Petroleum Development Oman L.L.C.

OCCUPATIONAL HEALTH SPECIFICATIONS

Document ID	**SP-1231**
Document Type	**Specification**
Security	**Restricted**
Discipline	
Document Owner	
Month and Year of Issue	**December 2020**
Version	**6.0**
Keywords	Occupational Health, Industrial Hygiene, Health hazards,

Document Authorisation

Document Owner	Document Custodian
 Dr Nasser Al Yaqoubi Ref. Ind: MCOH	 Haitham Al adwani Ref. Ind: MCOH1

Revision History

The following is a brief summary of the four most recent revisions to this document. Details of all revisions prior to these are held on file by the Document Custodian.

Version No.	Month & Year	Author's Name and Title	Scope / Remarks
1.0	18 February, 2002	Wayne Austin, CSM/32	Initial issue. Supersedes: HSE-SM: Ch 12, s3.0 (Rev.0, Oct-96) and Ch4, s4.0 - s5.0 (Rev.1, Oct-96) Occupational Health Management Guidelines (1996): Section 2 (GN8, GN11, GN12, GN14, GN15, GN16, GN17, GN18, GN20, GN21, GN22, GN23) and Section 3 (IN1, IN2, IN3, IN4, IN5, IN6, IN 9, IN10, IN11, IN12, IN13, IN14) PDO Hearing Conservation Program (Dec-99) PDO Brochure: "Keep Your Back Working"
2.0	25 January, 2007	Brett Young, MSE/ 32	Included requirements for HRA, HFE in New projects & Health Reporting Modified Noise Exposure limits to meet EU and International standards New vibration exposure limits included from HSE UK Changes to Section 5.0 includes workstation design and Indoor Air Quality guidelines New Section 6.0 on Biological Health Hazards
3.0	24 August, 2011	Dr Suad Lamki	Included Legal requirements for medical record keeping, Ergonomics, PPE, Eye Hazards, UVR Chemical TransmissionOccupational Allergens Mercury Copd, Legionnaires, Psychological Stress, Health Performance Monitoring.
4.0	23 February, 2014	Jose Petrizzo and Mitul Desai (MCOH1)	Simplified the document and changed its structure into the Standards, Health hazards, OH monitoring & HPI. Removed the lengthy theory part & included hazard specific Accountabilities. Linked with the new IH procedures (asbestos, legionella, manual material handling, fit testing etc.)
5.0	1st. January, 2017	Jose Petrizzo (MCOH1)	Inclusion of:

			Updated requirements for: HRA, HFE, introducing Control Banding concept and Respiratory Protection Selection Guide.
6.0	03th. December 2020	Jose Petrizzo (MCOH1)	Updated of: 1. purposes of HIA, HMP HRA, HFE. 2. HRA frequency review 3. inclusion of new PDO references SP-2215 and 2222 4. Deleted Respitratory Protection Appendix for simplification of content and had been included in SP-1234 5. Guidelnies linked to the specification

User Notes:

1. The requirements of this document are mandatory. Non-compliance shall only be authorized by a designated authority through STEP-OUT approval as described in this document.
2. A controlled copy of the current version of this document is on PDO's live link. Before making reference to this document, it is the user's responsibility to ensure that any hard copy, or electronic copy, is current. For assistance, contact the Document Custodian.
3. Users are encouraged to participate in the ongoing improvement of this document by providing constructive feedback.

Related Business Processes & CMF Documents

Related Business Processes

Code	Business Process (EPBM 4.0)

Parent Document(s)

Doc. No.	Document Title

Other Related CMF Document(s)

Doc. No.	Document Title
SP 1194	Chemical Management
SP 1230	Medical Examination, Treatment and Facilities
SP-1232	Public Health
SP-1234	Personal Protective Equipment
SP-1237	Ionising radiation
SP-1170	Naturally Occurring Radioactive Materials
SP-2215	Human Factors Engineering
SP-2222	Heat Stress Managament
PR-1243	Medical Emergency Response
PR-1418	Incident Notification, Reporting & Investigation

TABLE OF CONTENTS

Introduction

1.1 Purpose and Objectives

This Specification describes PDO's requirements for managing occupational health risks associated with the activities of **PDO and its Contractors** by incorporating the Health Management Standards (HMS) and Health manuals into projects and all activities. HMS are concerned with preventing negative impacts to health from work activities and providing a healthy workplace. This contributes to a healthy thriving workforce which drives better business results.

1.2 Performance Requirements

Unless otherwise stated in this Specification, occupational exposure limits (OELs) for all chemical and physical agents herein shall be the Threshold Limit Values (TLVs) defined in the latest annual edition of the American Conference of Governmental Industrial Hygienists (ACGIH) and Biological Exposures Indices (BEI) booklet. Where a more stringent OEL is defined by local legislation or by PDO, the Corporate Industrial Hygienists will publish the OEL in this document.

These TLVs can be obtained on a case-by-case basis from the Corporate Industrial Hygienists or from the PDO Health Hazard Register (HHR).

In case of chemical substances without OEL, the PDO Control Banding will be applied for control's implementation (See Appendix 2).

1.3 Responsibilities

Directors are responsible for ensuring that the activities they control are managed in accordance with the requirements of this Specification. In the event that circumstances prevent compliance with this Specification, Directors or their representative shall seek step-out approval according to CP-122 "HSE Code of Practice": Organizational, Roles, Responsibilities, Accountabilities and Authorities.

Corporate Functional Discipline Heads are responsible for ensuring that the requirements of this Specification are reflected in the documents for which they are responsible.

Contract Holders are responsible for communicating this Specification to Contractors, and for ensuring that the requirements of this Specification are adhered to within the scope of their contracts. In the event that circumstances prevent compliance with this Specification, Contract Holders shall seek step-out approval according to CP-122 "HSE Code of Practice": Organizational, Roles, Responsibilities, Accountabilities and Authorities.

Contractors are responsible for ensuring that activities undertaken within the scope of their contracts are managed in accordance with all the requirements of this Specification

1.4 Reports & Records

PDO & Contractors: Monitoring undertaken in PDO facilities either by external consultants or Industrial Hygienists from the Contractor companies for any health hazards (noise, chemical, radiation) or for any exposure (*biological* monitoring) shall be provided to the Corporate Occupational Health Team for their review and inclusion into the Company monitoring statistics / occupational exposure data management (OEDM).

