



GoM Region Health Risk and Exposure Assessment

Purpose/Scope

1

The GoM Region Health Risk and Exposure Assessment processes is used by the Health and Industrial Hygiene Team to systematically identify and assess health risks and exposures in the workplace. Health risks and exposures include chemical, physical, biological, and ergonomic hazards and psychosocial factors with the potential to affect personnel. This process establishes how GoM Region complies with applicable federal and local regulations and conforms to BP's OMS element 3.4 Health and Industrial Hygiene.

2 Roles and Responsibilities

2.1 Health and Industrial Hygiene Team

- A. Facilitate and publish GoM Operations (including onshore sites), Wells, and Projects Health Management and Assessment Plans (Healthmaps),
- B. Develop and communicate site-specific Health & Industrial Hygiene (IH) Plans,
- C. Communicate and provide input on health and IH risks for the GoM Region and Facility Risk Registers,
- D. Coordinate/conduct IH assessments,
- E. Communicate, interpret, and report exposure monitoring data,
- F. Maintain a stock of IH monitoring equipment which includes maintenance and calibration of the equipment,
- G. Recommend risk and exposure reduction measures (i.e., elimination/substitution, administrative controls, personal protective equipment (PPE)), as appropriate,
- H. Maintain documentation regarding risk and exposure assessments,
- I. Provide guidance and training for Health & Safety (H&S) Site Leads performing exposure monitoring,
- J. Assist with developing health and IH training materials and delivery of training as needed,
- K. Review applicable health and IH related incidents, external health and IH events, process safety assessments, and natural disasters as part of the risk assessment process, and
- L. Coordinate medical surveillance.

2.3 Health & Safety Site Lead or designate

- A. Participate in health risk assessment process,
- B. Assist with coordinating and conducting IH monitoring per Health & IH Team request,
- C. Communicate and post exposure monitoring results,
- D. Provide Health & IH Team with information on work tasks and controls related to health hazards, and
- E. Contact Health & IH Team for assistance with health events / incidents.

2.4 Area Operating Manager, Facility Manager or designate

Review and approve site-specific Health and IH plans.

2.5 Operating Installation Manager, Well-Site Leader or designate

- A. Address exposure control recommendations as communicated in IH reports,
- B. Communicate facility health concerns to the Health & IH Team, and
- C. Inform the Health & IH Team of changes to existing processes, controls, or procedures that have the potential to result in new or additional exposures.

2.6 Members of the Workforce

- A. Participate in the health risk and exposure assessment process,
- B. Communicate health concerns to the H&S Site Leads and/or Health & IH Team, and
- C. Utilize exposure controls and risk reduction measures implemented at the facility.

2.7 Contractors

As part of the control of work process, third party contractors are responsible for conducting hazard assessments as part of performing work on BP facilities, which include exposure assessments and providing exposure control equipment. These assessments shall be shared with BP.

3 General Requirements

3.1 Identification of Health Hazards

GoM Region identifies hazards (i.e., chemical, physical, biological, and ergonomic hazards and psychosocial factors) including human factors that could harm the health of personnel and the public during normal operating conditions, maintenance activities, emergencies and natural disasters. This is accomplished through the following:

- A. Operations, Wells, and Projects' Healthmaps, which identify and prioritize health risks, will be reviewed and updated for a period not to exceed three years.
- B. Site-Specific Health & IH Plans that identify facility specific health risks will be reviewed every 2 years or as required based on assessed risk.
- C. Input from personnel on health concerns.
- D. Hazard and Operability and Hazard Identification Studies (HAZOPs / HAZIDs).
- E. Hazard Identification Task Risk Assessments (HITRA).
- F. Process safety assessments.

