

EPETCO FIBREGLASS PROJECT

Occupational Health & Safety Manual

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1.0 Introduction

EPETCO (Eastern Petrochemical Company) has identified a need for a **Fibre Glass** manufacturing facility in the Kingdom of Saudi Arabia.

The feasibility study and initial framing documents have concluded that the plant is of the following description:

Capacity	60,000 Tons/year
Location	Jubail Industrial City, KSA
Product Type	ECR glass.
Product Range	Chopped strand mat, Woven Rovings and Wound strand.
Fuel	Natural Gas
Owner/Client	Eastern Petrochemical Company (EPETCO)
Technology Holder	FIBEREX Glass Corporation Canada.
Project Management and Technical Consultancy	Mohamed Turki Mott Macdonald (MTMM)

Key Objectives of the Project:

- To deliver a complete new Greenfield Fibreglass Plant, operating and producing “Fibreglass” in various forms as described in the tender documents
- To provide a modern state-of-the-art manufacturing facility which produce a high quality product with minimum wastage.
- To secure a local market share of 50% within three years and to establish a market share within the GCC countries in the same period.
- To provide a first-class service to the customers and return profit to the shareholders.
- To provide employment for local Saudi Nationals in the management and the operational areas of the plant and to become an employer of choice in the Kingdom of Saudi Arabia.

The goal for this Health and Safety Manual is to identify Critical Conditions involved in carrying out certain operations related to production on day-to-day activities and move them steadily to successful completion without employee injury.

2.0 Objective, Policy and Management Program

2.1 Manual Objective

The objective of this manual is to protect the people who are working at the site against injury, sickness or even death through safe and healthy working conditions, by assuring the conservation of valuable manpower resources and the prevention of loss or damage to lives and properties. This is consistent with the country's development goals and its commitment to the development of staff and personnel in the working place.

This Manual is in compliance with International Finance Corporation (IFC) – World Bank Group Occupational Health & Safety Guidelines.

2.2 Policy

EPETCO/MTMM is committed to the promotion of the health & safety of all the people during plant construction, operation and associated activities through prevention of occupational injuries and illnesses by continual improvement of the working environment. EPETCO/MTMM is to ensure that the Contractor and their Sub-contractor have enforced and prioritized their Health and Safety Policy and Manual with utmost strictness and compliance.

The Safety Manual formalizes and defines our commitment to:

- Raising Occupational Health and Safety awareness.
- Pre-planning, coordinating, and executing all project activities in a manner that will assure the prevention and control of the conditions that may cause employee, staff, or visitor injury or illness.
- Legal compliance
- Prevention and control of conditions that may cause Contractor/ Subcontractor's employee injury and work related illness.
- Decreasing operating costs through conservation of our human physical resources.

All project management functions will comply with Saudi Arabia Government and company safety requirements applicable to the construction, installation, commissioning and facilities services and/or equipment.

2.3 Policy Implementations

2.3.1 Compliance with Construction/Installation/Commissioning Requirements:

The construction and installation/commissioning of equipment carried out by Contractor/Sub-contractor will meet Saudi Arabia Government and International Safety requirements.

2.3.2 Operating Standards and Instructions

Risks that cannot be eliminated by design are controlled by operating standards and Instructions. Compliance with safety standards and instructions will be consistently enforced for all personnel.

2.3.3 Personal Protection

Personal protective equipment and periodic environmental monitoring will be used to help to protect all employees against exposure to health and safety hazards which cannot be eliminated.

2.3.4 Inspection

Inspection to detect and correct unsafe practices and conditions will be conducted periodically. Conduct regular safety inspection of the job on site, maintain records and continually monitor the program of effectiveness. These inspection needs to be performed by the HSE Manager.

2.3.5 Response to Accidental Occurrences.

A site specific, effective emergency response plan must be established as per the guidelines of this manual. These should include measures to contain or control an emergency and/or disaster when an accident occurs to minimize the loss of resources. A reporting and investigation system should be put in place to determine the cause of the accident and the adoption of corrective actions to avoid a recurrence.

2.3.6 Off-The-Job Safety

Off-the-job safety training (e.g. seat belt use) shall be vigorously practiced to provide the means for all people to protect themselves and their families from harm during off duty hours.

2.3.7 Accountability

All contractors shall be held accountable for personal and functional safety performance .An important factor in an employee's overall job performance evaluation will be how well the employee meets his safety responsibilities.

2.3.8 Management Review

The project leadership must review the safety system on a regular basis to ensure its continuing suitability, adequacy, effectiveness, and compliance to standards requirements and to initiate continual improvements.

2.4 Training

All personnel shall be provided with safety awareness training as well as help in developing those skills that are required to perform, supervise, and manage assigned tasks without mishap.

2.4.1 Training Programs

The Employer shall conduct continuing programs to increase the supply of competent personnel qualified to carry out code of safe practice during construction/operation phase of the project.

2.4.2 Criteria for Training

The prescribed course of study/training in accordance to an accredited agency is standards shall be used or followed. There must be adequate training facilities for holding of training including laboratory facilities, library rooms and equipment. Training staff shall composed of persons recognized, duly trained and certified by the accredited training agency.

2.4.3 Training of Personnel Competence

The prescribed training course shall be a requisite for the appointment of safety officer (see below table)

At least the following number of supervisors, or technical personnel shall take the required training, additionally a safety officer shall be appointed either full time or part time depending on the number of workers and type of workplace whether hazardous or non-hazardous.

Appointment of Safety Officer

Number of Workers	Number of Safety Officer
Hazardous Places	
200 and below	One part-time
Over 200 to 1000	One full time
For over 1000 workers	One full time and One Deputy
Non Hazardous Places	
Less than 1000	One part-time
For every 1000	One full time

2.5

2.6 Applicability & Approach

This manual provides guidance and examples of reasonable precautions to implement in managing principal risks to occupational health & safety. Contractors that have the technical capability to manage the health and safety issues of their employees should implement the application of hazard management activities.

Preventive and protective measures should be introduced according to the following order of priority:

- Eliminating the hazard by removing the activity from the work process. Examples include substitution with less hazardous chemicals during operation phase, using different manufacturing process, etc.
- Controlling of hazards at its source through use of engineering control. Examples include local exhaust ventilation, isolation rooms, machine guarding, acoustic insulation, protective devices, etc.
- Minimizing the hazard through design of safe work systems and administrative or institutional control measures. Examples include proper job rotation, training employees in safe work procedures, lock-out and tag-out, limiting stress due to work duration, monitoring the workplace, etc.
- Providing appropriate personal protective equipment (PPE) in conjunction with training in the use and maintenance of PPE.

The application of preventive and control measures to occupational hazards should be based on comprehensive job safety or job hazard analysis. The result of this analysis should be prioritized as part of an action plan based on the likelihood and severity of the consequence of exposure to the

identified hazard. An example of a qualitative risk ranking analysis matrix to help identify priorities is described in the table below:

Risk Ranking Table to classify worker scenario based on likelihood and consequence

Likelihood	Consequences				
	Insignificant [1]	Minor [2]	Moderate [3]	Major [4]	Catastrophic [5]
[A] Almost Certain	L	M	E	E	E
[B] Likely	L	M	H	E	E
[C] Moderate	L	M	H	E	E
[D] Unlikely	L	L	M	H	E
[E] Rare	L	L	M	H	H

Legend:

E: extreme risk; immediate action required

H: high risk; senior management attention needed

M: moderate risk; management responsibility should be specified

L: low risk; manage by routine procedures

3.0 General Facility Design, Operation & Construction

3.1 Integrity of Workplace Structures

Permanent and recurrent places of work should be designed and equipped to protect OHS.

- Surfaces should be easy to clean and maintain and accumulation of hazardous compound should not be allowed.
- Building should be structurally safe, provide appropriate protection against the climate, and have acceptable light and noise conditions.
- Fire resistant, noise-absorbing materials should, to the extent feasible, be used for cladding on ceiling and walls
- Floors should be level, even and non-skid
- Heavy oscillating, rotating or alternating equipment should be located in dedicated buildings or structurally isolated sections
- Risks that cannot be eliminated by design are controlled by operating standards and Instructions. Compliance with safety standards and instructions will be consistently enforced for all personnel.
- Personal protective equipment and periodic environmental monitoring will be used to help to protect all employees against exposure to health and safety hazards which cannot be eliminated.
- Inspection to detect and correct unsafe practices and conditions will be conducted periodically. Management must conduct regular safety inspections of the job site, maintain records and continually monitor the program of effectiveness.
- The project leadership must review the safety system on a regular basis to ensure its continuing suitability, adequacy, effectiveness and compliance to the standard requirements and initiate continual improvements.

3.2 Workspace & Exit

- The space provided for each worker, and in total, should be adequate for safe execution of all construction activities, operation, including transport and storage of materials and products
- Passages to emergency exits should be unobstructed at all times. Exits should be clearly marked to be visible in total darkness. The number and capacity of emergency exits should be sufficient for safe and orderly evacuation of the greatest number of people present at any time, and there should be a minimum of two exits from any work area.
- Facilities should be designed and built taking into account the needs of disabled persons.
- Stored materials must not block exits, aisles, fire protection equipment, or passage ways.

3.3 Fire Precautions and Prevention

3.3.1 Precaution at Workplace

The workplace should be designed to prevent the start of fires through the implementation of fire codes applicable to industrial settings. Other essential measures include:

- Equipping facilities with fire detectors, alarm systems, and fire-fighting equipment. The equipment should be maintained in good working order and be readily accessible. It should

be adequate in terms of size and use for the premises, equipment installed, physical and chemical properties of material present, and the maximum number of people.

- Provision of a manual fire-fighting equipment that is easily accessible and simple to use.
- Fire emergency alarm systems that is both audible and visible.

For basic guidance, a checklist is attached as **Annex 1** of this manual “**Basic Fire Fighting Facilities and Equipment Inspection Checklist**”.

This checklist is subject to the compliance of local fire fighting agency requirements through the responsibility of Contractor Health & Safety Department.

3.3.2 Fire Prevention

Fire prevention are the measures to prevent fires and protect against all the possible harmful effects, in order to avoid injury to personnel and loss of time and materials.

3.3.2.1 Before the Job Starts

An accident at a construction site can have serious effects on a nearby oil or gas facility and vice versa, because of the large amounts of fuel present at both locations. The factors which must be considered before the job starts include site preparation, work permit schedules, types of work permits required and type/quantity of equipment required on site.

As part of this process, the contractor must take into account the potential hazards that can be encountered on site; protection of machinery and equipment; control of ignition sources; storage of flammable and combustible materials; housekeeping; staff training; and end of shifts checks.

3.3.2.2 Layout

Good layout ensures the project can be carried out efficiently. The following principles of project layout and organization can help minimize fire risks:

- Avoid congestion around machinery and equipment where there is a high level of activity and traffic.
- Operations having a high fire risk, such as welding and spray painting, should be isolated from flammable and explosive materials or specially protected.
- Be sure to provide adequate emergency access and egress.

3.3.2.3 Equipment Protection

Some items of the plant equipment need special handling and care after they arrive on site and until they are commissioned. Examples are computers (and other electronic instrumentation and control gear) and large pumps and compressors. Such equipment should be covered and protected against possible damage that could result from its exposure to normal construction activity, dust, paint spray, etc. Consideration should also be given to protecting it against fire, which could be caused by storing it near combustible material and against water or other fire fighting agents that might be used to put out a fire.

3.3.2.4 Control of Ignition Sources

Compliance with work permit procedures and conditions to protect against possible ignition sources of oils or gases should be strictly followed and contractors must take steps to prevent ignition of construction materials, lubricants, and fuels used in the job itself.

- Electrical equipment should be checked regularly for defects.
- Smoking is permitted only in designated areas.
- Welding equipment, asphalt kettles, heating appliances and other open flames or hot surfaces should be segregated from combustible materials.
- Open fires and /or open burning of materials should be strictly prohibited.
- Proper bonding and grounding techniques shall be used for any operation where static electricity could become an ignition source.

3.3.2.5 Flammable Liquids

Flammable liquids are those that can produce a flammable mixture in air at ambient temperature. Care in handling flammable fluids is of prime importance.

- All flammable liquids must be kept in securely capped metal containers or steel drums on which the contents are clearly marked. Gasoline, acetone, spirits and other volatile liquids with flash points below 32°C (90°F) should be kept in strong metal lockers located in well ventilated, non combustible huts or sheds.
- Flammable gases in cylinders (acetylene, propane, etc) shall be segregated from other materials, preferably under an open, well-ventilated sun shade. Oxidizing gases (Oxygen, chlorine, nitrous oxide etc) shall be stored separately.

3.3.2.6 Combustible Materials

Although the main material used in the construction of plants for the glass industry is non-combustible steel or concrete, on a construction site many materials are potential fuel for a fire: Packing material, scaffold planks, form lumber, electrical insulation, tires, and other rubber goods, lubricating oil and grease, and diesel fuel, in addition to the flammable liquids (fuels, paints, solvents) mentioned above. Therefore, daily site clean up of combustible materials is required to reduce fire hazards.

3.3.2.7 Housekeeping

Rubbish accumulated at a job site provides a good starting point for a fire. Waste should be removed at regular intervals and always at the end of a working day. Metal bins with close fitting lids should be provided for oily rags, wood shavings, and other highly combustible wastes. Use non-combustible absorbents to remove spills or leaks of oil. Good housekeeping on the site can eliminate many of the situations where a fire can start.

3.3.2.8 Fire Classification

Fires are classified as class A, B, C, D, or special depending upon the types of material involved. These classifications are defined as follows:

Class A: Fires in ordinary combustible materials such as wood, cloth, paper, trash, rubber and plastic.

Class B: Fires in flammable liquid, oil, grease, tar, oil-base paint, lacquer, and flammable gas.

Class C: Fires involving energized electrical equipment or systems, resulting in the extinguishing media conducting electricity.

Class D: Fires in combustible metals, such as magnesium, titanium, zirconium, sodium, lithium and potassium.

Special: Fires in certain reactive chemicals that fall outside the other four classifications and that, in some cases, require special extinguishing agents or techniques.

3.3.2.9 Emergency Equipment

Each contractor has a contractual obligation to provide and maintain adequate, easily accessible fire extinguishers on the job site. The contractor should consult with the local Fire Protection Unit for advice on selection of such equipment. There are three types of fire extinguishers normally found on project site: Water, Carbon dioxide, and dry chemical types. Contractor personnel should be aware of the fire fighting equipment available on site and be familiar with its use.

3.3.2.10 Water Type Fire Extinguisher

Water extinguishers should be available around sites where there will be class "A" material, such as wood, paper, waste material, or packing crates. The typical portable water extinguisher comes in a 9.5 liters size.

3.3.2.11 Carbon Dioxide Type Extinguisher

The carbon dioxide type extinguisher is normally used for controlling electrical fires. These fires take place in motors, switch gears and so forth and are usually very easily controlled by de energizing the circuits that supply the power. The advantage of using CO₂ in this particular instance is that it leaves no residue in the mechanisms of the electrical equipment and therefore, does not further contribute to the damage.

A CO₂ extinguisher should never be used in enclosed areas where people are present, because the gas displaces oxygen from the immediate environment. When the oxygen level in the environment is reduced sufficiently to put out a fire, the oxygen level is also incapable of supporting human life.

3.3.2.12 Dry Chemical Type Extinguisher

A dry chemical type extinguisher is normally used in controlling class "B" fires in flammable liquids.

3.3.2.13 Pressurized water

Since most fires at project sites involve Class A materials, they can be fought with water. For this a pressurized water system and water hoses should be available on site.

If there is no permanent system installed at a particular location, a water tanker and portable water extinguishers will have to be supplied in order to take care of any Class A fires.

3.3.2.14 End of Shift Check

A routine inspection shall be made at the end of the working day to see that everything is left in a safe condition. The following itemized check list shall be followed:

- Clean up and removal of rubbish and materials.
- Switch of electrical equipment at the mains. Separate circuits should be provided for security lights and other equipments that have to be left turned on.
- Cover valuable equipment to protect it against dirt and against the effects of water that might be used in an emergency.
- Make a special check of smoking areas, hot equipment, welding areas, etc. to be sure there is no possibility of delayed ignition resulting in a fire.
- Return flammable liquids and gas cylinders to designated storage area.

3.4 Lavatories and Shower

- Adequate lavatory facilities (toilets and washing area) should be provided for the number of people expected to work in the facilities and work sites and allowance made for segregated facilities, or for indicating whether the toilet facility is “in use” or “vacant”. Toilet facilities should be provided with adequate supplies of hot and cold running water, soap, and hand drying devices.
- Where workers may be exposed to substances poisonous by ingestion and skin contamination may occur, facilities for showering and changing into and out of street and work clothes should be provided.
- A suitable number of portable urinal or toilet facilities should be available at site workplace where a supply of water is always available.

3.5 Potable Water Supply

- Adequate supplies of potable drinking water should be provided from a fountain with an upward jet or with a sanitary means of collecting the water for the purpose of drinking
- Water supplied to areas of food preparation or for the purpose of personal hygiene (washing or bathing) should meet drinking water quality standards.

3.6 Clean Eating Area

- Where there is potential for exposure to substances poisonous by indigestion, suitable arrangement are to be made for provision of clean eating areas where workers are not exposed to the hazardous or noxious substances.

3.7 Lighting

- Workplaces should, to the degree feasible, receive natural light and be supplemented with sufficient illumination to promote worker safety and health and enable safe equipment operation. Supplemental “task lighting” may be required where specific visual acuity requirements should be met.
- Emergency lighting of adequate intensity should be installed and automatically activated upon failure of the principal artificial lighting source to ensure safe shut-down, evacuation, etc.

3.8 Safe Access

- Passageways for pedestrian and vehicles within and outside buildings should be segregated and provide for easy, safe and appropriate access.
- Equipment and installation requiring services, inspection, and/or cleaning should have unobstructed, unrestricted and ready access.
- Hand, knee and foot railings should be installed on stairs, fixed ladders, platforms, permanent and interim floor openings, loading bays, ramps, etc.
- Opening should be sealed by gates or removable chains
- Covers should, if feasible be installed to protect against falling items
- Measures to prevent unauthorized access to dangerous area, should be in place
- At site workplace, workers should be fully aware of the safe access and evacuation safe area during an emergency

3.9 First Aid

First aid is the immediate help that is provided at the site to an injured or seriously ill person before professional medical help could be obtained.

First aid is a fluid concept not only in what must be done (how long, how complex) but in who can do it. In some situations immediate action can save life, limb or eyesight. Co-workers of victims should not remain paralyzed while waiting for trained personnel to arrive.

First aid personnel are persons on the spot, generally workers who are familiar with the specific conditions of work. They might not be medically qualified but they must be trained and prepared to perform very specific tasks. First aid personnel should be selected carefully, taking into account attributes such as reliability, motivation and the ability to cope with people in a crisis situation working under pressure.

- The employer should ensure that qualified first aid can be provided at all times. Appropriately equipped first-aid stations should be easily accessible throughout the place of work.
- Eyewash station and/or emergency showers should be provided close to all workstations where immediate flushing with water is the recommended first-aid response.
- Where the scale of work or the type of activity being carried out so requires, dedicated and appropriately equipped first-aid room/s should be provided. First-aid stations and rooms should be equipped with gloves, gowns, and masks for protection against direct contact with blood and other body fluids.
- Remote sites should have written emergency procedures in place for dealing with cases of trauma or serious illness up to the point at which patient care can be transferred to an appropriate medical facility.

3.9.1 First Aid Attendants

- Become acquainted with first aid techniques
- Be able to provide emergency care in the workplace
- Know how to perform and practice health education
- Ensure that when more than 50 persons are employed within a radius of 15 kilometers, first aid facilities run by a nurse familiar with first aid services and exclusively assigned to medical duties.

- Make sure that the contractors have provided or made arrangements to provide, a dedicated emergency vehicle (ambulance), properly supplied and marked to transport injured personnel to the nearest designated health care facility.

3.9.2 Labor and Workmen Law (Saudi Labor and Workmen Law Chapter 7)

Article 134

The employer shall provide first aid services for the workmen in accordance with the standards to be determined by the Minister of Labor in collaboration with the Health Ministry. If the number of his workmen in a single location within a radius of 15 kilometers exceeds fifty, he shall employ a nurse who shall be familiar with first aid services and exclusively assigned to medical duties.

Article 135

Every employer who employs more than fifty workmen shall inform the appropriate Labor Office of the name of the physician who has been selected to treat his workmen. In case he employs more than an hundred workmen, he shall inform the office of the physician and specialists whom he has selected to treat his workmen, and of the names of the hospital which he has designated for that purpose.

Article 136

Every employer shall prepare for each workman a medical file showing the result of the medical examination performed on the workman under his employment, a description of the cases of his illness, the stages of his treatment, the periods of his absence from work, provided that mention shall be made in the file of the kinds of ordinary and occupational and labor injuries.

3.9.3 INJURIES

Definitions

Injury: a physical damage to body tissues caused by an accident or by exposure to environmental stress.

Wound: a break in the continuity of body tissue or opening in the skin. A wound may be an injury but not all injuries are wounds.

The following are basic response to certain injuries subject to compliance with a local medical agency through Contractors provision and medical care system. A well trained and experienced first-aid attendant is responsible to do an appropriate procedure when such occur.

Head injuries

- Maintain an airway.
- Control bleeding.
- Protect against infection.
- Prevent further injury.
- Be aware that bleeding from the ears, nose and throat is a result of a fracture at the base of the skull.

- Do not attempt to remove foreign objects embedded in the head as this may cause uncontrollable bleeding.
- Apply head dressings in such a manner that they will not slip off during transportation to hospital.
- In cases of respiratory centre damage, apply mouth-to-mouth resuscitation to ensure an adequate supply of oxygen.

Facial injuries

- Check for obstructed airway as facial injuries may cause external bleeding resulting in blockage of airway.
- The bleeding from the oral cavity can be particularly heavy. Control bleeding by realigning the jaw, i.e. by grasping the chin and pulling it straight out.
- Maintain the airway by turning the victim on his/her side.

Chest injuries

- Seal the chest wound from the outside as quickly as possible.
- Never extract foreign objects from the chest wound.
- Maintain airway.
- Apply mouth-to-mouth resuscitation and external heart massage if necessary.
- Transport the patient in a sitting position unless he/she is in shock.

Abdominal injuries

- Cover the wound with a sterile dressing; apply a compression binder to control haemorrhaging.
- Look for any penetrating wounds and other symptoms such as vomiting, abdominal pain and tenderness.
- Never attempt to replace protruding organs, cover them with sterile gauze and keep the cloth moist.
- Place the patient in a semi-sitting position unless he/she is in shock.
- Keep the patient warm with blankets.
- Never give the patient anything to drink or eat.

Eye injuries

- Do not interfere with eye injuries except in minor cases. Refer the victim to hospital immediately.
- Any chemical splashed into the eye(s) must be considered a vision-threatening emergency. Forcibly keep the patient's eyelids open while irrigating with water for at least five minutes, then refer the patient to an ophthalmologist. Inform the ophthalmologist of the nature of the chemical contaminant.
- Never put eye ointment in an eye about to be seen by the ophthalmologist. The ointment makes clear visualizations of the retina very difficult.

Fractures

Definitions

- **Fracture:** any break in a bone.

- **Simple fracture (closed fracture):** the skin covers the fracture.
- **Compound fracture (open fracture):** the skin is broken and the bone has direct contact with the open air.

It is essential to remember the following:

- Do not harm. Unwise attempts by the patient to continue to use a fractured extremity may cause laceration of the soft tissues and may lead to the broken bone penetrating the skin or to the onset of shock.
- Protect and immobilize. Apply a splint to the fracture so the victim can be moved more comfortably and without causing any further injuries.

Thermal Injuries

Burns

There are three main types of burn:

- thermal
- electrical
- chemical

Estimate the seriousness of the burns by using the Rule of Nine: the head and neck comprise 9% of the skin area; the chest, 18%; the back, 18%; each arm, 9%; and each leg 18% (for the sake of completeness the genitals/perineum comprise 1%). First degree burns are superficial with reddening of the skin. Second degree burns extend deeply into the skin with redness and third degree burns involve the entire thickness of the skin.

- Prevent shock.
- Do not attempt to remove patient's clothes except in case of a chemical burn.
- Wrap the patient in a clean sheet to prevent infection.
- Maintain body temperature.
- Neutralize the chemical agent if a neutralizer is available.
- Determine what chemical agents have been the causes of the burns before transferring the patient to hospital.

Poisoning

- Induce vomiting as quickly as possible by administering a tablespoon of ipecac syrup except in instances of ingestion of acids, alkalis and petroleum products.
- Administer water, milk or universal antidotes; water should be used if there is nothing else available.
- Do not give fluid to an unconscious person.
- Administer mouth-to-mouth or mechanical resuscitation if there is difficulty in breathing.
- If poison is in contact with the skin, remove all contaminated clothing and flood the affected area with water.
- If poison is in contact with the eyes, irrigate both eyes with large quantities of water.
- Identify the poisoning material or collect all vomited material in a container and transport it to the hospital with the patient for laboratory analysis.

Shock

Shock means there is not enough blood circulating through the body. Symptoms of shock include: pale, cold and moist skin, shallow breathing, bluish fingernails and lips, thirst and restlessness.

- Treat shock by removing the cause: stop the bleeding, relieve the pain, and splint the fracture.
- Prevent infection and maintain body heat.
- Lay the patient flat.
- Burn victims suffering from shock should be given liquids in small amounts.

Impaired Breathing

- Mouth-to-mouth resuscitation
- Clear the mouth and the throat of any dentures, mucus, food, blood or other obstructions.
- Tilt the head back as far as possible and stretch the neck.
- Lift the lower jaw forward.
- Pinch the nose.
- Open your mouth wide sealing your lips over those of the victim, takes deep breath and blow forcefully until you see the victim's chest rise.
- Remove your mouth when you see the victim's chest rise; listen for exhalation.
- Continue the same procedure 12-20 times per minute.

