Operations: HSE

Health and Industrial Hygiene

GoM Region Health Risk and Exposure Assessment

This document is governed by GOO Document Lifecycle process. Changes to this document must be approved by the GOO GoM Document Governance Board before they can be implemented. Contact IMDC team for additional guidance.
### AMENDMENT RECORD

<table>
<thead>
<tr>
<th>Revision Date</th>
<th>Authority</th>
<th>Custodian</th>
<th>Revision Details</th>
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<tr>
<td>09/13/2019</td>
<td>HSE Manager – Miranda Jones</td>
<td>Health Manager – Valerie Murray</td>
<td>Reformatted document. Changed health database from Medgate to Cority. Changed Tr@ction to IRIS. Changed role titles to match upstream blueprint organization. Minor grammar changes. Updated location of where exposure monitoring reports are stored. Revision 4.</td>
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<tr>
<td>06/04/2014</td>
<td>Director of Health and Safety</td>
<td>Health and Hygiene Team Leader</td>
<td>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, H&amp;S Site Lead, Area Operating Manager, Offshore Installation Manager / Wellsite Leader, personnel, and contractors. 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. 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.</td>
</tr>
<tr>
<td>10/29/2008</td>
<td>Curtis Jackson</td>
<td>Dennis Johnson</td>
<td>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.</td>
</tr>
<tr>
<td>01/31/2006</td>
<td>S. Garner/S. Tink/C.</td>
<td>Jack Kogut</td>
<td>No content changes. Changed CD # from 20,000 to UPS-US-SW-GOM-HSE-DOC-00424-2 to conform to</td>
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GoM Region Health Risk and Exposure Assessment Policy

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new numbering nomenclature in GoM HSSE Doc Base.  
Revised the name of 2 Authorities.
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1. **Purpose/Scope**

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. **Key Responsibilities**

2.1. **Health Team (Occupational Health and Industrial Hygiene)**

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 and Environmental Site Advisors (HSE) Site Advisors 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.

2.2. **Health, Safety and Environmental (HSE) Site Advisor 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.

2.3. **Area Operations Manager, Facility Manager, or Designate**

Review site-specific Health and IH plans.

2.4. **Offshore Installation Manager (OIM), Wellsite 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.

2.5. Workforce

A. Participate in the health risk and exposure assessment process,
B. Communicate health concerns to the HSE Site Advisor and/or Health & IH Team,
C. Utilize exposure controls and risk reduction measures implemented at the facility, and
D. 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/reports.
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.
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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 IRIS and/or Health & IH Plans.

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

A. 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

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

4.2. Workplace Characterization

C. 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

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

4.3.1. Exposure Assessment

E. 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 the Appendix.

F. 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: Brief and Scala Model

\[ RF = \frac{8 \times \frac{24 - h}{h}}{16} \]

4.3.2. 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 Cority as well as on the Health & IH shared-drive. Equipment calibration shall be maintained per manufacturer’s guidance and calibration records stored in Cority and the IH 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), and
D. Other Equipment, as necessary.

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 Cority.

IH and exposure assessment reports will be used to communicate results. The reports will:
G. Compare monitoring results to appropriate PELs/TLVs,
H. Review and compare historical monitoring data to identify exposure trends,
I. Provide recommendations and actions for improvement, as needed
J. Recommend medical surveillance, as needed

Report action items will be entered in IRIS and tracked to closure.

Electronic sample records are retained in Cority as exposure records. The IH and exposure assessment original field notes, sample data sheets, calibration logs, laboratory chain of custody, and laboratory analytical reports
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will be uploaded and retained in Cority 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 loaded to the document management system 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 this document.

6. Definitions

<table>
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<tr>
<th>Term</th>
<th>Definition</th>
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<tbody>
<tr>
<td>Acceptable Exposure</td>
<td>The hazard or exposure is clearly, sufficiently controlled such that no further risk reduction measures are needed.</td>
</tr>
<tr>
<td>External Event</td>
<td>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.</td>
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<tr>
<td>Grab Sample</td>
<td>A sample taken within a short time period, generally to determine the contaminants at a specific time or during a specific event.</td>
</tr>
<tr>
<td>Healthmap</td>
<td>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.</td>
</tr>
<tr>
<td>Industrial Hygiene (IH)</td>
<td>The anticipation, recognition, evaluation, and control of health hazards in the workplace.</td>
</tr>
<tr>
<td>Permissible Exposure Limit (PEL)</td>
<td>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.</td>
</tr>
<tr>
<td>Short Term Exposure Limit (STEL)</td>
<td>Maximum concentration for a continuous 15-minute sampling period. Expose should not occur more than four times a day, with at least 60 minutes between exposures.</td>
</tr>
<tr>
<td>Similar Exposure Groups (SEGs)</td>
<td>A group of workers having the same general exposure profile for the agent being studied.</td>
</tr>
<tr>
<td>Threshold Limit Value (TLV)</td>
<td>Airborne concentration of a substance to which nearly all workers can be exposed daily without adverse effects. The American Conference of</td>
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</table>
Governmental Industrial Hygienists (ACGIH) publishes these values annually on the basis of the most current scientific data.

