



**A STANDARD OPERATING PROCEDURE
for**

CONFINED SPACE ENTRY

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U.S. General Services Administration
Safety and Environmental Management Team
1500 E. Bannister Road
Kansas City, MO 64131

INTRODUCTION

This Standard Operating Procedure (SOP) has been developed for the purpose of outlining the general safety and health precautions to be followed during tasks involving entry into confined spaces.

Many hazards associated with entering and working in confined spaces are due, in a large part, to a failure to recognize that a confined space is a potential hazard where the most serious accidents can **and do** occur. Since work in confined spaces is, and has always been potentially dangerous, General Services Administration (GSA) managers and supervisors must take the time and effort to ensure that entering, working in, and exiting a confined space is done safely. Successful managers and supervisors will look into the possibility of the most unfavorable situation in every case and take appropriate precautionary measures.

The Occupational Safety and Health Administration (OSHA) has published regulations for permit-required confined spaces; Title 29, Code of Federal Regulations, Part 1910.146 (29 CFR 1910.146). The criteria contained in the regulations are the basis for the requirements set forth in this SOP. Managers and supervisors who insist on compliance with these rules will greatly reduce the chance of an undesirable event occurring in a confined space.

This SOP, therefore, is intended to inform GSA managers, supervisors, and employees of the **minimum** requirements of the Confined Space Entry Program. All procedures must comply with 29 CFR 1910.146 and be approved, prior to entry into a confined space, by the GSA regional Occupational Safety and Health (OSH) Program office.

Generally, each confined space poses its own hazardous conditions and, therefore, must be thoroughly evaluated prior to employee entry. Due to the potential for serious or even fatal injuries, local GSA managers must prepare separate written procedures for confined space entry and the work practices to be followed within the space. The regional OSH Program Office must review all written permit-required confined space entry procedures **prior to** an employee entering the space. In the event of an emergency, verbal authorization from the regional OSH Program Office is permitted without advance written approval, but this must be followed by a written request and subsequent authorization at the earliest possible time.

This SOP is not to be used by contractors entering a confined space under a GSA contract. Contractors must comply with all OSHA standards, including preparing and enforcing a written confined space entry program. The procedures developed or initiated by contractors to comply with standards are their responsibility.

A copy of the OSHA standards applicable to the GSA Confined Space Entry Program must be available to all supervisors and employees who are required to perform work in conjunction with a permit-required confined space. A copy of 29 CFR 1910.146 must be made a part of the local activity confined space entry written procedures.

Another reliable source of information relative to confined space safety is the American National Standards Institute (ANSI) standard "Safety Requirements for Confined Spaces, Z117.1." ANSI standards may be purchased from American National Standards Institute, 1430 Broadway, New York, NY 10018.

OSHA standards may be obtained from the local OSHA Area Office or purchased from the Superintendent of Documents, Government Printing Office, Washington, DC 20402.

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General Services Administration
Heartland Region
CONFINED SPACE ENTRY PROGRAM

1. **POLICY**. It is GSA Heartland Region policy that GSA personnel shall **NOT** enter permit-required confined spaces unless specifically approved **IN WRITING** by the regional OSH Program office **PRIOR TO** entering the space.

Furthermore, absolutely **NO** personnel shall be permitted to enter any permit-required confined space as a part of any project at any time except as outlined in this SOP.

2. **GENERAL REQUIREMENTS**.

a. This SOP contains requirements for practices and procedures to protect employees from the hazards of entry into and work within confined spaces which can be identified by the local GSA manager exercising reasonable care.

b. Local GSA activity managers who do not wish to use the contents of this SOP for their local Confined Space Entry Program will develop local procedures in cooperation with the regional OSH Program Office. Regardless of which method is used, the procedures must be reviewed by the regional OSH Program Office **prior to** GSA employees being allowed to enter into or work within a permit-required confined space. The regional OSH Program Office must be given a minimum of 15 days to review each proposed procedure. An exception to the 15-day rule is allowed for emergency situations only. However, there is **NO** exception to the rule that the procedures must be reviewed by the regional OSH Program Office **in advance** of entry.

c. A copy of the approved practices and procedures (including the applicable OSHA standard) shall be made available to GSA supervisors and employees who are to participate in work requiring entry into a permit-required confined space.

3. **REFERENCES**.

a. OSHA 29 CFR 1910.146, Permit-Required Confined Spaces for General Industry.

b. An SOP for Controlling Hazardous Energy Sources.

c. An SOP for Selection, Care, and Use of Respiratory Protection -- Part I: General.

- d. An SOP for a Written Hazard Communication Program.
- e. An SOP for Welding, Cutting, and Brazing.

4. DEFINITIONS. The following definitions are used within this SOP:

a. Acceptable Environmental Condition. Conditions within a space in which uncontrolled hazardous atmospheres are not present and which include any additional environmental criteria GSA may require for employee entry into the space.

b. Attendant. An employee stationed outside the permit-required confined space who is trained as required by this SOP and who monitors the entrant(s) within the permit-required confined space. An attendant may not monitor more entrants nor more confined spaces than the entry permit specifically authorizes. Furthermore, the attendant shall not be assigned duties other than continuously monitoring the entrant(s).

c. Blinding or Blanking. The absolute closure of a pipe, line, or duct, by fastening across its bore a solid plate or cap which completely covers the bore; which extends at least to the outer edge of the flange at which it is attached; and which is capable of withstanding the maximum upstream pressure.

d. Confined Space. A "confined space" is any space which meets all the following criteria:

(1) Limited or restricted means of entry or exit. Examples include, but are not limited to, boilers, tanks, vessels, silos, storage bins, hoppers, vaults, pits, and diked areas.

(2) Is large enough for an employee to enter and perform assigned work.

(3) Is not designed for continuous occupancy by the employee.

e. Emergency. Any occurrence (including any failure of hazard control or monitoring equipment) or event(s), internal or external to the confined space, which could endanger entrants.

f. Engulfment. The surrounding and effective capture of a person by a liquid or finely divided (flowable) solid substance that can be aspirated to cause death by filling or plugging the respiratory system or that can exert enough force on the body to cause death by strangulation, constriction, or crushing.

Engulfment is considered to occur when a person is so surrounded above their waist.

g. Entrant. Any GSA employee who has been trained as required by this SOP and who is authorized by the local GSA activity manager (or designee) to enter a confined space. Entrants may rotate duties, acting as attendants if the program and permit so states. Any properly trained person with entry authority may enter the confined space if the permit grantee authorizes the entry and the attendant is informed.

h. Entry. The act by which any part of a person's body intentionally passes through an opening into a confined space. "Entry" includes ensuing work activities in that space. The entrant is considered to have entered as soon as any part of the entrant's body penetrates the opening of the confined space.

i. Entry Permit. The written or printed document established by this SOP generated by the GSA activity manager authorizing entry into a permit-required confined space. The GSA Confined Space Entry Permit, [Appendix A](#), is to be used for this purpose.

j. Entry Supervisor. The person responsible for determining if acceptable entry conditions are present at a permit-required confined space where entry is planned, for authorizing entry and overseeing entry operations, and for terminating entry.

k. Hazardous Atmosphere. An atmosphere which exposes employees to a risk of death, incapacitation, injury, or acute illness from one or more of the following causes:

(1) A flammable gas, vapor, or mist in excess of 10 percent of its lower explosive level or lower flammable limits (LEL/LFL);

(2) An airborne combustible dust at a concentration that obscures vision at a distance of five (5) feet or less;

(3) An atmospheric oxygen concentration below 19.5 percent or above 23.5 percent.

(4) An atmospheric concentration of any substance above its published exposure limits, such as Permissible Exposure Limits (PELs) promulgated by OSHA or Threshold Limit Values (TLVs) issued by the American Conference of Governmental Industrial Hygienists (ACGIH), whichever is more stringent;

(5) Any atmospheric condition recognized as immediately dangerous to life and health (IDLH).

l. Hot Work Permit. GSA's written authorization to perform operations (e.g., riveting, welding, cutting, grinding, burning, heating, etc.) capable of providing a source of ignition. GSA Form 1755 is used for this purpose.

m. IDLH. Any condition which poses an immediate or delayed threat to life or that would cause irreversible adverse health effects or that would interfere with an individual's ability to escape unaided from a space.

n. Inerting. The rendering of the atmosphere of a space non-flammable, non-explosive, or otherwise chemically non-reactive by such means as displacing or diluting the original atmosphere with steam or a gas that is non-reactive to that space; e.g., carbon dioxide or nitrogen.

o. Isolation. The separation of a space from unwanted forms of energy which could be a serious hazard to confined space entrants. Isolation is usually accomplished by such means as blanking or blinding; removal or misalignment of pipe sections or spool pieces; double block and bleed; or lock-out/tag-out.

p. LEL. The minimum concentration of a vapor or gas in air below which propagation (spreading away) of flame does not occur upon contact with a source of ignition. Also sometimes referred to as the "Lower Flammable Limit."

q. Line Breaking. The intentional opening of a pipe, line, or duct that is or has been carrying flammable, corrosive, or toxic material; an inert gas; or any fluid at a pressure or temperature capable of causing injury.

r. Local Activity Manager. Person who exercises authority over a facility, a workcenter, an operation, a project; **and** the employees working therein. This individual can be the building superintendent, the Field Office Manager (FOM) or designated assistant, Contracting Officer's Representative (COR), division manager, workcenter supervisor, etc.

s. Permit-Required Confined Space. Any confined space which meets **one or more** of the following criteria:

(1) Contains or has a known potential to contain a hazardous atmosphere.

(2) Contains a material with the potential for engulfment of an entrant.

(3) Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls, or a floor which slopes downward and tapers to a smaller cross-section.

(4) Contains any other recognized serious safety or health hazard.

t. Personal Protective Equipment (PPE). Includes respirators, chemical protective gloves, safety eyewear, hearing protection, emergency eyewash, and shower units, as well as other similar equipment and clothing. Protective clothing is not intended for the convenience nor comfort of the employee, nor to protect personal clothing or uniforms from the normal amount of soil or wear encountered in performing duties of the position.

u. Prohibited Condition. **Any** condition within a permit-required confined space that is not allowed by the permit during the period when entry is authorized.

v. Retrieval Line. A line or rope secured at one end to the worker by a chest-waist or full-body harness and with its other end secured to either a lifting (or other retrieval) device, or to an anchor point located outside the entry portal.

w. Retrieval System. The equipment (including retrieval line, chest or full-body harness, lifting device, and anchor) used for non-entry rescue of persons from a confined space.

x. Supplied-Air Respirators. Supplied-air respirators, for the purpose of this SOP, includes both self-contained breathing apparatus (SCBA) as well as air line respirators equipped with a 5-minute escape SCBA. Supplied-air respirators do not filter or cleanse the atmosphere in which the wearer is working but, rather, provides the wearer with clean air from outside the hazardous area.

y. Testing. The process by which the hazards that may confront entrants of a permit-required confined space are identified and evaluated. Testing includes specifying the tests that are to be performed within the confined space. Testing most commonly refers to hazards such as, but not limited to:

- Airborne conditions (LEL, oxygen levels, toxic concentrations),
- Pressure checks of pipes or vessels,
- Energization of electric lines or panels,

- ☒ Temperature (hot and cold) checks of thermal systems, etc.

5. RESPONSIBILITIES.

a. Local Activity Managers shall:

(1) Identify and prominently label **all** permit-required confined spaces at their facilities, as outlined in Paragraph 6a(2) of this SOP. If unsure, request an evaluation from the regional OSH Program Office to determine whether suspect areas fit the definition of a permit-required confined space. Refer to [Figure 1](#) of this SOP for examples of acceptable signs.

(2) Prohibit **any** work from occurring within a permit-required confined space except as outlined within this SOP.

(3) Initiate a permit to work in a permit-required confined space (see [Appendix A, Confined Space Entry Permit](#)) and to verify the permit has been approved prior to allowing entry and to sign the permit once Part 1 has been completed. Also, to ensure proper safety equipment is available and worn by employees.

(4) Ensure all personnel responsible for tasks associated with permit-required confined spaces are properly trained regarding practices, procedures, and precautions in safe entry and work practices associated with those confined spaces.

(5) Complete and sign the Confined Space Entry Permit, including determining the protective equipment to be worn, special safety procedures to be followed, and air monitoring to be conducted while in each area.

(6) Perform, or train entering personnel to perform, all atmospheric tests required for entry into permit-required confined spaces and to determine whether additional ventilation and/or precautions are necessary.

(7) Ensure GSA personnel entering permit-required confined spaces are properly equipped, as required by this SOP, to conduct operations safely. Such equipment **may** include, but is not limited to, lifelines and retrieval devices, lock-out devices, ladders and barricades, respirators and protective clothing, air monitoring equipment, communication devices, etc.

(8) Ensure entries into GSA's permit-required confined spaces by contractor personnel are conducted in accordance with Paragraph 6g, Non-GSA Employee (Contractor) Operations, of this SOP.

(9) After completion of the operation, maintain the canceled or expired Confined Space Entry Permit in office files for at least two (2) years; submit a copy of the canceled or expired permit to the regional OSH Program Office for review and record keeping.

(10) Ensure a review of each entry into a permit-required confined space is conducted as outlined in Paragraph 6f, Program Review, of this SOP.

(11) Notify, **immediately**, the regional OSH Program Office of any emergencies (injuries, fatalities, or near misses) associated with GSA's permit-required confined spaces which endanger human life and health.

b. Entrants shall:

(1) Know the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure.

(2) Follow all practices and procedures outlined within this SOP and on the permit when entering a permit-required confined space.

(3) Immediately evacuate a permit-required confined space and notify their supervisor or the local activity manager whenever:

(a) An order to evacuate is given by the attendant or entry supervisor.

(b) The entrant recognizes any warning sign or symptom of exposure to a dangerous situation.

(c) The entrant detects a prohibited condition.

(d) An evacuation alarm is activated.

(4) Use/wear the equipment and follow the procedures approved by the regional OSH Program Office.

(5) Communicate with the attendant, as necessary, to enable the attendant to monitor entrant status and to alert entrants of the need to evacuate the space.

(6) Alert the attendant whenever:

(a) The entrant recognizes any warning sign or symptom of exposure to a dangerous situation.

