

## **EMERGENCY RESPONSE PROCEDURE**

**AGREEMENT NO. :** 09-5578-E-4

**PROJECT NAME :** Ruwais Refinery Expansion Project  
EPC-4: Tankage & Associated  
Interconnecting Piping





**COMPANY :** Abu Dhabi Oil Refining Company (TAKREER)

**PMC :** Mott MacDonald Ltd.

**CONTRACTOR :** Daewoo Engineering & Construction Co., Ltd.

<b>TAKREER</b>	<b>RUWAIS REFINERY EXPANSION PROJECT</b>	<b>DAEWOO E&amp;C</b>	
	<b>EPC-4 TANKAGE AND ASSOCIATED INTERCONNECTING PIPING</b>		
	<b>AGREEMENT No. 09-5578-E-4</b>		
PROJECT No. 5578	Doc. No. 5578-E4-HSE-HU-00032	Rev. 0	Page 2 / 18

This page is a record of all revisions of this document. All previous issues are hereby superseded and are to be destroyed.

Proprietary Information: This document contains proprietary information and may not be partly or wholly reproduced without prior written permission from TAKREER and/or Daewoo Engineering & Construction Co., Ltd.						<b>DOC. CLASS</b>	<b>T/1</b>
						<b>DIST. CODE</b>	<b>18</b>
0	11 June 10	Issued for Construction	C Wardman	DY Kim	J Brand	M.Heo	
A	26 May 10	Issued for review	C Wardman	DY Kim	J Brand	M.Heo	
<b>REV</b>	<b>DATE</b>	<b>REASON FOR ISSUE</b>	<b>PREP</b>	<b>CHKD</b>	<b>REVD</b>	<b>APP'D</b>	<b>COMPANY</b>
<b>SIGNED (Initials)</b>							

**NOTES:**

- (a) Revisions are denoted by a vertical line placed in the right-hand margin against the revised text.
- (b) PREP = Prepared by, CHKD = Checked by, REVD = Reviewed by, APP'D = Approved by.
- (c) In case of conflict between any requirements stipulated in this document with the contractual requirements, the contractual requirements shall prevail.

<b>TAKREER</b>	<b>RUWAIS REFINERY EXPANSION PROJECT</b>	<b>DAEWOO E&amp;C</b>	
	<b>EPC-4 TANKAGE AND ASSOCIATED INTERCONNECTING PIPING</b>		
	<b>AGREEMENT No. 09-5578-E-4</b>		
PROJECT No. 5578	Doc. No. 5578-E4-HSE-HU-00032	Rev. 0	Page 3 / 18

### REVISION INDEX DETAILS

Rev	Location of Change	Brief Description of Change
0	Table of Contents	Updated page numbering
0	1.4	Changed “there” to “three” in 4 <sup>th</sup> paragraph
0	3.6	Added triage as part of medical teams responsibilities
0	4.5	Added point on secondary assembly points during site evacuation
0	4.7	Added new section on muster point selection, location and design
0	5.4	Standby vehicle with strobe light, spark arrestor, chalwyn valve

<b>TAKREER</b>	<b>RUWAIS REFINERY EXPANSION PROJECT</b>	<b>DAEWOO E&amp;C</b>	
	<b>EPC-4 TANKAGE AND ASSOCIATED INTERCONNECTING PIPING</b>		
	<b>AGREEMENT No. 09-5578-E-4</b>		
PROJECT No. 5578	Doc. No. 5578-E4-HSE-HU-00032	Rev. 0	Page 4 / 18

## TABLE OF CONTENTS

1. INTRODUCTION.....	5
1.1 General .....	5
1.2 Scope .....	5
1.3 Purpose .....	5
2. DEFINITIONS.....	8
3. ROLES & RESPONSIBILITIES .....	9
3.1 General .....	9
3.2 Project Manager .....	9
3.3 Incident Commander .....	9
3.4 HSE Manager .....	10
3.5 Rescue Team .....	10
3.6 Medical Support .....	11
3.7 Security Personnel .....	11
3.8 Site Personnel .....	11
4. EMERGENCY RESPONSE SYSTEM .....	12
4.1 General Instructions .....	12
4.2 Communication .....	12
4.3 Emergency Control Centre .....	12
4.4 Drawings .....	13
4.5 Transportation .....	13
4.6 Training and drills .....	13
5. EMERGENCY RESPONSE PROCEDURE .....	15
5.1 Fires .....	15
5.2 Toxic and hydrocarbon leak .....	15
5.3 Medical .....	16
5.4 Suspension trauma .....	16
5.5 Confined space .....	17
5.6 Spill response .....	17
6. SCENARIOS .....	18
6.1 Potential high risk emergencies (site) .....	18
6.2 Potential high risk emergencies (camp) .....	18