Records must be kept for an appropriate length of time. For occupational health information [occupational hygiene sampling data (such as OEDM)] this is often determined by legislation and may be as long as 30 years after exposure ceases, or according to legislative requirements, whichever is the longer.

Since the employee's work history forms part of the exposure profile, provision should be made to keep that portion of the personnel file, which contains details of job history and movement within the company for the same length of time.

It is essential that the links between exposure data, the work history and the medical record be maintained for the full length of time. In the ideal situation, one database will house all the information with appropriate securities protecting the confidentiality where necessary.

Any non-compliance with this Specification shall be notified, investigated and reported per "HSE Code of Practice": Improvement.

1.5 Legal Requirements

Legal local Occupational Health requirements in Oman are stipulated in Royal Decree No. 35/2003-2012 "Oman Labor Law" and the Occupational safety and Health regulations for Establishments governed by labor law - Ministerial Decision (MD) number 286/2008.

Inspectors appointed by the Ministry have the power to examine the worker-related records of an establishment and to enter places of work. Inspectors also have the authority to question whoever they wish and to publish reports on the results of their investigations.

1.6 Scope and Applicability

The following Health Management Standards are described in this Specification:

1) Health Impact Assessment (HIA)
2) Health Risk Assessments (HRA)
3) Human Factors Engineering (HFE)

The other PDO specifications / procedures related to Health Management are following:

1) Product Stewardship (SP-1194)
2) Medical Examination, Treatment and Facilities (SP-1230)
3) Public Health (SP-1232)
4) Smoking, Drugs & Alcohol (SP-1233)
5) Personal Protective Equipment (SP-1234)
6) Ionising radiation (SP-1237)
7) Medical Emergency Response (SP-1243)
8) Incident Notification, Reporting & Investigation (PR-1418)
9) Human Factors Engineering (SP-2215)
10) Heat Stress Standard (SP-2222)

This Specification also describe:

- Management of health hazards
- Exposure monitoring of health hazards
- Reporting of Health Incidents and Health Performance Indicators

All the Health Management Standards & Specifications are applicable to PDO and all Contractors.

They are also applied where there is an interface between PDO and Contractor activities, which may result in either:

- PDO generated exposures of potential health significance to contractors, or
- Contractor generated exposures of potential health significance to PDO employees

1.7 Review and Improvement

Any user of this document who encounters a mistake or confusing entry is requested to immediately notify the Document Custodian using the form provided in CP-122 “HSE Code of Practice”: Organizational, Structure and System.

This document shall be reviewed as necessary by the Document Custodian, but no less frequently than every four years. Triggers for full or partial review of this Specification are listed in CP-122 “HSE Code of Practice”: HSE MS Document & Inofrmation Control.

1.8 Distribution

This specification shall be communicated and distributed to PDO employees and relevant Contractors to whom this specification needs to be distributed.

2 Occupational Health Standards

2.1 Health Impact Assessment (HIA)

Purpose:

To identify and assess the potential health impacts of a project "outside the fence" in order to implement measures so that negative impacts are minimized and positive impacts are optimized. HIA is one of the applications of the *Hazards And Effects Management Process* Hazards And Effects Management Process (HEMP) for projects.

HIA applies to projects as follows:

- new Major Installations and pipeline developments;
- new exploration and drilling activities;
- modification of existing activities, including Major installations and pipeline developments, having impacts with potential Consequences of 4 or 5 on the RAM; and
- decommissioning or abandonment of existing activities, including Major Installations and pipeline developments.

Requirements:

Project Manager shall be Accountable for the following requirements:

1) Identify the need to carry out an HIA using the Environmental Screening Rport (ESR).
2) Start the HIA process in the ASSESS-SELECT phases of the project and integrate it in the design-and-decision making process.
3) Obtain or appoint a Subject Matter Expert to lead HIA.
4) Provide project-specific information and other resources required for the HIA.
5) Identify the need to engage with external Stakeholders and engage with them in line with Social Investment Performance. Disseminate and communicate information in ways and formats appropriate to the Stakeholder groups.
6) Approve the deliverables of requirements, monitor progress against the Health Management Plan (HMP) and document its implementation (see the Notes below).
7) Nominate a Subject Matter Expert (SME) for HIA who shall be Accountable for the following:
    - Perform the HIA in line with Internationally Recognised Standards.
    - Identify and document the nature and magnitude of the impacts and determine the project category to manage these.

2.2 Health Management Plan (HMP)

Purpose:

A Health Management Plan (HMP) has to be developed in order to bring together all essential health information that must be produced for each project phase from Assess to Operate. An Initial Health Plan must be developed in the SELECT (Basis for Design - BfD) phase, this is especially important in areas with challenges in medical care, where there will be a focus on Medical Emergency Response and individual fitness. The HMP pursues two main objectives:

- Ensure that the Health requirements and the Specifications are comprehensively implemented in the project.

- Complete specific Health assessments mandated by the HSE MS, Discipline Controls and Assurance Framework (DCAF), local legislation and rules on the project.

The Plan shall be developed by MCOH department and an Occupational Health Technical Authority (TA) must sign off all health reports and plans. The Health Plan will identify activities and control measures for the Health aspects of the PDO HSE Management System (MS) and where these are integrated into the project, in order to comply with it and with Project Standard 01. Furthermore, Health should be considered as an opportunity for input into the project sustainable development strategy and plan

The Health Plan summarizes the Health elements (HRA, HFE, HIA, FtW, Medical Emergency Response) that are required for the SELECT (BfD) Phase of any Project.. These Health elements will be developed, updated and delivered according to the HSE Project Activity Plan along the project cycle in the upcoming phases.

2.3 Health Risk Assessments (HRA)

Purpose:

To avoid harm to people from health hazards in the work environment through identifying, assessing, and managing health risks; and implementing measures to recover from Effects.

The HRA shall consider risks arising from chemical, physical, biological, ergonomic and psychological hazards associated with the work environment. HRA shall be covered in all operational activities, maintenance, including new projects, acquisition, closure, divestment an abandonment of facilities.