(b) The entrant detects a prohibited condition.

(7) Notify, **immediately**, the attendant, entry supervisor, local activity manager, and regional OSH Program Office of any emergencies (injuries, fatalities, or near misses) associated with GSA's permit-required confined spaces which endanger human life and health.

c. Attendants shall:

(1) Know the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure.

(2) Be aware of possible behavioral effects of hazard exposure in authorized entrants.

(3) Follow all practices and procedures outlined within this SOP and on the permit when attending an entry into a permit-required confined space.

(4) Continuously maintain an accurate count of authorized entrants in the permit-required confined space and ensure the means used to identify authorized entrants accurately identified who is in the confined space.

(5) Remain outside the permit-required confined space during entry operations and shall **NOT** leave the entry portal of the confined space **until** properly relieved by another attendant. "Properly relieved" means the oncoming attendant meets **ALL** requirements outlined for an attendant as described within this SOP.

(6) Communicate with the entrant, as necessary, to monitor entrant status and to alert entrants of the need to evacuate the space.

(7) Monitor activities inside and outside the space to determine if it is safe for entrants to remain in the space.

(8) Immediately require evacuation of a permit-required confined space and notify their supervisor or the local activity manager whenever:

(a) An order to evacuate is given by the entry supervisor.

(b) The attendant recognizes any warning sign or symptom, including behavioral effects, of exposure to a dangerous situation.

(c) The attendant detects a prohibited condition.

(d) The attendant detects a situation outside the space that could endanger the authorized entrants.

(e) An evacuation alarm is activated.

(f) If the attendant cannot effectively and safely perform **all** the duties assigned in this SOP.

(9) Use/wear the equipment and follow the procedures approved by the regional OSH Program Office.

(10) Alert the entrant whenever:

(a) The attendant recognizes any warning sign or symptom of exposure to a dangerous situation.

(b) The attendant detects a prohibited condition.

(11) Record personnel and equipment entering and exiting the confined space in the Entrant Inventory and Equipment Inventory sections of the Confined Space Entry Permit ([see Appendix A](#)).

(12) Summon rescue and other emergency services as soon as the attendant determines authorized entrants may need assistance to escape from hazards associated with the permit-required confined space.

(13) Take the following actions when unauthorized persons approach or enter a permit-required confined space:

(a) Warn the unauthorized persons they must exit immediately if they have entered the confined space.

(b) Inform the authorized entrants and the entry supervisor if unauthorized persons have entered the confined space.

(14) Performs **non-entry** rescues as needed and **only** as outlined elsewhere within this SOP.

(15) Performs **no** duties that might interfere with the attendant's **primary** duty: To monitor and protect the authorized entrants.

(16) Notify, **immediately**, the entry supervisor, local activity manager, and regional OSH Program Office of any emergencies (injuries, fatalities, or near misses) associated with GSA's permit-required confined spaces which endanger human life and health.

d. Entry Supervisors shall:

(1) Know the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure.

(2) Be aware of possible behavioral effects of hazard exposure in authorized entrants.

(3) Follow all practices and procedures outlined within this SOP and on the permit when attending an entry into a permit-required confined space.

(4) Verify, by checking that the appropriate entries have been made on the entry permit, all tests specified by the entry permit have been conducted and all procedures and equipment specified by the entry permit are in place before endorsing the entry permit and allowing entry to begin.

(5) Terminate the entry and cancel the entry permit whenever conditions, either inside or outside the permit-required confined space, indicate entrants may be harmed.

(6) Verify rescue services are available and the means for summoning them are operable. Refer to Paragraph 6h, Rescue & Emergency Services, of this SOP for requirements.

(7) Remove unauthorized individuals who enter or who attempt to enter the permit-required confined space during entry procedures.

(8) Determine, whenever responsibility for a permit-required confined space is transferred and at intervals dictated by the hazards and operations performed within the space, that entry operations remain consistent with terms of the entry permit and acceptable entry conditions are maintained.

(9) Notify, **immediately**, the local activity manager and regional OSH Program Office of any emergencies (injuries,

fatalities, or near misses) associated with GSA's permit-required confined spaces which endanger human life and health.

e. The Regional OSH Program Office shall:

(1) Provide assistance and guidance, upon request, to local activity managers, regarding implementation of the requirements of this SOP.

(2) Ensure an annual review of the Confined Space Entry Program is conducted as outlined in Paragraph 6f, Program Review, of this SOP.

(3) Respond immediately to emergencies (injuries, fatalities, or near misses) associated with GSA's permit-required confined spaces which endanger human life and health.

6. PROGRAM REQUIREMENTS. The following requirements pertaining to permit-required confined spaces are provided for planning purposes only. Specific requirements will be developed following a complete and thorough evaluation of the work effort requiring entry into a permit-required confined space. Confined space entry procedures and requirements may include any or all of the following, as site conditions indicate:

a. Prior to Entry:

(1) Evaluation of Confined Spaces. Prior to allowing an entrant to enter a confined space, activity managers shall evaluate all workplaces under their cognizance to determine if any meet the criteria of a permit-required confined space (PRCS), as defined above. [Table 1](#) lists spaces which may be classified as confined spaces. This list is not all inclusive. [Figure 1](#) of this SOP provides a chart to guide individuals in evaluating spaces and determining entry procedures. **If in doubt, the space must be considered permit-required.** If workplaces contain permit-required confined spaces, all requirements outlined within this SOP shall be followed; [Appendix A](#) of this SOP summarizes various entrance requirements for GSA as well as Contractor personnel. Assistance in evaluating workplaces may be obtained, upon request, through the regional OSH Program Office.

Table 1.

EXAMPLES OF POSSIBLE CONFINED SPACES
Bulk Tanks & Process Vessels
Furnaces & Boilers
Manholes & Underground/Utility Vaults
Sewage Pits & Septic Tanks
Sewers & Lift Stations

Shafts, Pipelines, & Stacks
Tank Cars & Tank Trailers
Trenches, Pits, & Diked Areas

FIGURE 1, PERMIT-REQUIRED CONFINED SPACE EVALUATION CHART

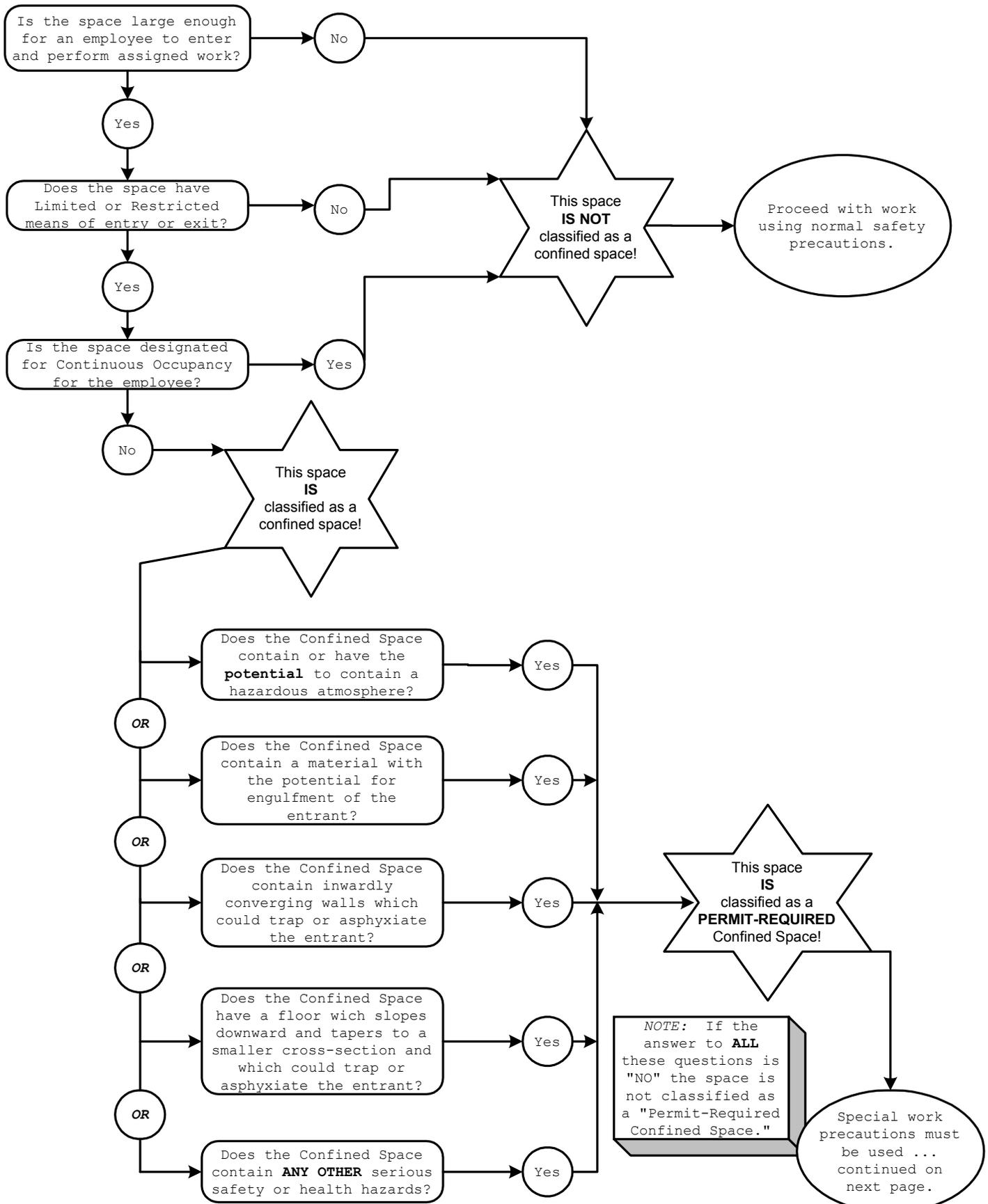
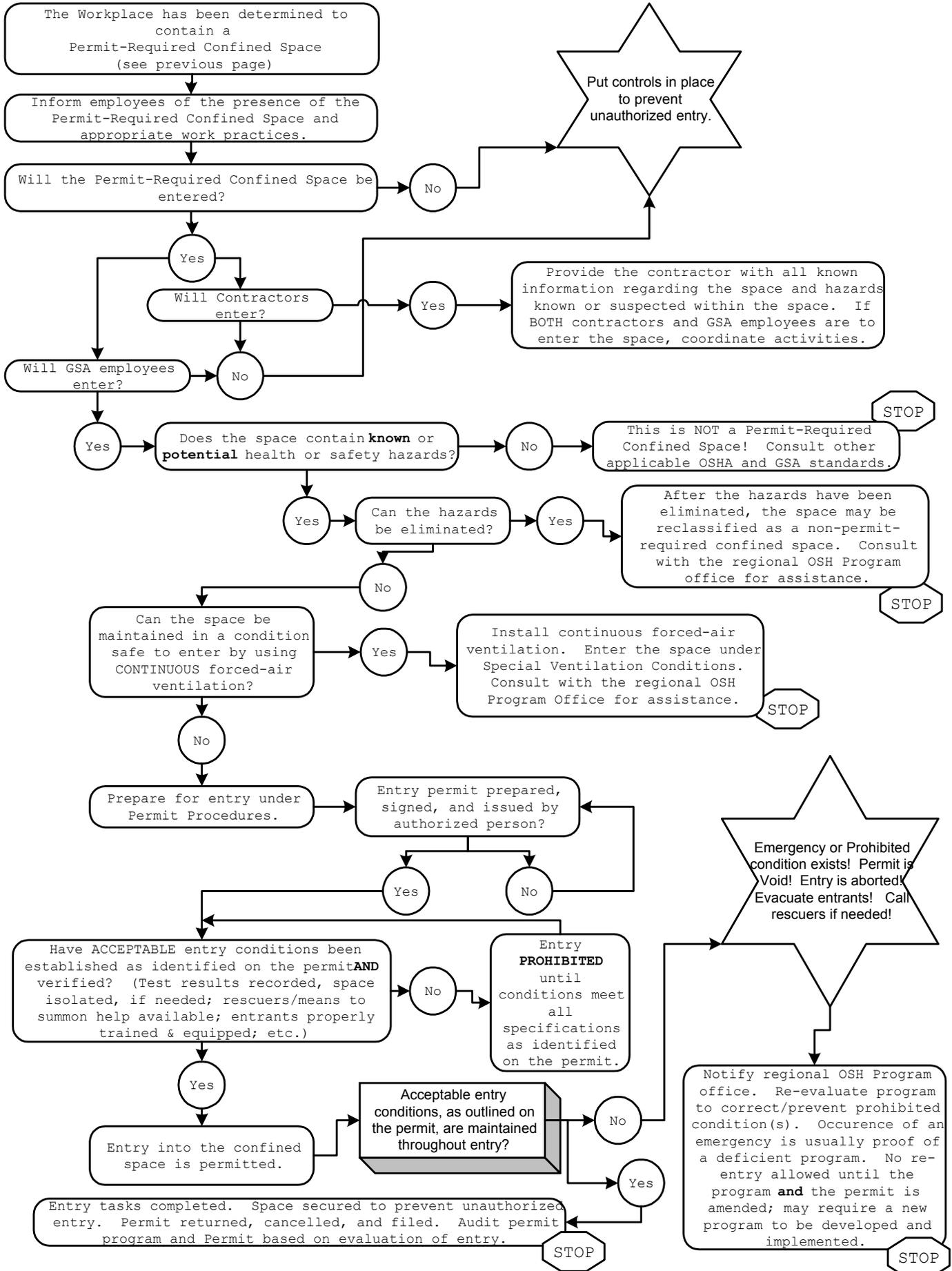


FIGURE 1, PERMIT-REQUIRED CONFINED SPACE EVALUATION CHART (Continued)



(2) Warning Signs. Warning signs shall be permanently posted at **ALL** entrances to any permit-required confined space. Examples of acceptable wording is presented in Figure 2, below:

FIGURE 2. Warning Signs.

