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## طرح نگهداشت و افزایش تولید 27 مخزن

### ACTIVE FIRE PROTECTION AND SAFETY CONCEPT

#### نگهداشت و افزایش تولید میدان نفتی بینک

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## 1.0 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 Client (PEDCO). Also PEDCO (as General Contractor) has assigned the EPC-packages of the Project to "Hirgan Energy - Design and Inspection" JV.

As a part of the Project, New Gas/Condensate Pipelines (from Binak New GCS to Siahmakan GIS/Binak PU) shall be constructed.

### GENERAL DEFINITION

The following terms shall be used in this document.

CLIENT:	National Iranian South Oilfields Client (NISOC)
PROJECT:	Binak Oilfield Development – Surface Facilities; Gas & Gas-Condensate Pipelines
EPD/EPC CONTRACTOR (GC):	Petro Iran Development Client (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 EPD/EPC CONTRACTOR (GC) and approved by 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 CLIENT rather than by an EPC/EPD CONTRACTOR, supplier or VENDOR.
MAY:	Is used where a provision is completely discretionary.

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## 2.0 SCOPE

These criteria include facilities design, equipment design and selection, and outlining appropriate procedures and work practices to be implemented in later staged of project execution.

The objective of Safety concept is to ensure that the Plant is designed in such a way that it can be constructed, operated and maintained safely, in a healthy manner and in an environmentally acceptable way by clearly addressing and taking into consideration Health, Safety and environmental aspects during the design process and verifying its implementation.

To achieve these objectives, systems shall be designed, and organization shall be put in place:

- To prevent the occurrence of hazardous events,
- And provide means to limit the consequences that might occur.
- The Safety concept:
  - ensures integrity of operation, and in particular:
  - avoids exposure to potential hazards,
  - minimizes the potential or frequency of hazardous events,
  - controls or mitigates the consequences of the hazards, including impact to
    - environment,
  - provides means to ensure suitable safety to life in hazardous occasion is available,
  - Ensures the installation shall be designed to a safe standard,
  - Provides safe working conditions for personnel,
  - Defines the requirements regarding asset protection, and ensure they are duly taken into consideration.

## 3.0 ABBREVIATION

AFP	Active Fire Protection
ALARP	As Low As Reasonably Practicable
F&G	Fire & Gas
HAZID	Hazard Identification
HAZOP	Hazard and Operability Study
HSE	Health, Environment and Safety

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ISBL	Inside Boundary Limit
OSBL	Outside Boundary Limit
PFP	Passive Fire Protection
SIL	Safety Integrity Level
CGD	Catalytic Gas Detectors
IRGD	Infrared Gas Detectors

#### 4.0 PROJECT REFERENCED DOCUMENTS / DRAWINGS

- Specification for Passive Fire Protection
- Specification for Environmental Job
- Specification for hazardous area classification
- Material Safety Data sheets (MSDS)
- Process Design Criteria

#### 5.0 CODES AND STANDARDS

##### 5.1 IPS (IRANIAN PETROLEUM STANDARD)

IPS-G-SF-126	General Standard for Hand And Wheel Type Fire Extinguishers
IPS-E-PR-190	Engineering standard for Layout and spacing
IPS-E-CE-260	Engineering standard for Fireproofing
IPS-E-SF-220	Engineering standard for Fire Water Distribution & Storage facilities
IPS-E-SF-380	Engineering Standards for fire protection in buildings

##### 5.2 NFPA (NATIONAL FIRE PROTECTION ASSOCIATION)

NFPA 10	Standard for Portable Standard for Portable Fire Extinguishers
NFPA 22	Standard for Water Tanks For Private Fire Protection
NFPA 30	Flammable and Combustible Liquid Codes
NFPA 704	Standard System for the identification of the hazards of materials for emergency response.

