CONTENT

1. SCOPE

This general instruction establishes requirements and guidelines related to the use of atmosphere-supplying respirators in Saudi Aramco industrial facilities. These requirements and guidelines include: applications; respirable air specifications; respirable air supply systems; respirator specifications; standard practices of training, maintenance, inspection, sealing and functioning of the facepiece; qualification, maintenance and use of air cylinders; and responsibilities of involved organizations. SOLAS (Safety of Life At Sea) is not covered.

This instruction covers the following atmosphere-supplying respirators used by Saudi Aramco during operations:

- Self-Contained Breathing Apparatus (SCBA)
- Supplied Air (airline) Breathing Apparatus (SABA)
- Combination-Type Supplied Air Breathing Apparatus (SABA) with self-contained escape air supply
- Emergency Escape Breathing Device (EEBD)

This instruction does not cover:

- Respirators for medical purposes
- Respirators for use onboard aircraft
- Respirators for underwater diving

2. REFERENCES

Referenced in this instruction are:

- ANSI/CGA G-7.1-1989: Commodity Specification for Air.
- GI 1781.001, Inspection, Testing, & Maintenance Of Fire Protection Equipment
- GI 1783.001, Fire Fighting Training Company Personnel
- NFPA 1852, Standard on Selection, Care, and Maintenance of Open-Circuit Self-Contained Breathing Apparatus (SCBA)
- NFPA 1981, Standard on Open-Circuit Self-Contained Breathing Apparatus (SCBA) for Emergency, 2007 edition.
- NFPA 1989, Standard on Breathing Air Quality for Fire and Emergency Services Respiratory Protection, 2008 edition
- Services NIOSH Pocket Guide to Chemical Hazards
- SAES-B-067, Safety Identification and Safety Colors

Industry standards used in preparing this instruction are:

- ANSI Z88.2-1992: American National Standard for Respiratory Protection
- SASO SSA 322/1982: Industrial Safety and Health Regulations, Part 5-Personal Protective Equipment
- OSHA 29 CFR 1910.134: Respiratory Protection
- Construction Safety Manual Section I-10
- CGA C-6.1-1984: Standards for Visual Inspection of High Pressure Aluminum Compressed Gas Cylinders

Abbreviations:

- ANSI - American National Standards Institute
- CFR - Code of Federal Regulations (USA)
- CGA - Compressed Gas Association (USA)
- DOT - USA Department of Transportation
- NFPA - National Fire Protection Association (USA)
- NIOSH - National Institute for Occupational Safety and Health (USA)
- SAMS - Saudi Aramco Materials System (KSA)
- SASO - Saudi Arabian Standards Organization (KSA)
- USA - United States of America

3. DEFINITIONS

3.1 Abrasive-Blasting Respirator: A respirator designed to protect the wearer from inhalation of, impact of, and abrasion by materials used or generated in abrasive blasting.

3.2 Approved Air Compressor: An air compressor whose quarterly air sample has been certified as "Within Normal Limits' by Environmental Chemistry Laboratory or a laboratory approved by them or the Lab Research & Development Center, per the standards of the latest edition of ANSI/CGA G-7.1-1989: Commodity Specification for Air.

3.3 Atmosphere-Supplying Respirator: A class of respirators that supplies pressurized respirable atmosphere independent of the ambient atmosphere.

3.4 Cascade System: A series of cylinders manifold together containing respirable air under pressure that is used either to fill other cylinders or to provide respirable air to SABA.

3.5 Closed Circuit SCBA: A SCBA in which all or a percentage of the exhaled air is cleaned and rebreathed.

3.6 Composite Cylinder: Consists of aluminum alloy inner shell with a total overwrap of carbon or fiber with epoxy resin.

3.7 Continuous-Flow Respirator: An atmosphere-supplying respirator that provides a continuous flow of respirable air to the respiratory inlet of the facepiece.

3.8 Emergency Escape Breathing Device (EEBD): A self-contained respirator used during escape from an oxygen deficient or contaminated environment.

3.9 Exposure Limit: The maximum allowable concentration of a contaminant in the air to which an individual may be exposed. These may be time-weighted averages, short-term limits, or ceiling limits.

Note: In Saudi Aramco operations exposure limits are adopted from the USA National Institute of Occupational Safety and Health, NIOSH.

Refer to the NIOSH Pocket Guide to Chemical Hazards. Employees may contact the Industrial Hygiene representative in their area for exposure limits.

3.10 Hazardous Atmosphere: An atmosphere that contains a contaminant(s) in excess of the exposure limit or is oxygen deficient or both. (Note: Hazardous atmospheres may be immediately dangerous to life or health (IDLH) or non-IDLH. Refer to the definitions of IDLH atmosphere and oxygen deficient atmospheres.)

3.11 High Risk Area: An area with high probabilities of the atmosphere containing a contaminant at a concentration at or above its IDLH concentration or an oxygen deficient atmosphere, or both. Examples include Drilling & Workover, Manned Offshore Platforms, Refinery Distillation, Chlorine Handling Areas, Chemical Mixing Buildings, Fractionation Modules, Sulfur Plants, Large Chemical Warehouses, laboratories, GOSPs, and Gas Treatment Plants.

