Information provided herein is offered in good faith as:

- Sickness absence reports;
- Elimination;
- Health surveillance records;
- Education and training;
- Occupational illness and injury reports;

consequence in relative terms,’low,’ ‘medium’ or ‘high,’ and combining the two using previously agreed rules. This approach to the expression of risk is perfectly adequate for many types of evaluation, allowing for a structured approach to be adopted in situations where more precise numerical methods would be inappropriate.

A Health Risk Assessment Matrix (HRAM) is a useful tool in ranking health risks. A ranking is obtained by assigning to each identified health hazard within a matrix a severity and likelihood, based on their potential to cause all health and on the history of previous exposure. Entering different rows on the matrix enables prioritization for health-care management to be set and mitigation measures planned. A comparison between the required controls and current controls will enable the identification of any gaps.

The figure below given an example of such a technique:

### CONSEQUENCES

<table>
<thead>
<tr>
<th>CONSEQUENCES</th>
<th>INCREASING LIKELIHOOD</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td><strong>Severity</strong></td>
<td>Personal injury</td>
</tr>
<tr>
<td><strong>Likelihood</strong></td>
<td>Rare</td>
</tr>
</tbody>
</table>

- **Severity**
  - Personal injury: includes physical injuries resulting from exposure to hazards.
  - Mild: moderate injuries that require medical attention.
  - Moderate: severe injuries that require hospitalization.
  - Severe: life-threatening injuries that may be fatal.
  - Extreme: fatal injuries.

- **Likelihood**
  - Rare: exposure occurs very infrequently.
  - Unlikely: exposure is possible but rare.
  - Possible: exposure is likely but not guaranteed.
  - Likely: exposure is probable.
  - Certain: exposure is guaranteed to happen.

### 6. Health risk evaluation

A health risk is generally defined as the likelihood that exposure to a hazard will result in occupational illness, disability or death. Health risk evaluation considers the information generated by the hazard identification process (see Section 4 — ‘The process’).

### Individual susceptibility

Health risk assessments are usually general. It is impossible to assess how each individual will react to every health risk. Factors that influence this variability include: history, age, sex, personal habits (e.g. smoking, alcohol and substance abuse/dependence), medical and occupational history as well as health status. Pregnancy and breastfeeding require special consideration.

### Exposures

Exposure is the amount (dose) of the hazard to which the person has been exposed. This is a combination of the magnitude, frequency and duration of exposure. In order to assess the degree of exposure to an identified health hazard, it may be necessary to quantify the level of personal and/or environmental exposure and benchmark against accepted standards. Examples range from formal level meters for measuring noise to personal dosimeters for measuring radioactive exposure.

When necessary, reference documents should be consulted and past experience borne in mind.

### Cumulative exposures

Multiple exposures to health hazards can occur either simultaneously or consecutively, adding to an individual’s total dose and potentially increasing the risk. For example, a combination of chemicals with similar toxicity is assessed, the effect may be the sum of the effects of all the chemicals, or even more. Similarly, if control measures are taken out, exposure from each task may be cumulative (e.g. manual handling).

- People exposed to health hazards in every aspect of their lives, including homes, hobbies and leisure, as well as work. Where the same hazard is involved, this adds to any exposure. For example, people whose liability exposure to chemicals, water or hard-core labour is not starting with zero exposure when they begin work. For the case of biological hazards domestic and relationship pressures may affect an individual’s ability to handle workplace stress.

### 7. Setting priorities

The risk associated with a particular activity is often judged by estimating the probability and consequence in relative terms, ‘low,’ ‘medium’ or ‘high,’ and combining the two using previously agreed rules. This approach to the expression of risk is perfectly adequate for many types of evaluation, allowing for a structured approach to be adopted in situations where more precise numerical methods would be inappropriate.

A Health Risk Assessment Matrix (HRAM) is a useful tool in ranking health risks. A ranking is obtained by assigning to each identified health hazard within the activity a severity and likelihood, based on their potential to cause all health and on the history of previous exposure. Entering different rows on the matrix enables prioritization for health-care management to be set and mitigation measures planned. A comparison between the required controls and current controls will enable the identification of any gaps.

