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| **طرح نگهداشت و افزایش تولید 27 مخزن** |
| **SPECIFICATION FOR ENVIRONMENTAL JOB****نگهداشت و افزایش تولید میدان نفتی بینک** |
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| D01 | JUL. 2022 | AFD | A.H.Saber | M.Fakharian | Sh.Ghalikar |  |
| D00 | AUG. 2021 | IFC | M.Asgharnejad | M.Fakharian | Sh.Ghalikar |  |
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**REVISION RECORD SHEET**

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1. **INTRODUCTION**

Binak oilfield in Bushehr province is a part of the southern oilfields of Iran, is located 20 km northwest of Genaveh city.

With the aim of increasing production of oil from Binak oilfield, an EPC/EPD Project has been defined by NIOC/NISOC and awarded to Petro Iran Development Company (PEDCO). Also PEDCO (as General Contractor) has assigned the EPC-packages of the Project to "Hirgan Energy - Design and Inspection" JV.

**GENERAL DEFINITION**

The following terms shall be used in this document.

|  |  |
| --- | --- |
| CLIENT:  | National Iranian South Oilfields Company (NISOC)  |
| PROJECT: | Binak Oilfield Development – General Facilities |
| EPD/EPC CONTRACTOR:  | Petro Iran Development Company (PEDCO) |
| EPC CONTRACTOR: | Joint Venture of : Hirgan Energy – Design & Inspection(D&I) Companies |
| VENDOR: | The firm or person who will fabricate the equipment or material. |
| EXECUTOR:  | Executor is the party which carries out all or part of construction and/or commissioning for the project. |
| THIRD PARTY INSPECTOR (TPI): | The firm appointed by EPC CONTRACTOR and approved by GC & CLIENT (in writing) for the inspection of goods. |
| SHALL: | Is used where a provision is mandatory. |
| SHOULD: | Is used where a provision is advisory only. |
| WILL:  | Is normally used in connection with the action by CLEINT rather than by an EPC/EPD CONTRACTOR, supplier or VENDOR. |
| MAY:  | Is used where a provision is completely discretionary. |

1. **Scope**

The main objective of this document is to identify the minimum environmental requirements and criteria for the design of the Binak Oilfield Development.

1. **NORMATIVE REFERENCES**

## Local Codes and Standards

* IPS-G-SF-860 General Standard for Air Pollution Control
* IPS-G-SF-870 General Standard for Soil Pollution Control
* IPS-G-SF-880 General Standard for Water Pollution Control
* IPS-E-SF-860 Engineering Standard for Air Pollution Control
* IPS-E-SF-880 Engineering Standard for Water Pollution Control
* IPS-G-SF-900 General Standard for Noise Control and Vibration
* Iranian Environmental Regulation (1397)

## International Codes and Standards

* GS-EP-SAF-253-EN(2012) General Specification Safety(Impacted area, restricted area and fire zones)
* The Human Environmental Laws, Regulation Criteria and Standards issued by DOE

## The Project Documents

* BK-GNRAL-PEDCO-000-PR-DB-0001 Process Basis of Design

## ENVIRONMENTAL DATA

Refer to "Process Basis of Design; Doc. No. BK-GNRAL-PEDCO-000-PR-DB-0001".

1. **EMISSIONS TO AIR**

## Flare

For flares, following emission measures shall be followed:

Table 1: Emission measures for Flare

|  |  |  |  |
| --- | --- | --- | --- |
| **Scenario** | **Restricted Area** | **Impacted Area** | **Smokeless Factor** |
| Flare flame out | LC 1% | IDLH | N.A. |
| Flare - continuous operation (ignited release) | TLV TWA | N.A. | Ringleman 1 for 100% design capacity |
| Flare - emergency operation (ignited release) | TLV STEL | N.A. | Ringleman 1 for 20% design capacity |

 Table 2: Toxic Threshold Values

| **Material** | **CAS****Number (0)** | **LC 1% 30 min (ppm)** | **IDLH 30 min (ppm)** | **TLV STEL****(ppm)** | **TLV TWA****(ppm)** |
| --- | --- | --- | --- | --- | --- |
| **Hydrogen sulphide** | **H2S** | *7783-06-4* | 472 (1) | 100 (1) (4) | 10 (2) | 5 (2) |
| **Sulfur dioxide** | **SO2** | *7446-09-5* | 866 (3) | 96 (3) (4) | 5 (8) | 2 (8) |
| **Carbon monoxide** | **CO** | *630-08-0* | 2000 (7) | 1200 (4) | 200 (4) | 25 (5) |
| **Carbon dioxide** | **CO2** | *124-38-9* | N.A. | 40000 (4) | 30000 (5) (6) | 5000 (5) (6) |

