

Recommended Practice for Oil and Gas Well Servicing and Workover Operations Involving Hydrogen Sulfide

API RECOMMENDED PRACTICE 68
FIRST EDITION, JANUARY 1998

REAFFIRMED, SEPTEMBER 2010



AMERICAN PETROLEUM INSTITUTE

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Upstream Segment

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FOREWORD

These recommended practices were prepared by the API Subcommittee on Oil and Gas Well Servicing and Workover Operations Involving Hydrogen Sulfide. This standard is under the administration of the American Petroleum Institute Exploration & Production Department's Executive Committee on Drilling & Production Practices.

It is intended that these voluntary recommended practices serve as a guide to promote and maintain integrity of oil and gas well servicing/workover facilities and operations in the interest of public safety, personnel safety, and protection of the environment. Users of this publication are reminded that constantly developing technology, specific company requirements and policy, and specialized or limited operations do not permit coverage of all possible operations, practices, or alternatives. This standard is not so comprehensive as to present all of the recommended practices for oil and gas well servicing/workover operations involving hydrogen sulfide. Alternative operating procedures and/or equipment are available and routinely used to meet or exceed recommended practices or performance levels set forth herein. Recommendations presented in this publication are based on industry experience and expertise involving a wide range of operating locations and conditions. Recommendations presented in this publication are not intended to inhibit developing technology and equipment improvements or improved operating procedures. This publication, or portions thereof, cannot be substituted for qualified technical/operations analysis and judgment to fit a specific situation.

There may be federal, state, or local statutes, rules, or regulations requiring oil and gas well servicing/workover operations to be conducted in a safe or environmentally sound manner. Organizations and individuals using this standard are cautioned that requirements of federal, state, or local laws and regulations are constantly changing. These requirements should be reviewed to determine whether the practices recommended herein and the operations being planned or conducted are consistent with current laws and regulations.

Information concerning safety and health risks and proper precautions with respect to particular materials and conditions should be obtained from the employer, the manufacturer or supplier of that material, or the material safety data sheet (MSDS).

Provisions of these voluntary recommended practices include use of the verbs "shall" and "should," whichever is deemed most applicable for the specific situation. For purposes of this publication, the following definitions are applicable:

Shall: Indicates the "recommended practice(s)" have universal applicability to that specific activity.

Should: Denotes a "recommended practice(s)" 1) where a safe comparable alternative practice(s) is available; 2) that may be impractical under certain circumstances; or 3) that may be unnecessary under certain circumstances.

Suggested revisions to these recommended practices are invited and should be submitted to: Director, Exploration & Production Department, American Petroleum Institute, 1220 L St., N.W. Washington, D.C. 20005.

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Recommended Practice for Oil and Gas Well Servicing and Workover Operations Involving Hydrogen Sulfide

0 Introduction

The petroleum industry, through many years of research and operating experience, has developed guidelines and standards for safe operations under conditions involving hydrogen sulfide. Continuing industry efforts, which include planning, prudent selection and layout of equipment, prudent selection of materials, operating and emergency procedures, specialized safety equipment, and appropriate personnel training, have contributed to successful and safe operations. Effective response to emergencies requires prior planning. *Good engineering practice (engineering and administrative controls) dictates that operations systems be designed to minimize exposure of personnel and the public to hydrogen sulfide and sulfur dioxide.*

1 Scope

Recommendations set forth in this publication apply to oil and gas well servicing and workover operations involving hydrogen sulfide. These operations include well completion, servicing, workover, downhole maintenance, and plug and abandonment procedures conducted with hydrogen sulfide present in the fluids being handled. Coverage of this publication is applicable to operations confined to the original well-bore or original total depth and applies to the selection of materials for installation or use in the well and in the well servicing operation(s). The presence of hydrogen sulfide in these operations also presents the possibility of exposure to sulfur dioxide from the combustion of hydrogen sulfide. *Refer to Section 5 for applicability of this standard.*

This standard addresses personnel training, personnel protective equipment, contingency planning and emergency procedures, classification of locations, materials and equipment, operations, rig practices, special operations, offshore operations, characteristics of hydrogen sulfide and sulfur dioxide, and evaluation and selection of hydrogen sulfide monitoring equipment.

