

Statewide Rule 36: Operations in Hydrogen Sulfide Areas

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RRC Mission



Our mission is to serve Texas by our stewardship of natural resources and the environment, our concern for personal and community safety, and our support of enhanced development and economic vitality for the benefit of Texans.

Session Description



Discussion of the Statewide Rule 36 including general requirements, H-9 Certificate of Compliance, radius of exposure, safety issues, and contingency plans.

What is H₂S?

- Colorless gas with a flame that is practically invisible
- Heavier than air
- Soluble in oil and water
- Dangerous to health
- Sewer gas, stink damp, sour crude, rotten-egg gas

Where do you find H₂S?

- Variety of natural and industrial settings
- Natural gas and petroleum
- Most H₂S obtained as by-product
- Can be recovered from natural gas and refining operations and converted to sulfuric acid or high quality Sulfur

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Texas Administrative Code (TAC) **Title 16, Part 1, Chapter 3** **§3.36**

Oil, Gas, or Geothermal Resource Operation in Hydrogen Sulfide Areas

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Introduction

- Designed to protect public from hazards of hydrogen sulfide gas (H₂S)
- Education and training are the best defenses
- Industry must protect themselves, public
- Denver City H₂S tragedy, February 1975

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Compliance requirements

- Exploration, production and transportation of hydrocarbon fluids that contain hydrogen sulfide gas
 - 100 ppm or greater concentration
- Exceptions:
 - gathering, storing and transporting stabilized liquid hydrocarbons (atmospheric pressure)
 - refining, petrochemical and chemical plants
 - operations where concentration of H₂S is less than 100 ppm

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General Provisions

- Testing to determine H₂S concentration in operation/system
 - color metric tubes (Storage Tanks Only)
 - Tutweiler (titration method)
 - Lead-acetate method (ASTM D4084)

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General Provisions

- Done at random sites/wells
- The well must be in production a minimum of **24 hours** prior to the test.
- Must be performed onsite. Samples cannot be taken into a lab.
- May include:
 - well tubing or casing
 - portable well tester
 - treater or other vessel with fluid/gas
 - gas sales meter (upstream of a scrubber)

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Form H-9 Certificate of Compliance required:

- H₂S concentration is **100 ppm** or greater in system/operation
- Producing/injection in designated H₂S field
- Drilling into known H₂S field near a public area
- Drilling into a wildcat field (H₂S)

•NOTE: A field is designated as sour when an operator files a Production H-9 indicating 100 ppm or greater H₂S concentration.



Radius of Exposure (ROE)

- SWR 36 identifies two ROEs that identify potential danger, may require additional compliance.
- **100 ppm** ROE – distance from release to where H₂S concentration in air will dilute to **100 ppm**.
- Identifies public **areas** within the ROE

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Radius of Exposure (ROE)

- 500 ppm ROE – distance from release to where H₂S concentration in air will dilute to 500 ppm
- Identifies public roads within the ROE
 - public roads are tax supported or any road used for public access/use

Compliance Requirements Based on ROE



RULE 36 COMPLIANCE REQUIREMENTS DRILLING & PRODUCTION

PROVISION	CASE 1	CASE 2	CASE 3
H ₂ S Concentration Test	X	X	X
H-9	X	X	X
Training	X	X	X
District Office Notification	X	X	X
Drill Stem Tests Restricted	X*	X*	X
BOP Test	X*	X*	X
Materials		X	X
Warning and Marker		X	X
Security		X	X
Contingency Plan			X
Control and Equipment Safety			X
Monitors		X**	X**
Mud (ph Control or Scavenger)			X*
Wind Indicators		X**	X
Protective Breathing Equipment		X**	X
Choke Manifold, Secondary Remote Control, and Mud-Gas Separator			X
Flare Stacks			X*

Case 1: 100 ppm ROE
is < 50'

Case 2: 100 ppm ROE ≥
50' but < 3,000'
& No Public Area

Case 3:

- 100 ppm ROE ≥ 50' & Public Area; or
- 500 ppm ROE contains Public Road; or
- 100 ppm ROE ≥ 3,000'



Warning & Marker Provision

All new signs shall state
“Caution” and “Poison Gas” with yellow and black
contrast





