



Hydrogen Sulfide (H₂S) Management



Purpose

The purpose of this program is to establish safe work practices and procedures for Validus Energy locations and employees where hydrogen sulfide (H₂S) may be present in liquids, gases, or related equipment.

Scope

This policy applies to all Validus Energy worksites and employees.

Process

All work in H₂S environments that require active respiratory protection must be performed by qualified contractors and not by Validus Energy employees.

All employees shall wear a personal monitor set to alarm at 10 Parts per Million (PPM) when working on a location that has the potential for H₂S.

Upon monitor activation, employees shall notify others then evacuate crosswind and upwind to a muster point and contact their supervisor and EHS.

Prior to re-entry the site shall be cleared by EHS or a third-party safety company.

Responsibilities

Leadership	Commit to, follow, and reinforce the requirements set forth in this program. Provide sufficient resources for implementation.
Supervisors	Ensure Validus employees have the knowledge and skills to follow this program.
EHS	Provide resources or a third party to clear locations following an alarm and facilitate the development of H ₂ S contingency plans when necessary.
Validus Employees	Follow the requirements of this program; report gaps to EHS.



Definitions

Contingency Plan - a site-specific written document that provides an organized plan for alerting and protecting the public within an area of exposure following the accidental release of all potentially hazardous atmospheric concentrations of hydrogen sulfide.

H2S Site – A Validus Energy wellsite that has 100 PPM or greater in the untreated wellstream.

Parts Per Million (PPM) - parts of vapor or gas per million parts of contaminated air by volume.

Public Area - A dwelling, place of business, church, school, hospital, school bus stop, government building, public road, all or any portion of a park, city, town, village, or other similar area that can be expected to be populated. (Used for Contingency Plan calculations)

Radius of Exposure (ROE) – The distance from a release to where H2S concentration in the air will dilute to a specific concentration.

Road - Any federal, state, county or municipal street or road owned or maintained for public access or use. (Used for Contingency Plan calculations)

Policy

H2S Site designation – Sites will be classified as an H2S Site based on the concentration of H2S in in the gas or liquid stream prior to treatment.

Note: This does not include sites affected by bacterial H2S.

A list of H2S Sites will be maintained and updated on Validus. Energy no less than quarterly.

H2S Contingency Plans

Contingency plans will be developed where required based on the flowchart in Appendix 1.

The H2S Contingency plan will include:

- Emergency procedures
- Characteristics of H2S (and SO₂)
- Maps and drawings
- Training and drills
- Emergency contacts

Contingency plans shall be reviewed annually.



Signage

Signage is required on sites that have concentrations of 50 PPM or greater in the untreated wellstream or on drilling and completions sites that have the potential for H₂S based on offset wells or other data. See Appendix 2 for examples of required signage.

Sites with H₂S concentrations of 50 ppm or more in the untreated gas stream shall have signage posted at the lease entrance stating CAUTION - Poison Gas May be present.

Sites with H₂S concentrations of 100 ppm or more in the untreated gas stream shall have signage posted at the lease entrance, tank battery, and at the wellhead stating DANGER- Poison Gas May Be Present.

Personnel access to tanks at sites with H₂S concentration of 100 ppm or more shall be restricted by a chain and warning sign across the stairs.

API RP 49 'Recommended Practice for Drilling and Well Service Operations Involving Hydrogen Sulfide' will be followed for drilling, workover, and completions sites.

Sites with H₂S concentrations of 10 ppm or more in the untreated gas stream shall have a wind indicating device visible from anywhere on the location.

H₂S Site Activity

Activities on H₂S Sites that require opening a hatch or valve must have an approved Job Hazard Analysis (JHA).

Prior to opening any hatch or equipment, verify that there is adequate ventilation and H₂S concentrations are below 10 PPM in the work area. If at any time a personal or fixed H₂S monitor alarms, close the valve or hatch, and evacuate the area crosswind and upwind.