3.10 Air Supply

- Sufficient fresh air should be supplied for indoor and confined workplaces. Factors to be considered in ventilation design include physical activity, substances in use, and process related emissions. Air distribution system should be designed so as not to expose workers to draught
- Mechanical ventilation system should be maintained in good working order. Point-source exhaust systems required for maintaining a safe ambient environment should have local indicators of correct functioning.
- Re-circulation of contaminated air is not acceptable. Air inlet filters should be kept clean and free of dust and microorganism. Heating, ventilation and air conditioning (HVAC) and industrial evaporative cooling system should be equipped, maintained and operated so as to prevent growth and spreading of disease agents (e.g. legionella pneumophilia) or breeding of vectors (e.g. mosquitoes and flies) of public health concern.

3.11 Work Environment Temperature

- The temperature in work, rest room and other welfare facilities should, during services hours, be maintained at a level appropriate for the purpose of the facility.
- To avoid dehydration during harsh weather temperature due to heat at site workplace, workers should always take fluid to replenish lost body fluids due to extreme sweating. If dizziness or loss of orientation is evident, workers should stop working and consult the first-aid attendant for proper treatment.

3.12 Cranes & Lifting Equipments

The purpose of this procedure is to assure that cranes and lifting equipments (i.e. hoists, block and tackle, winches, and associated components) are used and maintained in a safe manner. This procedure establishes responsibilities procedures and precautions for the inspection, use, testing and maintenance of cranes and lifting equipments.

3.12.1 Scope

The provision of this procedure apply to all lifting operations, personnel involved in the use of cranes and/or lifting equipment. This procedures will be applied to all cranes being used in the worksite, lay-down, fabrication, storage areas and any other areas at site.

3.12.2 Responsibilities

Employee – It shall be the responsibility of every individual involved in cranes and lifting activities to inspect the equipment prior to and after use, to tag-out defective equipment for return, for repair or for replacement and use of cranes and lifting equipment properly (in accordance with this procedures and manufacturer’s instructions)

Site Management – It shall be the responsibility of the site management to ensure that only cranes and lifting equipments which meets requirements of this procedures/guide are leased and/or purchased for use at site

Maintenance – The equipment supervisor/foreman shall be responsible to ensure that periodic test/inspection of cranes and lifting equipment are accomplished and that employees using such equipment are properly trained and understand the hazards associated during operation

Safety Department – It shall be the responsibilities of the Safety Manager to periodically monitor maintenance and construction activity to verify proper usage of cranes and lifting equipment and compliance with this procedure.

Third Party Inspector – A qualified 3rd party inspection organization will be required to verify proper test and certification of cranes at given recommended period.

3.12.3 General Rigging and Equipment Operation Requirements

- Only licensed/certified operators are allowed to operate cranes and other powered lifting equipment
- Never attempt to lift a load beyond the capacity of the equipment being used. Exercise extreme care when starting to lift load that might be near the rated capacity of the cranes. Under these conditions, a test lift should be made, by raising a load a fraction of an inch from the floor and placing the control in the “OFF” position. This test is to determine if the crane is capable or not of handling the load and also test the efficiency of the hoist brake system.
- Know the safe carrying capacity of: Nylon web sling, wire roper sling, chain sling, and other lifting equipment such as shackles, hooks, spreader bar, etc., so as not to overload.
- Remove from service all defective lifting equipment and lifting gear and report the defects to supervisor
- Do not tie knots in chain sling, rope sling or wire cables to shorten it as this directly affect its lifting capacity.
- Do not place bolts or other material between links of a chain to shorten or splice it

- Protect sling of being damage or cut by sharp edges during lifting work by placing a softener between the sling and sharp edges. Avoid sharp bends in wire-rope sling and apply lubricants as needed to prevent corrossions. Web-sling shall not be exposed to chemicals not painted and shall be properly stored
- Under no circumstances that personnel be allowed to work under suspended load. Standing and walking below lifted load is strictly prohibited.
- Do not walk ahead of the moving load and do not swing suspended loads over people standing or working below. No one is permitted to ride the hook of the load.
- Lift gradually until slack is completely out of the hoist rope. Load snatching or sudden lift is not allowed at all.
- Position the cranes hook directly over the load to avoid if from swaying during lifting. Always hooked the sling hook to the lifting hook of the load.
- Set load on proper blocking, never directly on a sling
- Decreasing the angle between the sling and the horizontal increases the stress on the leg. Consequently the sling angle at horizontal should be less than 30 degrees
- Use only one part (shackle or choker end) to a hook whenever possible. Mount and secure with suitable material all open-type hook to avoid sling being dislodge from the hook
- Avoid hand contact with the load. Taglines must be used to control the lift and positioning of loads
- Ensure the load is clear of any obstructions along its path. Inform all person in the vicinity of the route to where the lifting takes place
- Ensure that the signalman/rigger is in clear view with the crane operator for communication and safety
- The operator shall ensure that the crane/lifting equipment has a valid inspection certificate prior to use. Pre-operational check must be performed by the operator to ensure that all controls and safety system are in good working conditions.
- The operator shall test the brakes each time a load is approaching the rated load. Raising the load a few inches and applying the brakes shall test the brake function
- The load shall not be lowered below the point where less than two full wraps of rope remain on the hoisting drum
- The operator shall not leave the control while the load is still suspended

3.12.4 General Inspection Guidelines

Cranes and lifting equipment shall be inspected periodically and properly documented, a minimum of one month and whenever rated load or proof load test is performed. The Maintenance Department is required to the monthly inspection as a minimum as follows:

- The examination or inspection shall be carried out in adequate lightings
- The items under examination shall be clean and free from rust to enable a proper visual examination
- Inspection shall be carried out by a trained/certified competent person
- The identification number and safe working load shall be checked with the test certificate. The equipment shall be proof-load tested by a qualified person prior to Maximum Safe Working Load (MSWL) stamping or re-stamping.

- Written report shall indicate clearly the equipment inspected and date, a clear statement on the result of the inspection shall be noted. Where a defective parts or function has failed, immediate arrangement is to be made to withdraw it from use and properly tagged.

3.12.5 Inspection Criteria

There are two types of safety inspection for cranes and lifting equipment, that is Regular Service Inspection and Periodic Inspection. Regular inspections are conducted daily or weekly intervals. Periodic Inspections are conducted by monthly, quarterly and annually. Regardless of the inspection frequency, crane operators are responsible to observe and check for any defect and reposting to his superior prior to use.

Daily Check

- Verify that all functional operating mechanism re properly adjusted and do not interfere with operation of the equipment
- Verify that there is no deterioration of leakage in lines, tanks, valves, pumps, and other pneumatic or hydraulic systems
- Verify that hooks do no have cracks or deformation, hooks with cracks or more than 15% in excess of normal throat opening or 10% twist form the plane of the unbent hook shall be taken out or service and discarded
- Verify hoist chains (including end connections) for excessive wear, twist, and distorted links that may interfere with proper functions

Monthly Check

- Hooks (to include identification number)
- Hoist chains
- Mechanical components (for excessive wear or cracks)
- Ropes (for any sign of deterioration) such as:
 - Reduction of rope diameter due to loss of core support, corrosion or wear
 - Worn-out wire due to cuts or dents
- Deformation or components such as pins, bearing shaft, gears, rollers, locking or clamping parts
- Leaks from pneumatic or hydraulic systems
- Wear of chain drive sprocket
- Electrical apparatus and its proper functions

3.12.6 Specific Crane and Lifting Equipment Safety Requirements

Mobile Cranes

- All cranes shall have a capacity plate and a boom angle indicator mounted in clear view of the operator
- Test load shall not exceed 100% of the rated load at any selected working radius
- Crane shall be positioned on a location which horizontal level in within 1% grade
- Crane's hoist rope shall not be wrapped around the load
- The load shall be attached to the hook be means of sling or other approved lifting gear
- The load shall be properly secured and balanced before lifting

- The hooks shall be properly distributed to avoid swaying during lifting
- The operator shall test the brakes each time a load is approaching the rated load
- During transit, the boom shall be positioned in line with the direction of motion
- Crane boom shall be retracted to avoid turning over when traveling without load
- When crane is to be operated at a fixed radius, the boom hoist pawl or other locking device shall be engaged
- Hoist-rope of chare shall not be handled on a winch head without the knowledge of the operator
- Cranes shall not be operated without the full amount of ballast or counterweight in place as specified by the manufacturer
- To stop the engine while refueling
- A dry chemical fire extinguisher shall be kept in the cab at all times
- Clearance between an operating crane and any electrical transmission lines shall never be less than 10 feet
- In transit with no load and boom lowered, the clearance between crane and transmission lines shall never be less than four feet
- Boom stopper shall be installed to limit the travel of boom
- An adequate luminance is to be installed when working at night
- When a pile extractor is used, the boom angle should be kept at or less than 60 degrees above horizontal
- When securing a crane, the operator shall lower the load block or bucket onto the ground properly

Overhead and Bridge Cranes

- Control handles should be clearly identified by signs and by shape or position so the operator can tell by the “feel” which motion is about to be controlled without taking his eyes from the signals.
- A dry chemical fire extinguisher shall be installed in the vicinity of the crane.
- Foot-walks shall be of rigid construction and designed to sustain a distributed load of at least 50 pounds per square foot (=243 kgf per square meter) and have an anti-slip type walking surface.
- Access to the foot-walks shall be racked by one or more fixed ladders not less than 16 inches wide.
- Stanchions or hold-grabs shall be installed to enable a person to climb up and down safely on and from the trolley.
- End limit stoppers shall be provided at the limits of travel of the trolley and shall be constructed to resist the applied force during contact....

Monorails

- End limit stoppers shall be provided at open ends of tracks such as interlocked cranes, track openers and track switches.
- Monorails hoists, operated in swivels, should have one or more safety catches or lugs that will support the load should a suspension pin fail.
- Safeguards shall be provided to prevent trolley frame from being deformed or distorted.

Winches

- A safety brake lowering device shall be installed and portable units shall be firmly anchored securely against the pull of the hoisting rope or chain with load.
- Suitable guards shall be installed to protect operator against flying strands of wire and the recoil of broken ropes.
- A positive locking device shall be provided to lock gears in hand-cranked operated winches.
- A pin shall be installed through the end of the crank-shaft to retain it in the socket during hoisting operations.
- All gears shall be fully encased and electrical power-driven winches shall be electrically earthed/grounded.

Hoists (Electric, Air and Manual Chain)

- The safe load capacity of each hoist shall be shown in conspicuous figures on the body of the machine as well as a label in a readable position covering safe operating procedures.
- Flanges on hoist drums with single-layer spiral grooves shall be free of projections that could damage a rope.
- All hoists shall be attached to their supports with shackles or safety latches and have an adequate design factor for the maximum loads to be imposed.
- Load hooks shall have safety latches.
- Hoists operating on rails, tracks or trolleys shall have positive end-limit stoppers.
- Loads shall only be picked up when directly under the hoists.
- Electric hoist control handles shall be clearly marked "HOIST", "RAISE" and "DOWN".
- Control buttons of powered hoists shall have a constant contact action so when released, its operation stops.
- Air hoists shall have a locknut that holds the shaft or its rod secured by a castellated nut and cotter pin.
- A clevis clip or other device shall be used to prevent the hook from being detached from the hoist support.
- A choke or control valve shall be placed in the air supply line coupling to prevent the hoist from rising or lowering too rapidly.
- For hand-operated chain hoists, an automatic load brake otherwise known as "decelerator" shall be provided to hold the load from too rapid a descent.

Portable Hoists/Floor Crane

- Hoists operated by electric power shall be effectively earthed or grounded.
- Sweep guards on the track wheels of portable floor cranes shall be installed.
- Truck handles on hoists shall be designed to stand upright when not in use.
- Workers are not permitted to ride the crane during movement.
- Casters or wheels shall be locked before machine is used.
- Gears and other rotating parts shall be guarded.
- End limit stoppers for vertical travel on the hoisting cable drum shall be appropriately installed.

Man-basket

Cranes may be used to hoist and suspend employees on work platform or to provide access and egress in special work situations, provided that:

- Such action results in the least hazardous exposure to employees.
- There are no other means or availability of equipment designed for this purpose.

Controlled conditions for use of cranes with aerial work platforms are as follows:

- The rated capacity of the crane at the radius at which the lift will be made shall be divided by four (4) and this limit shall not be exceeded.
- A full cycle operational test lift shall be made prior to lifting of employees. The man-basket's test weight shall be twice the weight of the intended load.
- Pre-lift plans showing boom angle and maximum intended load, shall be prepared for in every lift. Prior to execution, plans shall be reviewed and approved by the MHI Site Manager and Safety Manager.
- A firm level footing shall be provided for cranes and its outriggers fully extended. Footing stability shall be verified during the full cycle operational test.
- The load line on which the platform is suspended shall have load lowering control. The free fall option shall not be used with suspended work platforms.
- Employees working inside man-baskets or other aerial platforms shall wear full body harness clipped "ON" the independent lifelines attached above the crane's hoist block before lift-off and during the entire work duration while being suspended by a crane.
- All lifts of man-baskets shall be accomplished per the manufacturer's recommendations.

3.13 Ladder Safety

To provide requirements for the proper selection, inspection, maintenance and use of ladders

3.13.1 Scope

All the requirements stated in this procedure apply to all ladders to be used at site

3.13.2 Requirements

General

- Each ladder should be inspected for possible damage and missing parts before use. Defective ladders shall not be used and shall be taken out of service
- Metal ladders shall not be used and around in energized electrical system or equipment
- All ladders should have non-skid surface on each cleat
- Ladders shall be capable of supporting four times the intended load
- Ladders shall never be used as foot-bridge or supports of means of horizontal access

Extensions/Straight Ladder

- Ladder shall be provided with rope tied on the top rung to secure the ladder when in use

Stepladder (A-frame ladder)

- Stepladder shall have locking spreaders that will be fully spread and locked when in use
- Stepladders should not be used as straight ladder
- Workers are not allowed to stand the top rung of a stepladder

Wooden Ladder

- All wooden ladders shall not be painted, clear varnish or coating is allowed for protection only
- Ladder shall be made of good lumber and free of knots or cracks

3.13.3 Ladder Usage

- Set the feet on the ladder at the ratio of 1:4 = 1 meter out of 4 meters up or 75 degrees angle
- Ladder shall not be used for light temporary works, one worker at a time is allowed on the ladder
- Never position a ladder in front of doorways, unless properly guarded. Placing ladder on top of unstable object should be avoided
- Assign someone to hold or secure the ladder while in use
- Place ladder in firm footing and keep the top and bottom landing clear of any obstruction
- Ladder leading to walkway, platform and landing should exceed 0.9 meters (3 feet) from the intended point of landing
- Ladder shall not be used as walkways or runways of scaffolding.
- Workers should face the ladder when scaling up or down with both hands on the ladder

3.13.4 Ladder Inspection

- Each ladder shall be inspected before use for cracks, loosed joints or locking device etc.
- Any ladder found to be defective shall be put out of service

3.13.5 Maintenance and Storage

- Ladders shall be protected from extreme weather when not in use
- Ladders stored horizontally shall be supported at both ends and at the middle section to avoid sagging
- All metal fittings is to be checked for corrosion
- Ladders shall be inspected for cracks, loose of bent rungs, and other wears that may effect in unsafe carrying of load
- Damage and defective ladder shall not be placed in the storage to avoid unintentional use. Immediate repair of defective ladder shall be performed or discarded if required.

4.0 Emergency Management Plan

4.1 Purpose

To establish guideline and direction among project site employees for a quick and effective response in dealing with any emergency situations.

4.2 Scope

This procedure covers site area during an emergency situation. This applies to all project personnel inside the site.

4.3 Emergency Planning

This involves the development of a specific plan which details actions to be taken by trained personnel during an emergency in an effort to efficiently control it and minimize its negative impact on workers, the environment or property and a facility at site. This type of planning also extends to developing emergency control strategies and instituting training and drills for all site personnel.

This plan begins with basic strategies, principles, responsibilities and guidelines that need to be observed and complied with during an emergency at the construction site. Any man-made calamity and/or natural disaster shall be covered by this emergency response plan.

4.4 Definitions

Emergency

An emergency is an abnormal incident posing a threat to the safety of workers, the environment or property and a facility at site and which can be brought under control using the resources and procedures for emergency response in place for the facility or site.

Disaster

A disaster is an emergency which poses a more serious threat to the safety of workers, the environment or property and facilities at site which cannot be brought under control using the resources and procedures for emergency response in place for the facility or site.

Support and Information

Efficient and accurate communications is a necessary part of effective emergency response actions. Contractor shall ensure effective management of information during an emergency. Contractor shall develop and prepare communication networks between sub-contractors and off-site agencies to ensure that operations can be properly coordinated, so that external organizations (e.g. Police Department, Fire Department) can quickly and effectively disseminate any information to the community when any serious threat arises.

Response Strategy

The response team will have its own capability to handle emergencies caused by construction failures, nature, etc by using its own resources within construction site. However, when the emergency escalates to the point when outside assistance from other off-site emergency response agencies is required, and then the Site Manager shall immediately initiate the set site procedure for outside assistance.

Emergency Classifications

Emergencies that might take place inside construction site that needs prompt actions are the result of unexpected condition leading to fire, explosion, oil or chemical spill, gas release, vehicle accident, release of radioactive substances, collapse of structures, natural disasters, serious injury/fatality and act of arson/sabotage/riot.

In the event of emergency, involved personnel are also expected to promptly notify relevant key personnel in accordance with the Emergency Response Organization Chart & Emergency Response Plan flowcharts (see figure 4.A & 14.A)

4.5 Emergency Classification Code

4.5.1 Code I (Minor Emergency)

- Minor Injury or illness
- Small fires or theft
- Damage to equipment or property (including third party property)
- All other minor safety or security-related matters.

Subcontractors shall be responsible for controlling, containing, resolving, investigating and reporting to contractor/Safety Manager for all Code-I emergencies. Refer to Figure 4.A & 14.1 for proper reporting procedure.

Subcontractors shall not compromise any safety/security regulations/requirements, during their efforts to successfully resolve Code-I emergencies.

4.5.2 Code II (Significant Emergency)

- Serious injury or death
- Release or spillage of dangerous liquids and gases
- Environmental Spills on or to water
- Release of Radioactive material or media
- Explosions
- Riot
- Failure of a structure or equipment
- Dropped objectives over pipeline or facility
- Truck falling onto a pipeline or facility
- Environmental spills on land

Subcontractors are responsible for controlling, containing, resolving, investigating and reporting to contractor for all Code-II emergencies that are containable within their own worksite. Any containable Code-II emergency shall refer to Figure 4.A & 14.A.

Any code II emergency situation beyond the subcontractor's capabilities, the subcontractor Site Manager shall notify. He shall monitor and report current and ongoing situation and provide all relevant details.

Subcontractors shall not compromise any safety/security regulations and requirements, during their efforts to successfully resolve Code-II emergencies.

4.5.3 Code III (National Disaster/Emergency)

- Natural Disaster
- High Winds/Storm
- Severe Floods
- Earthquakes
- Civil Unrest
- Civil Commotion/Riots, Plague
- Acts of War, terrorism and Bomb Threats
- Acts of Arson and Sabotage

Subcontractor's Site Manager shall notify safety department and shall initiate actions for requesting outside assistance from local, state, Federal Agencies.

The Site Manager will inform partner and owner of such event immediately and coordinate its action.

4.6 Emergency Response Organization

The Emergency Response Organization (Figure 4.A) is a structured working group whose function is to control an emergency or disaster situations. This organization is to establish functional responsibilities for prevention, readiness, response and recovery. An action coordinating group at subcontractor level shall be formed to support planning, coordination and resource management for Code I or II emergency situation. Partner, owner and Subcontractors safety officers are members of this action group.

4.7 Emergency Response Teams

4.7.1 Sub-Contractor's Emergency Response Team

Sub-contractor's Emergency Response Teams shall be responsible for control all Code I and II emergencies. The team is under control of the responsible sub-contractor site manager in an emergency situation within their area of responsibility.

4.7.2 Sub-Contractor's First Line Response Team (FLT)

The First Line Response Team (FLT) shall be the sub-contractor's safety manager (The Emergency Response Team Leader (RTL) and his designated personnel from his sub-contractors. FLT is called into action for fire fighting and other emergency requirements.

4.7.3 Second Line Response Team (SLT)

The Second Line Response Team shall be the back up for all other project sub-contractors First Line Response Team. Second Line Response Team is supervised by the other sub-contractors Response Team Leaders and will follow the direction of the sub-contractors Emergency Centre Commander.

4.7.4 Third Line Response Team (TLT)

Third Line Response Team (TLT) shall be the back-up personnel from off-site organizations, agencies (Police Dept., Fire Dept., Federal Agencies) when such assistance is requested. The sub-contractor Emergency Commander under the overall control of the site manager shall coordinate the efforts and assistance from TLT until such time that overall direction of the emergency response is assumed by an outside governmental agency or authority.

4.8 Safety Procedures

4.8.1 General

All construction site personnel shall follow the following general safety procedures.

- Know the location and operation of the nearest.
 - Emergency Alarm
 - Exit
 - Fire fighting apparatus
 - Emergency Equipment
 - Assembly area and directional routes
 - Emergency Response Team Leaders and Coordinators (e.g., FLT and SLT)
- In the event of an emergency which may warrant an immediate evacuation and/or rescue operation) contractor and subcontractors shall assist the emergency authorities to enable a smooth, quick and safe evacuation or rescue operation.
- When alarm is made siren and/or communication all client and sub-contractors personnel shall take the following appropriate actions:
 - a) Stay calm and do not panic.
 - b) Halt work immediately
 - c) Switch off all electrical equipment/appliances, and all suspended loads to be landed down.
 - d) Leave your workplace as quickly and as safely as possible.
 - e) If time permits, close all doors before leaving premises.
 - f) Report to supervisor/foreman and assemble at designated assembly points.
 - g) Wait for head count/roll calls and for further instructions.
 - h) Provide assistance when requested or directed by local emergency response personnel.

4.9 Assembly Points

4.9.1.1 Offices

All office staff or those in the office at time of emergency notification shall immediately evacuate from the building and move out to a pre-selected assembly point. The respective administrative managers shall check to ensure that everyone is out of the building. Wait for head count/roll call and further instructions from the Emergency Control Center.

4.9.1.2 Fieldwork Sites

All personnel Contractor and Sub-Contractors at site shall evacuate their respective work area under the direction of the supervisor/foreman to the pre-planned and marked assembly points for head count/roll call.

4.10 Duties and Responsibilities

4.10.1.1 Duties of Appointed emergency Response Personnel

To ensure an effective emergency network, all appointed emergency response personnel should be capable of carrying out the duties and responsibilities assigned.

4.10.1.2 Sub-Contractors emergency commanders

In an emergency a “one-man command” is most essential so as to avoid confusion and misunderstanding. In this instance, sub-contractor’s site Manager shall assume the position of “emergency Commander” and take full responsibilities to direct and co-ordinate all emergency operations.

4.10.1.3 Sub Contractors’ Emergency Coordinators.

The Emergency Coordinator (EC) shall be the sub-contractors’ Safety Officers who are responsible to co-ordinate and direct his response team activities at the scene of the emergency. He reports to the emergency Commander at the emergency control Center.

4.10.1.4 Sub-Contractors’ Security Coordinator

The Sub-Contractor Site Manager shall appoint the Security Head (SC) who will coordinate and be responsible to liaise on security matters with Contractor and local police etc.

4.10.1.5 Sub-Contractors’ Primary Considerations:

Each Sub-Contractor’ shall accomplish the following:

- a) Provide a list of actions i.e. information sheet listing, times and actions which must be taken by the sub-contractor in an emergency with clear indications as to each action’s priority.
- b) Create organizational framework that will provide a rapid and effective response to any emergency situation.
- c) Assign, in advance, trained persons responsible for taking actions.
- d) Provide effective communication channels between Contractor and other Sub-contractors. These channels or communication are essential for coordinating the many tasks that are needed to deal effectively and efficiently with any emergency.
- e) Specify the required equipment and materials, as well as personnel, to carry out the measures during emergency.
- f) Provide relevant information applying to different emergency situations such as contingency plans in the event of an oil spill as to its control and prevent oil spillage.

4.10.1.6 Sub-Contractors’ Important Considerations:

Each contractor shall demonstrate how the following considerations will be addressed during an emergency.

- a) Protection of assets and environment.
- b) Assured integral co-ordination of actions taken both at the location of the emergency and the emergency control Center.
- c) Continuity of communications and liaison throughout the emergency situation, to ensure that all concerned parties are kept fully informed.
- d) Knowledge of relevant local legislation or regulations.
- e) Safety of person directly involved in handling an emergency.
- f) Availability of a trained, well informed sub-Contractor personnel to handle swiftly and correctly the overall administration in an emergency situation.

4.10.1.7 Sub-contractors' emergency Control Center

Sub-Contractors' emergency Control Center (ECC) is a central command and control point used by the sub-contractor during any emergencies. Even through specific emergency plans will often vary with different hazards, the sub-Contractor shall establish procedures, processes, and techniques capable of controlling all hazards.

Sub-Contractors' communication facilities for an emergency situation through phone at the response center or walkie-talkie shall be established so that request for assistance or relaying information can be maintained without interference. Contractor shall make arrangements for a uniform specific channel and inform all personnel of the radio procedures, should an emergency arise.

4.10.2 Contractor Duties and Responsibilities:

Site Manager

- a) Contractor Site Manager assumes responsibility for overall emergency response for Code II non-containable emergencies. For Code III emergency, he will coordinate and request Partner and/or Owner to act in conjunction with outside authorities and agencies as appropriate/until outside authorities arrive, and assume control together with partner/owner Emergency Response Committee (ERC).
- b) Report to Contractor Project Manager the Progress on resolving the emergency situation.
- c) Inform the site Office on the Progress.
- d) Issues "All clear Sign" to his employees, sub-contractors.

Emergency Coordinator (Safety Manager/Officer)

- a) Reports to the Contractor Site Manager.
- b) Assumes responsibility (as directed by Contractor Site Manager) to assist in coordinating with off-site authorities as required.
- c) Verifies that injured personnel are receiving adequate attention.
- d) Coordinates that proper consideration is given to the preservation of evidence in consultation with the Sub-Contractor(s).
- e) Coordinates that the effected Construction area is sealed off and undisturbed for investigation in consultation with the Sub-Contractor(s).
- f) Evaluates emergency responsibilities of Sub-Contractor organizations for code I and II emergencies.

