



Quality Assurance Work Instruction

CP-00-7000-05

Approved:

Date: 01 October 2008

Title: Confined Spaces

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1.0 POLICY/PURPOSE

Personnel are not permitted to enter a confined space without first determining the hazards associated with such an entry and, when appropriate, take the necessary precautions to ensure personnel are fully protected as required by regulations (e.g., OSHA, Cal/OSHA, etc.) and this work instruction (WI). The purpose of this WI is to establish the Santa Barbara Applied Research (SBAR), Inc. confined spaces program.

2.0 SCOPE

This WI applies to all SBAR operations where confined spaces are located. SBAR subcontractors also comply with the provisions of this WI.

3.0 REFERENCES AND DEFINITIONS

3.1 References

ISO 9001: Quality Management Systems-Requirements, Third Edition (2000-12-15)

29 CFR 1910.146: Permit-Required Confined Spaces

T8 CCR 5156-5159: Confined Spaces

AFOSHSTD 91-25: Confined Spaces Program

3.2 Definitions

Acceptable Entry Conditions: Conditions that ensure worker EH&S that must exist in a Permit Space to allow entry and continued occupancy.

Attendant: An employee stationed outside one or more Permit Spaces who monitors the authorized entrants and who performs all assigned attendant duties, to include, when applicable, rescue duties.

Authorized Entrant: An employee who is authorized by SBAR to enter a Permit Space.

Confined Space: An area/space that:

- Large enough and so configured that an employee can bodily enter and perform assigned work; and
- Has limited or restricted means for entry or exit; and
- Is not designed for continuous employee occupancy.

Examples include water valve pits, tanks, pressure vessels, silos, storage bins, pits, launch facilities, etc.

Confined Space Assessment Form (Form CP-00-7000-05-B): A form that is used to evaluate and determine whether or not a confined space is a Permit Space or Non-Permit Space.



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Emergency: Any occurrence or situation, internal or external to the Permit Space that could endanger entrants. Includes any failure of hazard control or monitoring equipment, e.g., O₂ or hazardous vapor meter failure.

Entry: The action by which a person passes through an opening into a Permit Space. Entry includes ensuing work activities in that space and is considered to have occurred as soon as any part of the body breaks the plane of an opening into the space.

Entry Permit or Permit (Form CP-00-7000-05-C): A written or printed document that is provided by SBAR to allow and control entry into a Permit Space and contains specified information about the Permit Space.

Entry Supervisor: The person (e.g., foreman, lead technician) responsible for determining if acceptable entry conditions are present at a Permit Space where entry is planned. This individual authorizes entry and oversees entry operations and terminates entry as required should an emergency arise. The entry supervisor is the last person to sign the entry permit after all conditions have been met.

Environmental Health and Safety (EH&S) Office: The SBAR staff agency responsible for safety and environmental programs. Normally, this function is performed at the contract level.

Hazardous Atmosphere: An atmosphere that may expose employees to the risk of death, incapacitation, and impairment of ability to self-rescue (i.e., escape unaided), injury, or acute illness from one or more of the following:

- A flammable gas, vapor, or mist in excess of ten percent of its lower explosive limit (LEL) or lower flammable limit (LFL).
- An airborne combustible dust at a concentration that meets or exceeds its LEL or LFL.

NOTE

THIS CONCENTRATION MAY BE APPROXIMATED AS A CONDITION IN WHICH THE DUST OBSCURES VISION AT A DISTANCE OF FIVE FEET OR LESS.

- Atmospheric oxygen below 19.5 percent or above 23.5 percent.
- Atmospheric concentration of any substance for which a dose is published in T8 CCR 5155, Table AC-1: Permissible Exposure Limits for Chemical Contaminants (or applicable state OSHA requirements). The same goes for substances/doses listed in Group 14 for Radiation and Radioactivity as well as applicable Material EH&S Data Sheets (MSDS).
- Any other atmospheric condition that is Immediately Dangerous to Life or Health (IDLH).

Immediately Dangerous to Life or Health (IDLH): Any condition that poses an immediate or delayed threat to life that would cause immediate or delayed adverse health effects or that would interfere with a worker's ability to escape unaided from a Permit Space.