1. CAS Number is given to ease library checks for up to date threshold values
2. Ineris - Toxicité aigüe de l’hydrogène sulfuré (H2S) - Ineris-DRC-00-25425-ETSC-STi- 00DR294 – Année 2000
3. INRS - Valeurs limites d’exposition professionnelle aux agents chimiques en France - Edition 984 - Aide- mémoire technique –- Décembre 2007 - 2ème edition Ineris - Fiche de données toxicologiques et environnementales des substances chimiques - Seuils de toxicité aigüe - Dioxyde de soufre – Année 2005
4. Ineris - Fiche de données toxicologiques et environnementales des substances chimiques - Seuils de toxicité aigüe - Dioxyde de soufre – Année 2005
5. NIOSH - USA
6. ACGIH – Year 2005
7. OSHA – USA
8. U.K. HSE - Hazardous installations Directorate SPC/Tech/OSD/30 - Januray 2008 - Version 1
9. Ineris - Fiche de données toxicologiques et environnementales des substances chimiques - Dioxyde de soufre SO2 - Version N°1 - Août 2005

N.A.: Not Available

1. **EMISSIONS TO AIR**

## Limit on Liquid Effluents

Emissions criteria for liquid effluents are indicated in Environmental Regulations and Standards, Iranian Protection Organization Summer 1995 (Sewage Disposal Standard) and in IPS-E-SF-880 ('Engineering Standard for Water Pollution Control'). Threshold limit values are summarized in Table 3

Table 3: Maximum Permissible Concentration of Containments in Effluents

| **Pollutant** | **Discharge to****Surface Runoff****(mg/l)** | **Discharge to****Ground Water****(mg/l)** | **Irrigation & Agriculture usage** **(mg/l)** |
| --- | --- | --- | --- |
| Ag | 0.1 | 0.1 | 0.01 |
| Al | 5 | 5 | 5 |
| As | 0.1 | 0.1 | 0.1 |
| B | 2 | 1 | 1 |
| Ba | 2 | 1 | 1 |
| Be | 0.1 | 1 | 0.1 |
| Ca | 75 | - | - |
| Cd | 0.1 | 0.01 | 0.01 |
| Cl2 | 1 | 1 | 0.2 |
| Cl- | (NOTE 1)  | (NOTE 1) | (NOTE 1) |
| CH2O - Formaldehyde | 1 | 1 | 1 |
| C6H5OH - Phenol | 1 | Trace | 1 |
| CN - Cyanide | 0.2 | 0.1 | 0.1 |
| Co - Cobalt | 1 | 1 | 0.05 |
| Cr 6+ | 0.5 | 1 | 1 |
| Cr 3+ | 1 | 1 | 1 |
| Cu | 1 | 1 | 0.2 |
| F | 2.5 | 2 | 2 |
| Fe | 3 | 0.5 | 3 |
| Hg | 0 | 0 | 0 |
| Li | 2.5 | 2.5 | 2.5 |
| Mg | 100 | 100 | 100 |
| Mn | 1 | 0.5 | 0.2 |
| Mo | 0.01 | 0.01 | 0.01 |
| Ni | 1 | 1 | 0.2 |
| Ammonium (NH4) | 2.5 | 0.5 | - |
| Nitrite (NO2-) | 10 | 10 | - |
| Nitrate (NO3-) | 50 | 1 | - |
| Phosphate (Phosphur) | 1 | 1 | - |
| Pb | 1 | 1 | 1 |
| Se | 1 | 0.1 | 0.02 |
| Sulfide SH2 | 3 | 3 | 3 |
| Sulfite S032- | 1 | 1 | 1 |
| Sulfate S042- | 300  | 300  | 500 |
| Vanadium (V) | 0.1 | 0.1 | 0.1 |
| Zn | 2 | 2 | 2 |
| Grease Oil | 10 | 10٭ | 10 |
| Detergent ABS | 1.5 | 0.5 | 0.5 |
| BOD5  | 20  | 20 | 100 |
| COD  | 50  | 50 | 200 |
| Dissolved Oxygen DO (Min.) | >2 | >2 | >2 |
| Total Dissolved Solids TDS | NOTE 2 | NOTE 2 | NOTE 2 |
| Total Suspended Solids TSS | 30 | 30 | 100 |
| Sediment Solids SS | 0 | 0 | 0 |
| pH | 6.5-8.5 | 5-9 | 6-8.5 |
| Radioactive Materials | 0 | 0 | 0 |
| Turbidity (Turbidity Unit) | 50 | 50 | 50 |
| Color (Color Unit) | Note 5 | 75 | 75 |
| Temperature (T) | NOTE 3 | - | NOTE 3 |
| Digestive Coliform (Number in 100 ml) | 100 to 400 | 100 to 400 | 100 to 400 |
| Total Coliforms(Number in 100 ml)MPN | 100 to 1000 | 100 to 1000 | 100 to 1000 |
| Parasites | - | - | NOTE 4 |