4.11 Exercises and Drills

Contractor and Sub-Contractors with the assistance of the Action Coordinating Group will plan to conduct an emergency Exercises and drills at least twice a year among all of their construction personnel. Contractor by this process, will be able to use and test the control arrangements, alarm systems, protective devices, detection, communications and other related systems that shall be applicable during this exercise. Exercises will also provide an opportunity to appraises the coordination and performance of the Sub-Contractor's first Line response team (FLT). Contractor safety manager/Officers shall witness, observe, document and evaluate all drills and Exercises.

4.11.1 Drill and Exercise Notification

The Sub-Contractor's Emergency Commander or his assistant is responsible to relay information to FLT and other emergency support teams. The emergency Commander shall inform and instruct his FLT team to take appropriate actions. He shall use the terms mentioned below during this exercise:

- a) State "This is a drill" (repeat 3 times).
- b) State the location of incident (e.g. boiler, jetty, etc)
- c) State type of emergency (e.g. oil spills, fire/explosion)
- d) State whether there are casualties, or person(s) injured.

Following this announcement the ECC Commander will:

- a) Activate the duty FLT emergency response team.
- b) Notify same information to neighbouring sub-Contractors.
- c) Notify key personnel as per the Emergency Call list and Telephone Number (See Figure 14.A).

The request for inter-contractor assistance may be accomplished via direct line telephone, or radio communication.

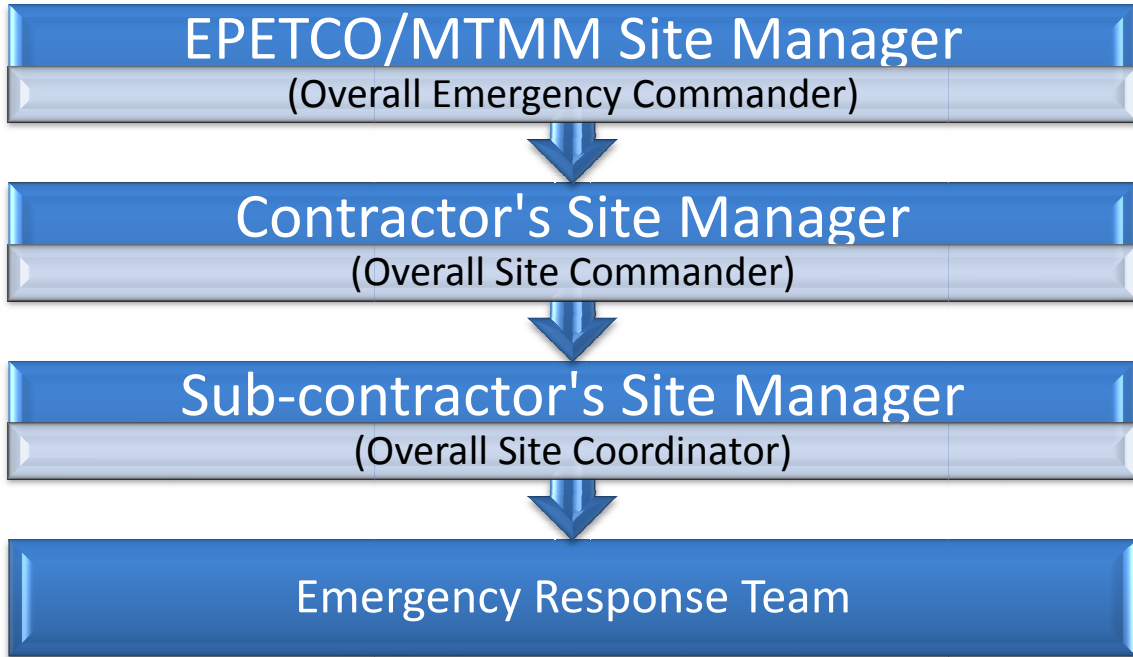
4.12 Instruction from Government Agencies and/or Authorities/Partners.

For a code III emergency, Saudi Arabia Governmental Agencies and/or authorities/Partners/Owner will notify IWSP as to the appropriate emergency actions to be taken. Contractor Project Manager will notify all project Sub-Contractors' personnel concerning these actions. However, should the Government Agencies decide to take command and control the emergency situation, Government Agencies should declare such intentions to Contractor.

4.13 Records

Contractor and Sub-contractors are responsible for developing and maintaining completed records and reports of code I, II, III emergency situations. All contractor records and reports shall be available for internal and external audits, if required.

Figure 4.A Emergency Response Organization Chart



5.0 Communication and Training

5.1 Training

- Provision should be made to provide Health & Safety orientation to all new employees to ensure they are apprised of the basic site rules of work at/on the site and of personal protection and preventing injury to fellow employee.
- Training should consist of basic hazard awareness, site-specific hazards, safe work practices, and emergency procedures for fire, evacuation, and natural disaster, as appropriate. Any site-specific hazard or color coding in use should be thoroughly reviewed as part of orientation training

Good safety training is important to workers, supervisors, and engineers to be up-to-date with current safety technology and practices. Safe working practices could be learned when workers understand how accidents happened. Measures can then be taken to prevent a recurrence. People who are trained to do their jobs correctly can also be expected to do their job safely.

5.1.1 Training for Supervisors /Project Engineers.

- The immediate job of preventing accidents falls upon the Supervisor/Engineer not because it has been arbitrarily assigned to him, but because accident prevention and production control are closely associated to supervisory functions.
- The most direct way to develop the desired attitudes and to impart the necessary information about safety to Supervisors/Engineers is to give them safety training.
- The course for Supervisors or Engineers which include legal requirements, company administrative policies and safety aspects of the work would likely be under taken by the supervisors or engineers.

5.1.2 Scope of Training

Safety training needs to be an on going procedure, if it is to accomplish the optimum results. The program Material and presentation should cover all safety subjects. A limited training effort, such as safety meeting, may prompt supervisors /engineers to do a better job for a short period, but interest would start to lag unless an effective safety training program is in place.

Frequent follow up by the Supervisors / Engineers to correct work practices would also help to create an understanding and to eliminate resentment which is a source of undesirable work attitudes.

5.1.2.1 Basic Training

- A basic occupational training program and specialty courses should be provided, as needed, to ensure that workers are oriented to the specific hazards of individual work assignments. Training should generally be provided to management, supervisors, workers and occasional visitors to areas at risks and hazards.
- Workers with rescue and first-aid duties should receive dedicated training so as not to inadvertently aggravate exposures and health hazards to themselves or their co-workers. Training would include the risk of becoming infected with blood-borne pathogens through contact with bodily fluids and tissues.

- Through appropriate contract specification and monitoring, the employer should ensure that service providers, as well as contracted and subcontracted labor, are trained adequately before assignment begins.

5.1.2.2 Training Topics

The Law and Safety

- Statutory requirements
- Appropriate regulations
- Duties of Company/contractors and workers

Policy and Administration

- Human relation
- Consultations
- Safety officer : Duties ,goals ,objectives

Principles of Accident Prevention

- Methods of achieving safe work.
- Accident and injury causes.
- Hazard Identification procedure.

Site Inspection and Tidiness

- The role of management
- Hazard Identification Procedure
- Record results
- Follow up procedures
- Feedback
- Relationship of site housekeeping to accident occurrence.

Health and Personal Protective Equipment

- Medical Examination
- Hazard to health on site
- Sanitation and welfare
- Protective clothing
- First Aid
- Personal Protective equipments and its correct use and care.

Electricity

- Appreciation of electrical hazards
- Power tools
- Arc welding
- Low voltage systems
- Lighting and power system on sites

Equipment

Hazards and accident prevention methods connected with the use of different types of heavy equipment.

- Hazard connected with the use of ladders, scaffold, etc. and work on roofs.

Fire Prevention and Control

- Principle causes determining fire
- Understanding fire chemistry
- Fire fighting equipment
- Fire fighting training.

Communications

- Effective methods of communication (particular interest to non-english speaking workers)
- Method and preparation of reports
- Safety Committees
- Safety meetings

5.2 Visitor Orientation

If the visitors to the site can gain access to areas where hazardous conditions or substances may be present, a visitor orientation and control program should be established to ensure visitors do not enter hazard areas unescorted.

5.3 New Task Employee and Contractor Training

The employer should ensure that workers and contractors, prior to commencement of a new assignment, have received adequate training and information enabling them to understand work hazard and to protect their health from hazardous ambient factor that may be present.

The training should adequately cover:

- Knowledge of materials, equipment and tools
- Known hazard in the operations and how they are controlled
- Potential risk to health
- Precautions to prevent exposure
- Hygiene requirements
- Wearing and use of protective equipment and clothing
- Appropriate response to operation extremes, incidents and accident

5.4 Labeling of Equipment

- All vessels that may contain substances that are hazardous as a result of chemical or toxicological properties, or temperature or pressure, should be labeled as to the content and hazard and appropriately color coded.

- Similarly, piping systems that contain hazardous substances should be labeled with the direction of flow and contents of the pipe, or color coded whenever the pipe passing through a wall or floor is interrupted by a valve or junction device.

5.5 Communicate Hazard Codes

- Copies of the hazard coding system should be posted outside the facility at emergency entrance doors and the fire emergency connection system where they are likely to come to the attention of emergency service personnel.
- Information regarding the type of hazardous materials stored, handled or used at the facility, including typical maximum inventories and storage locations, should be shared proactively with emergency service and security personnel to expedite emergency response when needed
- A material safety data sheet (see annex 2) should be available to site supervisors, QA/QC department and store to ensure correct knowledge of material properties and hazards. Same is to be included in training in handling such hazardous materials.
- Representative of local emergency and security services should be invited to participate in periodic (annual) orientation tours and site inspections to ensure familiarity with potential hazards present.

6.0 Physical Hazard

Physical Hazards represent potential for accidents, injury or illness due to repetitive exposure to mechanical action or work activity. Single exposure to physical hazards may result in a wide range of injuries, from minor and medical aid only, to disabling, catastrophic, and/or fatal. Multiple exposures over prolonged period can result in disabling injuries of comparable significance and consequence.

6.1 Hazard Identification, Risk Assessment and Control

In reviewing the safety requirements for construction activities (i.e. new, modified or rebuilt plants or facilities), it is difficult for even the most experienced engineer and /or contractor to identify all the potential safety hazards that may be encountered unless a systematic potential – hazard review is conducted as a part of hazard identification.

The hazards identified are classified, according to their degree of potential human impact considering severity and probability (i.e. from most severe and probable to least severe and probable) during the initial design phase. This allows for a change in methodology or operating procedures in the direction of reducing the risk associated with the hazard to an acceptable level, or eliminating it altogether.

6.1.1 Definitions

Hazard: A source or a situation with a potential for harm in terms of injury or ill health, damage to property, damage to the workplace, environment or a combination of these.

Hazard Identification: Is the process of recognizing that a hazard exists and defining its characteristics.

Risk: Combination of the likelihood and consequences of a specified hazardous event occurring.

Tolerable risk: a risk that has been reduced to such a level that can be endured by the company having regards to its legal obligations and its own policy

Tasks: Sequential steps taken to complete an activity.

Near Miss: A near miss is an event that could have resulted in human injury or damage to property, or the environment.

6.1.2 Hazard Identification Plan

Hazards and risk assessment are established for all activities in order to determine and control those that can have a significant impact on the health and safety of all workers. The hazards list is also updated from time to time. This is done proactively or in case of any of the following scenarios:

- Legal Requirements
- Near Miss Reported
- First Aid Cases
- Interested Party Complaints.

6.1.3 Risk Assessment of the Activity specific to the tasks:

This involves analyzing the basic job sequence, identifying the potential hazard and reviewing the existing controls. Based on these factors the risk rating is done. The potential hazards involved in the task are classified as under:

SB	Struck by: person struck by an object
SA	Struck against: person strikes against object
CW	Contact with energy source like electrical, hydraulic, thermal, pneumatic
CB	Caught between pinched, crushed between objects
CO	Caught on person or his clothing gets caught on an object
JDp	Awkward Posture, exertion due to stressful / awkward posture.
CI	Caught in: person caught in an opening
FS	Fall to same level by slipping or tripping
FB	Fall to below level
EX	Exposure to gases, dusts, mists, UV, IR, Noise etc.
JDFo	Excessive force, exposure to stressors from excessive force
JDFr	Excessive repetitions, exposure to stressors by excessive frequency

The criteria for the risk assessment rating are as follows

SEVERITY [S]		
0	Negligible	No injury, illness, lost work
1	Marginal	Minor injury, illness, minor property damage
2	Critical	Severe injury or illness, minor property damage
3	Catastrophic	Permanent disability, loss of life, major equipment damage
EXPOSURE [E]		
0	Few workers, few times a day	
1	Few workers, frequently	
2	Many workers, frequently	
PROBABILITY [P]		
0	Low probability of loss of occurrence	
1	Moderate probability of loss of occurrence	
2	High probability of loss of occurrence	

Total Risk Rating [TR] = S + E + P

Nature and History of the Activity:

The risks associated with an activity are also analyzed based on the history and nature of the job. Specific parameters are identified having different weightages, which contribute to the risk rating of the job. The maximum potential hazard for any job can reach a score of 200.

The parameters and their respective weightages are discussed below:

Parameter		Weightage
1	First Aid Cases	40
2	Near miss cases	20
3	LTA / RWC	60
4	Toxic / Energy release potential	40
5	Non routine activity	10
6	Ergonomic stressors	10
7	Hazardous job based on judgment	20
Max Potential Risk Rating		200

6.1.4 Equipment Safety Analysis in the SOP's (ESA)

The ESA is done as a part of the SOP's for identifying the hazards associated with the equipment used while performing a specific task as well as the inherent hazards posed by the equipment. This involves analyzing the equipment, identifying the potential hazards and reviewing the existing controls. The methodology for identifying the total risk rating associated with the equipment is the same as the one for risks associated with an activity while performing a task.

6.1.5 Job Hazard Analysis (JHA)

JHA is a basic procedure for establishing the safe approach to performing a task. It consists of a written procedure designed to review job methods, identify hazards, and recommend safe procedures.

The Ergonomics leaders who are trained in the technique of JHA perform the JHAs'. The JHA's are aimed at identifying the Ergonomic stressors involved in various operations areas.

6.1.6 Procedure for Identification of Occupational Health and Safety Hazards

1. Identifies the activities related to his working area. While identifying the activities, the following shall be taken into account:
 - The amount of risk involved while performing the activity / by the equipment
 - Past incidents or history
 - Normal & emergency situations
2. Breaking down the task in to a sequence of steps
3. Identifying the potential hazards and assessing the resulting risks
4. Reducing/eliminating the risks at source, where possible
5. Fill details (Activity/Unit/Equipment, Condition and Remarks) on the format with Severity, Exposure & Probability.
6. Recommending safe procedures to combat the residual risks

6.1.7 Criteria for Intolerable Risk

Intolerable risks are classified on the following criteria:

- Total Risk Rating [TR] > 4 for ESA
- Severity = 3
- Overall Job Ranking based on job history > 120
- Ergonomic stressors in red zone i.e. >3
- Non – compliance with legal requirements

6.1.8 Examples of Typical Hazards in the Site

6.1.8.1 Above Ground Potential Hazards

- Overhead power lines, list KV rating
- Bridges, by-passes
- Micro wave / communication towers
- Facilities close by
- Trees, poles
- Fuel/chemical/pressure vessels and systems

6.1.8.2 Ground Level Potential Hazards

- Electrical wires
- Roadways
- Ditches
- Obstruction
- Unstable soil
- Fences/walls
- Traffic flow
- Guide wires
- Nearby buildings, schools, houses
- Adverse weather conditions
- Hazards by nearby plants or operations etc.

6.1.8.3 Underground potential Hazards

- Buried utilities
- Building foundations
- High water table
- Underground water waste
- Unstable soil
- Chemical/trash dump area
- Voids in earth
- Underground fuel/chemical/pressure system and vessels

6.1.8.4 Interface Potential Hazards

- Existing emergency evacuation plans
- Emergency communication system

- Traffic flow
- Protective equipment requirement
- Hazardous waste disposal
- Hazards from other outside operation
- Escape routes
- Evacuation Alarms
- Access control
- Flammable liquid/chemical/pressure vessel storage
- Gas release in to proposed area.

6.1.8.5 Risk Control

Once the hazards are identified, control the risks involved in the various activities in the following order of priority:

- Elimination of the Hazard at root source.
- Putting in operational controls to minimize the risk rating. The controls could be in the form of hardware, interlocks, guards, etc.
- Implementing secondary controls such as PPE's, permits, manuals etc

6.2 Occupational and other Work-related Diseases

6.2.1 Objectives

- Understand the relationship between work and health
- Understand the interaction of man, environment and work
- Know the various types of stresses or hazards that may be present in different types of occupations including industry, agriculture etc.
- Know the concept of occupational and work-related diseases and the concept of aggravation
- Recognize general health problems of workers and whether or not they are work-related
- Survey the workplace, recognize signs and symptoms of early impairment of health and carry out simple tests to support the diagnosis of an occupational and/or work-related disease
- Give advice to management regarding the control and prevention of the identified hazards
- Give advice to workers and educate them regarding the nature of hazards they are exposed to, control measures, personal hygiene, early symptoms and first aid
- Refer patients and affected workers for further investigation and treatment
- Consult with the related authority on environmental monitoring of the workplace and on implementation and maintenance of control measures (especially engineering)
- Know the laws, rules and regulations governing occupational safety and health including hazard control at the workplace, recommended standards and threshold limit values, pre-placement and periodic medical examinations, schedule of occupational diseases (as applicable), insurance and compensations for occupational disease and accidents
- Keep medical records including personal medical files, records of accidents and occupational diseases, records of pre-placement and periodic examinations

- Keep records of environmental monitoring, safety activities, workplace surveys and report on health and safety trends at the workplace.

6.2.2 Introduction and Basic Concept

Occupational and work-related disease

Occupational diseases ... stand at one end of the spectrum of work-relatedness where the relationship to specific causative factors at work has been fully established and the factors concerned can be identified, measured, and eventually controlled. At the other end [are] diseases [that] may have a weak, inconsistent, unclear relationship to working conditions; **in** the middle of the spectrum there is a possible causal relationship but the strength and magnitude of it may vary.

Degree of work-relatedness

The degree of work-relatedness of a work-connected disease condition varies **in** different situations and determines whether a disease is considered an occupational disease, a work-related disease or aggravation of a concurrent disease, e.g.

- A specific agent like lead or silica, which is present essentially in the workplace, causes a disease condition which cannot occur due to other causes; this is an occupational disease.
- Where infection can occur at the workplace, an occupational disease can also be caused by a specific agent, such as tuberculosis among health care workers in a tuberculosis treatment centre. Of course infection can also occur **in** the general population under non-occupational conditions.
- Work-related diseases occur much more frequently than occupational diseases.
- They are caused by the interaction of several extrinsic risk factors and a number of intrinsic factors each of which may or may not operate in any individual case. Occupational hazards are among the risk factors which can contribute to the occurrence of work-related diseases. Examples are many and include:
 - behavioural responses
 - psychosomatic illness
 - hypertension
 - coronary heart disease
 - chronic non-specific respiratory disease
 - locomotor disorders.
- Work conditions can aggravate pre-existing disease: hepatic dysfunction can be aggravated by exposure to certain chlorinated hydrocarbons; bronchial asthma can be aggravated by dust exposure and renal disease can be aggravated by inorganic mercury, cadmium and certain solvents.
- Exposure to combinations of occupational hazards may result in synergistic effects which are much more pronounced than effects of individual exposures simply added together.
- Individual susceptibility to the effects of some occupational exposures varies. Genetic factors are important determinants of individual susceptibility.

6.3 Occupational Diseases

6.3.1 Definition

Occupational diseases are adverse health conditions in the human being, the occurrence or severity of which is related to exposure to factors on the job or in the work environment. Such factors can be:

- Physical: e.g. heat, noise, radiation
- Chemical: e.g. solvents, pesticides, heavy metals, dust
- Biological: e.g. tuberculosis, hepatitis B virus, HIV
- Ergonomic: e.g. improperly designed tools or work areas, repetitive motions
- Psychosocial stressors: e.g. lack of control over work, inadequate personal support
- Mechanical: these mainly cause work accidents and injuries rather than occupational diseases.

6.3.2 Characteristics of Occupational Diseases

The occupational cause of occupational disease is often overlooked by health care providers. This is due to several special characteristics of occupational disease that may obscure its occupational origin.

The clinical and pathological presentation of most occupational diseases is identical to that of non-occupational diseases; e.g. asthma (excessive airway narrowing in the lungs) due to airborne exposure to toluene diisocyanate is clinically indistinguishable from asthma due to other causes.

Occupational disease may occur after the termination of exposure. An extreme example would be asbestos-related mesothelioma (a cancer affecting the lung and abdomen) which can occur 30 or 40 years after the exposure.

The clinical manifestations of occupational disease are related to the dose and timing of exposure; e.g. at very high airborne concentrations, elemental mercury is acutely toxic to the lungs and can cause pulmonary failure, while at lower levels of exposure, elemental mercury has no pathologic effect on the lungs but can have chronic adverse effects on the central and peripheral nervous systems.

Occupational factors can act in combination with non-occupational factors to produce disease; e.g. exposure to asbestos alone increases the risk of lung cancer five-fold; and the long-term smoking of cigarettes increases the risk of lung cancer between 50 and 70 fold.

6.4 Prevention of Occupational Diseases

Primary Prevention

Primary prevention is accomplished by reducing the risk of disease. In the occupational setting, this is most commonly done by reducing the magnitude of exposure to hazardous substances. As the dose is reduced so is the risk of adverse health consequences. Such reductions are typically managed by industrial hygiene personnel and are best accomplished by changes in production process or associated infrastructure, e.g. the substitution of a hazardous substance with a safer one, or enclosure or special ventilation of equipment or processes that liberate airborne hazards. These are known as engineering controls.

Other methods of exposure reduction include use of personal protective equipment and rotation of workers through areas in which hazards are present to reduce the dose to each worker (NB: this method does, however, increase the number of workers exposed to the hazard).

Secondary Prevention

This is accomplished by identifying health problems before they become clinically apparent (Le. before workers report feeling ill) and intervening to limit the adverse effects of the problem. This is also known as occupational disease surveillance. The underlying assumption is that such early identification will result in a more favourable outcome.

An example of secondary prevention is the measurement of blood lead levels in workers exposed to lead. An elevated blood lead level indicates a failure of primary prevention but can allow for corrective action before clinically apparent lead poisoning occurs. Corrective action would be to improve the primary prevention activities listed above.

Tertiary prevention

This is accomplished by minimizing the adverse clinical effects on health of a disease or exposure. Typically this is thought of as clinical occupational medicine. An example of tertiary prevention is the treatment of lead poisoning (headache, muscle and joint pain, abdominal pain, anaemia, kidney dysfunction) by administration of chelating medication. The goal is to limit symptoms or discomfort, minimize injury to the body and maximize functional capacity.

6.5 Rotating and Moving Equipment

Injury or death can occur from being trapped, entangled or struck by machinery parts due to unexpected starting of equipment or unobvious movement during operations. Recommended protective measure include:

- Designing machines to eliminate trap hazards and ensuring that extremities are kept out of harm's way under normal operating conditions. Examples of proper design considerations include two-hand operated machines to prevent amputations or the availability of emergency stops dedicated to the machine and placed in strategic locations. Where a machine or equipment has an exposed moving part or exposed pinch point that may endanger the safety of any worker, the machine or equipment should be equipped with, and protected by, a guard or other device that prevents access to the moving part or pinch point. Guards should be designed and installed in conformance with appropriate machine safety standards.
- Turning off, disconnecting, isolating and de-energizing (Locked Out and Tagged Out) machinery with exposed or guarded moving parts, or in which energy can be stored (e.g. compressed air, electrical components) during servicing or maintenance.
- Designing and installing equipment, where feasible, to enable routine services, such as lubrication, without removal of the guarding devices or mechanisms.

6.5.1 Mechanical Equipment

The widespread use of mechanical equipment in the project site improves the quality and efficiency of the work but it can lead to situations which are potentially hazardous.

The only safe way of using mechanical equipment is to have properly trained operators, running equipment that is well maintained and carrying out the work for which it was designed.

6.5.2 Operators

Qualifications

Only trained personnel shall operate any mechanical equipment. Operators shall be trained in the procedures and functions relevant to a specific piece of equipment; they must be fully aware of the capabilities and limitations of the machine and have knowledge of the day- to day maintenance that it requires.

It is recommended that contractors train and test all equipment operators and issue them with written authorization specifying the equipment which they are competent to operate.

Licensing Requirements

Operators of mobile heavy equipment must be in possession of a Saudi Arabia Government (SAG) license for that particular class of machinery.

6.5.3 Machinery Guards

All moving parts of the machinery must be shielded by guards. This is particularly true with gears, pulleys, V- belts, and revolving shafts. All of these are present on most of the static equipment used on or around project construction site. Other examples of equipment which must be guarded include cooling fans on compressors and generators, the main drive shafts on pumps and dumpers, and the cable drums on winches and concrete mixers.

Guards must be installed on equipment before it arrives on site and maintained in position at all times while equipment is operating. Guards removed for routine maintenance or for repair must be replaced before the equipment is returned to service.

6.5.4 General Requirements

- Before any mechanical equipment is used, all required work permits must be obtained.
- All machinery should be inspected before being placed in service and at regular intervals thereafter.
- Maintenance schedule should be established for each piece of equipment and strictly followed.
- No repair, adjustments, or replacement of parts on moving machinery is permitted. Before making any repairs, all equipment must be stopped and deactivated so that it cannot be unintentionally started.
- At the start of each shift, the operator must check oil, water, fuel, and hydraulic levels, that all gauges are operating and that the machine is functioning smoothly. Safety equipment (e.g., Guards, limit switches, governors) must be checked daily.
- Equipment traveling or working on the highway must have lights and reflectors. Park equipment clear of the road way. If this is not possible, use flash lights, cones, or other warning devices to alert approaching traffic.
- Unless otherwise instructed, operators must dismount from a machine while maintenance or repair work is being carried out.
- Where an operator of a mobile machine cannot see the area all around his machine, an attendant must be in a position to direct and assist the operator.
- All equipment must be located so that exhaust fumes will not affect workers in the area. Gasoline – driven equipment shall not be used inside a building or other confined space.

