



# *HSE PLAN*



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## **1. SCOPE**

This procedure describes the accident prevention rules and safety programs of Niroo Va Tavan that shall apply to all personnel engaged for the construction work of the PROJECT. The primary purpose of this procedure is to prevent accidents, which may injure personnel or damage property.

## **2. SAFETY COMMITTEE**

The Project Manager shall organize a safety Committee Consisting of Site Manager and Safety manager in order to implement the safety programs covered by the construction safety rules and procedure. The committee shall cover security and sanitation as well as safety activities of the construction work, and the operation procedure shall be established prior to starting the construction work.

## **3 GENERAL REQUIREMENT**

### **3.1 Identification**

All employees working on the SITE shall wear as authorized temper proof badge on their outer garment at all time within the SITE. This badge shall show the registered number and category of each work.

### **3.2 House Keeping**

All construction office and temporary facility and work area shall be kept reasonably clean and free of rubbish and debris, which may create unsafe conditions or fire nearby in the designated area.

### **3.3 Working Plan**

The Safety Committee shall prepare working plans for the following works before the commencement of the construction work:

- Erection and/or assembling of equipment and/or structure of which height is 30m and over.
- Scaffolding having the height of 10m and over which is to be used for 60 days and longer.
- For works which the Committee judges as critical from the viewpoint of safety.

The working plan shall include the organization, schedule, construction equipment arrangement, scaffolding and safety precaution as well as detailed execution plan of the work.

### **3.4 Excavations**

Excavation must be fenced, barricaded, or otherwise protected to prevent personnel from slipping or falling into them. A thorough inspection of the protective system shall be made once each day. Ladders or access slopes shall be provided for working areas 1.5 meters or more below the ground.

An excavation permit shall be obtained for any excavations to be made adjacent to the facilities already constructed before commencing the work to avoid damage to underground cables or piping.



### **3.5 Posters and Signs**

Posters and signs shall be adopted as visual aids for accident and fire prevention. Posters shall be written in English, Persian, or the main language of the workers. They shall be conspicuously displayed. These posters and signs shall not be removed or replaced until the related work is completed.

### **3.6 Authorization**

#### **3.6.1 Authorization & Work Permits**

Any work to be performed in a UNIT or AREA shall be controlled by the Safety Manager, and needs work permit before Commencement of the work.

##### **3.6.1.1 Authorizations During Construction**

During construction the Area manager shall ask the Safety Manager specific authorization for following works:

- a) Connection to the electric power network.
- b) Connection to the water supply network.
- c) Installation of stores to contain cylinder gases highly flammable liquids; paint and similar hazardous materials.
- d) Installation of pits for the storage of sealed radioactive sources.
- e) Storage and use of explosives.
- f) Excavation in restricted area (where electrical cables and piping are laid).
- g) Closure of site roads for the purposes of excavations and other activities which will obstruct road traffic.
- h) Connection to the sewer system.

##### **3.6.1.2 Work Permits during the Precommissioning & Commissioning of Plant**

At certain stages of progress of a contract some areas of a plant may be simultaneously occupied by several interested groups of people.

They may be divided into three general categories, i.e.:

- Construction & Commissioning Supervision (Contractor)
- Construction Contractors.
- Employer's Operating Engineers (Employer).

In order to prevent dangerous situations arising through the presence of persons working in these areas occupied by Construction Contractor, by Employer Commissioning personnel the responsibility for the safety of those persons must be determined and agreed before the start of the activity by all the parties concerned.



When the Commissioning Manager intends to carry out testing or precommissioning or commission operations on the plant, the responsibility for the area will be taken over by the (designated) EMPLOYER Area Manager who will assume control of the area.

### **3.6.1.3 Procedure for the Issuance of Work Permit:**

The Commissioning Manager must advise the Site Manager in writing that the plant, or section of the plant (to be clearly specified in writing) is to be designated as a “Controlled Area” as from a given time and date. The nature of the testing or precommissioning or commissioning work to be carried out in that area is to be stated.

Immediately the Resident manager will issue a Circular to all Parties and will inform Contractor Personnel, Construction Contractor Representative and Employer's Representative that no work is to be carried out in that area unless authorized by the issue of a work permit, at that moment the Employer Area Manager will assume control of the area.

