteria set forth in DR N 0066 – 96- DGC dated March 13, 1996, which refers to the use of dispersants. It should be mentioned that these dispersants may only be used in areas that are more than 20 meters deep, and authorized by the Pisco Harbor Master's Office on a case-by-case basis.

- The dispersants authorized by DICAPI, which shall have a validity of three (3) years, to be renewed by the interested parties, subject to verification, are the following:

- ECODIS
- ELASTOL
- SOLVAC – D

## 2.3 LIST AND LOCATION OF EQUIPMENT

The spill kit to be used on land and sea is the following:

**FOR SPILLS**

| EQUIPMENT | QUANTITY | LOCATION |
|---|---|---|
| 18' 18 ABSORBING CLOTH | 16 | Utility Platform |
| 3/8 PAD 18 18 | 100 | Utility Platform |
| ABSORBING ROLL 19 140' | 01 | Utility Platform |
| ABSORBING CHORD 4 40' | 100 | Utility Platform |
| GLOVES, LENGTH 13 | 4 PAIRS | Utility Platform |
| SPECIAL BAGS WITH POLYETHYLENE TIES | 100 | Utility Platform |
| 55 GAL POLYETHYLENE DRUMS | 02 | Utility Platform |
| 25 LB GRANULAR PEAT BAG | 01 | Utility Platform |
| 10' ABSORBING CHORD<br>70' ABSORBING CHORD | 100<br>30 | Utility Platform |
| 55 GALLON DISPERSANT DRUM | | Utility Platform |

The personnel of the Plant, the Terminal and the THREE (03) tugboats will act in accordance with the job distribution chart contained herein, which covers the entire facility and applies to all drills carried out.

It is important to mention that the tugboat crew members will be responsible of containing the spill and preventing it from reaching the coast. This means that they will be the first to have access to hydrocarbon spill equipment and deploy it to the spill area.

The tugboat crew members will dispose of their wastes in tanks located in the utility platform, which have a 50-gallon capacity and are equipped with wheels to be transferred to the plant for final disposal. These tanks will be used for:

- Oil wastes
- Waste water
- Solid wastes

Waste water will be processed inside the plant and later disposed of, with DIGESA's permission in the green areas located inside the plant. Oily wastes will be stored in drums and they disposed of in authorized treatment plants. Solid wastes will be incinerated inside the plant or disposed of in duly authorized sanitary landfills, if appropriate. Soil contaminated with diesel both on the beach and within the containment walls will be taken to the designated plot of land inside the plant to be mixed with chemicals for biological degradation, thus complying with the national regulations.

| FIRE FIGHTING EQUIPMENT | | |
|---|---|---|
| **DESCRIPTION** | **MAKE** | **OBSERVATION** |
| | | |
| Motor pump | | 100 GPM |
| Motor pump | | 100 GPM |
| Motor pump | | Wharf Fire Fighting System |
| Foam pump | | Wharf Fire Fighting System |
| Telecommanded Monitor | | Wharf Fire Fighting System |
| Telecommanded Monitor | | Wharf Fire Fighting System |
| Deflecting nozzles (18) | | Wharf Fire Fighting System |
| Hydrants (6) | | Wharf Fire Fighting System |
| Fixed Monitors (2) | | Wharf Fire Fighting System |
| Fixed Monitors (2) | | Wharf Fire Fighting System |
| Hose Stations (4) | | Wharf Fire Fighting System (fresh water) |
| Gas Detector and Monitor | | Wharf Fire Fighting System |
| Gas sensors (14) | | Wharf Fire Fighting System |
| Portable motorpump | | |
| Portable motorpump | | |
| Air compressor | | |
| Dry Chem. Powder Exting. | | 136 kg |
| Dry Chem. Powder Exting. | | 136 kg |
| Dry Chem. Powder Exting. | | 250 kg |
| Dry Chem. Powder Exting. | | 250 kg |
| Neoprene cloth (29)<br>Canvass cloth (12) | | 1 ½ ∅ (30 m) hose |
| Neoprene cloth (69)<br>Canvass cloth (14) | | 2 ½ ∅ (30 m) hose |

Fire fighting water or foam jets, generally placed in high parts.

## 2.4 FIRE FIGHTING STATION

2.4.1 The design of the fire water supply and the distribution system are based on a water volume required for a large scale fire; 227 m3/hour (1000 gpm) per monitor. There are four monitors installed in the plant and terminal, with a total of 908 m3/hour, which would be the demand required.

2.4.2 In this sense, the plant has a fire water storage tank (T-6305), capable of providing 04 continuous hours of water to the fire pumps. On a secondary basis and as an emergency, water for fire fighting may be obtained from the sea.

2.4.3 It is important to mention that the tank (T-6305) needs at least 8 days to refill, in view that the desalination regime is 30 m3/hour (120 gpm).

2.4.4 It has two fire pumps, each with a capacity of 908 m3/hour. They suction water to tank T-6305. One of them is ready to act, while the other is on stand-by. Both pumps operate with Diesel 2, for which they have a 4 barrel capacity (200 US gal) supply.

2.4.5 Among others, the water distribution system has the following elements: a system of hydrants, monitors, a protection foam system and a sprinkler system. The size of the system is such that it may reach the farthest point of the plant.

2.4.6 The pipes and valves are arranged in such a way that the water may arrive from two directions to any area of the plant.

2.4.7 The general system must be capable of manually turning on or shutting off the foam system, and must also have a depth of 01 meter of foam over the LNG leak, until is has completely vaporized.

2.4.8 The plant has mobile water and foam fire fighting equipment and an ambulance.

2.4.9 The fire truck is one of those available in Peru, with four doors for the crew cabin. It has a 341 m3/ hour pump (1500 gpm) on average as well as a proportional foam system.

2.4.10 The tank containing concentrated foam has a capacity of 227 m3/hour (1000 US gal) and must be resistant. It may be made of polypropylene or fiberglass with a separate water compartment.

2.4.11 The fire truck carries low expansion concentrated foam, in 5-gallon containers with on line inductors and foam generators of large expansion.

2.4.12 A monitor is mounted on the fire truck with a large expansion portable generator. This design agrees with international standards.

2.4.13 The ambulance is equipped to provide medical emergency service. It is of type I, class Id 4 2, conventional, as it exists in Peru.

## 3. RESPONSE ACTIVITIES

A. Response actions are described in the foregoing point.

B. The Terminal Superintendent, as the qualified person and the Operations Manager, as well as the Head of the Safety and Environmental Protection Unit, as alternates, have full authority to commence immediate response action in the event of a spill of oily substances, leaks or fires and to coordinate with the Maritime Authority and OSINERG.

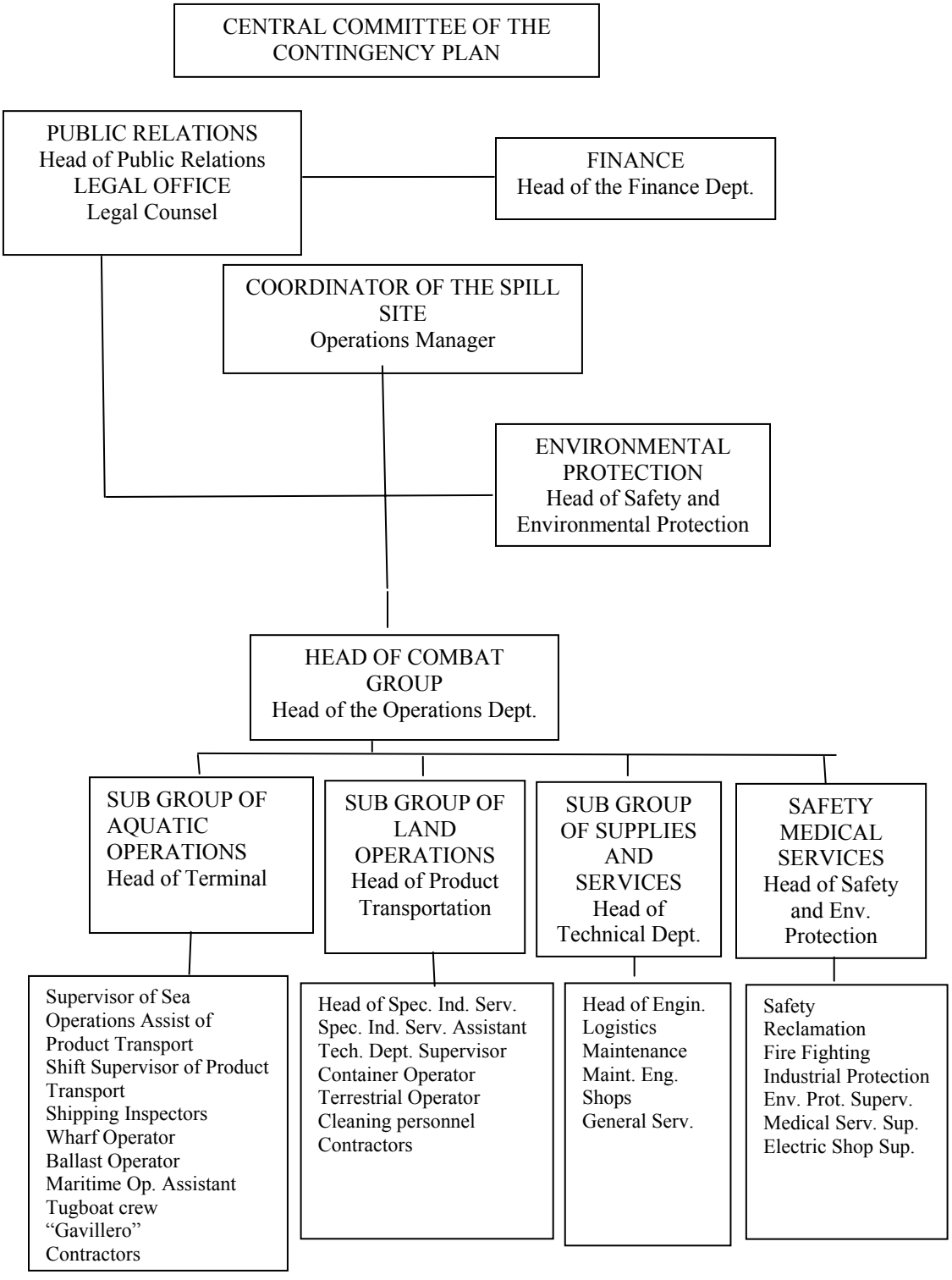
C. The personnel is conveniently trained to address a spill in any loading situation and to support situations where the local contingency plan is applied. The personnel's responsibilities are described in the table contained in part E of this Section.

D. The equipment is detailed in part C of Section B of this Contingency Plan.

E. The response charts of the Terminal personnel are shown in this part of the Plan:

Chart No. 1 Organization
Chart No. 2 Performance
Chart No. 3 Allowances and Responsibilities

CHART NO. 1 ORGANIZATION TO FIGHT AND EMERGENCY



Duties and Responsibilities of the Response Plan in the event of a hydrocarbon spill

**Central Committee of the Contingency Plan**

Is formed by:

- Terminal Superintendent
- Operations Manager
- Head of the Safety and Environmental Protection Unit

Assisted by the Legal Office, Public Relations and the Finance Department.

Its main functions are:

- Decide the level of investment to be made in order to provide the necessary resources for the implementation of the Contingency Plan.
- Coordinate with the legal office all matters regarding the complaints filed against the Company as a result of the spill.
- Authorize the hiring of services required to control the spill.
- Keep the General Management of the Company posted on the entire scope of the contingency.
- Review and approve the contingency report and order the actions required to prevent it from repeating.

**Coordinator of the Spill Site CLD**

- Decide the implementation of the Zonal Contingency Plan.
- Inform the Central Contingency Committee the events and of the decision to trigger the Zonal Contingency Plan.
- Likewise, if the contingency requires it, coordinate with the Pisco Harbor Master's Office to trigger the Local Contingency Plan.
- Keep the Harbor Master's Office posted on the development of the response actions.

- Provide through public relations, with the authorization of CCC, the official information on the contingency. He will be the only one authorized for this purpose.
- Request the opening of an authorization for expense (AFE) to collect the contingency expenses.
- If necessary, coordinate with the local authorities and Civil Defense the evaluation of the inhabited centers in the vicinity of the risk area.
- Constantly evaluate the availability of spill control equipment and recommend actions necessary to achieve strengthening or renovation.
- Issue the final contingency report.
- Coordinate the preparation and offering of courses, seminars, drills to keep the personnel trained to address any contingency that may arise.
- Foster the development of prevention activities.

**Head of the Combat Group JGC**

- Evaluate the preliminary spill report and assist the CLD for the implementation of the Zonal Contingency Plan.
- Assume the direction of the response action plan.
- Keep the CLD informed of the development of the response actions.
- Determine the response strategies of the equipment and materials to be used.
- Coordinate with the Sub Groups the containment, recovery, clean-up and reclamation actions.
- Establish the initial time of the response operations and supervise with the support of safety the development of the agreement safely as planned.
- In coordination with the CLD and the Environmental Protection Advisory Office, define the place and the procedure for the final disposal of recovered hydrocarbons.
- Prepare the daily log book.
- Foster the ongoing treatment of the Combat Group

**Head of the Water Operations Sub Group JSGOA**

- Responsible for the effective use of the containment and gathering equipment. Also, of the surfactant when so required, or of the authorized dispersant, with the prior authorization of the Harbor Master's Office.
- Responsible for the storage and water transportation of the recovered product up to the place designated for final disposal.
- Verify the supply of materials and equipment required and supervise the transportation thereof to the spill site.
- Assign the tasks to be performed to each member of his Sub-Group.
- Inspect the affected area together with the safety personnel and determine that no risks exists for the performance of response operations.
- Supervise the activities are developed according to the established work procedures and safety profiles.
- Prepare the daily information on activities and deliver it to the Combat Head.

**Head of the Land Operations Group JSGOT**

- Responsible for gathering, storing and final disposal of recovered hydrocarbons.
- Responsible for the adequate clean-up of contaminated beaches.
- Assign the tasks to be performed to each Sub-Group member.
- Verify the supply of materials and equipment required and supervise the transportation thereof to the site of the spill.
- Inspect the affected area with the safety personnel and determine if there are no risks for the performance of response operations.
- Supervise the activities are carried out in accordance with the established work procedures and safety profiles.
- Prepare daily information on the activities and deliver it to the Combat Head.

**Head of Supply and Services Sub-Group JSGSS**

- Supply the equipment, spare parts and materials required to fight the spill, and timely transport it to the site of the occurrence.

- Provide room and board for the personnel participating in the response operations.
- Transport the materials and equipment to the place indicated by the Operations Sub-Groups.
- Keep communication from the direction center of the Spill Site Coordinator, the Combat Group Head, the Heads of Operations Sub-Groups and other offices that may be required.
- Provide communication equipment for required liaison.
- Provide the required third-party support personnel (contractors) for spill and clean-up control work.
- Be in charge of a group of mechanics, electricians, communications, logistics and administrative services personnel.

**Safety and Medical Services**

- Recommend the personal protection equipment required for the members of the response team to perform their activities with the minimum risk.
- Supervise strict compliance with the safety measures adopted in order to avoid accidents.
- The Safety and Fire Fighting Personnel will have specific control tasks to carry out during he spill control actions.
- Verify the fire fighting equipment is in good operating condition and available for use if necessary.
- Responsible for Safety and Environmental Protection, vigilance, control of access of people and materials. Also, for the search of personnel.
- Request police and/or military support if required.
- Attend to all health needs that may arise and make sure that all resources are fully available, such as first aid, stretchers, etc.
- Organize the area where first aid is provided to personnel suffering any accident during the performance of response operations.
- Responsible for the evacuation of personnel who may required medical assistance in hospital centers.
- Coordinate with CLD and with the offices involved in the annual revision of the Zonal Contingency Plan.

**Public Relations**

- Will have the final version of the facts provided by the CLD and with the respective approval of the CCC will disclose any information.
- Will periodically inform the media of the actions carried out, the achievements and expectations related to spill control, in order to avoid speculations.
- Will issue concise and explicit press releases and communiqués, placing emphasis on the spill response and control actions carried out in order to prevent further damage. Likewise, will inform of the causes and effects of the incident, for a real knowledge by the public opinion.