Refer to the PDO Health Hazard Register (HHR) available on the PDO HSE – Health webpage.

Requirements:

1) Line management including Project Manager are Accountable for the following:

1.1 Verify that Health Risks have been identified and assessed using an HRA, and that Controls and Recovery Measures in line with PDO Health Hazard Register and Hierarchy of Controls, have been implemented and maintained.

1.2 Approve HRA results and verify they have been documented.

1.3 Approve the gap closure Remedial Action Plan, and track and implement the agreed actions.Verify that Health Risks, Controls and Recovery Measures are understood by impacted people. Ensure that control and recovery measures are used, in place and are effective via:

- Site field visits, drills, inspections, audits
- Training, procedure and documentation reviews
- Leadership engagement sessions
- Learning from incidents (LFIs).

1.5 Review the content of the HRA when existing operations are changed in a way that would change the Health Hazards or reduce the effectiveness of Controls and Recovery Measures.

1.6 Arrange exposure monitoring and health surveillance programs as required by HRA controls or legal requirements, contacting MCOH Department for advice / support.

2) The MCOH Department is Accountable for:

2.1 Provide guidance and assistance when required

2.2 Approval of the HRA and communicate the outcome to the relevant stakeholders.

2.3 Recording or entering generic HRAs in PDO system and encourage the Line to uploada remedial actions into PIM or an equivalent system

2.4 Define the appropriate frequency of HRA review, according to changes in operations/activities that would change the Hazards or reduce the effectiveness of Controls and Recovery Measures. HRAs reviews should be scheduled at a frequency determined by the task/job complexity and the level of risk, as a minimum every 3 years. The Business Management of Change (MOC) process should be used to trigger a new/review of the HRA for changes to existing operations

3) The Site Supervisor is Responsible for:.

3.1 Implement and maintain Controls and Recovery Measures in the work environment as documented in the HRA.

Note: for further information regarding HRA rules please refer to *GU-725*

2.4 Human Factors Engineering (HFE) in Projects

Pupose:

To manage Risk to people(end users) and technical systems through design.

Requirements:

HFE principles shall be considered and applied during the SELECT (BfD) and never later than DEFINE (Front End Engineering Design - FEED) phase of new facilities projects where design can have a critical impact on equipment usability and user safety and health.

HFE shall be applied in the following projects:

- New plants/facilities
- Revamp of existing plant/facility (unless there is no change to the work system)
- Buildings and workstations design (e.g. central control rooms, offices, workshops and laboratories)
- IT software/hardware, instrumentation

Project Manager shall be Accountable for the following requirements:

1) Perform an HFE screening for each new project to determine whether a formal HFE Strategy is needed to support Project decisions. Consult with the Technical Authority (ATA) in Human Factors Engineering on the outcome of the HFE Screening.
2) Produce a Project HFE Strategy if the HFE screening results show that a strategy is needed. Incorporate the Project HFE Strategy into the BfD, or into the HSE Plan for FEED or Detailed Design (DD).
3) Integrate the Project HFE Strategy into project decisions and planning.
4) Incorporate relevant results of the implementation of the Project HFE Strategy into the Documented demonstration of ALARP.

The HFE Technical Authority (TA) or the HFE Authorized Person (AP) shall be responsible for approval of the Project HFE Strategy and close out reports. Refer to SP-2215.

3 Health Hazards

Health hazards may fall into categories of physical, ergonomic, chemical, biological and psychological in nature. The general principles of controlling adverse exposure to health hazards are well known and include:

- Elimination.
- Substitution.
- Engineering Controls: Modification, Containment, Isolation.
- Administrative Controls: Procedure, Education and training, Job rotation.
- Personal protective equipment (PPE)

3.1 Physical Health Hazards

Physical hazards include noise and vibration; extreme temperatures (heat stress) and working at hyperbaric pressure; ionizing and non-ionizing radiation.

3.1.1 Noise

Legal requirements for noise control in the workplace as established in MD 80/94 "Issuing Regulations for Noise Pollution in Working Environment" and the Occupational safety and Health regulations for establishments governed by labor law - MD number 286/2008 Article 16 Fourthly shall be implemented and supported with the following requirements.

Requirements

Managers are Accountable for the below mentioned requirements:

1) Identify and assess through HRA those tasks and areas where Noise Levels could result in Noise Induced Hearing Loss (NIHL).
2) Update noise assessment / mapping every three years or earlier in case when equipment or conditions change in a way that may increase the exposure of personnel to noise.
3) Establish hearing protection zones based on a Noise Contour of 85 dB(A) and identify them with marking/signage. When portable equipment is the source of the noise use location drawings, equipment marking or other controls to identify hearing protection zones.
4) Reduce noise exposure to As Low As Reasonable Practicable (ALARP) in the workplace using the Hierarchy of Controls.
5) Select and provide adequate hearing protectors that fits and reduces exposure of the wearer below 85 dB(A) for an eight-hour Noise Dose.
6) Train personnel every three years, who are exposed to noise level above 80 dB (A). The awareness training must cover the information on noise hazards & its health effects, noise controls, proper wear of hearing protectors.
7) Provide medical surveillance (Audiometry) and verify personnel are tested at the times and frequency as specified under the PDO SP-1230. Personnel exposed to a daily noise dose of 85 dB(A) shall have an audiometry test conducted every two years. In cases where personal daily noise dose exceeds 100 dB(A), audiometry testing shall be performed every year.
8) Report NIHL case in accordance with the PDO Procedure on Incident Notification and Reporting (PR-1418).
9) Supervisors shall be responsible:
   - to enforce and instruct people to wear hearing protection at all times when entering or working in an identified hearing protection zone
   - To continuous verify adequate use of hearing protectors

Project Team shall ensure:

- that the design and construction of new facilities and new plants is assessed in the FEED reviews or similar risk management processes, to prevent employees from being exposed to noise at levels which are in excess of the occupational exposure limits.
- that the same requirements are applied when modifying facilities or plant.
- when designing and selecting new equipment during procurement, preference should be given to a quieter item.

Noise Monitoring

Contact the Occupational Health Department (MCOH) for advice and support.

Noise Limits

Noise limit for Hearing Conservation in the field and Sound levels inside Buildings are defined in the Appendix 1.