The Construction Contractor shall ask the Work Permit for any work to be carried out on the “Controlled Area”.

The ISSUING AUTHORITY (Employer AREA MANAGER) will indicate the particulars of the precautions to be observed, and will sign the Work Permit.

The person which will execute the work will have the responsibility to observe the prescribed precautions and will start the work only after that all the prescribed checking have been carried out including the checks by the EMPLOYER Fire Brigade.

Warning notices should be posted at the approach to the designated area including the remote ends of live mains where these form part of the processes in the area.

### **3.6.1.4 Work Permits**

#### **- Function of a Work Permit**

The issue of a Work Permit authorizes specific work to be carried out under controlled conditions in restricted areas.

#### **- Controlled Areas**

Controlled areas are locations which have been designated as areas of special risk and where specific permission is required before starting work.

Before undertaking work of any description in a Controlled Area it is necessary to apply for and obtain authorization from the precommissioning / commissioning activities.

The Safety Committee shall coordinate with Employer to issue the following categories of Permit to Work:

#### a) Hot Work Permit

Written authorization to carry out any type of work activity, which introduces into a work area, a flame, spark or heat which could cause ignition.

#### b) Cold Work Permit

A permit to authorize any type of work, other than hot work, carried out in a defined area.



c) Excavation Permit

Permission to carry out excavation deeper than 0.3 meters in a defined area. Hot or Cold Work Permits are still required in addition to an Excavation Permit.

d) Electrical Permit

Written authorization to carry out work on electrical network or equipment.

e) Radiography Permit

Substances or apparatus which emits ionizing radiations shall not be brought into site without Employer Safety Officers written approval.

In addition a radiography permit must be obtained before the use of any such substance or apparatus on site.

f) Entry Into Confined Space Permits

A written permit authorizing work to be carried out in any tank, vessel, flue or similar confined space in which dangerous fumes, lack of oxygen or flooding are liable to be encountered. The relevant areas will be defined by the Employer.

The Safety Manager shall provide a daily/ weekly forecast of Permits to be applied for, including type of work, interface activities, work areas, duration and manpower.

### **3.6.2 Fire Extinguisher**

During the construction of the Project, fire extinguishers shall be provided at their working area, especially for construction of office buildings, control rooms, substations and other buildings. Numbers and locations of fire extinguishers to be prepared shall be approved by the Safety Manager before the commencement of the construction work.

## **3.7 Accident**

### **3.7.1 Injuries**

First aid facilities should be provided at construction office area should nominate responsible person for first aid at the beginning of the construction work.

In the event that some body injured while working on the SITE, it is the Site Manager responsibility to notify the Safety Manager immediately, and to be followed by a report in writing within 24 hours.

### **3.7.2 Fire**

In case of fire, the discoverer shall immediately notify the Safety Manager. Persons working adjacent to the site of the fire shall immediately try to put out the fire with fire extinguishers if the fire is small.

### **3.7.3 Accident Follow-up**

The Safety manager shall furnish with a written accident report on all accident within 24 hours of occurrence.



All accident shall be investigated by the Committee and safety manager concerned immediately after occurrence of accident to clarify the cause and to take corrective measures against recurrence of similar accidents on the Site.

### **3.8 Accident Report**

#### **3.8.1 Accident Report**

Accident Reports shall be prepared whenever the following accidents occur:

- 1) Injury involving in loss of or damage to employees.
- 2) Disease including food poisoning.
- 3) Traffic accident, including that during off-duty hours.
- 4) Accidents such as collapse, fire, theft, etc., involving in loss of and damage to machines and facilities.

#### **3.8.2 Filling Blanks**

The accident reports shall be filled up in the following manners:

- 1) Illustrate how the accident occurred.
- 2) Attach photographs of accident spot and other detailed information such as home address, present address and family members of injured workers in case of death or serious injury.
- 3) Gas poisoning, food poisoning, traffic accident, and other injury to any third party shall be including category of Injury Accident.

#### **3.8.3 Reporting**

The Safety Manager shall prepare an accident report on-the-spot investigation of the accident

In case of serious accident, an accident report shall be submitted to the Safety Committee, and the Project Manager shall call an extraordinary meeting to find the best way of countermeasures for presentation of recurrence of the similar accident and inform of it's conclusion to the area Manager to enforce them in their safety practice for further construction work.