<b>TAKREER</b>	<b>RUWAIS REFINERY EXPANSION PROJECT</b>  <b>EPC-4 TANKAGE AND ASSOCIATED INTERCONNECTING PIPING</b>  <b>AGREEMENT No. 09-5578-E-4</b>	<b>DAEWOO E&amp;C</b>	
PROJECT No. 5578	Doc. No. 5578-E4-HSE-HU-00032	Rev. 0	Page 5 / 18

## 1.0 INTRODUCTION

### 1.1 General

The emergency response plan forms part of the project HSE Management System. The intent of the plan is to provide a generic platform for emergency response scenarios during the execution of the WORKS on RRE.

The plan is thus based on these generic scenarios, with the consideration of the added risk of live hydrocarbon piping corridor crossing the site. These risks include potential toxic and/or flammable gas being present due to emission or rupture of lines. It must be noted that these risks will be minimized through several control measures, but it must be taken into account during the emergency response planning.

The Emergency response team will only respond to the Incipient Stage of the incident. Where response to an incident would require additional resources, the Emergency response team would rely on Mutual Aid from ADNOC Emergency Services (for site incidents) or Ruwais Emergency Services (for off-site incidents). It is imperative to note however that if there is any uncertainty of the severity of an incident ADNOC Emergency Services must be contacted immediately.

The Emergency response will be coordinated from the Emergency Control Centre. It must also be noted that due to the geographic spread of the site three emergency response teams will be designated for particular areas of operation.

The Emergency response procedure must be seen as a dynamic document and will be updated throughout the execution of the works to ensure that it is current and up to date.

### 1.2 Scope

The Emergency response procedure is applicable to all project areas, on and off site and to all personnel involved in activities related to EPC-4 WORKS. These include COMPANY, CONTRACTOR and SUBCONTRACTOR personnel.

### 1.3 Purpose

#### 1.3.1 Minor-Incident Scenarios

The purpose of this plan is to ensure that systems are in place to effectively manage emergencies when they occur, and to mitigate or reduce the impact and severity of these incidents and recover as soonest. The purpose can be summarized as follows;

- 1) To avoid the impact of any emergency to personnel and, if avoidance is not possible, to limit and mitigate the impact of the emergency to personnel, and reduce the recovery time required.
- 2) To implement and effectively maintain an organization framework (incident command system) that will provide a rapid and effective response to any emergency situation.
- 3) To provide a chronological list of actions that must be taken in an emergency with clear and easy to follow instructions.

<b>TAKREER</b>	<b>RUWAIS REFINERY EXPANSION PROJECT</b>  <b>EPC-4 TANKAGE AND ASSOCIATED INTERCONNECTING PIPING</b>  <b>AGREEMENT No. 09-5578-E-4</b>	<b>DAEWOO E&amp;C</b>	
PROJECT No. 5578	Doc. No. 5578-E4-HSE-HU-00032	Rev. 0	Page 6 / 18

- 4) To assign and authorize personnel responsible for taking specific emergency actions.
- 5) To identify the communication channels essential for the co-ordination of tasks that are required to manage an emergency, both within the project and externally in conjunction with appropriate emergency services.
- 6) To provide relevant information and procedures applying to different emergencies such as, but not limited to;
  - Toxic gas (H<sub>2</sub>S or SO<sub>2</sub>)
  - Flammable Gas (hydrocarbon compounds)
  - Corrosive Agents (Ammonia, Acids etc.)
  - Fire
  - Health – Outbreak of illness or disease.
  - Medical Accidents – fractures, lacerations, abrasions etc.
  - Confined space problems – trench collapse, toxic gas emissions etc.
  - Suspension trauma
  - Road and traffic incidents
- 7) To provide information on available emergency and mutual aid services.
- 8) To provide personnel with the knowledge to understand the emergency response and evacuation plan, with the level of training directly in relation to the roles they will perform during emergencies.
- 9) During the induction training of all new personnel training on the procedures will be provided. Drills will support training for personnel that could be affected by emergency scenarios.