**Legal Advice**

- Shall be conveniently informed of the spill consequences (damages, response actions, etc.), for which purpose it will request and make a legal evaluation of the final contingency report.
- Will advise the CCC and the CLD on legal aspects in order to address the concerns of the entities of the affected populations. If necessary, will travel to the site of the occurrence in order to directly advise on the initial steps to be taken.
- Represent the Company in legal issues that may arise as a result of the claims filed by people affected by the spills.

**Finance**

- The Head of the Finance Department is responsible for the management of financial resources, who will take steps to obtain the funds require to cover spill control expenses.
- Once the response actions have concluded, will make a final balance of the expenses incurred.

**Environmental Protection**

- The Head of Environmental Protection will proceed to the spill site and evaluate the existing risks and indicate the contamination areas.
- Once the emergency has occurred, will assist the CLD in spill control matters, in order to make decisions that will allow efficiently developing the Contingency Plan for the purpose of reducing and controlling the damages to the environment.
- Will keep permanent communication with the entities involved in the Contingency Plan, as well as with the local authorities (civil and military), Civil Defense personnel, populated centers, in order to make the necessary arrangements to trigger and develop the established plan, depending on the magnitude of the spill and, if necessary, order the evacuation of the populated centers.
- Will advise the CLD in defining the place and the procedure for the final disposal of hydrocarbons and recovered contaminated material.
- Will advise the General Services Unit on the hiring of companies specialized in the treatment of contaminated animals. To this end, he will have updated information on the personnel and specialized companies in and outside the area, that are in the capacity of providing the service.

**CHART NO. 2: IMPLEMENTATION**

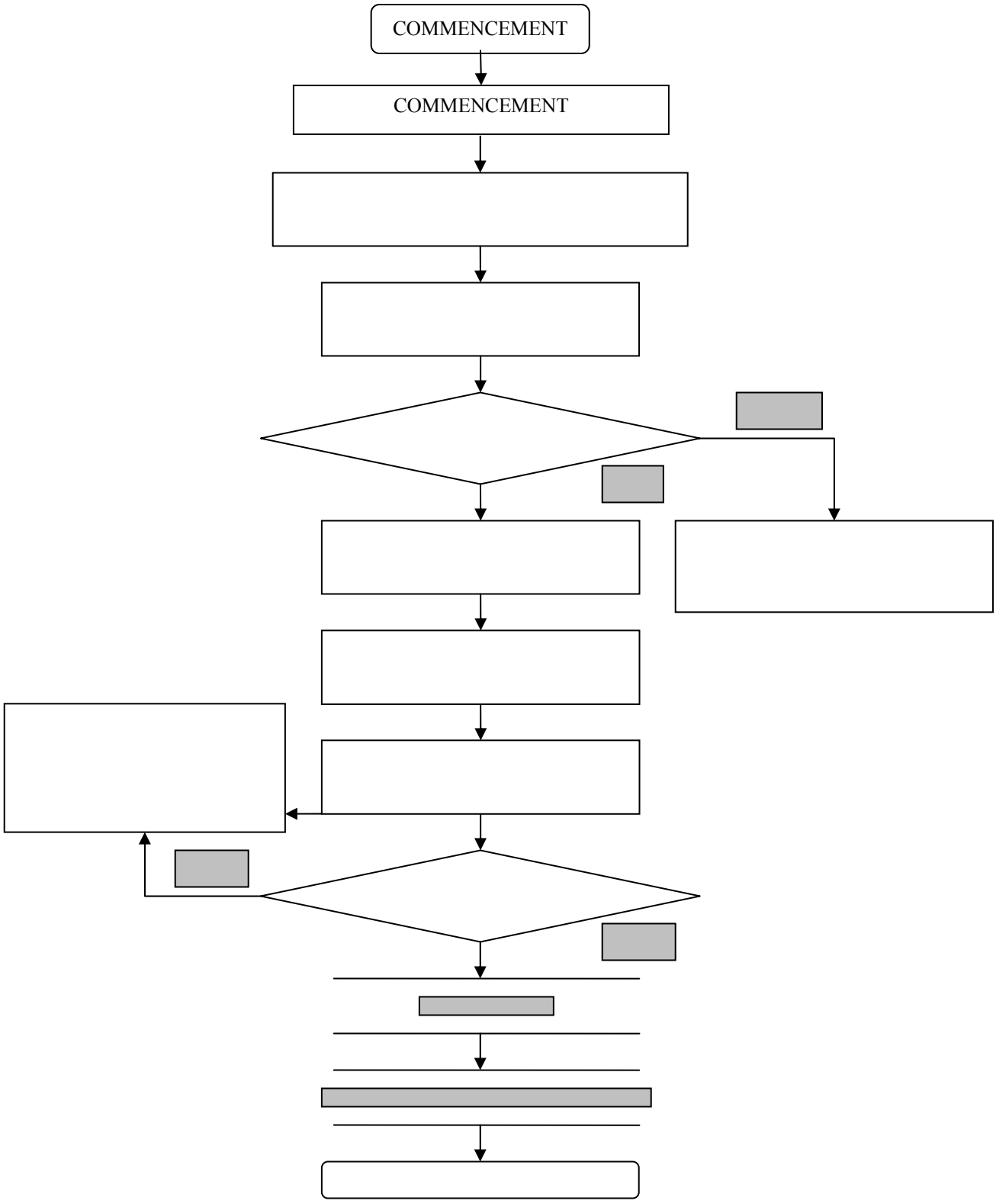


**CHART NO. 3: DUTIES AND RESPONSIBILITIES**

SPILL ALARM: Stipulated by the Company
FIRE ALARM: Stipulated by the Company
EARTHQUAKE ALARM: Stipulated by the Company

| N | Names and Surnames | Post in the Terminal | Post in the event of a spill | Post in the event of fire | Post in the event of an earthquake |
|---|---|---|---|---|---|
| 1 | | | CGP | CGP | CGP |
| 2 | | | CLD | CLD | CLD |
| 3 | | | JCG | JCG | JCG |
| 4 | | | JSGOA | JSGOA | JSGOA |
| 5 | | | JSGOT | JSGOT | JSGOT |
| 6 | | | JSGSS | JSGSS | JSGSS |
| 7 | | | JSGSSM | JSGSSM | JSGSSM |
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| | |
|---|---|
| CGP | Plan Coordinator |
| CLD | Spill Site Coordinator |
| CPA | Environmental Protection Coordinator |
| JGC | Combat Group Head |
| JSGOA | Head of the Sub-Group of Water Operations |
| JSGOT | Head of the Sub-Group of Land Operations |
| JSGSS | Head of the Supplies and Services Sub-Group |
| JSGSSM | Head of the Safety and Medical Services Group |

The personnel directly involved in marine operations who are under the rank of the terminal administrator and must be considered in the chart of responsibilities in accordance with the plant's directives and the rank of each personnel are the following:

Full time in sea operations:

Bay head
Mechanic
Stevedores (4)
Tugboat Master (3)
Tugboat Engineer (3)
Tugboat greaser (3)
Tugboat maneuvers (6)

Of the plant:

Cargo head
Supervisor of loading operations
Operator of wharf control room
Operator of LNG loading arms
Mechanics to connect loading arm hoses.

## 4. SENSITIVE AREAS

### A. CHARACTERISTICS OF THE COAST

- The coast between the south of the Cañete River and north of the Topara Ravine is a relatively flat area, located near the sea, but separated from it by high cliffs. The beach is basically sandy and has an area of approximately 100 meters, on average, from where low high waves arrive to the cliffs.

- The flora of Pampa Melchorita is very scarce, and only little vegetation of low hills can be seen in the form of spots.

- The following conclusions were drawn from observations made along six kilometers of beach and interviews with local fishermen who fish using fishing lines and nets :

  - The fish caught has a size of approximately 25 and 50 centimeters. It is important to mention that the species observed are disperse throughout the south littoral and that the study area, where the terminal will be built is not an exclusive habitat thereof.

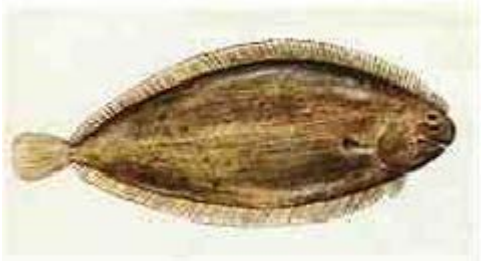
    Among the live species are common flounder, “pez zorro”, “pez bogo”, guitar fish and “chita”. The order that they have been placed is the catch order, from greater to less. Few mammals were also observed and only of transit, such as sea lions and dolphins.

  - As far as birds are concerned, a large number was observed and, according to versions from fishermen of the area, they arrive nearly all year round. Among the main ones we could see the following. Peruvian seagull , Comon Booby, Dominican seagull, black headed vulture, red headed vulture, Peruvian pelican. The order is from greater to lesser number of species observed.

  - A large number of crabs were also observed. The number is approximately 20 individuals per 1 square meter. This species was seen all along the beach, in lesser number in areas with a greater concentration of birds.

**PHOTOS OF MELCHORITA BEACH**

## PHOTOS OF FISH AND MAMMALS OF THE AREA

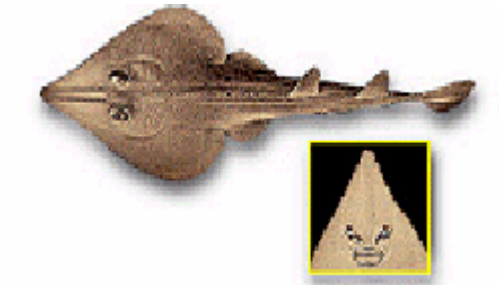


Common flounder

Mojarrila

Chita

Pez bobo



Guitar Fish

Dolphins (in transit)

Sea lions (in transit)

**PHOTOS OF LOCAL BIRDS**

Grey seagull

Peruvian seagull

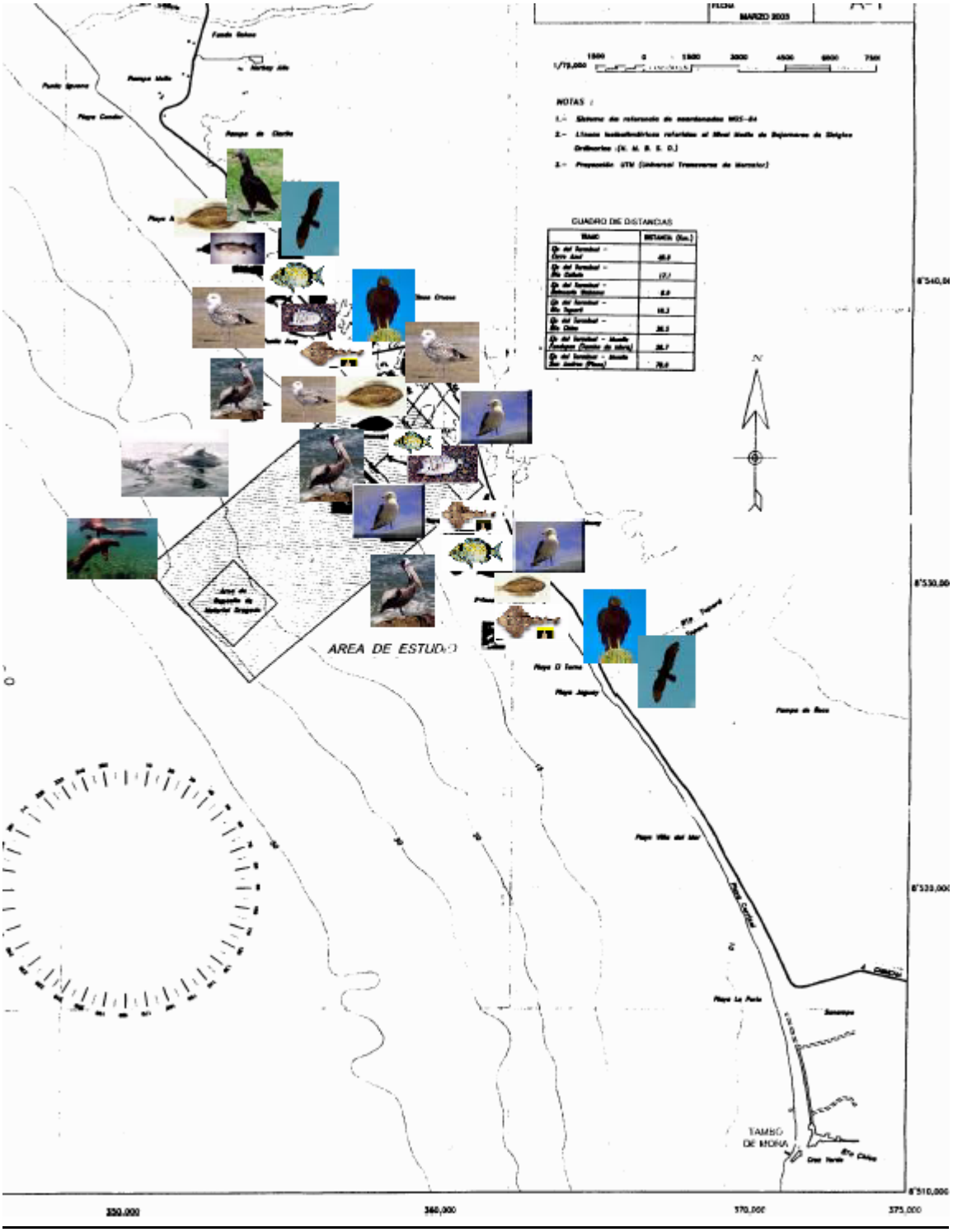
Peruvian pelican (in transit)

Common booby (in transit)

Red headed vulture

Black headed vulture

**B. MAP OF THE AREA AND DISTRIBUTION OF SPECIES**



**C. PROTECTION OF SENSITIVE AREAS:**

- ❖ Inside the plant there are containment walls surrounding all tanks containing hydrocarbons and LGN.

- ❖ There are containment walls around the storage tanks, with the capacity to contain all the hydrocarbon that has spilled from the tank.

- ❖ There area submergible pumps, with their respective hoses, to be used to extract the fuel found inside the API tank containment walls in the plant.

- ❖ If the spill reaches the sea from the plant or from the Terminal, the tugboats will operate immediately to:

  - Collect the material and equipment to address spills.
  - Place containment barriers in the spill area, preventing it from reaching or dispersing along the coast.
  - Place absorbing cloth.
  - Store the spilled oily substance in temporary storage drums conveniently placed in the bridge.

- ❖ If the spill reaches the beach, since it is a sandy area, the diesel will not seep in too much. In these cases it is recommendable to use shovels to lift the contaminated sand and take it to a safe place to receive biological degradation treatment.

- ❖ If there area birds or other species impregnated with Diesel, the following action will be taken:

**INITIAL ACTION**:

- Rescue the birds or other animals impregnated with Diesel 2 from the affected area.
- Immobilize the animal with a towel or net.

- Remove the water from the animal, and take it to land where it is easier to treat. If necessary, catch the bird at night, using the light of a vehicle or flashlight to blind it temporarily.
- Clean the beak and nostrils from every oil remain. Immobilize the beak to avoid damaging it and cover the bird with a clean and dry blanket in order to prevent the beak from recontamination, since the bird will try to clean itself from the oil. Keep the bird warm.
- Verify whether it has any symptoms of toxicity.
- Administer 60 grams of hydrating salts.
- Implement and condition an provisional area for the treatment and recovery of affected birds.
- Carefully transport the birds to the treatment area.

**TREATMENT AND RECOVERY**

- It is important to highlight that the care, treatment and recovery must be preferably performed under the direction of specialized personnel, biologists or other professionals who have had experience in the treatment of sea birds.
- Cooperation will be sought from agencies related to the care of birds: universities, investigation institutions, etc.
- The treatment and recovery actions carried out are:

  - Clean the bird's body with special chemical agents, eliminating all hydrocarbon from the body.
  - Rinse the bird's body with a continuous clean water jet, in order to eliminate any hydrocarbon residue.
  - Measure the weight and temperature of each bird.
  - Cover the body with a blanket in case of hypothermia and place it in a special area with moderate temperature.
  - Supply hydrating salts, in a dose of 60 grams every hour up to a maximum of six hours, if required.
  - Four hundred grams of fresh fish will be required to feed each bird twice a day.