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### 8. Reducing risks: remedial actions

#### Controlling adverse exposure

The general principles of controlling adverse exposure to health hazards are well-known and include:

- Elimination;
- Substitution;
- Modification;
- Containment;
- Isolation;
- Procedures;
- Education and training; and
- Personal protective equipment (PPE).

This hierarchy of control can be applied to all health hazard categories and is illustrated by applying it to the following examples—noise.

#### Controlling noise—An example:

**Elimination**

Noise is only generated if there is a vibration source. Eliminating noise requires engineering measures to remove the origin of vibration.

**Substitution**

Quiet alternatives with better vibratory characteristics may be available.

**Modification**

Once noise is generated it can travel from the source via ‘noise pathways.’ Measures should be taken to make structural adjustments to the workplace, such as partition walls and the introduction of absorptive materials/devices, for example acoustic ceiling tiles, reflective wall coverings and flexible acoustic screening.

**Containment**

Noise emitted by equipment and/or processes can be contained by partial or total acoustic enclosures.

**Isolation**

Increasing the distance between the noise source and people can be achieved by automation, the use of remote controls and acoustic refuges.

**Procedures**

Workplace rules, task rotation and permits to work are examples of systems used to control adverse exposure. In the case of noise, this may mean restricting the hours of work or numbers of people involved in a noisy activity.

### 9. Remedial action plan

Where the need for action to reduce health risks is identified by HRAs, a Remedial Action Plan should be drawn up. This should state which additional control or recovery measures are required. This plan should include: priorities, responsible person and target dates for actions and there should be a tracking system to ensure that the action plan has been carried out efficiently, effectively and on time.

### 11. Review of HRA

The HRA should be reviewed periodically and, in particular, in response to changes in activities, equipment or personnel and take account of the results of health surveillance or disease outbreaks. Any major modifications to the operation will warrant a review of the HRA.

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This publication is produced and maintained to assess both the environmental quality of our operations and the impact of our activities on the environment.

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Disclaimer: Information provided herein is offered in good faith to provide the industry with an understanding of the issues it must consider in relation to health and safety. Readers are advised that they must rely on their own diligence when determining how or whether to respond to the information herein. Further, this guide is not intended to replace necessary and appropriate medical or other professional advice or attention. Further, this guide is not intended to replace necessary and appropriate medical or other professional advice or attention.
1. Introduction

The aim of a Health Risk Assessment (HRA) is to identify health hazards, evaluate their risks to health and determine appropriate control and recovery measures.

Given the multi-faceted nature of health and the responsibilities of employers to provide a secure and healthy workplace, it is essential that a systematic approach be used to evaluate the potential for individual harm and protect against any adverse exposure.

This document provides a brief overview of the HRA process. Detailed guidance can be found in the generic HRA standard template given in Part 2 (on the attached CD-ROM) or by consulting an occupational health professional.

2. Scope

The HRA process is broadly applicable to all activities within the oil and gas industry.

HRA addresses the life cycle of any operation, and takes account of all employees, contractors and third parties at work.

A health risk assessment should be performed at the earliest stage of a project or operation, reviewed periodically and revised when there is a significant change or as required by local legislation.

3. Purpose

The purpose of this document is to expand on the information presented within the OGP publication Managing Health at Oil and Gas Activities. It provides a framework for the identification, evaluation and control of potential health hazards and risks with the overall intent of protecting employees’ health.

Responsibilities and accountabilities of both the individual subject matter experts and the line/operational staff, and the exact relationship between the two, will vary depending on culture and organizational structure. However, this document is aimed primarily at helping line management to understand the process and competencies required. It is nevertheless important to ensure that these responsibilities and accountabilities are defined. In general, the subject matter experts guide the HRA process and ensure its integrity, while line/operational staff use their knowledge of the operational processes and their judgment to apply the Risk Assessment techniques. They are ultimately responsible for ensuring that the HRA is undertaken, and that the results of the HRA are acted upon.

The attached CD-ROM contains Part 2 of A Roadmap to Health Risk Assessment in Microsoft® Word™ format. The document defines what HRA is, what it should include, and how to incorporate the HRA within an ESE Management System. The appendices provide further guidance and good practice examples to assist in implementing these elements.