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Hot Work ("Burn") Permit: Written authorization, usually from a fire department, to perform operations capable of providing a source of ignition. Burn Permits will first be obtained from the fire department prior to any welding, cutting, burning, heating, grinding, needle gunning, etc.

Inerting: Inerting is the displacement of the atmosphere in a Permit Space by a noncombustible gas, such as nitrogen, to such an extent that the resulting atmosphere is noncombustible. Further, inerting produces an IDLH atmosphere for oxygen; therefore, entry will be denied and/or personnel will immediately evacuate.

Lower Explosive Limit (LEL): The lowest concentration of flammable or combustible vapor which can be ignited by a spark or flame. This is also referred to as Lower Flammable Limit or LFL.

Master Entry List (MEL): A document lists all known confined spaces and designates each as a Permit Space or Non-Permit Space. MELs are contract specific and contain the following minimum information:

- Building/location
- Name/area/designation of the confined space
- Description of the confined space (e.g., air handler, tank)
- Identify whether the space is a Permit Space or Non-Permit Space
- Date the space was evaluated.

Non-Permit Confined Space (Non-Permit Space): A confined space that does not contain or have the potential to contain any hazard capable of causing death or serious physical harm. This includes the absence of, or potential to contain, any atmospheric hazard.

Oxygen Deficient Atmosphere: An atmosphere containing Less than 19.5 percent oxygen by volume, an IDLH atmosphere.

Oxygen Enriched Atmosphere: An atmosphere containing more than 23.5 percent oxygen by volume, thereby increasing the likelihood of a catastrophic fire.

Permit-Required Confined Space (Permit Space): A confined space that has one or more of the following characteristics:

- Contains or has a potential to contain a hazardous atmosphere.
- Contains a material that has the potential for engulfing an entrant.
- Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section.
- Contains any other recognized serious EH&S or health hazard.



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Permit-Required Confined Space Program (Permit Space Program): SBAR's overall program for controlling, and where appropriate, for protecting employees from Permit Space hazards and for regulating employee entry into Permit Spaces.

Prohibited Condition: Any condition in a Permit Space that is not allowed by the entry permit during the period when entry is authorized.

Rescue Service: Designated personnel who are authorized and trained to rescue personnel from a Permit Space.

Retrieval System: Equipment used for non-entry rescue of persons from a Permit Space. This equipment includes a retrieval line, chest or full-body harness, wristlets (if appropriate), and a lifting device or anchor.

Testing: The process by which the hazards that may be present in a Permit Space are identified and evaluated.

Upper Explosive Limit (UEL): The highest percentage of a material in air that can be ignited. Accordingly, if the UEL is exceeded, the mixture cannot be ignited and sustain combustion.

4.0 RESPONSIBILITIES

4.1 Quality Manager

The SBAR Quality Manager is responsible for this WI and revises SBAR *Confined Spaces Training Syllabus WI (CP-00-7000-005-A)*, as necessary.

4.2 Program Managers

Program Managers ensure confined space requirements are fulfilled on their contracts and when necessary, ensure contract specific WIs are written to supplement this WI.

4.3 Contract/Subcontract Managers

Where confined spaces are present on a contract, Contract/Subcontract Managers ensure prime and subcontractor employees comply with the applicable requirements of this WI as well as 29 CFR 1910.146 and/or T8 CCR 5156-5159 (or applicable state OSHA requirements), as appropriate.

4.4 Environmental Health and EH&S Safety (EH&S) or Equivalent

EH&S personnel are responsible for:

- Implementing the confined spaces program for their respective contracts and, as necessary, publish a contract specific WI to supplement this WI.



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- Referring to the applicable OSHA references (e.g., 29 CFR 1910.146, T8 CCR 5156-5159, or applicable state OSHA requirements, and appendices) for the details necessary to administer a successful confined spaces program.
- Completing Confined Space Assessment Forms for all confined spaces and maintaining the Master Entry List for their respective contract(s). (**NOTE:** The EH&SS may delegate the completion of Confined Space Assessment Forms to personnel who are trained and qualified to make these assessments.)
- Issuing Entry Permits for their respective contracts. (**NOTE:** The EH&SS may delegate this to personnel who are trained and qualified to issue Entry Permits.)
- Conducting training IAW *SBAR Confined Spaces Training Syllabus (CP-00-7000-05-A)* or *certified outside agency*.
- Developing, maintaining, and distributing confined spaces information materials.
- Develop coexistence procedures for confined spaces when other agencies (e.g. companies, subcontractors, etc.) may occupy the same space to perform work.