#### **3.8.4 Monthly Accident Status Report**

The Safety Manager shall prepare the Monthly Accident Status Report at the end of the month, and shall submit it to the Safety Committee as one of monthly construction report. The report form shall be filed out as follows:

- 1) For total man hours, fill in actual working hours including overtime.
- 2) For number of injuries, fill in number of accidents.
- 3) Injury Frequency, Severity and Mortality can be calculated by following formulas ( by USA – ANSI – 2 16.4 – 1977).





$$\text{FREQUENCY (F)} = \frac{\text{NUMBER OF RECORDABLE CASES} \times 200,000}{\text{WORKED MANHOURS}}$$

$$\text{SEVERITY(S)} = \frac{\text{NUMBER OF LOST WORKED DAYS}}{\text{WORKED MANHOURS}}$$

$$\text{MORTALITY (M)} = \frac{\text{NUMBER OF DEATH CASES} \times 6,000 \times 200,000}{\text{WORKED MANHOURS}}$$

### **3.8.5 Actions to be taken in Emergencies**

Fire and injury or other industrial accidents involving in the loss of and damage to the workers or equipment or facilities shall be notified to the parties concerned and shall be further reported through the Emergencies /communication Channel.

## **4. SAFETY EQUIPMENT**

### **4.1 General**

All workers shall wear suitable working clothes. Every worker shall wear shoes and a safety helmet on the Site. Safety helmet shall be used properly. Personal protective equipment or devices shall be furnished as required, and their use shall be enforced.

### **4.2 Sight and Face Protection**

Workers engaged in electric welding, cutting, or other similar operations shall be required to wear helmets or shields with filters of appropriate shade and gloves when necessary. Workers engaged in grinding or similar work shall be required to wear goggles with safety filters for sight protection or face masks giving equal protection.

### **4.3 Safety Belt**

Workers in hoppers, bins, or confined spaces or on steep slopes, swinging scaffolds, structural steel, or unstable work at an elevation 2 meters or more above the ground shall be secured by safety belts and independent life lines.



## **5 TRAFFIC RULES**

### **5.1 General**

Only authorized personnel are permitted to operate motorized equipment for the construction work. Operators shall have a valid operator's license.

### **5.2 Parking**

All vehicles shall be parked at the area designated by Safety Manager except vehicles in use for the construction work. Roads which are narrow shall be open without any obstructions at all times for easy access.

Motor vehicles and other mobile equipment shall not be parked adjacent to, fire fighting equipment, building exits, walkways, etc.

### **5.3 Trucks**

Trucks and other mobile equipment shall be constructed to prevent material from falling off the equipment onto the road. Any material spilled from the equipment shall be removed from the street immediately.

Materials over hanging the end or sides of a vehicle shall be marked with a red flag.

### **5.4 Speed Limit**

All drivers shall obey the speed limit which is 25 kilometer per hour within the SITE unless otherwise indicated by signs or boards approved by the Safety Manager.

## **6. WORK AT ELEVATED PLACES**

### **6.1 General**

Scaffolds, ramps, ladders, and platforms shall be provided for all work to be done 2 meters or more above the ground.

Erection, replacing, and dismantling of scaffolds ramps, and platforms shall be directed by the construction supervisors.

Unauthorized persons shall be prohibited from entering the construction area of scaffoldings, ramps, and platforms. Safety ropes and caution signs like NO ENTRY and DANGER OVERHEAD shall be displayed during the construction work.

Scaffolds, ramps, and platforms shall be kept free from grease, mud, or any other material, and shall be inspected regularly every month, and any damaged or unsafe portions shall be repaired or replaced by the immediately.

Safety nets shall be provided where scaffolds are infeasible or unavailable, such as when assembling pipe rack, stack, and structure.



All openings and ends of platforms located 2 meters or more above the ground shall be barricaded or covered. Work at high elevations without a safety belt or safety net shall be prohibited.

### **6.2 Metal-Tube Scaffolding**

The ground on which the uprights are to be erected shall be firmly compacted. If the ground is uneven, adjustable metal base plates shall be used.

In general, the spacing of the uprights shall not exceed 1.8 meters longitudinally, and 1.5 meters in the span direction. Joints of the uprights shall be in a line but staggered.

Metal fittings shall be secured and tightened with proper tools.