**DANGER
CONFINED SPACE
ENTRY BY PERMIT ONLY**

When specific work practices and/or safety equipment are specified, statements shall be added to the warning signs in large letters. For example:

RESPIRATOR REQUIRED FOR ENTRY
and/or
**HOT WORK
PERMITTED**
and/or
NO HOT WORK

(3) Training. Local activity managers shall be responsible for ensuring confined space entry training is provided to all GSA personnel required to enter permit-required confined spaces as a part of their assigned duties **as well as** their supervisors and attendants, and that the practices and procedures presented during the training are properly implemented. This training is required **prior to** the individual entering such a space and **annually** thereafter so long as the individual's work assignment involves entering permit-required confined spaces. Untrained personnel shall not be permitted to enter permit-required confined spaces. Personnel required to work in a permit-required confined space or in support of those working in a permit-required confined space, and their supervisors, shall have training in the following areas:

(a) Emergency entry and exit procedures unique to each procedure and space.

(b) Use of applicable protective equipment, including respirators, safety equipment, retraction gear, etc.

(c) Lock-out and tag-out procedures outlined in An SOP for Controlling Hazardous Energy Sources.

(d) The entry permit system.

(e) Work practices unique to each procedure.

Training shall not be considered complete until the local activity manager and the regional OSH Program Office judge the employee has attained an acceptable degree of proficiency for entering and working in confined spaces.

(4) Entry Permits. Prior to allowing a GSA employee to enter a permit-required confined space, a GSA Confined Space Entry Permit, see [Appendix A](#), shall be issued. Entry into a permit-required confined space shall be prohibited until the entry permit, **all** necessary tools, equipment, and rescue services are available and in-place; and preliminary air tests have been completed.

(a) The Confined Space Entry Permit shall be posted conspicuously at the entrance to the confined space. The permit shall be protected against defacing and the elements.

(b) Immediately preceding entry into the confined space, the employee performing the task, the attendant, and the entry supervisor shall thoroughly examine the applicable entry permit and be totally knowledgeable with the terms, conditions, and contents thereof. This shall be done at the entry location.

(c) After the permit expires, it shall be maintained in the office files for a minimum of two (2) years after it's expiration date. The regional OSH Program Office shall be notified prior to work commencing if the space is classified as a "permit-required confined space."

NOTE: Issuing a Confined Space Entry Permit does **NOT** authorize hot work (welding, cutting, etc.) within that space. Special procedures must be developed and implemented for any hot work to be performed within a confined space.

(5) Equipment and Supplies. Entry into a permit-required confined space shall be prohibited until **all** necessary tools, equipment, and rescue services are available and in place. Required protective clothing and equipment shall be carefully examined to ensure they are appropriate and work properly. When work may cause exposures to airborne substances above acceptable exposure limits, respirator protection shall be provided (see "An SOP for Selection, Care, and Use of Respiratory Protection --

Part I: General", regarding respiratory protection). Such exposure limits include, but are not limited to, PELs issued by OSHA or TLVs issued by ACGIH, whichever is more stringent.

(6) Ventilation. Permit-required confined spaces must be purged of harmful atmospheric contaminants or conditions before entry is allowed. Purging can be accomplished by forced ventilation of fresh air into the space using a high-volume blower. Such blowers must be capable of effectively exchanging the air within the confined space with fresh outside air; fans generally are not adequate. The regional OSH Program Office should be consulted for recommendations regarding acceptable blowers for the confined space to be entered. An acceptable environmental condition (i.e., non-hazardous atmosphere) shall be maintained at all times while the entrant occupies the permit-required confined space.

(a) Where the use of an air blower is required to ensure acceptable environmental conditions, fuel-supplied blowers **SHALL NOT** be used.

(b) Blower intakes shall be placed sufficiently upwind or away from the entry point to prevent mixing of the intake air with exhausted air. The attendant shall ensure the air around the blower intake is clear of contaminants (such as from the exhaust of internal combustion engines) or blockage.

(c) The forced air ventilation shall be so directed as to ventilate the immediate areas where the entrant(s) is or will be present within the space.

(d) Forced air ventilation of a confined space, when required to be used, shall continue until all entrants have left the space.

NOTE: Control of airborne hazards through forced air ventilation does **NOT** constitute elimination of the hazards. If ventilation is interrupted, hazardous airborne concentrations may readily accumulate within a short period of time.

(7) Atmospheric Testing and Monitoring. Atmospheric testing and monitoring is required for two distinct purposes: evaluation of the hazards of the space **before entry** and verification that acceptable conditions continue to exist **during entry** in that space; all results **shall be** logged. Equipment to be used for these purposes will be provided by the regional OSH Program Office based upon the contaminants known or anticipated to occur within specific confined spaces.

(a) **Air testing and monitoring within a confined space must be conducted within the breathing zone(s) and/or potential breathing zone(s) of the entrant(s).** Where the entrant(s) will be working in multiple sites within a confined space, **each** site must be monitored. When utilizing air monitoring equipment the operator must be aware of the equipment's response time on the results displayed, and proceed accordingly.

(1) Pre-Entry Testing. Entrants shall **NOT** enter a permit-required confined space until the atmosphere within that space has been tested and certified as safe. Remote-testing of the atmosphere will be conducted. This is accomplished by utilizing extended sampling probes on the testing instrumentation and testing **ahead of, below, and around** the entrant. In this manner, a safe corridor and work space can be established. All areas within the confined space where the entrant(s) are to be working shall be tested. It is imperative to test **all levels** of the confined space (ceiling, floor, and in between) to ensure hazardous materials have not stratified thus presenting a hazard at a non-tested level.

(2) Monitoring During Entry. To the extent feasible, continuous monitoring for atmospheric hazards shall be conducted throughout the entry. Where continuous monitoring is possible, periodic recording (at least **hourly**) of atmospheric concentrations will be completed. Additionally, if alarms on the testing instrument activate, the atmospheric concentrations shall be recorded and the space immediately evacuated. When the instrument provides data logging capabilities, a print-out of accumulated data will be acquired and attached to the Confined Space Entry Permit. Where the nature of the contaminant and the instrumentation available does not permit continuous monitoring of atmospheric hazards, the regional OSH Program Office shall provide recommendations regarding the required frequency for testing within the space. **All** results shall be recorded.

(b) Data Requirements. Data to be recorded shall include:

- (1) The name and signature of the individual conducting the testing,
- (2) The date and time of testing,
- (3) The sample locations, and
- (4) The results of the testing at each of the sampling locations.

(c) Personnel Requirements. Individuals assigned responsibility for testing the permit-required confined space shall be fully trained, qualified, and competent to operate the test equipment. Competency shall be determined by the local activity manager in conjunction with the regional OSH Program Office.

(d) Equipment Requirements. Air testing equipment to be utilized in conjunction with permit-required confined space entries shall be calibrated, direct-reading devices approved by the regional OSH Program Office. Air monitoring to be conducted within permit-required confined spaces during entry shall be of the continuous-monitoring types. The equipment, at a minimum, shall be calibrated according to the manufacturer's recommendations for that specific instrument. Non-calibrated or malfunctioning equipment shall **not** be utilized. The regional OSH Program Office should be used to provide guidance and directions regarding the use, care, and calibration of air monitoring equipment.

(e) Types of Testing.

(1) Evaluation Testing. The atmosphere of a space should be analyzed using equipment of sufficient sensitivity and specificity to identify and evaluate any hazardous atmospheres that may exist or arise. This is so appropriate entry procedures can be developed and acceptable entry conditions be stipulated for that space. Evaluation and interpretation of these data and development of the entry procedures must be reviewed by the regional OSH Program Office.

(2) Verification Testing. The atmosphere of a permit-required confined space which may contain a hazardous atmosphere must be tested for residues of all contaminants identified by evaluation testing using appropriate equipment. This testing is to determine that residual concentrations at the time of testing and entry are within the range of acceptable entry conditions. Testing results are to be recorded on the entry permit.

(f) Sequence of Testing. Atmospheric monitoring shall be accomplished in the following sequence:

- ① Oxygen concentrations.
- ② LEL of combustible gases and vapors.
- ③ Potential toxic contaminants.

(g) Testing Stratified Atmospheres. When monitoring for entries involving a descent into atmospheres which may be stratified, the atmospheric envelope should be tested a distance of approximately **every** 1.22 meters (4 feet) in the direction of travel and to each side. If a sampling probe is used, the entrant's rate of progress will be slowed to accommodate the sampling speed and detector's response time.

(h) Evacuation of Space. Any of the following conditions shall require **IMMEDIATE** evacuation of personnel from the space:

(1) **Oxygen** levels:

⇒ Less than **19.5 percent** when not utilizing supplied-air respirators **or**

⇒ Less than **16 percent** when supplied-air respirators are being used, **or**

⇒ Greater than **23.5 percent**.

(2) **LEL** greater than **10 percent**.

(3) **Carbon monoxide** levels greater than **25** parts per million (ppm).

(4) **Hydrogen sulfide** concentrations in excess of **10** ppm.

(i) Additionally, appropriate tests for other likely chemical contaminants shall be made, when appropriate, to ensure the atmosphere is safe. Information pertaining to chemical contaminants may be found on a material safety data sheet (MSDS) for products to be used within the confined space. In order for respirators not to be required to be worn for entry, the results of the tests performed must reflect contaminant levels are less than one-half the OSHA PEL or ACGIH TLV, whichever are more restrictive, for the contaminants encountered. The specific type and configuration of respirators shall be as recommended by the regional OSH Program Office and will be based upon specific hazards and working conditions known or anticipated within the space.

(j) Respiratory protection may be required, if in the opinion of the local activity manager or regional OSH Program Office, potentially hazardous concentrations of contaminant levels may occur during operations within the confined space. Respiratory protection **must** be selected and utilized **only** as

outlined by the GSA SOP "Selection, Care, and Use of Respiratory Protection" and by the regional OSH Program Office.

(k) When the entrant leaves the confined space for any reason or for any period of time, reentry will not be allowed until the space is properly retested and proven to be safe for occupancy.

NOTE: Retesting results must be recorded and dated exactly in the same manner as when tested the first time. Where retesting is performed, the appropriate spaces on the Confined Space Entry Permit shall be completed.

(8) Valves, Switches, and Other Hazardous Energy Sources. Lock-out requirements found within "An SOP for Controlling Hazardous Energy Sources" shall be strictly followed. All hazardous energy sources connected with the operation in a confined space will be closed, chained, locked, and tagged with the name of the person who locked them to prevent accidental introduction of contaminants (e.g., live steam, hot water, etc.). In the case of boilers, the drain valve will be opened and all pressure will be drained off. The drain valve will then be closed, chained, and locked. For fireboxes, the fuel supply will similarly be secured.

NOTE: It must be noted that isolation, blanking, or otherwise controlling energy sources could have an adverse impact or reaction on the equipment served by the energy source. Therefore, it is imperative the managers of the equipment affected be informed of the controls **prior to** commencing the work. In addition, adequate barriers or locking devices should be at the equipment controls. Barriers or locks shall only be removed by the individual who place or installed them. Equipment managers must also be informed when controls have been removed and the equipment is returned to service.

(9) Attendant. At least one (1) employee will be assigned as an attendant outside the permit-required confined space for the duration of the entry. Attendants may be assigned to monitor more than one confined space **provided** all duties outlined within this SOP for attendants can be effectively performed for **each** confined space.

(a) The attendant shall be continuously stationed outside the permit-required confined space and will stay in continuous and direct communication, visual or verbal, with the workers within the confined space.

(b) The attendant shall not have any other duties but to serve as attendant and know who should be notified in case of emergency.

(c) Attendants shall **NOT** enter a confined space except as provided for elsewhere within this SOP.

(10) Protective Equipment. Appropriate respiratory protection and protective clothing, as well as a safety harness and lifeline, may be required to be worn by personnel entering the confined space. Lifelines, harnesses, and hoists shall be used by personnel entering a permit-required confined space. The lifeline shall be connected at all times to the personnel working within the confined space and to a **fixed** location outside the confined space near the attendant.

(11) Emergency Procedures. It is recognized that in the event of an emergency, the attendant's first reaction will be to assist the entrant in an escape from the space. The attendant must be advised that if the entrant cannot escape unassisted for whatever reason, the attendant **MUST NOT** enter the space; rather, the attendant must **immediately** summon emergency response assistance and remain at the entry site to provide assistance to the rescuers. See Paragraph 6h, Rescue and Emergency Services, of this SOP for additional requirements.

(a) Emergency procedures, including phone numbers of fire departments and emergency medical services, shall be conspicuously posted at the telephone from which help would be summoned. Two-way communication at the site will be available between the attendant and potential emergency responders to facilitate emergency response.

(b) A complete, additional protective equipment ensemble, including respiratory protection and life lines, shall be labeled and be readily available on-site in the event emergency rescue is required. This ensemble shall be reserved solely for emergency rescue purposes.

(c) For permit-required confined spaces, at least one member of the rescue team must be competent and certified in the type of medical emergency that may be experienced in the event of a necessary response. After a thorough analysis of local needs, the facility manager, in cooperation with the regional OSH Program Office, shall determine if the rescue team shall be composed of GSA employees (in-house) or a team from an outside source (i.e., fire departments or rescue squads). If outside sources are used, they must be provided information prior to task start-up on

the type of tasks being performed, possible hazards to be encountered, possible exposures (chemical, gas, etc.), and type of space being entered.

b. While Inside:

(1) When entrance covers are removed, the opening to the confined space shall be promptly guarded by a railing, temporary cover, or other temporary barrier that will prevent an accidental fall through the opening and will protect each employee working in the space from foreign objects entering the space.

(2) Employees shall wear those items normally used to protect against traumatic injury and/or specified by the local activity manager and regional OSH Program Office.

(3) Adequate ventilation and lighting shall be maintained in order to ensure a safe environment.

(4) Testing of the atmosphere of the confined space will be conducted by the designated entrant(s) to ensure acceptable conditions are maintained throughout entry activities. Testing will be conducted and recorded as described elsewhere within this SOP. The entry supervisor will designate which entrant(s) will be responsible for conducting atmosphere testing. The regional OSH Program Office will provide criteria for monitoring, including parameters to be monitored, evacuation levels, and time frames for the monitoring (periodic, continuous, etc.). These requirements will be recorded on the Confined Space Entry Permit.

(5) The attendant shall maintain an up-to-the-minute record of who enters and exits the confined space, along with the equipment and tools taken into and out of the confined space.