Warning & marker provision

- Signs must be of sufficient size
- Signs must be posted:
 - at well or facility within city limits or close proximity to public
 - at public road crossings
 - along a line when located within public area
 - along a road at frequent intervals to avoid accidental excavation

Warning & Marker Provision



Examples



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Security

- Facilities shall be fenced and locked
 - when located within $\frac{1}{4}$ mile of a public area
 - for tank facilities within city/town limits
- The fencing provision will be considered satisfied where the fencing structure is a deterrent to public access.
- Specific fencing requirements required on case-by-case basis
 - District Office makes this determination



Materials & Equipment

- Manufactured to satisfy NACE MR-01-75 and API RP-14E requirements
- Materials not susceptible to H₂S stress cracking may be used
 - fiberglass, plastics
 - when used for applicable industry standard, specifications or recommended practices
- Other materials may be used
 - Commission must approve case-by-case



Materials & Equipment

- Existing facilities shall be in compliance providing there has been no H₂S stress related failure
- RRC shall be notified of a failure resulting from H₂S stress cracking
 - notified in writing
 - compliance of system will be determined

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- **Control and safety equipment**
- Operators subject to this provision include:
 - 100 ppm ROE is in excess of 50 ft., includes any public area
 - 500 ppm ROE is greater than 50 ft., includes any public road
 - 100 ppm ROE is 3,000 ft. or greater
- Operators subject to this provision shall:
 - install and maintain devices and safety procedures to prevent the undetected release of H₂S gas



Contingency plan

- Plan of action for alerting, responding and protecting the public following release of potentially hazardous volume of H₂S gas
- Required for any operations where:
 - 100 ppm ROE is in excess of 50 ft., includes any public area
 - 500 ppm ROE is greater than 50 ft., includes any public road
 - 100 ppm ROE is 3,000 ft. or greater

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Contingency plan

- Instructions/procedures for alerting public/safety personnel of emergency
- Procedures for requesting assistance to remove public
- Call list
 - supervisory personnel, sheriff, DPS, ambulance, fire department, doctors, RRC District Office, etc.

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Contingency plan*

- Plat detailing area of exposure
- Names & telephone numbers of responsible parties
- Provisions for advance briefing of the public
- RRC District Office phone number

**Refer to SWR 36 “Contingency Plan Provisions”
for a complete list of requirements.*

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Injection of H₂S Gas

- Injection of fluids containing H₂S is not allowed unless:
 - approved by Commission after public hearing
 - approved by District Office
- Contingency plan and control and safety equipment required
- Injection of sour produced water is not H₂S injection

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Training

- Operations with **100 ppm** or greater H₂S shall train employees working in potentially affected areas in H₂S safety
- Operators shall require service companies in H₂S affected areas to utilize only personnel trained in H₂S safety
- Training **MUST** be done on an annual basis

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Training

- Training **SHALL** include:
 - hazards and characteristics of H₂S safety precautions
 - operations of safety and life support equipment
- Additional training for on-site supervisory personnel:
 - effects of H₂S on metal components
 - corrective action and shutdown procedures
 - full knowledge of contingency plan



Accident notification

- Operator is responsible for notifying RRC District Office:
 - accidental release of H₂S gas that may present a hazard
 - activation of contingency plan
 - incident/accident involving H₂S gas
- A written report shall be furnished to the RRC District Office within **10 days** of these conditions.

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Drilling and workover provisions

- Infield drilling and workovers
- Drilling into known H₂S zone
- Wildcat drilling
- Drilling or workover operations where:
 - 100 ppm ROE is in excess of 50 ft., includes any public area
 - 500 ppm ROE is greater than 50 ft., includes any public road



Infield drilling and workovers

- Requirements for drilling or workovers on leases with Production Form H-9 filed:
 - protective breathing equipment (SCBA)
 - maintained at two or more locations
 - wind indicators and H₂S signs on site
 - automatic H₂S sensors/alarms
 - personnel trained in H₂S and safety equipment



Infield drilling and workovers

- Minimum compliance depth for drilling: **1,000 feet** above known H₂S zone
- Compliance for workovers is when a rig moves in to rig up



Drilling into known H₂S zone

- File Form H-9 with District Office
 - at least **30** days prior to drilling
 - waiver may be requested in writing to DO
- Protective breathing equipment (SCBA) shall be maintained at **two** or more locations

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Drilling into known H₂S zone

- Visible wind indicators
- H₂S signs posted at entrance
- Automatic, audible H₂S sensors/alarms
- Personnel trained in H₂S and safety equipment
- Compliance depth for drilling: **1,000 ft.** above known H₂S zone

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Wildcat drilling

- “Wildcat” designation may require operator to comply if District Office determines conditions warrant compliance.
- Call District Office for specific requirements
- Requirements vary by District Office.