3.12 Immediately Dangerous to Life or Health (IDLH) Atmosphere: An atmosphere that poses an immediate hazard to life or poses immediate irreversible debilitating effects on health.

Note: In Saudi Aramco operations IDLH contaminant concentrations are adopted from the USA National Institute of Occupational Safety and Health, NIOSH.

Refer to the NIOSH Pocket Guide to Chemical Hazards. Employees may contact the Industrial Hygiene representative in their area for IDLH contaminant concentrations.

3.13 Low Risk Area: An area with low probabilities of the atmosphere containing a contaminant at a concentration above its IDLH concentration or oxygen deficient atmosphere, or both. Examples would be utility units, truck loading areas (except in bulk plants), warehouses, office areas, parking areas, etc., depending on their location and specific type of operation(s).

3.14 Medium Risk Area: An area with a medium probability of the atmosphere containing a contaminant at a concentration at or above its IDLH concentration or oxygen deficient atmosphere, or both. Examples include Sulfur Storage Plants, Utilities areas, Bulk Plants, Smaller Chemical Warehouses, Ice Plants, Tank Farms, and Crude Transfer Pump areas.

3.15 Open-Circuit SCBA: An SCBA in which the breathing air is exhaled to the atmosphere after each breath.

3.16 Oxygen-Deficient, IDLH Atmosphere: An atmosphere with an oxygen concentration of less than 20 percent by volume.

3.17 Positive Pressure Respirator: An atmosphere-supplying respirator that maintains a positive pressure in the facepiece at all times.

3.18 Respirator: A personal device designed to protect the wearer from the inhalation of hazardous atmospheres.

3.19 Self-Contained Breathing Apparatus (SCBA): A positive pressure atmosphere-supplying respirator in which the respirable pressurized air source is carried by the wearer.

3.20 Supplied Air Breathing Apparatus (SABA): A positive pressure atmosphere-supplying respirator in which the main supply of respirable air is not carried by the wearer and may well have an escape set designed to provide a supply of emergency air to egress/escape from the area if the main supply of breathing air fails.

4. DESCRIPTIONS

This section describes the atmosphere-supplying respirators used by Saudi Aramco during operations.

4.1 Self-Contained Breathing Apparatus (SCBA): Saudi Aramco uses only the open-circuit, positive-pressure type of SCBA in normal operations. In an open-circuit SCBA, respirable, compressed air in a cylinder is carried by the wearer. The air is supplied to a facepiece and exhaled to the environment after use. The complete respirator consists of a facepiece, regulator, hose assembly, a harness/frame assembly, quick fill connection, cascade breathing air system connection and an air cylinder. In the positive-

pressure type of SCBA, a positive pressure is maintained in the facepiece, which prevents contaminants from entering the facepiece. SCBA may be used to enter an IDLH atmosphere.

4.2 Supplied Air (airline) Breathing Apparatus (SABA): In a SABA respirator, respirable air is supplied through a small-diameter hose from an approved air compressor or from compressed-air cylinder(s). The hose is attached to the wearer by a belt or other suitable means and can be detached rapidly in an emergency. A flow control valve or orifice is provided to govern the rate of airflow to the wearer. Air supplied to the facepiece from the airline is exhaled to the ambient atmosphere through a valve(s) or openings(s) in the enclosure (facepiece, helmet, hood, or suit). Hose supplied by the manufacturer and recommended operating pressures and hose lengths must be used.

Supplied Air Breathing Apparatus must not to be used to enter an IDLH atmosphere unless provided with a self-contained air supply as described in Section 4.3.

Supplied Air Breathing Apparatus used by Saudi Aramco is Continuous-flow (positive-pressure): In this type, air is supplied continuously to a loose-fitting facepiece, tight-fitting facepiece, hood, or helmet. Saudi Aramco uses this type in abrasive-blasting helmets and hoods.

4.3 Combination-Type - Supplied Air Breathing Apparatus with Self-Contained Air Supply: This type combines the capabilities of an airline respirator and a SCBA into a single device. This device includes a facepiece, regulator, harness, hose line attachment and a cylinder of compressed air for safe egress from the area if the airline system fails. Saudi Aramco uses a cylinder sized to provide a supply of emergency air to egress/escape from the area if the airline system fails. This egress/escape cylinder of air is not intended as a normal air supply source. This respirator may be used to enter an IDLH atmosphere if the airline hose is used to provide air to the wearer. Air from the air cylinder is then used for escape/egress only.

4.4 Emergency Escape Breathing Device (EEBD): This device consists of a pressurized cylinder supplying a minimum of 15 Minutes breathable air and a hood or full facepiece. It is to be used only for escape from an oxygen deficient or contaminated environment. The donning procedures are quick and easy to allow for situations where there is a little time to seek safety from a hazardous atmosphere. Deployment of EEBDs requires the proponent to complete a comprehensive assessment to justify their benefit, and proponents must also address training and maintenance, as well as how contractors and visitors will be handled. Use of EEBDs must be incorporated into emergency response plans (see Section 5.7).