<table>
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<tr>
<th>Time-Weighted Average (TWA)</th>
<th>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.</th>
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<td>Unacceptable Exposure</td>
<td>The hazard exposure is insufficiently controlled such that further risk management measures are needed.</td>
</tr>
<tr>
<td>Uncertain Exposure</td>
<td>Results when the hazard exposure relative to an exposure limit or guideline or other measure is uncertain.</td>
</tr>
</tbody>
</table>

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

8. Appendix: Non-Inclusive List of Health Hazards and Sampling Information

<table>
<thead>
<tr>
<th>Substance</th>
<th>Corresponding Policy</th>
<th>Type of Sample</th>
<th>General Work Activity</th>
<th>Sampling Equipment</th>
<th>Approved Analytical Method*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benzene</td>
<td>Benzene Policy UPS-US-SW-GOM-HSE-DOC-00094-2</td>
<td>Full-shift</td>
<td>Routine and Maintenance Work, breaking containment</td>
<td>Pump and Tube (400/200 mg Charcoal) or Organic Vapor Monitor (OVM) 3M 3520/3500</td>
<td>NIOSH 1501</td>
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<tr>
<td></td>
<td></td>
<td>STEL</td>
<td>Routine, Line &amp; Equipment Opening (L&amp;E&amp;O), and maintenance work, breaking containment</td>
<td>Pump &amp; tube (400/200 mg coconut charcoal) or Photoionization Detector (PID) Meter as a screening tool</td>
<td>NIOSH 1501</td>
</tr>
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<td></td>
<td>L&amp;E&amp;O, maintenance work, and determining stream concentration</td>
<td>PID Meter as a screening tool or Colorimetric tube (Draeger or Sensidyne)</td>
<td>Direct Reading</td>
</tr>
<tr>
<td>Substance</td>
<td>Corresponding Policy</td>
<td>Type of Sample</td>
<td>General Work Activity</td>
<td>Sampling Equipment</td>
<td>Approved Analytical Method*</td>
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<tr>
<td>BTEX (Benzene, Toluene, Ethyl benzene, Xylene)</td>
<td>Benzene Policy UPS-US-SW-GOM-HSE-DOC-00094-2</td>
<td>Full-shift or STEL</td>
<td>Routine, L&amp;E, and maintenance work, breaking containment</td>
<td>PID Meter as a screening tool or Pump and Tube (400/200 mg Charcoal) or OVM 3M 3520/3500</td>
<td>NIOSH 1501</td>
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<tr>
<td>Total Hydrocarbons</td>
<td>N/A</td>
<td>Full-shift or STEL</td>
<td>Routine, L&amp;E, and maintenance work, breaking containment</td>
<td>PID Meter as a screening tool, Pump and Tube (400/200 mg Charcoal), or OVM 3M 3520/3500</td>
<td>NIOSH 1550</td>
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<td>Hydrogen Sulfide</td>
<td>Hydrogen Sulfide Policy UPS-US-SW-GOM-HSE-DOC-00113-2</td>
<td>Full-shift or Task</td>
<td>Routine work, L&amp;E, and determining stream concentration</td>
<td>Gas Meter (data logging H2S) or pump and tube (400/200 mg 2ro)</td>
<td>NIOSH 6013</td>
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<td>Methanol</td>
<td>N/A</td>
<td>Full-shift and STEL</td>
<td>Routine and L&amp;E, work on methanol equipment</td>
<td>Pump &amp; tube (400/200 mg Silica Gel)</td>
<td>NIOSH 2000</td>
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<tr>
<td>Carbon Monoxide</td>
<td>N/A</td>
<td>Grab</td>
<td>Routine Operations</td>
<td>Gas Meter or Colorimetric tube</td>
<td>Direct Reading</td>
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<tr>
<td>Chlorine (free in water)</td>
<td>Potable Water Management Policy UPS-US-SW-GOM-HSE-DOC-00001-3</td>
<td>Grab</td>
<td>Water to end users</td>
<td>Hach Model CN 66F Test Kit</td>
<td>Direct Reading</td>
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<td>Heat and Cold Stress</td>
<td>UPS-US-SW-GOM-HSE-DOC-00952-2</td>
<td>Area</td>
<td>Ambient Temperature/ Humidity meter, Wet Bulb Globe Temperature (WBGT) instrument or Kestrel Heat Stress Monitor</td>
<td>Direct Reading</td>
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<td>Mold / Spores Safety Practice</td>
<td>UPS-US-SW-GOM-HSE-DOC-00737-2</td>
<td>Area (Air)</td>
<td>Routine Operations, Living Quarters</td>
<td>Air-O-Cell Zefon 37 mm filter</td>
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<td>Lead</td>
<td>UPS-US-SW-GOM-HSE-DOC-00524-2</td>
<td>Full-shift and Task</td>
<td>Hot work or abrasive removal of lead containing coatings</td>
<td>Pump &amp; 37 mm mixed cellulose ester (MCE) or polyvinyl chloride (PVC) filter</td>
<td>OSHA ID-125G, NIOSH 7300</td>
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<tr>
<td>Asbestos</td>
<td>Asbestos Management Manual</td>
<td>Full-shift and Task</td>
<td>Removal, abatement, or demolition of</td>
<td>Pump &amp; 25 mm MCE (cowl) 1.2 / 0.8 μm filter</td>
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<tr>
<td>Heavy Metals Safe Work Practice</td>
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<td>Removal, abatement, or demolition of known or suspect</td>
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<td>Welding Scan</td>
<td>Heavy Metals Policy UPS-US-SW-GOM-HSE-</td>
<td>Full-shift and Task</td>
<td>Welding or torch cutting</td>
<td>Pump &amp; 37 mm PVC</td>
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<td>Cadmium</td>
<td>Heavy Metals Policy UPS-US-SW-GOM-HSE-</td>
<td>Full-shift and Task</td>
<td>Removal of corroded cadmium plated bolts</td>
<td>Pump &amp; 37 mm MCE or PVC</td>
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*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.
Are you proposing to create / revise / supersede / obsolete a document containing mandatory requirements \(^{(1)}\) or guides \(^{(2)}\) which impact one or more of GOO GoM teams?