- The estimated recovery will be two to three days, depending on the degree of contamination of the birds.
- Once the birds have recovered, they will be released at the place from where they came.

**PRODUCTS TO CLEAN BIRDS**

- The products used to clean birds will be biodegradable chemical agents and will be applied by aspersion diluted in water to guaranty full immunity when in contact with the skin.
- Among the agents used are AQUAQICK, which contains biosurfactants (15), citric acid (15), natural oils (10) and water (60). This product will be dissolved in water at least in 1/200 parts of water to be applied to animals.
- Another chemical agent is ELASTOL, which is applied in a combination of 95 of sawdust and 5 of ELASTOL. This dust is applied to the contaminated feathers of birds and left during 30 minutes. Then it is rinsed with detergent and abundant water. The result is that the hydrocarbon is removed from the bird.

**AREA TO TREAT AND CLEAN CONTAMINATED BIRDS**

The following areas are indicated to treat and clean birds contaminated with hydrocarbons:

- RECEPTION: Identification of the species, determination of recovery potential, establishment of pressure and temperature, administration of medicine.
- WASHING AND CLEANING: Locate bath with solvents, rinses and drying.
- STORAGE: The birds are placed in individual cages, covered with disposable paper on the floor.
- TRANSPORTATION: The cages are located in certain areas during the initial hours (8 to 10 hours), to confirm their reestablishment.
- TREATMENT: Reestablishment area that includes feeding facilities, tempered area and water for cages.

**D. EQUIPPING AND AVAILABLE PERSONNEL**

The available equipment and its characteristics are described in SECTION F of Appendix 3 of this Plan. The available personnel, as well as its functions and responsibilities are found in SECTION D of this Plan.

## 5. DISPOSAL AND ELIMINATION PLAN

In the plant, the storage tanks have retaining walls with drainage for rain and flood.

In the event of a diesel 2 spill in the tanks, these walls may contain all the capacity of the tanks.

The spilled diesel 2 is extracted with submergible absorbing pumps and is sent to an API separation tank and from there to a CPI separation tank to be finally taken to a slop oil tank.

There is personnel available to remove the rocks and sand that may have been contaminated and taken to the solid waste deposit area for final disposal, in accordance with the local regulations.

It is important to mention that in Peru there is no equipment to treat sand and rocks contaminated with hazardous substances. Therefore, these elements will be gathered and delivered to the aforementioned areas in the plant.

Thereafter, those elements that are not solid, as in the case of sand, undergo a recycling process, where biodegrading agents act for final cleaning.

For oily wastes there are temporary tanks arranged on the utility platform, which are periodically taken to the plant for final disposal in authorized places.

# SECTION : C

# RISK ASSESSMENT

## 1. SPILL RISKS IN THE TERMINAL

In the plant and in the marine facilities, the critical areas where hydrocarbon spills or LNG leaks may occur, whether due to operating problems, fires, explosions or earthquakes, are the following:

- Main hydrocarbon storage tank area
- A diesel 2 tank, which is found in the utility dock, with a 1.5 m3 capacity for the fire pump.
- Electric switchboards

Containment walls have been built around these tanks, which are capable of storing the tanks' maximum hydrocarbon capacity, in the event of a spill. As it was mentioned earlier, the spilled hydrocarbon will be extracted with submergible absorbing pumps, towards API tanks fitted out in the plant.

The same occurs in the case of LNG, for which a platform has been prepared with a containment wall in the lower part of the plant (half cliff), known as the watertight area and is located outside the storage tanks and the process area.

## 2. RISK IN TRANSFER ELEMENTS

The possibility of a spill caused by pipe breakage in the Diesel 2 loading system could occur in the Terminal dispatch area or in a section of the pipes along the Terminal bridge, due to abrupt movements or heavy seas, operations problems or earthquakes. An earthquake could cause pipes to break in any section on the bridge. Also, in the connection to the tugboats while supplying Diesel 2. This is assuming the emergency occurs during loading tasks.

## 3. INTERNAL RISKS

- ❖ Fires
- ❖ Explosions

## 4. EXTERNAL RISKS

- ❖ Earthquake

❖ Tsunami

- In each case of potential risks that may arise in the Terminal the following parameters should be taken into account:

- Analyze the infrastructure, equipment, maintenance of equipment and training of personnel, considered as prevention systems for each one.

- The behavior of the personnel during the occurrence of the events, the compliance with actions in accordance with the chart of duties and responsibilities, as well as in the drills carried out, which necessarily includes the handling of equipment and evacuation, as the case may be.

- Analysis of the occurrence, causes, consequences, reports.

## 5. FIRE FIGHTING ACTIONS

The following systems and facilities for the respective fire control will be available.

### ❖ FIRE FIGHTING INFRASTRUCTURE

The following systems and facilities will be available for the respective fire control as detailed below:

- Water supply system (see table No. 1)
- Water storage system (see table No. 1)
- Distribution of portable equipment in the Terminal (see Table No. 1)

### ❖ FIRE FIGHTING FACILITIES

An updated drawing of the layout of fire fighting equipment and accessories will be maintained, detailed as follows:

- Pumping units (capacity and work pressure)

- Fire hoses and accessories
- Portable monitors
- Portable equipment to apply fire fighting foam
- Portable and rolling extinguishers
- Hydrants
- Fire mask
- Fire cannons
- Fire truck
- Truck with concentrated foam system

❖ **FIRE FIGHTING PROCEDURES**

Fire fighting procedures must have the following administrative procedures which must be known by all personnel so that they may act efficiently in the event of any emergency.

- Description of responsibilities of the units and participants
- Distribution of fire fighting equipment and facilities
- Fire alarms and action to be taken in the event of a fire
- Internal and external evacuation systems
- Specific organization chart of the crews, including medical support.

Three basic procedures will be taken into account in putting out a fire.

- Fuel supply will be halted (shut off of valves, transfers, etc.).
- The presence of air in contact with fuel will be eliminated, covering the area on fire with foam.
- The heat that causes the product to evaporate will be eliminated, since the vapor is combustible, the water is the most effective agent for this purpose.

The first actions to be adopted to address a fire in the Terminal will be to isolate and evacuate the area, in addition to the following precautions:

- Removal of all containers from the area exposed to fire and heat, if this action can safely carried out.

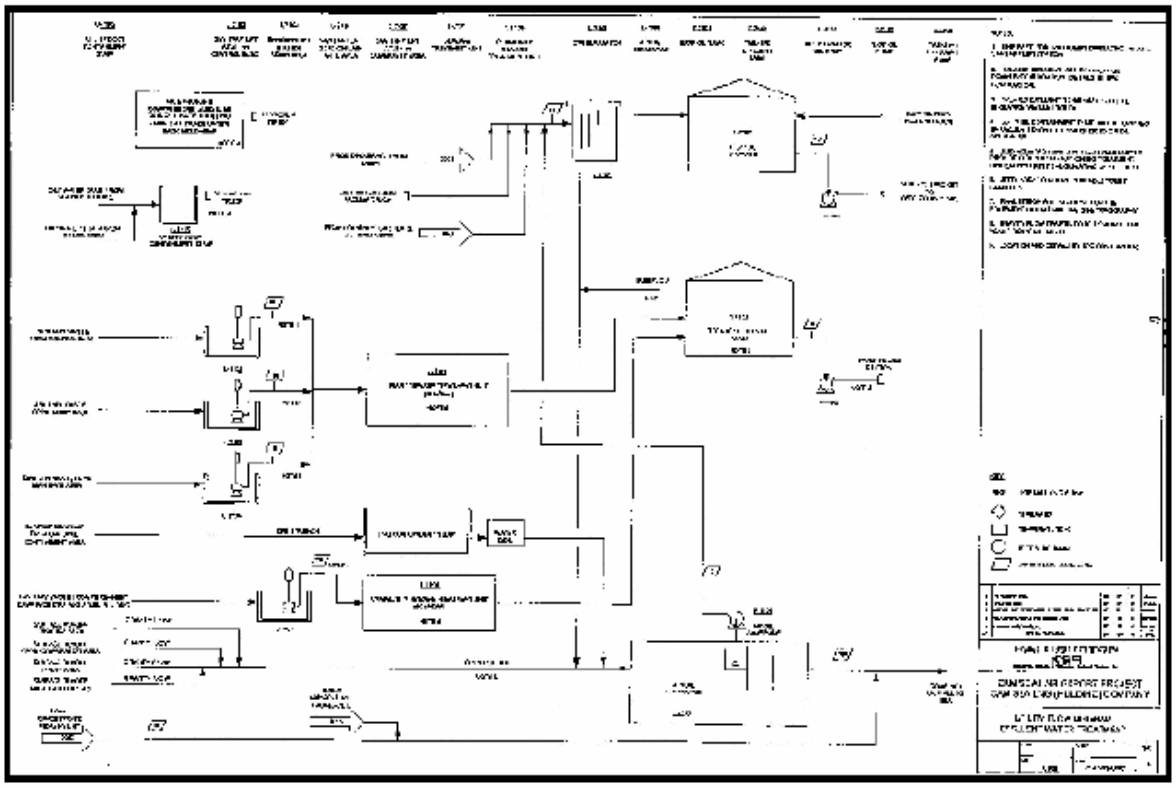
- Lateral cooling with water of containers that are exposed to flame or heat.
- In the event of intense fire in the unloading areas, remote control hoses with supports will be used or a monitor cannon.

❖ **ADDITIONAL ASPECTS TO BE INCLUDED IN THE FIRE CONTINGENCY PLAN**

- Boost the annual training and field training program for all personnel.
- Frequently inspect the operation of equipment to address emergencies and disasters, and disseminate the location, handling and maintenance condition thereof.
- Inform on the evaluation of fire, rescue and personnel evacuation drills.

**PLANT AND TERMINAL FIRE FIGHTING SYSTEM**

**TABLE NO. 1**



## 6. ACTIONS IN THE EVENT OF AN EARTHQUAKE

In the event of the occurrence of a strong earthquake, the procedure will be as follows:

The administrative and operating personnel must be efficiently familiar with the safety and evacuation rules. It is important to mention that following an earthquake with a magnitude of 6 or 7 degrees on the Richter scale, within a distance of 100 miles off our coasts, a tsunami could occur, which would cause a great flood.

The Terminal personnel will have a quick evacuation to the plant located in the upper part of the cliff. To this end, there will be a small truck available at the utility dock.

The personnel has an evacuation area inside and outside the facilities, for which there will be an evacuation map available showing all the escape routes for each area of the plant.

Following are some indications to be followed:

- Appoint a single person in charge. In this case it is the qualified person named in this plan.
- Verify alarm devices.
- Verify that evacuation signals for the personnel have been properly posted and are visible.
- Verify that the evacuation and escape areas are clear. This is a constant duty of the safety crew.
- Hold drills twice a year.
- Delimit the evacuation areas.

❖ **DURING THE EARTHQUAKE**

- Keep calm and control panic.
- Immediately stop all loading facilities if these activities are being carried out.
- In offices, head towards previously designated safe areas.

- Remember that an earthquake causes loud noise, dust, falling articles. Keep away from glass doors and windows.
- Prepare to evacuate.
- Keep calm and orient visitors in the plant.
- The personnel working at the terminal must verify the condition of equipment and machinery in order to avoid possible hydrocarbon leaks.
- The head of the safety group will order a careful inspection of the entire plant once the earthquake has stopped, in order to detect, leaks, seepage or other damages to the plant, provided the earthquake's intensity has been moderate (3 to 4 degrees on the Richter Scale). If the earthquake has been of great intensity (6 to 7 degrees on the Richter Scale), he will order the evacuation of all personnel, in the event of a Tsunami or replaces of equal or greater intensity.
- Every worker will proceed in accordance with the instructions specified in the table of duties and responsibilities.

❖ **INSTRUCTIONS FOR EVACUEES**

Evacuation during emergencies, such as fires and earthquakes, will only be carried out when expressly ordered by the general coordinator of the contingency plan, unless the emergency compromises the personnel's physical integrity.

The meeting point will be determined by the plan through its general coordinator, and must be explicitly indicated in this plan, and placed on the plant's drawing.

The order will be given through an alarm or loudspeakers. Upon receiving an evacuation order, the following procedure will be followed:

In the Plant:

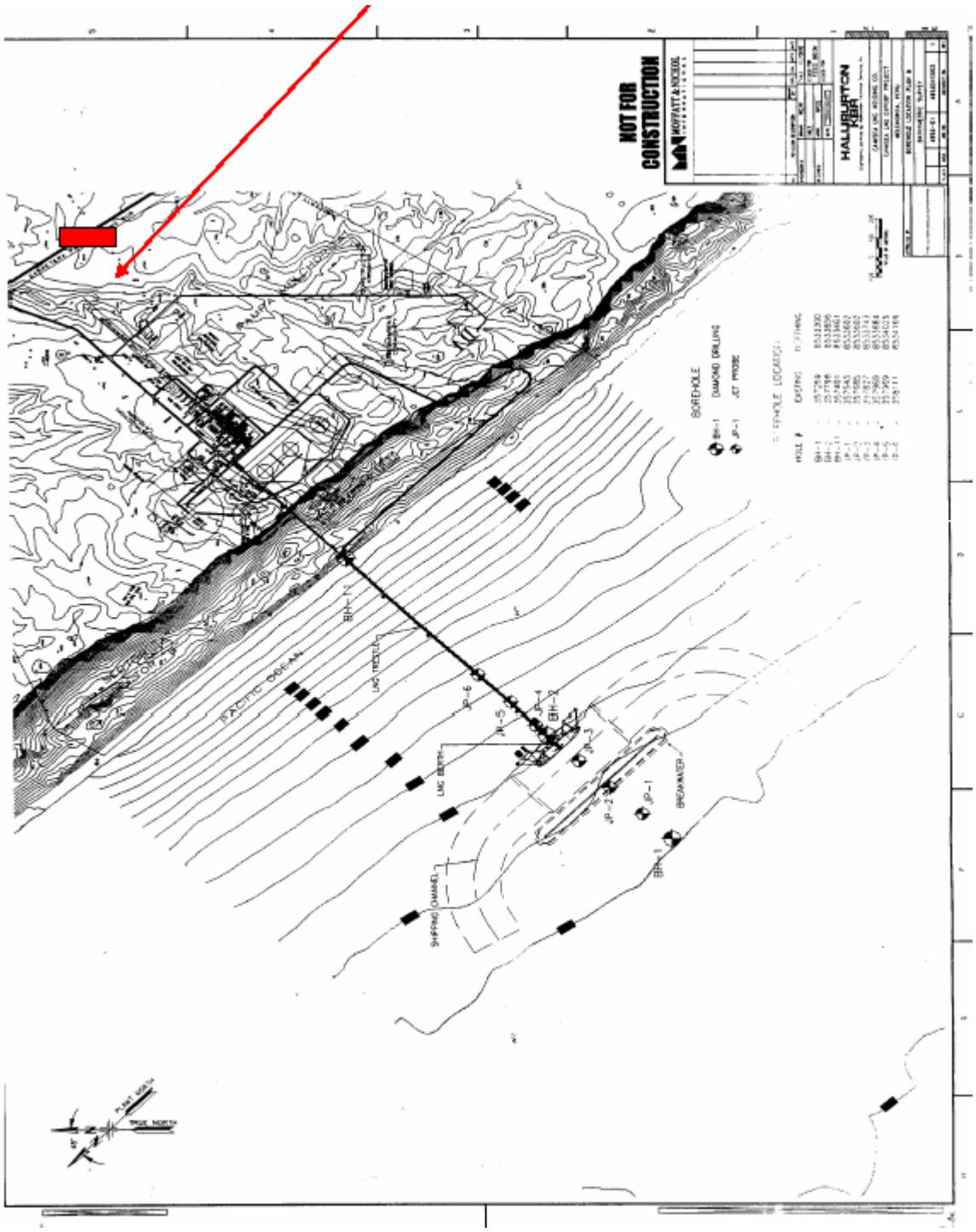
- Once the evacuation order has been given, mobilization towards a previously fixed meeting point in the plant, in an orderly and quick way, without running or panicking.
- The orders of whoever is leading the evacuation must be obeyed, keeping calm, avoiding panic, no pushing or shouting.