5. APPLICATIONS

5.1 Refer to Supplement 1780.001-1 for selection of atmosphere-supplying respirators available from SAMS stock.

5.2 Allocation of SCBA units shall be accordance with Supplement 1780.001-6.

5.3 Employees using SCBA shall operate in teams of two or more. Teams shall be able to communicate with each other through visual, audible, or physical means to coordinate their activities, and they must remain in close proximity to each other to provide assistance in case of an emergency. Two additional qualified standby users with two additional, fully charged, spare SCBA shall be immediately available shall a rescue be required. Standby wearers shall be equipped with the same standard and duration of

SCBA as the original team. In addition to the use of SCBA or SABA, it will be necessary to consider what other conditions may be present when entering the area, for example it may be necessary to wear chemical suit protection or other forms of protective clothing. All individuals expected to wear SCBA or SABA must be trained in its use in accordance with this GI and standby wearers must have additional training in emergency procedures.

5.4 Firemen shall use SCBA per the Fire Protection Department's Standard Operating Procedures.

5.5 Thirty-minute SCBA shall be located within the battery limits of all facilities that have the potential to release toxic gases or present other hazards necessitating the use of SCBA. They are provided for emergency activities only. Additional thirty-minute SCBA shall be provided in a bank outside the control room for plant work of short durations.

5.6 Thirty-minute SCBA and Supplied Air Breathing Apparatus with an egress/escape cylinder shall be available at workover and drilling rig floors.

5.7 An emergency escape breathing device (EEBD) is only for escape from a dangerous breathing environment to a place of safety. EEBDs 15-Minutes shall not be used for doing any work in a hazardous environment. Acquisition and allocation/deployment of EEBDs shall be highly selective and shall comply with the following:

5.7.1 Individual workplace risk assessments shall be performed by the proponent to provide justification for EEBD placement or deployment. These assessments shall be documented and updated at least annually. EEBDs are only warranted where they provide a verifiable and documented increase in personnel safety and when there are no other reasonable options for comparable personnel evacuation and protection during credible emergency scenarios. As a general rule, EEBDs might be indicated for those areas where workers may have to make a quick escape from a hazardous atmosphere to a safe breathing environment and the means of egress are limited, e.g., offshore drilling rigs.

5.7.2 Options available for EEBD placement or deployment include: (1) providing a portable unit (e.g., belt-worn) to all (or selected) personnel in a facility; (2) providing wall-mounted units at select, fixed locations; or (3) providing a combination of portable units to selected personnel in a facility as well as wall-mounted units at select, fixed locations.

5.7.3 When utilizing option 1 or 3 noted above, spare units for visitors and other non-regularly assigned personnel, e.g., service companies and contractors and visitors who may encounter a toxic gas in the performance of their work, shall be provided as deemed necessary. Training must be provided if contractors or visitors may need to use EEBDs.

5.7.4 Proponents must address training and maintenance procedures with respect to EEBDs.

5.7.5 If proponents acquire and deploy EEBDs, their purpose, use, and assignment shall be covered in department emergency response plans.

6. RESPIRABLE AIR SPECIFICATIONS

6.1 Air in cascade and SCBA cylinders shall meet the specifications in the table of Supplement 1780.001-2.

6.2 Air used directly from approved air compressors to supplied air breathing apparatus airline respirators shall meet the specifications in the table of Supplement 1780.001-3.

7. RESPIRABLE AIR SUPPLY SYSTEMS

7.1 Supplied Air Breathing Apparatus (SABA) shall receive their respirable air directly from an approved air compressor or from a cascade system equipped with a low air alarm system as specified in supplement 1780.001-1, Supplement 1780.001-2 and Supplement 1780.001-3.

7.2 Cylinders for SCBA and SABA with escape/egress cylinders shall be recharged to their maximum allowable working pressure if they have a valid hydrotest date stamp (metal) or label (composite). Recharging may be done from a cascade system or directly from a respirable approved air compressor.

7.3 If oil-lubricated approved air compressors are used to provide respirable air, the compressed air outlet shall be provided with instrumentation to provide an alarm upon an excessive concentration of carbon monoxide. (Supplement 1780.001-2 and Supplement 1780.001-3).

8. SPECIFICATIONS

8.1 Atmosphere-supplying respirators shall be certified by the United States National Institute for Occupational Safety and Health (NIOSH) and shall meet operational and maintenance guidelines in NFPA Standard1852.

8.2 SCBA shall be of the open-circuit, positive-pressure type.

8.3 Supplied air breathing apparatus (SABA) shall be of the positive-pressure or continuous-flow positive-pressure types.

8.4 An emergency escape breathing device (EEBD) shall consist of a pressurized cylinder supplying a minimum of 15 Minutes breathable air. It shall include a hood or full face piece, as appropriate, to protect the eyes, nose and mouth during escape; hoods and face pieces shall be constructed of flame resistant materials and include a clear window for viewing. An inactivated EEBD shall be capable of being carried hands-free. Brief instructions or diagrams clearly illustrating their use are to be clearly printed on the EEBD. Maintenance requirements, manufacturer's trademarks and serial number, shelf life with accompanying manufacturer date, and name of approving authority are to be printed on each EEBD. All EEBDs are to be clearly marked.

9. DIRECT CHARGE PURCHASE REQUISITIONS

9.1 All direct charge (9COM) purchases of SCBA, EEBD, and combination-type respirators with SABA are subject to approval by the local Fire Protection Division Head or the Manager of the Fire Protection Department. A written program specified in Section 11.2.10 shall be also provided in EEBD purchase order request.