(6) Other than the attendant, entry supervisor, activity manager, rescue personnel, and regional OSH Program Office personnel, **NO OTHER PERSONS** shall be permitted to be at or near the entry portal to the permit-required confined space. The purpose of this prohibition is to ensure those responsible for the task are not distracted from their responsibilities. The presence of unauthorized persons who refuse to leave the area shall be cause for ceasing the operations within the confined space and making a full report to the Field Office Manager for corrective measures.

c. After Exiting:

(1) The attendant will verify all personnel and equipment that entered the permit-required confined space have

exited the area. Then, and only then, may the permit-required confined space be returned to normal operation.

(2) Entry supervisor will cancel the Confined Space Entry Permit as outlined in Paragraph 6d, Entry Permit, of this SOP. After cancellation, the entry permit will be retained as outlined in Paragraph 6d(3) of this SOP.

d. Entry Permit. A confined space entry permit shall be properly issued **BEFORE** entry into **ANY** GSA permit-required confined space is allowed. The entry permit will be issued **ONLY** for the duration of the task to be completed.

(1) Contents of the Entry Permit. The contents of the entry permit are to be based on the hazard identification and evaluation for the specific confined space to be entered. The Confined Space Entry Permit, Appendix A, shall be used for this purpose. The entry permit must list, as a minimum, all the following items:

(a) The conditions under which the permit-required confined space may be entered.

(b) The reasons for entering the space.

(c) The anticipated health and safety hazards associated with the entry.

(d) The specific location of the confined space to be entered, including building address, room or space identification, etc.

(e) The date(s) and time(s) for which this specific entry is authorized.

(f) Air monitoring requirements and restrictions pertaining to the entry, including testing equipment to be used and frequency of tests.

(g) The protective measures required for and during entry. This includes, but is not limited to, the measures used to isolate the confined space and to eliminate or control hazards **before** entry (e.g., lock-out of equipment and procedures for purging, inerting, ventilating, and flushing confined spaces; barriers and shields).

NOTE: Inerting a space will make the atmosphere within that space inadequate to support human life. Request assistance from

the regional OSH Program Office **prior to** attempting an entry into a space that has been inerted.

(h) The protective clothing and equipment necessary for safe entry, communication between entrants and attendants, and emergency rescue.

(i) Communication procedures to be used to maintain continuous and direct contact between the entrant(s) and attendant(s). This can be accomplished by maintaining voice and/or visual contact, two-way radios, or other procedures which effectively establish the required contact.

(j) The name(s) and telephone number(s) of emergency rescue contacts.

(k) The name of each authorized entrant entering the space and the entrant's attendant(s).

(l) The name of the supervisor responsible for the task.

(m) Any additional data necessary to assure the task is conducted safely with a minimum of risk to the entrant(s).

(n) Name and signature of the individual authorizing entry into the permit-required confined space and the date the permit was signed.

(o) Any additional permits, such as for hot work, that have been issued to authorize work within the space.

(p) The results of the initial and periodic air monitoring tests performed, accompanied by the name(s) or initial(s) of the tester(s) and the date(s) and time(s) of when the tests were performed.

(2) Issuing a Confined Space Entry Permit.

(a) The entry permit will be issued **ONLY** for the duration of the task to be completed.

(b) Before entry into a permit-required confined space begins, the entry supervisor identified on the permit shall sign and date the entry permit to authorize entry. The completed permit shall be made available at the time of entry to all authorized entrants by posting it at the entry portal of the permit-required confined space. The entry permit shall remain posted at the entry portal until it is canceled.

(3) Cancellation of a Confined Space Entry Permit.

(a) The entry supervisor will cancel the Confined Space Entry Permit by signing and dating in the appropriate locations on the forms. After cancellation, the original Confined Space Entry Permit and Confined Space Checklist will be placed into office files and a copy of each will be forwarded to the regional OSH Program Office. File copies of the permit and checklist will not be discarded until at least two (2) years following cancellation of the forms.

(b) Any of the following circumstances will require the entry permit be canceled:

(1) The task for which the entry permit was issued has been completed.

(2) Acceptable entry conditions are not maintained throughout the entry. New conditions must be noted on the canceled entry permit and used in revising the confined space entry program (see Paragraph 6f, Program Review, of this SOP).

(3) Any emergency (injury, fatality, or near miss) associated with GSA's permit-required confined spaces which endanger human life and health.

e. Training.

(1) The Field Office Manager shall be responsible to ensure an **annual** confined space entry training program is presented at each activity where GSA employees are involved with entries into permit-required confined spaces.

(2) **NO** GSA employee shall be authorized to enter a permit-required confined space, act as an attendant thereto, be responsible for testing confined spaces, supervise such employees, or grant Confined Space Entry Permits until they have successfully completed a training program which establishes the employee's proficiency in the duties required by this SOP. The regional OSH Program Office will provide appropriate training materials to meet this requirement. Confined space entry training is required:

(a) **Prior to** the time the employee is first assigned any duties involving operations associated with permit-required confined spaces.

(b) **Prior to** any changes in the employee's assigned duties for which no previous training has been provided.

(c) **Whenever** there is a change in operations involving a permit-required confined space that presents a hazard about which an employee has not been previously training.

(d) **Whenever** there is a reason to believe there are deviations from the practices and procedures outlined within this SOP and/or on the Confined Space Entry Permit, or there are inadequacies in the employee's knowledge or use of those practices and procedures.

(e) At least **every 12 months** from the previous training.

(3) Confined space entry training shall consist, as a minimum, of the following elements:

(a) The location and identification of permit-required confined spaces located in the employee's work centers.

(b) Emergency entry and exit procedures unique to each procedure and space.

(c) Use of applicable protective equipment, including respirators, safety equipment, communication devices, retraction gear, etc.

(d) Applicable lock-out and tag-out procedures.

(e) The GSA permit system.

(f) Work practices and procedures unique to each task and confined space.

(g) A thorough indoctrination and discussion of this SOP or other locally-approved written confined space entry program procedures.

(h) A discussion of the hazards associated with hazardous materials known or suspected to be present in the confined space when workers are present. MSDS for several of the most common hazardous materials are presented in [Appendix B](#) of this SOP. Additionally, refer to Paragraph 11 of this SOP and to GSA SOP for a Written Hazard Communication Program for appropriate requirements.

f. [Program Review](#). Written program reviews of the Confined Space Entry Program shall be conducted as outlined below. Copies of the program reviews shall be maintained in the files of the

appropriate field office and the regional OSH Program Office office. Program review reports shall consist of:

- A narrative discussion of the elements identified under the paragraph discussing "Annual Reviews," below.
- Copies of all permits (e.g., Confined Space Entry Permit, Hot Work Permit, etc.) issued for the period(s) or incident(s) being reviewed.
- A copy of accident reports if the review considers any accidents, incidents, or near-misses.
- A copy of this SOP.

(1) Incident Reviews. Any emergencies (injuries, fatalities, or near misses) associated with GSA's permit-required confined spaces which endanger human life and health, shall result in a review of the Confined Space Entry Program. This review shall be initiated immediately upon notification of the emergency and shall be conducted concurrently by the Field Office Manager and by the regional OSH Program Office.

(2) Annual Reviews. On at least an annual basis, the confined space entry program will be reviewed, independently, by the Field Office Manager and by the regional OSH Program Office. Annual program reviews will cover the period January 1st through December 31st of the previous year. These program reviews will be conducted using canceled permits retained as required in Paragraph 6d(3) of this SOP.

(a) Field Office Managers shall complete Confined Space Entry Program reviews by March 1st of each year. If no entries into permit-required confined spaces were conducted during the 12-month period being reviewed, no program review is necessary.

(b) Copies of the annual program review will be forwarded to the regional OSH Program Office by March 15th of each year. The regional OSH Program Office will use these reviews in conducting their program review. The regional OSH Program Office will complete their Confined Space Entry Program review by May 1st of each year. Copies of the OSH program reviews will be made available to Field Office Managers.

(c) The purpose of these program reviews is to evaluate the effectiveness of the Confined Space Entry Program. These reviews will consider, at a minimum:

- ✦ Any unauthorized entry of a permit-required confined space.
- ✦ Conditions detected or recognized within or associated with a permit-required confined space prohibited by the entry permit.
- ✦ Any occurrence of an injury or near-miss during entry.
- ✦ Any change in use or configuration of a permit-required confined space.
- ✦ Employee complaints about the effectiveness of the Confined Space Entry Program.

(3) Other Reviews. Program reviews other than those specified above may be conducted at the request of the regional OSH Program Office or Field Office Managers, if conditions or events develop indicating a review is needed.

g. Non-GSA Employee (Contractor) Operations.

(1) If permit-required confined spaces have been identified at a GSA facility and the local activity manager decides GSA employees will not enter those spaces, a contractor may be used (review [Appendix A](#) of this SOP). The local activity manager shall also take steps to ensure the permit-required confined spaces are not entered by GSA employees.

(2) Prior to the Contractor Entering the Permit-Required Confined Space the local activity manager shall:

(a) Inform the contractor the workplace contains permit-required confined spaces and that entry is allowed ONLY through compliance with a permit program meeting OSHA and GSA requirements.

(b) Apprise the contractor of the elements, including the hazards identified and GSA's prior experience with the space, that makes the space in question a permit-required confined space.

(c) Apprise the contractor of any precautions or procedures GSA has implemented for the protection of employees in or near permit-required confined spaces where contractor personnel will be working.

(d) If a contractor performs tasks within a permit-required confined space, the local activity manager shall review

the Permit-Required Confined Space Program the contractor will follow to ensure it includes an "Entry Permit Procedure." The Entry Permit Procedure shall contain, as a minimum, those elements identified in Paragraph 6d, Entry Permits, of this SOP as required for GSA entry permits.

(3) **After** the Contractor has Completed Work Within a Permit-Required Confined Space the local activity manager shall request a debriefing from the contractor. During this debriefing, the contractor should inform the local activity manager of any hazards confronted or created within the permit-required confined space, unless this information was presented to the local activity manager during entry operations.

(4) GSA employees shall **NOT** be authorized to act as attendants or entry supervisors, enter or co-occupy a permit-required confined space being occupied by non-GSA employee entrants (local utility company employees, contractors, telephone installers, etc.). GSA employees may, however, be on-site to provide technical services or oversee the operation.

(5) All non-GSA employee (contractor) operations will be conducted in accordance with all applicable OSHA standards, GSA policies and procedures, or other standards or regulations deemed appropriate by the Field Office Manager or regional OSH Program Office.

h. Rescue and Emergency Services. Every entry into a permit-required confined space must be conducted with procedures having been implemented for rescue and emergency services. Also, refer to Paragraph 11 of this SOP for additional requirements.

(1) For entry into a permit-required confined space, rescue and emergency services must be immediately available. "Immediately available" is defined as emergency rescuers having a response time of **4 minutes or less** from their station to the entrance of the confined space. Where public emergency response organizations, such as the local fire department, are not immediately available, options include, but are not limited to:

- (a) Contract with private emergency rescue providers,
- (b) Develop in-house emergency rescue capabilities,
- (c) Delay entry into the permit-required confined space until emergency rescue services are immediately available, or

(d) Contract to have the work completed which necessitates entrance into the permit-required confined space. In this event, contractors must ensure emergency rescue services are available for their personnel.

(2) Attendants may **NOT** enter a permit-required confined space to attempt a rescue under any circumstances **unless** the attendant has been properly trained and certified as an emergency rescuer for that space **and not** until the attendant has been properly relieved by another attendant. In **ALL OTHER** cases, rescue services will be called upon for rescue assistance.

(3) To facilitate non-entry rescue, retrieval systems or methods shall be used whenever an authorized entrant enters a permit-required confined space, unless an exception is granted in writing by the regional OSH Program Office. Retrieval systems must be approved for the intended purpose and meet the following requirements:

(a) Chest or full-body harness with a retrieval line attached at the center of the entrant's back near shoulder level. The harness and retrieval line must be attached to the entrant during **all times** during the entry.

(b) The other end of the retrieval line shall be attached to a mechanical device or fixed point outside the confined space in such a manner that rescue can begin as soon as the rescuer becomes aware rescue is necessary. The mechanical device or fixed point to which the retrieval line is to be attached shall **NOT** be a vehicle of any type.

(c) A mechanical device is required to be readily available to retrieve personnel from vertical-type permit-required confined spaces which are more than 1.5 meters (5 feet) deep and is recommended for horizontal permit-required confined space entries. "Readily available" means the device is immediately available for use at the entrance to the confined space. Unpacking, set-up, unloading, etc., is not "readily available."

(4) At, or immediately adjacent to every permit-required confined space a method (e.g., telephone, two-way radio, etc.) for notifying emergency response personnel must be present. "Immediately adjacent" means the attendant can notify emergency responders without the need to leave the entrance of the permit-required confined space.

(a) If a telephone is used to notify emergency responders, a listing of all appropriate emergency telephone numbers must be available and legible. The emergency numbers to

be used must be direct lines to emergency response services; the call must not be routed through an operator. "911" is **not** an appropriate listing as it is not a direct line to emergency response personnel. The listing must be protected from weather and other adverse environmental conditions.

(b) If two-way radios or other means of communications are used, the attendant must have ensured contact with the emergency rescue personnel is capable and available **prior to** entry into the confined space.

(5) Prior to authorizing entrance into a permit-required confined space, the local activity manager shall arrange for emergency and rescue services. At a minimum, the local activity manager shall:

(a) Inform the rescue service (e.g., local fire department, etc.) of the hazards they may confront when called on to perform rescue at the facility.

(b) Provide the rescue service with access to a permit-required confined space from which rescue may be necessary so the rescue service can develop appropriate rescue plans and practice rescue operations.

(6) Emergency services may be provided either by in-house personnel, public services (such as local fire department), or through private contracts. If the attendant will enter the permit-required confined space to attempt a rescue, the attendant shall **NOT** leave the entry portal of the confined space **until** properly relieved by another attendant. "Properly relieved" means the oncoming attendant meets **ALL** requirements outlined for an attendant as described within this SOP. Regardless of the source of the services, emergency response services must meet the following minimum requirements:

(a) Each member of the rescue service shall be provided with, and trained to properly use the PPE and rescue equipment necessary for making rescues from the permit-required confined spaces in consideration.

(b) Each member of the rescue service shall be trained to perform the assigned rescue duties. Each member shall also be trained as an entrant.