6.5.5 Compressors

Compressors are one of the most common pieces of equipment used in construction work. They can be used to supply air for portable power tools or to supply air to sustain men working with breathing apparatus in extremely hazardous atmospheres. There is considerable difference in the quality of the air used for these two functions.

- All workers on the site must know the dangers of compressed air. Never use compressed air to dust off clothing or body part. Horseplay with compressed air must be strictly forbidden. When compressed air is used in special cleaning /purging tasks, goggles and full face shield must be worn.
- Compressor must be properly designed, inspected, tested and maintained.
- Before start up, a daily check should be made of the compressor pressure relief valve, fuel, oil and water levels and the air reservoir should be drained of trapped water.
- When compressors supply air for breathing:
 - The air intake must be located so that it does not draw in exhaust gas.
 - There must be a filter to remove oil mist.
 - They must be equipped with automatic high temperature alarm.
 - The air must be tested periodically to be certain it is safe to breath.

6.5.6 Concrete Mixers and batching Plant

A concrete mixer of some type will be used on almost every construction site. The principles of good maintenance and properly trained operators apply equally whether it is only a small mixer for masonry work or a full batching plant with a large capacity cement silo, sand and aggregate bins, and a power shovel.

6.5.7 Excavators

Excavations are carried out using very specialized equipment which roughly falls into two categories.

- Fixed Position Machines
- Moving machines

The choice of equipment to be used is determined by the size of the project, topography, volume of the earth to be hauled out and many other factors. Fixed position machines include, but are not limited to, face shovels, backhoes, draglines and grabs. Moving machines include, but are not limited to bulldozers, loaders, scrapers, graders, and trenching machines.

6.5.8 Generators

A competent electrician shall be available to ensure that electrical connections are properly made. The operator should be responsible only for the mechanical function of the machine.

- All pulleys, belts, and fans must be totally enclosed or otherwise guarded.
- The machine must be properly grounded before each use.
- The side panels to the engine cover are designed to give access to the machinery for maintenance or repair.

6.5.9 Fire Prevention Guide for Portable Generators

The following are the typical check lists of the major items to look for.

- Repair all fuel leaks
- Check hose and connections for wear and cracks
- Clean up all combustible trash around the generator.
- Exhaust piping system shall be kept away from work areas and combustible materials.
- Generator sets shall be located at least 50 feet from buildings or materials that may catch fire.
- Inspect all wiring for damage or improper splices /repairs.
- Electrically ground all generator sets.
- Fire extinguisher should be readily accessible. One Co2 extinguisher for generator and a dry chemical extinguisher for engine drive are recommended.
- Conduct daily inspections of all generator sets as per all above points.

6.5.10 Graders, Dozers, Scrappers, Loaders and Mini loaders

Heavy earth moving equipment only allows operator a limited view of the immediate area. It is, therefore, essential that a banksman be appointed to warn the operator of hazards that cannot be seen from the operator's position. The equipment shall be equipped with rollover protection.

6.6 Noise

Noise limits for different working environments are provided in the table below:

- No employee should be exposed to a noise level greater than 85dB(A) for a duration of more than 8hrs/day without hearing protection. In addition, no unprotected ear should be exposed to a peak sound pressure level (instantaneous) of more than 140dB(C).
- The use of hearing protection should be enforced actively when the equivalent sound level over 8hrs. reaches 85dB(A), the peak sound level reach 140dB(C), or the average maximum sound level reached 110dB(A). Hearing protective devices provided should be capable of reducing sound levels at the ear at least 85dB(A).
- Although hearing protection is preferred for any period of noise exposure in excess of 85dB(A), an equivalent level of protection can be obtained, but less easily managed, by limiting the duration of noise exposure. For every 3 dB(A) increase in sound levels, the allowed exposure period of duration should be reduced by 50%. (source: the American conference of governmental industrial hygienists – 2006).
- Prior to the issuance of hearing protective devices as the final control mechanism, use of acoustic insulating materials, isolation of the noise source, and other engineering controls should be investigated and implemented, where feasible.
- Periodic medical hearing checks should be performed on workers exposed to high noise levels.

Location/Activity	Equivalent Level LAeq,8h	Maximum LAmax,fast
Heavy industries (no demand for oral communication)	85 dB (A)	110 dB (A)
Light industry (decreasing demand for oral communication)	50 – 65dB (A)	110 dB (A)
Open offices, control rooms, service counters or similar	45 – 50dB (A)	
Individual offices (no disturbing noise)	40 – 45dB (A)	
Classrooms, lecture rooms	35 – 40 dB (A)	
Hospitals	30-35dB (A)	40 dB (A)

Source: IFC-World Bank Group

6.7 Vibration

Exposure to hand-arm vibration from equipment such as hand and power tools, or whole-body vibrations from surfaces on which the workers stand or sit, should be controlled through choice of equipment, installation of vibration dampening pads or devices, and limiting the duration of exposures. Limits of vibration and action values. (i.e the level of exposure at which remediation should be initiated). Exposure levels should be checked on the basis of daily exposure time and data provided by equipment manufacturers.

6.8 Electrical

Exposed or faulty electrical devices, such as circuit breakers, panels, cables, cords and hand tools, can pose a serious risk to workers. Overhead wires can be struck by metal devices, such as poles or ladders, and by vehicles with metal booms. Vehicles or grounded metal objects brought into close proximity with overhead wires can result in arcing between the wires and the object, without actual contact. Recommended actions:

- Marking all energized electrical devices and lines with warning signs.
- Locking out (de-charging and leaving open with controlled locking device) and tagging-out (warning sign placed on the lock) devices during service or maintenance
- Checking all electrical cords, cables, and hand power tools for frayed or exposed cords and following manufacturer recommendations for maximum permitted operating voltage of the portable hand tools.
- Double insulating/grounding all electrical equipment used in environments that are, or may become, wet; using equipment with ground fault interrupter (GFI) protected circuits.
- Protecting power cords and extension cords against damage from traffic by shielding or suspending above traffic areas.
- Appropriate labelling of service rooms housing high voltage equipment (electrical hazard) and where entry is controlled or prohibited.

- Rubber tired construction or other vehicles that come into direct contact with, or arcing between, high voltage wires may need to be taken out of service for periods of 48hours and have the tires replaced to prevent catastrophic tire and wheel assembly failure, potentially causing serious injury or death;
- conducting detailed identification and marking of all buried electrical wiring prior to any excavation
- Establishing “No Approach” zone around or under high voltage power lines in conformance with **Table 5-9A** below.

Table 5-9A: “No Approach” Zones for High Voltage Power Lines	
Nominal phase-to-phase voltage rating	Maximum Distance
750 or more volts, but no more than 150,000 volts	3 meters
More than 150,000 volts, but no more than 250,000 volts	4.5 meters
More than 250,000 volts	6 meters

Source: IFC-World Bank Group

6.9 Eye Hazards

Solid particles from a wide variety of industrial operations, construction activities and/or a liquid chemical spray may strike a worker in the eye causing an eye injury or permanent blindness. Recommended measures included:

- Use of machine guards or splash shields and/or face and eye protection devices, such as safety glasses with side shields, goggles (*refer to – PPE*), and/or a full face shield. Specific Safe Operating Procedure (SOP’s) may be required for use of sanding and grinding tools and/or when working around liquid chemicals. Frequent checks of this types of equipment prior to use to ensure mechanical integrity is also good practice. Machine and equipment guarding should conform to standards published by organizations such as CSA, ANSI and ISO.
- Moving areas where the discharge of solid fragment, liquid or gaseous emissions can reasonably be predicted (e.g. discharge of sparks from metal cutting station, pressure relief valve discharge) away from the places expected to be occupied or transited by workers or visitors. Where work fragments could present a hazard to transient workers or passers-by, extra area guarding or proximity restricting systems should be implemented, or PPE required for transient and visitors.
- Provision should be made for persons who have to wear prescription glasses either through the use of overglasses or prescription hardened glasses.

6.10 Welding/Hotwork

Welding creates an extremely bright and intense light that may seriously injure a workers eyesight. In extreme cases, blindness may result. Additionally, welding may produce noxious fumes to which prolonged exposure can cause serious chronic diseases.

This section outlines the principles involved and the precautions to be taken in gas welding, cutting and brazing and electric arc welding operations.

Welding/cutting are safe operations if carried out in the correct manner. Where equipment is defective or there is no well arranged, well lit, or properly ventilated working place, hazards can arise.

For issuance of permit prior to execution of hotworks, please refer to annex 2 Hotwork Permit

6.10.1 Gas Welding: Oxy Acetylene Equipment and Use

The personnel working with welding equipment shall be trained, competent and provided with personal protective equipment. Welding goggles, helmets, screens, forced ventilation and similar equipment shall be provided to all workers and to trainees in the immediate area.

6.10.2 Gases

Oxygen (O₂)

Oxygen is odorless. It can promote rapid combustion; therefore, grease and oil must never be used near oxygen as this could cause fire. Oxygen cylinders or apparatus shall not be handled with oily hands or gloves. A jet of oxygen must never be permitted to strike an oily surface, greasy cloths or enter fuel, oil or other storage tanks.

Acetylene (C₂H₂)

Acetylene has a distinct odor often likened to that of garlic or sour apples. It is combustible when mixed with air over a wide range (2.5%- 81%) Acetylene burned with oxygen can produce a higher flame temperature than any commercial gas.

Acetylene becomes unstable at pressure above 103 kpa (15 psig) which means it may explode. Under no conditions shall acetylene be generated and piped (except in approved cylinder manifolds) or utilized at a pressure in excess of 15psi of gauge pressure. Inside the cylinder acetylene is dissolved in acetone to prevent internal explosion; therefore it is essential that acetylene cylinders be stored, handled and used in the vertical positions to prevent the liquid acetone from escaping and damaging the valves and other equipment.

6.10.3 Storage of Cylinders:

- Cylinders should be stored in a safe dry, well ventilated place prepared and reserved for that purpose. Oxygen cylinders and flammable gas cylinders shall be stored separately at least 6.6 meters apart or separated by a fire proof partition.
- All storage areas shall have Arabic and English "No smoking" signs prominently displayed.
- Cylinders shall not be stored at temperatures exceeding 54°C (130°F) accordingly they should not be stored near sources of heat such as radiators, furnaces, or near highly flammable substances like gasoline.

6.10.4 Handling of Cylinders

Serious accidents may result from the misuse, abuse, or mishandling of cylinders.

- Cylinders should never be handled by their valves since the valves are not designed to take such stress. When not in use, the valve shall be protected with the valve cap.
- All valves must be fully closed before a cylinder is moved unless a trolley or special carrier is used, regulators and hoses should be detached from the cylinders for moving.
- If cylinders are to be lifted by a crane, specially designed bottle holders with lifting eyes should be used.

6.10.5 Equipment Inspection:

All equipment should be examined immediately before use and regularly maintained. All welding operations shall be conducted in well ventilated areas.

- Only soapy water should be used to check for leaks. Presence of a leak is often indicated by a hissing sound or unusual changes in the torch flame.
- Acetylene can form explosive compounds in contact with certain metals or alloys, particularly unalloyed copper or silver. Joint fittings or lines made of copper should not be used and acetylene should not come into contact with copper pipe work or tubing. Only approved materials shall be used for acetylene systems.
- Hoses should be used for one type of gas only and color coded for identification. They should be examined before use for any signs of splitting which might give rise to leakage.
- It is dangerous to let the torch flame come into contact with gas cylinders or for the lighted torch itself to be left unattended. Torches shall never be set down while lit.
- Cylinders in use should be kept upright on a custom built stand fitted with a bracket to accommodate the hoses and equipment or otherwise secured.

6.10.6 Electric Arc Welding

Voltage: The voltage across the welding arc is normally within the range 20-40v. The voltage supplied, however, needs to be somewhat higher so that means of stabilizing and regulating the arc current can be introduced in the circuit. Using a 60-80 V supply will usually suffice.

6.10.7 Auxiliary Power outlets

Most welding machines are furnished with an alternator which produces 3 KVA of 118 and 230 volts. As a safety factor all power hand tools which are not double insulated should be grounded to the welder frame. Ground fault interrupts are required, where power output exceeds 5 KV.

6.10.8 Protective Measures

The need for the operator to take safety precautions and preventive measures during the operations of the welding machines to ensure that no safety related incident occurs cannot be overemphasized. The following is the list of precautions and operating considerations to take into account when operating a 400amp arc welding machine, for example. All users are strongly encouraged to read the equipment operating manual to ensure reliable and safe operations.

- Keep all doors, covers and panels in place when operating the machine.
- Ensure that engine protection push button “pops out” when the engine is switched off.
- Maintain welding and ground cables and connections in good conditions.

- When welding is in progress the full length of cable must be stretched out on the ground.
- Do not adjust the current control while welding is in progress. This can damage the control.
- Sparks and molten or hot metal coming from the work area can easily set fire to combustible materials near or below the working area. Wherever possible, all combustible material should be removed from the work area.
- When welding or cutting material that is supported by a crane, a shield should be provided to protect the suspension ropes or chains. Grounding cables shall only be connected to work, not to the crane or rigging.
- Forced ventilation shall be arranged wherever work is to be carried out in a confined area.
- Dry chemical fire extinguishers should be kept available while work is in progress.
- All completed work should be marked "Hot".

6.11 Industrial Vehicle Driving and Site Traffic

Poorly trained or inexperienced industrial vehicle drivers have increased risk of accident with other vehicles, pedestrians, and equipment. Industrial vehicles and delivery vehicles, as well as private vehicles on-site, also represent potential collision scenarios. Industrial vehicle driving and site traffic safety practices include:

- Training and licensing industrial vehicle operators in the safe operation of specialized vehicles such as forklifts, including safe loading/unloading load limits.
- Ensuring drivers undergo medical surveillance
- Ensuring moving equipment with restricted rear visibility is outfitted with audible back-up alarms
- Establishing rights-of-way, site speed limits, vehicle inspection requirements, operating rules and procedures (e.g. prohibiting operation of forklifts with forks down position) and control of traffic patterns or direction.
- Restricting the circulation of delivery and private vehicles to defined routes and areas, giving preference to 'one-way' circulation where appropriate.

Traffic accidents have become one of the most significant causes of injuries and fatalities among members of the public worldwide. Traffic safety should be promoted by all project personnel during displacement to and from the workplace, and during operation of project equipment on public and private roads. Prevention and control of traffic related injuries and fatalities should include the adoption of safety measures that are protective of project workers and of road users, including those who are most vulnerable to road traffic accidents. Road safety initiatives proportional to the scope and nature of project activities should include:

- A. Adoption of best transport safety practices across all aspects of project operations with the goal of preventing traffic accidents and minimizing injuries suffered by project personnel and the public. Measures include:
 - Emphasizing safety aspects among drivers
 - Improving driving skills and requiring licensing of drivers
 - Adopting limits for trip duration and arranging driver rosters to avoid overtiredness
 - Be sure to avoid dangerous routes and times of day to reduce the risk of accidents.
 - Be sure to use speed control devices (governors) on trucks, and remote monitoring of driver actions.

B. Regular maintenance of vehicles and use of manufacturer approved parts to minimize potentially serious accidents caused by equipment malfunction or premature failure. Where the project may contribute to a significant increase in traffic along existing roads, or where road transport is a significant component, recommended procedures include:

- Ensure minimized pedestrian interaction with construction vehicles.
- Be sure to coordinate with local communities and responsible authorities to improve signages, visibility and overall safety of roads, particularly along streets located near schools or other locations where children may be present.
- Collaborating with local communities on education about traffic and pedestrian safety (e.g. school education campaigns)
- Coordination with emergency responders to ensure that appropriate first aid is provided in the event of accidents.
- Using locally sourced materials, whenever possible, to minimize transport distances.
- Locating associated facilities, such as worker camps, close to project sites and arranging worker bus transport to minimizing external traffic.
- Employing safe traffic control measures, including road signs and flag persons to warn of dangerous conditions.

6.11.1 Roadways

- Roadways for automobiles, tractors, or other vehicles shall be soundly constructed with good wearing surfaces.
- Roadways should be of adequate width, and where used by two-way traffic shall be at least twice the width of the widest vehicle normally used plus 1.25 m (4 ft), sufficient clearance from overhead structures shall be provided.
- Where the installations of grade or level crossing cannot be avoided such crossing shall be protected.
- Adequate railings or walls shall be provided along bridges, slopes and sharp curves.

6.11.2 Parking of Vehicles

Regulations covering the use of driveways for entry and exit, speed limits, space allotments and methods of parking shall be provided and strictly enforced where parking space is provided for automobiles of the employees.

6.11.3 PEDESTRIANS:

- Premises are surrounded by fencing, separate entrance and exit gates shall be provided for pedestrian, vehicular and railroad traffic.
- Pedestrian traffic shall be located at a safe distance from those for vehicular and railroad traffic, shall be of sufficient width to permit the free passage of employees during rush hours, and if possible, shall be so located as not to cross vehicular or railroad traffic.

6.12 Working Environment Temperature

Exposure to hot or cold working conditions in indoor or outdoor environments can result in temperature stress-related injury or death. Use of personal protective equipment (PPE) to protect against occupational hazards can accentuate and aggravate heat-related illnesses. Extreme temperatures in permanent work environments should be avoided through implementation of

engineering controls and ventilation. Where this is not possible, such as during short-term outdoor work, temperature related stress management procedures should be implemented which include:

- Monitoring weather forecast for outdoor work to provide advance warning of extreme weather
- Adjustment of work and rest periods according to temperature stress management procedures.
- Providing temporary shelters to protect against the elements during working activities or for use as rest areas.
- Use of protective clothing
- Providing easy access to adequate hydration such as drinking water or electrolyte drinks

6.13 Ergonomics, Repetitive Motion, Manual Handling

Injuries due to ergonomics factors, such as repetitive motion, over exertion, and manual handling, take prolonged and repeated exposures to develop, and typically require periods of weeks to months for recovery. These problems should be minimized or eliminated to maintain a productive workplace. Controls may include:

- Use of mechanical assist to eliminate or reduce exertions required to lift materials, hold tools that reduce force requirements and holding times, and improve postures
- Providing user adjustable work stations
- Incorporating rest and stretch breaks into work processes and conducting job rotation
- Implementing quality control and maintenance programs that reduce unnecessary forces and exertions
- Taking into consideration additional special conditions such as left handed persons

6.13.1 Occupational Ergonomics

Ergonomics is the study of the complex relationships between people, physical and psychological aspects of the work environment (e.g. facilities, equipment and tools), job demands and work methods. The aim of ergonomics is primarily to optimize, first and foremost, the comfort, as well as the health, safety and efficiency, of the worker. Applying ergonomic principles however, is not only beneficial to workers. The benefits to employers are equally significant and are both visible and measurable in terms of increased efficiency, higher work efficiency, reduction in work time lost due to illness or injury and decreased insurance costs.

A fundamental principle of ergonomics is that all work activities cause the worker to experience some level of physical and mental stress. As long as this stress is kept within reasonable limits, work performance should be satisfactory and the worker's health and well-being should be maintained.

If stress is excessive, however, undesirable outcomes may occur in the form of errors, accidents, injuries or decreases in physical or mental health. Ergonomically-related injuries and illnesses range from eye strain and headaches to musculoskeletal ailments such as chronic back, neck and shoulder pain, cumulative trauma disorders (CTDs), repetitive strain injuries (RSIs) and repetitive motion injuries (RMIs).

The goal of an occupational ergonomics programme is to establish a safe work environment by designing facilities, furniture, machines, tools and job demands to be compatible with workers attributes (such as size, strength, aerobic capacity and information processing capacity) and

expectations. A successful ergonomics programme should simultaneously improve health and enhance productivity.

6.13.1.1 Objectives

- Understand the human, machine and environment relationship.
- Be aware of ergonomics as a tool for healthier and safer working conditions.
- Know how to take into account the workers dimensions and the physical/psychosocial capabilities and limitations in order to avoid harmful working conditions.
- Collect information in the work situation about both the workers and the nature of the work in order to offer correct and prioritized advice.
- Create awareness as to why and how to improve the work situation and to give simple suggestions in order to design ergonomically efficient, new work situations.
- Communicate with management and workers about improvements in the work situation in order to benefit as much as possible.

6.13.2 Ergonomics: A Multidisciplinary Science

Ergonomics is a multidisciplinary science with four major areas:

- Human factors engineering
- Work physiology
- Occupational biomechanics
- Anthropometry

6.13.3 Human Factors Engineering

Human factors engineering, sometimes called engineering psychology, is concerned with the information processing aspects of work. Broadly, the objectives are to design procedures, equipment and the work environment to minimize the likelihood of an accident caused by human error.

6.13.4 Work Physiology

Work physiology is the sub-discipline of ergonomics concerned with stress that occurs during the metabolic conversion of biochemical energy sources, such as glucose, to mechanical work. If this stress is excessive, the worker will experience fatigue. Fatigue may be localized to a relatively small number of muscles or may affect the entire body.

High levels of local muscle fatigue can be caused by:

- Sustained awkward posture, e.g. a mechanic who must continuously twist his body to perform repairs to an automobile engine
- High strength demands associated with a specific task, e.g. using a wrench to undo a badly rusted wheel-nut when loosen or tightening.

Dynamic, whole-body work occurs when multiple groups of large skeletal muscles repeatedly contract and relax in conjunction with the performance of a task, e.g. walking on a level surface, pedaling a bicycle, climbing stairs and moving a load (by carrying, pushing, pulling, or shoveling) from one location to another. Common symptoms of whole-body fatigue include shortness of breath, weakness in working muscles and a general feeling of tiredness. The prevention of whole-body fatigue is best accomplished through good job design.

6.13.5 Occupational Biomechanics

Biomechanics is the sub-discipline of ergonomics concerned with the mechanical properties of human tissue, particularly the resistance of tissue to mechanical stress. A major focus of occupational biomechanics is the prevention of the lower back and upper extremities. Mechanical stress is most effectively controlled through ergonomics, i.e. designing job demands so that resulting mechanical stress can be tolerated without injury.

6.13.6 Biomechanics of Lifting, Pushing and Pulling

(a) Principles of lifting

- Test your personal strength limits and make- sure the load to be lifted is below 50% of that limit.
- Avoid lifting loads that exceed the general strength limits calculated for various types of lifting
- Minimize twisting with a load, and, when it is necessary to twist, rotate the pelvis.
- Keep the load close to the body when lifting it.
- Exercise caution when working in slippery or cluttered areas.

(b) Principles of pushing and pulling

- Make certain that the area ahead of the load is level and clear of obstacles; if it is not level, some system of braking should be available.
- Push the load rather than pull it; this will reduce spinal stress, and in most cases will improve the visibility ahead.
- Wear shoes that provide good foot traction; the coefficient of friction between the floor and the sole of the shoes should be at least 0.8 wherever heavy loads are moved.
- When starting to push a load, brace one foot and use the back, rather than the hands and arms, to apply force; if the load does not start to move when a reasonable amount of force is applied, get help from a co-worker or use a powered vehicle.
- Pushing or pulling is easier when the handles of the loaded cart are at about hip height (91.114 cm for men) than they are at shoulder height or above. Handles lower than the hips are awkward and unsafe to use.

6.13.7 Use of Anthropometric Data

One of the primary reasons for physical stress on the job is the mismatch in size between the worker and the workplace, equipment or machinery. This mismatch may result in having to work bent over, having to work with one or both arms and shoulders held high for long periods or having to sit on a stool or bench that is too low or too high.

Anthropometry is concerned with fitting tools and workspaces to the dimensions of the human body. Since humans come in a tremendous range of shapes and sizes, this is often a difficult task. Knowing the distribution of shapes and sizes is the first step in anthropometric design. There are thousands of different measurements on the human body that are relevant to the design of tools, workplaces and even clothing.

6.14 Working at Heights

Fall prevention and protection measures should be implemented whenever a worker is exposed to the hazard of falling more than two meters; into operating machinery; into water or other liquid;

into hazardous substances; or through an opening in a work surface. Fall prevention/protection measures may also be warranted on a case-specific basis when there are risks of falling from lesser heights. Fall prevention may include:

- Installation of guardrails with mid-rails and toe boards at the edge of any fall hazard area.
- Proper use of ladders and scaffolds by trained employees
- Use of fall prevention devices, including safety belt and lanyard travel limiting devices to prevent access to fall hazard area, or fall protection devices such as full body harnesses used in conjunction with shock absorbing lanyards or retracting inertial fall arrest devices attached to fixed anchor points of horizontal life-lines.
- Appropriate training in use, serviceability, and integrity of the necessary PPE
- Inclusion of rescue and/or recovery plans, and equipment to respond to workers after an arrested fall.

6.14.1 Working Places, Ladders, and Scaffolding

Employer has a legal and contractual responsibility to ensure that each place at which his employees work is safe and that it remains safe as long as men work there. Similarly, each supervisor is responsible for ensuring that every man working under his direction or control has a safe working place and a safe means of getting to and from every working place.

When work cannot safely be done on the ground or from part of the building or permanent structure, scaffolds, ladders, or other means of support shall be provided and properly maintained.