- Personnel who has been assigned the task of removing irreplaceable important and/or confidential documents must carry them with them to the meeting site.
- If an evacuee falls, he must try to get up immediately in order to avoid others from falling and causing agglomeration that may cause fatal injuries. Those who are near must assist in quickly lifting the individual.
- If an evacuee is a nervous person, he must not be entrusted with any important job.
- Upon reaching the meeting points, they must assemble in an orderly fashion in order to verify that all are present.
- If there are any visitors present during the evacuation, they must be advised of the routes and actions to be followed for a quick evacuation to the meeting point.
- Depending on the progress of the occurrence, the coordinator and head of the groups may authorize a total evacuation, OUTSIDE THE TERMINAL AND THE PLANT the to external evacuation area conveniently marked in this Drawing (see Drawing No. 1).

At the Terminal:

- In the event of a mild earthquake they will remain at their work posts.
- If the earthquake has been very strong, they must evacuate the plant and proceed to the safety area located in the plant. They will remain there at the orders of the general coordinator.
- In the event of a fire, wait for the order to evacuate the terminal or, in the event of imminent danger, proceed to evacuate to the plant. They will be alert to support the fire fighting group if necessary.

**DRAWING NO. 1. : EXTERNAL AREA FOR EVACUEES**



## 7. ACTIONS IN THE EVENT OF A TSUNAMI

Tsunamis or sea quakes are a succession of ocean waves that have long periods, typically between 15 to 40 minutes, and are imperceptible at sea but, when they approach the coast, the large kinetic energy they carry becomes potential energy and the waves may grow to reach several meters in height. Earthquakes measuring over 7.5° on the Richter scale frequently generate tsunamis. Volcanic eruptions and submarine landslides can also generate tsunamis.

Once a tsunami is generated, it propagates in all directions. The propagation speed depends on the depth of the sea. For example, a tsunami that travels part of an ocean that is 4,000 m. deep will have a speed of 720 km/h. Then, if we know the depth of the sea, we can calculate the approximate time of tsunami arrival in any part of the coast. For instance, if a tsunami is generated off the coasts of Alaska, it may reach Peruvian coasts in about 16 hours.

The height of a tsunami at sea is only a few centimeters. On the open sea a tsunami may pass under a ship unnoticed. However, it has a wavelength of about 350 km. Then, the tsunami poses no hazard at sea, but when it approaches shore it slows and grows in height upon encountering increasingly shallow waters.

In many islands of Indonesia and Japan, where unfavorable bathymetric and topographic conditions prevail, tsunamis can reach over 30 meters above sea level. In the case of Peru, a tsunami may not reach the coast as a big wave, but rather as a flood wave that may range between 6 to 9 m. in height.

Fortunately, Peru has not suffered the effects of tsunamis as frequently as other places on Earth. However, history shows that the destructive effects of several tsunamis have impacted our coasts in the past.

In Peru, the most destructive tsunamis occurred on October 28, 1746 and August 13, 1868. The first one struck the coasts of Callao and reached a height of 7 m. This tsunami resulted in the death of 5 to 7 thousand people, and is probably the most destructive tsunami that has ever

taken place in Peru. The second one occurred on August 13, 1868 and caused substantial damage from Trujillo (Peru) to Concepcion (Chile). In Arica, a war vessel was washed ashore and left grounded 400 m. inland. The effects of this tsunami were felt in ports as remote as Hawaii, Australia and Japan. Finally, the last destructive tsunami occurred on June 23, 2001, off the coasts of Camaná - Arequipa, destroying the "La Punta" summer resort, immediately south of Camaná, almost completely, leaving more than 1,000 houses destroyed, 28 casualties, and over 65 people unaccounted for.

**International and National Tsunami Warning System**

In April 1964, a strong earthquake hit Alaska, generating a tsunami that affected the coasts of several Pacific Rim countries, causing both substantial casualties and property damage. The tsunami reached the Pacific Rim countries several hours after the earthquake had hit Alaska. The authorities of these countries could have warned the population and make them evacuate coastal areas; however, there was no tsunami warning system in place. As a result, the International Tsunami Warning System was created in 1965.

This International System has its headquarters in Hawaii and is supported by information received from seismographic and mareographic stations (stations that measure earthquakes and sea water levels, respectively).

For instance, if a strong earthquake occurs in the Pacific Ocean area, the seismographic station that is closer to the epicenter will give Hawaii notice thereof, for the latter to retransmit the information to all countries that form part of the system. As no certainty exists as to whether or not the earthquake has generated a tsunami, then the mareographic station that is closer to the epicenter checks whether there has been a sudden sea level change, that is, whether or not a tsunami has been generated. If so, it will give notice thereof to Hawaii, for the latter to send a warning to all Pacific Rim countries.

Each Pacific Rim country has its own National Tsunami Warning Center, which coordinates the issuance of warnings with the International System. In Peru, the General Bureau of Hydrography and Navigation (DHN) runs this center, with headquarters in Chucuito, Callao.

The National Tsunami Warning Center receives information from the International Center through the "Jorge Chavez" International Airport, via a modem and/or magnetic telephone. Upon receipt of the warning, the DHN contacts the International System to assess the possible effects that the tsunami could have upon our coasts. If a risk does exist, a warning is issued to the National Institute of Civil Defense, which is in charge of activating the corresponding evacuation plans.

The Peruvian Geophysical Institute also forms part of the National Tsunami Warning System and reports the location of the epicenter and the earthquake intensity to properly assess the tsunami risk.

In order to properly send tsunami warnings to all communities along Peru's coast, the DHN is connected through the Naval Communications System with all harbormaster's offices all along the coast.

It is worth bearing in mind that if a tsunami occurs at a remote location, the National Tsunami Warning System will give notice thereof to the population through the Civil Defense authorities (mayor of the district, harbor master, etc.). However, if a tsunami occurs at a nearby location, the natural warning will be the earthquake that occurs 15 to 25 minutes before the tsunami probably strikes the coast, for which reason workers should move away from the coast onto higher ground immediately after being hit by a strong earthquake (>7.0°). The evaluation of both possibilities should be carried out immediately.

Tsunamis have affected the coastal areas of Lima-Callao in the past. The largest tsunamis, particularly off the coast of Lima-Callao, are usually caused by earthquakes, close to the coast, triggered by the abduction of the Nazca Plate under the South American Plate. Callao has repeatedly been struck by tsunamis that have resulted in substantial casualties and property damage.

## 8. GAS CONTROL

The risks inherent in the presence of gases that are not kept inside containers vary, depending on the chemical and physical properties of the environment into which they are emitted.

All gases, except for oxygen and air, entail some risk for individuals as they displace the air they breathe. Inert, colorless and odorless gases, like nitrogen, helium, argon and others are particularly dangerous, as they are not noticed. The minimum concentration of oxygen in the air for human survival ranges between 6 and 10 (the normal range is 21) in volume, but even at higher concentrations muscular coordination and the senses are affected.

**Toxic or poisonous gases**

The risks inherent in this type of gases are obvious. However, they are particularly worrying in those cases where they are emitted close to a fire, as they could hinder the firemen's efforts to fight the fire, because firemen may be prevented from gaining access to the respective area or otherwise may be obliged to wear breathing masks.

**Oxygen and other oxidizing gases**

Although they are not flammable, these gases could cause other elements to catch fire at lower temperatures: they can accelerate combustion or otherwise start a fire by easing the propagation of flames, originating from equipment where fuel is being burned, beyond the combustion chambers.

**Liquefied gases**

These gases represent a risk to people and property if they are spilled in a liquid form, due to their low temperatures. Contact with these cold liquids can cause freezing, which may be very dangerous in cases of prolonged exposure. Low temperatures affect the properties of many construction and structural materials, particularly plastics and carbon steel; they usually become fragile and can break easily, giving rise to structural failures.

This is not feasible in the case of LNG storage tanks, as shown in the project description section, in Chapter II, because LNG storage tanks are built of a special alloy, 9% nickel steel,

which makes them resistant to the very low temperatures they must withstand and also to moderate earthquakes. On the other hand, there are also tanks for the storage of diesel and gasoline, propane, butane, nitrogen, ethylene, and the possibility of structural failures is very unlikely.

**Flammable gases**

Due to their abundance, the behavior of flammable gases, like methane, if a leak occurs, is of utmost importance. Two risks are basically associated with flammable gases: explosions resulting from combustion (methane does not exploit) and fire.

Explosions resulting from combustion

These explosions occur in the following stages:

- When a flammable gas or the liquid phase of a liquefied flammable gas escapes from its container, pipeline or piece of machinery (this leak can also be due to the normal operation of the overpressure release device). When the spill occurs, it evaporates quickly, producing large amounts of vapors, characteristic of the liquid-vapor transition.

- The gas mixes with air and becomes diluted.

- Under certain gas-air ratios (flammability or combustionability margins), the mixture becomes flammable and could catch fire (if there is no ignition source, there will be no fire).

- The flammable mixture, once it comes into contact with the ignition source, burns quickly and produces large amounts of heat.

- This heat is absorbed by every object that is close to the flames or to the gaseous products that result from high-temperature combustion processes.

- All matter expands when heated. Air shows the highest expansion level when it is close to a flame or to the gaseous products that result from high-temperature combustion processes.

- If hot air cannot expand because, for instance, it is inside a room or confined space, then pressure will build up inside the room or confined space.

- If the structure of the room or confined space is not strong enough to withstand this pressure, some elements will yield quickly and abruptly and will be displaced from their original position, with a violent and uproaring noise. This is called explosion. In view that said pressure builds up as a result of a combustion process, the explosion is called explosion resulting from combustion. It is also called room explosion, vapor-air explosion, including other names that are less accurate.

Fire resulting from flammable gas

The fire that results from the ignition of flammable gases can be considered an explosion resulting from an aborted combustion process where an insufficient air – flammable gas mixture is accumulated because the mixture ignites prematurely or because it is not confined to a closed space. Obviously, a leak of flammable gas to the outside environment will result in a fire. However, if there is a massive leak, the surrounding buildings, or the surrounding air itself, might provide sufficient confinement to trigger what is frequently called an open-air explosion. Non-cryogenic liquefied gases can trigger this phenomenon. The same occurs with hydrogen, ethylene, and some reactive gases, due to the extremely high flame propagation speed.

Toxic clouds

Instant leak

It means that the leak takes place during a brief period of time. Due to the high pressure and high speed involved in the leak, the gas will initially scatter regardless of the wind. The leak can be compared with the gas jet of a jet-plane that absorbs and drags large amounts of surrounding air.

A heavy and cold gas cloud is then formed and dragged by the wind. The gas cloud disappears in the air quite quickly.

## 5. EMERGENCY SHUTDOWN SYSTEM (ESD)

This emergency shutdown system that responds to a LNG leak is being used in LNG vessels and terminals.

The ESD allows to automatically, quickly and safely close, without the support of an operator, the valves to shut off the entire LNG transfer system when loading operations are being performed. It can also be started manually, by remote control, from the vessel or terminal.

## 10. RULES FOR VISITING THE SHIP AND TERMINAL

- Make sure that the captain is aware of the visit.
- Visitors should turn off all battery-operated devices when entering the Terminal (cell phones, radios, cameras). Visitors can only turn them on when they get to a safe place inside the ship.
- Onboard the ship, visitors should remain together and must be accompanied by the captain or their representative.
- Smoking is only authorized in the areas designated by the captain. Visitors should preferably refrain from smoking.
- Visitors should wear personal protective equipment (shoes, helmet, etc.) within working areas.
- Visitors should know that onboard the vessel the EMERGENCY ALARM consists of one long blast on the ship's whistle or a continuous alarm bell.
- The alarm to go to the BOAT STATION is seven short blasts on the ship's whistle, followed by one long blast.
- Visitors must identify the location of emergency stations, gathering points, and boat stations.

- Before entering any confined space, including the machinery room, visitors should obtain the authorization of the Officer on Duty.
- Only the entry doors assigned to gain access to the lodging area can be used.
- Cameras should not be used onboard the vessel, unless the captain's written authorization is obtained.
- No work can be performed without the authorization of the Officer on Duty.
- The ship's equipment cannot be used without the written authorization of the captain.
- Visitors are subject to drug and alcohol searches, which will be conducted by police officers.
- All the rules and regulations of the vessel must be obeyed.
- The captain is obliged to give clear protection and safety instructions onboard, and all visitors must follow these instructions.
- The ship's personnel should not be disturbed while performing their duties or taking their rest or recreational period.
- Visitors must inform the captain when they are planning to leave the ship, so that they may be accompanied to the gangway.

# SECTION : D

# TRAINING AND DRILLS

## 1. PERSONNEL TRAINING

Both the personnel in charge of loading operations at the plant, as well as the Terminal personnel, are conveniently trained to carry out their work and respond to any emergency.

### 1.1 IDENTIFICATION OF TRAINING REQUIREMENTS

1.1.1 Procedure to respond to a spill on 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.
- Loading 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.

1.1.2 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 small spills, the product will be absorbed with sand or any absorbent material consistent with the product spilled. Then, the wastes will be collected and properly disposed of.

- 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.

1.1.3 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 vapor 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.

1.1.4 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.

1.1.5 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 armored 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.

1.1.6 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:

## 1.2 OPERATIONS INVOLVING OILY SUBSTANCES

### 1.2.1 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.

### 1.2.2 Before loading Diesel 2

Before loading Diesel 2, the person in charge will make sure that all the personnel in charge of the respective loading operations are aware of the entire manifold system, including pipelines, flanging procedure, drainage pipes, maximum permissible pumping rate, drills, measurement (vertical measurement of the free surface of a tank, in meters or feet, in order to determine the volume of hydrocarbons still left), and level indicators.

It is worth bearing in mind that the refilling of tanks usually results in spills. It is also important to bear in mind the fact that one of the most important causes of spills are flexible pipes in bad condition. To avoid this problem, flexible pipes will be inspected, tested and maintained in accordance with the manufacturer's instructions.

### 1.2.3 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.

1.2.4 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.

## 1.3 CHECK LIST

1.3.1 Before loading Hydrocarbons

- There should be a clear signaling system in place to report the commencement of loading operations, reductions 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.

1.3.2 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.

1.3.3 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.

## 2. TRAINING SCHEDULE

2.1 As part of its policy, the Melchorita Terminal will carry out at least two drills a year, one spill drill and one fire drill.

2.2 By means of Directorial Resolution No. 0497-98-DCG, dated December 01, 1998, the General Bureau of Harbor Masters' Offices and Coastguards has been entrusted with the task of performing a spill drill using all the necessary spill response equipment, every three years. All the people who are involved in the Plan will participate in this drill.

2.3 Drills will be carried out in accordance with the instructions and responsibilities set forth in the attached TABLE OF ASSIGNMENTS AND RESPONSIBILITIES.

2.4 Each time a drill is conducted, a Hydrocarbon Spill Assessment Form will be filled out and entered in the register of new events. This drill register must be kept on file for a period of at least three years and will be handed over to the Harbor Master of Pisco, whenever required for inspection, in keeping with the provisions set forth in Directorial Resolution No. 0497-98-DCG, dated December 01, 1998, issued by the General Bureau of Harbor Masters' Offices and Coastguards.

# SECTION : E

# PROCEDURES FOR UPDATING AND REVISING THE PLAN

## 1. UPDATING, RECORDS AND COMMUNICATIONS

1.1 All major changes introduced to the Plant's facilities and the Terminal will be recorded in the Registration Sheet referred to in SECTION A, point 5, of this plan.

1.2 The Plan revision, including its subsequent updating as a result of any change to the Plant's facilities and the Terminal, will be recorded in the Registration Sheet. Regardless of any change introduced to the Terminal facilities, resulting in a change to the Plan, the Plan must be revised on a mandatory basis every year, in accordance with the provisions set out in Directorial Resolution No. 0497-98/DCG, dated December 01, 1998, issued by the General Bureau of Harbor Masters' Offices and Coastguards.

1.3 Every revision and updating must be notified in writing to the Harbor Master and to the Environmental Director, for their information and approval.