(c) Each member of the rescue service shall practice making permit-required confined space rescues at least once every 12 months, by means of simulated rescue operations. During these simulated rescue operations they must make

extractions using dummies, mannequins, or actual persons from the actual or representative permit-required confined spaces.

(d) Each member of the rescue service shall be trained in basic first aid and in cardiopulmonary resuscitation (CPR). At least one (1) member of the rescue service responding to an emergency involving a permit-required confined space shall hold current certification in first aid and CPR.

7. HOT WORK TASKS.

a. Issuing a GSA Confined Space Entry Permit does **NOT** authorize hot work (welding, brazing, cutting, burning, grinding, etc.) to be conducted in that confined space. GSA Form 1755, Permit for Welding, Cutting and Brazing, **must be** completed and approved for **any** hot work, regardless of when or where or under any circumstances.

b. If hot work is to be performed in conjunction with a confined space entry permit, the provisions of 29 CFR 1910, Subpart Q -- Welding, Cutting and Brazing, must be **rigidly** enforced, as well as the GSA SOP for Welding, Cutting and Brazing. In addition, if hot work is necessary for a confined space entry task, prior written approval from the Field Office Manager, following notification of the regional OSH Program Office, is **mandatory**.

c. It must be noted, hot work conducted within or adjacent to a non-permit-required confined space requires that confined space be reevaluated and may result in the confined space being reclassified as a permit-required confined space!

8. SUPPLEMENTARY PRECAUTIONS.

a. The foregoing procedures apply to all GSA worksites where confined space entry takes place. It should be noted that precautions to be taken will differ from one confined space to another, with the most strenuous precautions applicable to permit-required confined spaces. For example, work in an electrical vault is not the same as work in a sewage ejector pit or in a gas utility manhole. While procedures for testing for oxygen deficiencies/enrichment are similar, entrants are exposed to vastly different hazardous potentials from the contents, or potential contents, of the space.

b. Field Office Managers must, therefore, supplement this SOP with specific procedures concerning specific confined spaces that are common to their facilities. These facility-generated procedures, reviewed by the regional OSH Program Office, shall be attached to the local SOP as an appendix.

c. A copy of the completed GSA Confined Space Entry Permit, with supplementary precautions attached, will be forwarded to the regional OSH Program Office for review and assurance that the Confined Space Entry Program criteria are being enforced.

d. If the Field Office Manager develops a process or procedure that will be as or more effective than those stated within this SOP, a variance can be applied for and granted. The variance shall be submitted to the regional OSH Program Office with adequate documentation and supportive material to allow the regional OSH Program Office to fully understand the reasons for the variance and to evaluate its effectiveness. Processes or procedures may **NOT** be put into implementation until written acceptance has been received from the regional OSH Program Office.

9. **ALTERNATE ENTRY PROCEDURES.** Alternate entry procedures for permit-required confined spaces (review [Appendix A](#)) may be requested and granted, on a case-by-case basis, from the regional OSH Program Office. Such exceptions are possible if it can be **demonstrated:**

- ☞ The **ONLY** hazard posed by the permit-required confined space is an actual or potential atmospheric hazard, and
- ☞ That continuous forced air ventilation **ALONE** is sufficient to maintain the permit-required confined space safe for entry, and
- ☞ Air monitoring and inspection data are available which supports the foregoing elements.

a. Exceptions to any entry requirements **must** be provided in **writing** by the regional OSH Program Office and be on-file at the local activity **before** alternate entry procedures are to be implemented.

b. If initial entry into a permit-required confined space is necessary to obtain the data needed to support a variance, the initial entry must be conducted in full compliance with all requirements for entry into a permit-required confined space as outlined within this SOP.

c. If alternate entry procedures are granted, the supporting data must be documented and made available to each employee who enters the space.

d. If alternate entry procedures are granted, the following minimum requirements shall be strictly enforced:

(1) Full compliance with **all** alternate entry provisions is enforced. Such provisions include those listed herein as well as additional items advocated for that space by the regional OSH Program Office.

(2) A Confined Space Entry Permit ([Appendix A](#)) shall be completed as outlined elsewhere in this SOP.

(3) Any conditions making it unsafe to remove an entrance cover shall be eliminated **before** the cover is removed.

(4) When entrance covers are removed, the opening shall be guarded as outlined elsewhere in this SOP.

(5) Before an employee enters the space, and periodically during the entry, the internal atmosphere of that space shall be tested as outlined elsewhere in this SOP.

(6) Continuous forced air ventilation shall be used as outlined elsewhere in this SOP.

(7) If a hazardous atmosphere is detected during entry:

(a) Each employee shall leave the space **immediately**.

(b) The entry permit shall be canceled.

(c) The space shall be thoroughly evaluated by the entry supervisor to determine how the hazardous atmosphere developed.

(d) Positive measures shall be implemented to protect employees from the hazardous atmosphere **before** any subsequent entry takes place.

(e) The regional OSH Program Office shall be notified of the incident **before** any subsequent entry takes place.

(f) The entry supervisor shall ensure all requirements for entry are again met, including issuing a **new** Confined Space Entry Permit ([Appendix A](#)). Instructions for issuance of the entry permit is found elsewhere in this SOP.

(8) The entry supervisor shall verify **and certify** the space is safe for entry and all pre-entry procedures are in place making the space safe for entry. This certification shall be

made **prior to entry** and in writing, containing the date, location of the confined space, and the name and signature of the individual making the certification. A copy of this certification shall be made available to all employees entering the confined space and a copy forwarded to the regional OSH Program Office.

10. **CHANGES IN USE OR CONFIGURATION OF A CONFINED SPACE.** It is the responsibility of local activity managers to evaluate changes in the use or configuration of confined spaces (review [Appendix A](#) of this SOP) under their cognizance and take appropriate action, as outlined below.

a. **Non-Permit-Required Confined Spaces.** When there are **any** changes in the use or configuration of a space classified as a non-permit-required confined space that **might** increase hazards to entrants, the local activity manager shall immediately reevaluate that space and, if necessary, reclassify it as a permit-required confined space. Once reclassified as a permit-required confined space, subsequent entry into that space shall be permitted **only** as outlined within this SOP.

b. **Permit-Required Confined Spaces.** A space classified as a permit-required confined space may be reclassified as a non-permit-required confined space **only** under the following conditions:

(1) If the permit-required confined space poses **NO** actual or potential atmospheric hazards and if **ALL** other health and safety hazards within the space are eliminated without entry into the space. If entry into the permit-required confined space is needed to eliminate the hazards, all entry requirements pertaining to permit-required confined spaces outlined within this SOP shall be enforced.

(2) The local activity manager shall document the basis for determining that **ALL** health and safety hazards within the permit-required confined space have been eliminated. This documentation shall contain the date, the location of the space, and the signature of the person making the determination. A copy of the documentation shall be made available to every employee entering the space and another copy forwarded to the regional OSH Program Office for review.

(3) Written concurrence is received from the regional OSH Program Office regarding the reclassification. Reclassification and alternate entry procedures are **NOT** to be enacted until **written** concurrence is received.

(4) If hazards arise within a permit-required confined space which has been reclassified as a non-permit-required confined space, the following actions shall be required:

(a) Each employee shall leave the space **immediately**.

(b) The space shall be thoroughly evaluated by the entry supervisor to determine whether it must be reclassified as a permit-required confined space as outlined elsewhere in this SOP.

(c) Positive measures shall be implemented to protect employees from the hazards **before** any subsequent entry takes place.

(d) The regional OSH Program Office shall be notified of the incident **before** any subsequent entry takes place.

(e) The entry supervisor shall verify the space is safe for entry and the reclassification documentation is valid, if the space will continue to be classified as a non-permit-required confined space. If the entry supervisor determines the space can no longer be classified as a non-permit-required confined space, all entries shall be conducted in accordance with requirements for a permit-required confined space as outlined elsewhere in this SOP.

11. **HAZARDOUS MATERIALS**. Workers must be made aware of the hazards of all hazardous materials with which they may come into contact. It must be recognized that hazardous materials which may be found within a confined space not only include those naturally occurring in the space (e.g., methane and hydrogen sulfide in a sewage pit, natural gas in a firebox from the fuel supply, etc.) but also includes those introduced by the workers during their work operations (e.g., solvents used for cleaning, oxygen-acetylene used for welding, etc.) and those generated as a result of the work performed (e.g., welding fumes, dust from grinding or scraping, etc.). Refer to the GSA SOP for a Written Hazard Communication Program for a full discussion of appropriate practices and procedures regarding hazard communication.

a. **Appendix B** of this SOP provides MSDS for common hazardous materials which may be encountered in a confined space; this listing is **NOT** to be considered as complete.

b. Additionally, should a worker require emergency medical treatment as a result of work associated with a confined space, a copy of the MSDS for the hazardous materials known or suspected

to be present in the confined space shall be made **immediately** available to the medical facility upon their **verbal** request.

Attachments

APPENDIX A

CONFINED SPACE ENTRY PERMIT

CONFINED SPACE ENTRY PERMIT

PERMIT VALID FOR 8 HOURS ONLY

ALL COPIES OF PERMIT WILL REMAIN AT JOB SITE UNTIL JOB IS COMPLETED -- PERMIT MUST BE KEPT FOR AT LEAST 18 MONTHS FOLLOWING EXPIRATION

DATE ISSUED	TIME ISSUED	DATE EXPIRED	TIME EXPIRED
SITE LOCATION & DESCRIPTION		PURPOSE OF ENTRY	
SUPERVISOR(S) IN CHARGE OF CREWS	TYPE OF CREW	TELEPHONE NUMBER	NAME OF ATTENDANT(S) IN CHARGE OF ENTRY
COMMUNICATION PROCEDURES			
RESCUE PROCEDURES (Telephone number at bottom of page 2)			
GAS TESTER(S) NAME(S)	INSTRUMENT(S) USED	MODEL/TYPE	SERIAL/UNIT NUMBER

HAZARD IDENTIFICATION LIST. List below all hazards known or suspected which may be present within the identified confined space.		YES	NO
1.	Potential/Probable Atmospheric Contaminants:		
	Oxygen Deficient/Enrichment		
	Hydrogen Sulfide		
	Carbon Monoxide		
	Other (List)		
2.	Energized Electrical Lines		
3.	Engulfment Hazards (Water, Grain, etc)		
4.	Fuel or Steam Lines Present		
5.	High Pressure Lines Present		
6.			
7.			
8.			

CHECKMARK (✓) DENOTES MINIMUM REQUIREMENTS TO BE COMPLETED AND REVIEWED PRIOR TO ENTRY. INDICATE DATE AND TIME THE REQUIREMENT HAS BEEN COMPLETED & REVIEWED.

REQUIREMENTS LISTING	REQUIRED	DATE	TIME	COMMENTS
Lock Out/De-energize/Try-out				
Line(s) Broken-Capped-Blanked				
Purge-Flush and Vent				
Ventilation				
Secure Area (Post and Flag)				
Breathing Apparatus				
Resuscitator - Inhalator				
Standby Safety Personal				
Full Body Harness w/"D" ring				
Emergency Escape Retrieval Equip				
Fire Extinguishers				
Lighting (Explosive Proof)				
Protective Clothing				
Respirator(s) (Air Purifying)				
Burning and Welding Permit				

GENERAL SERVICES ADMINISTRATION

GSA FORM 3625 (Rev. 1-94)
Prescribed by PBS P 5900.2C

PRE-ENTRY CHECKLIST		YES	NO
1. Did your survey of the surrounding area show it to be free of hazards such as drifting vapors from tanks, piping or sewers?			
2. Does your knowledge of industrial or other discharges indicate this area is likely to remain free of dangerous air contaminants while occupied?			
3. Are you trained and certified in the operation of the air monitoring device(s) to be used?			
4. Is/are the air monitoring device(s) calibrated and operating properly?			
5. Did you test the atmosphere of the confined space prior to entry?			
6. Did the atmosphere check as acceptable (no alarms given)?			
7. Will the atmosphere be continuously monitored while the space is occupied?			
8. Have all hazardous energy sources within the space been properly de-energized and locked out?			
9. Is all required safety and rescue equipment available on-site?			
10. Have all personnel associated with this confined space entry received the required confined space entry training?			
11. Have all personnel associated with this project been thoroughly briefed regarding specifics concerning this confined space entry?			
12. Are emergency response contact numbers posted at the worksite?			
13. Do attendants & entrants know & understand emergency notification signals?			
14. Is a valid Confined Space Entry Permit posted at the worksite entrance?			

EVALUATION: A "NO" answer to any of the above questions indicates the space is NOT yet ready to be entered; resolve before permitting entry. Any question to which the answer is "UNKNOWN" shall be answered with a "NO."

ENTRANT INVENTORY. List below all personnel entering into and exiting from the confined space. Each entry and each exit must be logged!			
NAME OF INDIVIDUAL	ENTERED DATE & TIME	EXITED DATE & TIME	ATTENDANT'S INITIALS

EQUIPMENT INVENTORY. List below all equipment taken into and removed from the confined space.			
IDENTIFICATION OF EQUIPMENT & SUPPLIES	TAKEN INTO SPACE DATE & TIME	REMOVED FROM SPACE DATE & TIME	ATTENDANT'S INITIALS

EMERGENCY NAMES and PHONE NUMBERS		
Rescue		()
Ambulance		()
Fire		()
Safety		()

SUPERVISOR AUTHORIZING ENTRY and ENSURING ALL ABOVE CONDITIONS SATISFIED		
NAME	SIGNATURE	
DEPARTMENT	TELEPHONE NUMBER ()	DATE

INSTRUCTIONS for completing the CONFINED SPACE ENTRY PERMIT

SECTION A: GENERAL INSTRUCTIONS.

- ☑ This permit will be used to perform a pre-entry safety check of the confined space as well as to authorize entry into a confined space. Additionally, the permit is used to record the results of atmospheric monitoring conducted within the confined space.
- ☑ **No** entry into a permit-required confined space (**PRCS**) will be allowed until this permit has been signed and dated (page 3) by the supervisor responsible for and authorizing entry into the PRCS.
- ☑ Due to activities occurring within the space, a non-permit required confined space (**non-PRCS**) may become a PRCS. Therefore, it is recommended this permit be required for entry into **any** confined space.
- ☑ This permit must be posted at the entrance to the PRCS until the permit expires. Once a permit expires it must be filed as outlined in Section C, below. While the permit is posted it must be protected against defacement, damage, weather, etc.
- ☑ The Safety and Environmental Management Branch must be made aware of the intent to enter any PRCS. This notification is outlined within the GSA SOP for Confined Space Entry and may be accomplished by forwarding a copy of the authorized permit within 72 hours of the intended entry.