2 References

2.1 STANDARDS

The following standards contain provisions which, through reference in this text, constitute provisions of the standard. All standards are subject to revision, and users are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below.

API

BULL E1 *Bulletin on the Generic Hazardous Chemical Category List and Inventory for the Oil*

and Gas Exploration & Production Industry

BULL E4 *Release Reporting for the Oil and Gas Exploration and Production Industry as Required by the CWA, CERCLA, and SARA Title III*

BULL 6J *Bulletin on Testing of Oilfield Elastomers, A Tutorial*

RP7G *Recommended Practice for Drill Stem Design and Operating Limits*

RP 14C *Recommended Practice for Analysis, Design, Installation, and Testing of Basic Surface Safety Systems on Offshore Production Platforms*

RP 14F *Recommended Practice for Design and Installation of Electrical Systems for Offshore Production Platforms*

RP 49 *Recommended Practices for Drilling and Drill Stem Testing Operations Involving Hydrogen Sulfide*

RP 53 *Recommended Practices for Blowout Prevention Equipment Systems for Drilling Wells*

RP 54 *Recommended Practices for Occupational Safety for Oil and Gas Well Drilling and Servicing Operations*

RP 67 *Recommended Practices for Oilfield Explosives Safety*

RP 500 *Recommended Practice for Classification of Locations for Electrical Installations at Petroleum Facilities*

RP 2201 *Procedures for Welding or Hot Tapping on Equipment in Service*

Spec 5 CT *Specification for Casing and Tubing*

Spec 5 D *Specification for Drill Pipe*

Spec 6 A *Specification for Valves and Wellhead Equipment*

Spec 16 A *Specification for Drill Through Equipment*

Spec 16 C *Specification for Choke and Kill Systems*

Publ 2217A *Guidelines for Work in Inert Confined Spaces in the Petroleum Industry*

ACGIH¹

Threshold Limit Values (TLVs) for Chemical Substances and Physical Agents and Biological Exposure Indices

¹American Conference of Governmental Industrial Hygienists, 1330 Kemper Meadow Drive, Cincinnati, Ohio 45240.

ANSI²

- CGA G-7.1 *Breathing Air, Grade D*
 IES RP7-1990 *Practice for Industrial Lighting*
 Z88-2 *Practices for Respiratory Protection*

EPA³

- EPA/600/8-
 E86/026A *Health Assessment Document for Hydrogen Sulfide*

ISA⁴

- S12.15, *Performance Requirements for Hydrogen Sulfide Detection Instruments*
 Part I
 RP12.15, *Installation, Operation, and Maintenance of Hydrogen Sulfide Detection Instruments*
 Part II

NACE⁵

- MR0175-94 *Standard Material Requirements Sulfide Stress Cracking Resistant Metallic Materials for Oilfield Equipment*

National Response Team⁶

- NRT-1 *Hazardous Materials Emergency Planning Guide*
Technical Guidance for Hazards Analysis, Emergency Planning for Extremely Hazardous Substances

NFPA⁷

- NFPA 70 *National Electrical Code*

NIOSH⁸

- NIOSH 74-111 *Criteria for a Recommended Standard for Occupational Exposure to Sulfur Dioxide* (GPO No. 017-033-00029)
 NIOSH 77-158 *Criteria for a Recommended Standard for Occupational Exposure to Hydrogen Sulfide* (GPO No. 017-033-00217-7)
 DHHS 94-116 *NIOSH Pocket Guide to Chemical Hazards*

PACE⁹

- Report 85-5 *Review of Ambient Hydrogen Sulfide Standards in Canada*

²American National Standards Institute, 1430 Broadway, New York, New York 10018.

³Environmental Protection Agency, available from U.S. Government Printing Office, Washington, D.C. 20402.

⁴Instrument Society of America, Box 12277, Research Triangle Park, North Carolina 27709.

⁵National Association of Corrosion Engineers, NACE International, Box 218340, Houston, Texas 77218-8340.

⁶National Response Team, National Oil and Hazardous Substances Contingency Plan GWDR/12, 2100 Second Street SW, Washington, D.C. 20593.

⁷National Fire Protection Association, 60 Batterymarch Park, Quincy, Massachusetts 02269.