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### 5.3 API (AMERICAN PETROLEUM INSTITUTE)

API RP 505 Recommended Practice for classification of locations for electrical installations at petroleum facilities

## 6.0 SITE CONDITION

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

## 7.0 SAFETY PHILOSOPHY

The main sources of a fire hazard are hydrocarbons in the form of flammable gas, crude oil and condensate. In the case of liquid fires the main firefighting methods are based on eliminating the fuel source if possible, cooling the equipment involved and separating the fuel from oxygen. In the case of a gas fire it is generally considered dangerous to extinguish the fire itself because this leaves escaping gas to form gas clouds with the subsequent risk of an explosion. Such an explosion could have far more devastating effect than letting the fire burn while attempting to shut off the gas leak and cool the equipment involved.

The most effective method of containing a fire situation is to have adequate separation distances between the plant/process units. These allow for firefighting access and contain the fire to a limited plot area. Unfortunately, this is not always possible and other methods of containing a fire area are necessary.

Small fires can usually be tackled in the early stages with the use of portable fire extinguishers, of which a sufficient number always are available local to the risks. In the event of a more serious situation developing, in the form of a pool fire, jet fire then the fixed firefighting facilities on site is required.

### 7.1 DESIGN CRITERIA

Safety aspects will be incorporated into the design as dictated by the specifications issued by the Client.

Where no standards exist to cover a specific aspect, the standards, procedures and normal good engineering practice shall be used.

The philosophy assumes the occurrence of only one major incident at one time.

Contractors & suppliers should have quality system that conform, to BS 5750/ ISO 9000 series.

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## 7.2 DESIGN SAFETY OBJECTIVES

The general design safety objectives will focus on a cost risk optimized solution for risk being ALARP and specifically as follows:

- Minimize the risk and consequences of an accidental event.
- Minimize the potential for hazardous occurrences
- Ensure a safe working environment for personnel
- Ensure adequate means of escape are provided
- Provide sufficient safety devices and redundancy to detect, isolate and minimize uncontrolled releases of flammable and toxic liquids and gases.
- Provide appropriate fire protection systems to rapidly bring under control and extinguish any reasonably foreseeable fire which could develop during normal operations.
- Minimize the potential for pollution of the environment from accidental spills, venting or flaring of hazardous materials.

## 7.3 RISK ASSESSMENT

The primary goal of risk assessment is to identify the hazards that are involved in a process or system and develop adequate safe guards to prevent or reduce negative consequences from the related hazardous events. This study will be done based on below considerations and guidelines.

### 7.3.1. PRIMARY OBJECTIVE

This project shall be designed so that the risks from potential hazards are eliminated or kept as low as reasonably practicable (ALARP). It shall also consider the possible impacts upon any nearby populations.

This primary objective can be achieved by setting the following goals;

- Removal of hazards;
- Reduce the risks of hazardous events occurring;

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- Minimize the risk of escalation should a hazardous event occur, and
- Take the necessary remedial measures to protect personnel, the facility and environment should an accident occur, (e.g. initiate a plant ESD).

Preference shall be given to simplifying the design wherever possible with the emphasis on inherent safety and separation of hazards.

### 7.3.2. HAZARD IDENTIFICATION

The identification of Hazards (HAZID) in the design process is critical, enabling the efficient development of HSE into the design and supporting philosophies and specifications.

The main objectives of the HAZID process are to:

- Ensure that all major hazards have been identified;
- Understand the causes, consequences and likelihood of the hazards;
- Determine that effective controls are in place/necessary for the management of the hazard; and
- Provide a process of evaluation which is auditable and can be verified by a third party.

The approach involves the interrogation of the proposed design to identify the associated hazards, their causes, consequences and likelihood, and establishes the measures necessary to manage the risk (Risk Reduction).