3.1.2 Vibrations

Legal requirements for vibrations control in the workplace as established in MD 286/2008 Article 16 Fourthly, Article 32 (item 3rd) and Article 34 Secondly shall be implemented and supported with the following requirements.

Requirements:

Managers are Accountable for the below mentioned requirements:

1) Identify and assess through HRA those tasks and areas where vibration levels could result in health effects.
2) Establish an inventory of equipment that generate either Hand Arm Vibration (HAV) or Whole Body Vibration (HBV).
3) Perform vibration assessments when equipment or conditions can cause exposure to vibrations (e.g. use of portable hand tools, driving of heavy vehicles on graded / off roads).
4) Reduce vibration exposure to ALARP in the workplace using the Hierarchy of Controls.
5) Purchase equipment which comply with local and international vibration standards.
6) Select and provide adequate anti-vibration hand gloves that fits and minimize exposure to HAV.
7) Improve road constructions and regular maintenance of graded roads to minimize exposure to WBV.
8) Train personnel every three years, who are exposed to vibration level above the applicable exposure limit. The awareness training must cover the information on vibration hazards & its health effects, n vibration controls, proper use of vibration protectors & other guidelines.
9) Persons exposed to dose of 4 m/s^2 for HAV & 0.5 m/s^2 for WBV shall be provided medical surveillance as specified under the PDO SP-1230.
10) Report vibration exposure related illness case in accordance with the PDO Procedure on Incident Notification and Reporting (PR-1418).
11) Supervisors shall be responsible:
    - to continuous verify adequate guidelines to minimize exposure to vibrations

Project Team shall ensure:

- that the design and construction of new facilities and new plants is assessed in the FEED reviews or similar risk management processes, to prevent employees from being exposed to vibration at levels which are in excess of the occupational exposure limits.
- that the same requirements are applied when modifying facilities or plant.
- when designing and selecting new equipment during procurement, preference should be given to a low vibration generating equipment or tools.

Vibration Monitoring

Contact the Occupational Health Department (MCOH) for advice and support.

Vibration Limits

Exposure (8-hrs)	**HAV**	**WBV**	**Remark**
Action value	2.5 m/s^2	0.315 m/s^2	introduce technical & organizational measures to reduce exposure.
Limit value	4.0 m/s^2	0.5 m/s^2	should not be exceeded

Refer to the latest ACGIH TLVs for Vibration limit details.

3.1.3 Heat Stress

Legal requirements for heat stress management in the workplace as established in Oman Labor Law No. 35/2003-2012, MD 286/2008 Article 16, Opal Heat Stress Management and subsequent MD No. 322/2011 shall be implemented and supported with the following requirements.

Requirements

Managers are Accountable for the below mentioned requirements:

1) Identify and assess through HRA those tasks and areas where heat stress could result in heat edema, heat rashes, heat cramps, heat exhaustion, heat syncope or heat stroke.
2) Reduce heat stress exposure to ALARP in the workplace using the Hierarchy of Controls.
3) Implement adequate work – rest regimen including hydration program, cool shelter area and job rotation, acclimatization and buddy system.
4) Ensure that all earth moving machines, cranes are having enclosed cabins with air conditioning.
5) Train personnel every three years, who are exposed to heat stress. The awareness training must cover the information on heat stress hazards & its health effects, heat stress controls, importance of hydration & rest breaks.
6) Report heat stress related illness case in accordance with the PDO protocol, 'Incident Notification and Reporting' (PR-1418).
7) Supervisors shall be responsible to enforce and instruct people to follow:

- hydration and
- work-rest regimen at all times

Heat stress Monitoring

Contact the Occupational Health Department (MCOH) for advice and support. Refer to local regulations.

3.1.4 Hyperbaric Pressure

Hyperbaric pressure is related to, producing, operating, or occurring at pressures higher than normal atmospheric pressure. Underwater work (e.g. divers). In these conditions, workers are at risk of Decompression Sickness (DCS).

Legal requirements for Hyperbaric pressure control in the workplace as established in Oman Labor Law No. 35/2003-2012 shall be implemented and supported with the following requirements.

Requirements

Managers are Accountable for the below mentioned requirements:

1) Identify and assess through HRA those tasks and areas where Hyperbaric Pressure could result in any of the above mentioned health effects.
2) Reduce Hyperbaric Pressure exposure to ALARP in the workplace using the Hierarchy of Controls putting emphasize in the use of decompression chambers to gradually bring workers back to normal surface pressure and taking into account the updated decompression tables that detail the time and pressure needed to do this safely.
3) Train personnel every three years, who are exposed to Hyperbaric Pressure. The awareness training must cover the information on Hyperbaric Pressure hazards & its health effects, Hyperbaric Pressure controls, Importance of decompression.
4) Assure that all workers under hyperbaric pressure risk receive the fitness to work medical examination according to the PDO SP-1230.
5) Report Hyperbaric Pressure related illness case in accordance with the PDO Procedure on Incident Notification and Reporting (PR-1418).

Hyperbaric Pressure Limits

Refer to the latest National Institute of Occupational Safety and Health (NIOSH) Decompression tables (Edel-Kindwall).

3.1.5 Electromagnetic Field (EMF)

EMF means static electric, static magnetic and time-varying electric, magnetic and electromagnetic fields with frequencies up to 300 GHz, that include Radio Frequencies (RF), sub-radio frequencies and electromagnetic from power transmission & generation (e.g. radars, telecommunication systems, transformers, high tension lines).

Legal requirements for EMF control in the workplace as established in Oman Labor Law No. 35/2003-2012 shall be implemented and supported with the following requirements.

Requirements

Managers are Accountable for the below mentioned requirements:

1) Identify and assess through HRA those tasks and areas where EMF could result in any of the above mentioned health effects.
2) Reduce EMF exposure to ALARP in the workplace using the Hierarchy of Controls.
3) Train personnel every three years, who are exposed to EMF. The awareness training must cover the information on EMF hazards & its health effects, EMF controls, importance of isolation, distance etc.
4) Report EMF related illness case in accordance with the PDO Procedure on Incident Notification and Reporting (PR-1418).