⁸National Institute for Occupational Safety and Health (U.S. Department of Health, Education, and Welfare), available from U.S. Government Printing Office, Washington, D.C. 20402.

⁹Petroleum Association for Conservation of the Canadian Environment, 12002-275 Slater Street, Ottawa, Ontario, Canada L1P 5H9.

2.2 REGULATIONS

The following regulations are referenced in this standard. All regulations are subject to revision, and users should determine the latest version to ensure compliance.

Bureau of Mines (DOI)¹⁰

- 30 CFR Chapter 1, Subchapter B, Part II, Subpart H, *Respiratory Protection Devices*

Coast Guard (DOT)¹¹

- 33 CFR Parts 140, 143, and 146, *Emergency Evacuation Plans for Manned OCS Facilities*
 54 FR 21566, May 18, 1989, *Emergency Evacuation Plans for Manned OCS Facilities*

DOT¹²

- 49 CFR Part 178, Subpart C, *Shipping Container Specifications*

EPA³

- 40 CFR Part 264, Subpart D, *Contingency Plans and Emergency Procedures*
 40 CFR Part 302, *Designation, Reportable Quantities, and Notification*
 40 CFR Part 355, *Emergency Planning and Notification*
 40 CFR Part 370, *Hazardous Chemical Reporting: Community Right-to-Know*

MMS (DOI)¹³

- 30 CFR Parts 250 & 256, *Oil, Gas, and Sulphur Operations in the Outer Continental Shelf*
 53 FR 10596-10777, April 1, 1988
Oil, Gas, and Sulphur Operations in the Outer Continental Shelf

MMS-OCS-1

- Safety Requirements for Drilling Operations a Hydrogen Sulfide Environment, Outer Continental Shelf (February 1976)*
 47 FR 28888,
 July 1, 1982 *Safety Requirements for Drilling Operations in a Hydrogen Sulfide Environment, Outer Continental Shelf*

¹⁰Bureau of Mines, U.S. Department of Interior, available from U.S. Government Printing Office, Washington, D.C. 20402.

¹¹Coast Guard, U. S. Department of Transportation, available from U.S. Government Printing Office, Washington, D.C. 20402.

¹²U. S. Department of Transportation, available from U.S. Government Printing Office, Washington, D.C. 20402.

¹³Minerals Management Service, U.S. Department of Interior, 381 Elden Street, Herndon, VA 22070-4817. Available from U.S. Government Printing Office, Washington, D.C. 20402.

OSHA¹⁴

- 29 CFR Part 1910.38, *Employee Emergency Plans and Fire Prevention Plans*
- 29 CFR Part 1910.120, *Hazardous Waste Operations and Emergency Response*
- 29 CFR Part 1910.134, *Respiratory Protection Standard*
- 29 CFR Part 1910.146, *Permit-Required Confined Spaces*
- 29 CFR Part 1910.1000, *321 Air Contaminants*
- 29 CFR Part 1910 Subpart I, *Personal Protective Equipment*
- 29 CFR Part 1910.1200, *Hazard Communication Standard*

2.3 OTHER REFERENCES

1. Poda, George A., "Hydrogen Sulfide Can Be Handled Safely," *Archives of Environmental Health*, Vol. 12, 795–800, June 1966.
2. Ronk, Richard and White, M. K., "Hydrogen Sulfide and the Probabilities of Inhalation Through a Tympanic Membrane Defect," *Journal of Occupational Medicine*, Vol. 25, No. 5, 337–340, May 1985.
3. Pasquill, F., *Atmospheric Diffusion*, Second Edition, John Wiley & Sons, New York, NY, 1947.
4. Slade, D. H., *Metrolgy and Atomic Energy* NTIS-TID 24190 (1968), National Technical Information Service (NTIS), U.S. Department of Commerce, Springfield, VA 22161.
5. Wilson, D. J., "Release and Dispersion of Gas from Pipeline Ruptures," Department of Mechanical Engineering, University of Alberta, Edmonton, Canada.
6. Jann, P. R., "Evaluation of Sheltering In Place," *Journal of Loss Prevention in the Process Industry*, Vol. 2, No. 1, Jan. 1989, pp 33–38.
7. MacFarlane, D. R. and Ewing, T. F., "Acute Health Effects From Accidental Releases of High Toxic Hazard Chemicals," *Journal of Loss Prevention in the Process Industry*, Vol. 3, No. 1, January 1990, pp 167–176.
8. Wilson, D. J., "Stay Indoors or Evacuate to Avoid Exposure to Toxic Gas?," *Emergency Preparedness Digest*, Ottawa, Canada, January–March 1987, pp 19–24.
9. Davies, P. C. and Purdy, G., "Toxic Gas Risk Assessments—The Effects of Being Indoors," North Western Branch Papers 1986 No. 1, Institution of Chemical Engineers, Health and Safety Executive, Major Hazards Assessment Unit, St. Annes House, Stanley Precinct, Bootle, Merseyside, England.
10. Glickman, T.S. and Ujrhara, A. M., "Protective Action Decision Making in Toxic Vapor Cloud Emergencies," Center for Risk Management, Resources for the Future, Washington, D. C. 20036.