1.4 The number and date of the above notice, including the approval document, must be recorded in the Registration Sheet of this Plan.

# SECTION : F

# APPENDICES

**APPENDIX 1**

**SPECIFIC INFORMATION ON THE TERMINAL**

**GROUND FACILITIES**

| PRODUCT/DESIGNATION | TANK SIZE<br>Diameter x height or length | TANK CAPACITY |
|---|---|---|
| Diesel T-5301 | 6.5 m. x 6 m. | 179 m3, work capacity |
| LNG T-3401 | 70 m. x 32 m. | 110,000 m3 |
| LNG T-3402 | 70 m. x 32 m. | 110,000 m3 |
| Propane V-3102 A | 4.5 m. x 25 m. (length) | 600 m3 ton |
| Propane V-3102 B | 4.5 m. x 25 m. (length) | 233.5 ton |
| Ethylene V-3101 A | 4.0 m. x 20 m. (length) | 400 m3 work capacity |
| Ethylene V-3101 B | 4.0 m. x 20 m. (length) | 400 m3 work capacity |
| Slop Oil T-7101 | 3.0 m. x 3.5 m. | 20 m3 work capacity |
| Hot Oil T-4101<br>(heating circulation) | 3.6 m. x 6 m. | 55 m3 work capacity |

**TRANSFER FACILITIES (PIPELINES)**

- **Infrastructure**

The bridge, where all Terminal pipelines will be installed, is 1314 meters long from the shoreline to the loading platform. It is a trestle bridge. The Utility Dock is at the end. The trestle bridge coordinates are the following:

| START | END |
|---|---|
| N 8534773.120 | N 8533844.048 |
| E 358720.583 | E 357791.511 |

- **Pipelines**

The following pipelines will be installed at the loading platform:

- LNG loading pipelines 30 ∅
- Vapor return gas pipeline 24∅
- LNG recirculation pipeline 08∅
- Fire-fighting water pipeline 12∅
- Nitrogen pipeline 02∅
- Air supply for instruments 02∅

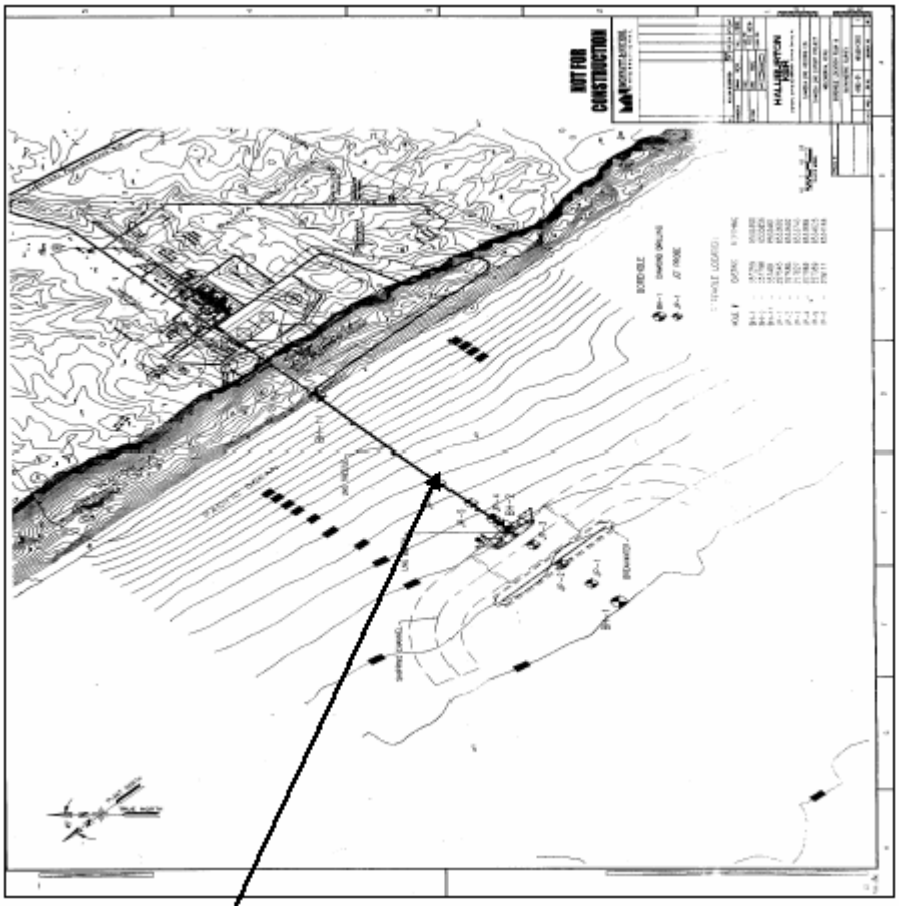
The following pipelines will be installed at the utility dock:

- A 02 ∅ pipeline to supply diesel to the tugboats that operate in the Terminal area. There will be three (03) tugboats with a nominal capacity of 50 tons each.
- A seawater pipeline, for the reverse osmosis plant.
- The fire pump (LCI) is also located at the utility dock.

- **Characteristics**

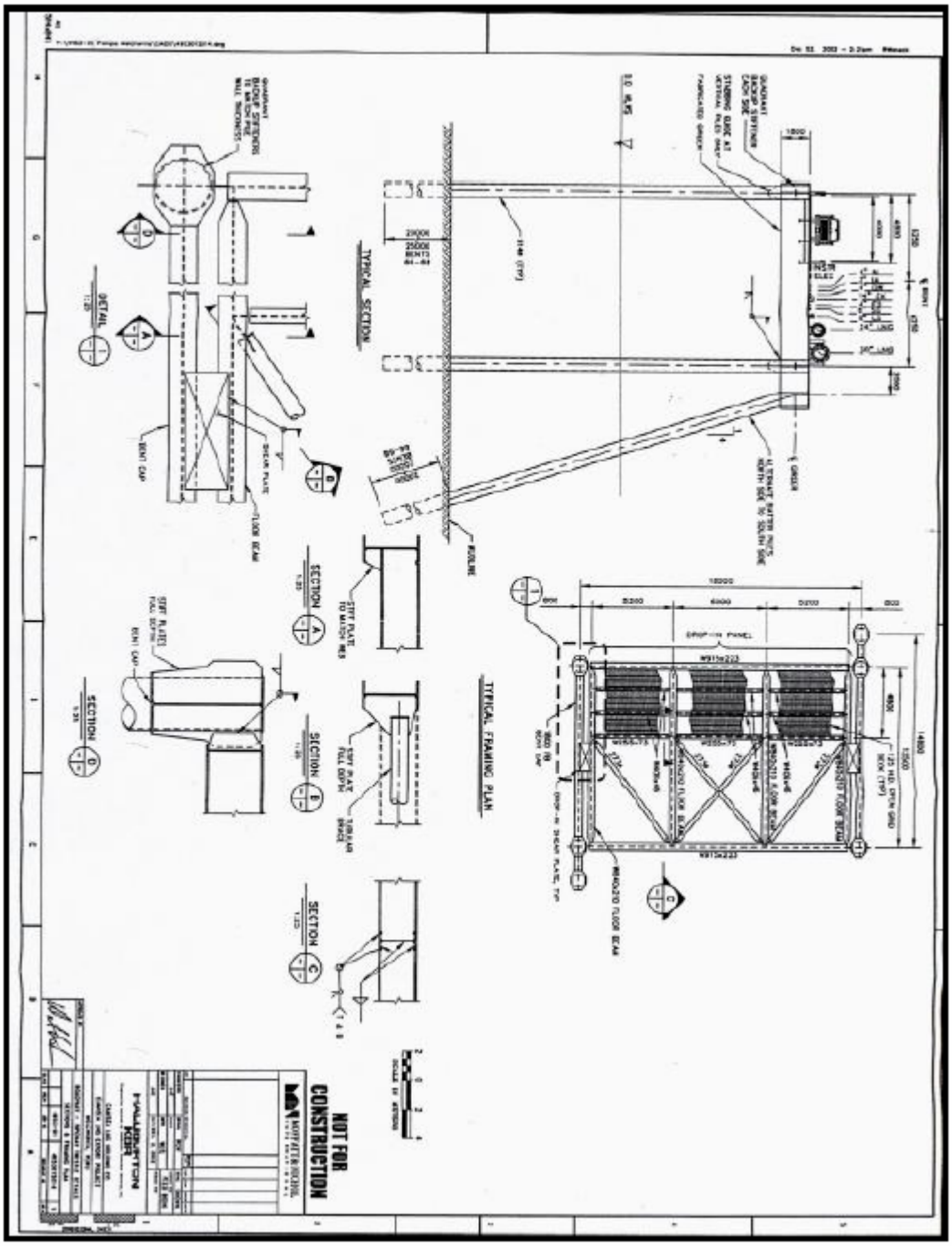
Following are the characteristics of the pipelines:

- LNG pipelines are made of 304/304L SPEC stainless steel and include a high-performance thermal isolation system to minimize heat exchange.
- The LCI, nitrogen, air supply for instruments, and diesel 2 pipelines are made of carbon steel.
- The seawater pipeline for the reverse osmosis plant is made of fiberglass or an alloy.
- The seawater pipeline used for cooling purposes is made of fiberglass or an alloy.




All pipelines connected to the loading platform and the utility dock pass through this bridge.

**Drawing No. 2 – Pipeline Layout**



## C. TRESTLE BRIDGE, LOADING PLATFORM AND UTILITY DOCK

(See Drawing E, Hydrographic Survey of Melchorita)

PERU LNG's Marine Terminal is located in the maritime area of Playa Melchorita, around 20 km. south of the city of Cañete and 06 km. north of the Wakama summer resort, province and department of Lima.

The UTM coordinates, WGS 84, of the axis of the trestle bridge are the following:

- Start E 358,666 N 8'534,727
- End E 357,259 N 8'533,320

The UTM coordinates, WGS 84, of the platform axis, including mooring dolphins, are the following:

- Start E 357,198 N 8'533,359
- End E 357,248 N 8'533,274

GENERAL INFORMATION (see Drawing E, Hydrographic Survey of Melchorita)

PERU LNG, in order to have the necessary infrastructure in place to ship liquefied natural gas from the marine area off Playa Melchorita, is planning to build a loading wharf where ONE (01) 277 m. long x 43.4 m. wide 160,000 $m^3$ methane tanker is expected to be moored.

The Terminal is made up of FOUR (04) main structures, as follows: trestle bridge, LNG loading platform, mooring dolphins, and breakwater. The entire structure has been designed to withstand horizontal loads caused by seismic events and, on the west side of the platform, withstand the impact of vessels. To this end, tilted piles will be strategically located to reduce undesired deformations and stress.

It includes a monitoring center, fitted out with gas detection monitors and monitors for the entire loading operation, among others.

The trestle bridge will be 1,300 m. long. It will first run perpendicular to the coastline, to be followed by a 30 m. long x 30 m. wide platform that will run perpendicular to the trestle bridge.

**GENERAL CHARACTERISTICS OF THE TRESTLE BRIDGE, LOADING PLATFORM AND MOORING DOLPHIN (see Drawing E, Hydrographic Survey of Melchorita)**

**Trestle bridge**

A 1,300 m. long structure from the shore to the LNG loading platform, capable of bearing the weight of loaded vehicles of up to 25 ton capacity. Transverse piles will be around 18 m. apart. Transverse piles and beams will be built of steel elements, while the platform will be built of concrete, steel or a combination of both elements.

To fit out the trestle bridge, the space available on both ends of the transverse beams will be used to install pipelines and other elements that will hang from the structure.

The trestle bridge has been designed to be 1,300 m. long to provide the necessary water depth for the berthing of vessels at critical tide conditions, bearing in mind the fact that there will be a 250 m. wide x 3 m. deep **dredged navigational channel** that begins at the Northwest end of the Terminal, on the 15 m. isobath, and ends at the Southwest end of the Terminal, also on the 15 m. isobath, passing by the 13 and 14 m isobaths. See Drawing B-2.

**Loading Platform (Figure 1)**

Is the main structure that will allow the berthing of ONE (01) vessel at a time, with a storage capacity of up to 160,000 m3, for loading Gas.

The wharf-platform will be 30 m. long and 30 m. wide.

Below the platform, the sea will be 17 m. deep, it being part of the dredged channel.

Transverse piles and beams will be made of steel elements, while the platform will be built of concrete, steel or a combination of both elements.

The platform will be 9 to 11 m. high on the mean low water springs (MLWS).

**Utility Dock**

This platform is close to the seaward end of the trestle bridge and will be used to berth tugboats for refueling. It includes one fire pump. There will also be THREE (03) special tanks to temporarily store solid wastes, oil wastes and wastewater. Spill control and response equipment will also be kept in this area.

**Mooring dolphins**

Secondary structures for berthing and mooring vessels. Four (4) mooring dolphins will be used to withstand the tractive force when vessels are berthed. Each such structure will consist of a breasting dolphin and quick-releasing hooks. Six (6) mooring dolphins will be installed to withstand mooring loads. Each such structure will in turn include a quick-releasing hook system.

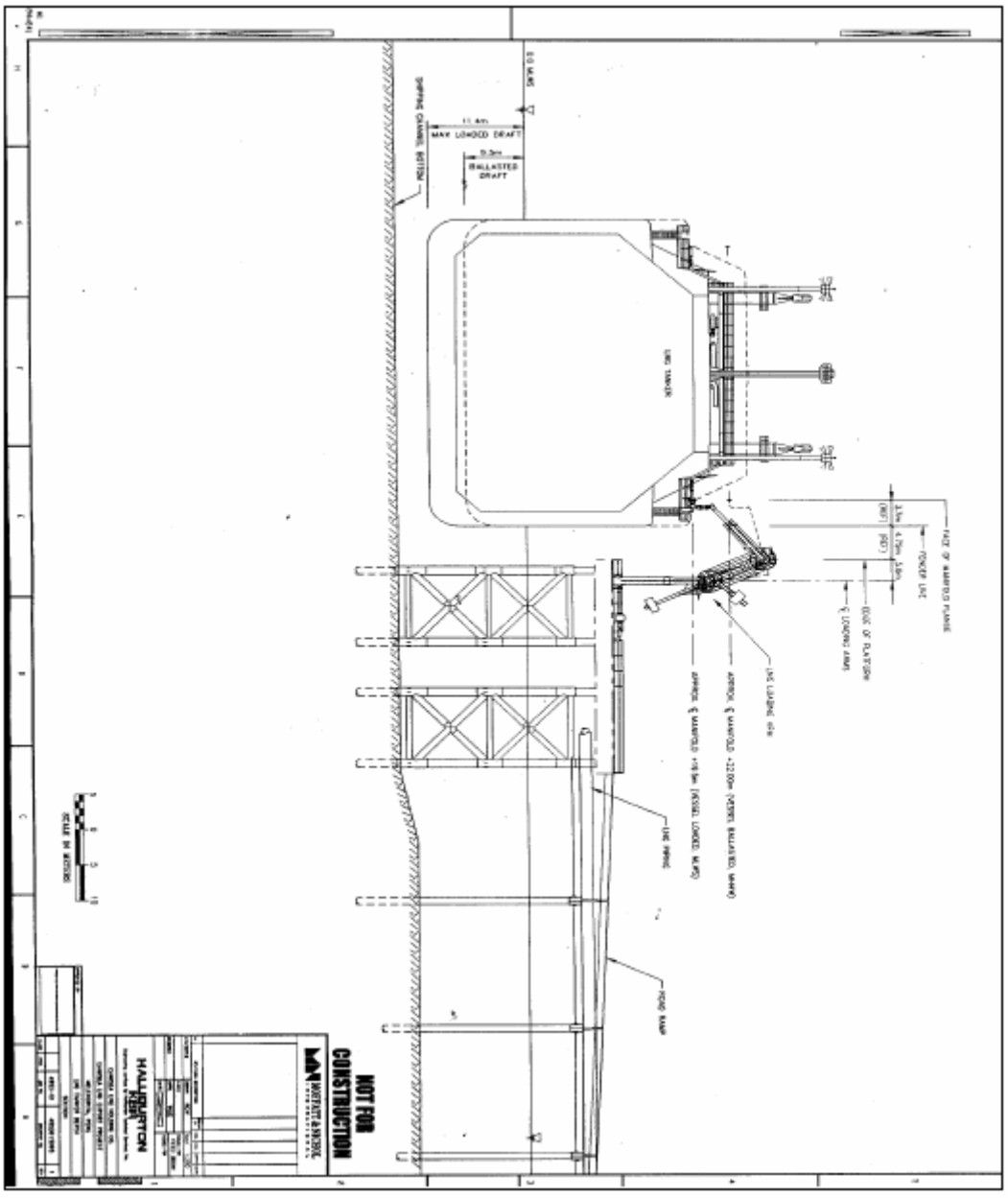
For safety reasons, mooring dolphins are fitted out with automatic cable release devices, to be ready for any emergency. To this end, there is a mooring cable stress monitor. Cables can be released from the dock by remote control (control area).