The following are reviewed as part of this health hazard identification process:

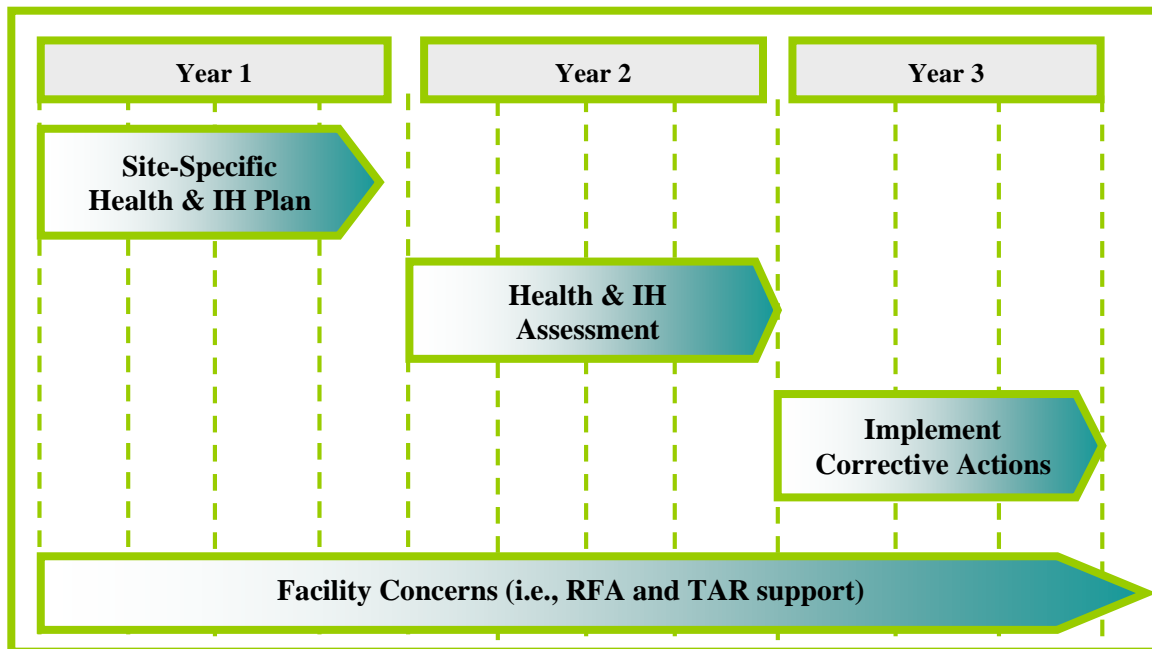
- A. Existing operations.
- B. Projects.
- C. Office environment.
- D. Health related incidents/report.
- E. External events, including natural occurrences.
- F. Government/industry health guidance and standards.
- G. Lessons learned.
- H. Audit findings.

3.2 Assessment of Health Hazards

The assessment of health hazards includes:

- A. Annual update of the Region & Facility Risk Registers with Process Safety Risk Engineers. The risk register includes Health & IH risks (white, turquoise, blue, and purple).
- B. Completion of the 3-year Health & Industrial Hygiene Cycle (Figure 1) which consists of:
 1. Development of the Site-Specific Health and IH Plan.
 2. Conduct facility Health & IH assessments and review historic assessments and corrective actions.
 3. Implement Corrective Actions. Once agreed, the line organization is responsible to implement corrective actions from the Health & IH assessment. Actions will be tracked in Tr@ction.
- C. Requests for assistance (RFA) and Turnaround (TAR) support for existing and emerging health risks.

Figure 1 - 3-Year Health & Industrial Hygiene Cycle



4 Process

The occupational exposure assessment process includes: establishing a strategy (including selection of personnel to be monitored), a workplace characterization, an exposure assessment, and an exposure

classification. Reporting monitoring results, records management, and monitoring equipment are used to document and evaluate exposure assessments.

4.1 Establishing a Strategy

Different strategies will include baseline, comprehensive, compliance, complaint, engineering and administrative controls, program management and emergency response.