10. STANDARD PRACTICES

Activities related to atmosphere-supplying respirators shall follow standard practices as outlined in this section.

10.1 Employees who may use atmosphere-supplying respirators, such as supervisors, persons who issue these respirators and employees who need or may need to use these respirators in their work or in emergencies, shall be trained and retrained periodically by a qualified person(s). Employees shall receive training in accordance with General Instruction 1783.001, 'Fire Fighting Training Company Personnel.

Training shall include:

- The need for respirator protection
- An explanation of why a particular type of respirator has been selected
- An explanation of the operation, capabilities and limitations of the respirator selected
- Fitting of facepiece
- Donning (putting on) and doffing (taking off) of respirators
- Regulations concerning respirator use
- Instructions in emergency procedures
- Maintenance, inspection, and storage of respirators
- Sealing and functioning of the facepiece

10.2 Care, maintenance, inspection, and storage for respirators shall include:

10.2.1 Cleaning and Sanitizing

Respirators issued to an individual or on a station shall be cleansed and sanitized immediately after use, refer to Section 11.3.4. Respirators intended for emergency use shall be cleaned and sanitized after being used.

10.2.2 Inspection for Defects

10.2.2.1 The user shall inspect all respirators, in normal use, immediately before each use to ensure that it is in proper working condition. Prior to cleaning and sanitizing, each respirator shall be inspected to determine if it is in proper working condition, if it needs replacement of parts or repairs, or if it should be discarded. Each respirator stored for emergency or rescue use shall be scheduled for inspection in accordance with GI 1781.001, 'Inspection, Testing, & Maintenance of Fire Protection Equipment.' Respirators that do not meet applicable inspection criteria shall be immediately removed from service and repaired or replaced. Any defects found or removal from service shall be reported using form SA 3708, 'Fire Protection Equipment Status Report.'

10.2.2.2 Respirator inspection shall include a check for tightness of connections; for the condition of the respiratory inlet covering, head harness, valves, connecting tubes, harness assemblies, hoses; and for the proper function of regulators and alarms. Each rubber or other elastomeric part shall be inspected for pliability and signs of

deterioration. Each air cylinder shall be inspected to ensure that it is fully charged and with a current hydro test date.

10.2.2.3 A record of inspection dates shall be kept for each respirator maintained for emergency or rescue use.

10.2.2.4 Inspections for an EEBD are visual only. A portable unit shall be inspected at the beginning of each work shift. Stored units shall be inspected on the same schedule as SCBA. Inspections shall comply with manufacturer's requirements. Any EEBD failing to meet all inspection criteria shall be removed from service.

10.2.3 Parts Replacement and Repair

Only technicians certified in the proper respirator maintenance and overhaul shall do replacement of parts and repair. Replacement parts shall be only those designated for the specific respirator repaired. Instrumentation for valve, regulator, and alarm adjustments and tests shall be calibrated to a standard at least every 3 years.

10.2.4 Storage

Respirators shall be stored in a manner that will protect them against physical and chemical agents such as vibration, shocks, sunlight, heat, extreme cold, excessive moisture, damaging chemicals, dust, dirt, or sand. Respirators shall be stored to prevent distortion of rubber or other elastomeric parts. Respirators shall not be stored in such places as lockers and toolboxes, unless they are protected from contamination, distortion, and damage. Emergency and rescue use respirators that are placed in work areas shall be accessible at all times. See, also supp,6 Section 2.5.

10.3 Sealing and Functioning of the Facepiece

10.3.1 For planned activities, atmosphere-supplying respirators with facepiece shall not be worn when any condition prevents an adequate seal between the facepiece and the wearer's face (e.g., spectacles with temple bars/straps, etc.) or any other interference with the proper functioning of the respirators.

10.3.2 If spectacles, goggles, face shield or welding helmet must be worn with an atmosphere-supplying respirator, they shall be worn in such a way, or be of such a type, that they do not affect the seal of the facepiece to the face. For example, prescription lenses can be mounted inside the facepiece using a kit available from the manufacturer/vendor.

10.4 Qualification, Maintenance, and Use of Air Cylinders

10.4.1 Air cylinders shall be periodically hydrotested, inspected, and marked in accordance with instructions from the manufacturer or DOT.

10.4.2 An air cylinder that leaks, is bulged, has defective valves or safety devices, bears evidence of physical abuse, fire, heat, or chemical damage, or detrimental rusting or corrosion shall not be used unless it is properly repaired and re-qualified by the Fire

Protection Department. Any defects found or cylinders removed from service shall be reported using form SA 3708, 'Fire Protection Equipment Status Report.

10.4.3 Thread protectors must be used on a cylinder when it is not in use to prevent dust, dirt, or sand from entering the cylinder valve assembly.

11. RESPONSIBILITIES

11.1 Fire Protection Department shall:

11.1.1 Arrange for their respirable air compressor's quarterly air sampling and testing of the air used in their atmosphere-supplying respirators through the laboratories in Section 11.4 and ensure that the air meets the specifications in Section 6.