### 7.3.3. RISK REDUCTION

The following safeguards should be considered to reduce the likelihood of hazardous events occurring, e.g. fire and explosion:

- Simplify the process
- Ensure that the processing of flammable or explosive substances is safe, and complies with recognized international standards

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- Minimize probability of loss of containment through material selection, inspection and quality control measures
- Control of substances hazardous to health (COSHH)
- Eliminate or minimize possible sources of ignition and separate from hazards (e.g. leak sources)
- Prevent the uncontrolled release of flammable or explosive substances
- Prevent unwanted and potentially dangerous accumulation of combustible, flammable or explosive substances and atmospheres
- Provision of proper access for firefighting, emergency evacuation, and maintenance
- Design for ease of operation and maintenance consistent with minimum manning

The elimination of hazardous occurrences is obviously not possible. Specific measures can be implemented to reduce the probability of hazardous events occurring (e.g. fire and explosion) and to control or limit the extent of the event. The following measures should be considered to mitigate, control and recover from hazardous events:

- Provision of fire & gas detection designed to raise the alarm
- Minimize the duration of any event by reducing pressure and inventory, and increasing depressurization rate where applicable
- Minimize the risk of escalation by reducing the probability of ignition
- Extinguish any resultant fire
- Reduce the effects of any resultant explosions, e.g. overpressure
- Ensure emergency power and communication facilities will be available when required
- Emergency Control Planning
- Allow escape, evacuation and rescue of personnel

	<p>نگهداشت و افزایش تولید میدان نفتی بینک سطح الارض</p> <p>احداث خطوط انتقال گاز/مایعات گازی از ایستگاه تقویت فشار گاز بینک تا ایستگاه تزریق گاز سیاهمکان/واحد بهره برداری بینک</p>																									
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#### 7.3.4. HAZOP

A HAZOP will be conducted to identify safety and operability.

### 7.4 F&G SYSTEM

#### 7.4.1 FIRE & GAS DETECTION

The primary objectives of the Fire & Gas Detection system are to:

- Provide early detection of the presence of fires or flammable gas releases.
- Communicate detection information to personnel so that response measures can be initiated.

These objectives should be pursued as far as reasonably practicable through the provision of the following measures in the design:

- Prompt detection of fire and gas leaks through links to initiate alarms and automatic executive actions for safeguarding.

Announcement of existing mimic panel light will be activated by manual call points to enable personnel to raise the alarm on discovery of a hazardous condition.

For gas condensate pipeline:

Gas condensate will be sent to Binak production unit and as this unit is not in scope of work of this project, no F&G devices will be considered for that area. Transferring facilities are part of gas compressor unit and will be considered in that unit.

For Gas injection pipeline (8" buried pipeline):

Transferring facilities are part of gas compressor unit and will be considered in that unit. For receiving facilities, existing F&G system will be studied, if more F&G devices are required will be shown in related document and drawings.

	<p>نگهداشت و افزایش تولید میدان نفتی بینک سطح الارض</p> <p>احداث خطوط انتقال گاز/مایعات گازی از ایستگاه تقویت فشار گاز بینک تا ایستگاه تزریق گاز سیاهمکان/واحد بهره برداری بینک</p>																									
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## 7.5 ACTIVE FIRE PROTECTION AND FIRE FIGHTING SYSTEM

The first objective of firefighting is to extinguish a small fire before it expands, or to control a large fire until adequate help arrives.

Selection of firefighting systems should be based on the fire types identified in plant.

There are two basic types of fire-fighting equipment ready for immediate use:

Portable and fixed. Fixed fire-fighting systems shall be installed in areas representing a major fire risk, and particularly cover equipment containing significant quantities of hydrocarbons.

Fire protection equipment should be kept in first-class condition and should be tested periodically in accordance with accepted procedures.

Firefighting system will be designed based on the assumption that there is only one major fire at a time.

The method used to determine the designation of fire areas will assist in the design and construction phases, as it allows the allocation of loss prevention systems, equipment and documentation.

The active fire protection system will be employed for the prevention, control, and extinguishing and explosion protection of the plant potential fires.

The active fire protection system consists of:

Transferring facilities (4" gas condensate & 8" gas buried pipeline) are part of gas compressor unit and will be considered in that unit. Gas condensate will be sent to Binak production unit and as this unit is not in scope of work of this project, no firefighting equipment will be considered for that area.

For receiving facility in Siahmakan gas injection unit, just on Pig receiver will be considered. As this device will be located inside existing plant, existing firefighting equipment will be studied, if more firefighting equipment ( such as portable & wheeled extinguishers) are required will be shown in related document and drawings.