4.2 Workplace Characterization

Characterization of the workplace is obtained from (but not limited to):

- A. Historical exposure monitoring data.
- B. Process descriptions and flow diagrams.
- C. Level 1 and 2 HITRAs.
- D. Personnel feedback and communication of health concerns.
- E. Walk-through assessment of the operation.
- F. Existing knowledge of health and IH hazards present in the operation.
- G. Stream analytical data.
- H. Safety Data Sheets (SDSs).

4.3 Exposure Assessment

Exposure assessments can be conducted through quantitative and qualitative exposure assessments or a combination of both.

4.3.1 Quantitative Exposure Assessment

Quantitative assessments utilize monitoring equipment to measure exposures or concentrations of health hazards (i.e., benzene, noise, radiation). Quantitative monitoring can be instantaneous or integrated over a time period. Validated methods and accredited laboratories are used to analyze IH samples. A non-inclusive list of health hazards along with sampling information and approved analytical methods can be found in Appendix 1.

Exposure results are compared to the Occupational Safety and Health Administration Permissible Exposure Limits (OSHA- PELs) and American Conference of Governmental Industrial Hygienists Threshold Limit Values (ACGIH-TLVs). The more conservative PEL or TLV will be used to compare exposure data. Full shift samples will be compared to an adjusted PEL or TLV to account for unusual work schedules (i.e., 12-hour workshifts). GoM will utilize the Brief and Scala model (unless otherwise specified by regulatory requirements) shown in Formula 1 where “*h*” is shift duration in hours.

Formula 1

$$RF = \frac{8}{h} * \frac{24 - h}{16}$$

4.3.2 Qualitative Exposure Assessment

Qualitative exposure assessments utilize information instead of monitoring equipment to develop a subjective risk ranking. In some instances, exposure measurements and methods may not be available for new chemicals introduced to the workplace upon initial use. In the absence of exposure measurements, the following information can be included as part of the qualitative risk assessment process:

- A. Job and process knowledge.
- B. Studies in the industrial hygiene, toxicology, and epidemiology fields.
- C. Chemical inventories and safety data sheets (SDSs).
- D. Physical data (such as vapor pressures).
- E. Quantity of the chemical used.
- F. Chemical storage and handling requirements.
- G. Historical exposure data for similar operations and facilities.
- H. Existing exposure controls.

Through qualitative (and quantitative) exposure assessments, risk rankings can be developed as an input for the Region or Facility Risk Registers for health hazards. The risk rankings are used to identify exposure monitoring priorities and help direct resources toward the development of exposure control systems.

4.4 Exposure Classification

Workplace exposures are classified as acceptable, uncertain, and unacceptable based on the information collected during the exposure assessment.

4.5 Selection of Personnel for Monitoring

Personnel are selected for monitoring based on tasks being performed or similar exposure groups (SEGs). Information regarding time spent in process areas, shift work, overtime work, variability within job functions, and worker rotation shall be taken into consideration when determining SEGs. Personnel can belong to more than one SEG.

When contractors are selected for monitoring, the Health & IH Team will request monitoring permission from the contract company's safety representative and will share and communicate monitoring data.

4.6 Industrial Hygiene Equipment Inventory

The IH Team equipment inventory shall be kept updated in Medgate as well as on the Health & IH shared-drive. Equipment calibration shall be maintained per manufacturer's guidance and calibration records stored in Medgate and the IH compliance files.

BP facilities are recommended to have the following calibrated equipment on-site:

- A. NORM meter, equipped with gamma and alpha/beta radiation probes (preferably intrinsically safe).
- B. Sound level meter.
- C. Direct reading benzene monitor (i.e., photoionization detector)

4.7 Reporting Results and Recordkeeping

Individual notification letters will be sent to the individuals monitored to communicate results. For BP employees, the notification letters will be e-mailed directly to personnel with the individuals Supervisor copied. For contractors that are monitored, notification letters (hardcopy or e-mail) will be sent to their Supervisor or designate. Records of notification letters will be retained in Medgate.