SECTION B: COMPLETING THE PERMIT. Data entries for the following blocks are explained:

Page 1

- Date and Time Issued/Expires -- Enter the date and time (24-hour clock) on which the permit becomes effective and expires. A permit will expire at whichever of the following occurs first:
 - a) End of the task for which the permit was issued,
 - b) Conditions change adversely from those anticipated when authorizing the entry, or

c) No longer than 8 hours following commencement of work within the space.

- Site Location and Description -- Identify the specific location of the confined space to be entered. For example, "Federal Records Center, 9700 Page, Overland, MO; Room SB005; Sewage Ejector Pit #1."
- Purpose of Entry -- Provide a brief description of the specific purpose of this entry. For example, "Replace ejector pump."
- Supervisor in Charge of Crews -- Enter the name of the on-site supervisor in charge of crews entering the confined space, type of crew (e.g., electrician, plumber, etc.) and phone number where the supervisor can be reached.
- Name of Attendant(s) -- Enter the name of the attendant(s) who will be stationed at the entrance of the PRCS. Attendant qualifications, duties, and restrictions are outlined in the GSA SOP for Confined Space Entry and must be adhered to. Not required for non-PRCS entries.
- Communication Procedures -- Positive, continuous audible and/or visual communications must be maintained and exercised throughout the entry. Indicate here how this will be accomplished (e.g., voice, FM two-way radio, etc.). Not required for non-PRCS entries.
- Rescue Procedures -- For PRCS entries, emergency rescue capabilities must be pre-arranged and immediately available. Indicate here what procedures will be utilized (e.g., Local fire department via telephone, GSA employees on-site, etc.). Qualifications, duties, and restrictions for emergency responders are outlined in the GSA SOP for Confined Space Entry and must be adhered to. Not required for non-PRCS entries.
- Gas Tester(s) Name -- Enter the name of the individual(s) who will be responsible for performing atmospheric testing within the confined space, both before entry as well as during entry activities. These personnel must have been trained on the use, calibration, and maintenance of the specific equipment which will be utilized. Not required for non-PRCS entries.

- Instrument(s) Used - Model/Type - Serial/Unit # -- Identify the atmospheric testing equipment to be used. Not required for non-PRCS entries.
- Hazard Identification List -- Indicate which hazards are known or suspected to exist within the confined space **before** any preparation for entry has been made **as well as** any additional hazards which may exist or develop **during** entry activities. This list will be used to determine what controls will be necessary (see 10b, below). Use additional sheets as necessary to fully characterize the confined space. Place a checkmark in the appropriate column to indicate which control measures will be required for entry into the confined space. For those items which are required, indicate the date and time (24-hour clock) those requirements were completed **and** verified. Not required for non-PRCS entries.
- Pre-Entry Requirements List -- Indicate by a checkmark in the "REQUIRED" column which elements are required to be in place before entry into the confined space can begin. Before entry occurs, completion of the required elements must be checked and verified. This is recorded by appropriate entries in the "DATE" and "TIME" columns.

Page 2

- Pre-Entry Checklist -- Self-explanatory. All "NO" or "unknown" answers must be resolved to "YES" **BEFORE** entry into the space is permitted. Not required for non-PRCS entries.
- Entrant Inventory -- Self-explanatory. The Attendant will maintain this section on an on-going basis throughout the entry. Its purpose is to ensure all personnel entering a PRCS exit the space before it is closed.
- Equipment Inventory -- Self-explanatory. The Attendant will maintain this section on an on-going basis throughout the entry. Its purpose is to ensure all equipment taken into a PRCS is brought out of the space before it is closed.
- Emergency Names and Phone Numbers -- Self-explanatory. Not required for non-PRCS entries.
- Supervisor Authorizing Entry -- Self-explanatory.

Page 3

➤ Air Monitoring Record -- Before entry into a PRCS is allowed and at least every 2 hours (or more often dependent upon the nature and source of the contaminants involved) throughout the entry, air monitoring for hazardous atmospheres identified must be conducted. The identified Gas Tester will be responsible for conducting the atmospheric monitoring; the Attendant(s) on duty will be responsible for maintaining this log up-to-date throughout entry activities. The following columns are explained:

- Monitoring Tests to be Conducted: Each of the contaminants for which air monitoring must be conducted are to be listed in this column. For atmospheric hazards listed on the form but not known or suspected to be present within the space, enter "N/A" in the "PRE-ENTRY" column.
- Permissible Concentrations: This column lists those air concentrations which are acceptable for entry to occur or to continue. Air concentrations above these concentrations which persist for more than 1 minute **shall** result in prevention or the **immediate** termination of entry activities. Where atmospheric hazards exist which are not listed on the form, the Safety and Environmental Management Branch shall be consulted for determining appropriate permissible concentrations. As a general rule, permissible concentrations will be the more restrictive of either the OSHA Permissible Exposure Limits or the ACGIH Threshold Limit Values (current edition).
- Pre-Entry: Immediately prior to entering a PRCS, atmospheric monitoring of all breathing zones which will be encountered within the PRCS must be conducted. This column will be utilized to record the results of that monitoring.
 - Time: Enter time the monitoring was completed, using a 24-hour clock.
 - Conc: Enter time the concentration observed from the respective air monitoring test conducted.
- During Entry: During any activities within a PRCS, atmospheric monitoring of all breathing zones encountered within the PRCS must be conducted. This

column will be utilized to record the results of that monitoring on an on-going basis. There are sufficient columns for recording concentrations every 2 hours over an 8-hour workshift. Should more frequent monitoring be required to be conducted, use additional sheets as necessary. If a continuous-monitoring, data logging electronic air monitor is used, the concentrations may be entered on this log every 2 hours **IF** a print-out of the monitor's memory is attached to this permit.

Time: Enter time the monitoring was completed, using a 24-hour clock.

Conc: Enter time the concentration observed from the respective air monitoring test conducted.

- Comments or Records of Problems Encountered -- Record **ANY** unexpected events, problems, etc. occurring inside or outside the confined space which effect the health and safety of personnel working within the space. Use additional sheets as necessary. Any problems which are noted on this form must be immediately brought to the attention of the supervisor authorizing the entry and to safety personnel within the Safety and Environmental Management Branch.
- Name & Signature of Individual Conducting Monitoring -- Self-explanatory. To be completed upon expiration of permit.

SECTION C: DISPOSITION OF PERMIT -- After the permit has expired, the permit will be:

- ↻ Reviewed for completeness. If any problems are noted on page 4 of the permit, those problems must be investigated and resolved.
- ↻ The completed form must be files within the responsible office's files for at least 18 months. This is to permit the required reviews of entries within PRCS, as required annually by OSHA.

APPENDIX B

MATERIAL SAFETY DATA SHEETS

AGA GAS -- CARBON MONOXIDE

MATERIAL SAFETY DATA SHEET

NSN: 6830011038438

Manufacturer's CAGE: 09785

Part No. Indicator: A

Part Number/Trade Name: **CARBON MONOXIDE**

=====
General Information
=====

Company's Name: AGA GAS INC
Company's Street: 6225 OAKTREE BLVD
Company's City: CLEVELAND
Company's State: OH
Company's Country: US
Company's Zip Code: 44131-5000
Company's Emerg Ph #: 216642-6600
Company's Info Ph #: 216-642-6600
Distributor/Vendor # 1: IWECO
Distributor/Vendor # 1 Cage: 03XZ9
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 003
Status: SE
Date MSDS Prepared: 01APR92
Safety Data Review Date: 17APR96
Preparer's Company: AGA GAS INC
Preparer's St Or P. O. Box: 6225 OAKTREE BLVD
Preparer's City: CLEVELAND
Preparer's State: OH
Preparer's Zip Code: 44131-5000
MSDS Serial Number: BZFYK

=====
Ingredients/Identity Information
=====

Proprietary: NO
Ingredient: CARBON MONOXIDE
Ingredient Sequence Number: 01
NIOSH (RTECS) Number: FG3500000
CAS Number: 630-08-0
OSHA PEL: 55 MG/CUM
ACGIH TLV: 57 MG/CUM
Other Recommended Limit: 50 PPM

=====
Physical/Chemical Characteristics
=====

Appearance And Odor: COLORLESS, ODORLESS GAS.
Boiling Point: -312.7F
Vapor Pressure (MM Hg/70 F): -337.1F
Specific Gravity: 0.96
Solubility In Water: SLIGHT

=====
Fire and Explosion Hazard Data
=====

Lower Explosive Limit: 12.5
Upper Explosive Limit: 74
Extinguishing Media: WATER, DRY CHEMICAL, CO2.
Special Fire Fighting Proc: STOP THE FLOW OF CO. USE WATER SPRAY TO COOL SURROUNDING CONTAINERS.
Unusual Fire And Expl Hazrds: CO HAS ALMOST THE SAME DENSITY AS AIR. IT WON'T DIFFUSE BY RISING AS W/SOME LIGHTER FLAMMABLES SUCH AS HYDROGEN/NATURAL GAS (METHANE). AUTOIGNITION TEMP=1166F.

=====
Reactivity Data
=====

Stability: YES
Cond To Avoid (Stability): CONDITIONS 125F, SOURCES OR IGNITION.
Materials To Avoid: OXIDIZERS
Hazardous Decomp Products: NONE
Hazardous Poly Occur: NO
=====

=====
Health Hazard Data
=====

Route Of Entry - Inhalation: YES
Route Of Entry - Skin: NO
Route Of Entry - Ingestion: NO
Health Haz Acute And Chronic: INHALATION: OXYGEN TRANSPORT FUNCTION OF THE HEMOGLOBIN OF THE BLOOD IS REDUCED SINCE IT REACTS W/INHALED CO TO FORM CARBOXY HEMOGLOBIN INSTEAD OF ITS NORMAL REACTION W/THE OXYGEN IN THE LUNGS FORMING OXYHEMOGLOBIN. THE AFFINITY OF HEMOGLOBIN FOR CO IS 200-300 TIMES GREATER THAN ITS AFFINITY FOR OXYGEN. (SEE SUPP)
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: NONE
Signs/Symptoms Of Overexp: HEADACHE, DIZZINESS, HEART PALPITATIONS, WEAKNESS, CONFUSION, NAUSEA, CONVULSIONS, UNCONSCIOUSNESS.
Med Cond Aggravated By Exp: PERSONS IN ILL HEALTH WHERE SUCH ILLNESS WOULD BE AGGREGATED BY EXPOSURE TO CO SHOULDN'T BE ALLOWED TO WORK W/HANDLE PRODUCT.
Emergency/First Aid Proc: INHALATION: IF CONSCIOUS ASSIST TO AN UNCONTAMINATED AREA & TREAT W/SUPPLEMENTAL OXYGEN. IF UNCONSCIOUS REMOVE TO UNCONTAMINATED AREA & GIVE ASSISTED RESPIRATION & OXYGEN AT THE SAME TIME. OBTAIN MEDICAL ATTENTION IN ALL CASES. PHYSICIAN SHOULD BE INFORMED THAT PATIENT HAS INHALED TOXIC QUANTITIES OF OF CO.
=====

=====
Precautions for Safe Handling and Use
=====

Steps If Matl Released/Spill: EVACUATE ALL PERSONNEL FROM AREA. USE APPROPRIATE PROTECTIVE EQUIPMENT. IF LEAK IS IN USER'S EQUIPMENT, BE CERTAIN TO PURGE PIPING W/INERT GAS PRIOR TO ATTEMPTING REPAIRS. IF LEAK IS IN CONTAINER/CONTAINER VALVE CONTACT CLOSEST SUPPLIER.
Waste Disposal Method: DON'T ATTEMPT TO DISPOSE OF WASTE/UNUSED QUANTITIES. RETURN IN THE SHIPPING CONTAINING PROPERLY LABELED, W/ANY VALVE OUTLET PLUGS/CAPS SECURED & VALVE PROTECTION CAP IN PLACE TO SUPPLIER. DISPOSE OF IAW/FEDERAL, STATE & LOCAL REGULATIONS. UN 1016
Precautions-Handling/Storing: USE ONLY IN WELL-VENTILATED AREAS. VALVE PROTECTION CAPS MUST REMAIN IN PLACE UNLESS CONTAINER IS SECURED W/VALVE OUTLET PIPED TO USE POINT.
Other Precautions: DON'T DRAG, SLIDE/ROLL CYLINDERS. USE SUITABLE HAND TRUCK FOR CYLINDER MOVEMENT. USE PRESSURE REDUCING REGULATOR WHEN CONNECTING CYLINDER TO LOWER PRESSURE (<2000 PSIG) PIPING/SYSTEMS. PROTECT CYLINDERS FROM PHYSICAL DAMAGE. (SEE SUPP)
=====

=====
Control Measures
=====

Respiratory Protection: POSITIVE PRESSURE AIR LINE W/MASK/SCBA SHOULD BE AVAILABLE FOR EMERGENCY USE.
Ventilation: HOOD W/FORCE VENTILATION
Protective Gloves: RECOMMENDED
Eye Protection: SAFETY GOGGLES/GLASSES
Other Protective Equipment: SAFETY SHOES/SHOWERS
=====

Transportation Data

Disposal Data

Label Data

Label Required: YES

Label Status: G

Common Name: CARBON MONOXIDE

Special Hazard Precautions: INHALATION: OXYGEN TRANSPORT FUNCTION OF THE HEMOGLOBIN OF THE BLOOD IS REDUCED SINCE IT REACTS W/INHALED CO TO FORM CARBOXY HEMOGLOBIN INSTEAD OF ITS NORMAL REACTION W/THE OXYGEN IN THE LUNGS FORMING OXYHEMOGLOBIN. THE AFFINITY OF HEMOGLOBIN FOR CO IS 200-300 TIMES GREATER THAN ITS AFFINITY FOR OXYGEN. (SEE SUPP) HEADACHE, DIZZINESS, HEART PALPITATIONS, WEAKNESS, CONFUSION, NAUSEA, CONVULSIONS, UNCONSCIOUSNESS.