**Breakwater**

It will be aligned parallel to the coast and, consequently, will run perpendicular to the loading platform access bridge.

It will be built of rock to protect the wharf and the vessel from the action of waves. It will be located 250 m. to the west of the wharf at a depth of 14 to 16 m. Studies recommend a total length of 800 m.

**Figure 1 LOADING PLATFORM**



- **Types of vessels berthing at the wharf** (See Drawing E, Hydrographic Survey of Melchorita).

**Vessels**

They are known as methane vessels

| | | |
|---|---|---|
| Capacity | : | 160,000 $m^3$ |
| Type of tanks | : | Prismatic |
| Overall length | : | 277 m. |
| Length between perpendiculars | : | 266 m. |
| DWT | : | 66,500 tons |
| Breadth | : | 43.4 m. |
| Depth | : | 26 m. |
| Load draught | : | 11.4 m. |
| Light draught | : | 09.5 m. |

**Tugboats**

3 tugboats with the following characteristics are required:

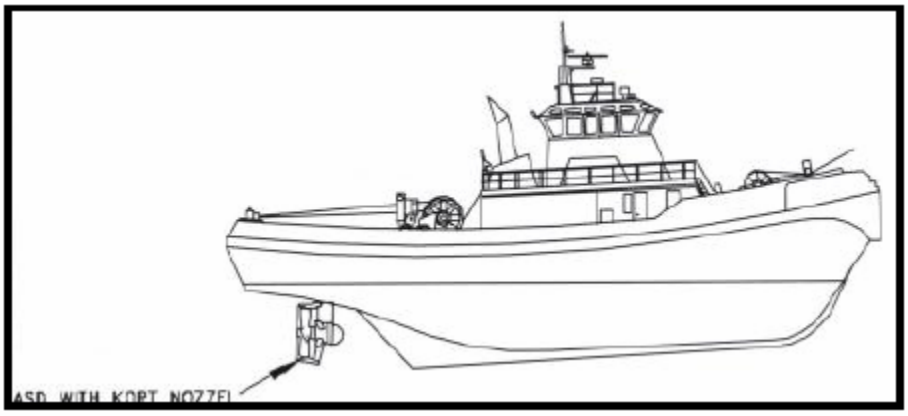
| | | |
|---|---|---|
| Overall length | : | 32 m. |
| Breadth | : | 14 m. |
| Draught | : | 05 m. |
| Static force | : | 50 t. |
| Pushing force | : | 40 t. |
| Tugging force | : | 40 t. |
| Winch force | : | 133 t. |
| Vertical line force | : | 150 t. |
| Engine power | : | 4000 HP |

This type of tugboat can develop great engine power within a short distance and provides great friction force, being able to do a great job with a short line.

It includes 200 m. of coiled cable, there being 100 m. of free cable to work independently of the ship.

Its turning circle is completed within a radius of 450 m., at an average of 12° per minute at 3 knots.

This tugboat needs three crewmembers. At least two of them should be trained and in a capacity to perform all the maneuvers ordered by the pilot. Besides, two of them will be duly trained to perform deck work and cable maneuvering. All of them will know how to respond to an emergency.



- **Nautical Signaling** (See Drawing B-2, Hydrographic Survey of Melchorita)

## 1. Terminal Signaling

**Nautical signaling and navigation safety (buoys and signals)**

The relevant provisions that deal with this subject are contained in the HIDRONAV-38 Nautical Signaling Regulations, 1985 edition, issued by the National Bureau of Hydrography and Navigation.

### 3.5.1 Terminal Signaling

The relevant provisions that deal with this subject are contained in the HIDRONAV-38 Nautical Signaling Regulations, 1985 edition, issued by the National Bureau of Hydrography and Navigation. The proposed signal satisfactorily complies with the provisions set out in Chapter III, Article 301, of the Regulations.

**The following nautical signaling equipment will be installed on both seaward ends of the Terminal:**

S-1(J) MD1 mooring structure (northern end of the berth)

S-2(K) MD-6 mooring structure (southern end of the berth)

**Navigation lanterns with tower assembly**

**Day signal**

| | | |
|---|---|---|
| Type | : | Navigation lanterns with tower assembly |
| Color of tower assembly | : | Fluorescent white |
| Height of tower assembly | : | 8 m. above the platform |
| Elevation above sea level | : | 15 m. |
| Shape of tower assembly | : | Cylindrical |

**Tideland ML-155 or similar night signal**

| | | |
|---|---|---|
| Type | : | Navigation lantern with tower assembly |
| Light | : | White |
| Elevation above sea level: | | 15 m. |
| Light period | : | A group of 2 flashes of light, to be confirmed by the National Bureau of Hydrography and Navigation (DHN). |

| | | |
|---|---|---|
| Effective range | : | 03 nautical miles (trans. factor 0.74). |
| Visibility | : | The whole horizon |

**Breakwater signaling devices**

The relevant provisions that deal with this subject are contained in the HIDRONAV-38 Nautical Signaling Regulations, 1985 edition, issued by the National Bureau of Hydrography and Navigation. The proposed signal satisfactorily complies with the provisions set forth in Chapter III, Article 301, of the Regulations.

As stated earlier in this report, in order to have a sheltered area for loading liquefied natural gas at the proposed Marine Terminal, the Project calls for the construction of a 800 m. long and 80 m. wide rock breakwater parallel to the coast.

Signaling lanterns will be installed on the northern and southern ends of the breakwater to define its location, according to the following characteristics:

**Breakwater lanterns, northern side**

S-3 (H) Northern side
S-4 (I) Southern side

**Day signal**

| | | |
|---|---|---|
| Location | : | Northern end of the breakwater |
| Type | : | Lantern with tower assembly |
| Color of tower assembly: | | Fluorescent white |
| Height of tower assembly: | | 8 m. above the platform |
| Elevation above sea level: | | 15 m. |
| Shape of tower assembly: | | Cylindrical |

**Tideland ML-140 or similar night signal:**

| | | |
|---|---|---|
| Location | : | Northern end of the breakwater |
| Type | : | Lantern with tower assembly |
| Light | : | White |
| Elevation above sea level: | | 15 m. |
| Light period | : | Flashes of light, to be confirmed by DHN. |
| Effective range | : | 05 nautical miles (trans. factor 0.74). |
| Visibility | : | The whole horizon |

### 3.5.2 Dredged channel – signaling devices

The relevant provisions that deal with this subject are contained in the HIDRONAV-38 Nautical Signaling Regulations, 1985 edition, issued by the National Bureau of Hydrography and Navigation. The proposed signal satisfactorily complies with the provisions set forth in Chapter III, Article 301, of the Regulations.

#### 3.5.3.1 General

- To install signals along the proposed Marine Terminal entry and exit dredged channel, the project calls for the installation of a system consisting of TWELVE (12) signaling buoys/marks. TWO (02) of them will be positioned ONE (01) mile off the coast, on the seaward side, both at the entry to and exit from the channel, EIGHT (08) will be placed in the channel itself, of which SIX (06) will be placed on the sides of the dredged channel (4 buoys and 2 piles), and the remaining TWO (02) piles will be positioned in such a way that, together with TWO (02) channel buoys and TWO (02) approach buoys, will define the entry to and exit from the channel. See Drawing B-4.

- The TWO (02) approach buoys will be painted white and will have a white light and will be pen or crowbar-shaped.

- From the EIGHT (08) channel buoys/marks, FOUR will be painted green and will have a green light, and FOUR (04) will be painted red and will have a red light.

- From the FOUR (04) green buoys (portside), ONE (01) will be pile-shaped and THREE (03) will be pen- or crowbar-shaped and will have a conical green mark on top.

- From the FOUR (04) red buoys (starboard side), ONE (01) will be pile shaped and THREE (03) will be pen- or crowbar-shaped and will have a conical red mark on top.

- The TWO (02) complementary leading buoys (piles) will be made of fiberglass-cased concrete piles.

#### 3.5.3.2 Characteristics of channel approach and exit buoys

S-7 (A) Approach buoy, heading angle 060°
S-8 (B) Exit buoy, heading angle 220°

**Tideland SB-285P or similar pen-shaped buoys (crowbar-shaped)**

**Buoy description:**

| | | |
|---|---|---|
| Shape | : | Cylindrical, double nun |
| Total height | : | 2.50 m. |
| Height of tower assembly | : | 1.23 m. |
| Cylinder height | : | 0.585 m. |
| Height of lower nun | : | 0.685 m. |
| Greatest diameter | : | 0.87 m. |
| Material | : | Plastic reinforced with fiberglass |

| | | |
|---|---|---|
| Color | : | White |

**Light description:**

| | | |
|---|---|---|
| Color | : | White |
| Type | : | Bell-shaped self-sustained light with X –shaped attachment |
| Energy source | : | Built-in solar panels |
| Range of Light | : | 2 nautical miles (Atmospheric Transparence Factor 0.75) |
| Rate | : | Flashes of light the characteristics of which are still to be confirmed with the DHN. |
| Ignition | : | Automatic switch with built-in photovoltaic cell. |
| Visibility | : | The whole horizon |
| Anchorage | : | 25 m. of ½¨galvanized steel cable with ½" shackles and an anchor weight of 200 kg. |

**Notes:**

The characteristics of the blinking lights of the different buoys that will be used for signaling purposes in the dredged channel are still to be confirmed with the DHN. Different blinking lights will be used in order to make it easier to identify the different buoys.

### 3.5.3.3 Characteristics of channel buoys

**a. Pen-type buoys (spar) in the dredged channel:**

A-1 (C ) Entrance buoy, northern side.

A-24 (D) Entrance buoy, southern side.

A-17 (O) Exit buoy, northern side.

A-16 (P) Exit buoy, southern side.

A-22 (G) Channel buoy, curved path on southern end, entrance side

A-19 (L) Channel buoy, curved path on western end, exit side

**Buoy description:**

| | | |
|---|---|---|
| Shape | : | Cylindrical, double nun |
| Total height | : | 2.50 m. |
| Height of tower assembly | : | 1.23 m. |
| Cylinder height | : | 0.585 m. |
| Height of lower nun | : | 0.685 m. |
| Greatest diameter | : | 0.87 m. |
| Material | : | Plastic reinforced with fiberglass |
| Color | : | Red light on the starboard side and green light on the port side of the channel. |

**Description of Tideland SB-285P or similar light:**

| | | |
|---|---|---|
| Color | : | Red light on the starboard side and green light on the port side of the channel. |
| Type | : | Bell-shaped self-sustained light with X –shaped attachment |
| Energy source | : | Built-in solar panels |
| Range of light | : | 2 nautical miles (Atmospheric Transparence Factor 0.75) |
| Rate | : | Flashes of light the characteristics of which are still to be confirmed with the DHN. |
| Ignition | : | Automatic switch with built-in photovoltaic cell. |
| Visibility | : | The whole horizon |
| Anchorage | : | 25 m. of ½¨galvanized steel cable with ½” shackles and an anchor weight of 200 kg. |

**Notes:**

The characteristics of the blinking lights of the different buoys that will be used for signaling purposes in the dredged channel are still to be confirmed with the DHN. Different blinking lights will be used in order to make it easier to identify the different buoys.

**b. Dredged channel piles:**

A-2 (E) Channel buoy, curved path on northern end, entrance side
A-14 (M) Channel buoy, curved path on eastern end, exit side

**Pile description:**

| | | |
|---|---|---|
| Shape | : | Cylindrical |
| Elevation above sea level | : | 5.0 m. |
| Material | : | fiberglass-cased concrete |
| Color: | : | Red on the starboard side and green on the port side of the channel. |

**Description of Tideland ML-140 or similar light:**

| | | |
|---|---|---|
| Color | : | Red light on the starboard side and green light on the port side of the channel. |
| Type | : | Bell-shaped self-sustained light with X –shaped attachment |
| Energy source | : | Built-in solar panels |
| Range of light | : | 2 nautical miles (Atmospheric Transparence Factor 0.75) |
| Rate | : | Flashes of light the characteristics of which are still to be confirmed with the DHN. |
| Ignition | : | Automatic switch with built-in photovoltaic cell. |
| Visibility | : | The whole horizon |

**Notes:**

The characteristics of the blinking lights of the different buoys that will be used for signaling purposes in the dredged channel are still to be confirmed with the DHN. Different blinking lights will be used in order to make it easier to identify the different buoys.

**c. Dredged channel entry and exit leading buoys**

S-5 (F) entry leading buoys, includes RACON

S-6 (N) exit leading buoys

**Buoy description**

| | | |
|---|---|---|
| Shape | : | Cylindrical piles |
| Elevation above sea level | : | 13.0 m. |
| Material | : | Fiberglass-cased concrete |
| Color | : | White |

**Light description:**

| | | |
|---|---|---|
| Color | : | White |
| Type | : | Bell-shaped self-sustained light with X –shaped attachment |
| Energy source | : | Built-in solar panels |
| Range of light | : | 3 nautical miles (Atmospheric Transparence Factor 0.75) |
| Rate | : | Flashes of light the characteristics of which are still to be confirmed with the DHN. |
| Ignition | : | Automatic switch with built-in photovoltaic cell. |
| Visibility | : | The whole horizon |

**Notes:**

The characteristics of the blinking lights of the different buoys that will be used for signaling purposes in the dredged channel are still to be confirmed with the DHN. Different blinking lights will be used in order to make it easier to identify the different buoys.

### 3.5.3 Signals to be installed in the dredged material storage area

The relevant provisions that deal with this subject are contained in the HIDRONAV-38 Nautical Signaling Regulations, 1985 edition, issued by the National Bureau of Hydrography and Navigation. The proposed signal satisfactorily complies with the provisions set forth in Chapter III, Article 301, of the Regulations.

In order to install signals in all FOUR (04) vertices of the area to be used to store the material dredged from the proposed Marine Terminal access and exit channel, the project calls for the installation of ONE (01) signaling buoy at each vertex, as per the following characteristics:

**Buoy description:**

| | | |
|---|---|---|
| Shape | : | Cylindrical, double nun |
| Model | : | P-2ST |
| Total height | : | 2.50 m. |
| Height of tower assembly | : | 1.23 m. |
| Cylinder height | : | 0.585 m. |
| Height of lower nun | : | 0.685 m. |
| Greatest diameter | : | 0.87 m. |
| Material | : | Plastic reinforced with fiberglass |
| Color | : | Yellow |
| Marks on the hull | : | M-1 through M-4, in black |

**Description of Tideland SB-285 or similar light:**

| | | |
|---|---|---|
| Color | : | Amber |
| Type | : | Bell-shaped self-sustained light with X –shaped attachment |
| Energy source | : | Built-in solar panels |
| Range of light | : | 2 nautical miles (Atmospheric Transparence Factor 0.75) |
| Rate | : | Flashes of light the characteristics of which are still to be confirmed with the DHN. |
| Ignition | : | Automatic switch with built-in photovoltaic cell. |
| Visibility | : | The whole horizon |
| Anchorage | : | 25 m. of ½¨galvanized steel cable with ½" shackles and an anchor weight of 200 kg. |

**Notes:**

The characteristics of the blinking lights of the different buoys that will be used for signaling purposes at the vertices of the square-shaped storage area are still to be confirmed with the DHN. Different blinking lights will be used in order to make it easier to identify the different buoys.