### 1.3.2 Major Incident Scenarios

Major hazards that cannot be considered as part of the project environment are beyond the scope of this plan. For these hazards contingency plans have not been specifically prepared however on realization there will still be a requirement to manage the evacuation and rescue of personnel and administration of medical assistance.

The management of these emergency scenarios will be considered in the Emergency response procedure. During the training of the emergency response team and medical staff specific advice on the actions to be taken will be provided. Examples of hazards that are not specifically addressed include:

- War
- Earthquake
- Storms/Subsidence

<b>TAKREER</b>	<b>RUWAIS REFINERY EXPANSION PROJECT</b>  <b>EPC-4 TANKAGE AND ASSOCIATED INTERCONNECTING PIPING</b>  <b>AGREEMENT No. 09-5578-E-4</b>	<b>DAEWOO E&amp;C</b>	
PROJECT No. 5578	Doc. No. 5578-E4-HSE-HU-00032	Rev. 0	Page 7 / 18

- Equipment Collapse (excavations, scaffolding, structures etc)
- Criminal acts
- Catastrophic Pipeline/Vessel Rupture
- Other Catastrophic events.

The catastrophic failure of a pipeline/vessel in the vicinity of the construction areas is not considered as a minor accident scenario where controlled evacuation procedures apply. However due to the potential consequences of a major pipeline release in close proximity to personnel this emergency scenario is included in the evacuation planning and training of personnel.

<b>TAKREER</b>	<b>RUWAIS REFINERY EXPANSION PROJECT</b>	<b>DAEWOO E&amp;C</b>	
	<b>EPC-4 TANKAGE AND ASSOCIATED INTERCONNECTING PIPING</b>		
	<b>AGREEMENT No. 09-5578-E-4</b>		
PROJECT No. 5578	Doc. No. 5578-E4-HSE-HU-00032	Rev. 0	Page 8 / 18

## 2.0 DEFINITIONS

Assembly	Assembly refers to a localized evacuation where persons will assemble at the closest safe muster point in the area.
DEC	EPC. Daewoo Engineering and Construction Company Ltd.
Emergency Response Team	Emergency response team. This is a group of persons who respond to the incipient stage of an emergency and normally comprises of the Incident commander, rescue team, medical staff and security personnel. The team will receive dedicated training and be fully familiar with this procedure.
Emergency Control Centre	Emergency Control Center. This is also the coordination center during emergencies.
Emergency	An unplanned event, which results or may result in injury to people, damage to property and/or environment.
Emergency Management System	Emergency Management System, this is the system of control, mitigation and recovery as described in the emergency response plan.
Evacuation	Evacuation refers to a site wide evacuation where persons will completely evacuate the site and be transported to a safe location.
H2S	Hydrogen Sulfide.
Incident Commander	Incident Commander. This is the person who takes charge of the Incident and will act as the focal point during emergencies.
PA	Public Address system
PMC	Mott MacDonald
SCBA's	Self Contained Breathing Apparatus.
Rescue Team	The rescue team is a team comprising of Safety personnel (CONTRACTOR or SUBCONTRACTOR) who have received third party training in rescue and evacuation procedures.
Takreer	Client/ Owner

<b>TAKREER</b>	<b>RUWAIS REFINERY EXPANSION PROJECT</b>	<b>DAEWOO E&amp;C</b>	
	<b>EPC-4 TANKAGE AND ASSOCIATED INTERCONNECTING PIPING</b>		
	<b>AGREEMENT No. 09-5578-E-4</b>		
PROJECT No. 5578	Doc. No. 5578-E4-HSE-HU-00032	Rev. 0	Page 9 / 18

### **3.0 ROLES AND RESPONSIBILITIES**

The responsibilities in the EMS are clearly defined to ensure that all persons within the system understand their duties. It also provides a system of accountability which will ensure an effective execution of the emergency response procedure during an actual emergency situation.

#### **3.1 General**

The ultimate emergency response responsibility within the PROJECT lies with the Project Manager. The Project Manager in turn delegates HSE specific roles and responsibilities to others in the Project Management Team. The Project Manager delegates the operational roles and responsibilities of all construction areas to the Construction Manager who is in charge of the day-day site activities. The Admin Manager is responsible for the management of the Camp and Administrative functions. The project HSE Manager is responsible for leading the PROJECT HSE Management System.