1) Amount of chloride in industrial effluents should not exceed 250 mg/L (ppm) of fresh water.

2) Total dissolved solids in industrial effluents should not increase the amount of the materials more than 10% in the underground water/river and any other sources in a distance of 200 m, in which effluent dumped.

3) Increase of temperature should not be more than 3°C within 200 meter from inlet.

4) Number of parasite seeds in the treated urban waste water should not be more than one seed per liter, if it is being used for irrigation of agriculture products which are consumed un boiled (raw)

5) Color of source water should not exceed more than 16 standard units due to industrial effluent, dumped.

## Drinking Water Standard

Table 4: Physical Characteristic of Potable Water

|  |  |  |
| --- | --- | --- |
| **Constituent** | **Maximum Desired Limit (mg/lit)** | **Maximum Permissible Limit (mg/lit)** |
| Total dissolve solids | 500 | 1500 |
| Total hardness | 150 | 500 |
| Calcium (Ca) | 75 | 200 |
| Magnesium (Mg) | 50 | 150 |
| Manganese (Mn) | 0.05 | 0.5 |
| Iron (Fe) | 0.3 | 1 |
| Zinc (Zn) | 5 | 15 |
| Chromium as (Cr) | 0.5 | 1.5 |
| Sulphate (SO4) | 200 | 400 |
| Chloride (Cl) | 200 | 600 |
| Ammonia (N) | 0.002 | 0.05 |
| Detergents | 0.1 | 0.2 |
| Phosphates (P) | 0.1 | 0.2 |

Remarks:

In case of magnesium is greater than 30 mg/lit, the Sulfate content shall not exceed 250 mg/lit.

For more detail on specification of potable water refer to IPS-G-SF-880.

1. **Solid Wastes**

## Waste Categories

CONTRACTOR shall be responsible for waste management during the construction, commissioning, and start-up of the plant. The CLIENT shall be responsible for the waste management during the operating lifetime of the plant. The waste management plan shall incorporate the storage, collection and disposal of solid waste. The purpose of the waste management plan is to ensure that waste disposal is carried out in an environmentally responsible manner.

Wastes are categorized into one of the following classes:

Table 5: Waste Categories

|  |  |
| --- | --- |
| **Waste Category** | **Definition** |
| Hazardous wastes | Wastes which are corrosive, explosive, toxic, oxidizing etc. which constitute a high degree of hazard to public health or the environment. |
| Non Hazardous Wastes | Wastes which are biologically or chemically active in the environment. Examples are household garbage and sanitary waste sludge. |
| Inert wastes | Wastes which are not biologically or chemically active in the environment Examples i.e. glass, concrete and brick. |

## enIRONMENTAL DESIGN CRITERIA

CLIENT / CONTRACTOR shall develop a strategy for waste management based on the hierarchical principles of Reduction - Reuse - Recycle - Recover and aimed at reduction of residual waste that ultimately required disposal.