The above-described nautical signaling devices comply with the provisions set forth in Articles 108, 205.a.4 and 205.b of the Nautical Signaling Regulations, HIDRONAV-38, 2nd edition, 1985, and will be installed in order to serve as a point of reference to avoid the performance of trawl fishing and other activities that may be affected by the material deposited at the bottom of the sea within the area indicated above.

## PHYSICAL CHARACTERISTICS OF HYDROCARBONS

- **MOLECULAR STRUCTURE OF HYDROCARBONS**

Petroleum is made up of several different hydrocarbon molecules with different molecular weights, ranging from the lightest to the heaviest, depending on the number of carbon atoms comprising the molecules involved.

Light molecules, like for instance methane, ethane, butane and propane, tend to gasify under normal atmospheric conditions, while heavier molecules, like asphalt and bitumen, tend to solidify. Intermediate molecules like Kerosene and Diesel, are in a liquid state under normal conditions and are the most commonly transported products.

- **PHYSICAL PROPERTIES**

- **Density**. The mass of a substance, like hydrocarbons, regardless of its byproducts, usually contains gases derived from hydrocarbon liquids that are heavier than air, at ambient temperature.

This property is particularly important due to the stratification these gases could have when hydrocarbons are being handled (loaded, unloaded, washed, etc.).

**Viscosity.** Defined as the internal resistance of a fluid to flow over another fluid or to oblige a liquid layer to flow over another layer, when a liquid layer exists between both of them. It is worth stressing that viscosity is a general property of both liquids as well as gases, although the former are much more viscous than the latter.

In hydrocarbons, viscosity decreases as the temperature increases and increases as the temperature decreases.

**Pour Point.** Is the lowest temperature at which hydrocarbons will continue flowing.

**Flash Point.** Is the lowest temperature at which vapors from a liquid will ignite upon application of a small flame along the liquid's surface.

**Vapor pressure.** A hydrocarbon mixture in a tank generates gases that fill up the space still left in the tank. Part of these gases are dissolved in the liquid, until an equilibrium is achieved with a certain amount of gas distributed evenly. The pressure exerted by this gas is called vapor pressure.

When the gas/liquid ratio is zero, it is called true vapor pressure; this pressure increases as the temperature of the mixture increases.

**Combustibility.** During the burning process, hydrocarbon gases react with oxygen present in air, producing C02 and water. This reaction generates enough heat to form a visible flame that moves through the mixture of gas, hydrocarbons and air. When the gas above the liquid hydrocarbons is ignited, the heat resulting therefrom evaporates the fresh gas and preserves the flame.

- We should bear in mind the fact that on entering water, petroleum undergoes weathering (weather exposure). This process will basically depend on the type of hydrocarbon involved, plus volume, atmospheric variables and sea conditions. In this case, we are speaking of diesel, and only small amounts of diesel, so the spill may tend to concentrate in a given place because there may be little surface stress owing to the temperature of seawater in the area, giving enough time for the recovery of the hydrocarbon spill. The possibility of a spill reaching the beach is remote.

## GAS PROPERTIES

- **INTRODUCTION**

The word GAS describes a form of matter that has no shape or volume of its own, but rather adapts to the shape and volume of the container.

In view that all substances can change into a gaseous state, depending on the temperature and pressure applied, the word GAS is used to describe substances that exist in a gaseous state under normal conditions, that is, under normal temperature and pressure (TPN), that is, approximately at 21° C and 1 atm. pressure.

To transport gas, the gas must be necessarily pressurized or refrigerated, and the risk is that, if an accidental gas leak occurs, said gas may multiply its volume hundreds of times.

The risks associated with the chemical properties of gas, that is, flammability, reactivity or toxicity, increase when the gas disperses in the atmosphere and becomes invisible.

A cloud dispersion model, according to wind speed and weather conditions, can give a rough idea of the areas where danger exists.

Sometimes, the risk faced by the population is so big as the impossibility of evacuating the population in a few minutes, while the gas dispersion takes place. However, in other cases containing the spill is so easy as placing a canvas on the leak or placing a wedge to plug the spill.

The incident can be substantially minimized with a quick response on the part of firemen. Quickly accessing the service database, being aware of the protection offered by personal protective equipment, and short exposure periods can successfully save the lives of affected people.

- **CLASSIFICATION**

To classify the different types of gases, we must bear in mind some common denominators that reflect the chemical and physical properties of gas.

**Classification of gases according to their chemical properties**

As regards gases, the chemical properties are the most important ones, as they reflect their capacity to chemically react with other matters, generating potentially hazardous sub-products or large amounts of heat.

Flammable Gases

A flammable gas is any gas that can burn under standard oxygen conditions in air. The combustion of flammable gases in air is subject to the same conditions as flammable liquid vapors; that is, any flammable gas will burn only within certain gas-air mixture limits (flammability or combustibility limits) and at a given temperature, as required to start a reaction (ignition temperature).

Although flammable liquid vapors and flammable gases show the same combustion properties, the term Flash Point has practically no meaning for gases. The Flash Point is basically the temperature at which a flammable liquid generates a sufficient amount of vapors to produce combustion. Said temperature is always below its normal boiling point. A flammable gas is usually at a higher temperature than its normal boiling point temperature, even when it is transported in liquid state and, therefore, its temperature is well above its Flash Point temperature.

A good example is butane, hydrogen, acetylene, etc, which are gases that burn, cannot be breathed, and can form explosive mixtures with air.

Non-flammable gases

Gases that do not burn under any concentration of air or oxygen. However, many of these gases can maintain the combustion of other matters or can otherwise tend to suppress said combustion. Those that maintain the combustion process are usually called oxidizing gases, and are made up of mixtures of oxygen and other gases like Helium, Argon, etc.

Those gases that do not maintain the combustion process are usually called inert gases. The most common inert gases are: Nitrogen, Argon, Helium, Carbon Bioxide, and Sulfur Bioxide. It is also true that some metals like, for instance, Magnesium, can react vigorously with Nitrogen or Carbon Bioxide.

Reactive gases

In view that most part of gases can chemically react with other substances under certain conditions, the term reactive gas is used to distinguish those gases that react with other matters or with themselves, generating large amounts of heat or potentially hazardous reaction products through a reaction other than combustion and under reasonably foreseeable triggering conditions (heat, impact, etc.).

Fluoride is an example of a highly reactive gas, because it reacts practically with all organic and inorganic substances at normal temperatures and pressures, and usually at a sufficient speed to produce flames. Chloride (classified as a non-flammable gas) is another example. It reacts with Hydrogen (flammable gas) and can also produce flames.

Several gases can chemically react with themselves when subjected to easily foreseeable conditions of heat and impact, including fire exposure with large amounts of heat, like Acetylene, Metylacetylene, Propane-diene, and Vinyl Chloride. These gases are usually kept in containers and are mixed with other substances for their transportation and storage; sometimes, they are kept in special containers in order to stabilize them against possible reaction triggers.

Toxic gases

Certain gases can be hazardous for people if released into the atmosphere. This category includes poisonous gases or gases that may be irritating if inhaled or coming into contact with the skin, like Chloride, Hydrogen Sulfide, Sulfur Bioxide,

Ammonia, or Carbon Monoxide. The presence of these gases can make the work of fire fighters more difficult, if they are exposed to these gases.

**Classification of gases according to their physical properties**

The physical properties of gases are very important to provide protection against and respond to fire events, because they affect the physical behavior of gases, both while they remain inside their containers, as well as when they are released accidentally. By their very nature, gases must be fully stored inside containers for their transportation, handling and storage, until they are used.
For practical reasons and easiness of use, gases should be stored in containers that contain the largest possible amount of gas. For this reason, the necessary measures are to be taken to increase the pressure of the gas, in such a way that it will be transported in a liquid state and very seldom in a gaseous state.

This situation may be quite confusing for some people, but it is important to make this distinction for purposes of the application of fire prevention and fire-fighting practices.

Compressed gases

Compressed gas is a gas that, under normal temperatures and under pressure within any given container, remains in a gaseous state. Compressed gas is any gas or mixture of gases the critical temperature of which is smaller than or equal to –10 C.

Liquefied gases

Any gas that, under normal temperatures and under pressure, remains in a liquid state and partially in a gaseous state. The pressure basically depends on the temperature of the liquid. Liquefied gas is any gas the critical temperature of which is higher than or equal to –10 C.

Cryogenic gases

Cryogenic gases are gases that, in order to remain in a liquefied state within the container where they are stored, should be kept at temperatures that are below normal temperatures, usually above their boiling point at normal temperature and pressure, and at pressures that are proportionately low or moderate. The main reason of this difference with respect to liquefied gas is that the cryogenic gas cannot be kept indefinitely in the container where it is stored because it cannot prevent the penetration of atmospheric heat, which continuously tends to increase its pressure to levels that may exceed its resistance to any type of container. Cryogenic gas is any gas the boiling temperature of which at atmospheric pressure is below – 40 C.

Pressure-dissolved gases

A typical case is Acetylene. Acetylene is a gas that cannot be pressurized if it is not previously kept at very special conditions. It needs a cylinder packed with a porous material, to which Acetone is added. The acetylene charged into the cylinder dissolves in the Acetone and is distributed throughout the pores of the internal porous material.

One of the characteristics of these gases is that they do not remain free, but rather dissolve in another medium, usually because of their reactivity.

- **NATURAL GAS**

Gas accumulates in underground deposits in geological regions known as hydrocarbon-bearing sedimentary basins, where gas can be found alone or mixed with petroleum. The term "natural gas" includes a number of substances the economic use of which results in different industrial processes, as follows:

The lightest fraction of natural gas is methane, also simply called natural gas. Liquefied methane, called LNG (liquefied natural gas), is cooled to cryogenic

temperatures in order to be transported in special vessels called “methane carriers” or “methane vessels” for export purposes. The plant will be handling this gas.

When entering the plant, the Camisea natural gas contains: 87.71 Methane, 10.24 Ethane, 0.53 Nitrogen, 1.5 CO2 and 0.02 Propane, at a temperature of 30° C. The gas exiting the plant contains: 80.55 Methane and 10.45 Ethane at less than (-) 163°C.

The term Liquefied Petroleum Gas (LPG) is understood to mean propane gas or propane gas mixed with liquid butane gas. This fraction of the natural gas is sold either on a retail basis, in cylinders, or on a wholesale basis, in special vessels.

The term Natural Gas Liquids (NGL) is understood to mean the liquefiable fraction of the natural gas, which is heavier than methane. It includes LPG, ethane gas and natural gasolines. Ethane is highly prized by the petrochemical industry because it can be finally turned into plastics.

The so-called gas chain includes from subsoil deposits, where gas in solution coexists with petroleum or otherwise gas remains in a gaseous state, to the flarer or final consumer, and includes two large activities:

Exploration (E) and Production (P), also known as upstream activities, which include: acquisition and processing of geological information; drilling and workover of exploratory and outpost extension wells; gas extraction; physical separation of gas from petroleum; in the case of associated gas, the treatment required to separate, through physical-chemical processes, undesirable components like water and carbon dioxide, to bring the final gas into agreement with the quality standards prevailing in the market. During this process, the liquefiable components (LNG) are extracted to leave only the methane gas, almost as a single component of the gaseous mixture, for its subsequent transportation and distribution.

Downstream activities include transportation by gas pipelines, economic storage, local distribution through networks, marketing and brokerage. A difference exists

between the storage of gas and other utilities like electricity, which requires synchrony between production and consumption.

Natural gas industrial or refining processes, like those associated with the NGL (Natural gas liquids) and LPG (Liquefied petroleum gas) processes, or physical transformation processes, like those involving LNG (Liquefied natural gas), are carried out to comply with the requirements of very particular markets, which have different characteristics.

**Description and technical characteristics of natural gas**

Natural gas is colorless, odorless, tasteless, shapeless, and lighter than air. It is gaseous at any temperature below -161º C. For safety reasons, a chemical odorant that smells a little like rotten eggs, Mercaptan, is added to natural gas so that it can be smelled if there is a gas leak.

Natural gas is a mixture of light hydrocarbons mainly composed of methane and ethane. The composition of natural gas is never constant; however, the primary component of natural gas is methane (at least 90%), which has a simple hydrocarbon structure composed of one carbon atom and four hydrogen atoms (CH4). Methane is highly flammable, burns easily and almost completely, and emits very little contamination.

Natural gas is neither corrosive nor toxic, its combustion temperature is high, and has a narrow flammability range, making it an inherently safe fossil fuel compared to other fuel sources. In addition, because of its specific density of 0,60, lower than that of air (1,00), natural gas tends to rise and, consequently, can easily disappear from the site it is located through any crack

The carbon and hydrogen in natural gas are thought to have originated from the remains of plants and animals that were accumulated at the bottom of lakes and

oceans over millions of years. After having been buried under huge layers of other sediments, the organic material was transformed into crude oil and natural gas as a result of the high pressure from the layers of sediments and the heat from the earth's core. The oil and gas were then squeezed out of the marine shales in which they were deposited, and from there went into porous sedimentary rocks. Then, oil and gas migrated upward through the porous rock, as it is less dense than the water, filling the pores. Several different types of oil and gas "traps" exist.

Natural gas is found throughout the world, either in reservoirs deep beneath the surface of the earth, or on the oceans. It forms as pockets of gas over crude oil deposits or is trapped in porous rock formations. When natural gas is found in crude oil deposits it is called associated natural gas, and when it is found without the presence of oil it is called non-associated natural gas.

When natural gas is cooled to a temperature of approximately -163°F at a normal atmospheric pressure, it condenses to a liquid called liquefied natural gas (LNG). One volume of this liquid takes up almost 1/600th less volume than natural gas. LNG is two times less heavy than water (about 45%). LNG is odorless, colorless, non-corrosive, and non-toxic. When vaporized, it burns only in concentrations of 5% to 15% when mixed with air. Neither LNG, nor its vapor, can explode in an unconfined environment. Since LNG takes less volume, natural gas is liquefied for ease of transporting and storing.

Natural gas is considered a clean fuel. Commercialized natural gas is practically sulfur free (the Camisea gas is absolutely sulfur free) and produces virtually no sulfur dioxide (SO2). Natural gas emits lower levels of nitrogen oxides (No) than oil and coal. Emissions of carbon dioxide (CO2) are less than those of other fossil fuels (According to Eurogas 40-50% less than coal and 25-30% less than oil).

**Physical Properties of the Natural Gas components**

| | Methane | Ethylene | Ethane | Propane | Butane | Nitrogen | Air |
|---|---|---|---|---|---|---|---|
| **Molecular Formula** | CH4 | C2H4 | C2H6 | C3H8 | C4H10 | N2 | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Molecular Weight** | 16.04 | 28.05 | 30.07 | 44.09 | 58.12 | 2<br>28.02 | A 212<br>0.2404 |
| **Specific Heat °F** | at 175<br>0.4502<br>at 112<br>0.5308<br>at 59<br>0.5284<br>50 – 392<br>0.5931 | at-131.8<br>0.3086<br>at 59<br>0.3592<br>59 -212<br>0.399<br>77 - 392<br>0.430 | at-115.6<br>0.3475<br>at 59<br>0.3861 | | | at –293.8<br>0.256<br>at 59<br>0.2477 | |
| **Boiling Point, °F** | - 258.7 | - 155.2 | -128.2 | -43.87 | -31.1 – 31.6 | -320.8 | -127.3 |
| **Dissolution Point, °F** | -299.2 | -273.1 | -297.8 | -309.82 | -211 | -345.9 | -227.6 |
| **Liquid Density** | 0.415 | 0.566 | 0.561 | 0.585 | 0.600 | 0.808 | 0.874 |
| **Vapor density, sp gr. Air 1** | 0.5444 | 0.9749 | 1.0493 | 1.554 | 2.0854 | 0.9672 | 1.00 |
| **Vaporization temperature, tu/l** | 248.4 | | At 32 135.0<br>At-4 156.6<br>At - 40<br>175.5<br>At - 130<br>228.6 | At 68<br>150.12<br>At 32<br>161.28<br>at-22<br>176.40 | 164.7 | 85.68 | 91.75 |
| **Flammability in air – percentage**<br><br>**Lower**<br>**Higher** | <br><br>5.00<br>15.00 | <br><br>2.75<br>28.6 | <br><br>3.00<br>12.50 | <br><br>2.12<br>9.35 | <br><br>1.86<br>8.41 | | |
| **Relative value as liquid at boiling point and gas at 0°F** | 630 | 485 | 488 | 316 | 108 | 690 | 760 |
| **Critical Temperature °F** | - 116.5 | 50 | 90 | 206 | 306 | -232.8 | -221.3 |
| **Latent temperature, tu/l at p** | 219.7 | 207.56 | 210.7 | 183.5 | 165.9 | | |

**Natural Gas and the Environment**

All fossil energies have an impact, to a greater or smaller extent, upon the environment, both because of the construction and operation of the infrastructure required to make them available to consumers, as well as because of their use.