IH and exposure assessment reports will be used to communicate results. The reports will:

- A. Compare monitoring results to appropriate PELs/TLVs,
- B. Review and compare historical monitoring data to identify exposure trends,
- C. Provide recommendations and actions for improvement, as needed
- D. Recommend medical surveillance, as needed

Report action items will be entered in Tr@ction and tracked to closure.

Electronic sample records are retained in Medgate as exposure records. The IH and exposure assessment original field notes, sample data sheets, calibration logs, laboratory chain of custody, and laboratory analytical reports will be uploaded and retained in Medgate as well as added to the IH compliance files and maintained in accordance with appropriate legislative and regulatory requirements for exposure records.

Exposure assessment reports will be assigned a facility Documentum number and retained as an exposure record, these will also be stored on the Health & IH shared-drive.

5 Training

There are no training requirements associated with the SWP.

6 Definitions

Term	Definition
Acceptable Exposure	The hazard or exposure is clearly, sufficiently controlled such that no further risk reduction measures are needed.
External Event	Health event occurring outside of BP business anywhere in the world. These may be communicated via Bureau of Safety and Environmental Enforcement (BSEE), Center for Disease Control (CDC), Offshore Industrial Hygiene Work Group, Learning Alert, etc.
Grab Sample	A sample taken within a short time period, generally to determine the contaminants at a specific time or during a specific event.
Healthmap	Health Management and Assessment Plan. A tool to initiate the first steps to managing health and provides the basic building blocks to help achieve BP's Commitment of 'no harm to people'. Healthmap can cover the whole range of health and industrial hygiene hazards/risks through a systematic process that identifies and prioritizes health hazards/risks relevant to a particular site, Region or other entity.
Industrial Hygiene (IH)	The anticipation, recognition, evaluation, and control of health hazards in the workplace.

Permissible Exposure Limit (PEL)	A PEL is the maximum airborne concentration of a substance regulated by the Occupational Safety and Health Administration (OSHA) to which any worker may be exposed during a normal eight-hour workday or 15-minute period.
Short Term Exposure Limit (STEL)	Maximum concentration for a continuous 15-minute sampling period. Exposure should not occur more than four times a day, with at least 60 minutes between exposures.
Similar Exposure Groups (SEGs)	A group of workers having the same general exposure profile for the agent being studied.
Threshold Limit Value (TLV)	Airborne concentration of a substance to which nearly all workers can be exposed daily without adverse effects. The American Conference of Governmental Industrial Hygienists (ACGIH) publishes these values annually on the basis of the most current scientific data.
Time-Weighted Average (TWA)	Employee's average exposure in any 8-hour work shift of a 40-hour work week. Both OSHA and ACGIH have TWA exposure limits/guidelines.
Unacceptable Exposure	The hazard exposure is insufficiently controlled such that further risk management measures are needed.
Uncertain Exposure	Results when the hazard exposure relative to an exposure limit or guideline or other measure is uncertain.

7 References

- GRP 3.4 – 0004: Managing Industrial Hygiene
- Healthmap Website: <http://healthmap.bpweb.bp.com/>
- American Industrial Hygiene Association (AIHA): *The Occupational Environment: Its Evaluation, Control, and Management*
- AIHA: *A Strategy for Assessing and Managing Occupational Exposures*
- Appendix: Non-inclusive List of Health Hazards and Sampling Information

Revision Log:

Revision Date	Authority	Custodian	Revision Details
06/04/2014	Director of Health and Safety	Health and Hygiene Team Leader	Reformatted document. Changed document Authority and Custodian. Section 1 - included OMS Sub-Element for Health and Industrial Hygiene. Section 2 - added and updated responsibilities for the Health / IH Team,