¹⁴Occupational Safety & Health Administration (U.S. Department of Labor), available from U.S. Government Printing Office, Washington, D.C. 20402.

11. Wilson, D. J., "Variation of Indoor Shelter Effectiveness Caused by Air Leakage Variability of Houses in Canada and the USA," US EPA/FEMA Conference on Effective Use of In-Place Sheltering as a Potential Option to Evacuation During Chemical Release Emergencies, Emmitsburg, MD, November 30–December 1, 1988.

2.4 BIBLIOGRAPHY

The following publications contain information related to this subject:

1. [API RP 14F](#), *Recommended Practice for Design and Installation of Electrical Systems for Offshore Production Platforms*, available from American Petroleum Institute, 1220 L St., NW Washington, DC 20005, 1991.
2. [API RP 55](#), *Recommended Practices for Conducting Oil and Gas Producing and Gas Processing Plant Operations Involving Hydrogen Sulfide*, American Petroleum Institute, 1220 L St., NW Washington, DC 20005, 1995.
3. GPA 2145-85, *Physical Constants of Paraffin Hydrocarbons and Other Components of Natural Gas*, available from Gas Processors Association, 6526 E. 60th Street, Tulsa, OK 74145.
4. NIOSH, *Recommended Standard for Occupational Exposure to Hydrogen Sulfide*, available from US Government Printing Office, Washington DC 20402.
5. Public Health Service Publication 999-AP-26, *Workbook on Atmospheric Dispersion Estimates*, D. Bruce Tanner, available from U.S. Department of Health, Education, and Welfare, Cincinnati, OH.
6. Texas Railroad Commission Rule 36, *Oil, Gas, and Geothermal Resources Operations Hydrogen Sulfide Areas*, Texas Railroad Commission, Austin, TX.

3 Acronyms and Abbreviated Definitions

The following acronyms and abbreviations are used in this publication:

3.1 ACRONYMS

ACC	Acceptable Ceiling Concentration
ACGIH	American Conference of Governmental Industrial Hygienists
ANSI	American National Standards Institute
API	American Petroleum Institute
BOP	Blowout Preventer
CAS	Chemical Abstract Service
CERCLA	<i>Comprehensive Environmental Response, Compensation, and Liability Act</i>
CGA	Compressed Gas Association
CFR	<i>Code of Federal Regulations</i>
DC	Direct Current
DOI	U. S. Department of Interior
DOL	U. S. Department of Labor
DOT	U. S. Department of Transportation