Wildcat drilling

- “Full compliance” requires:
 - infield drilling and workover requirements
 - sufficient breathing equipment
 - minimum **3** audible H₂S sensors
 - method of igniting gas in event of emergency
 - choke manifold, mud-gas separator, flare line and method for lighting the flare



Wildcat drilling

- “Full compliance” requires:
 - secondary remote control of blowout prevention and choke equipment located a safe distance from well
- Drill Stem Test of H₂S zone
 - during daylight hours
 - RRC DO notified before test
- BOP and well control systems pressure tested
 - at or near compliance depth
 - RRC DO notified 4 hours prior



Drilling or workover operations

- When **100 ppm ROE** includes public area or **500 ROE** includes a road:
 - call RRC District Office
 - file Form H-9 for Drilling with the RRC DO **30 days** prior
 - file Contingency Plan with RRC DO
- Full compliance/same requirements as Wildcat drilling



Form H-9 Certificate of Compliance

- Certified operator has or will comply with the provisions
- H-9's **are not** transferable, each operator must test each lease/gas well or system and file H-9
 - file **in triplicate** with the District Office
 - file **30 days prior** to commencement of drilling;
 - file within **30 days after P-4** certificate of transfer;
- New/amended H-9 filed if change in public exposure
- Signed by a person trained, experienced and qualified to make the certification



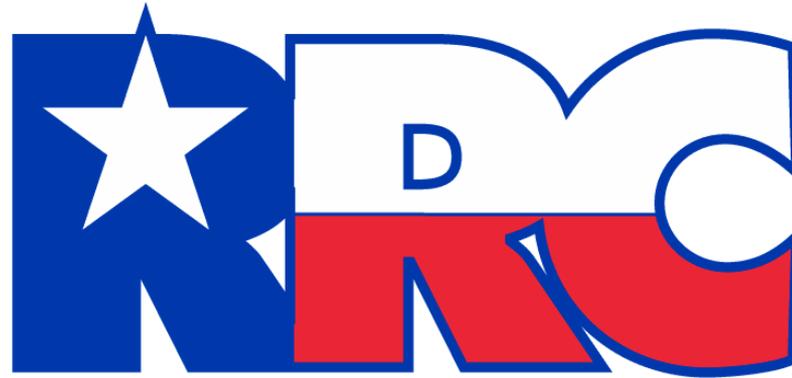
Completion report required

- Shall report on the initial completion report for oil well and gas well gas the H₂S concentration when completed either in a designated H₂S field or the H₂S is **100 ppm** or greater
- Shall file a Drilling Form H-9 or provide a copy of a certified copy of a Production Form H-9 when submitting a drilling application that requires one to be filed

RRC District Office H2S Coordinators



- San Antonio (01/02), Wesley Dresch* (210) 227-1313
- Houston (03), Pete Fisher (713) 869-5001
- Corpus Christi (04), Rick Silguero (361) 242-3113
- Kilgore (05/06), Ronny Russell (903) 984-3026
- Abilene (7B), Sam Birdwell** (325) 677-3545
- San Angelo (7C), Bill Spraggins (325) 657-7450
- Midland (08/8A), Tom Fouts (432) 684-5581
- Wichita Falls (09), Kim Peterson (940) 723-2153
- Pampa (10), Alan Leach (806) 665-1653
- *State Coordinator for Districts 1, 2, 3, 4, 5, & 6
- **State Coordinator for Districts 7B, 7C, 8/8A, 9 & 10



Statewide Rule 36

H₂S Information:

<http://www.rrc.state.tx.us/oil-gas/research-and-statistics/field-data/h2s/>

<http://www.rrc.state.tx.us/media/2943/outlinerule36.pdf>