6.14.2 Working Places - General

- **Access and Egress:** A safe means of getting to and from a working place shall be provided and used.
- **Lighting:** Every working place and every means of getting to and from a working place shall be provided with adequate lighting which shall be properly maintained.
- **Prevention of fall:** Permanent decking, parts of structure, walkways, foot bridges, etc which men use in the course of their work or for a permanent or temporary access, shall be provided with a guard rail system and toe boards at all edges from which men, tools, or materials could fall 1.6 meters or more. Holes and gaps shall be guarded or securely covered. Stairs shall have all treads properly secured and shall be fitted with handrails through out their length.
- **Ramps:** Where the slope of a ramp exceeds 1 vertical to 4 horizontal, the ramp shall be fitted with stepping cleats at 0.3 meter (1 foot) intervals. When a ramp is to be used by the general public, its slope shall not exceed 1 vertical to 4 horizontal. Handrails shall be provided.
- **Falling Materials:** Where there is danger of men being struck by falling material, protective covering shall be erected..
- **Hot Surfaces:** Suitable precaution shall be taken to prevent men coming into contact with any hot surface.
- **Slipping and Tripping:** Contractors are responsible for maintaining good housekeeping to prevent slipping, tripping and falling. Oil spills, mud, scrap, other debris must be cleared up immediately. Men shall not be permitted to walk or work on steel work or other surfaces on which paint or cement wash is still wet.

- **Roof work:** When works is done on or from the roof of a building or structure, or where men have to cross, work on, or work from fragile roofs or surfaces, adequate protection in the form of crawling boards, roof ladders, or other suitable covering must be provided to prevent men and materials falling from or through the roof. Temporary guardrails shall be placed to prevent workers from falling. During storms or high winds, workers shall not be working on a roof or scaffold that is exposed to weather.
- **Insecure Structure:** Unstable or weak structures shall be supported by stays, supports, or other fixings where necessary. If work being done is likely to reduce the stability of an existing structure or building, bracing or other means of support shall be used. Unstable structures shall not be left unsupported over night.

6.14.3 Ladders

The safety of the ladders depends on four important factors: selection, condition, position and use.

6.14.3.1 Selection

- A ladder must be of proper length for the job to be done.
- Metal ladders, ladders with metal reinforced side rails, and ladders which are wet shall not be used near electrical equipment with exposed live conductors.
- Aluminium ladders shall not be used where a likelihood of contact with materials harmful to aluminium such as caustic liquids, damp line, wet cement etc.

6.14.3.2 Condition

- Each ladder shall be examined before use.
- All damaged ladders shall be removed from service.

6.14.3.3 Position

- The side rails of ladders shall be equally supported on a firm level surface.
- The area at the base of a ladder must be kept clear.
- Ladders shall not be supported on their rungs or cleats. Rungs or cleats shall not be support planks.
- Whenever possible ladders shall be set at an angle of 75° to horizontal ground.
- Both side rails of a ladder shall be evenly supported at the upper resting place. Side rails must be securely tied off to prevent movement.
- Where there is a possibility of a ladder being struck by moving vehicles or equipment, a man should be placed on guard or a space at the base should be securely fenced off.

6.14.3.4 Use

- Before mounting a ladder, personnel shall check their shoes for freedom from grease, oil or mud.
- Single rung and single cleat ladder should be used by only one man at a time. When ascending or descending, personnel shall face the ladder and keep both hands on the ladder.
- Men ascending or descending ladders shall not carry tools and materials in their hands. Tools may be carried in pockets or on special belts provided there is no risk of injury and movement is not impaired.

- A man working on or from a ladder must always have a secured handhold and both feet on the same rung or cleat. If the work to be done requires the use of both hands, a safety belt is required, securely fixed to a dropline (Life line).

6.14.3.5 Scaffolding

Scaffolds shall be designed, erected, moved, disassembled, altered and inspected by a competent person. To avoid the use of make-shift platforms, each application will be carefully planned to ensure that scaffolding is used where required and that such scaffolding conforms to the applicable scaffolding erection requirements.

6.14.3.6 Requirements Common to all Scaffolding

- Scaffolds shall not be used for storage of materials except materials currently being used. Materials will be placed only on cross members. Scaffolds shall be kept clean of trash, oil and other debris.
- A scaffold shall be adequately designed to carry, without failure, four times the maximum intended loads. At no time shall a scaffold be overloaded.
- The footing of scaffolding must be sound and rigid, capable of supporting the weight. Unstable objects such as bricks or blocks shall not be used in the support.
- All scaffolds shall be maintained in safe condition. A scaffold damaged or weakened from any cause, shall be immediately tagged and taken out of service until repaired.
- All planking or platforms shall be fully checked. Ends shall be overlapped a minimum of 12 inches and secured from movement.
- Protection shall be provided when there is exposure to over head hazards.
- Wire rope or wire and synthetic or fiber rope used for scaffold suspensions shall be capable of supporting six times of the intended load.
- Each scaffold shall be erected under the supervision of a competent person.
- Safe access (ladders) to upper levels of the scaffold will be installed as part of the assembly process. Stair towers shall be used, when physically possible, on stationary scaffolds 18 feet or higher. If not, rope grabs and lifelines shall be installed along side the scaffold ladder.

6.14.3.7 Scaffolding Terminology

- Base Plate: A metal plate with a spigot or screw jack for distributing the load from a post or other load bearing tube.
- Bearer (Transom): A horizontal tube across runners to form the support for a platform or to connect the outer post to the inner post.
- Brace: A tube placed diagonally with respect to the vertical and the horizontal members of a scaffold and fixed to them to give stability.
- Coupler: A device for locking together component part of tube and coupler scaffold.
- Design Load: The maximum intended load; that is the total of all loads including the workers, materials and equipments placed on the unit.
- Dropline: A vertical line from a fixed anchorage, which is independent of the work platform and its rigging, and to which the lanyard is affixed.
- Fabricated tubular Frame Scaffold: A system of tubular frames (Panels) field erected with bracing members.
- Load Ratings; Maximum loading for the following categories.
 - Heavy Duty – 75 lb./ft²
 - Medium Duty – 50 lb./ft²

- Light Duty - 25 lb/ft²
- Special Duty – For specific type of jobs.
- Mobile Scaffold: A scaffold assembly supported by casters and moved along manually.
- Plank: A wood board or fabricated component that is a flooring member.
- Post: (standard) Vertical scaffold tube that bears the weight of the structure.
- Rated Load: The manufacturers recommended maximum load
- Scaffold: A temporary elevated or suspended work unit and its supporting structure used for supporting workers or materials or both.
- Tie: A device used between scaffold components and the building or structure to enhance lateral stability.
- Toeboard: A barrier secured along the sides and the ends of a platform unit to guard against the falling of material, tools and other loose objects.
- Tube and coupler scaffold: A scaffold system consists of tubing that serves as posts, bearers, braces, ties and runners, a base supporting the post; and special couplers that serves to connect the uprights and join the various members.

6.15 Illumination

Work area light intensity should be adequate for the general purpose of the location and type of activity, and should be supplemented with dedicated work station illumination, as needed. For the minimum limits for illumination intensity for a range of locations/activities. Please refer to Table 6-12A below

Table 6-12A: Minimum Limits For Workplace Illumination Intensity	
Location/Activity	Light Intensity
Emergency light	10 lux
Outdoor non working areas	20 lux
Simple Orientation and temporary visits (machine storage, garage, warehouse)	50 lux
Workspace with occasional visual tasks only (corridors, stairways, lobby, elevator, auditorium, etc.)	100 lux
Medium precision work (simple assembly, rough machine works, welding, packing, etc.)	200 lux
Precision work (reading, moderately difficult assembly, sorting, checking, medium bench and machine works, etc.),office	500 lux
High Precision work (difficult assembly, sewing, color inspection, fine sorting, etc.)	1,000 – 3,000 lux

Source: IFC-World Bank Group

*lux-SI unit for illumination-lumen per square meter

Controls include:

- Use of energy efficient light sources with minimum heat emission
- Undertaking measures to eliminate glare/reflections and flickering of lights
- Taking precautions to minimize and control optical radiation including direct sunlight. Exposure to high intensity UV and IR radiation and high intensity visible light should also be controlled.
- Controlling laser hazards in accordance with the equipment specifications, certifications and recognized safety standards. The lowest feasible class Laser should be applied to minimized risks.

7.0 Chemical Hazards

Chemical hazards represent potential for illness or injury due to single acute exposure or chronic repetitive exposure to toxic, corrosive, sensitizing or oxidative substances. They also represent a risk of uncontrolled reaction, including the risk of fire and explosion, if incompatible chemicals are inadvertently mixed. Chemical hazards can most effectively be prevented through a hierarchical approach that includes:

- Replacement of the hazardous substance with a less hazardous substitute
- Implementation of engineering and administrative control measures to avoid or minimize the release of hazardous substances into the work environment keeping the level of exposures below internationally established or recognized limits
- Keeping the number of employees exposed, or likely to become exposed to a minimum
- Communicating chemical hazards to workers through labelling and marking according to national and international recognized requirements and standards including Material Safety Data Sheets (see annex 3 MSDS) or equivalent. Any means of written communication should be easily understood language and be readily available to exposed workers and first-aid attendant
- Training workers in the use of the available information (such as MSDS), safe work practices, and appropriate use of PPE

When dealing with unfamiliar chemicals, it is always wise to assume that it is hazardous. The exposure to hazards associated with a material depends largely on its proper identification, handling, usage, transport, storage and disposal. In addition, materials which may be completely harmless in one application may be deadly in another. The proper identification and labeling of chemicals is a very important safety precaution.

When dealing with a potentially harmful chemical, precaution should be taken to ensure that workers do not swallow it, inhale it, or allow it to contact their skin. The chemical must not be allowed to accidentally mix with other substances in transportation, storage, or use. It must not be subjected to undue shock, pressure, or heat. When the chemical is no longer needed, it must be safely disposed of or recycled.

7.1 Health Hazards

Hazards to health arise from inhaling, swallowing, or skin contact. The severity of the hazard ranges from nuisance chemicals that produce no injury, to chemicals that on short exposure can cause severe injury or death. For industrial workers, the most prominent means of entry of a hazardous chemical in to the human body is through the respiratory tract by inhalation. The next most important means of entry is through skin absorption. The least hazardous pathway is through swallowing the chemical, as this seldom occurs in industry.

7.1.1 Inhalation Pathway Hazard

- Chemicals may be in the form of gases, vapors, dusts, or a mixture of these. The senses of sight or smell cannot be depended upon to warn of chemical hazards. Some gases are harmful in concentrations which cannot be detected by their odor. Furthermore, some gases paralyze the sense of smell. Hydrogen sulfide at low concentrations can very quickly paralyze the olfactory nerves so that harmful concentrations cannot be detected through smells.

- When handling a volatile liquid, the maximum allowable concentration of the vapor should be known and not exceeded. Where exhaust ventilation is not available, good mechanical ventilation must be provided or the work must be done out doors.
- Dust is a common hazard. Whenever dusty material is handled, respiratory hazard may exist. Exhaust ventilation, fans, blowers, and proper handling procedures must be used to keep the dust from entering the workers breathing zone. If these methods fail, dust masks must be provided and their use enforced.

7.1.2 Skin Hazards

Skin contact/exposure hazard may not be as dangerous to life as respiratory hazards, but they are far more common. Dermatitis resulting from contact with harmful chemicals is a common work injury. Proper handling methods are the first step in protection. The second step, in the case of materials which act rapidly on the human body, such as corrosive chemicals (i.e. acids and caustics) is to provide a physical barrier in the form of goggles, hoods, gloves, aprons, suits, etc. The third step is to provide eyewash fountains and safety showers which flush the materials from the eyes or skin.

The type of personal protective equipment required depends on the hazardous characteristics of the chemical and the way it is used. Personal cleanliness is important. Thorough washing of the hands and face before meals, daily bathing, and regular change of clothing will reduce harmful contact with chemicals.

7.1.3 Hazards of Swallowing Chemicals

In industry, swallowing chemicals does not occur frequently. The main precaution is to ensure that workers know that material is hazardous if swallowed, and that they must wash their hands free of harmful chemicals before smoking, drinking or eating. Never store harmful chemicals in food containers or handle chemicals near foods.

7.2 Emergency Treatment

7.2.1 Artificial Respiration

Persons overcome by harmful gases and vapors must be taken out in to the fresh air and, if they have stopped breathing, given artificial respiration; if there is no heart beat, commence cardiopulmonary resuscitation (CPR).

7.2.2 First Aid

In case of accidental swallowing of chemicals, it is not wise to induce the patient to vomit. The hospital must be informed of the chemical injury or chemical swallowed and the person should be moved to the hospital immediately for medical treatment. In case of caustic or corrosives, drinking large amounts of water, followed by medical treatment, is recommended.

7.2.3 Showers and Eyewash

For skin hazards, the best treatment is thorough water washing under the emergency shower or eyewash fountain. Field treatment should only consist of flushing away the chemicals. The patient should be taken to the hospital for treatment.

If the water piping to the shower or fountain is exposed to the sun, the water will become so hot during summer that it could scald the user. The piping must be buried, insulated, or shaded from the

sun or the line must be a only a short branch for the main water line that is used frequently enough to keep the water from overheating in the sun.

Caution:

- Before removing goggles, face shields, or other personal protective equipment, the user must get under the shower or use the eye wash fountain to wash off as much of the chemical as possible.
- It is a mistake to start for the hospital without first doing everything possible to flush out the harmful chemical. The eyes or skin must be washed for quite a long time to remove the chemical. It is necessary to wash the eye holding the eyelids open with the fingers for at least fifteen minutes to free the eyes of bases and caustics. This will be painful, but it is absolutely necessary. In the case of acids, water will remove acid quickly, but it is necessary to hold eyelids open with the fingers, painful as this may be, and roll the eyes around under the shower or in the eye fountain to make sure that all acid is removed. At least fifteen minutes of thorough washing are required in the case of acid contact to skin or eyes.
- Caustic alkalis such as sodium hydroxide and potassium hydroxide are much more difficult to wash from skin or eyes. Strong alkalis of this type mixed with water feel slippery to the touch. The skin should be washed until the slippery feeling has gone and washing should be continued for at least 15 minutes.

7.3 Fire Hazards

- Only the necessary amount of hazardous materials should be brought in to the work place, usually not more than one day's supply. Hazardous materials must not be allowed to accumulate, and any extra amount should be cleared from the work area. All flammable materials should be stored according to the specifications of their Chemical Hazard Bulletin or Material Safety Data Sheet (MSDS).
- Smoking and the use of sparking devices near flammable liquids or finely divided combustible solids must be prohibited.
- Blocking off air to a burning object is often possible in acid dip tanks or rubbish containers where a cover can be provided and dropped down on the container to smother the flame.
- The use of fire fighting equipment, such as extinguishers or water streams, must be available in case all effective fire prevention measures fail to prevent a fire.

7.4 Reactivity Hazards

As a general precaution, rough handling and shock should be avoided. Chemicals should not be allowed to mix with other chemicals unless it is known that no harmful reaction will occur.

7.5 Transportation, Storage, and Disposal

7.5.1 Transportation

During transportation, hazardous materials must be protected against shock, accidental mixing with other chemicals, damage to the containers, undue heat from sun or other sources, and theft, which could allow hazardous materials to come in contact with people who are unaware of the dangers. A vehicle transporting hazardous chemicals must be suitably labeled.

7.5.2 Storage

Precaution must be taken to avoid shock, undue heat, or unplanned mixing. There are some cases where separate walls or specified distance are required. Specific storage recommendation in the manufacturer – provided Material Safety Data Sheet (MSDS) should be followed.

7.5.3 Disposal

Hazardous/toxic waste liquid, solid and semi-solid material, because of the quantity involved, the concentration, and /or the biological, physical, chemical, or infectious characteristics, pose a hazard to human health and /or the environment if it is improperly managed. The disposal of the hazardous material must be conducted by contractor /user.

7.5.4 Explosive Materials

The use of explosive materials within construction is extensive and whether large or small quantities are handled, the responsibilities falling upon supervisory staff are considerable. Those responsible must consider the acquisition, storage, transporting, handling and use of explosive materials, as well as the emergency procedures to be adopted in the case of misfire, accident, fire etc. The acquisition and use of explosive materials in Saudi Arabia are strictly controlled by the Government, whose requirements must be adhered to at all times. For the use of explosive materials and for blasting operations, the Contractor has to have taken permission from the concerned Government Agency.

7.6 Air Quality:

Poor quality due to the release of contaminants into the workplace can result in possible respiratory irritation, discomfort or illness to workers. Employers should take appropriate measures to maintain air quality in the work area, these includes:

- Maintaining levels of contaminant dust, vapors and gases in the work environment at concentrations below those recommended by the American Conference of Governmental Hygienists (ACGIH) threshold limit value – concentration to which most workers can be exposed repeatedly without sustaining adverse health effect.
- Developing and implementing work practices to minimize release of contaminants into the work environment including:
 - Direct piping of liquid and gaseous materials
 - Minimized handling of dry powdered materials
 - Enclosed operations
 - Local exhaust ventilation at emission/release point
 - Vacuum transfer of dry materials rather than mechanical or pneumatic conveyance
 - Indoor secure storage, and sealed containers rather than loose storage
 - Where work shifts extend beyond eight hours, calculating adjusted workplace exposure criteria recommended by ACGIH-2005

7.7 Fire and Explosions

Fires and explosions resulting from ignition of flammable materials or gases can lead to loss of property as well as possible injury or fatalities to project workers. Prevention and control strategies include:

- Storing flammables away from ignition sources and oxidizing materials. Further, flammables storage area should be:

- Remote from entry and exit points into buildings
- Away from facility ventilation intakes or vents
- Have natural or passive floor and ceiling level ventilation and explosion venting
- Use spark-proof fixtures
- Be equipped with fire extinguishing devices and self-closing doors, and constructed of materials made to withstand flame impingement for a moderate period of time.
- Providing bonding and grounding of and between, containers and additional mechanical floor level ventilation if materials are being, or could be, dispensed in the storage area.
- Where the flammable material is mainly comprised of dust, providing electrical grounding, spark detection, and if needed quenching systems.
- Defining and labeling the fire hazards areas to warn of special rules (e.g. prohibition in use of smoking materials, cellular phones, or other potential spark generating equipment)
- Providing specific worker training in handling of flammable materials, and in fire prevention or suppression.

7.8 Corrosive, Oxidizing, and Reactive Chemicals

Corrosive, oxidizing, and reactive chemicals present similar hazards and require similar control measures as flammable materials. However, the added hazard of these chemicals is that inadvertent mixing or intermixing may cause serious adverse reactions. This can lead to the release of flammable toxic materials and gases, and may lead directly to fires and explosions. These types of substances have the additional hazard of causing significant personal injury upon direct contact, regardless of any intermixing issues. The following controls should be observed in the work environment when handling such chemicals:

- Corrosive, oxidizing and reactive chemicals should be segregated from flammable materials and from other chemicals of incompatible class (acids vs. bases, oxidizers vs. reducers, water sensitive vs. water based etc.) stored in ventilated areas and in containers with appropriate secondary containment to minimize intermixing during spills.
- Workers who are required to handle corrosive, oxidizing or reactive chemicals should be provided with specialized training and provided with, and wear, appropriate PPE (gloves, apron, splash suit, goggles etc.)
- Where corrosive, oxidizing, or reactive chemicals are used, handled, or stored, qualified first-aid should be ensured at all times. Appropriately equipped first-aid stations should be easily accessible throughout the place of work, and eye-wash stations and/or emergency showers should be provided close to all workstations where the recommended first-aid response is immediate flushing with water.

7.9 Asbestos Containing Materials (ACM)

The use of asbestos containing materials (ACM) should be avoided in new buildings or as a new material in remodeling or renovation activities. Existing facilities with ACM should develop an asbestos management plan which clearly identifies the locations where the ACM is present, its condition (e.g. whether it is in friable form with potential to release fibers), procedures for monitoring its condition, procedures to access locations where ACM is present to avoid damage and training of staff who can potentially come into contact with the material to avoid damage and prevent exposure. The plan should be made available to all persons involved in operations and maintenance activities. Repair or removal and disposal of existing ACM in buildings should only be

performed by specially trained personnel following host country requirements, or in their absence, internationally recognized procedures.

8.0 Radiological Hazards

Radiation exposure can lead to potential discomfort, injury or serious illness to workers. Prevention and control strategies include:

- Places of work involving occupational and/or natural exposure to ionizing radiation should be established and operate according to Table 5-F below;
- Exposure to non-ionizing radiation including static magnetic fields; sub-radio frequency magnetic fields; static electric fields; radio frequency and microwave radiation; light and near-infrared radiation; and ultraviolet radiation, should be controlled to internationally recommended limits.

Table 5-F Acceptable Effective Dose Limits for Workplace Radiological Hazards		
Exposure	Workers (min.19 years of age)	Apprentices and students (16-18 years of age)
Five consecutive year average -effective dose	20mSv/year	
Single year exposure -effective dose	50mSv/year	6 mSv/year
Equivalent dose to the lens of the eye	150mSv/year	50mSv/year
Equivalent dose to the extremities (hands, feet) or the skin	500mSv/Year	150 mSv/year

Source: Int'l Basic Safety Standards thru IFC-World Bank Group

8.1 Non-Ionizing Radiation

8.1.1 Ultraviolet Radiation

Exposure occurs in welding, metal cutting and exposure to carbon arc. It causes skin erythema, burns and hyperpigmentation. Exposure of the eyes causes "arc eye" with conjunctivitis and severe pain and may lead to corneal ulceration. Eye protection using special face shields is necessary. Prolonged exposure causes atrophy of the skin and epitheliomas.

8.1.2 Infrared Radiation

Exposure occurs in front of furnaces, in steel mills, in the glass industry, in blacksmith and in chain manufacture. Exposure of the eyes can cause cataracts or corneal affection. Skin burns can also occur. Complete protection of the eyes can be achieved by wearing special goggles.

8.1.3 Ionizing Radiation

Sources of radiation include radioactive isotopes and x-ray machines. Ionizing radiation is used in medicine, industry, agriculture, research and atomic warfare. Radiations are either electromagnetic waves, like x-rays and gamma rays, or minute particles, like alpha, beta and neutrons. Both types cause ionization or excitation of atoms which leads to tissue destruction.

The effect of ionizing irradiation depends on the dose, type of radiation, whether exposure was continuous or interrupted and whether it was total body or localized, as well as the type of irradiated. The power of penetration of different types of radiation varies from very high, such as X-ray and gamma ray radiation, to very low, such as alpha radiation.

Different tissues vary in their sensitivity to radiation, with the tissues of the haemopoietic system and the gastrointestinal mucosa being the most sensitive and those of the bones and muscles being the least sensitive.

Effects may vary:

- Death occurs within 24 hours if the whole body is exposed to high dose.
- Acute radiation syndrome occurs if the dose is less. Signs and symptoms appear within 24-48 hours and are due to affection of the gastrointestinal mucosa causing severe bloody diarrhea and the shock of the haemopoietic system and of the skin. If death occurs it is due to hemorrhage (due to thrombocytopenia) or infection (due to damage of intestinal mucosa and leucopenia)
- Beta-radiation affects the skin only, causing skin burns and alopecia.
- Chronic radiation effects may follow long after an acute exposure or follow repeated exposure to doses not enough to cause acute effects.
- Chronic effects include skin atrophy, loss of finger prints, alopecia, nail changes, telangiectasia, pigmentation, keratosis and epitheliomas. Other effects include sterility, abortion, mutagenic effects and birth defects.

Control of exposure to external irradiation (uptake of radioactive materials) follows more stringent regulations.

Laboratories or establishments in which radioactive materials are handled should be constructed in such a way as to offer maximum containment, enclosure and shielding of radioactive material, and to ensure easy and complete cleaning in case of spills. Handling by remote control is very useful.

Ventilation and waste disposal systems should be separate from those of other areas and radioactive waste should not be disposed of in public waste systems. Radioactive waste should be disposed of in such a way that environmental contamination is not likely.

Environmental monitoring should be practiced and alarm systems should be provided.

Other measures include:

- Pre-placement and periodic medical examinations with special emphasis on eyes, skin and blood
- Personal protective clothing
- Pocket dosimeters
- Personal monitoring badges
- Whole body counters
- Monitoring of radioactivity in biological fluids

9.0 Personal Protective Equipment (PPE)

Personal Protective Equipment (PPE) is identified as equipment designed to be worn or held by workers to protect themselves against work related hazards. It will be appropriate to keep in mind certain ground rules for the use of PPE's. PPE is the last line of defense for employee's protection. This is chosen if all other control measures such as Engineering, Procedural and Administrative Control measures fail. PPE does not and cannot eliminate hazards at work. As a barrier between the worker and the hazard, it can only prevent or reduce exposure to hazards and the consequent injury severity. PPE should be resorted to only if absolute removal of the hazard in the work environment is impossible or impracticable. PPE should conform to Application National Standards or Codes of Practice and Good Engineering Practices/Design.

Summary of Recommended Personal Protective Equipment According to Hazard.		
Objective	Workplace Hazards	Suggested Personal Protective Equipment
Eye & Face Protection	Flying particles, molten metal, liquid chemicals, gases or vapour, light radiation	Safety Glasses with side-shields, protective shields, etc.
Head Protection	Falling objects, inadequate height clearance, and overhead power cords	Plastic helmets with top and side impact protection
Hearing Protection	Noise, Ultra-sound	Hearing protectors (ear plugs or earmuffs)
Foot Protection	Falling or rolling objects, pointed objects, Corrosive or hot liquids	Safety shoes and boots for protection against moving & falling objects, liquids and chemicals
Hand Protection	Hazardous materials, cuts or lacerations, vibrations, extreme temperatures	Gloves made of rubber or synthetic materials (neoprene), leather, steel, insulating materials, etc.
Respiratory Protection	Dust, fogs, fumes, mists, gases, smokes, vapors	Facemasks with appropriate filters for dust removal and air purification (chemicals, mists, vapors, and gases)Single or multi-gas personal monitors, if available
	Oxygen Deficiency	Portable or supplied air (fixed lines).On-site rescue equipment.

Body protection	Extreme temperatures, hazardous materials, biological agents, cuts & lacerations	Insulating clothing, body suits, aprons, leggings etc of appropriate materials.
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Source: IFC-World Bank Group

9.1 Purpose

This procedure emphasizes the use of Personal Protective Equipment (PPE's) specifically in the workplaces to safeguard the workers from an identified hazard to which he is exposed, thereby permitting essential movement of limbs required for efficient job performance.

9.2 Application

This shall apply to all personnel in all workplaces which have been identified as hazardous.

