1.0 Purpose, Objectives and Scope

1.1 Purpose
The purpose of this procedure is to ensure that effective safe work practices are used to protect the workforce from occupational exposure to hydrogen sulfide (H2S).

1.2 Objective
The objective of this procedure is to establish the requirements for the recognition and control of H2S, and to comply with Chevron expectations, federal Occupational Safety and Health Administration (OSHA) regulations 29 CFR Part 1910 for respiratory protection and air contaminants, and related state OSHA standards where applicable.

1.3 Scope
This procedure covers work performed by Chevron Pipe Line (CPL) employees and their delegates and contractors within CPL operational control.

Specifically, this procedure applies to all personnel, company and contractor, at Chevron Pipe Line (CPL) owned, operated, or maintained facilities where an exposure to airborne H2S at or above 5 parts per million (ppm) may occur.

Use of this procedure is required when any of the following activities are conducted in an area where H2S could be present:

- Entry into confined spaces
- Manual tank gauging
- Commodity sampling
- Barge loading and unloading
- Line repair
- Leak response
- Operating process equipment and vessels in areas where H2S is known to be or may be present
- Other activities which H2S monitoring has determined H2S in concentrations of 5 (ppm) or above is present

2.0 Requirements

3.0 Terms and Definitions
The following terms and definitions apply to this Hydrogen Sulfide Procedure:

**CVX Hydrogen Sulfide Exposure Standard** – Exposure limits, work practices and training requirements determined to standardize work place measures used to protect employees and contractors from risks involving actual or potential hydrogen sulfide exposures.

**Fixed Hydrogen Sulfide Monitor** – A continuous sensor mounted in a specific location to provide rapid detection of hydrogen sulfide presence for leak detection purposes or personal or community protection.
Immediately Dangerous to Life or Health (IDLH) - An atmospheric concentration that poses an immediate threat to life or would cause irreversible or delayed adverse health effects or would interfere with an individual's ability to escape from a dangerous atmosphere.

Personal Hydrogen Sulfide Monitor – A continuous monitor worn by personnel in or near their breathing zone intended to provide early detection and warning (audible and visual) of the presence of hydrogen sulfide equal to or in excess of 5 ppm.

SCBA – A self contained, air supply respirator worn by individuals in high respiratory hazard environments.

4.0 Roles, Responsibilities and Training Requirements

The following roles and responsibilities pertain to this procedure:

Management – provides visible leadership to ensure HES policies and procedures are fully implemented.

Team Member – must do the following:
- Follow the H2S requirements for their work areas as explained by their team leader and described within this procedure.

Team Leader – must do the following:
- Ensure that all personnel are knowledgeable of the H2S requirements for the areas in which they work
- Inform all personnel of the locations where H2S may be expected
- Ensure that all monitoring is completed
- Ensure all warning systems are posted, mounted, or labeled, as appropriate

HES Team – must do the following:
- Assist with monitoring by providing information, instruction, or direct assistance at the work site
- Assist with the selection, location, and usage of fixed monitoring systems
- Coordinate the development and revisions to this procedure
- Coordinate the implementation and training of this procedure

4.1 Initial Training

Employees who work in areas where the potential for exposure to H2S at 5 ppm or greater, must be informed of the hazards of H2S exposure, symptoms of overexposure, use of respiratory protection equipment, and special precautions to minimize exposure, and shall be trained in the hazards associated with H2S and the use of personal protective equipment. Trained employees shall:
- Demonstrate knowledge of the hazards of H2S
- Comply with the provisions of this and other applicable procedures
- Properly use and maintain personal protective equipment
1. Demonstrate knowledge of site-specific operations/contingency plan procedures, if applicable

Refer to Appendix A for details of training requirements.

4.2 Refresher Training

Refresher training must be provided as follows:

- As required by applicable regulations or SBU policy or process safety standards
- As needed when identified by: verification, inspections, incidents or audits

5.0 Standard Instructions

5.1 Process Overview

- Is there a potential for atmospheric H₂S in the work area? 
  - Yes: Is H₂S <5 ppm?
    - Yes: Personal/Portable H₂S monitor required for all work.
    - No: Personal/Portable monitor required for all work.
  - No: This procedure does not apply.

- H₂S signs required at equipment.