The following roles and responsibilities are attributed to specific designations in the emergency response procedure.

#### **3.2 Project Manager**

The Project Manager has the overall responsibility during any site emergency. During an actual emergency he will have the following responsibilities;

- Shall report immediately to the emergency control centre during an emergency.
- Provide any resources that may be required during an emergency.
- Communicate and inform the Head Office immediately of an actual site emergency.
- Act as the public relations officer during an emergency and manage communication with COMPANY and any outside agency.

#### **3.3 Incident Commander**

The assigned Construction Manager for a specific area will be appointed as an Incident Commander. He shall maintain overall responsibility during emergencies, in his area of responsibility, to direct his emergency response team. He will also be clearly identified with a unique sticker on his hard hat indicating that he is an appointed incident commander.

The Incident Commander shall take all necessary precautions to prevent an emergency occurring within the PROJECT and to limit the exposure of the workforce to emergencies in other areas.

His major duties and responsibilities are to:

- Ensure the facilities are in place at all PROJECT areas to monitor and respond to emergency scenarios.
- Manage the emergency response team during emergencies.
- Ensure that the emergency response team has adequate resources available during emergencies.
- Determine if assembly or evacuation is required during an emergency, and initiate the relevant alarm.
- Receive feedback from the rescue team on head count figures and if areas are swept and clear.
- Make critical decisions on site with the objective of sustaining life, limiting the impact of the emergency and recovery as soon as possible.
- Issue the all clear signal after confirming that it is safe to do so.

<b>TAKREER</b>	<b>RUWAIS REFINERY EXPANSION PROJECT</b>  <b>EPC-4 TANKAGE AND ASSOCIATED INTERCONNECTING PIPING</b>  <b>AGREEMENT No. 09-5578-E-4</b>	<b>DAEWOO E&amp;C</b>	
PROJECT No. 5578	Doc. No. 5578-E4-HSE-HU-00032	Rev. 0	Page 10 / 18

- When appropriate, advise project and corporate management of any significant emergencies or incidents.
- To be the contact point for outside organizations involved in the emergency.

### **3.4 HSE Manager**

The HSE Manager shall be responsible for the overall oversight of implementation and compliance to the EMS.

His major duties and responsibilities are;

- Ensure that training, as required, is carried out for all persons working on the PROJECT. These include Incident Commanders, Rescue Team, Medical Staff, Security personnel and the remaining project personnel.
- Schedule and carry out emergency drills on a quarterly basis to familiarize the emergency response team and site personnel with the emergency response procedure.
- Establish the emergency control centre and manage its day to day operation.
- Provide support to the Incident Commander and the rest of the emergency response team during emergencies.
- Update and revise the emergency response procedure on regular intervals to ensure that it is current and covers the site activities.
- Ensure that adequate rescue equipment and other resources are in place to manage any foreseeable emergency.

### **3.5 Rescue Team**

The rescue team will be selected from Safety personnel, and be appointed on completion of relevant in house and third party training. The rescue team will be clearly identified with an appropriate sticker on their hard hats.

Their major duties and responsibilities are;

- To ensure the effective emergency response initiation on site during an emergency.
- To assist in making the area safe and assemble all personnel to the closest safe muster point.
- To receive feedback from the relevant work supervisors on their head-counts and report back to the Incident Commander on the status of the assembly.
- To carry out rescue work if so required during emergencies.

### **3.6 Medical Support**

The duty nurse will respond to the incipient stage of an emergency as required by the Incident Commander. The duty nurse will provide basic first aid and life support until emergency services arrive, or medivac casualties to the closest medical facility as may be required.

Their major duties and responsibilities are;

- To respond to the initial stages of emergencies and provide support to the Incident Commander if so required.
- To provide basic first aid and life support as required.
- To medivac casualties to the closest medical facility as required.