The construction of this type scaffolding shall be executed to follow the supplier's procedure.

### **6.3 System Scaffolding**

The scaffold height generally shall not exceed 45 meters, but system scaffolding which exceeds 45 meters shall be designed for the strength. The height of the upright frame shall not exceed 2 meters, and the spacing shall not exceed 1.8 meters. Upright frames shall be tied to cross braces and ledger frames.

Braces shall be fixed by pins or screws to prevent loosening.

The spacing of ties or stays for other walls shall not exceed 5 meters vertically and 5.5 meters horizontally.

System scaffolding shall be erected in accordance with the manufacturer's specification.

### **6.4 Tank Scaffolding**

Structural steel, straps, steel bars for brackets, hooks and hangers shall be free from any damage or corrosion.

Guardrails shall be wire rope not less than 9 mm in diameter or steel pipe not less than 13 mm in diameter. Nylon rope shall not be used.

Spacing between scaffold brackets shall not exceed 3.5 meters.

Planks shall be supported at 2 points or even at 3 point, if necessary.

All ladders shall be fixed to the tank side wall at every 4 meters of height.

### **6.5 Material Handling**

Materials, rubbish, and tools shall not be thrown from upper levels to lower levels or to the ground. Excess materials shall not be placed on the work floor or runway.

When lowering or moving materials on the ground, suitable devices, such as a chute, bag, container with a rope, or a device tied securely with rope, shall be used.

During the work, the foreman shall carefully keep watch, provide NO ENTRY and DANGER OVERHEAD signs, and rope off the related work area for safety.



## **7. ELECTRICAL WORK**

### **7.1 General**

All electrical work shall be performed by qualified and experienced workers. Equipment shall be locked or secured to prevent starting by unauthorized persons.

Live parts of apparatus and wiring shall be effectively guarded to protect all workers or objects from coming into contact.

All equipment and wiring shall be checked daily by the operator before starting work. All electrical circuits shall be grounded. Warning signs or posters, such as DANGER, NO ENTRY, shall be displayed at dangerous places, such as power generator, switch boxes, and overhead or underground cables.

### **7.2 Welding Machine**

Before welding machines are used, insulation shall be tested and certified to be in safe operating condition. Automatic anti-electric shock devices shall be provided for all welding machines and tested every day before work is started.

### **7.3 Movable Wiring**

Wiring shall be cab-type cable having a dielectric strength of not less than the rated voltage of 600 volts. Cable having ample capacity to the load shall be used.

All cables shall be installed away from any steel materials, such as wire rope, steel-frame scaffold, etc, and cable with any external damage shall not be used.

### **7.4 Grounding**

To prevent short circuits or electric shocks, special precautions, such as grounding, shall be taken for wiring work where metal scaffolds or steel structures are erected. Grounding shall be insured by connecting the wire to an earth rod buried firmly in the ground. Brass or steel bolts and nuts shall be used for grounding terminals of all electrical equipment.

## **8. ERECTION WORK**

### **8.1 General**

The erection work plan and procedure shall be checked.

Warning signs of NO ENTRY and safety ropes shall be provided around the erection working area. The strength of the road and any obstacles on the route of the crane shall be checked. The road shall be reinforced and obstacles removed, where required.

Only authorized persons having a license shall be permitted to operate the crane or to do slinging for lifting equipment.



Lifting work shall not be carried out during bad weather, such as strong winds or rain. All cranes and winches shall be tested, inspected regularly each month. Cranes or winches shall be locked and broken when not in operation.

### **8.2 Erection by Gin Pole**

The gin pole shall be assembled by a mobile crane or sub-gin pole, from the lower section to the upper section.

Based on the erection plan, the required number of guy ropes (four being on the minimum) shall be installed between the top of the gin pole and the man dead.

During installation of the guy rope, the pole shall be supported by a mobile crane or sub – gin pole.

When dismantling the gin pole, a watchman shall be assigned. The gin pole shall be dismantled carefully to prevent it from falling or being damaged.

### **8.3 Rigging Work**

Rigging work shall be performed under the direction of an authorized foreman.

The lifting weight shall be the total weight of the equipment or materials, crate, and lifting tackle.