EMF Monitoring

Contact the Occupational Health Department (MCOH) for advice and support.

EMF Limits

Refer to the latest ACGIH TLVs for EMF.

3.1.6 Ultraviolet (UV) Radiation

UV radiation is electromagnetic radiation like visible light, can be transmitted in form of waves from 100 nm to 400 nm in the electromagnetic spectrum (UV-C 100 nm to 280 nm; UV-B 280 nm to 315 nm and UV-A 315 nm to 400 nm). Sunlight is the greatest source while, manmade UV sources are UV lamp, arc welding and mercury vapour lamps.

Legal requirements for UV control in the workplace as established in Oman Labor Law No. 35/2003-2012 shall be implemented and supported with the following requirements.

Requirements

Managers are Accountable for the below mentioned requirements:

1) Identify and assess through HRA those tasks and areas where UV radiation could result in any of the above mentioned health effects.
2) Reduce UV radiation exposure to ALARP in the workplace using the Hierarchy of Controls.
3) Train personnel every three years, who are exposed to UV radiation. The awareness training must cover the information on UV radiation hazards & its health effects, UV radiation controls, importance of clothing & shading.
4) Report UV radiation related illness case in accordance with the PDO Procedure on Incident Notification and Reporting (PR-1418).

UV Radiation Monitoring

Contact the Occupational Health Department (MCOH) for advice and support.

UV Limits

Refer to the latest ACGIH TLVs for UV radiation.

3.1.7 Ionizing Radiation

Refer to the PDO Specification on Ionizing Radiation (SP-1237).

3.1.8 Naturally Occurring Radioactive Materials (NORM)

Refer to the PDO Specification on NORM (SP-1170).

3.1.9 Lighting

Legal requirements for Lighting in the workplace as established in the MD 286/2008 Article 16 & 17 shall be implemented and supported with the following requirements.

Requirements

Managers are Accountable for the below mentioned requirements:

1) Identify and assess through HRA those tasks and areas where poor lighting could result in any of the above mentioned health effects.
2) Ensure lighting requirements are adequately met when designing and constructing of new facilities / plants or modifying of existing facility / plant. There should be sufficient and suitable lighting (natural or artificial) wherever persons are working.
3) Confirm work areas are provide adequate lighting (e.g. for computer users in office - 400 Lux). If the minimum requirements are not meeting, improve lighting levels by simply replacing existing fluorescent tubes / diffusers or providing tasks lighting.
4) Have regular maintenance and cleaning programs for lighting systems to enable optimal performance.

Lighting Measurement

Contact the Occupational Health Department (MCOH) for advice and support.

Lighting Limits

Refer to the standards for lighting levels contained in the PDO Specification for Civil and Building Design Criteria (SP-1275) and in the Shell DEP 33.64.10.10.

3.2 Ergonomics

Ergonomics is a multi-disciplinary science that considers the interaction between humans and their working environment to improve the design of work systems, workplaces and products. It aims at establishing a well-designed work environment by achieving a balance between design functionality and ease of use.

Legal requirements for manual handling in the workplace as established in the MD 286/2008 Article 15 and 35 shall be implemented and supported with the following requirements.

Requirements

Managers are Accountable for the below mentioned requirements:

1) Identify and assess through HRA those tasks and areas (involving manual material-handling causing lifting, pushing, pulling or awkward postures of neck, back, hands, legs) where ergonomic hazards could result in any type of the Musculo-Skeletal disordes (MSD).
2) Reduce ergonomic hazard to ALARP in the workplace using the Hierarchy of Controls.
3) Nominate Department Focal points for Ergonomics who shall be trained by the Occupational Health Department (MCOH). The trained Focal points shall be responsible to:

- Conduct awareness training / campaign on computer ergonomic.
- Evaluate all office work stations by conducting rapid assessment for computer users.
- Instruct people to follow ergonomic postures when using computer or handling material.
- Perform visual assessment on receiving complaints (on ergonomics, indoor environment e.g. water stained ceiling tiles, damaged chair, poor lighting) from building occupants
- If needed, coordinate with the Occupational Health Department (MCOH) for their support

4) Implement adequate Design & Engineering Practices (DEPs) in the following:
   - New plants/facilities or Revamp of existing facility
   - Buildings and workstations design (e.g. control rooms, offices, workshops and laboratories)
   - IT hardware, instrumentation
5) Train personnel every three years, who are exposed to ergonomic hazards (computer users, manual material handlers, extreme mechanical or awkward postures). The training must cover the information on ergonomic hazards & its health effects, controls, postures, relaxing, exercises (refer to the PDO Procedure on Manual Material Handling (PR-2111).
6) Report MSD related case in accordance with the PDO Procedure on Incident Notification and Reporting (PR-1418).

Ergonomic Monitoring / Assessment

Ergonomic assessment can be performed using the following techniques:

- Ovaco Working Assessment (OWAS)
- Rapid Upper limb Assessment (RULA) & Rapid Entire Body Assessment (REBA)
- NIOSH Lifting Equation
- Computer Ergonomic Assessment

Refer to the PDO Procedure on Manual Material Handling (PR-2111) for screening ergonomic assessment of any manual material handling task.

Contact the Occupational Health Department (MCOH) for getting assistance on Computer Ergonomic Assessment & information on Office furniture standards.

Ergonomic Limits

Refer to the latest ACGIH TLVs for Lifting limit.

3.3 Chemical

Chemicals are organic or inorganic, natural or synthetic substances present in the workplace environment, exposure to which are capable of causing health harm effects like irritation, corrosion, asphyxiation and toxicity (systemic, carcinogens, mutagens, reproductives). The typical classification of chemicals are metals, liquids, aerosols (dust/fiber, mist, fog, smoke, fume) gas and vapors).

Legal requirements for chemical hazards control in the workplace as established in MD 286/2008 Article 8, 37, 38, 39 & 40, Article 42 – item 3 shall be implemented and supported with the following requirements.

Requirements

Managers are Accountable for the below mentioned requirements:

1) Identify and assess through HRA those tasks and areas where chemical hazard could result in any of the above mentioned health effects.