Label Name: AGA GAS INC

Label Street: 6225 OAKTREE BLVD

Label City: CLEVELAND

Label State: OH

Label Zip Code: 44131-5000

Label Country: US

Label Emergency Number: 216642-6600

BOC GASES -- HYDROGEN SULFIDE

MATERIAL SAFETY DATA SHEET

NSN: 683000N084167

Manufacturer's CAGE: 80382

Part No. Indicator: A

Part Number/Trade Name: **HYDROGEN SULFIDE**

=====
General Information
=====

Company's Name: BOC GASES
Company's Street: 575 MOUNTAIN AVE
Company's City: MURRAY HILL
Company's State: NJ
Company's Country: US
Company's Zip Code: 07974
Company's Emerg Ph #: 905-949-3777;800-424-9300 (CHEMTREC)
Company's Info Ph #: 908-464-8100
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Status: SMJ
Date MSDS Prepared: 07JUN96
Safety Data Review Date: 19MAR98
MSDS Serial Number: CGSJR

=====
Ingredients/Identity Information
=====

Proprietary: NO
Ingredient: HYDROGEN SULFIDE (SARA 302/313) (CERCLA)
Ingredient Sequence Number: 01
Percent: 99
NIOSH (RTECS) Number: MX1225000
CAS Number: 7783-06-4
OSHA PEL: 20 PPM, C
ACGIH TLV: 10 PPM; 15 STEL

Proprietary: NO
Ingredient: SUPDAT: AT CONCS 700 PPM HAVE BEEN FATAL. CONTINUOUS INHAL OF
LOW CONCS MAY CAUSE OLFACTORY FATG/PARALYSIS OF (ING 3)
Ingredient Sequence Number: 02
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: ING 2: SENSE OF SMELL. THUS, DETECTION OF HYDROGEN SULFIDE BY
ITS ODOR IS NOT EFTIVE. TOX EFTS OBSERVED IN (ING 4)
Ingredient Sequence Number: 03
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: ING 3: NEWBORN RATS AFTER EXPOSURE OF PREGNANT FEMALE TO 20
PPM HYDROGEN SULFIDE.
Ingredient Sequence Number: 04
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: FIRST AID PROC: IN ALL CASES OF OVEREXP. RESCUE PERS SHOULD BE

EQUIPPED W/NIOSH APPRVD SCBA & SHOULD RECOGNIZE (ING 6)
Ingredient Sequence Number: 05
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: ING 5: HAZS OF OVEREXP DUE TO OLFACTORY FATG. EXTREME FIRE HAZ
EXISTS WHEN RESCUING SEMICONSCIOUS/UNCON PERS DUE (ING 7)
Ingredient Sequence Number: 06
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: ING 6: TO FLAMMABILITY HAZ. AVOID USE OF RESCUE EQUIP WHICH
MAY CNTN IGNIT SOURCES/CAUSE STATIC DISCHARGE. ASSIST(ING 8)
Ingredient Sequence Number: 07
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: ING 7: VICTIMS TO UNCONTAM AREA & INHALE FRESH AIR. QUICK
REMOVAL FROM CONTAM AREA IS MOST IMPORTANT. IF BRTHG (ING 9)
Ingredient Sequence Number: 08
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: ING 8: STOPS ADMIN ARTF RESP & SUPPLEMENTAL OXYGEN OR MIXTURE
OF 5% CARBON DIOXIDE IN OXYGEN. KEEP CALM & WARM. (ING 10)
Ingredient Sequence Number: 09
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: ING 9: FURTHER TREATMENT SHOULD BE SYMPTOMATIC & SUPPORTIVE.
SEEK MED ASSISTANCE IMMED.
Ingredient Sequence Number: 10
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: HNDLG/STOR: SENSE TO DETECT PRESENCE OF HYDROGEN SULFIDE.
ANALYTICAL DEVICES & INSTRUMENTATION ARE READILY AVAIL(ING 12)
Ingredient Sequence Number: 11
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: ING 12: FOR THIS PURPOSE. PERFORM FREQUENT ANALYTICAL TESTS TO
BE SURE TWA NOT EXCEEDED. MANY METALS CORRODE (ING 13)
Ingredient Sequence Number: 12
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: ING 12: RAPIDLY W/WET HYDROGEN SULFIDE. ANHYDROUS HYDROGEN
SULFIDE CAN BE HANDLED IN CARBON STEEL, ALUMINUM (ING 14)
Ingredient Sequence Number: 13
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: ING 13: INCONEL, STELLITE & 304 & 316 STAINLESS STEELS. AVOID
HARD STEELS WHICH ARE HIGHLY STRESSED; THEY MAY BE (ING 15)
Ingredient Sequence Number: 14
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: ING 14: SUSCEPTIBLE TO HYDROGEN EMBRITTLEMENT FROM HYDROGEN
SULFIDE. USE ONLY IN WELL-VENTD AREA. VALVE PROT CAPS (ING 16)
Ingredient Sequence Number: 15
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: ING 15: MUST BE IN PLACE UNLESS CNTNR SECURE W/VALVE OUTLET
PIPED TO USE POINT. DO NOT DRAG/SLIDE/ROLL CYLS. USE (ING 17)
Ingredient Sequence Number: 16
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: ING 16: SUITABLE HAND TRUCK FOR MOVEMENT. USE PRSSURE REDUCING
REGULATOR WHEN CONNECTING CYL TO LOWER PRESSURE (ING 18)
Ingredient Sequence Number: 17
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: ING 17: (<750 PSIG) PIPING/SYSTEMS. DO NOT HEAT CYL TO INCR
DISCHARGE RATE OF PROD FROM CYL. USE CHECK VALVE OR (ING 19)
Ingredient Sequence Number: 18
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: ING 18: TRAP IN DISCHARGE LINE TO PREVENT HAZARDOUS BACK FLOW
INTO SYSTEM.
Ingredient Sequence Number: 19
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: OTHER PRECS: KNOCKED OVER. FULL & EMPTY CYLS SHOULD BE
SEGREGATED. USE "FIRST IN-FIRST OUT" INVENTORY SYS TO PVNT (ING 21)
Ingredient Sequence Number: 20

NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: ING 20: FULL CYLS BEING STORED FOR EXCEES PERIODS. POST "NO
SMKNG OR OPEN FLAMES" SIGNS IN STOR/USE AREAS. THERE(ING 22)
Ingredient Sequence Number: 21
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: ING 21:SHOULD BE NO IGNIT SOURCES IN STOR/USE AREA. FOR ADDNL
STOR RECOMS CONSULT COMPRESSED GAS ASSOC PAMPHLETS(ING 23)
Ingredient Sequence Number: 22
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: ING 22:P-1 & G-12. NEVER CARRY COMPRESSED GAS CYL/CNTNR OF GAS
IN CRYOGENIC LIQ FORM IN ENCLSD SPACE SUCH AS CAR(ING 24)
Ingredient Sequence Number: 23
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: ING 23: TRUNK/VAN/STATION WAGON. LEAK CAN RSLT IN FIRE, EXPLO,
ASPHY/TOX EXPOS. SHIPMENT OF COMPRESSED GAS CYL (ING 25)
Ingredient Sequence Number: 24
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: ING 24: WHICH HAS NOT BEEN FILLED BY OWNER/WITH HIS/HER
(WRITTEN) CONSENT IS A VIOLATION OF TRANSPORTATION REGS.
Ingredient Sequence Number: 25
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

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Physical/Chemical Characteristics

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Appearance And Odor: COLORLESS VAPOR WITH ROTTEN EGG ODOR.
Boiling Point: -76F,-60C
Melting Point: -118F,-83C
Vapor Pressure (MM Hg/70 F): SUPDAT
Vapor Density (Air=1): 1.21
Solubility In Water: SOLUBLE

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Fire and Explosion Hazard Data

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Lower Explosive Limit: 4.0%
Upper Explosive Limit: 44.0%
Extinguishing Media: WATER, CARBON DIOXIDE, DRY CHEMICALS.
Special Fire Fighting Proc: USE NIOSH APPROVED SCBA AND FULL PROTECTIVE
EQUIPMENT (FP N). IF POSSIBLE, STOP FLOW OF HYDROGEN SULFIDE. USE WATER
SPRAY TO COOL SURROUNDING CONTAINERS.

Unusual Fire And Expl Hazrds: HYDROGEN SULFIDE IS HVR/AIR & MAY ACCUM IN LOW AREAS & MAY TRAVEL CONSIDERABLE DIST TO IGNIT SOURCE. SHOULD FLAME BE EXTINGUISHED & FLOW OF GAS (SUPDAT)

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Reactivity Data
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Stability: YES
Cond To Avoid (Stability): NONE SPECIFIED BY MANUFACTURER.
Materials To Avoid: DANGEROUSLY REACTIVE WHEN MIXED W/CONCD NITRIC ACID OR OTHER STRONG OXIDIZING AGENTS. VAPS WILL IGNITE SPONT (SUPDAT)
Hazardous Decomp Products: OXIDES OF SULFUR.
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): NOT RELEVANT
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Health Hazard Data
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LD50-LC50 Mixture: NONE SPECIFIED BY MANUFACTURER.
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: YES
Route Of Entry - Ingestion: YES
Health Haz Acute And Chronic: EYES:LOW CONCS GENERALLY CAUSE IRRIT TO CONJ. RPTD EXPOS TO LOW CONCS REPORTED TO CAUSE CONJ, PHOTO PHOBIA, CORNEAL UNLIKELY. HYDROGEN SULFIDE IRRIT MUC MEMBS CAUSING BURNING FEELING W/EXCESS SALIVATION LIKELY. GI TRACT IRRIT MAY (EFTS OF OVEREXP)
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: NOT RELEVANT
Signs/Symptoms Of Overexp: HLTH HAZ: ALSO OCCUR. INHAL:HYDROGEN SULFIDE REACTS W/ENZYMES IN BLOODSTREAM & INHIBITS CELLULAR RESPIRATION RSLTG IN PULM PARALYSIS, SUDDEN COLLAPSE & DEATH. CONTINUOUS EXPOS TO LOW (15-50 PPM) CONCS GENERALLY CAUSES MUC MEMB IRRIT & MAY ALSO CAUSE HDCH, DIZZ/ NAUS. HIGHER CONCS (200-300 PPM) MAY RSLT IN RESP (SUPDAT)
Med Cond Aggravated By Exp: BLOOD DISORDERS.
Emergency/First Aid Proc: EYES: PERS W/POTNTL EXPOS TO HYDROGEN SULFIDE SHOULD NOT WEAR CNTCT LENSES. FLUSH CONTAM EYES W/LG AMTS OF WATER FOR AT LST 15 MIN. PART EYELIDS W/FINGERS TO ENSURE COMPLETE FLUSHING. IF IRRIT PERSISTS, SEEK MED ATTN IMMED. SKIN:FLUSH AREA W/WATER. IF IRRIT PERSISTS, CONSULT MD. INGEST:TREAT IN MANNER SIMILAR TO INHAL EXPOS. SEEK MED ATTN AS SOON AS POSS. INHAL:PROMPT MED ATTN MANDATORY (ING 5)
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Precautions for Safe Handling and Use
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Steps If Matl Released/Spill: EVACUATE PERS FROM AREA. USE APPROP PROT EQUIP. IF LEAK IS IN USER'S EQUIP, BE CERTAIN TO PURGE PIPING W/INERT GAS PRIOR TO ATTEMPTING REPAIRS. IF LEAK IS IN CNTNR OR CNTNR VALVE, CONTACT APPROP EMER TELEPHONE NUMBER LISTED/CALL CLOSEST BOC LOCATION.
Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.
Waste Disposal Method: DISP MUST BE I/A/W FED, STATE & LOC REGS (FP N). DO NOT ATTEMPT TO DISPOSE OF RESIDUAL WASTE/UNUSED QTYS. RETURN IN SHIPPING CNTNR PROPERLY LABELED W/VALVE OUTLET PLUGS/CAPS SECURED & VALVE PROT CAP IN PLACE TO BOC/AUTHORIZED DISTRIBUTOR FOR DISP.
Precautions-Handling/Storing: EARTH-GROUND & BOND ALL LINES & EQUIP ASSOC W/HYDROGEN SULFIDE SYS. ALL ELEC EQUIP SHOULD BE NON-SPKG OR EXPLO PROOF. DO NOT RELY ON OLFACTORY(ING 11)
Other Precautions: PROTECT CYLS FROM PHYSICAL DMG. STORE IN COOL, DRY, WELL-VENTD AREA AWAY FROM HEAVILY TRAFFICKED AREAS & EMER EXITS. DO NOT LET TEMPS WHERE CYLS STORED EXCEED 130F(54C). STORE CYLS UPRIGHT & FIRMLY SECURED TO PVNT FALLING/BEING (ING 20)

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Control Measures
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Respiratory Protection: NIOSH APPROVED POSITIVE PRESSURE AIR LINE WITH FULL-FACE MASK AND ESCAPE BOTTLE OR SCBA SHOULD BE AVAILABLE FOR EMERGENCY USE.

Ventilation: HOOD WITH FORCED VENTILATION. USE LOCAL EXHUST TO PREVENT ACCUMULATION ABOVE EXPOSURE LIMIT.

Protective Gloves: NEOPRENE, BUTYL RUB, PVC, POLYETHYLENE.

Eye Protection: ANSI APPRVD CHEM WORKERS GOGGLES (FP N).

Other Protective Equipment: ANSI APPROVED EYE WASH & DELUGE SHOWER (FP N). SAFETY SHOES.

Work Hygienic Practices: NONE SPECIFIED BY MANUFACTURER.

Suppl. Safety & Health Data: VP: 267 (1840 KPA) PSIA. EXPLO HAZ: CONTINUE, INCR VENT TO PVNT FLAM MIX FORM IN LOW AREAS/POCKETS. PROD MAY EXPLODE OR BURN OVER WIDE RANGE OF MIXS IN AIR. MATL TO AVOID: WHEN MIXED W/VAPS OF ARREST LEADING TO COMA/UNCON. EXPOS FOR 30 MIN (ING 2)

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Transportation Data
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Disposal Data
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Label Data
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Label Required: YES

Technical Review Date: 25MAR98

Label Date: 20MAR98

Label Status: G

Common Name: HYDROGEN SULFIDE

Chronic Hazard: NO

Signal Word: DANGER!