4.5 Managers/Supervisors

Managers and supervisors ensure their operations comply with confined spaces program requirements. Additionally, managers and supervisors ensure their personnel understand which areas they work in are confined spaces and that personnel further understand the risks associated with entering confined spaces, especially Permit Spaces.

4.6 Employees

Prior to entering any confined space, employees contact SBAR EH&S or contract site equivalent to determine if the space is a Permit Space or a Non-Permit Space. If the space is a Permit Space, employees fully comply with all Entry Permit conditions.



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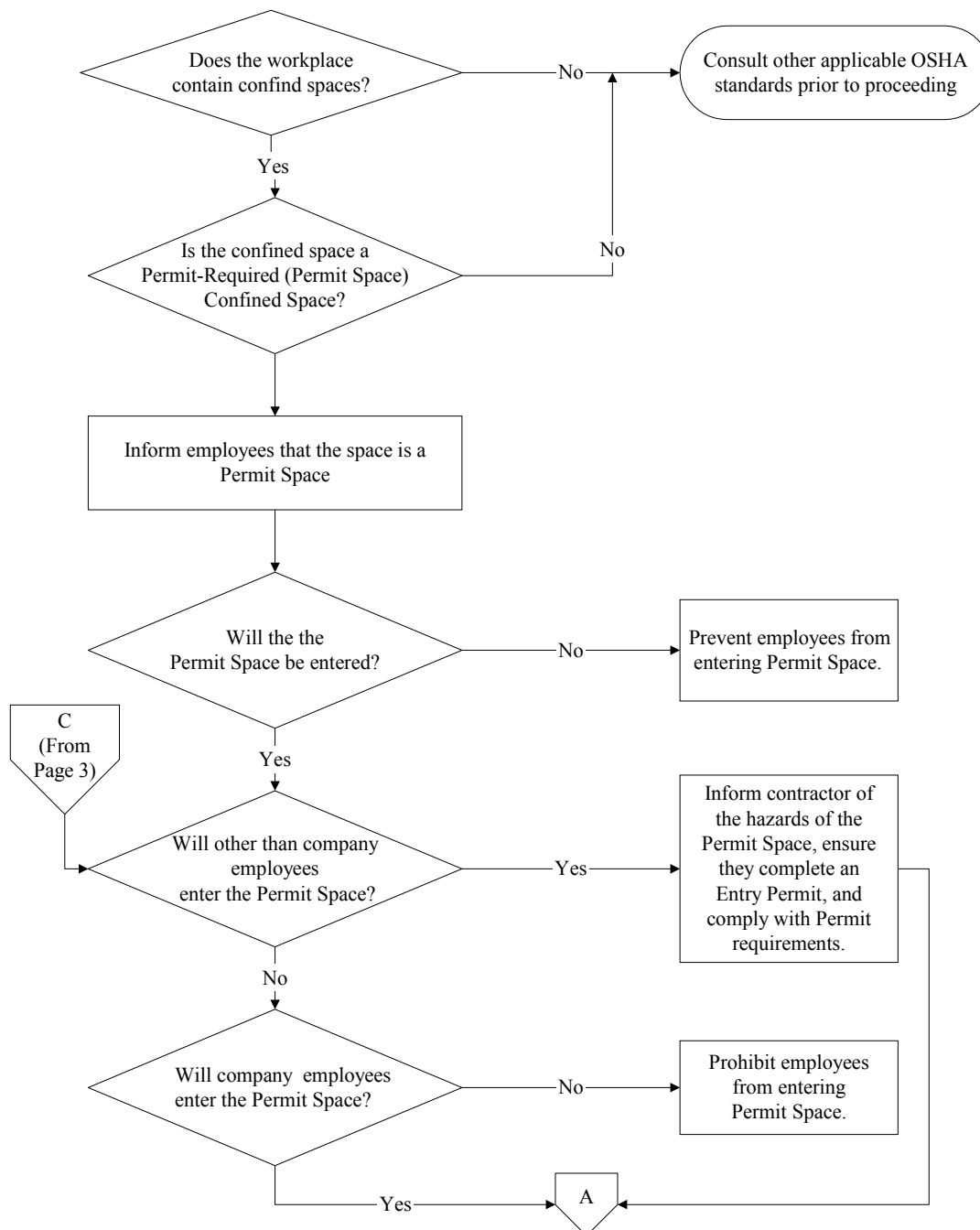
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5.0 REQUIREMENTS/PROCEDURES