Training

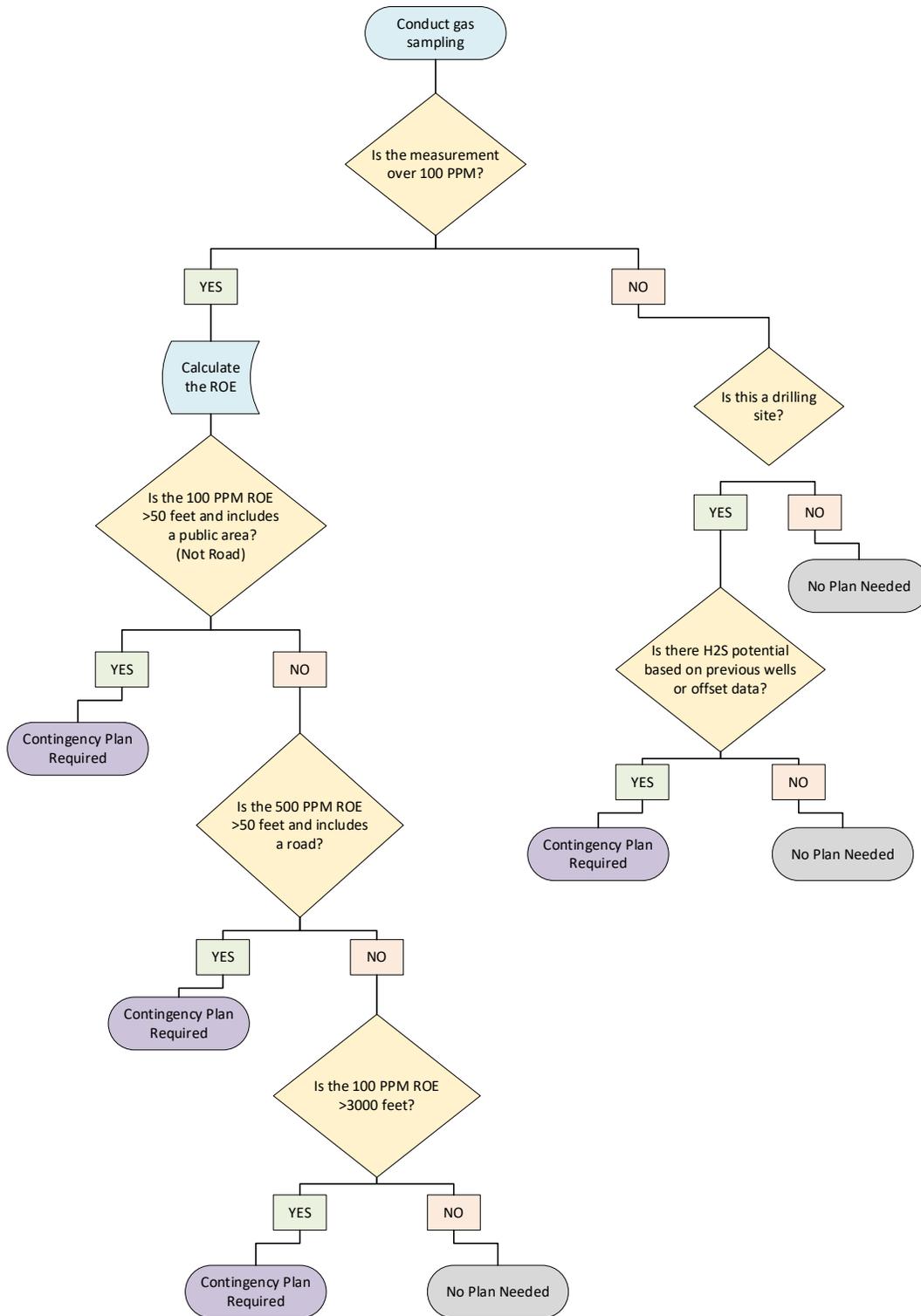
All employees that have the potential to work on an H₂S Site will receive annual H₂S training that covers the following:

- Sources of H₂S
- Health hazards of H₂S
- Signs and symptoms of H₂S exposure, acute and chronic toxicity
- Physical and chemical properties of H₂S
- Work Procedures
- Personal protective equipment required when working around H₂S.
- Use and care of gas detection equipment.
- Routes of egress
- Emergency assembly areas
- Use of contingency plans and emergency response
- Burning, flaring, and venting of H₂S



APPENDIX 1

Contingency Plan Flowchart





APPENDIX 2

Signage



50 PPM or more in the untreated gas stream



100 PPM or more in the untreated gas stream



Drilling and Completions sites

H₂S AWARENESS AREA H₂S < 10 ppm <ul style="list-style-type: none">Hydrogen Sulfide May Be PresentNo Immediate Health HazardAuthorized Personnel OnlyMaintain H₂S AwarenessPortable Gas Monitor RecommendedReport Alarms or Odor Immediately <small>API RP 49 – CONDITION I</small>
WARNING - H₂S HAZARD H₂S 10 - 30 ppm <ul style="list-style-type: none">Toxic Gas – Injury PossiblePersonal Gas Monitor REQUIREDEscape Respirator AvailableNo Unauthorized EntryFollow Evacuation Routes <small>API RP 49 – CONDITION II</small>
DANGER - EXTREME H₂S HAZARD H₂S > 30 ppm FATAL IF INHALED <ul style="list-style-type: none">SCBA REQUIREDImmediate Life-ThreatContinuous Air MonitoringImmediate Life-ThreatContinuous Air MonitoringEvacuate if Alarm Sounds <small>API RP 49 – CONDITION III</small>