EHS	Extremely Hazardous Substance
EMI	Electromagnetic Interference
EPA	Environmental Protection Agency
EPCRA	<i>Emergency Planning and Community Right-to-Know Act</i>
ERPG	<i>Emergency Response Planning Guide</i>
FR	<i>Federal Register</i>
HAZWOPER	Hazardous Waste Operations and Emergency Response
H ₂ S	Hydrogen Sulfide
IDLH	Immediately Dangerous to Life or Health
ISA	Instrument Society of America
LEL	Lower Explosive Limit
LEPC	Local Emergency Planning Committee
MMS	Minerals Management Service
MSDS	Material Safety Data Sheet
NACE	National Association of Corrosion Engineers
NFPA	National Fire Protection Association
NIOSH	National Institute for Occupational Safety and Health
NRTL	Nationally Recognized Testing Laboratory
NTIS	National Technical Information Service
OCS	Outer Continental Shelf
OSHA	Occupational Safety and Health Administration
PEL	Permissible Exposure Limit
PG	Pasquill-Gifford
ppm	parts per million
RCRA	<i>Resource Conservation & Recovery Act</i>
REL	Recommended Exposure Level
RFI	Radio Frequency Interference
ROE	Radius of Exposure
RP	<i>Recommended Practice(s)</i>
RQ	Reportable Quantity
SARA	<i>Superfund Amendments and Reauthorization Act</i>
SCF	Standard Cubic Feet
SERC	State Emergency Response Commission
SO ₂	Sulfur Dioxide
SSC	Sulfide Stress Cracking
STEL	Short Term Exposure Level
TLV	Threshold Limit Value
TPQ	Threshold Planning Quantity
TWA	Time Weighted Average

3.2 DEFINITIONS

For the purposes of this standard, the following definitions are applicable.

3.2.1 acceptable ceiling concentration (ACC): The designated level of an air contaminant to which an employee may be exposed at any time during an 8-hour shift, except for a time period and up to a concentration not exceeding the “acceptable maximum peak above the acceptable ceiling con-

centration for an 8-hour shift.” Refer to 29 *CFR* Part 1910.1000 and Table Z-2.

3.2.2 breathing zone: A hemisphere forward of the shoulders with a radius of 6 to 9 inches. Refer to OSHA Instruction CPL 2-2.20A, March 30, 1984; amended by CPL 2-20A CH-1, October 29, 1984.

3.2.3 continuous hydrogen sulfide monitoring equipment: Equipment capable of continuously measuring and displaying the concentration of hydrogen sulfide in ambient air.

3.2.4 emergency response planning guide—level 2 (ERPG-2): The maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to one hour without experiencing or developing irreversible or other serious health effects or symptoms that could impair their abilities to take protective actions. Refer to *Technical Guidance for Hazards Analysis; Emergency Planning for Extremely Hazardous Substances*.

3.2.5 enclosed facility: A 3-dimensional space enclosed by more than $\frac{2}{3}$ of the possible projected plane surface and of sufficient size to allow the entry of personnel. For a typical building, this would require that more than $\frac{2}{3}$ of the walls, ceiling, and floor be present. Refer to [API RP 500](#).

3.2.6 essential personnel: Those individuals required to provide proper and prudent safe operations activities and those required to effect control of the hazardous hydrogen sulfide or sulfur dioxide conditions.

3.2.7 gas detection instrument: An assembly of electrical, mechanical, and chemical components designed to sense and respond continuously to the presence of chemical gases in atmospheric mixtures.

3.2.8 hydrogen sulfide: Chemical formula is H₂S. A flammable, toxic gas that is normally heavier than air and sometimes found in fluids encountered in oil and gas producing and gas processing operations. *CAUTION: Inhalation at certain concentrations can lead to injury or death.* Refer to Appendix A.

3.2.9 immediately dangerous to life and health (IDLH): An atmospheric concentration of any toxic, corrosive, or asphyxiant substance 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. [API Publication 2217A](#) specifies an oxygen content of less than 19.5% as oxygen deficient and an oxygen content of less than 16% is considered IDLH.

3.2.10 inadequately ventilated: Ventilation (natural or artificial) that is not sufficient to prevent the accumulation of

significant quantities of toxic or inert gases such that a hazard is created.

3.2.11 length-of-stain detector: A specially designed pump and colorimetric indicator tube detector (length-of-stain), with a supply of detector tubes, that operates by using the pump to pull a known volume of air or gas through a detector tube. The tubes contain chemical reagents that are designed to detect the presence and display the concentration of specific gases or vapors in the sample. The length of the resultant color band in the tube indicates an instantaneous quantitative concentration of the specific chemical in the sample.

3.2.12 permissible exposure limit (PEL): The inhalation exposure limit specified in 29 *CFR* 1910.1000 or applicable state standards. These limits may be expressed as an 8-hour time weighted average (TWA), a Ceiling Limit, or 15-minute Short Term Exposure Limit (STEL). PELs are subject to change and users should check the latest version of 29 *CFR* Part 1910.1000, "Toxic and Hazardous Substances," for compliance.