Figure 1-Permit Required Confined Space Decision Flow Chart (Page 1 of 3)





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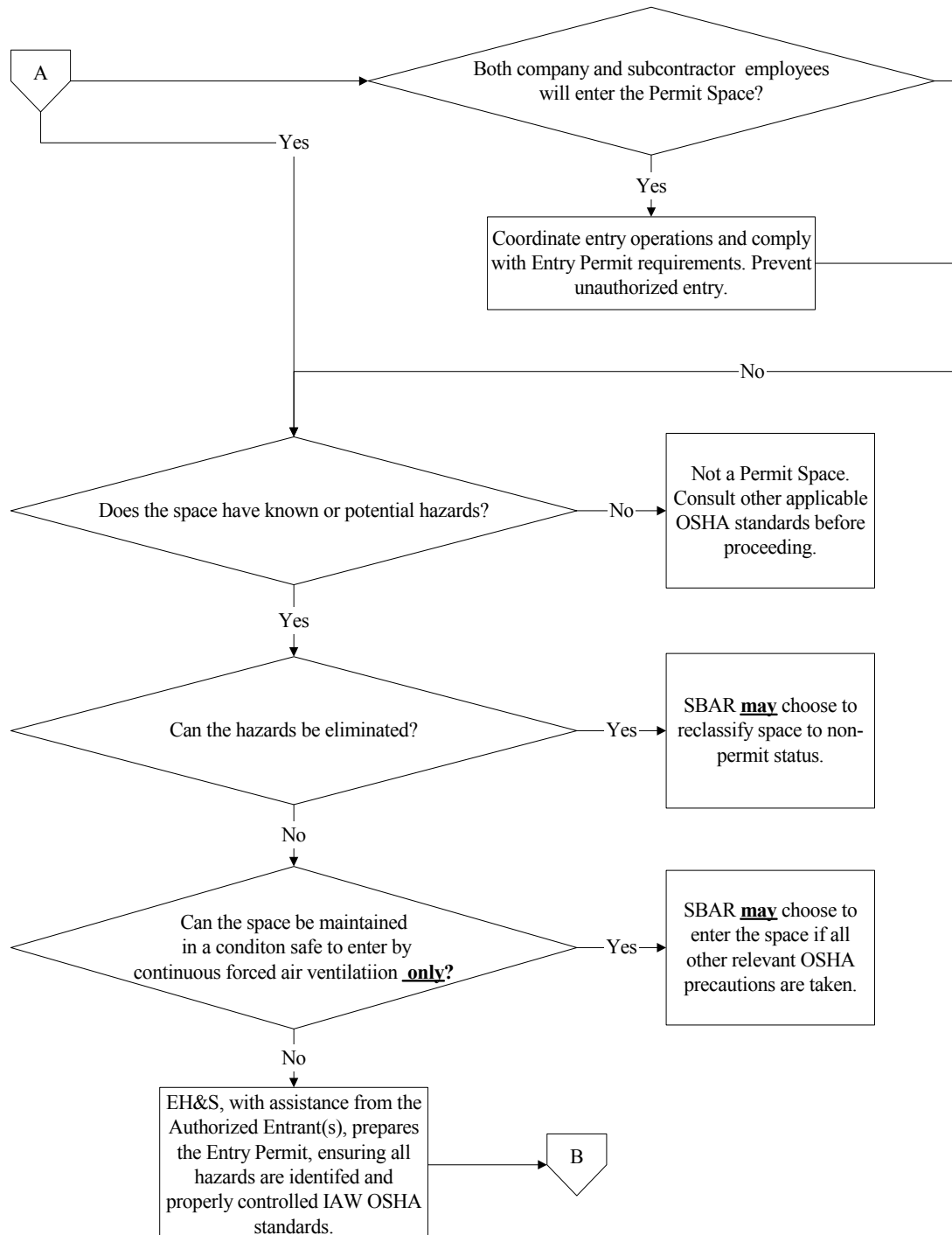
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Figure 1-Permit Required Confined Space Decision Flow Chart (Page 2 of 3)