<b>TAKREER</b>	<b>RUWAIS REFINERY EXPANSION PROJECT</b>  <b>EPC-4 TANKAGE AND ASSOCIATED INTERCONNECTING PIPING</b>  <b>AGREEMENT No. 09-5578-E-4</b>	<b>DAEWOO E&amp;C</b>	
PROJECT No. 5578	Doc. No. 5578-E4-HSE-HU-00032	Rev. 0	Page 11 / 18

- Provide triage in case of a major accident with multiple casualties

### **3.7 Security Personnel**

Their major duties and responsibilities are;

- To control the access during emergencies. This includes stopping all vehicle movements during an emergency and not permitting any vehicles to access through the control points unless otherwise instructed by the Incident Commander.
- To escort Emergency Vehicles to the scene of an emergency.
- Coordinate and manage communication in the emergency control centre during an emergency.
- To provide assistance to the emergency response team as required.

### **3.8 Site Personnel**

The site personnel have the following general roles and responsibilities during an emergency;

- Follow the instructions of the Incident Commander and emergency response team during an emergency.
- Report any incident or accident immediately to the emergency control centre or their supervisor.
- Respond promptly to an emergency situation (or drill) and report to their muster point or to the appropriate transportation in the event of an immediate evacuation situation.

<b>TAKREER</b>	<b>RUWAIS REFINERY EXPANSION PROJECT</b>	<b>DAEWOO E&amp;C</b>	
	<b>EPC-4 TANKAGE AND ASSOCIATED INTERCONNECTING PIPING</b>	<b>AGREEMENT No. 09-5578-E-4</b>	
PROJECT No. 5578	Doc. No. 5578-E4-HSE-HU-00032	Rev. 0	Page 12 / 18

## **4.0 EMERGENCY RESPONSE SYSTEM**

### **4.1 General Instructions**

This section defines the requirements of the emergency response procedure. In the event of any serious emergency occurring on site the following general guidelines will be observed;

- In the event that a major incident has occurred on site, personnel in the vicinity shall immediately report the incident to the emergency control centre or their supervisor.
- The emergency control centre in return shall immediately inform the emergency response team of the nature and location of the emergency and any other pertinent information such as specific hazards that may exist in the area.
- Depending on the nature of the emergency, permits shall be considered cancelled and work immediately suspended. Permits will require re-issue before returning to work.
- The Incident Commander will immediately report to the area and determine if assembly at Muster Points is required and inform the emergency control centre who in turn will activate the site alarm.
- Supervision will proceed to the areas of site where personnel under their control are working. The supervision must only go to their workers if it safe to do so.
- The rescue team shall as necessary, alert the workforce to leave their place of work, switch off all equipment and muster at the prescribed places on site.
- A decision will be made as to whether an evacuation is required. The location of the final evacuation point shall be determined by the nature of the emergency and contributing factors such as wind direction.

### **4.2 Communication**

- The key emergency response team members will be issued with two-way radios and will be trained in radio communication procedures.
- A public address and alarm system will be used to communicate actions to be taken during an emergency.
- An audible evacuation and muster alarm will be installed on site, and the different tones are to be communicated during site induction. The alarms will be tested every Sunday at 12H00.
- A hand held megaphone will also be available on site for use in emergencies.
- Communication will at all times be done in English and be channeled through the emergency control centre.
- Communication with third parties or mutual aid will be established through the emergency control security and be managed by the Project Manager.

### **4.3 Emergency Control Centre**

The emergency control centre will be the focal point for management of incidents. The emergency control centre will ideally be situated close to the permit to work office, however it must be in a safe location. The emergency control centre will be permanently manned by a Security Supervisor who is fully conversant in English.

The control centre will also receive all information regarding incidents, and re-distribute such information in line with the incident response and investigation procedures.

<b>TAKREER</b>	<b>RUWAIS REFINERY EXPANSION PROJECT</b>  <b>EPC-4 TANKAGE AND ASSOCIATED INTERCONNECTING PIPING</b>  <b>AGREEMENT No. 09-5578-E-4</b>	<b>DAEWOO E&amp;C</b>	
PROJECT No. 5578	Doc. No. 5578-E4-HSE-HU-00032	Rev. 0	Page 13 / 18

The following equipment/ facilities will be available in the emergency control centre;

- Full time Security Supervisor
- Base radio station
- Spare portable radios
- Multiple telephone line system (one call number)
- Computerized SMS system
- SCBA sets x 4
- DBI Sala Rollgliss remote rescue kit
- Full list of emergency contact numbers
- Spill response kits (chemical and oils)

#### **4.4 Drawings**

Up to date emergency layout drawings will be kept in the emergency control centre. The drawings will include the following information.