11.1.2 Recharge air cylinders on request with air meeting the respirable air specifications of Section 6. (Other organizations may also refill cylinders, provided the air specifications of Section 6 are met.)

11.1.3 Service SCBA and supplied air breathing apparatus for all Saudi Aramco organizations with the exception of abrasive-blasting helmets, hoods and contractor barges, drilling rigs, marine vessels from this requirement. This servicing includes: (i) periodic hydrotesting, inspection, and marking of air cylinders per Section 10.4; (ii) performing manufacturer certified regulator service and flow testing annually, and (iii) maintenance and repairs. Parts shall be charged to the proponent organization.

11.1.4 Maintain up-to-date records of cylinder and regulator service.

11.1.5 Inspect user organization's SCBA annually, in accordance with GI 1781.001, for correct operation and record this inspection on the service tag attached to the SCBA. With the exception of contractor barges, drilling rigs, marine vessels from this requirement.

11.1.6 Provide replacement cylinders to users while their cylinders are being serviced. With the exception of contractor barges, drilling rigs, marine vessels from this requirement.

11.1.7 Review and approve direct charge purchases per Section 9.1. This includes review of the written program specified in Section 11.2.10.

11.2 User Organizations shall:

11.2.1 Arrange for their respirable air compressor's quarterly air sampling and testing of the air used in their atmosphere-supplying respirators through the laboratories in Section 11.4 and ensure that the air meets the specifications in Section 6.

11.2.2 Ensure that atmosphere-supplying respirators are available as needed.

11.2.3 Ensure that employees who need to be trained in the use of atmosphere-supplying respirators (refer to Section 10.1) are so trained based on the standard practices in

Section 10, and that the face seal is adequate per Section 10.3. Arrange for the Fire Protection Department to train Saudi Aramco employees only in the use of SCBA. Contract with outside service organizations as needed to provide training on airline respirators (SABA) and EEBD. (This service is not provided by the Fire Protection Department.)

11.2.4 Inspect atmosphere-supplying respirators in accordance with GI 1781.001 based on the standard practices in Section 10 and record the inspection on the service tag attached to the respirator. Inspect SCBA using the checklist in Supplement 1780.001-4 or 5. Inspect EEBDs as noted in Section 10.2.2.4

11.2.5 Provide a service tag on SABA respirators with the last service date to ensure that servicing is done at regular time intervals.

11.2.6 Ensure that appropriate care is given to respirable air apparatus in their custody.

11.2.7 Ensure that damaged SCBA and SABA or those due for hydrotest shall be removed from service and the equipment status reported to the Fire Protection Department using form SA 3708, 'Fire Protection Equipment Status Report.

11.2.8 Ensure that damaged EEBD or those that fail visual inspection shall be removed from service.

11.2.9 Where employees, who require vision correcting lenses, are expected to wear SCBA or SABA as a normal part of their duties, they must be provided with appropriate lenses and attachments to wear during the use of atmosphere-supplying respirators.

11.2.10 Proponent shall have a formal written program in place (before purchase of EEBDs) containing a specific policy on the use of EEBDs (which are to be used only for escape purposes), as well as detailed requirements for, at a minimum, EEBD specifications, distribution, inspection and maintenance, and personnel training.

11.2.11 Consult Area Loss Prevention Department as necessary for assistance in determining EEBDs placement and deployment.

11.3 Employees shall:

11.3.1 Use atmosphere-supplying respirators per instructions and training received.

11.3.2 Guard against damage to atmosphere-supplying respirators.

11.3.3 Report any malfunction and/or damage of atmosphere-supplying respirators to their supervisor and immediately remove the affected set from service.

11.3.4 Clean and sanitize atmosphere-supplying respirators after each use, or as required by environmental conditions, according to the instructions in the user training and certification course.

11.3.5 Replace the used cylinder in a SCBA or SABA (if so equipped) with one fully charged as soon as possible.

11.3.6 Only use atmosphere-supplying respirators for which you have been trained and certified to use.

11.4 Environmental Chemistry Laboratory

11.4.1 The Environmental Chemistry Laboratory of the Dhahran Medical Center or a laboratory approved by them shall analyze the respirable air used in cascade and SCBA cylinders when requested by user organizations to assure that it meets the specification in the table of Supplement 1780.001-2.

11.4.2 Any laboratory approved by the Saudi Aramco Environmental Chemistry Laboratory shall be audited periodically by them to assure that a quality assurance program is in effect including uniformity of testing procedures and practices.

11.5 Research & Development Center

The Research & Development Center of the Engineering Services Organization shall analyze the respirable air supplied from compressors directly to supplied air-breathing apparatus when requested by user organizations to assure that it meets the specifications in the table of Supplement 1780.001-3.