			<p>H&S Site Lead, Area Operating Manager, Offshore Installation Manager / Wellsite Leader, personnel, and contractors.</p> <p>Section 3 - describes the process of health risk identification and assessment. Identification of health risks includes Healthmap and the development of a site-specific Health and IH Plan. The identification process includes a review of emerging health concerns, health incidents, external events, and process safety events. For health risk assessment, the entity and facility risk register is utilized. The IH assessment process describes a 3-year IH Cycle.</p> <p>Section 4 - describes the detailed process of risk assessment which includes monitoring strategy, workplace characterization, exposure assessment, and exposure classification. Section 5 - describes the process of selecting personnel for monitoring and use of similar exposure groups. Section 6 - describes the occupational exposure limits and unusual work schedule reduction factor used. Section 7 - added IH inventory calibration, maintenance, and suggested offshore IH instrumentation. Appendix -- updated List of Health Hazards with Sampling Information.</p>
10/29/2008	Curtis Jackson	Dennis Johnson	Added Health Map Risk Assessment process into the document and updated the Hazard inventory by adding all the hazards identified in Healthmap and some additional hazards.
01/31/2006	S. Garner/S. Tink/C. Jackson/R. DeLeonardis	Jack Kogut	No content changes. Changed CD # from 20,000 to UPS-US-SW-GOM-HSE-DOC-00424-2 to conform to new numbering nomenclature in GoM HSSE Doc Base. Revised the name of 2 Authorities.
12/08/2003	Bernie Herbert Steve Flynn Stan Garner and Ralph DeLeonardis	Jack Kogut	Initial issue.

Appendix: Non-inclusive List of Health Hazards and Sampling Information

Substance	Corresponding Safe Work Practice	Type of Sample	General Work Activity	Sampling Equipment	Approved Analytical Method*
Benzene	Benzene Safe Work Practice UPS-US-SW-GOM-HSE-DOC-00094-2	Full-shift	Routine and Maintenance Work, breaking containment	Pump and Tube (400/200 mg Charcoal) or Organic Vapor Monitor (OVM) 3M 3520/3500	NIOSH 1501
		STEL	Routine, Line & Equipment Opening (L&EO), and maintenance work, breaking containment	Pump & tube (400/200 mg coconut charcoal) or Photoionization Detector (PID) Meter as a screening tool	NIOSH 1501
		Grab	L&EO, maintenance work, and determining stream concentration	PID Meter as a screening tool or Colorimetric tube (Dräger or Sensidyne)	Direct Reading
BTEX (Benzene, Toluene, Ethyl benzene, Xylene)	Benzene Safe Work Practice UPS-US-SW-GOM-HSE-DOC-00094-2	Full-shift or STEL	Routine, L&EO, and maintenance work, breaking containment	PID Meter as a screening tool or Pump and Tube (400/200 mg Charcoal) or OVM 3M 3520/3500	NIOSH 1501
Total Hydrocarbons	N/A	Full-shift or STEL	Routine, L&EO, and maintenance work, breaking containment	PID Meter as a screening tool, Pump and Tube (400/200 mg Charcoal), or OVM 3M 3520/3500	NIOSH 1550
Hydrogen Sulfide	Hydrogen Sulfide Safe Work Practice UPS-US-SW-GOM-HSE-DOC-00113-2	Full-shift or Task	Routine work, L&EO, and determining stream concentration	Gas Meter (data logging H ₂ S) or pump and tube (400/200 mg orbo)	NIOSH 6013
		Grab	Routine work, L&EO, and determining stream	Gas Meter (data logging H ₂ S) or Colorimetric	Direct Reading