- Muster point location
- Emergency control centre location
- Bus parking areas
- Escape routes
- Wind socks
- Location of clinics
- Location of hazardous areas (hydrocarbon lines)

#### **4.5 Transportation**

In some cases an emergency may require the evacuation of personnel from the site. In such cases, if time permits, personnel will be transported off site by bus. At all times there should be adequate transportation available for the total number of people on site.

In case where is being done in remote locations/ off-site, standby transportation has to remain in place. During normal working hours busses will be kept at designated parking areas and mobilize by the heavy equipment department.

During incidents where there is a release of toxic and/or flammable gas it will be more appropriate to evacuate the site, rather than go through an assembly process. Under these circumstances personnel will evacuate the site on foot, ensuring that they evacuate safely (up-wind and/or cross-wind). Secondary assembly points around the perimeter of the site shall be used in case of final site evacuation.

#### **4.6 Training and Drills**

Proper training and drills should be carried out to familiarize the site personnel and the emergency response team with the emergency response procedures. These drills will be carried out on a quarterly basis.

The HSE Manager in consultation with the emergency response teams will decide on specific scenarios for such drills, in consideration of actual site conditions. Emergency evacuation drill reports will be issued on completion of the drills including the scenario, findings and recommendations.

<b>TAKREER</b>	<b>RUWAIS REFINERY EXPANSION PROJECT</b>  <b>EPC-4 TANKAGE AND ASSOCIATED INTERCONNECTING PIPING</b>  <b>AGREEMENT No. 09-5578-E-4</b>	<b>DAEWOO E&amp;C</b>	
PROJECT No. 5578	Doc. No. 5578-E4-HSE-HU-00032	Rev. 0	Page 14 / 18

#### **4.7 Muster Points**

Muster points will be carefully selected through an analysis of the actual site conditions and prevalent hazards. The major consideration during construction is the live piping corridor that crosses the site and which can release hydro-carbons and H<sub>2</sub>S during a catastrophic failure. During the analysis the wind speed and direction should also be considered.

The Muster points will be placed in such a manner that during the most probable scenario (wind speed and direction) of failure of the live line, the site personnel could safely reach the muster points by mustering cross-wind and then upwind. The muster point locations will be marked up on a plot plan and displayed in prominent locations as well as the emergency control centre.

The muster point signs itself should be large enough to be easily identifiable and there should be sufficient space next to the muster points for workers to safely assemble. There should also be consideration for secondary muster points in case of site evacuation, to be placed outside the perimeter fence.

<b>TAKREER</b>	<b>RUWAIS REFINERY EXPANSION PROJECT</b>  <b>EPC-4 TANKAGE AND ASSOCIATED INTERCONNECTING PIPING</b>  <b>AGREEMENT No. 09-5578-E-4</b>	<b>DAEWOO E&amp;C</b>	
PROJECT No. 5578	Doc. No. 5578-E4-HSE-HU-00032	Rev. 0	Page 15 / 18

## 5.0 EMERGENCY RESPONSE PROCEDURE

This section describes some generic emergency situations and actions that must be taken during the execution of the PROJECT. The emergency situations should be revised, if required, throughout the execution of the PROJECT to ensure that they are current and up to date.

It must be noted that all practical control measures will be taken to prevent or avoid an emergency, however the planning has to be done for in case control measures do fail. The emergency response team will be trained to deal with all the most probable emergency scenarios that could occur during the execution of the work. This training will be done by a third party and will include practical and theoretical components. The most probably site emergencies that should be considered are;

- Fires
- Toxic and hydrocarbon leak
- Medical emergencies
- Suspension trauma
- Confined space entry
- Spill response

### 5.1 Fires

Fires are probably the most common emergency that will occur on the PROJECT due to the large volume of open flame work that will take place. It is very important that all personnel on site are familiar with fire response instructions.

Fire prevention techniques will also be utilized to prevent fires from occurring in the first place. The most common of these will be to have trained fire watches in place during any open flame works. They will ensure that relevant control measures are taken before and after the activity.

In case of a fire the first step is to raise the alarm by shouting "FIRE". The supervisor in the area should immediately report the incident to the emergency control centre after which an attempt should be made to extinguish the fire before it escalates.