11.6 Loss Prevention Department shall:

11.6.1 Verify that organizations using atmosphere-supplying respirators comply with this instruction.

11.6.2 Recommend appropriate atmosphere-supplying respirators as required.

11.6.3 Review and verify that air analysis and record keeping are performed in accordance with recognized standards.

11.6.4 Review the EEBD written program specified in Section 11.2.10 when requested.

12. APPROVAL

Recommended by:

_____ Date _____
A. A. MOKHTAR
Manager, Fire Protection Department

Approved by:

_____ Date _____
M. G. AL-ZAHRANI
Executive Director, Safety & Industrial Security

Concurred By:

_____ Date _____
A. F. AL-WUHAIB
Sr. Vice President, Operations Services

_____ Date _____
A. H. NASSER
Sr. Vice President, Upstream

_____ Date _____
S. S. AL-AYDH
Sr. Vice President, Engineering & Project Management

_____ Date _____
A. F. AL-KHAYYAL
Sr. Vice President, Industrial Relations

_____ Date _____
K. G. AL-BUAINAIN
Sr. Vice President, Downstream

_____ Date _____
A. A. AL-OTHMAN
Sr. Vice President, Finance

SUPPLEMENT 1780.001-1

SELECTION OF ATMOSPHERE-SUPPLYING RESPIRATORS
AVAILABLE FROM SAUDI ARAMCO MATERIALS SYSTEM (SAMS) STOCK

HAZARD	ATMOSPHERE-SUPPLYING RESPIRATOR REQUIRED
IDLH atmosphere Atmosphere contains a contaminant at a concentration at or above its IDLH concentration or the oxygen concentration is less than 20 percent by volume or both.	SCBA with 30-minute air supply cylinder (Scott Air Pak 50), (SAP# Material Number 1000127427) or airline respirator with a 10-minute supply of breathing air in an emergency escape/egress cylinder (Scott Ska-Pak, SAP# Material Number 1000127423). See notes 1 and 2.
Non-IDLH atmosphere Atmosphere may contain a contaminant at a concentration above or below its exposure limit but below the IDLH concentration and the oxygen concentration is 20 to 20.9 percent by volume.	Heavy duty abrasive-blasting using shot or sand: Use abrasive-blasting helmet (SAP# Material Number 1000129991). Light duty abrasive blasting or spray painting: Use airline hood (SAP# Materials Number 1000129995). Chemical contaminant not harmful to eyes or skin: Use airline respirator with half facepiece without emergency air supply (SAP# Material Number 1000127465). See note 2.

Notes:

1. The Ska-Pak, (SAP# Material Number 1000127423) shall also be used for any planned work under the Work Permit System expected to last 30 minutes or longer in an atmosphere that is oxygen deficient, whether it is IDLH or non-IDLH, or contains a toxic contaminant at a concentration above its exposure limit, whether it is IDLH or non-IDLH. Also, Industrial Hygiene may require this respirator for such work as spray painting, welding, metalizing, insecticide applications, or for stabilizing sand with sour crude in open areas.
2. Filters for airline respirators (SAP# Material Number 1000128147 and SAP# Material Number 1000127937).

SUPPLEMENT 1780.001-2

TABLE: SPECIFICATION FOR RESPIRABLE AIR IN CASCADE AND SCBA CYLINDERS	
Oxygen (O_2), percent by volume (Balance shall be predominantly nitrogen.)	20 to 23.5
Dew point of water vapor at atmospheric pressure, maximum degrees Centigrade	Dew Point ≤-54°C
Nonmethane volatile organic compounds (VOCs) content	Nonmethane VOC ≤25
Oil (condensed), maximum milligrams/cubic meter at atmospheric pressure and normal room temperature	05
Carbon monoxide (CO), maximum parts per million by volume	10
Carbon dioxide (CO_2), maximum percent by volume	0.10
Odor	No pronounced odor
Particulates, maximum milligrams/cubic meter at atmospheric pressure and normal room temperature	05

Note:

The specifications in this table are the same as those in *ANSI/CGA-7.1, Commodity Specification for A*ir, Table 1, for Grade "D" air.

SUPPLEMENT 1780.001-3

TABLE: SPECIFICATION FOR RESPIRABLE AIR SUPPLIED DIRECTLY FROM AN AIR COMPRESSOR TO A SUPPLIED AIR-BREATHING APPARATUS (SABA)	
Oxygen (O_2), percent by volume (Balance shall be predominantly nitrogen.)	20 to 23.5
Dew point of water vapor at atmospheric pressure, maximum degrees Centigrade	Dew Point ≤-54°C Nonmethane VOC ≤25
Nonmethane volatile organic compounds (VOCs) content	Nonmethane VOC ≤25
Oil (condensed), maximum milligrams/cubic meter at atmospheric pressure and normal room temperature	05
Carbon monoxide (CO), maximum parts per million by volume	10
Carbon dioxide (CO_2), maximum percent by volume	0.10
Odor	No pronounced odor
Particulates, maximum milligrams/cubic meter at atmospheric pressure and normal room temperature	05
Temperature at SABA respirator	Not to exceed ambient air temperature
Note: The specifications in this table are the same as those in *ANSI/CGA-7.1, Commodity Specification for Ai*r, Table 1, for Grade "D" air.	

SUPPLEMENT 1780.001-4

CHECKLIST FOR SCOTT AIR-PAK IIA (SCBA)
REGULAR OPERATIONAL INSPECTION

The following procedure shall be used for incoming and periodic inspections of SCBA:

SCBA not routinely used, but kept for emergency use, shall be inspected in accordance with GI 1781.001. All SCBA shall be inspected after each use.

1. Visually inspect the complete SCBA for worn or aging rubber parts and damaged components. Check for any cracks or deterioration of the breathing tube and ensure that both clamp/coupling end connections are secured to the facepiece and regulator respectively.