- H₂S is >100 ppm?
  - Yes: Refer to CVX standard for management of IDLH hazards and associated PPE requirements
5.2 General Instructions
A method of protecting employees from exposure to work-area atmospheric concentrations of H₂S equaling or exceeding 5 ppm shall be provided. Acceptable methods include, but are not limited to, the following:

- Requiring all personnel to wear proper and fully functioning supplied air respiratory protection equipment before entering the area
- Installing fixed H₂S monitoring equipment
- Using personal H₂S monitors
- Properly ventilating the facility to maintain H₂S concentrations in the work area atmosphere less than 5 ppm, confirmed by continuous monitoring
- Testing the facility before entry and continuously while in the facility using portable H₂S detection equipment to verify that H₂S concentration in the work-area atmosphere does not exceed 5 ppm

5.3 Detecting and Monitoring Hydrogen Sulfide

1. If a material specific Material Safety Data Sheet is not available for a produced oil or gas stream, testing for the presence of H₂S must be done for each new type of material soon after it has been received so that the degree of hazard can be assessed. Affected employees shall be advised of monitoring results and what precautions must be taken. Refer to the Chevron Hydrogen Sulfide Exposure Standard and CPL Exposure Assessment Procedure for instructions.

2. Continuous fixed monitoring systems are used to constantly measure the concentration of H₂S in the atmosphere. A fixed monitoring system should be considered where process equipment loss of containment may create harmful levels of H₂S where personnel are likely to be working or where a significant release may pose a community threat.

   Examples of such sites are meter stations, pump rooms, and barge loading/unloading areas that handle products containing levels of H₂S that may exceed 5 ppm in airborne samples.

   - The fixed monitors shall be set to alarm at 5 ppm to alert and warn personnel to use respiratory protection equipment if they are to remain in the area for an extended period.
   - If the fixed monitor has a second alarm, the second alarm shall be set to alarm at 15 ppm.
   - The fixed monitors shall be tested monthly, or as recommended by the manufacturer. The results of these tests shall be recorded.
   - Odor is not considered an effective indicator if H₂S. Individuals may not be able to smell an odor after an extended period of exposure to it, because they become accustomed to the odor.

3. Personal and portable H₂S monitor/alarm units are designed to provide workers with an additional measure of protection by warning of potentially hazardous levels of H₂S within the immediate work area. These personal H₂S monitor units should be set to alarm (both visible and audible) at 5 ppm to alert and warn personnel to evacuate the area or to use respiratory protection equipment (SCBA) if they are to remain in the area.
Contact your HES Safety Specialist for information regarding approved \( \text{H}_2\text{S} \) monitoring devices and their operation.

### 5.4 Warning Systems

1. When mixtures containing hydrogen sulfide are present in the workplace and exposures above the exposure limits can occur, appropriate hazard communication practices should be implemented. This includes MSDSs, chemical inventory, container labeling, warning systems (e.g., signs, flags, wind socks), and training.

2. A sign reading “Danger \( \text{H}_2\text{S} \) May Be Present” shall be conspicuously located at points where equipment can be opened and \( \text{H}_2\text{S} \) released to the atmosphere. These points may include:
   - The base of the stairway on tanks;
   - Sample points;
   - Barge/railcar loading and unloading facilities;
   - Valve boxes;
   - Scraper traps;
   - Pig launch or receipt stations
   - Other locations where monitoring has determined \( \text{H}_2\text{S} \) in concentrations equal to or above 5 ppm could be present and could pose a danger to personnel.

3. Above ground pipelines that contain product with concentrations above 1% or 10,000 ppm \( \text{H}_2\text{S} \) shall be labeled “\( \text{H}_2\text{S} \)” with black letters on a yellow band. Letters should be at least 3” high and visible from any direction from which personnel could approach.

4. Wind socks shall be located and maintained at facilities, where atmospheric \( \text{H}_2\text{S} \) at the source exceeds 10 ppm. The wind socks should be strategically mounted throughout the facility where they are visible to personnel.

### 5.5 Respiratory Protection

Follow instructions and requirements provided in the CPL Respiratory Protection Procedure HES 502. If the suspected area is a confined space, refer to the Confined Space Entry Procedure HES-201.

1. As defined in the Chevron Hydrogen Sulfide Exposure Standard, the only acceptable respirators are:
   - Full facepiece pressure-demand Self Contained Breathing Apparatus (SCBA) with a service life of 30 minutes. Pressure demand respirators are positive pressure atmosphere-supplying respirators that admit breathing air to the facepiece when the positive pressure is reduced inside the facepiece by inhalation.
   - Full facepiece pressure-demand Supplied Air Respirator (SAR) (Air-line) with auxiliary self-contained air supply.

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1 Refer to Chevron Safety In Design for Safety Signs, proper placement/size, etc. (section 9, 9.3)
c. Respirators provided solely for escape shall be certified by NIOSH, or have equivalent approval, for escape from atmospheres containing hydrogen sulfide. Escape-only respirators have a single function: to allow a person working in a normally safe environment sufficient time to escape from suddenly occurring respiratory hazards. Selection of an escape-only respirator should include consideration of factors such as maximum expected concentration, escape time (i.e., exposure duration), breathing rate, respirator service life, and eye irritation. Supplied air escape-only respirators are recommended.