\(^{(1)}\) Mandatory requirements are: ‘Shall’, ‘Must’, ‘Need to’ or ‘Required to’ type statements.

\(^{(2)}\) Guides containing ‘Should’ or ‘Recommended that’ type statements.

Is the document site / facility specific or regional engineering practice \(^{(3)}\)?

\(^{(3)}\) E.g.: Site Operating Procedures (SOPs), Emergency Response Plans (ERPs), REP, Maintenance and Inspection documents.

Is the document supporting (for revised or obsoleted doc) or intended to support (for new doc) conformance to / implementation of an OMS Group Essential or existing BP Practice, BP Procedure or BP Guide?

Is this complete \(^{(4)}\) or technical \(^{(5)}\) change to existing document?

\(^{(4)}\) Complete - New or significant changes to existing document (incl. superseding, obsoleting)

\(^{(5)}\) Technical - Changes impact the intent of one or more requirements

\(^{(6)}\) Identify GoM OMS RCT here. RCT approved PID needs to be emailed no later than two weeks before quarterly DGB Meeting to be considered for review. See DGB meeting schedule here.
**Document Lifecycle Tree**

Navigate through the form and click on the last box you ended through below selection process.

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**Document Details**

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<th>UPS-US-SW-GOM-HSE-DOC-00424-2</th>
<th>Revision</th>
<th>4</th>
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<td>Document Title</td>
<td>Health Risk and Exposure Assessment</td>
<td></td>
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<tr>
<td>Next Review Date</td>
<td>09/13/2024</td>
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**Reason for Issue:**
- [ ] New
- [ ] Revise
- [ ] Supersede
- [ ] Obsolete

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**Document Sign Off**

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<th>Print Name &amp; Title</th>
<th>Signature</th>
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<tr>
<td></td>
<td>Valerie Murray, Health Manager</td>
<td>[Signature]</td>
<td>9/21/2019</td>
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**Other Instructions & Comments**

- Embedded evidence of training and communication in the document.

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*This form to be inserted at the last page of the document.*