2) Ensure any new chemical or chemical product (containing Acute Toxic Substance [ATS] & Carcinogen, Mutagen and Reproductive [CMR] substance) are reviewed / approved by the PDO Occupational Health Department (MCOH), before they are used in the PDO. Use of Asbestos, pure Benzene, Oil containing PCB (polychlorinated biphenyl) is prohibited.
3) Ensure SHOC cards are available and displayed at work-place.
4) Identify storage and handling areas for ATS & CMR chemicals with applicable labeling / signage.
5) Reduce chemical exposure to ALARP in the workplace using the Hierarchy of Controls.
6) Determine content of hazardous chemicals (e.g. benzene, mercury) in the process streams.
7) Select and provide adequate PPE (for respiratory, skin, body & face) that fits and reduces chemical exposure of the wearer below the occupational exposure limits (OELs).
8) Implement a Respiratory Protection Program according to SP-1234 , including following actions:
   1.1 Ensure all respirator (tight-seal) wearers are medically tested and declared fit to wear respirator.
   1.2 Ensure fit testing is provided for respirator (tight-seal) wearers.
   1.3 Ensure proper selection of respirator is done according to SP-1234.
9) Establish exposure monitoring programs, where employees may be exposed to hazardous chemicals (e.g. benzene, mercury, hydrofluoric acid), to verify exposure are below the OEL.
10) Train personnel every three years, who are exposed to ATS, CMR, irritants and sensitizer chemical hazards. The awareness training must cover the information on chemical hazards & its health effects, exposure controls, proper wear of PPE. Only trained / instructed personnel shall be allowed to handle hazardous chemicals (including benzene, hydrofluoric acid, mercury etc).
11) Provide medical surveillance (specific to CMR e.g. benzene, mercury, irritants, carbon disulfide) and verify personnel are tested at the times and frequency as specified under the PDO SP-1230.
12) Report chemical illness case in accordance with the PDO Procedure on Incident Notification and Reporting (PR-1418).
13) Supervisors shall be responsible:
    - to enforce and instruct people to wear applicable PPE (for respiratory, skin, body & face) at all times when entering or working
    - to continuous verify that the wearers of respiratory protectors are fit tested and selection is properly made according to standards/references

Project Team shall ensure:

- that the design and construction of new facilities and new plants is assessed in the FEED reviews or similar risk management processes, to prevent employees from being exposed to chemical at levels which are in excess of the occupational exposure limits. For emergency/safety showers refer to *GU-817*.
- that the same requirements are applied when modifying facilities or plant.
- when designing and selecting new equipment during procurement, preference should be given to a less toxic chemical.

For more information regarding ATS & CMR chemical health hazards, refer to the PDO latest **Health Hazard Register (HHR), SP-1194 Chemical Management System** and **Safe Handling of Chemicals (SHOC) cards**.

Chemical Monitoring

Contact Occupational Health Department (MCOH) for advice and support.

Chemical Limits

For exposure limits of chemical hazards, refer to the latest ACGIH TLVs. PDO has five specific exposure limits as showed below:

Chemical Hazard	OEL - TWA	OEL - STEL
Benzene	0.5 ppm	2.5 ppm
Diesel Exhaust (particulates)	0.10 mg/m^3 (elemental carbon)	-
Hydrogen Sulfide	5 ppm	10 ppm
Cumene	10 ppm	50 ppm
1,3-Butadiene (0.1% or greater)	1 ppm	-

OEL - Occupational Exposure Limit; TWA - Time Weightage Average, for 8 hrs exposure; STEL - Short Term Exposure Level defined for 15 mins exposure

Control Banding

Control banding is a system that allows the MCOH team to categorize chemicals into a common class that can be easily recognized, put hazards into perspective, represent the default concept for unknowns (The Precautionary Principle) and when data is insufficient or an OEL is not established for any chemical substance, a band can be assigned to determine target exposure conditions. Appendix 2 shows the Control Banding system used in PDO.

3.4 Biological

A Biological agent is a microbiological entity, cellular or non-cellular, or human endoparasite, whether or not genetically modified, which may cause infection, allergy, toxicity or otherwise create a hazard to human health.

Legal requirements for biological hazards control in the workplace as established in MD 286/2008 Article 17 Secondly, Fourthly & Article 23 shall be implemented and supported with the following requirements.

Requirements

Managers are Accountable for the below mentioned requirements:

1) Identify and assess through HRA those tasks and areas where biological hazard could result in any of the above mentioned health effects.
2) Reduce biological exposure to ALARP in the workplace using the Hierarchy of Controls.
3) Select and provide adequate PPE that fits and reduces exposure to biological hazards.
4) Train personnel every three years, who are exposed to biological hazards. The awareness training must cover the information on biological hazards & its health effects, biological exposure controls, proper wear of PPE.
5) Provide medical examinations for the exposed workers at the times and frequency as specified under the PDO Specification on Medical Exams (SP-1230).
6) Report biological hazard illness case in accordance with the PDO Procedure on Incident Notification and Reporting (PR-1418).

3.4.1 Legionella

Refer to the PDO Procedure on Legionella Management Program (PR-2109).

3.4.2 Other Biological Hazards (food & water borne, poisoning animals)

Refer to the PDO Specification on Public Health (SP-1232).

Biological hazard Monitoring

Contact the Occupational Health Department (MCOH) for advice and support.

Biological Limits

For Legionella, refer to the PDO Procedure on Legionella Management Program (PR-2109) and for Food and water borne biological hazards, refer to the PDO Specification on Public Health (SP-1232).

3.5 Psychological Hazards

Stress, including work related stress, can be a significant cause of illness and is known to be linked with high levels of sickness absence, staff turnover, other issues such as more errors and considerable reduction in workplace productivity. If stress is excessive and goes on for some time, it may lead to mental and physical ill health e.g. depression, nervous breakdown and heart disease.

Legal requirements for psychological hazards control in the workplace as established in MD 286/2008 Chapter 2, Articles 26 and 27 shall be implemented and supported with the following requirements.

Requirements

Managers are Accountable for the below mentioned requirements:

1) Identify and assess through HRA those tasks and areas where work related stress could result in any of the above mentioned health effects.
2) Reduce work related stress to ALARP in the workplace using the Hierarchy of Controls.
3) Involve your team members in decision making.
4) Conduct stress awareness training for all. The awareness training must cover the information on work related stress & its health effects & controls.
5) Observe and monitor any signs of stress among your staff and intervene promptly and encourage them to seek medical assistance if required.
6) Report work related stress illness case in accordance with the PDO Procedure on Incident Notification and Reporting (PR-1418).