The consequence thereof includes, but is not limited to:

* Segregation of waste streams to optimize reuse/recycling, handling and safe and controlled residual waste.
* Residual waste disposal through incinerator unit specified by Local Authority

## SOURCES OF RESIDUES

Table 6: Summary of Waste Storage, Treatment and Disposal Methods

| **Type of Waste** | **Origin** | **Storage methods** | **Treatment/Disposal Methods** |
| --- | --- | --- | --- |
| **Hazardous:** |  |  |  |
| Waste oil / oily sludge | Vehicle, equipment, vessels and tanks clean out | Closed containers/drums | Transfers to allocated areas by authorized subcontractors |
| Chemicals | Chemical materials and chemical container | Store closed containers | Transfer by local authority |
| Ni Cd batteries | Substations, Battery room | Containers | Transfer to VENDOR or to allocated area by local authority |
| **Non Hazardous:** |  |  |  |
| Scrap metal | Construction / maintenance activities | Salvage area | Transfer to allocated area specified by local authority |
| Kitchen waste | Accommodation camps/site and shipping material | Closed containers | To the outside of plant by subcontractor |
| Paper and woods | Construction camps/ site and shipping material | Salvage area | Transfer to allocated area specified by local authority |
| Absorbent material | Use to remove chemical spills | Sealed drums | As per VENDOR instruction |
| **Inert:** |  |  |  |
| Soil and rock spoils | Project construction | Direct disposal | Reuse as back fill |
| plastic | Accommodation camps/ site | Containers | Eliminated with kitchen waste |

1. **Chemicals**

All chemicals on site shall be stored and handled in accordance with the “Materials Safety Data Sheets” (MSDS).

Hazardous chemicals will be held in appropriate segregated and impermeable areas on site.

## OCCUPATIONAL EXPOSURE LIMITS

To give protection to the workforce occupational health and safety limits exist which should not be exceeded at any point on a work site where people could be exposed to noxious or toxic gases. These limits apply over two time averages: the time weighted average (TWA) is the average concentration over an 8 hours period and the short term exposure limit (STEL) is a short-term maximum which applies as the average concentration over a 15 minute period that cannot be repeated more than 4 times per day with at least 60 minutes between exposure periods. The main applicable occupational exposure limits, taken from occupational exposure limits, are reproduced in following table.

Table 7: Occupational Exposure Limits in the workforce\*

|  |  |  |
| --- | --- | --- |
| **Substance** | **TWA (ppm)** | **STEL (ppm)** |
| CO2 | 5000 | 30000 |
| CO | 25 | 200 (1) |
| Propane | 2500 | - |
| Butane | 800 | - |
| pentane | 600 | - |
| n-Hexane | 50 | - |
| Heptane | 400 | 500 |
| H2S | 5 | 10 |
| NO2 | 3 | 5 |
| SO2 | 2 | 5 |

\*: Issued by Iran Ministry of Health

(1): NIOSH

For emergency situations that are unlikely to actually occur, a higher exposure concentration based on the Emergency Response Planning Guidelines (ERPG) developed by the American Industrial Hygiene Association can be used.

The ERPG-2 threshold for H2S is 30 ppm (43 mg/m3) and for SO2, 3 ppm (7.8 mg/m3). This threshold is defined as:

The maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to 1 hour without experiencing or developing irreversible or other serious health effects or symptoms that could impair their abilities to take protective action.

The ERPG-3 threshold for H2S is 100 ppm (143 mg/m3) and for SO2, 15 ppm (39 mg/m3). This threshold is defined as:

The maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to 1 hour without experiencing or developing life- threatening health effects.

1. **NOISE LIMIT**

## GENERAL

Noise levels shall limited throughout the sites in the development in order to:

* + Minimize the risks of hearing damage to personnel;
	+ Ensure alarms are audible;
	+ Permit adequate speech, telephone and radio communication;
	+ Maintain working efficiency; and
	+ Minimize off-site impact.

Similarly, vibration levels shall be limited, in order to prevent a health hazard and maintain the working efficiency of personnel. A maximum noise level of 85 dB, measured at 1m, shall be taken as the minimum standard for the PROJECT, consistent with local requirements and good international practice. Local requirements are detailed in IPS-G-SF-900.

## NOISE CONTROL

Noise limits for individual items of machinery shall be specified taking into account the results of a project noise study and the location of equipment and its acoustic environment. If it is not cost-effective to use low-noise equipment, sound-proofing shall be considered using sound-absorbent materials. Any sound-proofing enclosure should be designed to cause minimum interference with routine inspection and maintenance of the equipment. Suitable access doors and observation windows should be provided.

Personnel hearing protection shall only be used where engineering methods of noise control are not cost-effective or reasonably practicable. Such areas will be designated as 'restricted', with suitable local signage. In such areas, hearing protection will be mandatory.

## VIBRATION CONTROL

Priority shall be given to limiting the emission of vibrations from equipment by balancing of rotating equipment and provision of anti-vibration mountings.