



# Personnel Protection and Safety Equipment for the Oil and Gas Industries

Alireza Bahadori, PhD



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# **Personnel Protection and Safety Equipment for the Oil and Gas Industries**

*Dedicated to the loving memory of my parents,  
grandparents, and to all who contributed  
so much to my work over the years.*

# Biography

**Alireza Bahadori, PhD** is a research staff member in the School of Environment, Science and Engineering at Southern Cross University, Lismore, NSW, Australia. He received his PhD from Curtin University, Perth, Western Australia.

During the past 20 years, Dr Bahadori has held various process and petroleum-engineering positions and has been involved in many large-scale projects at NIOC, Petroleum Development Oman (PDO), and Clough AMEC PTY LTD.

He is the author of around 250 articles and 12 books. His books have been published by many major publishers, including Elsevier.

Dr. Bahadori is the recipient of highly competitive and prestigious Australian government's international postgraduate research award as part of his research in oil and gas area. He also received Top-Up Award from the state government of Western Australia through the Western Australia Energy Research Alliance (WA:ERA) in 2009. Dr. Bahadori serves as a reviewer and member of editorial board and reviewer for a large number of journals.

# Preface

The vast complexity and variety that nature presents within the oil, gas, and petrochemical industries requires specific books for personnel safety and protection measures. This book outlines the mentioned specific requirements.

Sanitation and first aid are two key factors, and the minimum requirements for keeping plants/machinery, workplaces, and personnel in healthy conditions are covered in this text.

The serious consequences of poor sanitary conditions and insufficient first-aid procedures in the oil, gas, and petrochemical industries can be briefly categorized as follows:

- a. Unsafe working conditions
- b. Malfunctioning machineries
- c. Poor health of personnel

In the control of occupational diseases caused by breathing air contaminated with harmful dusts, fogs, fumes, mists, gases, smokes, sprays, or vapors, the primary objective should be to prevent atmospheric contamination. This should be accomplished as far as feasible by accepted engineering control measures (e.g., enclosure or confinement of the operation, general and local ventilation, and substitution of less toxic materials).

The focus of this book is on the minimum requirements for protection of the respiratory system from inhalation of particulate matter, noxious gases, and vapors, and oxygen deficiency. The factors affecting the choice of respiratory equipment are discussed. The equipment covered include:

- a. Respirators for dusts, gases, and gases with dusts
- b. Breathing apparatus, self-contained closed and open-circuits
- c. Airline, fresh-air, and compressed types
- d. Dust hoods and suits (positive-pressure, powered)
- e. Underwater breathing apparatus
- f. Ventilatory resuscitators

This book is designed to assist in the selection of respiratory protective devices for use against atmospheric contaminants. Atmospheres can be contaminated by dust or gas, or be deficient in oxygen. These hazards occur singly or in combination. Additionally, each contaminant may have special characteristics of its own that require protection. For instance, radio-active or corrosive contaminants require the use of special clothing. Some gases, liquids, and soluble solids absorb through the skin and these also require special protection.

Contaminated atmospheres are described generally as nuisance atmospheres that are not toxic or immediately dangerous to health; hazardous atmospheres that are of low toxicity or cause easily reversible biological changes; dangerous atmospheres of a high toxicity or where health hazards are more severe; and atmospheres immediately dangerous to life.

Respiratory protective devices should either filter the contaminated atmosphere to produce air suitable for respiration or supply such air from an alternative source. The air is supplied to the breathing area (the nose and mouth of the wearer) by one of the following: a mouthpiece and nose clip; a half-mask covering the nose and mouth; a full face piece covering the eyes, nose and mouth; a hood covering the head down to the shoulders; or a suit covering the head and body down to waist and wrists.

The use of sealed radioactive sources has become so widespread that a resource to is needed to help guide users. Safety is the prime consideration in establishing a standard for the use of sealed radioactive sources. However, as the application of sources becomes more diversified, a text is needed to specify the characteristics of a source and the essential performance and safety-testing methods for a particular application.

Safety belts and harnesses are means of protective equipment that are fitted around the upper parts of the body protecting the user against falls and creating self-confidence when used in the correct manner. In designing and selecting a belt or harness for any particular work, care should be taken to ensure that the equipment gives the user, as far as it is compatible with safety, the maximum degree of comfort and freedom of movement, and also in the event of the user falling, the greatest possible security against injury. Self-locking anchorage, lanyards, and other component parts are safety protective devices used to protect against falls. In assessing the performance of safety belts and harnesses the focus is on maintenance, inspection, and storage of equipment.

This book specifies the minimum requirements for types, classes, materials, design, physical and performance details that afford protection to all workers in industrial plants. This book is divided into several parts and will provide a separate section for each category of protective clothing.



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