2. Check the latest cylinder hydrostatic test date to ensure it is current (within 5 years for steel/aluminum cylinder and 3 years for composite/Kevlar cylinders).

3. Visually inspect the cylinder for large dents or gauges in metal. Cylinders that show evidence of exposure to high heat or flame (e.g., paint turned brown or black, decals charred or missing, gauge lens melted or its rubber bumper distorted) shall be removed from service and sent to the local Fire Protection Unit for further inspection.

4. Check to see that the cylinder valve is closed and that any trapped air in the high-pressure hose and regulator has been purged. Check the cylinder pressure gauge to make sure that it reads "FULL." If not "FULL," replace it with a fully charged cylinder.

5. Check to ensure that the high-pressure hose coupling is hand tightened to the cylinder valve outlet.

   NOTE: Wrenches shall not be used, as damage to the coupling gasket ('O' ring) may result.

6. Close regulator BY-PASS valve (red knob) by turning it clockwise.

7. Close regulator MAIN-LINE valve (yellow knob) by depressing the lock-tab and turning the valve knob clockwise.

8. Check to ensure that the regulator cover is tight and not lifted. If the cover is loose or lifted, remove the regulator from service, tag it 'out of service,' and send for repair by authorized personnel.

9. Remove the breathing tube from the regulator.

10. Verify integrity of the diaphragm as follows:

    a. Place mouth over regulator outlet, gently inhale, and hold for 5 seconds. This negative pressure shall be maintained with no leakage (flow) through the regulator.

    b. Place mouth over regulator outlet and gently blow into regulator outlet, hold for 5 seconds. This positive pressure shall be maintained with no leakage (flow) through the regulator.

SUPPLEMENT 1780.001-4 (cont'd)

WARNING

If leakage is present, recheck the by-pass and main line valves to be sure they are fully closed and retest per steps 10a and 10b. If leakage is still present, remove apparatus from service, tag it 'out of service,' and send for repair by authorized personnel.

11. Open the regulator MAIN-LINE valve (yellow knob), by turning it full counter-clockwise. A clicking sound shall be audible, indicating that the lock-tab is functioning.

12. Open cylinder valve knob fully. The Pak-Alarm shall ring briefly. The regulator gauge shall indicate "FULL." Check for leakage at cylinder valve, regulator, and all connections.

13. Verify the negative pressure integrity of the facepiece seal and exhalation valve diaphragm by inhaling slightly. A negative pressure (suction) will be created, pulling the facepiece toward the face. Hold the negative pressure for 5-10 seconds. If leakage is noted, readjust the facepiece for a better seal and try again. If the leak test fails, then remove facepiece from service, tag it 'out of service,' and send for repair by authorized personnel.

14. Place the breathing tube quick connect coupling close to palm of hand and exhale. If any air flows from breathing tube, remove facepiece from service and send for repair by authorized personnel.

15. Connect the breathing tube coupling to regulator outlet securely and inhale. Air should be delivered with very slight effort.

16. Place selector lever in "ON" position. A slight increase in facepiece pressure shall be noted (positive pressure). Inhale several times. Place control lever in "OFF" position. Disconnect breathing tube and remove facepiece.

17. Push in and rotate the cylinder valve knob clockwise to close valve.

18. Release residual air pressure by slowly placing selector lever in "ON" position. Pak-Alarm shall ring briefly. After pressure is released (no flow), place lever in "OFF" position.

19. Restore the respirator to service.

WARNING

If the pak-alarm does not ring, remove apparatus from service, tag it 'out of service,' and send for repair by authorized personnel.

CAUTION

If any discrepancies are found during these procedures, remove the apparatus from service, tag it 'out of service,' and have it repaired by authorized personnel.

SUPPLEMENT 1780.001-5

CHECKLIST FOR SCOTT AIR PAK – FIFTY (SCBA)
REGULAR OPERATIONAL INSPECTION

The following procedure shall be used for incoming and periodic inspection of SCBA:

SCBA not routinely used, but kept for emergency use, shall be inspected in accordance with GI 1781.001. All SCBA shall be inspected after each use.

1. Visually inspect the complete SCBA for worn or aging rubber parts and damaged components. Check for any cracks or deterioration of the breathing tube and ensure that both clamp/coupling end connections are secured to the facepiece and regulator respectively.

2. Check the latest cylinder hydrostatic test date to ensure it is current, within 5 years for metal cylinders or 3 years for composite cylinders.

3. Visually inspect the cylinder for large dents or gauges in metal. Cylinders that show evidence of exposure to high heat or flame (e.g., paint turned brown or black, decals charred or missing, gauge lens melted or its rubber bumper distorted) shall be removed from service and sent to the local Fire Protection Unit for further inspection.

4. Check to see that the cylinder valve is closed and that any trapped air in the high-pressure hose and regulator has been purged. Check the cylinder pressure gauge to make sure that it reads "FULL." If not "FULL," replace it with a fully charged cylinder.

5. Check to ensure that the high-pressure hose coupling is hand tightened to the cylinder valve outlet.

   Note: Wrenches shall not be used, as damage, practically to the coupling gasket, may result

6. Check that the breathing regulator purge valve (red knob on regulator) is closed (full clockwise and pointer on knob upward).