Ropes shall be of good quality, free from rust, corrosion, and deformation. Wire rope shall be replaced when either of the following critical conditions is observed:

- 1) Quantity of broken wires exceeds 10 percent of the total in one strand.
- 2) Reduction in diameter exceeds 7 percent of the original.

Material shall be lifted by at least 2 ropes, and the sling angle shall not exceed 60 degrees.

The coefficient of safety for the main wire and other rigging shall be 6 or more when it uses.

Padding shall be provided at sharp edges of materials to be lifted to prevent the ropes and slings from being damaged or cut.

A guy rope shall be provided especially for extra-long or unstable special materials to be lifted.

## **9. CONSTRUCTION EQUIPMENT**

### **9.1 General**

Prior to use, all construction machinery and mechanized equipment shall be inspected and tested by a competent mechanical engineer and confirmed to be in safe operating condition. Inspection and test shall be conducted at least once a month to assure safe operation, and the records shall be kept by the Safety Manager.

Any machinery or equipment found to be unsafe shall not be used until the unsafe conditions have been corrected. All repairs on machinery and equipment shall be executed at a location designated for this purpose.

Machinery and equipment shall be operated only by designated personnel. Machinery or equipment requiring a licensed operator shall not be permitted to be operated without such an operator. Machinery and equipment shall be locked or secured to prevent their being started unauthorized persons.



## 9.2 Safety Devices

All belts, gears, shafts, pulleys, sprockets, spindles, flywheels, or other reciprocating, rotating, or moving parts of equipment shall be provided with protective guards to prevent contact by personnel. All drums on load-hoisting equipment shall be equipped with proper ratchets or other positive locking devices.

A stopper shall be installed on the hook of the crane to prevent the rope from slipping off.

All pressurized equipment and systems shall be equipped with approved safety or relief valves and proper pressure gauges.

## 9.3 Pressurized Equipment

Any pressurized equipment or systems confirmed to be unsafe shall be tagged OUT OF SERVICE, DO NOT USE. Use of such equipment shall be prohibited until the unsafe condition is corrected.

Pressurized equipment shall be operated and maintained only by qualified and authorized personnel.

It is advisable that the safety valve setting not exceeds 110 percent of the working pressure. The discharge from safety valves, relief valves, and blow offs shall be directed away from personnel.

## 9.4 Refueling

Gasoline or diesel engine equipment must not be refueled while the engine is operating. Gasoline and fuel should be dispensed through a pump and hose. Approved safety cans may also be used.

# 10. HAND TOOLS

## 10.1 General

All hand tools shall be kept in satisfactory condition and used only for the purpose for which they are designed. Prior to use; power tools shall be inspected and tested to ensure safe operating conditions. Periodic inspection shall be made to assure safe operating conditions.

When work is being carried out at an elevated position, tools not in use shall be secured or placed in holders.

Flexible rubber cable shall be used for all portable electric tools.

Waterproof connectors shall be used for cable connections.

## 10.2 Grinding Tools

Use of cracked or damaged grinding wheels shall be prohibited.

## 10.3 Pneumatic Tools

Air hoses shall be pressure-rated by the manufacturer, and this pressure shall not be exceeded. Defective hoses shall not be used. Compressed air shall be exhausted from the line before disconnecting tools from the line.



## **11. WELDING AND CUTTING**

### **11.1 General**

All welding and cutting apparatus shall be inspected daily.

Defective apparatus and equipment shall be replaced or repaired.

Combustible materials, equipment such as gas cylinders, rubber hoses, and debris shall be removed or shielded from heat, sparks, and slag from welding and cutting.

Welding or cutting work at elevated places shall be conducted only under safe conditions. A safety belt shall be worn.

When welding or cutting in confined areas for a long time, the space shall be well ventilated. During the work, the concentration of oxygen in the air must be greater than 18 percent. When working in a confined area, the workers should at least be paired to avoid accidents.

### **11.2 Welding Work**

All electric welding machines shall be effectively grounded. The ground lead for the welding machine shall be mechanical strong and electrically adequate for the service required.

Approved connectors shall be used to connect the welding cable whenever welding work is suspended or the welder leaves the construction area, the switch shall be turned off and the welding rod disconnected from the holder.

### **11.3 Gas Work**

Cylinders shall be stored in a well ventilated location and shielded from direct sunlight with steel plates or incombustible canvas.