The hazard posed by any particular activity shall be assessed and adequate PPE selected in accordance with the following criteria:

- Gives protection against risks without itself leading to any increased risk.
- Suitable for Personnel including correct fittings.
- Compatible with the work activity.
- Complies with specified standards.

9.3 General Requirement

- All personnel including subcontractors shall be provided with necessary PPE.
- The concerned area supervisor/contractors for the correct usage of PPE shall train all the workers.
- All personnel shall be held responsible for proper care and use of any PPE supplied to them.
- All PPE shall be cleaned and checked properly before its use.
- Personnel shall not be permitted to work if they are not equipped with appropriate PPE.
- Supervisor shall be accountable if workers under him do not wear and use appropriate PPE while working.

9.4 Head Protection

The safety helmet is the basic protective device for the head. The safety helmet saves the head from the impact of falling objects, as well as hitting against hard solid surfaces. A blow to the head is the most common cause of all head injuries in the work place. The hard shell of the safety helmet is designed to protect the head against impact. It deflects objects and distributes the force of impact, diffusing the gravity of the blow.

- Hard hats for the protection of workers from impact penetration from falling and flying objects, blows and from limited electric shock and burns shall be provided where there is reasonable probability of exposure to such hazards.
- All personnel engaged in constructional and operational activities in the camp, yard or workshop shall wear safety helmets.
- All personnel working at height shall wear helmets with chinstrap in position.

- Hard hats shall be made of non-combustible or slow-burning materials and when used in electrical environment shall be a non-conductor of electricity.
- The total weight of complete hard hat should not be more than 0.45 kg.
- Hard hats shall have a brim all around to provide protection for the head, face and back of the neck.
- Hard hats without brims and low crowns may be allowed only in confined spaces.
- The cradle and sweatband of hard hats shall be water-proof-material.
- Proper selection, design, construction, testing and use of head protectors are approved by the American National Standards Safety Requirements for Industrial Head Protection.

9.5 Hair Protection

- All persons with long hair employed around machinery shall completely cover their hair with well fitting caps or other equivalent protection.
- Caps shall not be of materials that are easily flammable and should be sufficiently durable to withstand regular laundering, disinfecting and cleaning.

9.6 Leg Protection

The basic universal form of foot protection is Safety Shoes. Special protective features such as steel toe cap, special chemical/ oil resistant sole, etc... are incorporated into the safety shoes depending on the nature of hazard. Essential requirements are:

- All personnel shall have leg protection such as safety shoe/boot/gumboot, etc. depending upon the nature of hazard.
- All welders should wear leg guards in order to prevent entry of hot chips into the gap between the foot and leg protective appliance.
- Workers shall be provided with approved safety shoes and leg protection whenever necessary as determined by the nature of work.

9.7 Eye and Face Protection

Eyes and face protection equipment shall be required where there is probability of exposure to hazards. In such cases, the contractors shall furnish a type of protective equipment suitable for the work to be performed and the workers shall use such equipment. Eye protection shall be provided where the activities present hazards for flying objects, liquids, injurious radiation, glare or a combination of these hazards.

Eye and face protective equipment shall conform to the following minimum requirements:

- Provide adequate protection against the particular hazard for which they are designed or intended.
- Be reasonably comfortable to use;
- Fit snugly and shall not unduly interfere with the movements of the user;
- Be durable, easily clean and in good condition;
- Be the approved type.

Whenever eye protection is needed, persons whose visions require the use of corrective lenses shall wear goggles or spectacles of the following types;

- spectacles which provide optical correction;

- goggles that can be worn over corrective spectacles without disturbing the adjustment of the spectacles;
- Goggles that incorporate corrective lenses mounted behind the protective lenses.

No	Type of Protection	Purpose
1	Spectacle / Goggles	Protection from dust, smoke, foreign bodies, Flying chips etc.
2	Chemical Goggles	Protection from chemicals and toxic substances
3	Welding shield with Filter lenses	Protection from infrared radiation, glare, sparks etc.
4	Face shield	Protection from chemicals, flying chips etc.

9.7.1 Selecting Eye and Face Protection Based on the Hazard

The following information indicates what is suitable and approved eye protection based on the type of hazard. See Figure 8.7.1 below for illustrations of the various types of eye and face protective equipment. There are six classes of approved eye protection. **When classes 3, 4, 5 & 6 are recommended Class 1 & Class 2 protectors must be used in conjunction with them.**

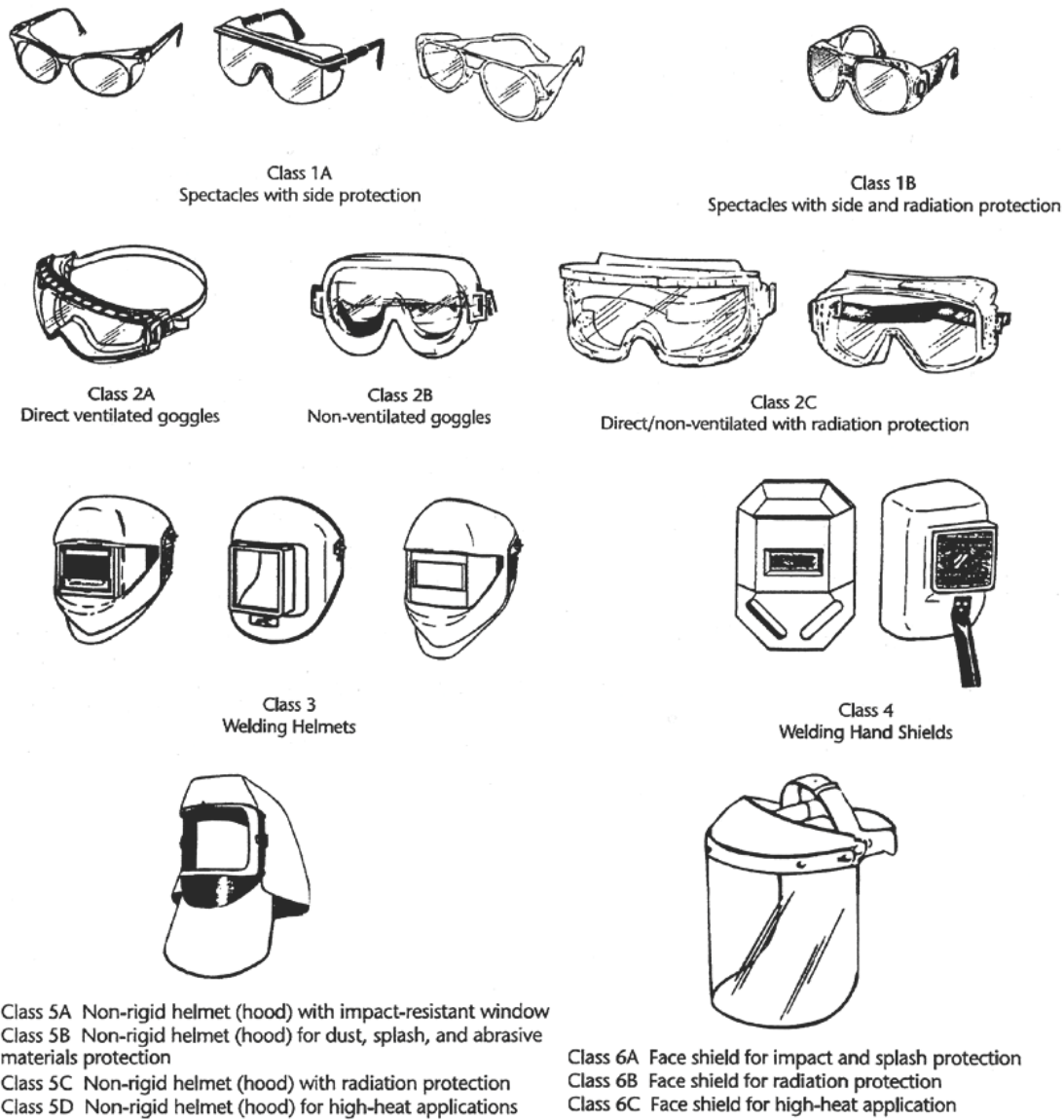
- If the hazard includes one or more of: flying objects, particles, dust or wind (e.g. hammering, sanding, grinding, drilling, nailing, etc.), use: Class 1A spectacles, Class 2A,B goggles, Class 6A face shield or Class 5A, B non-rigid hoods.
- If the hazard includes one or more of the following: heat and splash from molten materials (e.g. casting, soldering, pouring molten metal, etc.), use: Class 1B spectacles, Class 2C goggles, Class 6B, C face shields, or Class 5C,D non-rigid hoods.
- If the hazard includes one or more of the following: chemical burns (e.g. acid and alkali handling, chemical spray, pickling, plating, etc.), use: Class 2B goggles, Class 6A face shields, or Class 5B non-rigid hoods. Class 6 protectors must only be used in conjunction with Class1 or Class 2 protectors.
- If the hazard includes one or more of the following: abrasive-blasting materials (e.g. sandblasting, shot blasting, etc.), use: Class 2B goggles, Class 6A face shields, or Class 5B non-rigid hoods.
- If the hazard includes one or more of the following: stray light, glare, where slight reduction of visible radiation is required (e.g. bright sun, reflected welding flash, photographic

copying), use: Class 1A spectacles, Class 2A,B goggles, Class 6A face shield, or Class 5A,B non-rigid hood.

Under no circumstances are regular eyeglasses to be considered a substitute for approved eye protection. In most cases contact lenses may be used provided that additional, appropriate eye protection is worn.

- If the hazard includes one or more of the following: injurious optical radiation where moderate reduction of optical radiation is required (e.g. torch cutting, metal pouring, spot welding, etc.), use: Class 1B spectacles, Class 2C goggles, Class 6B face shields, or Class 5C non-rigid hoods.
- If the hazard includes one or more of the following: injurious optical radiation where large reduction of optical radiation is required (e.g. arc welding, heavy gas cutting, MIG welding), use: Class 3 welding helmet or Class 4 welding hand shield. Class 3 and 4 must be used only in conjunction with Class 2C protectors. Class 1B is not suitable for this type of hazard.

Figure 8.7.1 – Suitable and Adequate Eye and Face Protection



9.8 Body Protection

The requirements are: -

- All personnel, other than those working in the office, shall wear coveralls.
- Adequate body protection such as special suits, aprons, leggings etc shall be provided depending upon the nature of hazard.
- Disposable suits shall be provided wherever appropriate.
- Drivers shall wear coverall to drive the vehicles.
- All welders should wear leather aprons.

9.9 Hearing Protection

Earplugs and earmuffs are hearing protective devices. Noise is unwanted sound and is measured as an average weighted sound pressure level, expressed in decibels, abbreviated as dB(A). Threshold limit value of noise is 85dB(A). Exposure over 85dB(A) causes adverse effect on hearing. Earplugs are fitted in the outer part of the canal. Reusable ear plugs made of silicone rubber, if fitted properly, can reduce Noise Exposure Level by 5-15dB(A) Earmuffs consist of cushioned plastic cups with the spring-loaded headband. These fit over the whole ear to seal out noise. Earmuffs can reduce sound levels by 15-30dB (A).

9.10 Hand and Arm Protection

The versatility of the use of hands sets humans apart from other living creatures. Among the injuries suffered by hands in the workplace some common ones are lacerations, burns, fractures, dermatitis and punctures. Many kinds of hand gloves are available for hand protection. Select the appropriate type of hand gloves considering hazards involved in the job (see below table)

No	Type of Hand Gloves	Characteristics	Protects against
1	Leather Gloves Plain	Cut resistant leather	Cuts, Bruises, Abrasions, Lacerations during handling of metal sheets, sharp edged objects etc.
2	Acid / Alkali Proof Gloves	Rubber, Neoprene or Vinyl material	Corrosive chemicals and petroleum products
3	Canvas Gloves	Fabric or coated fabric	Grease, dust and dirt
4	Electrical Gloves	Made of insulated rubber having electrical resistance	Low voltage electric shock

9.11 Respiratory Protection

The Requirements are: -

All personnel shall have adequate respiratory protection depending upon the hazard associated with the work environment. (Please refer to Table Respiratory Protective Equipments)

- Self Contained Breathing Apparatus (SCBA), Supplied Air Breathing Apparatus (SABA) and escape/sets shall be checked and ensured safe before taking into use, as failure of respiratory protective appliance may lead to serious injuries including fatalities.

- For those wearing SCBA, a competent person shall be trained on SABA and escape sets for its testing, safe use and control.
- Supervisor should check and ensure safety against:
 - Lack of good facial fit of the mask.
 - Fitting masks to workers with different size of face.
 - Interference with the mask to face seal - Interference with hair.
 - Lack of cleanliness and hygiene.
 - Usage by persons with skin disease.
- The concerned supervisor/engineers shall maintain all records about daily inspection and maintenance of respiratory protective equipment.

Table: Respiratory Protective Equipments

No	Type of Respiratory Protection	Characteristics	Protects Against
1	Dust Filter (Disposable)	Plastic coated paper filter – filtering dust	Protection against nuisance dust below 0.5 microns.
2	Dust Respirator (Dust Filter)	Single or double filters of lint, cotton wool, etc. which can be replaced when plugged with particulate matter. Resin impregnated wool filter for dust of 10 micron or less.	Nuisance dusts and Pneumoconiosis producing dusts, powders, mists having TLV (Threshold Limit Value) not less than 0.1 mg/m ³ of air.
3	Light Chemical Cartridge Respirator	Mouth-cum-nose piece. Activated charcoal used for absorbing gases and fumes.	Light concentration of fumes; say 0.1% by volume of acid and paint spray.
4	Heavy Chemical Cartridge Respirator	Mouth cum nosepiece having usually a mixture of calcium hydroxide with sodium or potassium hydroxide used as reacting agent.	Light concentration of acid fumes and specified gases. Usually for concentration not exceeding 0.1% by volume.
5	Canister Gas Masks	Face piece or mouthpiece connected by a flexible tube to a canister containing neutralizing chemical for specified gases.	Specified fumes, vapors, and gases not exceeding a concentration of 2% by volume for a maximum period specified by

			supplier.
6	Emergency Escape Breathing Apparatus (Escape sets)	Compressed air supply with Full-face mask and low capacity cylinder.	Protection against Toxic Environment of high concentration for small period.
7	Self contained Breathing Apparatus(SCBA)	Compressed air cylinder supplies breathing air full facemask connected to the cylinder	Oxygen deficient environment, and toxic gas environment of high concentration
8	Supplied Air Breathing Apparatus (SABA)	Supplies fresh compressed breathable air from an outside source by air hose.	Oxygen deficient environment and toxic gas environment of high concentration and grit blasting operations

9.12 Radiation Protection

Radiation Protection is essential during Weld logging and Welding inspection. Industrial Radiography leads to emission of hazardous radio-active rays. The requirements are:

- Workers shall be classified as Radiation workers (classified persons) if they are exposed to dose limitations of: - Annual whole body dose – 5 mSv Instantaneous whole body dose – 7 µSv/hour
- All Radiation workers (classified persons) shall be subjected to dosimetry.
- All Radiation workers (classified persons) shall be sent for annual medical examination and medical records maintained.
- All Radiation workers (classified persons) shall wear Cumulative Dosimetry Badge from which the dose received can be measured.
- For any work where the exposure is likely to exceed 75 µSv in one day or work period radiation workers (classified persons) shall carry, in addition to cumulative dosimetry badge, a personal dose metre which should be reset after each work.

9.13 Safety belts, Life lines and Safety nets:

9.13.1 General Requirements:

- Workers in unguarded surface above open pits or tanks, steep slope, moving machinery and similar locations, or working from unguarded surfaces 6 meters or more above ground or water, temporary or permanent floor platform, scaffold construction or where otherwise exposed to possibility of falls hazardous to life or limb, shall be secured by safety belts and life lines. In situations where safety belts and life lines in guarded

platforms and scaffolds or temporary floors are not feasible, safety nets shall be provided and installed.

- Workers entering a sewer, flue, duct or other similar confined places shall be provided and required to wear safety belts with life lines attached and held by another person stationed at the opening ready to respond to agreed signals.
- Workers who are required to climb and work on top of poles six meters or more above shall use safety belts. On top of structures where there is no place to strap a safety belt, a messenger line shall be installed for strapping the safety belt or life line.

9.13.2 Materials Requirements:

- Safety belts shall be made of chromed tanned leather, linen or cotton webbing, or other suitable materials at least 11.5cm wide and 0.65 cm thick of sufficient strength to support the weight of a worker without breaking.
- Hardware used for safety belts should have strength approximately equal to the full strength of the waist band. Buckles shall hold securely without slippage or other failure. The holding power should be achieved by only a single insertion of the strap through the buckle in the normal or usual way.
- Belt anchors shall be made of metal machined from bar stock, forged and heat treated, capable of supporting a pull of 6,000lbs without fracture applied in the direction which the anchor must withstand should a man fall. All anchors and fastening shall be provided with means to prevent turning, backing off or becoming loose. Anchor fittings with single thread section which is merely screwed into reinforcing plates shall not be used, Metals recommended for belt anchors are nickel copper alloy and stainless steel.
- Life line shall be made of good quality rope of at least 1.9 cm diameter or equivalent material such as nylon rope of at least 1.27 cm diameter and shall be of sufficient strength to support a weight without breaking.
- Safety nets shall not be less than 0.94 cm diameter mesh ropes and not less than 1.90 cm diameter border ropes (perimeter) made of nylon rope or equivalent or other materials that can absorb the impact of a falling body equally as nets fabricated from nylon rope of the dimensions specified. The mesh shall be arranged not to exceed 6-inches on canters positively and securely attached to avoid wear at each crossing point and at points of contact with the border.
- Safety nets shall be equipped with adequately padded thimble sockets or equivalent means of attachments. Supports and anchorages shall be of sufficient size and strength to catch any falling worker. The net shall be attached to sufficient supports outside and beyond the area of possible fall and supported at sufficient heights to prevent sagging to any solid object beneath when cushioning the fall of a worker.
- Safety belts, life lines and safety nets shall be inspected before use and at least once a week thereafter. Defective belts, line or nets shall be immediately discarded and replaced or repaired before reuse.

9.13.3 Fall Protection

The requirements are:

- All those working at a height of 2 meters and above shall wear safety harness with lifeline and chin strapped helmets.

- Those who wear it and shall be stored in clean and hygienic atmosphere.
- All safety harness shall be checked by the supervisor before issuing for any damage such as:
 - Wear and tear of life line
 - Anchoring clip and screw
 - Buckles
 - Cleanliness and hygiene
- Safety harness should be tested and certified (and colour coded) by a competent person at least every six months.

9.13.4 BRITISH STANDARDS OF Personal Protective Equipments (PPE)

PPE shall conform to following standards:

- | | |
|---------------------------------|----------|
| • Safety Helmet | BS 5240 |
| • Safety Foot Wear | BS 953 |
| • Personal Eye Protection | BS 2724 |
| • Welding Filters | BS 679 |
| • Industrial Gloves | BS 1651 |
| • Rubber Gloves (Electrical) | BS 697 |
| • Flame Retardant Clothing | BS 1547 |
| • Welding Clothing | BS 2653 |
| • Protective Apron for Wet work | BS 3314 |
| • X-Ray Lead Apron | BS 3783 |
| • Full Body Harness | BSEN 361 |
| • Hearing Protectors | BSEN 352 |

10.0 Special Hazard Environments

Special hazard environments are work situations where all of the previously described hazards may exist under unique especially hazardous circumstances. Accordingly, extra precautions or rigor in application of precautions is required.

10.1 Confined Space

A confined space is defined as a wholly or partially enclosed space not designed or intended for human occupancy and in which a hazardous atmosphere could develop as a result of the contents, location or construction of the confined space or due to work done in or around the confined space. A permit-required confined space is one that also contains physical or atmospheric hazards that could trap or engulf the person.

Confined spaces can occur in enclosed or open structures or locations. Serious injury or fatality can result from inadequate preparation to enter a confined space or attempting a rescue from a confined space. Recommended management approaches include:

- Engineering measures should be implemented to eliminate, to the degree of feasible, the existence and adverse character of confined spaces.
- Permit required confined spaces should be provided with permanent safety measures for venting, monitoring, and rescue operations, to extent possible. The area adjoining an access to a confined space should provide ample room for emergency and rescue operations.
- Access hatches should accommodate 90% of the worker population with adjustments for tools and protective clothing,
- Prior to entry into a permit-required confined space;
 - Process or feed lines into the space should be disconnected or drained, and blanked and locked-out,
 - Mechanical equipment in the space should be disconnected, de-energized, locked-out, and braced, as appropriate.
 - The atmosphere within the confined space should be tested to assure the oxygen content is between 19.5 to 23 %, that the presence of any flammable gas or vapor does not exceed 25% of its respective Lower Explosive Limit (LEL).
 - If the atmospheric conditions are not met, the confined space should be ventilated until the target safe atmosphere is achieved, or entry is only to be undertaken with appropriate and additional PPE.
- Safety precautions should include Self Contained Breathing Apparatus (SCBA), life line, and safety watch workers stationed outside the confined space, with rescue and first aid equipment readily available.
- Before workers are qualified to enter a permit-required confined space, adequate and appropriate training in confined space hazard control, atmospheric testing, use of necessary PPE, as well as the serviceability and integrity of the PPE should be verified. Further, adequate and appropriate rescue and/or recovery plans and equipment should be in place before the worker enters the confined space.

10.2 Lone and Isolated Workers

A lone and isolated worker is a worker out of verbal and line of sight communication with a supervisor, other workers, or other persons capable of providing aid and assistance, for continuous

periods exceeding one hour. The worker is therefore at increased risk should an accident or injury occur.

- Where workers may be required to perform work under lone or isolated circumstances, standard operating procedures should be developed and implemented to ensure all PPE and safety equipment are in place before the worker starts work. Checklist should be established, at a minimum, verbal contact with the workers at least once every hour, and ensure the worker has a capability for summoning emergency aid.
- If the worker is potentially exposed to highly toxic or corrosive chemicals, emergency eye-wash or shower facility should be equipped with audible and visible alarms to summon aid whenever the eye-wash or shower is activated by the worker and without intervention by the worker.

11.0 Work Permit Program

The work permit system incorporates procedures commonly used in industrial facilities and construction site to ensure that necessary communication take place and hazards are controlled. The objective of this system is to protect workers and assets against potential hazards arising out of any abnormal or emergency operations.

11.1 Terms & Definition

Receiver / Concerned Person

The responsible person of contractors/sub contractors in the site.

Authorized Person / Issuer

A company authorized person/supervisor who is certified by the project manager to issue and approve work permits in restricted areas under their supervision. A qualified technical and safety personnel who is knowledgeable in the potential risk or danger within the workplace and activities to be performed.

Kinetic Energy - the force caused by the motion of an object (e.g. spinning flywheel).

11.2 Restricted/Confined Areas

A Confined area is any enclosure that meets any or all of the following conditions.

- A space large enough & so configured that a person can fully enter into the space & perform the assigned work.
- It has limited or restricted means of entry & exit
- It is not designed for continuous occupancy.
- Contains or has potential to contain hazardous atmosphere.
- It has an internal configuration such that an entrant could be trapped inside.
- It contains any other recognized safety hazard.(e.g. Electricity, moving machinery, falling, etc.)

The following are the examples of restricted areas : Petroleum processing plants; pump stations; tank farms; loading piers; hydrocarbon pipe lines; oil wells gas plants; gasoline service station areas where explosives and industrial X- ray or radio active materials are used or stored; work areas under or near power lines; confined space entry and material supply storage areas.

The atmosphere within the confined space should be tested to ensure the oxygen content is between 19.5 to 23% and that the presence of any flammable gas or vapor does not exceed 25% of its respective lower explosive limit (LEL).

11.3 Work Permit

There are three work permits.

- **General Work Permit (see Annex 4 – General Work Permit)**

The general work permit program is applicable in all abnormal or emergency situations which involve any or all of the following activities such as:

- Construction and all civil work
- Plumbing
- Wiring and electrification
- Installation
- Commissioning
- Modifications

- **Hot Work Permit (see Annex 2 – Hot Work & Confined Space Entry Permit)**

Any work that includes portable gas or electric welding, cutting, brazing, burning, abrasive grinding, torch soldering and other processes capable of generating heat, sparks, or flames which are potential ignition sources.

- **Confined Space Entry (see Annex 2 – Hot Work & Confined Space Entry Permit)**

This is required for tank cleaning, tank inspection, work in sewers or excavations of four feet or deeper.

11.4 Pre-work Inspection and Precautions

Both the person authorizing the Hot Work Permit and the person performing hot work shall personally do a pre-work inspection and assure precautions are completed prior to issuing a Hot Work Permit and starting any hot work.

This includes:

- Inspect and confirm work area is free from combustible materials. Combustible materials shall be moved (5m / 16 feet or more) away from the area where hot work will be performed or shall be protected by approved spark & fire resistive coverings (e.g. fire resistant tarps) and/or wetting down before starting. Appropriate precautions must be taken to protect operators of arc welders or other electric equipment from shock hazards where floors are wetted down.
- Determine that no flammable liquids, vapors, gasses or unlabeled chemical containers are present. This shall be based on a thorough visual inspection of the area.
- Tanks, drums or other containers that have held combustible materials or hazardous materials shall be emptied, cleaned or otherwise safeguarded prior to performing hot work on or near such containers.
- Protect any wall or floor openings to keep out sparks or hot materials. This includes cracks, open pipes, pipe holes and ducts.
- Confirm that fire protection devices are available and operational. This includes portable fire extinguishers, fire hoses, and nozzles, automatic sprinklers & alarms.
- Ensure adequate ventilation is provided to control exposure to airborne fumes, gases or particulate. When natural air movement will not be sufficient, provide local exhaust ventilators or general mechanical ventilation. Where adequate ventilation can not be

provided, potentially exposed worker(s) shall be protected by use of respiratory protection.