Acute Health Hazard-Moderate: X

Contact Hazard-Moderate: X

Fire Hazard-Severe: X

Reactivity Hazard-None: X

Special Hazard Precautions: FLAMMABLE GAS. ACUTE: EYES: IRRIT TO CONJUNCTIVA, CONJUNCTIVITIS, PHOTO PHOBIA, CORNEAL BULLAC, TEARING, PAIN AND BLURRED VISION. SKIN: IRRIT. INGEST: MUCOUS MEMBRANE IRRIT CAUSING BURNING FEELING W/EXCESS SALIVATION. GI TRACT IRRIT. INHAL: INHIBITION OF CELLULAR RESPIRATION RESULTING IN PULMONARY PARALYSIS, SUDDEN COLLAPSE AND DEATH. EXPOSURE TO CONCENTRATIONS OF 15-50 PPM: MUCOUS MEMBRANE IRRIT, HEADACHE, DIZZINESS OR NAUSEA AND MAY CAUSE PARALYSIS OF SENSE OF SMELL; 200-300 PPM: RESPIRATORY ARREST LEADING TO COMA OR UNCONSCIOUSNESS. NONE LISTED BY MANUFACTURER.

Protect Eye: Y

Protect Skin: Y

Protect Respiratory: Y

Label Name: BOC GASES

Label Street: 575 MOUNTAIN AVE

Label City: MURRAY HILL

Label State: NJ

Label Zip Code: 07974

Label Country: US

Label Emergency Number: 905-949-3777;800-424-9300 (CHEMTREC)

HUDSON BAY NATURAL GAS -- NATURAL GAS - GAS, NATURAL, DRY
MATERIAL SAFETY DATA SHEET
NSN: 6830013185797
Manufacturer's CAGE: 0RN77
Part No. Indicator: A
Part Number/Trade Name: **NATURAL GAS**

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General Information
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Item Name: GAS, NATURAL, DRY
Company's Name: HUDSON BAY NATURAL GAS
Company's Street: 11251 L. HOOD ST
Company's City: OAKLAND
Company's State: CA
Company's Country: US
Company's Zip Code: 94605
Company's Emerg Ph #: 510-430-8048
Company's Info Ph #: 510-430-8048
Record No. For Safety Entry: 003
Tot Safety Entries This Stk#: 003
Status: SE
Date MSDS Prepared: 22JUN92
Safety Data Review Date: 30NOV93
Supply Item Manager: JDC
MSDS Preparer's Name: UNREADABLE
MSDS Serial Number: BSDBS
Specification Number: UNKNOWN
Spec Type, Grade, Class: UNKNOWN
Hazard Characteristic Code: G2
Unit Of Issue: GL
Unit Of Issue Container Qty: BULK
Type Of Container: BULK
Net Unit Weight: UNKNOWN

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Ingredients/Identity Information
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Proprietary: NO
Ingredient: METHANE
Ingredient Sequence Number: 01
Percent: 70-99
NIOSH (RTECS) Number: PA1490000
CAS Number: 74-82-8
OSHA PEL: NOT ESTABLISHED
ACGIH TLV: ASPHYXIAN; 9293
Other Recommended Limit: NONE RECOMMENDED

Proprietary: NO
Ingredient: ETHANE
Ingredient Sequence Number: 02
Percent: 1-12
NIOSH (RTECS) Number: KH3800000
CAS Number: 74-84-0
OSHA PEL: NOT ESTABLISHED
ACGIH TLV: ASPHYXIAN 9293
Other Recommended Limit: NONE RECOMMENDED

Proprietary: NO
Ingredient: PROPANE
Ingredient Sequence Number: 03
Percent: <8
NIOSH (RTECS) Number: TX2275000

CAS Number: 74-98-6
OSHA PEL: 1000 PPM
ACGIH TLV: ASPHYXIAN; 9293
Other Recommended Limit: NONE RECOMMENDED

Proprietary: NO
Ingredient: BUTANE
Ingredient Sequence Number: 04
Percent: <5
NIOSH (RTECS) Number: EJ4200000
CAS Number: 106-97-8
OSHA PEL: 800 PPM
ACGIH TLV: 800 PPM; 9293
Other Recommended Limit: NONE RECOMMENDED

Proprietary: NO
Ingredient: PENTANE
Ingredient Sequence Number: 05
Percent: <3
NIOSH (RTECS) Number: RZ9450000
CAS Number: 109-66-0
OSHA PEL: 600 PPM/750 STEL
ACGIH TLV: 600 PPM/750STEL;9293
Other Recommended Limit: NONE RECOMMENDED

Proprietary: NO
Ingredient: HEXANE (N-HEXANE)
Ingredient Sequence Number: 06
Percent: <1
NIOSH (RTECS) Number: MN9275000
CAS Number: 110-54-3
OSHA PEL: 50 PPM
ACGIH TLV: 50 PPM; 9293
Other Recommended Limit: NONE RECOMMENDED

Proprietary: NO
Ingredient: HYDROGEN
Ingredient Sequence Number: 07
Percent: <0.5
NIOSH (RTECS) Number: MW8900000
CAS Number: 1333-74-0
OSHA PEL: NOT ESTABLISHED
ACGIH TLV: NOT ESTABLISHED
Other Recommended Limit: NONE RECOMMENDED

Proprietary: NO
Ingredient: HYDROGEN SULFIDE (SARA III)
Ingredient Sequence Number: 08
Percent: <4 PPM
NIOSH (RTECS) Number: MX1225000
CAS Number: 7783-06-4
OSHA PEL: 10 PPM/21 STEL
ACGIH TLV: 10 PPM/15 STEL; 9293
Other Recommended Limit: NONE RECOMMENDED

Proprietary: NO
Ingredient: CARBON DIOXIDE
Ingredient Sequence Number: 09
Percent: <1.5
NIOSH (RTECS) Number: FF6400000
CAS Number: 124-38-9

OSHA PEL: 10000PPM/30000STEL
ACGIH TLV: 5000PPM/30000STEL;93
Other Recommended Limit: NONE RECOMMENDED

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Physical/Chemical Characteristics

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Appearance And Odor: COLORLESS, ODORLESS, TASTELESS, LIGHTER THAN AIR GAS
Boiling Point: -259F, -162C
Melting Point: UNKNOWN
Vapor Pressure (MM Hg/70 F): GAS
Vapor Density (Air=1): 1000F

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Fire and Explosion Hazard Data

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Flash Point: UNKNOWN
Lower Explosive Limit: 4.0
Upper Explosive Limit: 14.0
Extinguishing Media: DRY CHEMICAL, CARBON DIOXIDE, OR HALON. STOP FLOW OF GAS PRIOR TO EXTINGUISHING.
Special Fire Fighting Proc: WEAR SCBA AND FULL PROTECTIVE GEAR. DO NOT EXTINGUISH FLAMES WHILE GAS FLOWING-EXPLOSIVE REIGNITION MAY OCCUR.
Unusual Fire And Expl Hazrds: PRODUCT IS EXTREMELY FLAMMABLE.

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Reactivity Data

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Stability: YES
Cond To Avoid (Stability): AVOID CONTACT WITH FLAMES, HEAT.
Materials To Avoid: STRONG OXIDIZING AGENTS
Hazardous Decomp Products: CARBON MONOXIDE, SULFUR DIOXIDE, NITROGEN OXIDES, CARBON DIOXIDE.
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): NONE

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Health Hazard Data

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LD50-LC50 Mixture: ORAL LD50 (RAT) IS UNKNOWN
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: NO
Route Of Entry - Ingestion: NO
Health Haz Acute And Chronic: ACUTE: INHALATION IN ATMOSPHERES WITH LARGE CONCENTRATION MAY CAUSE ASPHYXIATION DUE TO OXYGEN DISPLACEMENT; CENTRAL NERVOUS SYSTEM DEPRESSION. SKIN AND EYE CONTACT MAY CAUSE IRRITATION.
CHRONIC: NONE SPECIFIED BY MANUFACTURER.
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: NO INGREDIENT OF A CONCENTRATION OF 0.1% OR GREATER IS LISTED AS A CARCINOGEN OR SUPECTED CARCINOGEN.
Signs/Symptoms Of Overexp: INHALED: NAUSEA, VOMITING, DIZZINESS, DROWSINESS, STUPOR, UNCONSCIOUSNESS. SKIN/EYE: REDNESS, DISCOMFORT.
Med Cond Aggravated By Exp: PULMONARY CONDITIONS. AVOID ATMOSPHERE WHERE OXYGEN LEVEL HAS BEEN DISPLACED WITH METHANE TO BELOW 19.5%.
Emergency/First Aid Proc: REMOVE VICTIM TO FRESH AIR. QUICKLY RESTORE AND/OR SUPPORT BREATHING AS REQUIRED. HAVE TRAINED PERSON ADMINISTER OXYGEN IF AVAILABLE. ARTIFICIAL RESPIRATION SHOULD BE USED IMMEDIATELY IF BREATHING STOPPED. GET IMMEDIATE MEDICAL ATTENTION.

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Precautions for Safe Handling and Use

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Steps If Matl Released/Spill: EVACUATE AREA. ELIMINATE ALL SOURCES OF IGNITION. STOP LEAK IF POSSIBLE. PREPARE FOR POSSIBLE IGNITION. ENSURE

VENTILATION OF ENCLOSED AREAS.

Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.

Waste Disposal Method: DISPOSE OF IN ACORDANCE WITH LOCAL, STATE AND FEDERAL REGULATIONS.

Precautions-Handling/Storing: NATURAL GAS IS CONTAINED IN PIPING AND EQUIPMENT DESIGNED TO WITHSTAND ELEVATED PRESSURES. USE EXPLOSION-PROOF, CLASS I GROUP D ELECTRICAL EQUIPMENT.

Other Precautions: KEEP AWAY FROM STRONG OXIDIZING AGENTS, HEAT AND SOURCES OF IGNITION. NO SMOKING IN AREAS OF USE.

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Control Measures
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Respiratory Protection: IN IMMEDIATELY DANGEROUS TO LIFE OR HEALTH (IDLH) ATMOSPHERES, IN ENCLOSED AREAS, OR IMMEDIATELY ADJACENT TO BLOWING NATURAL GAS; SELF-CONTAINED BREATHING APPARATUS OR SUPPLIED AIR WITH ESCAPE BOTTLE IS REQUIRED. USE IAW 29 CFR 1910.134.

Ventilation: USE ADEQUATE MECHANICAL EXPLOSION-PROOF VENTILATION IF IN ENCLOSED AREA.

Protective Gloves: NONE SPECIFIED BY MANUFACTURER.

Eye Protection: NONE SPECIFIED BY MANUFACTURER.

Other Protective Equipment: WEAR FLAME RESISTENT FLASH SUITS IN POTENTIALLY FLAMMABLE ATMOSHERES OR CONFINED SPACES.

Work Hygienic Practices: NONE SPECIFIED BY MANUFACTURER.

Suppl. Safety & Health Data: USE OXYGEN MONITORS TO ENSURE ADEQUATE OXYGEN LEVELS AND COMBUSTIBLE GAS INDICATORS TO CHECK FOR EXPLOSIVE ATMOSPHERE.

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Transportation Data
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Trans Data Review Date: 93334

DOT PSN Code: JEP

DOT Proper Shipping Name: METHANE, COMPRESSED OR NATURAL GAS, COMPRESSED

DOT Class: 2.1

DOT ID Number: UN1971

DOT Label: FLAMMABLE GAS

IMO PSN Code: JOR

IMO Proper Shipping Name: METHANE, COMPRESSED

IMO Regulations Page Number: 2156

IMO UN Number: 1971

IMO UN Class: 2(2.1)

IMO Subsidiary Risk Label: -

IATA PSN Code: QHG

IATA UN ID Number: 1971

IATA Proper Shipping Name: METHANE, COMPRESSED

IATA UN Class: 2.1

IATA Label: FLAMMABLE GAS

AFI PSN Code: QHG

AFI Symbols: 0

AFI Prop. Shipping Name: METHANE, COMPRESSED OR NATURAL GAS, COMPRESSED

AFI Class: 2.1

AFI ID Number: UN1971

AFI Basic Pac Ref: 6-6,6-10

Additional Trans Data: ABOVE PSN APPLY ONLY IF SHIPPED VIA CARRIER; MOST NATURAL GAS SHIPPED VIA PIPELINE.

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Disposal Data
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Label Data
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Label Required: YES

Technical Review Date: 30NOV93

Label Status: F

Common Name: NATURAL GAS
Chronic Hazard: NO
Signal Word: DANGER!
Acute Health Hazard-Slight: X
Contact Hazard-None: X
Fire Hazard-Severe: X
Reactivity Hazard-None: X
Special Hazard Precautions: FLAMMABLE GAS! LARGE CONCENTRATIONS MAY CAUSE ASPHYXIATION DUE TO OXYGEN DISPLACEMENT. NATURAL GAS IS CONTAINED IN PIPING AND EQUIPMENT DESIGNED TO WITHSTAND ELEVATED PRESSURES. USE EXPLOSION-PROOF, CLASS I GROUP D ELECTRICAL EQUIPMENT. KEEP AWAY FROM SOURCES OF IGNITION AND STRONG OXIDIZING AGENTS. FIRST AID: REMOVE VICTIME TO FRESH AIR. QUICKLY RESTORE AND/OR SUPPORT BREATHING AS REQUIRED. HAVE TRAINED PERSON ADMINISTER OXYGEN IF AVAILABLE. ARTIFICIAL RESPIRATION SHOULD BE USED IMMEDIATELY IF BREATHING STOPPED. GET IMMEDIATE MEDICAL ATTENTION. TARGET ORGANS: LUNGS.
Protect Respiratory: Y
Label Name: HUDSON BAY NATURAL GAS
Label Street: 11251 L. HOOD ST
Label City: OAKLAND
Label State: CA
Label Zip Code: 94605
Label Country: US
Label Emergency Number: 510-430-8048
Year Procured: 1993