Cylinders transported by crane, hoist, or derrick shall be loaded on cradles, nets, or skid pans, but never in slings or chains or by magnets.

Cylinder caps shall be in place when cylinders are in storage, in transit, and whenever the regulator is not in place.

Acetylene cylinders shall be in an upright position during use and secured to prevent displacement.

Oxygen cylinders and fittings shall be kept away from oil or grease and not handled by oily hands or gloves.

All connections between hose and torch, or regulator shall be tightened rigidly with steel hose bands.

Pressure gauges with cracked glass or damaged regulators shall be renewed.



## **12. RADIOGRAPHY**

### **12.1 General**

Planning and procedure for radiography initially shall be formulated.

All procedures shall be thoroughly discussed by all related persons for familiarization.

All radiation equipment and radioactive materials shall be stored, handled, transported, or disposed of so that no person receives an unnecessary dose of radiation.

Monthly inspections shall be made of radiation apparatus, and the results shall be recorded and filed by the Construction Contractors for the required period. Shield ability of the radioactive material container( to be stored safety after daily work ) shall be inspected every six months.

### **12.2 Supervisor**

Radiography shall be performed under the direction of the radiography supervisor responsible for this work. A supervisor shall be appointed at every radiation area.

### **12.3 Workers**

All workers should have extensive knowledge of the work, such as radiation procedure, operation of radiation apparatus, and the effects of radiation on the body.

### **12.4 Radiation Area**

The area covered within a radius of 5 meters from the radiation working spot or location shall be called the radiation area.

Trespassing in this area shall be strictly prohibited. Warning signs, labels, and safety ropes or a fence shall be provided to prevent trespassing.

### **12.5 Radiations Work**

Posters showing the rated power output, that radiation is taking place, no entry allowed, and the danger to be displayed where radiation work is being carried out. Before starting the radiation work, the restricted area shall be checked to confirm that no unauthorized persons are in the area and to reconfirm it during the radiation work.

Radiation apparatus shall be operated by a radiation supervisor or an assistant authorized by a radiation supervisor.

All workers entering the restricted area shall wear badges sensitive to radiation.

### **12.6 Storage of Radioactive Materials**

Radiation materials shall be stored separately from other material or equipment. The storage place of radioactive materials shall be 10 centimeters or more above the ground and locked to prevent accident. Radiation materials shall be stored in the container made of lead of ample thickness with a lock.





### **12.7 Emergency Action**

In case of trouble, accident, or loss of radioactive materials, the following provisions shall apply:

- 1) When radioactive material is in an abnormal state due to mechanical fault in the radiation apparatus, the position of the radioactive material shall be checked with a meter, and the position shall be shielded by a lead plate to prevent radiation from dispersing.
- 2) When a capsule or holder of radioactive material is dropped, the area shall be designated a restricted zone, and this zone shall be examined by a meter. (Geiger counter)
- 3) When radioactive material is scattered from a broken capsule, the contaminated area shall immediately be declared a restricted zone.
- 4) All workers shall be evacuated immediately from an area where hazardous radiation is forecast.

## **13. SANITATION**

### **13.1 General**

All personnel engaged in the construction work shall pay much attention to maintenance of a clean and sanitary condition in the construction area and temporary facility area.

### **13.2 Toilet**

The temporary sewer system, including septic tanks, piping and manholes, will be provided and installed prior to construction work.

Toilet facilities up to and including the connection to the nearest manhole of the temporary sewer system shall be provided and installed in the temporary facilities area subject to prior approval of Employer. Toilet in the construction area shall be of portable type.

Toilet rooms shall be kept in good sanitary condition. They shall be cleaned at least daily.

### **13.3 Refuse Disposal**

The sufficient covered garbage containers should be provided at all necessary places of their responsibility to ensure adequate storage capacity during the construction work.

The containers shall be kept clean and emptied when full, but not less than once a day.

### **13.4 Epidemic Diseases**

Whoever finds suspicious conditions of a person possibly affected by an epidemic disease, he must report immediately to the Contractor's Administration Manager the name of the person and necessary information.

In a case of suspected food poisoning or an unusual prevalence of any illness in which fever, diarrhea, sore throat, vomiting, or jaundice is a prominent symptom, Safety Manager must report the outbreak immediately to the local Health Authority and office concerned.