Natural gas facilities and infrastructure, like gas pipelines and distribution networks, are mostly buried under the ground and, therefore, do not have a significant impact on the landscape. The remaining visible facilities, mainly platforms and regasification plants, owing to the technologies applied, are environmentally friendly.

Fossil fuels or their byproducts produce, following their combustion process, carbon oxides, sulfur and nitrogen, which should be limited to the largest extent possible to reduce acid rains, the greenhouse effect, and the deterioration of the quality of air.

Natural gas does not contain sulfur, for which reason, upon combustion, it does not emit sulfur oxides, which are mainly responsible for acid rains. Furthermore, with the new combustion technology developed, it is possible to substantially reduce the temperature of the flame, thus triggering a 40% decrease in the production of nitrogen oxides, as compared to other fuels.

Also because of its molecular composition, one carbon atom for every four hydrogen atoms, the carbon oxides produced during the natural gas combustion process account for 50% to 70% of those produced by other fuels. In addition, the fumes do not contain ashes or other solid wastes.

For all of the above reasons, natural gas helps improve the quality of air, and its increasing share in the energy market in different parts of the world is positively helping protect the environment.

**APPENDIX 2**

## 1. LIST OF CONTACTS

### 1.1 INTERNAL CONTACTS

| Name and Surname | Position filled in the Plan | Telephone Number Work/home | Address |
|---|---|---|---|
| | CGP | | |
| | CLD | | |
| | CPA | | |
| | JGC | | |
| | JSGOA | | |
| | JSGOT | | |
| | JSGSS | | |
| | JSGSSM | | |
| | Tugboat Master | | |
| | Pilot | | |

### 1.2 ENTITIES AND AUTHORITIES

| ENTITY | TELEPHONE | VHF | FAX | EMAIL |
|---|---|---|---|---|
| CALLAO Harbor Masters' Office | | | | |
| PISCO Harbor Masters' Office | | | | |
| Civil Defense – Municipality of CAÑETE | | | | |
| Civil Defense – Municipality of LIMA | | | | |
| Civil Defense – Municipality of CHINCHA | | | | |
| Civil Defense – Municipality of PISCO | | | | |
| Ecological Police CAÑETE | | | | |
| Ecological Police CHINCHA | | | | |
| OSINERG | | | | |

**APPENDIX 3**

**LIST OF EQUIPMENT**

**Spill containment**

| EQUPMENT | AMOUNT | LOCATION |
|---|---|---|
| 18" x 18"ABSORBENT PADS | 16 | Utility Dock |
| 3/8" x 18" x 18" PAD | 100 | Utility Dock |
| 19" x 140"ABSORBENT ROLL | 01 | Utility Dock |
| 4 x 40´ ABSORBENT CORDS | 100 | Utility Dock |
| 13' LONG GLOVES | 04 PAIRS | Utility Dock |
| SPECIAL POLYETHYLENE BAGS WITH TIE-DOWNS | 100 | Utility Dock |
| 55-GALLON POLYETHYLENE CYLINDERS | 02 | Utility Dock |
| GRANULAR BAG/PEAT 25 POUNDS | 01 | Utility Dock |
| ABSORBENT CORDS 10'<br>ABSORBENT CORDS 70´ | 100<br>30 | Utility Dock |
| 55-GALLON DISPENSANT CYLINDER | 01 | Utility Dock |

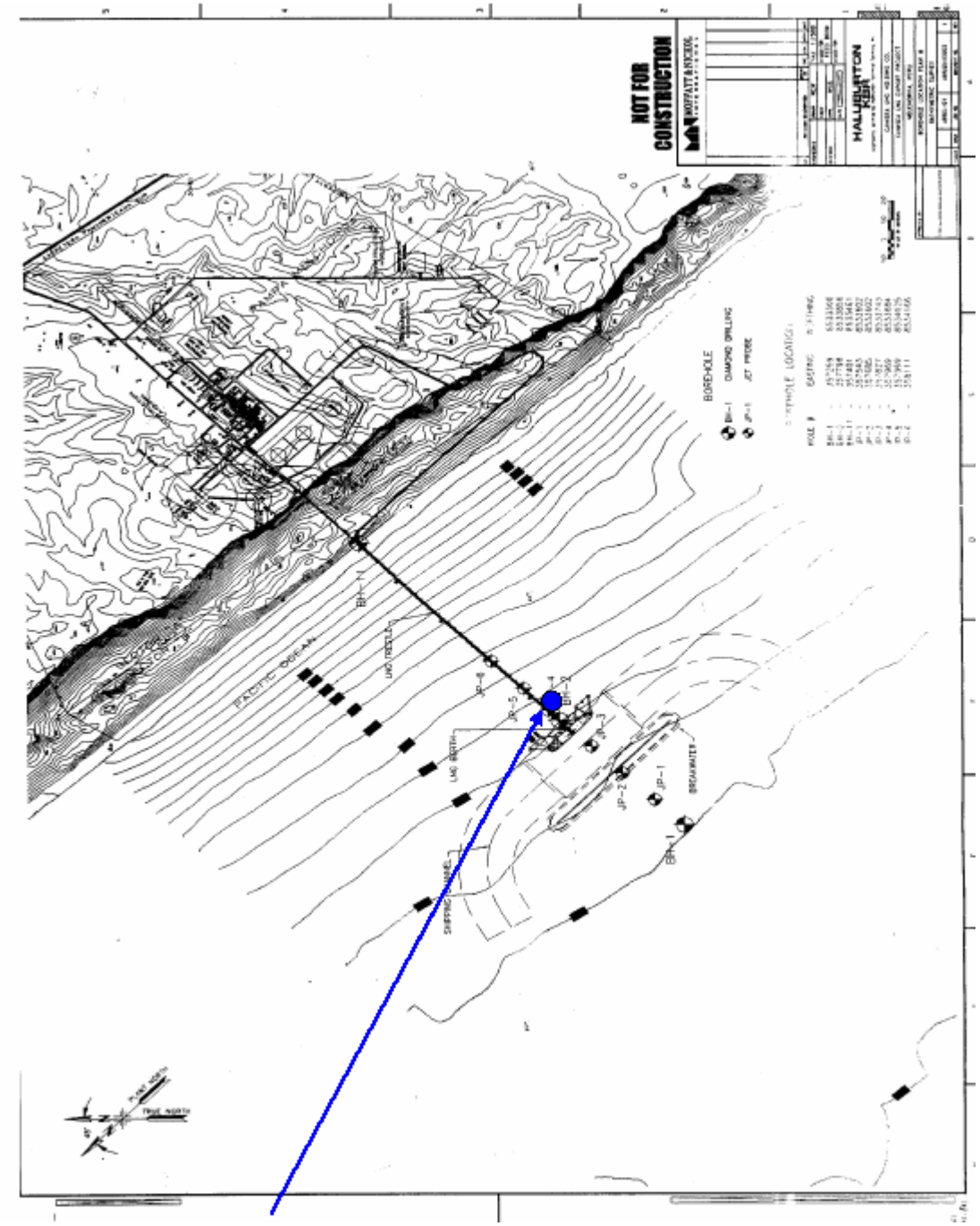
**Fire-Fighting Equipment**

| DESCRIPTION | BRAND | REMARKS |
|---|---|---|
| Motor pump | | 100 GPM |
| Motor pump | | 1000 GPM |
| Motor pump | | Fire-Fighting System, Dock |
| Motor pump | | Fire-Fighting System, Dock |
| Foam Concentrate Pump | | Fire-Fighting System, Dock |
| Telecommand Monitor | | Fire-Fighting System, Dock |
| Telecommand Monitor | | Fire-Fighting System, Dock |
| Deflector Nozzels (18) | | Fire-Fighting System, Dock |

| | | |
|---|---|---|
| Hydrants (6) | | Fire-Fighting System, Dock |
| Fixed Monitors (2) | | Fire-Fighting System, Dock |
| Fixed Monitors (2) | | Fire-Fighting System, Dock |
| Hose Stations (4) | | Fire-Fighting System, Dock (fresh water) |
| Gas Detector and Monitor | | Fire-Fighting System, Dock |
| Gas Sensors (14) | | Fire-Fighting System, Dock |
| Portable Motor Pump | | |
| Portable Motor Pump | | |
| Portable Motor Pump | | |
| Portable Motor Pump | | |
| Air Compressor | | |
| PQS Extinguisher | | 136 kg. |
| PQS Extinguisher | | 136 kg. |
| PQS Extinguisher | | 250 kg. |
| PQS Extinguisher | | 250 kg. |
| Neoprene pads (29)<br>Canvas pads (12) | | 1 ½ ∅ Hoses (30) m. |
| Neoprene pads (69)<br>Canvas pads (14) | | 2 ½ ∅ Houses (30) m. |

The monitors are actually water or foam guns that are usually installed in the upper part of the facilities involved.

**SPILL RECOVERY EQUIPMENT LAYOUT**



**UTILITY DOCK – SPILL RESPONSE EQUIPMENT**

**APPENDIX 4**

## COMMUNICATIONS PLAN

This appendix to the Contingency Plan identifies the emergencies that require an alarm, the location of which must be indicated by the Terminal. It also identifies the communications equipment required for the operations.

### A. Alarms

Fire at the Terminal or in the vessel
Spills or leaks involving liquefied gas
Spills involving Diesel 2
Leaks involving toxic vapors
Tsunamis

### B. Communication equipment available at the Terminal for the operations

FIXED telephones
Emergency telephones
Telephone with loud telephone ringer.
VHF ship frequency designated by the Pisco Harbor Masters' Office
Portable UHF radio for loading operations
Cell phones and beepers
Fax

**APPENDIX 5**

**ACRONYMS AND DEFINITIONS**

The acronyms and definitions for routine and emergency communications are based on common and easily understandable language. If the Maritime Authority with jurisdiction over the project area deems it convenient to use any special language, said language will be incorporated to this Contingency Plan.

Following are some definitions:

**Surfactant**

A substance used to recover a hydrocarbon spill, as opposed to the dispersant.

**Associated Gas**

Natural gas found in association with oil in a field, either dissolved in the oil or as a cap of free gas above the oil.

**Gas associated with petroleum**

Gas found together with petroleum.

**Fuel Gas**

Gaseous fuels that can be distributed by pipeline, such as natural gas, liquid petroleum gas, coal gas and refinery gas.

**Liquefied Petroleum gas (LPG)**

LPG is made up of propane, butane, or a mixture of propane and butane, which can be liquefied under pressure, whether in whole or in part, in order to facilitate its transportation and storage. LPG can be used for cooking, heating, and vehicle fuel purposes. It is obtained from petroleum refining.

**Solution gas**

Natural gas dissolved in crude oil within the field.

**Raw Natural Gas**

Natural gas that contains undesirable impurities and substances, such as: water, nitrogen, carbon bioxide, gaseous hydrosulfuric acid, and helium. These impurities and substances are removed before the gas is sold.

**Liquefied Natural Gas (LNG)**

Natural gas that, in order to make its transportation easier, is liquefied by refrigeration, cooled to -163°C at atmospheric pressure. Natural gas takes up 1/600th more volume than liquefied natural gas (LNG).

**Lean gas or dry gas**

Natural gas containing very little hydrocarbons other than methane. Its heating power typically stands at 1,000 Btu/standard cubic feet, unless a significant proportion of gases other than hydrocarbons are present.

**Rich gas**

Gas containing substantial quantities of methane, but a relatively high proportion of other hydrocarbons. Most of these hydrocarbons are usually separated as natural gas liquids.

**Dry gas**

a) The same as poor gas, that is, gas that does not contain hydrocarbons that will liquefy at ambient temperature and pressure.
b) Gas that does not contain water vapor, that is, gas without water.

**Synthetic gas**

A gas rich in methane, derived from oil or coal. It has the same basic characteristics and chemical composition as natural gas. After being treated to eliminate carbon bioxide, it can be used for household purposes, as a gas with low heating power.

**Gas pipeline**

A pipeline used for the transportation of natural gas at high pressure and over great distances.

**Gasoline or Petrol**

A fuel used in motorcars and motorcycles, etc (also known as petrol). Naturally occurring gasoline is known as condensate.

**Degree-day**

A measure of the coldness of the weather based on the extent to which the daily mean temperature falls below a reference temperature, usually 65°F; thus, each degree by which the daily mean temperature drops below 65°F represents one degree day. (°C is used in Continental Europe, instead of °F; the temperature base is usually 16°C, equivalent to 60.8°F).

**API Gravity**

The scale used by the American Petroleum Institute to express the specific gravity of oils.

**Specific Gravity**

The ratio between the density of a substance at a given temperature and the density of water at 4°C.

**Electromagnetic Interference (EMI)**

The electric or electronic interference produced by the operation of equipment or instruments due to the electromagnetic field generated by the nearness of electric and electronic equipment.

**Emergency shutdown (ESD)**

Bringing operations to a halt in a controlled, effective, safe, and quick fashion.

**Emergency shutdown system**

A system whereby loading operations are quickly and effectively shut down, either manually or through automatic control sensors, in a safe and controlled fashion. Depending on the product, it can take from 06 to 15 seconds.

**Fail to Safety**

Plant and equipment designed to perceive the slightest condition involving a risk, no matter how small the risk may be, regarding failures in the ESD system or loss of power in the ESD system.

**Fusible plug**

An element designed to measure temperatures between 98°C and 104°C. It acts on the ESD system and makes the valves shut down if a fire breaks out.

**Interphase**

Components transferring the link signal to the ship's ESD system or to the Terminal's ESD system.

**Intrinsically safe circuit**

A circuit where a spark or thermal effect, or normally both, or specific failure conditions, are incapable of igniting the gas vapors.

**Link**

The medium whereby a signal is emitted to start the ESD system. It can be transmitted from the ship to the ESD system on ground or vice versa.

**Pendent Extension**

A manual control that activates the ESD system in a remote location.

**Pipeline Period**

The time required for a pressure signal to travel along the pipeline system, starting from the beginning, reaching the end, and coming back. This time is calculated by dividing the line length by the speed of sound in the line fluid.

**Response Time**

Signal Response Time: Time elapsed between the moment a start signal is emitted to the ESD and the moment it is recognized by the ESD system.

Actuation Response Time: Time elapsed between the moment an ESD system recognizes the ESD start signal and the moment the required action begins. The Actuation Response Time comes immediately after the Signal Response Time.

**Total Shutdown Time**

Time elapsed between the manual or automatic start of the ESD system and the final shutdown of manifolds in the ship or Terminal.

**Total Valve Closure Time**

The time it takes for a valve to move from an open position to a closed position.

**Effective Valve Closure Time**

Period required for a valve to reduce the flow from 90 to zero.

**APPENDIX 6**

**LIST OF DRAWINGS**

- Drawing 1 External area for evacuees.

- Drawing 2 Dock Pipeline Layout

- Summary Drawing of Bathymetric Studies at a scale of 1:7500 B-2
  Includes:
  Reference bathymetry
  Reference topography of adjacent beach
  Submarine gradient
  Location of Terminal
  Location of Breakwater
  Location of dredged channel
  Location of dredged material storage area
  Nautical signaling
  High water mark
  Parallel line 50 m. from High Water Mark
  Dredged material storage area
  Riverside area

- Bathymetric drawing at a scale of 1:2500 B-4
  Includes
  Bathymetry
  Topography of adjacent beach
  Submarine gradient
  Location of Marine Terminal

Location of Dredged Channel

Location of Breakwater

Dredged channel area

Breakwater area

Nautical signaling system

High water mark

Parallel line 50 m. from High Water Mark

Riverside area

- Drawing showing the Characteristics and Layout of the Marine Terminal E