   Note: Do not use tools to open or close the purge valve. Open or close by using finger-pressure only. Rotation of the purge valve is limited to ½ turn.

7. If the hose to the breathing regulator is equipped with a quick disconnect, check that the disconnect is engaged properly and that sleeve is rotated ¼ to ½ turn so notch does not line up with rivet head. Test for proper engagement by tugging on the coupling.

8. Fully depress the center of the air saver switch on the top of the regulator and release.

9. Slowly open the cylinder valve by fully rotating knob counterclockwise at least 2 and ½ times. Vibralert alarm shall actuate and then stop. There shall be no airflow from the facepiece.

10. Don the facepiece or hold the facepiece to the face to effect good seal.

11. Inhale sharply to automatically start the flow of air.

SUPPLEMENT 1780.001-5 (cont'd)

12. Breath normally from the facepiece to ensure proper operation.

13. Remove facepiece from face. Air shall freely flow from piece.

14. Fully depress the center of air saver switch on the top center of regulator on the facepiece and release. The flow of air from the facepiece shall stop.

15. Rotate purge valve ½ turn counterclockwise (pointer on knob downward). Air shall freely flow from the regulator.

16. Rotate purge valve ½ turn clockwise to full closed position (pointer on knob upward). Airflow from regulator shall stop.

17. Push in and rotate cylinder valve knob clockwise to close. When cylinder valve is fully closed, open purge valve slightly to vent residual air pressure from the system. The Vibralert shall actuate as the pressure drops below 1000 psi. When airflow stops, return purge valve to the fully closed position (pointer on knob upward).

18. Restore the respirator to service.

WARNING

If the Vibralert does not activate, remove apparatus from service, tag it 'out of service,' and send for repair by authorized personnel.

CAUTION

If any discrepancies are found during these procedures, remove the apparatus from service, tag it 'out of service,' and have it repaired by authorized personnel.

SUPPLEMENT 1780.001-6

ALLOCATION OF SELF-CONTAINED BREATHING APPARATUS (SCBA)

CONTENT

This supplement establishes requirements and guidelines related to the allocation of self-contained breathing apparatus in Saudi Aramco's industrial facilities. These requirements and guidelines include the following:

1. SCOPE

This supplement addresses only the provision and placement of SCBA for emergency/escape use only. Supplied Air Breathing Apparatus (SABA), used by maintenance or operations personnel, shall be used in accordance with GI 1780.001, "Atmosphere-Supplying Respirators." This supplement does not deal with the provision, allocation, and use of SCBA for training purposes.

2. GENERAL GUIDELINES

2.1 All new, additional, or changes in SCBA placement shall be done only after Fire Protection, Loss Prevention, and the proponent have conducted a joint survey. The survey team must exercise their judgment and understanding of the operations in determining the specific locations and number and type of SCBA required. The team must consider such factors as types and severity of hazards, normal wind direction, probable approach and egress paths, congestion of the area, actions required and time available for those actions to be taken, and FrPD response.

2.1.1 Joint surveys shall be performed whenever changes occur within the risk area. This can include, but not be limited to, change in materials handled, plant or structural changes or alterations, changes in manpower levels, change of building use, and process changes.

2.2 SCBA used for entering and escape from IDLH areas or firefighting shall be a minimum 30-minute rated device.

2.3 Spare cylinders should not normally be held at field locations. All spare cylinders should, unless the Area Fire Marshal grants an exemption, be maintained at the Fire Control Unit.

Exemptions may include, but not be limited to, barges, supply boats, remote areas with no nearby Fire Control Unit, Plant Emergency Response Team (PERT) equipment lockers, offshore platforms, and tugs.

2.4 A minimum of two SCBA shall be located at opposite ends of the risk area. The survey must take into account the potential for serving more than one risk area by spacing and locating SCBA appropriately.

2.5 Self-contained breathing apparatus shall be clearly identified. Where wall mounting is used, location of permanently installed boxes for emergency equipment shall be marked by a safety green border or background as per SAES-B-067, Section 4.2.2.b. The weatherproof box for SCBA shall be installed no more than 36 inches from the bottom of the box to grade.

3. SCBA ALLOCATION GUIDELINES

3.1 High Risk and Medium Risk Areas:

3.1.1 Control Rooms: The number of SCBA provided shall be equal to the number of personnel on shift in the control room plus a suitable number of spares based on risk or the maximum expected number of personnel in the control room at any time.

In all cases, it is advisable to install at least two SCBA inside an operator shelter. The operators may be inside the shelter when an emergency occurs and will need to use SCBA. The number of SCBA shall be sufficient for the number of operators in the shelter.

3.1.2 Outside Operating Areas: SCBA shall be located where there is a potential for product release creating an IDLH atmosphere or it is expected that personnel working in the area need to take immediate action to minimize the release or the event of fire. The number of SCBA provided shall be equal to the number of workers per shift. Additional SCBAs shall be determined as per LPD assessment from a joint survey preformed as required in Section 2.1 in the body of the GI.

3.2 Low Risk Areas: SCBA shall be provided based on a survey as specified in Section 2.1 in the body of this GI.