The emergency response team will respond to the fire, irrespective of the severity. If the fire is controlled, or extinguished the incident investigation may commence. If the fire is however uncontrolled or a major fire mutual aid in the form of ADNOC emergency services should immediately be contacted. In such cases the assembly alarm should be activated and mustering should take place.

The ADNOC emergency services may be contacted on +971 (0) 26022340. The Security personnel at the access points to the site will be responsible to escort the emergency services into the site, to the location of the emergency.

All these efforts shall be coordinated through the emergency control centre.

### 5.2 Toxic & Hydrocarbon Leak

<b>TAKREER</b>	<b>RUWAIS REFINERY EXPANSION PROJECT</b>	<b>DAEWOO E&amp;C</b>	
	<b>EPC-4 TANKAGE AND ASSOCIATED INTERCONNECTING PIPING</b>		
	<b>AGREEMENT No. 09-5578-E-4</b>		
PROJECT No. 5578	Doc. No. 5578-E4-HSE-HU-00032	Rev. 0	Page 16 / 18

In the unlikely event of loss of containment of hydrocarbons from the piping corridor that passes through the site, an immediate site evacuation will be activated. During the induction program all personnel will be trained on the correct, safe method, to evacuate the site in case of a gas leak.

It is also important that a study be carried out to ensure that adequate escape routes and crash gates are available as to ensure that a safe evacuation can be done (also refer to section 4.7 above). As per the procedure, all equipment has to be isolated during such an emergency to reduce the possible ignition sources.

In cases that there are any casualties, two (2) teams consisting of two (2) members of the rescue team will don the SCBA's, proceed to the site on foot, and affect the rescue.

### **5.3 Medical Emergencies**

The site medical team will be responsible to deal with medical emergencies and carry out medivac if so required. A fully stocked ambulance will be available at all times for site activities with nurses to respond to such medical emergencies.

Medical emergencies can include injuries, illnesses, multiple injuries and contagious outbreak. The medical emergencies will be coordinated through the emergency control centre as all other emergencies and be managed by the Incident Commander. In case of a contagious outbreak the incident will be managed directly by the Project Manager and COMPANY and relevant governmental organizations will be informed immediately of such occurrences.

In case of serious injuries the casualties will be transported to the ADNOC emergency centre for further treatment. The site nurse who responds to the incident will make the call if escalation of medical care is required. In case of medical emergencies it is best to rather be cautious and transport casualties to medical facilities for in case serious injuries are suspected.

### **5.4 Suspension Trauma**

In case of working at height activities there is always a possibility of suspension trauma. Suspension trauma is caused when a person is suspended from a body harness for more than five (5) minutes in an upright posture with the legs relaxed below the body. Death from suspension trauma is caused by orthostatic intolerance and venous pooling.

Venous pooling occurs when a person cannot move their legs, like in case of being suspended in a harness, and is compounded by the harness straps exerting pressure on the femoral arteries. This results in blood not being able to return to the heart which deprives vital organs such as the heart and brain of oxygen. Death may occur as soon as fifteen (15) minutes after such an incident.

To mitigate the risk of suspension trauma the emergency response team will be trained in rescue from heights by a third party. The training will include theoretical and a practical component such as the use of rescue equipment (Rollgliss remote rescue kit).

In case of suspension trauma time is of the essence. In these cases if the person who is suspended cant self rescue the rescue team has to reach him as soon as possible. On completion of the rescue the team has to ensure toxic shock does not occur. This normally happens when the "stale" blood (de-oxygenated

<b>TAKREER</b>	<b>RUWAIS REFINERY EXPANSION PROJECT</b>  <b>EPC-4 TANKAGE AND ASSOCIATED INTERCONNECTING PIPING</b>  <b>AGREEMENT No. 09-5578-E-4</b>	<b>DAEWOO E&amp;C</b>	
PROJECT No. 5578	Doc. No. 5578-E4-HSE-HU-00032	Rev. 0	Page 17 / 18

blood) that was trapped in the legs return to the heart and causes cardiac arrest or failure of vital organs. To prevent toxic shock the casualty has to be placed with his legs in the 'w' position, and not laid flat. He should be kept in this position for 30-40 minutes so that the body can systematically replace the "stale" blood with oxygenated blood.