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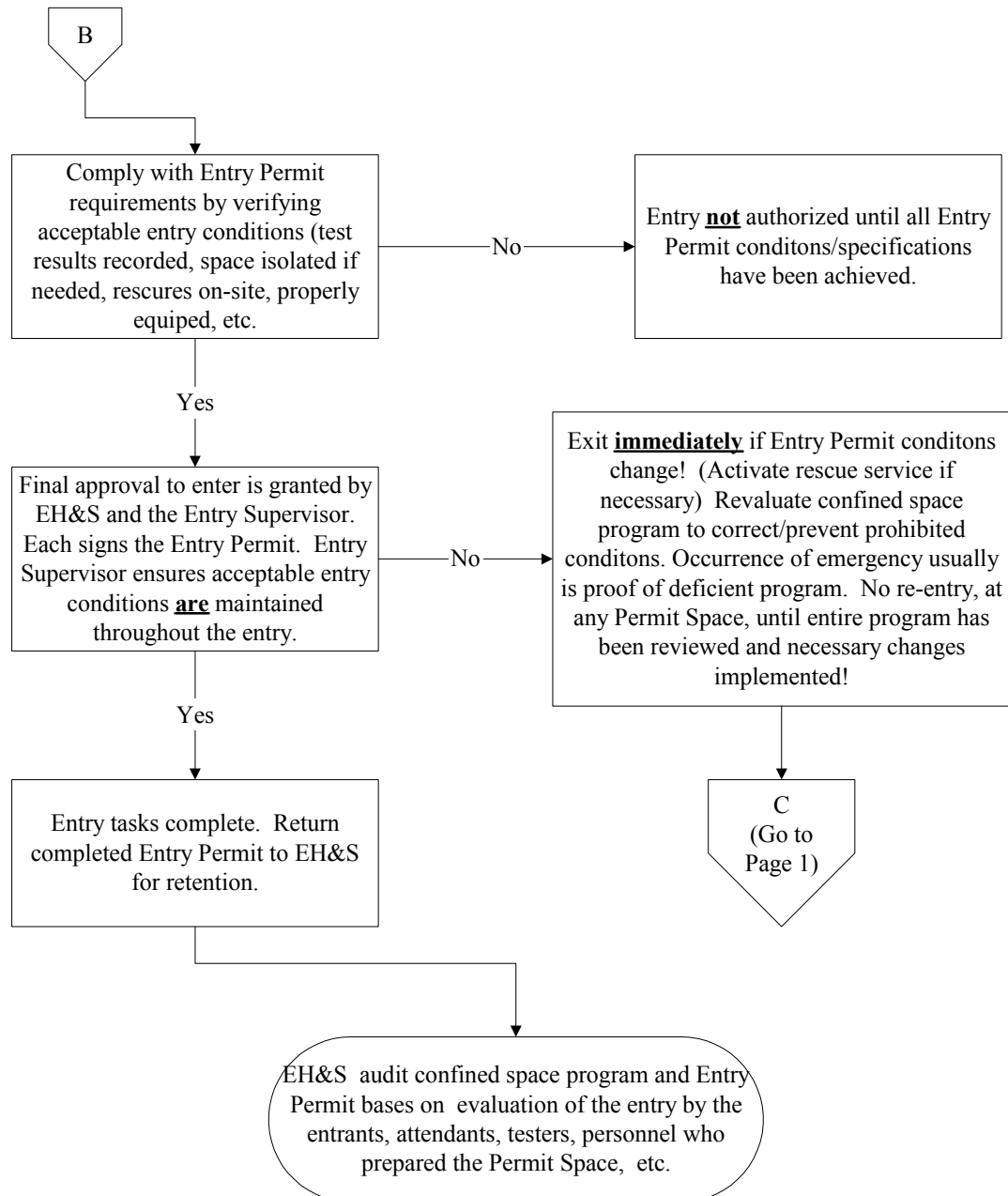
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Figure 1-Permit Required Confined Space Decision Flow Chart (Page 3 of 3)





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5.1 General

SBAR personnel are encouraged to participate in the development and implementation of the confined space program. This is accomplished through the solicitation of recommendations at EH&S and lead technician/foremen meetings as well as participation during the assessment of the various confined spaces.