3.2.13 shall: Indicates the "recommended practice(s)" has universal applicability to that specific activity.

3.2.14 shelter-in-place: The concept of providing the public protection from exposure to toxic gas or vapor releases to the environment by having residents stay indoors until emergency evacuators arrive or the emergency is over. Refer to Section 2.3, 7.11.

3.2.15 should: Denotes a "recommended practice(s)" 1) where a safe comparable alternative practice(s) is available; 2) that may be impractical under certain circumstances; or 3) that may be unnecessary under certain circumstances.

3.2.16 sulfur dioxide: Chemical formula is SO_2 . A toxic product of combustion of hydrogen sulfide, normally heavier than air. *CAUTION: Inhalation at certain concentrations can lead to injury or death.* Refer to Appendix B.

3.2.17 temporary safe haven: Refer to "shelter-in-place" (3.2.14).

3.2.18 threshold limit value (TLV): Airborne concentrations of substances representing conditions under which it is believed that nearly all workers may be repeatedly exposed day after day without adverse effects. These value may be expressed as 8-hour time weighted average (TWA), Ceiling Limits, or 15-minute Short Term Exposure Limits (STEL). Refer to American Conference of Governmental Industrial Hygienists (ACGIH), *Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices*. "TLV" is a trademarked term of ACGIH. TLVs are subject to change and users should check the latest edition of the foretated reference.

4 Applicability

4.1 PERSONNEL AND EQUIPMENT PROTECTION

In oil and gas well servicing/workover operations, severity of the environment shall be assessed. As a minimum, the following measures shall be implemented:

a. Personnel protection should be provided if the work area concentration of hydrogen sulfide (refer to 3.2.8) exceeds 10 ppm 8-hour time weighted average (TWA) or 15 ppm as a short term exposure level (STEL) averaged over 15 minutes (refer to Appendix A); or the work area concentration of sulfur dioxide (refer to 4.16) exceeds 2 ppm as an 8-hour TWA or 5 ppm as a STEL averaged over 15 minutes (refer to Appendix B). Personnel safety provisions of this publication do not apply when:

1. the atmospheric concentration of hydrogen sulfide could not exceed 10 ppm (by volume) in the breathing zone; or
2. the atmospheric concentration of sulfur dioxide could not exceed 2 ppm (by volume) in the breathing zone.

b. Equipment and materials shall be selected on the basis of resistance to sulfide stress cracking and corrosion. Refer to NACE Standard MR0175 for recommendations for selection of equipment and materials.

The equipment and materials provisions of this publication do not apply when the partial pressure of hydrogen sulfide in the gas could not exceed 0.05 psia or 10 psia in the gas phase of sour crude systems.

Some conditions may require extensive personnel safety measures but only the use of conventional equipment and materials; other conditions may require the use of special equipment and materials but only minimal personnel safety measures; still other conditions may require both.

Throughout this publication, "trigger levels" for various actions are used to ensure safety of employees and the public. These trigger levels have been established considering threshold limit values (TLVs—refer to 3.2.18). These TLVs are subject to change and users should check the latest edition of *Threshold Limit Values and Biological Exposure Indices* and the latest revision of 29 *CFR* Part 1910.1000 for compliance.

In 1989, the U. S. Department of Labor, Occupational Safety and Health Administration (OSHA) issued updated permissible exposure limits (PELs) for several hundred chemicals, including revised PELs for hydrogen sulfide (10 ppm as an 8-hour TWA or 15 ppm STEL averaged over 15 minutes) and sulfur dioxide [2 ppm as an 8-hour TWA or 5 ppm STEL averaged over 15 minutes (refer to 54 *FR* 2333, January 19, 1989)]. A federal court set aside the OSHA 1989 rule (refer to 58 *FR* 35338, June 30, 1993).

The American Conference of Governmental Industrial Hygienists (ACGIH) recommends a hydrogen sulfide TLV of 10 ppm (8-hour TWA) and a STEL of 15 ppm averaged over 15 minutes and recommends 2 ppm as an 8-hour TWA TLV and 5 ppm as a STEL averaged over 15 minutes for sulfur dioxide (refer to *Threshold Limit Values for Chemical Substances and Biological Exposure Indices*).