4. The process

The HRA process is summarized in the following diagram. The individual steps in the process are explained further in the document.

5. Health hazard identification

A health hazard is something with the potential to adversely affect the health of individuals or groups.

The difference between safety hazards and health hazards is that safety hazards have the potential to cause sudden injury, whereas health hazards have the potential to cause occupational illness (which may be acute, delayed or chronic), with varying degrees of disability or even death.

Health hazard identification is a process that considers all facets of work activity in order to establish the presence of health hazards.

### Geographical location

- Temperature and climate (e.g., extreme heat or cold) and wide temperature variations
- Altitude (e.g., low pressure of oxygen)
- Humidity and air quality
- Daylight (extreme of dark or light)
- Transport
- Communication infrastructure
- Location in relation to available health services and facilities (distance and access)
- Standard of healthcare facilities
- Competence of healthcare staff
- Security (e.g., stress, anxiety, kidnapping, violence)
- The potential for natural catastrophes

### Physical

- Noise
- Motion (e.g., sea sickness)
- Vibration (hand-arm, whole body)
- Pressure (vessels, drowning)
- Ionizing and non-ionizing radiation
- Thermal work environment
- Display screen equipment
- Ergonomics (a mismatch between the task and capability (including man-machine interfaces, manual handling, repetitive movements))
- Sharp objects
- Transport during work
- Ambient light levels

### Chemical

- Systemic poisons (e.g., heavy metals, H2S)
- Irritants
- Sensitizers (that cause skin and respiratory reactions)
- Acids and alkalis/caustic agents
- Carcinogens

### Biological

- Wildlife (animals including pets and guard dogs, reptiles, insects, plants)
- Sexually transmitted disease (commercial sex workers, camp followers)
- Endemic/epidemic disease (due to viruses, bacteria, fungi, parasites)
- Occupational disease (due to viruses, bacteria, fungi, parasites)
- Contaminated food and drink
- Poor hygiene (catering, accommodation, toilet facilities, waste disposal)

### Psychosocial

- Isolation (degree of access to social support)
- Overcrowding and lack of privacy
- Communication problems (business and family contacts)
- Discrimination
- Bullying and harassment
- Culture, local laws, religion and language (comprehension and comfort levels)
- Job design (control, content, workload)
- Job organization (shift patterns, sleep deprivation, rotations, jet lag)
- Leisure and recreation opportunities
- Substance abuse and dependence and smoking

The examples cited are not exhaustive and the hazard identification process will determine the health hazard profile for the specific activity.

Health hazards can generate either acute, delayed and/or chronic health effects:

- Acute effects (e.g., asthma):
  - Occur suddenly
  - Occur within seconds to hours following exposure
  - Usually have an easily identifiable cause
  - May lead to removal from the hazard and/or immediate medical attention

- Delayed effects (e.g., lung cancer):
  - Occur hours to years after the exposure
  - May not be easily associated with a specific hazard
  - May not present obvious symptoms
  - May only be diagnosed through health surveillance or sophisticated testing

### Equipment

- Condition of the equipment
- Specific hazards linked to the equipment (noise, vibration, radiation, heat, cold and exhaust emissions)
- Training and method of use

### Materials

- Physical and chemical characteristics
- Property changes or dispersion of the material during the activity may increase the hazard
- Quality of information (e.g., language and availability) pertaining to the material being used (material safety data sheets and/or industry/trade union information)

### Environment and Location

Special consideration must be given to jobs which, under certain circumstances, are considered as safe and low risk but when performed in extreme conditions (e.g., extreme heat, cold or noise, altitude, confined space) render the task more hazardous.

Special attention should also be given to personal protective equipment (PPE) and/or work test regimes when considering those highly hazardous situations. In certain cases, however, PPE may represent an additional risk (e.g., in extreme heat).

### Equipment and materials

Workplace equipment may pose a risk to health especially if it has been poorly designed or used incorrectly or malfunction. When listing the equipment and materials used in an activity, it will be necessary to consider:

- PPE (e.g., gloves, boots, safety glasses)
- Transportation during work
- Special attention should also be given to the exposure limits which should be reviewed and incorporated into the health risk assessment.

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