- Provide portable welding curtains or screens to protect adjacent workers from radiant energy (UV and IR) and spatter when performing torch or arc welding operations. Where use of welding curtains is not feasible (i.e. welding at elevated levels) appropriate barriers and signs shall be established to prevent adjacent workers from being exposed. Use fire resistant tarps or other barriers below when doing hot work at elevated heights.
- A “fire watch” person who may be a supervisor / worker must be assigned and ready with fully charged portable fire extinguisher(s) of appropriate type & size. The Fire Watch Person must be familiar with the facility and know emergency procedures.
- Determine whether structure or equipment contains or is coated with heavy metals (such as lead or cadmium), epoxy or urethane paints that must be removed before starting hot work.
- Both the Person Authorizing the Hot Work Permit and the Person that will be Performing Hot Work shall personally inspect and review the work area before signing the Hot Work Permit.
- If an authorized person who signed the permit has to leave the premises, then he can handover the job to another authorized person after explaining to him in detail the nature of the job & physically checking the work place & the person so authorized can close the permit.

11.5 Work Stoppage

If conditions change or become unsafe during the course of work, the issuer or supervisor may stop the work and cancel the permit.

The receiver has the responsibility to stop work and advise the issuer or supervisor any time he feels the safety of the job does not meet the conditions of the work permit.

11.6 Fire Watch

He is a person assigned the responsibility to prevent, observe and extinguish fires or released hot material or ignition sources and to activate facility emergency response as necessary.

11.7 Procedure for Work Permit

- a) The authorized receiver must request a work permit from a certified issuer (project engineer) before doing any work in the project site.
- b) The issuer will grant the work permit after he visited the site with the receiver.
- c) The issuer will grant the work permit after he reviews the hazards applicable to the particular job and is satisfied that the work can be done safely.
- d) If the work contemplated involves any change, addition, or deletion in the facility, the work should be reviewed by the Project Engineer and appropriate authorization is necessary.
- e) Identify all hazardous energy sources and energy isolating devices.

- f) Be sure to isolate all energy sources, secondary supplies as well as the main one with coordination with Electrical engineers.

11.8 Handling of Issued Work Permit

- A work permit is valid for only one shift, but it may be extended for one additional shift with proper approval. Exceptions in excess of 16 hrs may be granted in special cases, provided certain precautions are taken.
- The receiver of the work permit must keep the permit posted at the job location at all times or keep a copy in possession so that it may be presented upon request.
- When the job is completed or at the end of the shift work permit must be closed out by both issuer and receiver.
- The work permit shall be filled and kept by the issuing person /department for three months.

11.9 Hold Tags and Lockouts

People may be injured while working on equipment when the controls have not been locked and tagged in the off position. People do make mistakes and start equipment on which men are working; vibrations and ineffective mechanism can cause controls to move or valves to open.

- The purpose of the lock out system is to render controllers inoperative, i.e. circuit breakers, disconnect switches, valves etc. on any system, (Electrical, steam, hydrocarbon, water acid etc) where the operation of the control device could be hazardous to personnel working on the system.
- Hold tags and locks are primarily intended to protect the individual doing the work from being injured by an inadvertent start up.
- Tags are useful to tell who is working on the equipment and who authorized the job.
- Work permit issuer and receiver should ensure that hold tags and locks are used and so noted on the work permit.
- When more than one person is going to work on a system or on a number of pieces of equipment within the system, the multiple lockout clips enables each man to lock out the circuit or machine control.
- Only the person who placed the lock and tag shall remove it unless special authorization is given by the Project Manager or Safety Manager.
- The use of hold tags /lockouts shall be strictly enforced.

11.10 Rules on Work Permit Procedure

- Issuer and receiver must inspect job site together before signing the work permit.
- Issue the correct permit for the job: general, hot, confined space entry etc.
- Issuer and receiver must both have their possession a valid work permit card.
- Work permit must be correctly filled.
- Work permit should be issued for the specific period of time required to complete the job.
- To extend time work permit beyond one shift, the on coming issuer must inspect the job site, write in extended time and sign the permit.
- Special precaution such as requirements for fire watch, Scott air packs, life lines, barricades, etc must be written on the permits.

- The work permit must remain on the job site in a conspicuously visible place while work is going on. If an emergency develops, the permit must be withdrawn immediately and all work stopped without question.
- The work permit must be closed out after a job is completed. Issuer and receiver must inspect the job site and signoff the work permit.

12.0 Construction and Decommissioning

12.1 Applicability and Approach

This section provides additional, specific guidance on prevention and control of community health and safety impact that may occur during new project development, at the end of the project life-cycle, or due to expansion or modification of existing project facilities.

12.2 Environment

During construction and decommissioning activities, noise and vibration may be caused by the operation of pile drivers, earth moving and excavation equipment, concrete mixers, cranes and transportation of equipment, materials and people. Some recommended noise reduction and control strategies to consider in areas close to community areas include:

- Planning activities in consultation with local communities so that activities with the greatest potential to generate noise are planned during periods of the day that will result in least disturbance.
- Using noise control devices, such as temporary noise barrier and deflectors for impact and blasting activities, and exhaust muffling devices for combustion engines.
- Avoiding or minimizing project transportation through community areas.

12.3 Soil Erosion

Soil erosion may be caused by exposure of soil surface to rain and wind during site clearing, earth moving, and excavation activities. The mobilization and transportation of soil particles may, in turn, result in sedimentation of surface drainage networks, which may result in impact to the quality of natural water system and ultimately the biological systems that use these waters. Recommended soil erosion and water system management approaches include:

- Sedimentation Mobilization and Transport
 - Reducing or preventing erosion by
 - Scheduling to avoid heavy rainfall periods (i.e. during the dry season) to the extent practical
 - Contouring and minimizing length and steepness of slopes
 - Mulching to stabilize exposed areas
 - Re-vegetation of areas promptly
 - Designing channels and ditches for post-construction flows
 - Lining steep channel and slopes (e.g. use jute matting)
 - Reducing or preventing off-site sediment transport through use of settlement ponds, silt fences, and water treatment, and modifying or suspending activities during extreme rainfall and high winds to the extent practical.
- Clean runoff management
 - Segregating or diverting clean water runoff to prevent it mixing with the water containing a high solid content, to minimize the volume of water to be treated prior to release.
- Road Design
 - Limiting access road gradient to reduce run-off induced erosion

- Providing adequate road drainage based on road width, surface materials, compaction and maintenance
- Disturbance of Water Bodies
 - Depending on the potential of adverse impact, installing free-spanning structures (e.g. single span bridge) for road watercourse crossing.
 - Restricting the duration of timing of in-stream activities to lower low periods, and avoiding periods critical to biological cycles of valued flora and fauna (e.g. migration, spawning, etc.)
 - For in-stream works, using isolation techniques such as berming or diversion during construction to limit the exposure of disturbed sediment to moving water.
 - Consider using trenches technology for pipeline crossing (e.g. suspended crossing) or installation by directional drilling.
- Structural (slope) Stability
 - Providing effective short term measures for slope stabilization, sediment control and subsidence control until long term measures for the operational phase can be implemented.
 - Providing adequate drainage systems to minimize and control infiltration

12.4 Air Quality

Construction and decommissioning activities may generate emission of fugitive dust caused by a combination of on-site excavation and movement of earth materials, contact of construction machinery with bare soil, and exposure of bare soil and soil piles to wind. A secondary source of emission may include exhaust from diesel engines, of earth moving equipment, as well as from open burning of solid waste on-site. Techniques to consider for the reduction and control of air emissions from construction and decommissioning site includes:

- Minimizing dust from materials handling sources, such as conveyors and bins, by using covers and/or control equipment (water suppression, bag house or cyclone).
- Minimizing dust from open area sources, including storage piles, by using control measures such as installing enclosures and covers, and increasing the moisture content.
- Dust suppression techniques should be implemented, such as applying water or non-toxic chemicals to minimize dust from vehicle movements.
- Selectively removing potential hazardous air pollutants, such as asbestos, from existing infrastructure prior to demolition.
- Managing emission from mobile source
- Avoiding open burning of solid.

12.5 Solid Waste

Non-hazardous solid waste generated at construction and decommissioning sites includes excess fill materials from grading and excavation activities, scrap wood and metals, and small concrete spills. Other non-hazardous solid wastes include office, kitchen, and dormitory wastes when these types of operations are part of construction project activities. Hazardous solid waste includes contaminated

soils, which could potentially be encountered on-site due to previous land use activities, or small amounts of machinery maintenance materials, such as oily rags, used oil filters, and used oil, as well as spill cleanup materials from oil and fuel spills.

12.6 Hazardous Materials

Construction and decommissioning activities may pose the potential for release of petroleum based products, such as lubricants, hydraulic fluids, or fuels during their storage, transfer, or use in equipment. These materials may also be encountered during decommissioning activities in building components or industrial process equipment. Techniques for prevention, minimization and control of these impacts include:

- Providing adequate secondary containment for fuel storage tanks and for the temporary storage of other fluids such as lubricating oils and hydraulic fluids
- Using impervious surfaces for refueling areas and other fluid transfer areas
- Training workers on the correct transfer and handling of fuels and chemicals and the response to spills
- Providing portable spill containment and cleanup equipment on site and training in the equipment deployment
- Assessing the contents of hazardous materials and petroleum-based products in building systems (e.g. PCB containing electrical equipment, asbestos-containing building materials) and process equipment and removing them prior to initiation of decommissioning activities, and managing their treatment and disposal.
- Assessing the presence of hazardous substances in or on building materials (e.g., polychlorinated biphenyls, asbestos-containing flooring or insulation) and decontaminating or properly managing contaminated building materials

12.7 Wastewater Discharges

Construction and decommissioning activities may include the generation of sanitary wastewater discharge in varying quantities depending on the number of workers involved. Adequate portable or permanent sanitation facilities serving all workers should be provided at all construction sites. Sanitary wastewater in construction and other sites should be managed.

12.8 Contaminated Land

Land contamination may be encountered in sites under construction or decommissioning due to known or unknown historical releases of hazardous materials or oil, or due to the presence of abandoned infrastructure formerly used to store or handle these materials, including underground storage tanks. Actions necessary to manage the risk from contaminated land will depend on factors such as the level and location of contamination, the type and risks of the contaminated media, and the intended land use. However, a basic management strategy should include:

- Managing contaminated media with the objective of protecting the safety and health of occupants of the site, the surrounding community, and the environment post construction or post decommissioning

- Understanding the historical use of the land with regard to the potential presence of hazardous materials or oil prior to initiation of construction or decommissioning activities
- Preparing plans and procedures to respond to the discovery of contaminated media to minimize or reduce the risk to health, safety, and the environment.
- Preparation of a management plan to manage obsolete, abandoned, hazardous materials or oil. Successful implementation of any management strategy may require identification and cooperation with whoever is responsible and liable for the contamination.

12.9 Occupational Health and Safety

12.9.1 Over-exertion

Over-exertion, and ergonomic injuries and illnesses, such as repetitive motion, over-exertion, and manual handling, are among the most common causes of injuries in construction and decommissioning sites. Recommendations for their prevention and control include:

- Training of workers in lifting and materials handling techniques in construction and decommissioning projects, including the placement of weight limits above which mechanical assists or two-person lifts are necessary
- Planning work site layout to minimize the need for manual transfer of heavy loads
- Selecting tools and designing work stations that reduce force requirements and holding times, and which promote improved postures, including, where applicable, user adjustable work stations
- Implementing administrative controls into work processes, such as job rotations and rest or stretch breaks

12.9.2 Slips and Falls

Slips and falls on the same elevation associated with poor housekeeping, such as excessive waste debris, loose construction materials, liquid spills, and uncontrolled use of electrical cords and ropes on the ground, are also among the most frequent cause of lost time accidents at construction and decommissioning sites. Recommended methods for the prevention of slips and falls from, or on, the same elevation include:

- Implementing good house-keeping practices, such as the sorting and placing of loose construction materials or demolition debris in established areas away from foot paths
- Cleaning up excessive waste debris and liquid spills regularly
- Locating electrical cords and ropes in common areas and marked corridors
- Use of slip retardant footwear

12.9.3 Work in Heights

Falls from elevation associated with working with ladders, scaffolding, and partially built or demolished structures are among the most common cause of fatal or permanent disabling injury at construction or decommissioning sites. If fall hazards exist, a fall protection plan should be in place which includes one or more of the following aspects, depending on the nature of the fall hazard

- Training and use of temporary fall prevention devices, such as rails or other barriers able to support a weight of 200 pounds, when working at heights equal or greater than two meters

or at any height if the risk includes falling into operating machinery, into water or other liquid, into hazardous substances, or through an opening in a work surface

- Training and use of personal fall arrest systems, such as full body harnesses and energy absorbing lanyards able to support 5000 pounds (also described in this section in Working at Heights above), as well as fall rescue procedures to deal with workers whose fall has been successfully arrested. The tie in point of the fall arresting system should also be able to support 5000 pounds
- Use of control zones and safety monitoring systems to warn workers of their proximity to fall hazard zones, as well as securing, marking, and labeling covers for openings in floors, roofs, or walking surfaces

12.9.4 Struck By Objects

Construction and demolition activities may pose significant hazards related to the potential fall of materials or tools, as well as ejection of solid particles from abrasive or other types of power tools which can result in injury to the head, eyes, and extremities. Techniques for the prevention and control of these hazards include:

- Using a designated and restricted waste drop or discharge zones, and/or a chute for safe movement of wastes from upper to lower levels
- Conducting sawing, cutting, grinding, sanding, chipping or chiseling with proper guards and anchoring as applicable
- Maintaining clear traffic ways to avoid driving of heavy equipment over loose scrap
- Use of temporary fall protection measures in scaffolds and out edges of elevated work surfaces, such as hand rails and toe boards to prevent materials from being dislodged
- Evacuating work areas during blasting operations, and using blast mats or other means of deflection to minimize fly rock or ejection of demolition debris if work is conducted in proximity to people or structures
- Wearing appropriate PPE, such as safety glasses with side shields, face shields, hard hats, and safety shoes

12.9.5 Moving Machinery

Vehicle traffic and use of lifting equipment in the movement of machinery and materials on a construction site may pose temporary hazards, such as physical contact, spills, dust, emissions, and noise. Heavy equipment operators have limited fields of view close to their equipment and may not see pedestrians close to the vehicle. Center-articulated vehicles create a significant impact or crush hazard zone on the outboard side of a turn while moving. Techniques for the prevention and control of these impacts include:

- Planning and segregating the location of vehicle traffic, machine operation, and walking areas, and controlling vehicle traffic through the use of one-way traffic routes, establishment of speed limits, and on-site trained flag-people wearing high-visibility vests or outer clothing covering to direct traffic
- Ensuring the visibility of personnel through their use of high visibility vests when working in or walking through heavy equipment operating areas, and training of workers to verify eye contact with equipment operators before approaching the operating vehicle
- Ensuring moving equipment is outfitted with audible back-up alarms

- Using inspected and well-maintained lifting devices that are appropriate for the load, such as cranes, and securing loads when lifting them to higher job-site elevations.

12.9.6 Dust

- Dust suppression techniques should be implemented, such as applying water or non-toxic chemicals to minimize dust from vehicle movements
- PPE, such as dust masks, should be used where dust levels are excessive

12.9.7 Confined Spaces and Excavations

Examples of confined spaces that may be present in construction or demolition sites include: silos, vats, hoppers, utility vaults, tanks, sewers, pipes, and access shafts. Ditches and trenches may also be considered a confined space when access or egress is limited. In addition to the guidance, the occupational hazards associated with confined spaces and excavations in construction and decommissioning sites should be prevented according to the following recommendations:

- Controlling site-specific factors which may contribute to excavation slope instability including, for example, the use of excavation dewatering, side-walls support, and slope gradient adjustments that eliminate or minimize the risk of collapse, entrapment, or drowning
- Providing safe means of access and egress from excavations, such as graded slopes, graded access route, or stairs and ladders
- Avoiding the operation of combustion equipment for prolonged periods inside excavations areas where other workers are required to enter unless the area is actively ventilated

12.9.8 Other Site Hazards

Construction and decommissioning sites may pose a risk of exposure to dust, chemicals, hazardous or flammable materials, and wastes in a combination of liquid, solid, or gaseous forms, which should be prevented through the implementation of project-specific plans and other applicable management practices, including:

- Use of specially trained personnel to identify and remove waste materials from tanks, vessels, processing equipment or contaminated land as a first step in decommissioning activities to allow for safe excavation, construction, dismantling or demolition
- Use of specially trained personnel to identify and selectively remove potentially hazardous materials in building elements prior to dismantling or demolition including, for example, insulation or structural elements containing asbestos and Polychlorinated Biphenyls (PCBs), electrical components containing mercury
- Use of waste-specific PPE based on the result of an occupational health and safety assessment, including respirators, clothing/protective suits, gloves and eye protection.

12.10 Community Health and Safety

12.10.1 General Site Hazards

Projects should implement risk management strategies to protect the community from physical, chemical, or other hazards associated with sites under construction and decommissioning. Risks may arise from inadvertent or intentional trespassing, including potential contact with hazardous

materials, contaminated soils and other environmental media, buildings that are vacant or under construction, or excavations and structures which may pose falling and entrapment hazards. Risk management strategies may include:

- Restricting access to the site, through a combination of institutional and administrative controls, with a focus on high risk structures or areas depending on site-specific situations, including fencing, signage, and communication of risks to the local community
- Removing hazardous conditions on construction sites that cannot be controlled affectively with site access restrictions, such as covering openings to small confined spaces, ensuring means of escape for larger openings such as trenches or excavations, or locked storage of hazardous materials

12.10.2 Disease Prevention

Increased incidence of communicable and vector-borne diseases attributable to construction activities represents a potentially serious health threat to project personnel and residents of local communities.

12.10.3 Traffic Safety

Construction activities may result in a significant increase in movement of heavy vehicles for the transport of construction materials and equipment increasing the risk of traffic-related accidents and injuries to workers and local communities. The incidence of road accidents involving project vehicles during construction should be minimized through a combination of education and awareness-raising.

13.0 Monitoring

Occupational health and safety monitoring programs should verify the effectiveness of prevention and control strategies. The selected indicators should be representative of most significant occupational, health and safety hazards, and the implementation of prevention and control strategies. The occupational health and safety monitoring program should include:

- **Safety inspection, testing and calibration:** This should include regular inspection and testing of all safety features and hazard control measures focusing on engineering and personal protective features, work procedures, places of work, installations, equipment, and tools used. The inspection should verify that issued PPE continues to provide adequate protection and is being worn as required. All instruments installed or used for monitoring and recording of working environment parameters should be regularly tested and calibrated, and the respective records maintain.
- **Surveillance of the Working Environment:** Employers should document compliance using an appropriate combination of portable and stationary sampling and monitoring instruments. Monitoring and analysis should be conducted according to internationally recognized methods and standards. Monitoring methodology, cautions, frequencies and parameters should be established individually for each project following a review of the hazards. Generally, monitoring should be performed during commissioning of facilities or equipment and at the end of the defect and liability period, and otherwise repeated according to the monitoring plan.
- **Surveillance of Worker's Health:** When extraordinary protective measures are required, workers should be provided appropriate and relevant health surveillance prior to first exposure, and at regular intervals thereafter. The surveillance should, if deemed necessary, be continued after termination of the employment.
- **Training:** Training activities for employees and visitors should be adequately monitored and documented (curriculum, duration and participants). Emergency exercises, including fire drills, should be documented adequately. Service providers and contractors should be contractually required to submit to the employer adequate training documentation before the start of their assignment.

13.1 Incident Report, Analysis and Statistical Record

Employer is to ensure that an effective and systematic approach is in place for reporting and investigating accidents and other defined Safety Management System failures described herein in order that the following requirements can be satisfied.

The timely submission of reports to the:

- Regulatory authorities
- Safety Department
- Owner/Engineer Safety Team and Secretarial

The investigation of root causes of accidents and incidents so that corrective action may be taken to prevent further or similar recurrences and hence improve HS&E performance.

- To collect data for analysis so that trends can be established and targets set to reduce incidence levels.

- To minimize damage and loss in our industry and the environment

Responsibility for initiating investigations, commissioning reports, reviewing details and implementing follow up action rests with the management of the company involved.

13.1.1 Reporting Requirements

Employer must comply with this procedure to ensure that:

- all of their employees understand the importance of reporting all accidents and incidents as soon as possible;
- supervision establishes the initial facts and informs management and the HS&E advisor;
- in all instances a HSER form is raised (not necessary for a First Aid injury)
- the HS&E advisor in conjunction with senior management submit, when necessary, the reports to the HSE and to the Group.
- there is a process in place that records all events and their timely and effective close out.
- formal reports of events are made to management and safety committees.
- monthly reports are submitted to the Group.

13.1.2 Definitions

Incident

An incident is an event that gives rise to or could have given rise to an accident or other damage. This would include accidental losses that lead to the wastage of organizational assets, examples of which are:

People – injury or illness; short or long term disability due to injury or ill health and compensation payments.

Plant/Property - Losses that may occur from minor damage due to collisions or major damage from fire.

Processes – Losses will include products from a process or down time through human behaviour, such as failure to observe a PTW or some other requirement.

Environment – Pollution from spills and leaks may result in long or short-term damage as well as adverse publicity for the Group.

Accident - An accident is an incident that results in death, injury or ill health.

Near miss - Is an incident that had the potential to cause injury or ill health. For example, narrowly avoiding contact with a forklift truck, a dropped load, a trip over an obstacle or a slip on some substance.

Lost Work Case (LWC)

A work-related injury that causes the injured person (IP) to be absent from work for at least one normal shift after the shift on which the injury occurred, because the person is unfit to perform any duties.

Restricted Work Case (RWC)

A work-related injury which causes the IP:

- to be assigned to another job on a temporary basis, or
- to work at his/her normal job less than full time, or
- to work at his/her permanent job without undertaking all the normal duties.

Medical Treatment Case (MTC)

A work-related injury that requires attention from a medical practitioner (even if treatment is provided by someone other than a physician, e.g. suturing by a nurse) but does not result in either a lost time injury or a restricted work injury.

The following are generally considered as medical treatment.

- Application of antiseptics during second or subsequent visits to medical personnel.
- Treatment of second or third degree burn(s).
- Application of sutures (stitches).
- Application of butterfly adhesive dressing(s) or steri-strip(s) in lieu of sutures.
- Removal of foreign bodies from a wound if the procedure is complicated due to the size, location or depth of the object.
- Admission to a hospital, or equivalent medical facility for treatment.

First Aid Injury (FAI)

A First Aid injury is any one-time treatment, and any follow-up visit for the purpose of observation, of minor scratches, cuts, burns, splinters, etc., that do not ordinarily require medical care, not emergency treatment of serious injuries. Even if a physician or registered medical professional personnel provide the treatment, it is still considered to be first aid.

Reporting of FAIs

First Aid injuries shall be reported to site supervision and recorded in the first aid logs at company/site location. They do not require the completion of Accident or HSER reports. However, companies should analyse their first-aid logs frequently for any trends of injuries sustained by specific people or groups and for frequently occurring types of injury.

Note 1 There may be occasions when a first aid injury had the potential to be much more serious, in such cases these should be reported and investigated using the HSER form.

Note 2 Companies who have personnel working on sites or platforms may wish to use the HSER to record these injuries.

Environmental Incident

An event that led to or could have led to:

- Abnormal/harmful discharge or leak/spill into surface water or foul sewers.
- Significant ground contamination.
- Abnormal/harmful emission to atmosphere.

13.1.3 Performance Measures

Lost work case frequency (LWCF)

Number of LWCs * 106/ Number of hours worked

Total recordable case frequency (TRCF)

LWCs+MTCs+RWCs * 106/ Number of hours worked

Days away from work (DAFW)

Number of Days Away From Work as a result of a work-related injury or disease. To align with the LWC, the day on which the injury or the disease occurs is not counted.

(Some companies may wish to align with their clients and adopt the additional measure DAFWC, which is a measure of cases having time off work as a result of a work-related injury or illness.)

- Numbers of Near Misses by potential
- Numbers of Environmental incidents

13.1.4 Notification to the Group

There is a requirement to inform Corporate Communications as soon as possible in the event of a death or any other event that may attract public interest.

13.1.5 Statutory Reporting of Accidents, Dangerous Occurrences and Diseases

There are a number of occasions when statutory reports must be made to the authorities.

- **Fatal accident**- The death of any person whether or not they are at work, if the death is connected with work.
- **Major injury**, e.g. broken bone or amputation
- **Dangerous occurrence**, e.g. failure of a lifting device, pressure vessel or significant fire
- **Work related disease** e.g. dermatitis, occupational asthma and vibration white finger
- **Any injury that results in more than 3 consecutive days** (not including the day of the injury) absence from work or the employee unable to carry out their normal task for more than 3 days (not including the day of the injury.) This includes injury through work related violence.
- **Hospitalization** -Any person taken to hospital as a result of an injury arising from or in connection with work carried out in company premises.
- **Contractors** -When a contractor is injured then his employer must be informed by telephone and confirmed by fax. It is the contractor's employer who is responsible for making the statutory reports.
However, if the contractor is self-employed, then the occupier of the premises is responsible for submitting the statutory report.
- **Reportable events Offshore**- The owner of the installation is responsible for the submission of these reports.