2. A self-contained breathing apparatus (SCBA) or a supplied airline respirator with an escape bottle with a full face mask must be worn whenever:
   - The H₂S concentration in the work-area atmosphere is at or suspected to be at 5 ppm or greater
   - Personnel are conducting workplace air monitoring for H₂S and the H₂S concentration is unknown
   - When opening a system or bleeding down a system (for example, vessels, lines, scrubbers, etc.) and the concentration of H₂S in the work-area atmosphere is at or suspected to be at 5 ppm or greater

3. The Chevron hydrogen sulfide exposure limit determined to be immediately dangerous to life or health (IDLH) is 100 ppm.

4. The Chevron Hydrogen Sulfide Exposure Standard requires respiratory protection as described above in paragraphs 1a and 1b for entry into potential IDLH atmospheres, 100 ppm or greater. In addition, a second person is needed as a standby with a SCBA and rescue equipment in a safe area.

5. If manual tank gauging is performed to check automatic gauges or when gauge hatches will be opened for any reason and potential exposures are greater than or equal to 100 ppm, a second person (standby) is needed. The standby with a SCBA must be located in a safe area.

5.6 Other Protective Equipment
Wear protective equipment to prevent eye contact. Selection of eye protection depends on the work operations conducted and other personal protective equipment worn. It may include safety glasses, chemical goggles, face shields, or a full-facepiece respirator. (See MSDS for more information.)

6.0 Records

6.1 Required Records
The following records will be kept:
   - Training records, such as training rosters and an outline of the training curriculum, shall be maintained on all H₂S training at each facility.
   - A survey shall be conducted in each location where H₂S is produced. This survey should be indicated on the Personal Protective Equipment Hazard Assessment (HES-501). The H₂S level survey will be made part of the Industrial Hygiene monitoring program. The facility shall maintain copies of these surveys on file at each location.
6.2 Retention Requirements
Training records, such as training rosters and an outline of the training curriculum, shall be maintained on all H₂S training by each facility.

Record shall be maintained pursuant to Chevron Policy 566 – Information Retention.

7.0 References
The following is a complete list of the documents referenced by this standard:

Table 1. Document List

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<tr>
<td>Global Upstream – Training Requirements Tool</td>
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8.0 Other Guidance Documents

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<td>Oil and gas drilling H₂S safety:</td>
<td><a href="http://www.osha.gov/SLTC/etools/oilandgas/general_safety/h2s_precautions.html">www.osha.gov/SLTC/etools/oilandgas/general_safety/h2s_precautions.html</a></td>
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<td>California documentation of toxicity for H₂S:</td>
<td><a href="http://oehha.ca.gov/air/acute_rels/pdf/7783064A.pdf">http://oehha.ca.gov/air/acute_rels/pdf/7783064A.pdf</a></td>
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9.0 Document Control

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Appendix A: Training

The Team Leader must inform all personnel of the locations where H₂S may be expected.

Employees whose job requirements may put them in atmospheric environments with potential concentrations of H₂S in excess of 5 ppm in the work-area atmosphere shall have annual training in subjects including, but not limited to, the following:

- The hazards, characteristics, properties, and sources of H₂S (refer to Chevron MSDS)
- Danger in relying on sense of smell. Individuals may not be able to smell an odor after an extended period of exposure to it, because they become accustomed to the odor.
- Specific locations where H₂S monitors and respiratory protective equipment are required, locations of H₂S detectors and alarms.
- Proper use of H₂S detection methods and monitoring equipment and availability of monitoring information
- Effects of H₂S on equipment (metal fatigue)
- Symptoms of overexposure to H₂S
- Emergency medical procedures as outlined in the facility contingency plan, including first aid for H₂S overexposures
- Proper use of and maintenance of respiratory and eye protection equipment
- Safe work procedures and precautions to protect employees from H₂S
- Emergency response and rescue procedures should rescue become necessary
- Circumstances when a standby person in supplied air or SCBA is required
- Wind direction awareness and safe routes of egress
- Job hazards
- Confined and enclosed space entry procedures (where applicable)
- Applicable alarm signals
- The right to access exposure monitoring results, MSDSs, chemical inventory and medical records.

Employees who will be required to work in any area that has the potential to contain H₂S at or above 5 ppm must be informed of the hazards of H₂S exposure, symptoms of overexposure, use of respiratory protection equipment, and special precautions to minimize exposure.

Follow instructions and requirements provided in the Respiratory Protection procedure (HES 502). If the suspected area is a confined space, refer to the Confined Space Entry procedure (HES-201).

Training shall be on an on-going basis and be conducted by qualified personnel. Periodic drills on the use of the respirators and rescue of workers should be included as part of the training program.