In the interest of safety and health, this standard recommends use of the ACGIH TLVs (refer to *Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices*) as trigger levels for employee safety (refer to Appendices A and B). Some states have adopted these levels as requirements for employee safety.

Individual employers may set their own trigger levels after review and due consideration of site specific conditions, various regulatory requirements, and material safety data sheet (MSDS) information. Users should check the current status of OSHA PELs, OSHA acceptable ceiling concentrations (ACCs), ACGIH TLVs, and applicable regulatory requirements concerning substances of interest.

4.2 LEGAL REQUIREMENTS

This publication presents recommended practices and precautions deemed pertinent to protect personnel and the public from exposure to potentially hazardous concentrations of hydrogen sulfide and sulfur dioxide. These recommended practices recognize that owners, operators, contractors, and their employees have separate responsibilities that may be contractual in nature. It is not the intent of these recommended practices to alter the contractual relationship(s) between the parties. Some of the practices recommended herein are mandatory by local, state, or federal laws, rules, and regulations. Because of the functional and geographical diversity of these requirements, no attempt has been made in these recommended practices to designate which are optional and which are required. Furthermore, even if all the practices recommended herein are followed, there still may be existing or future legally imposed laws or regulations which would not be met. *In the event of any omission or conflict between these recommended practices and legally required action(s), the requirements of laws and regulations must control.* Some of the federal regulations (standards) pertinent to safe well servicing/workover operations involving hydrogen sulfide are listed in Section 2, "References." Users of this publication should review these regulations and other federal, state, and local laws to assure appropriate compliance in their specific operations.

4.3 HAZARD COMMUNICATION (WORKER RIGHT-TO-KNOW)

This publication contains important information that is intended as a guide but may not comply in all respects with

OSHA's Hazard Communication Standard. Appropriate counsel should be sought to assure compliance with hazard communication requirements for the specific operations. Refer to OSHA rules on hazard communication in 29 *CFR* Part 1910.1200, "Hazard Communication Standard" (52 *FR* 31877-31886, August 24, 1987).

4.4 EMERGENCY PLANNING AND COMMUNITY RIGHT-TO-KNOW ACT (EPCRA) AND COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND LIABILITY ACT (CERCLA)

The Emergency Planning and Community Right-to-Know Act (EPCRA), also known as Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA III), requires facilities with a threshold planning quantity (TPQ) of an extremely hazardous substance (EHS) to participate in emergency planning at a local level. Hydrogen sulfide and sulfur dioxide are both listed as EHSs with a TPQ of 500 pounds. A facility with hydrogen sulfide or sulfur dioxide present at its TPQ must notify the State Emergency Response Commission (SERC) and designate a facility emergency coordinator to assist the Local Emergency Planning Committee (LEPC) with its response plan.

EPCRA and CERCLA both require a facility to report a release of a reportable quantity (RQ) of a listed substance. The RQs for release reporting are 100 pounds for hydrogen sulfide and one pound for sulfur dioxide. Refer to [API Bulletin E4](#) for guidance on release reporting requirements. Both RQs (40 *CFR* Part 302) and TPQs (40 *CFR* Part 355) are subject to change and the facility operator should check for revisions.

EPCRA also requires submission of periodic and annual reports of information to state and local officials on the presence of hazardous chemicals at production facilities. These regulations are set forth in 40 *CFR* Part 370, and API has published suggested generic reporting forms (refer to [API Bulletin E1](#)) that are acceptable to the U. S. Environmental Protection Agency (EPA).

4.5 HAZARDOUS WASTE OPERATIONS AND EMERGENCY RESPONSE (HAZWOPER)

OSHA's standard, 29 *CFR* Part 1910.120, sets requirements for safety and health protection of employees involved in cleanup operations at uncontrolled hazardous waste sites being performed under government mandate; certain hazardous waste treatment, storage, and disposal operations conducted under the *Resource Conservation and Recovery Act* (RCRA); and emergency response to incidents involving hazardous substances. Appropriate guidance should be sought to assure compliance with 29 *CFR* Part 1910.120 requirements for the specific operations (refer to 54 *FR* 9294-9336, March 6, 1989).