The methods of informing the HSE is outlined in figure 14.A below

13.1.6 REPORT FORMS

- Preliminary Accident Report (see annex 5)
- Incident Investigation Report (see annex 6)

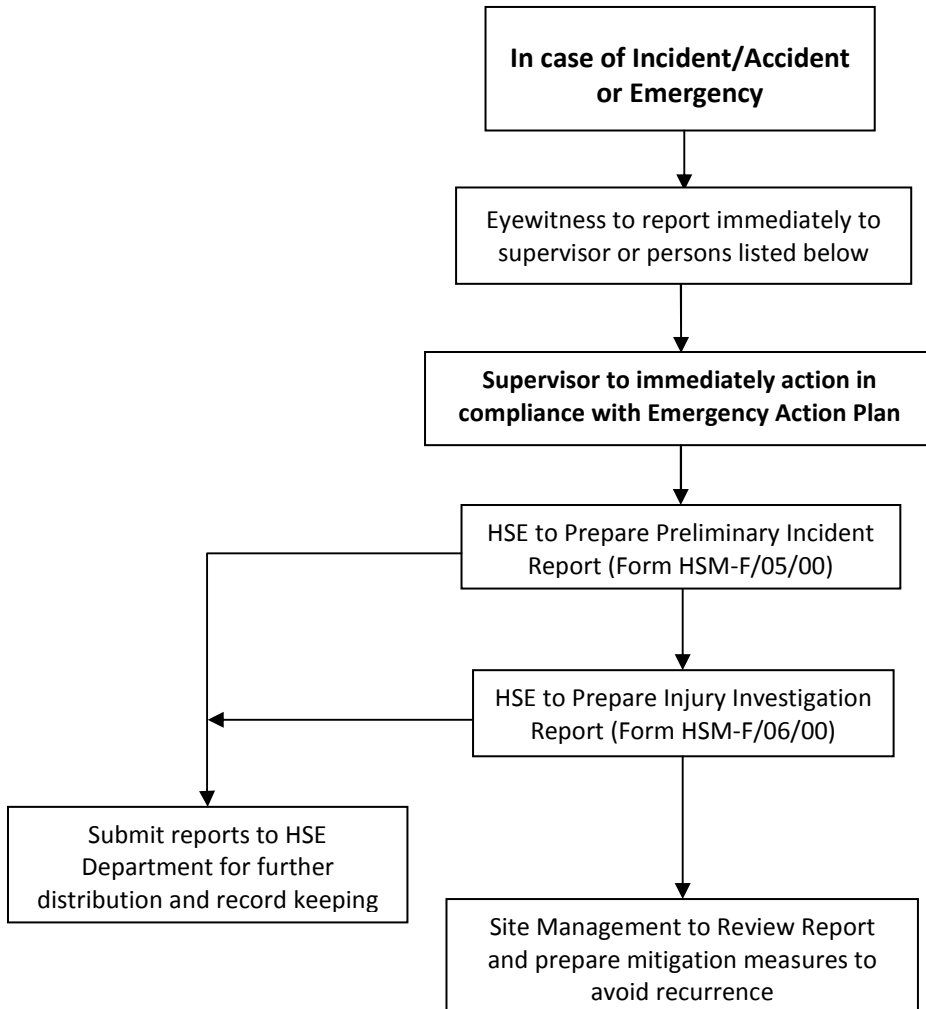
- Safety Statistics Report (see annex 7)

A typical case history is describe in Figure 14.B below

13.1.7 TIME SCALES FOR REPORTING

A summary of the reporting requirements and time scales for reporting the various events are in Figure 14.B below

Figure 14.A Incident/Accident/Emergency Response Flow Chart



Emergency Call List

Company Name	Contact Person	Mobile Phone No.	Radio Channel

Note: To include contact details of Government Agency and Police Department in addition to key Contractor/MTMM/EPETCO’s HSE personnel and Site Managers

Figure 14.B Accident/Incident Reporting Requirements

EVENT	HSE	Owner	Company	REMARKS
* Death of employee	1	2	4	Report immediately to HSE, Company Secretary, MTMM/EPETCO, Police Authority
* Death of a non-employee but work related	1	2	4	As above
* Major injury	1	2		Report within 24 hours to HSE Telephone/Fax & if considered serious enough to as above
* LWC > 3 days	1	2		Report to HSE within 10 days
LWC > 1 day		2		
* RWC > 3 days	1	2		
RWC > 1 day		2		
MTC		2		
* Dangerous occurrence	1		3	Report within 24 hours to HSE
* Employee injury due to violence	1	2		
Contractor serious injury		2		Inform employer immediately
Near-miss incident			3	
Environmental impact			3	Decision required on need to inform Government Authorities and Corporate communications
* Reportable Disease	1A	2		
First Aid			5	
* Hospitalisation of non employee	1	2		

***These are mandatory reports to the Health & Safety Executive**

Figure 14.C

TYPICAL CASE HISTORIES

Establishing Work-relationship

Injury Type	OSHA Recordable?
A Supervisor injures his hand while operating a flange on process plant during the shift. He visits the medic who administers a single suture to close a deep cut.	Yes. Injury is work-related.
A Technician trips and falls in the shower in his cabin while getting ready for his shift, breaking his arm. He has not yet reported for duty.	No. Injury occurs off-duty in the 'home from home'.
The OIM trips on the helideck while leaving the platform at the end of his tour. He sprains his knee badly and has to visit the hospital several times for heat therapy when back on the beach.	Yes. Injury occurs on 'premises' during work-related 'travel status'. Work related travel finishes at the heliport.
One of the Catering Staff strains his back while lifting a basket of laundry during his shift in the accommodation. He visits the medic and is given painkillers. He is told not to lift anything heavy for at least two days.	Yes. Injury is work-related even though in accommodation.
A Supervisor is involved in a car accident while traveling to the heliport to start his tour. He has to take time off work.	No. Work-related travel status begins at the heliport.
An Electrician strains his back badly while working out in the platform gym after his shift is over. He is unable to work normally and has to travel back to the beach where he is given a temporary job in the office.	No. Injury occurred during leisure time and activity is not work-related.

14.0 Annexure

- Annex 1 : Fire Precaution Checklist (Form HSM-F/01/00)
- Annex 2 : Hot Work and Confined Space Entry Permit (Form HSM-F/02/00)
- Annex 3 : Material Safety Data Sheet (OSHA form 174)
- Annex 4 : General Work Permit (Form HSM-F/04/00)
- Annex 5 : Preliminary Accident Report (Form HSM-F/05/00)
- Annex 6 : Incident/Illness/Injury Investigation Report (Form HSM-F/06/00)
- Annex 7 : Monthly Safety Report (Form HSM-F/07/00)

Fire Precaution Checklist

Doc Ref: HSM-F/01/00

Inspection for the month of: _____ Year _____

Fire Hazards	YES	NO
1. Are flammable materials correctly stores?	[]	[]
2. Is all electrical equipment correctly wired and earthed?	[]	[]
3. Is all wiring & equipment in good condition?	[]	[]
4. Are electric heaters clear of flammable material?	[]	[]
5. Are accumulations of flammable material regularly cleared away?	[]	[]
6. Is all dust regularly removed from around motors and moving machinery?	[]	[]
7. Are all moving machinery parts, motors, bearings, rollers etc. free of hot spots?	[]	[]
8. Are smoking refuges provided with ashtrays and bins?	[]	[]

Fire Fighting Equipment

1. Is all equipment checked annually and dated?	[]	[]
2. Is fire fighting equipment appropriate for the location and use?	[]	[]
3. Is all equipment clearly marked for designated use?	[]	[]
4. Is all equipment in good order, clean and properly stored?	[]	[]
5. If present, is the sprinkler system regularly checked?	[]	[]

Fire Alarms

1. Is the Fire Alarm system regularly checked?	[]	[]
2. Are maintenance checks recorded?	[]	[]
3. Are alarm call points clearly marked?	[]	[]
4. Is the system tested weekly from different points, and tests recorded?	[]	[]
5. Is the alarm audible everywhere in the workplace?	[]	[]
6. Do employees know how to sound the alarm?	[]	[]
7. Do employees know where the nearest alarm call point is?	[]	[]

Fire Exits

1. Are all Fire Exits clearly signed?	[]	[]
2. Is the route to the nearest exit clearly indicated?	[]	[]
3. Do all parts of the floor have direct access to a Fire Exit?	[]	[]
4. Are all exits clear of obstruction and not locked?	[]	[]
5. Do all exits open in the direction of escape?	[]	[]
6. Are exits clear of obstruction on the outside?	[]	[]
7. Are protected stairways clear of materials and equipment?	[]	[]
8. Is the emergency lighting system regularly checked?	[]	[]
9. Are lighting checks recorded?	[]	[]
10. Do employees know the way to their nearest fire exit?	[]	[]

Organisation and Procedures

1. Have competent staff been designated to take responsibility for fire emergencies?	[]	[]
2. Do all employees know who the designated person is?	[]	[]
3. Has the designated person been adequately trained?	[]	[]
4. Are there designated and signed assembly points?	[]	[]
5. Do all employees know their designated assembly point?	[]	[]
6. Are there notices posted informing employees what to do in the event of a fire?	[]	[]
7. Do contractors know the procedures?	[]	[]
8. Are all visitors properly informed about fire procedures?	[]	[]

Notices and Signs

1. Do all signs conform to the current Regulations?	[]	[]
2. Are signs clearly displayed?	[]	[]
3. Are Exit Signs illuminated in the event of power failure?	[]	[]
4. Do all employees understand the signs?	[]	[]

Fire Precaution Checklist

Doc Ref: HSM-F/01/00

Training for Employees

	YES	NO
1) Are regular fire drills held? At least once, preferably twice a year	[]	[]
2) Is the frequency of training adequate?	[]	[]
3) Is there a logbook for recording training?	[]	[]
4) Do all employees know the way to their assembly point?	[]	[]
5) Do employees know what to do if they discover a fire?	[]	[]
6) Do employees understand the extinguisher colour coding?	[]	[]
7) Do employees consider their training has been adequate?	[]	[]
8) Are the lifts interlocked with the alarm, or do employees know not to use them?	[]	[]

REPORTING

Fire Marshall Inspection Report:

Mitigation Measures Required:

Inspected by:

Name: _____ Sign _____ Date _____

Reviewed by:

Name: _____ Sign _____ Date _____

Hot Work and Confined Space Entry Permit

Doc Ref: HSM-F/02/00

This permit is intended only for:

- Gas or electric cutting or welding Brazing or Torch soldering Burning
 Abrasive grinding Confined Space Entry Others, pls. specify

Description of works to be carried out					
Location:					
Issue		Valid Until		Extended upto	
Date	Time	Date	Time	Date	Time
CHECKLIST - Pre-Work Inspection & Arrangement (before starting hot work)					
<input type="checkbox"/>	Flammable and combustible materials within a 35 foot radius of hot work have been removed or covered with fire retardant tarps or metal shield				
<input type="checkbox"/>	All floors and surface within a 35 foot radius of the hot work area have been swept free of combustible dust or debris				
<input type="checkbox"/>	Any opening or cracks in the walls, floors or ducts that are potential travel passages for sparks, heat and flames have been covered				
<input type="checkbox"/>	Any operable fire extinguisher or fire hose is nearby and accessible				
<input type="checkbox"/>	Determine that no flammable liquids, vapors, gases or unlabeled chemical containers are present. This shall be based on a thorough visual inspection of the area				
<input type="checkbox"/>	Ensure adequate ventilation is provided to control exposure to airborne fumes, gases or particulate				
<input type="checkbox"/>	Provide portable welding curtains or screens to protect adjacent workers from radiant energy (UV and IR) and spatter when performing torch or arc welding operations				
<input type="checkbox"/>	Determine whether structure or equipment contains or is coated with heavy metals (such as lead or cadmium), epoxy or urethane paints that must be removed before starting hot work				
<input type="checkbox"/>	A "fire watch" person who may be a supervisor / worker must be assigned and ready with fully charged portable fire extinguisher(s) of appropriate type & size. A fire watch will continue upto 30mins. after completion of works.				
<input type="checkbox"/>	Workers in adjacent areas are protected from potential exposure or flash				
CHECKLIST – Confined Space Entry					
<input type="checkbox"/>	Equipment Isolated				
<input type="checkbox"/>	Blinds installed				
<input type="checkbox"/>	Sign in / Out log record				
<input type="checkbox"/>	2 way radio available				
<input type="checkbox"/>	Mechanical ventilation installed or available				
Required Precaution					
<input type="checkbox"/>	Type of extinguisher required to be available: <input type="checkbox"/> Dry Chemical <input type="checkbox"/> CO2 <input type="checkbox"/> Foam <input type="checkbox"/> Water <input type="checkbox"/> Others:				
<input type="checkbox"/>	Check area with explosive meter device every _____ minutes where potential flammable gas/liquid is likely present				
<input type="checkbox"/>	For hot works: Designated fire watch person or supervisor who is also capable of using fire extinguishers				
<input type="checkbox"/>	For confined space entry : Designated attendant or supervisor with 2 way radio				
<input type="checkbox"/>	Additional Equipment Required: <input type="checkbox"/> lifeline <input type="checkbox"/> air respirator <input type="checkbox"/> goggles <input type="checkbox"/> hearing protection <input type="checkbox"/> resistant gloves <input type="checkbox"/> Coverall <input type="checkbox"/> Face shield/mask <input type="checkbox"/> Others, pls. specify:				

AUTHORIZATION

The information on this permit has been evaluated, the site has been examined and all safety measures are in place.

Description	Name	Sign	Date
Person performing hot works or confined space entry			
Contractor Supervisor			
Contractor Safety Coordinator			
Permit issuing person			
Final Authorization - Project Manager			

Section IV—Fire and Explosion Hazard Data

Flash Point (Method Used)	Flammable Limits	LEL	UEL
Extinguishing Media			
Special Fire Fighting Procedures			
Unusual Fire and Explosion Hazards			

Section V—Reactivity Data

Stability	Unstable		Conditions to Avoid
	Stable		
Incompatibility (<i>Materials to Avoid</i>)			
Hazardous Decomposition or Byproducts			
Hazardous Polymerization	May Occur		Conditions to Avoid
	Will Not Occur		

Section VI—Health Hazard Data

Route(s) of Entry	Inhalation?	Skin?	Ingestion?
Health Hazards (<i>Acute and Chronic</i>)			
Carcinogenicity	NTP?	IARC Monographs?	OSHA Regulated?
Signs and Symptoms of Exposure			
Medical Generally Aggravated by Exposure	Conditions		
Emergency and First Aid Procedures			

Section VII—Precautions for Safe Handling and Use

Steps to Be Taken in Case Material Is Released or Spilled

Waste Disposal Method

Precautions to Be Taken in Handling and Storing

Other Precautions

Section VII—Control Measures

Respiratory Protection (*Specify Type*)

Ventilation	Local Exhaust	Special
	Mechanical (<i>General</i>)	Other
Protective Gloves	Eye Protection	
Other Protective Clothing or Equipment		
Work/Hygienic Practices		

General Work Permit

Doc Ref: HSM-F/04/00

Control No.: _____

- Lock-out/Tag-out Working at Height Restricted Area
 Cold Works Hazardous Substance Handling Others

Important Notes:

1. The permit does not relieve the users of his responsibility with respect to safety
2. The applicant has to return all copies of permit to permit issuer after the completion of the job at the end of working hours. Applicant may retain the original copy
3. Make sure that each worker on job understands the safety aspects and the operational aspects
4. The applicant is not authorized for making utility connections viz. gas, electrical, air, nitrogen etc. on his own if ready outlet is not provided
5. Stop work and come out of confined space in case of emergency announcement, even in case of mock drills
6. In case of emergency, leave the plant/site and assemble at the designated assembly point
7. If more than one person/dept. is working on the same equipment, each one should put individual lock/tag on the equipment
8. Validity of the permit is up to the end of the shift. The same can be renewed up to max. 3 days
9. Name of all the employees involved in the job should be clearly written (use extra page if required)

Name of applicant securing the work	Name of Company/Contractor		
Scope of work	Location of Work		
	Validity	Date	Time
	Name of Worker		
Name of Worker	Validity Extension		
	Sign	Date	Time

Utility required: Air Gas Water Electricity Others Authorized by _____ Connected by _____

Personal Protective Equipment (PPE) Requirements:

Helmet Ear Protection Mask Face shield Harness Gumboots Sleeves Special Resistant Gloves Others

Precautionary measures to check prior to approval				Measures to be taken by Applicant			
	YES	NO	NA		YES	NO	NA
Concerned people are notified				Lock/tags applied			
Floor condition, pits, opening covered				Lances, hoses, cables etc. checked			
Area isolation done				Equipment checked			
Equipment shutdown as per procedure				Use of ladder for working at height			
Equipment isolated				Fall barrier/harness available			
Pipelines/equipment is pressure drained				Landing platform available & secured			
Electrical supply isolated				Lifeline Availability			
Equipment is washed with water				Safety Supervisor is available			
Air/N2 purging is done							
For confined space, enclosure to be checked for oxygen. Entry permit is on 19 to 21% (tested by)							
Ventilation, illumination provided							
Special instrument, measures, precaution procedures							

Issued by:

Approved by:

Sign:

Sign:

Date

Date:

Preliminary Accident Report

Doc Ref: HSM-F/05/00

DATE	TIME	HRS.
NAME	EMPLOYEE ID NO.	
COMPANY NAME		
RESPONSE CHECKLIST		
1. <input type="checkbox"/> Examine the incident scene and assess situation	5. <input type="checkbox"/> Call personnel help, if necessary	
2. <input type="checkbox"/> Check the severity of injury	6. <input type="checkbox"/> Call for emergency services, if necessary	
3. <input type="checkbox"/> Mitigate the unsafe condition	7. <input type="checkbox"/> Inform the concerned Project Manager/H&S Manager	
4. <input type="checkbox"/> Ensure the injured person/s is at ease	8. <input type="checkbox"/> Investigate for sources of evidence	
SEVERITY OF INJURY: MINOR <input type="checkbox"/> MAJOR <input type="checkbox"/> FATAL <input type="checkbox"/>		
INITIAL DESCRIPTION OF ACCIDENT		
WAS THE CASE REFERRED TO EXTERNAL DOCTOR/HOSPITAL	YES <input type="checkbox"/> NO <input type="checkbox"/>	
NO. INVOLVED IN THE ACCIDENT	MINOR _____ MAJOR _____ FATAL _____	
WITNESS STATEMENT		
REPORTED BY (Name/Title)	SIGN	DATE

Report No:										
Originator	Section 1		Circumstances			Original to supervisor – Copy to HSE Advisor/Manager				
Name:			Signature:				Date:			
Injury only	Section 2 Only required in the event of an injury									
	Person injured					Company		Hospital Details		
	Address					Work Site				
						Occupation				
						Job at accident				
Date of Birth					Time into shift					
Supervisor	Section 3 Corrective Action Non-injurious incidents only					Actioned by		Date Complete	Signed	
Signature:			Date:							
Management	Section 4 Corrective Action Review Non-injurious incidents only									
	Managers Signature:			Safety Rep Signature:				Date:		
HSE Advisor	Section 5 To be completed for incidents									
	HSE Advisor					Copies to: <input type="checkbox"/> Originator <input type="checkbox"/> Manager <input type="checkbox"/> Actionee				
	Date					<input type="checkbox"/> Managing Director <input type="checkbox"/> General Manager <input type="checkbox"/> Safety Rep				
	Potential			Reportable to HSE/OSHA			Investigation Level			DAFW
Potential Classification: e.g.. LWC, RWC, Near Miss, Hazard, MTC etc.										

6. DETAILS OF PHYSICAL INJURY (Where applicable) INSERT X against appropriate headings

INJURY LOCATION - PART OF BODY			NATURE / SEVERITY OF INJURY		
Skull	<input type="checkbox"/>	Lungs	Fatality	<input type="checkbox"/>	Burns
Head/Neck	<input type="checkbox"/>	Hip	Loss of Consciousness	<input type="checkbox"/>	Cuts/abrasions
Eyes	<input type="checkbox"/>	Leg	Loss of Sight	<input type="checkbox"/>	Sprain/Strains
Ears	<input type="checkbox"/>	Foot/Toes	Loss of Hearing	<input type="checkbox"/>	Shock (Electrical))
Spine	<input type="checkbox"/>	Shoulder	Amputation	<input type="checkbox"/>	Disease/Illness
Pelvis	<input type="checkbox"/>	Arm/Wrist	Fracture	<input type="checkbox"/>	Ingestion
Torso	<input type="checkbox"/>	Hand/Fingers	Crush	<input type="checkbox"/>	Foreign Bodies
Chest	<input type="checkbox"/>	Other Multiple (specify below)	Dislocation	<input type="checkbox"/>	Hospitalisation
			Respiration	<input type="checkbox"/>	Other (specify below)

7. BROAD ACCIDENT / INCIDENT TYPES

Loss of Containment	<input type="checkbox"/>	Falling/Flying Objects	<input type="checkbox"/>	Radiation	<input type="checkbox"/>
Fire/Explosion	<input type="checkbox"/>	Electrical	<input type="checkbox"/>	Vehicle Operation	<input type="checkbox"/>
Pollution/Environmental	<input type="checkbox"/>	Assault	<input type="checkbox"/>	Structural	<input type="checkbox"/>
Air Transport	<input type="checkbox"/>	Unsafe Act/Condition	<input type="checkbox"/>	Waterborne	<input type="checkbox"/>
Sea Transport	<input type="checkbox"/>	Mechanical/Lifting	<input type="checkbox"/>	Hazardous Substances	<input type="checkbox"/>
Land Transport	<input type="checkbox"/>	Crane Operations	<input type="checkbox"/>	Other (Specify Below)	<input type="checkbox"/>
Slips/Trips/Falls	<input type="checkbox"/>	Manual Handling	<input type="checkbox"/>		
Falling From Height	<input type="checkbox"/>	Using Machinery	<input type="checkbox"/>		

8. ACTUAL ACTIVITY LEADING TO ACCIDENT / INCIDENT

Using Portable Tools/Equipment	<input type="checkbox"/>	Working at Height	<input type="checkbox"/>	Draining/Flushing	<input type="checkbox"/>
Operating Plant/Machinery	<input type="checkbox"/>	Grinding	<input type="checkbox"/>	Breaking Connections	<input type="checkbox"/>
Assembling/Dismantling	<input type="checkbox"/>	Electrical Work	<input type="checkbox"/>	Diving	<input type="checkbox"/>
Handling Hazardous Materials/Substances	<input type="checkbox"/>	Inspection/ Examining	<input type="checkbox"/>	Radiography	<input type="checkbox"/>
Erecting/Dismantling Scaffolding	<input type="checkbox"/>	Welding/Burning	<input type="checkbox"/>	Manual Lifting	<input type="checkbox"/>
Climbing/Descending	<input type="checkbox"/>	Cleaning	<input type="checkbox"/>	Movement of Equipment	<input type="checkbox"/>
Walking	<input type="checkbox"/>	Painting	<input type="checkbox"/>	Sports/Recreation	<input type="checkbox"/>
Driving/Piloting	<input type="checkbox"/>	Digging	<input type="checkbox"/>		

9. IMMEDIATE CAUSE(S)

Failure in Communication	<input type="checkbox"/>	Improper Vehicle Operation	<input type="checkbox"/>	Exposure to Noise	<input type="checkbox"/>
Failure to follow Rules/Procedures	<input type="checkbox"/>	Fatigue/Illness	<input type="checkbox"/>	Inadequate Lighting	<input type="checkbox"/>
Failure to Use/Heed Warning/Safety Devices	<input type="checkbox"/>	Inadequate Warning/Safety Devices	<input type="checkbox"/>	Other (Specify Below)	<input type="checkbox"/>
Improper Manual Handling	<input type="checkbox"/>	Misuse of Equipment/Tools	<input type="checkbox"/>		
Inadequate Personal Protection Equipment	<input type="checkbox"/>	Defective Tools/Equipment	<input type="checkbox"/>		
Inadequate Respiratory Protection Equipment	<input type="checkbox"/>	Poor Housekeeping	<input type="checkbox"/>		
Failure to wear PPE	<input type="checkbox"/>	Work Environment	<input type="checkbox"/>		
Failure to wear RPE	<input type="checkbox"/>	Exposure to Chemicals	<input type="checkbox"/>		

10. BASIC CAUSE(S)

Inadequate Physical/Mental Capability	<input type="checkbox"/>	Inadequate Appreciation of Situation	<input type="checkbox"/>	Other (Specify Below)	<input type="checkbox"/>
Inadequate Knowledge/Skill	<input type="checkbox"/>	Inadequate Planning/Organisation	<input type="checkbox"/>		
Stress	<input type="checkbox"/>	Inadequate Design/Engineering	<input type="checkbox"/>		
Improper Motivation	<input type="checkbox"/>	Inadequate Procedures	<input type="checkbox"/>		
Inadequate Supervision	<input type="checkbox"/>	Inadequate Equipment/Tools	<input type="checkbox"/>		
Disregard of Instructions	<input type="checkbox"/>	Inadequate Maintenance/Inspection	<input type="checkbox"/>		
Inadequate Instructions	<input type="checkbox"/>	Inadequate Training	<input type="checkbox"/>		

11. INJURED PARTIES STATEMENT OF EVENTS

I declare that the above information is true and correct

NAME SIGNED
EMPLOYER DATE

12. WITNESS STATEMENT OF EVENTS

I declare that the above information is true and correct

NAME SIGNED
EMPLOYER DATE

13. INVESTIGATION FINDINGS/CONCLUSIONS

NAME SIGNED

EMPLOYER DATE

14. RECOMMENDATIONS FOR CORRECTIVE ACTION TO PREVENT RECURRENCE

ITEM	PERSON RESPONSIBLE	TASK	TARGET DATE	STATUS

15. APPROVAL of REPORT

	NAME	SIGNATURE	Date
SITE SUPERVISION			<input type="text"/>
SAFETY REPRESENTATIVE			<input type="text"/>
LINE MANAGEMENT			<input type="text"/>
HS&E ADVISOR			<input type="text"/>

16. APPROVAL of REPORT POST REVIEW BOARD for Lost Work Case

SENIOR MANAGER	Date
----------------	------

17 FORM COMPLETED BY

NAME (BLOCK CAPS)	POSITION
SIGNATURE	DATE

Monthly Safety Report

Doc Ref: HSM-F/07/00

Division / Company:		Total Manhours:	
Platform / Location:		No. of Employees:	
Month / Year:		Total Days Away from Work	

Recordables

Death or Major injuries (LWC)																				
RIDDOR Injury > 3 days (LWC)																				
Injury resulting in > 1 day away from work (LWC)																				
Restricted Work Case																				
Medical Treatment Case																				
Contractors Major Injury																				
Hospitalisation of Non Employees																				
First Aid Case																				
Work Related Violence																				
Reportable Disease																				
Environmental Impact																				
Dangerous Occurrence																				
Near Misses																				

Provide the number of HSER forms raised this period:

Give short description of all Near Miss and Environmental Impacts including potential (L,M,H) also the potential of any LWC, RWC and MTC

Description:

Give a short description of any Initiatives or Positive events for the past month

Description:

Prepared By (Signature):

Name

Date