EH&S, along with Affected Personnel, evaluates the hazards of all confined spaces and determines if those spaces are Permit or Non-Permit Spaces. This assessment is completed prior to employee entry. Figure 1, Permit-Required Confined Space Decision Flow Chart, is used as a guide for this assessment. Additionally, EH&S lists all confined spaces on a Master Entry List (MEL) that is distributed to all employees and, upon request, to the Customer (e.g., base safety office).

EH&S, along with Entry Supervisors and entrants, reviews and revises, as necessary, entry operations when there is reason to believe that measures taken under this program do not provide sufficient protection. Further, a yearly review is conducted of all Entry Permits to determine if sufficient protection is provided and if changes are needed to the Permit Space program. SBAR personnel are encouraged to offer their suggestions.

5.2 Permit System

Before any SBAR employee enters a space defined as a Permit Space, a written Entry Permit, i.e., *Form CP-00-7000-05-C*, is issued. Additionally, subcontractors are authorized to substitute their own Entry Permit form. Entry Permits, whether SBAR or a subcontractor forms, contain the following information/procedures:

- The permit is signed by the EH&S office or designee (Block 8 of Form *CP-00-7000-05-C*) or use subcontractor form and, as a minimum, the form will contain the following applicable items:
- Specify acceptable entry conditions.
- Prior to employee entry, the internal atmosphere is tested, with a calibrated direct-reading instrument, for the following conditions in the order given.
- Oxygen content.
- Flammable gases and vapors, and potential toxic air contaminants.

NOTE - AFFECTED EMPLOYEES, OR THEIR AUTHORIZED REPRESENTATIVE, ARE GIVEN THE OPPORTUNITY TO OBSERVE CONFINED SPACE TESTING PRIOR TO ENTRY. THEIR NAMES ARE DOCUMENTED ON THE ENTRY PERMIT (BLOCK 5 OF FORM CP-00-7000-05-C).

- Procedures to isolate the Permit Space.



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- Procedures to purge, inert, flush, or ventilate the permit required space, as necessary, to eliminate or control atmospheric conditions.
- Provide pedestrian, vehicle, or other barriers necessary to protect entrants from external hazards.
- Verify conditions in the Permit Space remain acceptable throughout the authorized entry.
- Define, as applicable, what equipment is present during Permit Space entry/occupancy.

The following equipment, on a case-by-case basis, is provided:

- Oxygen, combustible gases and vapors, and toxic gas detectors.
- Ventilation equipment to obtain acceptable entry conditions.
- Communications equipment.
- Personal Protective Equipment (PPE).
- Lighting equipment.
- Barriers and shields.
- Equipment, such as ladders for safe ingress and egress.
- Rescue and emergency equipment.
- Any other equipment necessary to provide a safe working environment.

Additional requirements include:

- Evaluate permit required space conditions as long as someone is in the space and prior to each entry.
- Provide at least one attendant outside the Permit Space to control entry and rescue personnel.
- Designate the persons who are to have active roles, i.e., Authorized Entrants, Attendants, who will test the atmosphere, etc.

Permit Spaces are closed (e.g., hatches closed and locked) as soon as entry is terminated. Normally, this will be the time listed on the Entry Permit "Authorized Duration of Permit" block (Block 1 of the SBAR Entry Permit Form).

For instances when SBAR workers must enter a confined space in support of another company or agency, the SBAR EH&S staff or equivalent determines if the space is a Permit Space or Non-Permit Space. If the space is a Permit Space, SBAR EH&S or equivalent can develop a separate permit or SBAR employee may be included on another company or agency



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permit, after coordination and proper approval with the other company/agency entry supervisor, EH&S office, etc.

CAUTION

SBAR DOES NOT AUTOMATICALLY ASSUME A CONFINED SPACE IS A NON-PERMIT SPACE JUST BECAUSE THE OTHER COMPANY OR AGENCY ALLOWS ITS WORKERS TO ENTER UNDER NON-PERMIT PROCEDURES.