Substance	Corresponding Safe Work Practice	Type of Sample	General Work Activity	Sampling Equipment	Approved Analytical Method*
			concentration, bilge water task	tube (Draeger or Sensidyne)	
Methanol	N/A	Full-shift and STEL	Routine and L&EO work on methanol equipment	Pump & tube (400/200 mg Silica Gel)	NIOSH 2000
Carbon Monoxide	N/A	Grab	Routine Operations	Gas Meter or Colorimetric tube	Direct Reading
Chlorine (free in water)	Offshore Production Facilities Potable Water Analysis and Inspection SWP UPS-US-SW-GOM-HSE-DOC-00001-3	Grab	Water to end users	Hach Model CN 66F Test Kit	Direct Reading
Ionizing Radiation – NORM	NORM Manual UPS-US-SW-GOM-HSE-DOC-000628-2	Area	Routine Operations	General Purpose Ratemeter – Model 3-IS with a Scintillator Probe – Model 44-2	Direct Reading
		Personal	Maintenance Operations	General Purpose Ratemeter – Model 3-IS with a Pancake Probe – Model 44-9	Direct Reading
Ionizing Radiation-Sealed Sources Ionizing Radiation-Nuclear Gauges	Radiation Safe Work Practice UPS-US-SW-GOM-HSE-DOC-00680-2 and UPS-US-SW-GOM-HSE-DOC-00691-2	Area	Typically done during Fracture jobs and other special well operations.	Micro R meter 500-2 Pulsar	Direct Reading
Noise	Hearing Conservation Safe Work Practice UPS-US-SW-GOM-HSE-DOC-00110-2	Area	Routine Operations	Sound Level Meter or Noise Dosimeters	Set by OSHA, ACGIH, and ISO noise criteria
		Personal	Routine Operations	Noise Dosimeters	Set by OSHA, ACGIH, and

Substance	Corresponding Safe Work Practice	Type of Sample	General Work Activity	Sampling Equipment	Approved Analytical Method*
					ISO noise criteria
Heat and Cold Stress	Heat Stress Prevention Safe Work Practice UPS-US-SW-GOM-HSE-DOC-00952-2	Area	Routine Operations	Ambient Temperature/ Humidity meter, Wet Bulb Globe Temperature (WBGT) instrument or Kestrel Heat Stress Monitor	Direct Reading
Mold / Spores	Indoor Air Quality Safe Work Practice UPS-US-SW-GOM-HSE-DOC-00737-2	Area (Air)	Routine Operations, Living Quarters	Air-O-Cell Zefon 37 mm filter	N/A
Lead	Heavy Metals Safe Work Practice UPS-US-SW-GOM-HSE-DOC-00524-2	Full-shift and Task	Hot work or abrasive removal of lead containing coatings	Pump & 37 mm mixed cellulose ester (MCE) or polyvinyl chloride (PVC) filter	OSHA ID-125G NIOSH 7300
Asbestos	Asbestos Management Manual UPS-US-SW-GOM-HSE-DOC-00541-2	Full-shift and Task	Removal, abatement, or demolition of known or suspect materials	Pump & 25 mm MCE (cowl) 1.2 / 0.8 µm filter	NIOSH 7400 or OSHA ID-160
		Bulk	Removal, abatement, or demolition of known or suspect materials	Double Bag Sample Vial	EPA 600-M4-82-020
Chromium VI, Nickel, Iron, and Manganese	Heavy Metals Safe Work Practice UPS-US-SW-GOM-HSE-DOC-00524-2	Full-shift and Task	Welding or torch cutting	Pump & 37 mm PVC	OSHA ID-215
Welding Scan	Heavy Metals Safe Work Practice UPS-US-SW-GOM-HSE-DOC-00524-2	Full-shift and Task	Welding or torch cutting	Pump & 37 mm MCE or PVC	NIOSH 7300 or OSHA 125G

Substance	Corresponding Safe Work Practice	Type of Sample	General Work Activity	Sampling Equipment	Approved Analytical Method*
Cadmium	Heavy Metals Safe Work Practice UPS-US-SW-GOM-HSE-DOC-00524-2	Full-shift and Task	Removal of corroded cadmium plated bolts	Pump & 37 mm MCE or PVC	NIOSH 7300 or OSHA ID-125G

*NIOSH - National Institute for Occupational Health; OSHA - Occupational Safety and Health Administration; EPA - Environmental Protection Agency, ACGIH - American Conference of Governmental Industrial Hygienists, ISO - International Organization for Standardization.