Due to the time constrains the most practical solution is to have the site personnel trained in rescue. The use of access systems such as mobile elevated working platforms (MEWPS), cranes with man-baskets and ladders should be considered by the team during rescue, however time is of the essence and may not be the best practical solution to gain access to the casualty during the incident. All the efforts shall be coordinated by the Incident Commander.

At all times a standby vehicle will be present for the emergency response team. The standby vehicle should be fitted with a strobe light for high visibility, and should also be set up for live plant conditions, i.e. spark arrestor and chawyn valve.

#### **5.5 Confined Space Rescue**

All confined space entry work will be done under permit to work, and the risk for the work will be properly assessed before the activity commences. Depending on the complexity of the confined space there may be requirements to install trip-pod winches or retracting ropes to remove persons from a confined space for in case they collapse. Atmospheric testing and all other normal control measures will be implemented before confined space work is done.

In case of an emergency in a confined space the standby person should immediately contact the emergency control centre. No person is allowed to enter a confined space during an emergency apart from the trained rescue team. The rescue team will report to the incident location and in consultation with the Incident commander affect the rescue in the most appropriate and safest manner. SCBA's, gas testing, lighting, rope ladders, tri-pod winches etc. may be required during such rescue efforts and should be readily available on site.

#### **5.6 Spill Response**

During the execution of the works on the project various oils and chemicals will be used. Control measures will be taken to prevent any spill of such substances such as bund walls, trained handlers, correct use of equipment etc. however there is always the possibility of a chemical or oil spill.

In case of a chemical or oil spill the emergency control centre has to be informed immediately. The emergency response team will mobilize to site together with the emergency spill kit. The spill kit should contain plastic bags, cable ties, shovels, absorbent material and gloves.

On arrival at the scene the first step would be to contain the spill and minimize the impact. In case of chemical spills the material safety data sheet (MSDS) should first be reviewed to ensure that the response team is fully aware of any hazards of the chemical. Once this is done the clean up may commence. The contaminated area should be cleaned and the absorbent material placed, and sealed, in the plastic bags. If soil was contaminated in the spill, this should also be cleared and placed in the bag.

The contaminated material should be disposed of by an authorized waste management contractor, and a clear record kept of any waste that has been disposed.

<b>TAKREER</b>	<b>RUWAIS REFINERY EXPANSION PROJECT</b>	<b>DAEWOO E&amp;C</b>	
	<b>EPC-4 TANKAGE AND ASSOCIATED INTERCONNECTING PIPING</b>		
	<b>AGREEMENT No. 09-5578-E-4</b>		
PROJECT No. 5578	Doc. No. 5578-E4-HSE-HU-00032	Rev. 0	Page 18 / 18

## 6.0 EMERGENCY SCENARIOS

The following section details possible emergency scenarios that may occur during the execution of the PROJECT.

### 6.1 Potential High Risk Emergencies (Site)

The following list out potential high risk emergencies;

- **Gas release** – breakdown of existing pipelines or operational facilities, struck by construction equipment.
- **Fire on site** – construction hot work activities, flammable materials, high summer temperatures.
- **Explosion** – industrial gas cylinder storage and operational use, build up of gases in confined areas.
- **High voltage electrical supplies** – U/G cables and sub-stations.
- **Temporary electric's** – electrical shock during construction work activities.
- **Working at height** – falls during construction work activities.
- **Deep Excavations** – collapse during construction work activities.
- **Confined spaces** – contaminated atmosphere, injuries, entry and rescue.
- **High rise light duty scaffold systems** – collapse during construction work activities.
- **Heavy duty scaffold systems** – collapse during support of heavy loads.
- **Heavy lifting operations** – failure of lifting equipment and rigging arrangements topple of crane(s).
- **Vehicular and mobile plant movements** – impact incidents, roll-overs, and crushing of persons.
- **Radioactive sources** – exposure to radiation, loss of a radioactive source.

### 6.2 Potential High Risk Emergencies (Camp)

- **Camp fire** – general e.g.; smoking in bed, cooking in rooms, overheating of fans & AC's, bringing poorly maintained or improvised electrical equipment into cabins.
- **Explosion** – LPG storage vessels, feed-lines, burner-points.
- **Food poisoning** – kitchens, refrigerators/freezers and food preparation areas.
- **Epidemic** – contagious illnesses brought in from outside.
- **Camp electrical supplies** – failure leading to loss of refrigeration, pumped water services, cooking services.