Note: for Fatigue Risk Management refer to *GU-738*

3.6 Indoor Environment Quality (IEQ)

IEQ result from interactions between building materials and furnishing, activities within the building, climate, and building occupants.

Legal requirements for IEQ as established in MD 286/2008 Article 15, Article 16 Firstly & Secondly; Article 17 shall be implemented and supported with the following requirements.

Requirements

Managers are Accountable for the below mentioned requirements:

1) Identify and assess through HRA those tasks and areas where IEQ could result in health hazard.
2) Reduce IEQ hazards to ALARP in the workplace using the Hierarchy of Controls.

3) Conduct periodic checks for IEQ to ensure that the conditions mentioned the Appendix 2 are maintained.
4) Report IEQ related illness case in accordance with the PDO Procedure on Incident Notification and Reporting (PR-1418).

Project Team shall ensure:

- that the design and construction of new facilities (buildings) is assessed to prevent employees from being exposed to IEQ hazards and the PDO Specifications on Heating, Ventilation & Air-conditioning (SP-1285) and on Building Services (SP-2155) are applied.
- that the same requirements are applied when modifying facilities (buildings).

IEQ Monitoring

Contact the Occupational Health Department (MCOH) for advice and support.

IEQ hazards Limits

Refer the Appendix – 3.

4 Occupational Health Monitoring

Monitoring refers to the application of methods, including exposure measurement, to monitor the ongoing effectiveness of control and recovery measures established in support of controlling health risks to ALARP. Health monitoring has a number of purposes, including:

- Determining acceptable and other exposures arising from various workplace scenarios including: normal operations, routine maintenance, non-recurring tasks, shutdown, turnaround, start-up, construction, demolition
- Demonstrating compliance with a specified occupational Exposure Limit (OEL) or Biological Exposure Indices (BEI).
- Recommending, justifying or verifying control measures
- Atmospheric testing for confined space entry and other work permits
- Investigating reported health effects
- Responding to employee or contractor exposure concerns
- Determining entry/exit levels for individuals for health surveillance
- Supporting emergency response
- Supporting epidemiological studies
- Responding to litigation and liability claims

4.1 OEL & BEI

Occupational Exposure Limit (OEL) is the airborne concentration of hazardous substances, to which workers may be repeatedly exposed day after day without adverse effect. An OEL does not represent a fine line between safe and dangerous concentrations, nor is it a relative index of toxicity.

Biological Exposure Indices (BEI) is a guidance value for interpretation of bio monitoring results. For biological monitoring and biochemical effect monitoring the BEI represents the concentration of a chemical, or its reaction product, in exhaled breath, body fluids, or tissues of workers below which no adverse health effects are expected. BEI are based on a dose-effect relationship or, more commonly, on the correlation with the corresponding OEL.

OEL and BEI are reference values for use in deciding on acceptable or unacceptable exposures in support of the selection of appropriate control measures and subsequent control assurance. They are not fine lines between safe and dangerous concentrations nor are they a relative index of toxicity.

Contact Occupational Health Department (MCOH) for advice and support.

4.2 Industrial Hygiene (IH) Monitoring

IH monitoring is used as one of the complements of health exposure assessment by measuring the level (intensity) of health hazards. The measurement of health hazards can be achieved by:

- Direct reading equipment, which provide an immediate indication of hazard intensity, e.g. chemical indicator tubes, electronic instruments, noise meter, lux meter etc.
- Indirect techniques, which collect the airborne contaminant either by diffusion (passive sampling) or pump (active sampling) onto a sample medium for subsequent laboratory analysis.

IH measurement / monitoring for any health hazard performed by the Contractors shall be always in consultation (well in advance) with the PDO OH Department (MCOH) and the data / result shall be forwarded to the same.

Recommended frequency for IH Monitoring is shown below in the Table.

Recommended Frequency for IH Monitoring

Exposure monitoring may be required, as part of the HRA process to:

- further quantify exposure during tasks or the full shift
- ensure the effectiveness of controls
- document compliance with regulatory occupational exposure limits (OELs) or standards representing control

An estimate of personal exposure should be made and compared to a standard representing acceptable control, e.g. OEL, PDO Control Banding assessment model. Conclusions regarding exposure risk will range from low to high.

EXPOSURE RATE Percentage of OEL	IH Monitoring Frequency	Duration of IH Monitoring at Specified Frequency
Greater than 100% - HIGH **Unacceptable risk: Exposure exceeds OELs. Not adequately controlled. Further risk reduction is required.**	**Continuously**	Until controls reduce exposures to less than 100%
Between 50%–100% - MEDIUM **There is some degree of control. Exposure is below the OEL, however further risk mitigation may be required to reduce the risk to ALARP.**	**Every Year**	Until controls reduce exposures to less than 50%
Between 10%-50% - LOW **Acceptable risk: Risk is controlled i.e. exposure is well below the OELs, but must be monitored for change**	Every Three Years	Until controls reduce exposures to less than 10% or until a potentially significant change* in the process / equipment or worker concern suggests that monitoring is required
NOTE: *If there is an inconclusive risk because Insufficient information is available to make a conclusion, then a monitoring may be required to further define exposure rate.*		

* Examples of potentially significant changes include:
  - adding a new process unit
  - introducing a new noise source such as a compressor
  - using a new feedstock or chemical additive
  - adding a requirement for additional manual handling or other physically demanding tasks
  - reducing maintenance that will increase vibration/noise or other exposure levels
  - the emergence of a biological hazard such as corona virus, mold growth, foodborne or waterborne illness
  - installing a radiation source.

The Business Management of Change (MOC) process should be used to trigger a new/review of the HRA for changes to existing operations.

4.3 Biological Monitoring

Biological monitoring is used as another complement of the exposure assessment. Measuring the concentration of chemical determinants in urine, blood or exhaled air of exposed workers provides an indicator of substance uptake.

Refer to the PDO Specification for Medical Examination, Treatment and Facilities (SP-1230).

5 Reporting of Health Incidents and Health Performance Indicators

Performance indicators or metrics are useful in monitoring the effectiveness of controls.

Incident Reporting & Investigation, stipulates that line Managers and all Contractors are responsible for notifying PDO and investigating all Non-Accidental Deaths (NAD) and Work Related Occupational Illnesses, which resulted or may have resulted from PDO's activities and Contractors' activities on behalf of PDO.

Health performance, NAD and Occupational illnesses data for company and contractor employees shall be reported on monthly basis to the PDO Occupational Health Department (MCOH) using the form 'Health Performance Indicator (HPI)' shown shown.

CONTRACTOR HEALTH PERFORMANCE INDICATOR (HPI)			
For the Month of:			
Location:			
Name of Health Facility / Contractor:			
Contract Holder:			
Name of Personnel Reporting:			
Date:			
#		**No.**	**Comments**
1	The total number of health consultations (clinic visits)		
2	The total number of audiometry surveys conducted		
3	The total number of abnormal audiometry conducted		
4	The total number of fitness to work medical conducted		
5	The total number of fitness to work medical declared unfit		
6	The total number of occupational illnesses		
7	The total number of occupational injuries		
8	The number of health education / Promotion activities		
9	The number of non accidental deaths		
10	The number of medivac cases		

6 APPENDICES

6.1 Appendix – 1. Noise limits

Occupational Noise OELs for Field (PDO criteria)

VARIABLE	Noise level dB(A)
Threshold	80
Action Level	82
Criterion level (limit)	**85**
Steady noise superior level	115
Impulse - impact noise superior level	140 dB(C)

Exchange Rate as 3 dB

Color Coding for Noise contours and Use of Hearing Protector

Color coding		Noise levels	Interpretation
	Yellow	80 to 84 dB	**Make** hearing protection **available.**
	Orange	85 to 90 dB	**Mandatory use** of hearing protection. Provide sign for mandatory 'use of hearing protector' in the area with noise level above 85 dB.
	Red	91 to 100 dB	**Mandatory use** of hearing protection**.** **Make double** hearing protection **available.**
	Purple	101 to 110 dB	**Mandatory use** of **double** hearing protection.
	Dark Blue	111 dB & Above	**Mandatory use** of **double** hearing protection. **Do not enter area** where continuous / steady noise level **above 115 dB &** impulse noise level **above 135 dB.**

Reference Sound levels for Buildings

Area Description	Maximum allowable sound level dB(A)
• Areas in workshops and machinery buildings where communication is required • Workshops for light maintenance	70
• Workshop offices • Control rooms, not continuously manned • Computer rooms	60
• Control rooms, continuously manned • Open plan offices • Social rooms, changing rooms, wash places and toilets	50
• Offices and conference rooms	45
• Personnel accommodation (bedrooms, private cabins, etc.)	40

6.2 Appendix – 2. Occupatiuonal Exposure Banding (OEB) in PDO

Substances with GHS Hazard Statement	Airborne concentration range (target)	Hazard Band
H303 May be harmful if swallowed, H305 May be harmful if swallowed, and enter airways H313 May be harmful in contact with skin, H315 Causes skin irritation, H316 Causes mild skin irritation, H320 Causes eye irritation H333 May be harmful if inhaled, H335 May cause respiratory irritation, H336 May cause drowsiness or dizziness, *all other hazard statements not otherwise listed and substances not hazardous for supply*	Aerosols: >1 to 10 mg/m^3 Gas and Vapor: >50 to 500 ppm	A Irritant
H302 Harmful if swallowed, H312 Harmful in contact with skin, H319 Causes serious eye irritation H332 Harmful if inhaled, H334: May cause allergy or asthma symptoms or breathing difficulties if inhaled, H371 May cause damage to organs	Aerosols: >0.1 to 1 mg/m^3 Gas and Vapor: >5 to 50 ppm	B Harmful
H301 Toxic if swallowed, H304 May be fatal if swallowed and enters the airways H311 Toxic in contact with skin, H314 Causes severe skin burns and eye damage H317 May cause allergic skin reaction, H318 Causes serious eye damage H331 Toxic if inhaled, H370 Causes damage to organs, H373 May cause damage to organs through prolonged or repeated exposure	Aerosols: >0.01 to 0.1 mg/m^3 Gas and Vapor: >0.5 to 5 ppm	C Toxic / Corrosive
H300 Fatal if swallowed, H330 Fatal if inhaled, H310 Fatal in contact with skin, H351 Suspected of causing cancer, H360F May damage fertility, H360D May damage the unborn child, H361f Suspected of damaging fertility, H361d Suspected of damaging the unborn child, H362 May cause harm to breast fed children, H370 Causes damage to organs H372 Causes damage to organs through prolonged or repeated exposure	Aerosols: <0.01 mg/m^3 Gas and Vapor: <0.5 ppm	D Very Toxic
H340 May cause genetic defects H341 Suspected of causing genetic defects H350 May cause cancer H350i May cause cancer by inhalation	Seek MCOH advise	E Irreversible

Ref: The Global Occupational Health Net, issue No. 8.

Aerosols: particles, dust, mist, fumes

6.3 Appendix - 3 IEQ limits

Temperature / Humidity Ranges for Comfort

(adapted from ASHRAE Standard 55 - 2017 Thermal Environmental Conditions for Human Occupancy)

Conditions	Relative Humidity	Acceptable Operating Temperatures, °C
Summer (light clothing)	30% to 60%	19 °C - 24 °C
Winter (warm clothing)		20 °C - 26 °C

Also refer to the PDO Specification on Design of Civil and Building Works (SP-1275).

Recommended levels for Indoor Air Quality

(from: U.S. Green Building Council (USGBC))

Contaminants	Recommended levels
Particulates	Respirable ($PM_{2.5}$) – 0.015 mg/m^3 Total (PM_{10}) – 0.05 mg/m^3
Carbon Dioxide (CO_2)	1000 ppm (ASHRAE)
Carbon Monoxide (CO)	9 ppm
Ozone	0.075 ppm
Formaldehyde	0.027 ppm
Volatile Organic Compounds (VOCs) as Total	0.5 mg/m^3