Before entry begins, the Entry Supervisor listed on the Entry Permit, along with the Authorized Entrants, inspects the confined space and ensures compliance with the requirements of the Entry Permit. The Entry Supervisor then signs the permit and posts it at the confined space entry point. Authorized personnel entering the Permit Space then verify that pre-entry preparations have been completed. Additionally, the employee's authorized representative is also authorized to review the permit.

Entry is only allowed during the period designated on the permit and should an entrant question the safety of the permit space after entry, the entrants leave the permit space and notify SBAR EH&S or equivalent. SBAR EH&S or equivalent then evaluates the entrants concern(s) and, if necessary, a new permit is issued with the new conditions listed on the new permit.

The Entry Supervisor terminates entry when the operations covered by the permit have been completed and/or a condition arises that is not allowed by the Entry Permit. SBAR EH&S or equivalent debriefs Entry Supervisors at the conclusion of entry operations regarding any hazards confronted or created during the entry. Suggestions are also solicited to improve the permit system.

Entry Supervisors provide the SBAR EH&S office or equivalent with a copy of all expired Entry Permits to facilitate review of the program. Document any problems or suggestions on how to improve the program. SBAR EH&S or equivalent files permits for at least one year.

5.3 Duties of Authorized Entrants

WARNING

DO NOT ENTER ANY PERMIT SPACE UNTIL SATISFIED WITH THE CONDITIONS LISTED ON THE PERMIT AS WELL AS THE CONDITIONS INSIDE THE SPACE ITSELF!

Authorized entrants must:

- Know the hazards that may be faced during entry to include the mode, signs or symptoms (including behavioral), and the consequences of exposure to a hazardous environment.
- Properly use all required equipment and comply with the entry permit.



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- Communicate with the attendant as necessary as to the safety of the space and to ensure the attendant can promptly notify the entrants of the need to evacuate the space.
- Alert the Attendant whenever:
 - The entrant recognizes any warning sign or symptom of exposure to a dangerous situation, or
 - The entrant detects a prohibited condition.
- Entrants evacuate the space as quickly as possible whenever:
 - An order to evacuate is given by the Attendant, the Entry Supervisor, or EH&S representative.
 - Warning signs or symptoms of exposure to a dangerous situation are detected.
 - A prohibited condition is detected.
 - An evacuation alarm is activated.
- Prior to entering any Permit Space, whether controlled by SBAR or another agency, entrants carefully read the permit and ensure all known and possible hazards are addressed and that they understand those hazards.

5.4 Duties of Attendants

Attendants must:

- Know the hazards associated with each entry, to include information on the mode, signs or symptoms (including behavioral), and the consequences of entrants being exposed to any hazards that might be present within the confined space.
- Remain outside the Permit Space, maintain an accurate count of who enters/leaves the space, thoroughly brief all authorized entrants as to the conditions of the Permit Space, and ensure only authorized entrants enter the confined space.

NOTE - ATTENDANTS, WHO ARE ALSO DESIGNATED AS THE RESCUE SERVICE, MAY ONLY ENTER A CONFINED SPACE AFTER TRAINING AND ONLY FOR RESCUE PURPOSES.

- Communicate effectively with the entrants while the space is occupied.
- Monitor conditions inside and outside the space to ensure it remains safe for the entrants and, should conditions deteriorate or become suspect, immediately evacuate the confined space.

NOTE - SHOULD THIS SITUATION ARISE, NOTIFY SBAR EH&S OR EQUIVALENT BEFORE ANYONE IS ALLOWED TO REENTER.



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- If needed, initiate on-site rescue procedures. This includes the summoning of additional emergency response personnel (e.g., the fire department at 911, ambulance, etc.).
- Perform no duties that might interfere with their Attendant responsibilities.

5.5 Duties of Entry Supervisors

WARNING

DO NOT ASSUME THE OTHER COMPANY'S PERMIT ACCURATELY REFLECTS ALL OF THE HAZARDS PRESENT OR MAY BE PRESENT IN THE SPACE!

Entry Supervisors must:

- Know the hazards associated with the Permit Space, including the mode, signs or symptoms (including behavioral), and consequences of exposure to any of the hazards in/around the space.
- Verify the Entry Permit is properly completed, that all tests mandated by the permit have been satisfactorily accomplished, and that all procedures and equipment required by the permit are in place. At this time, the entry supervisor signs the permit.
- Terminate the entry and cancel the permit should any situation arise that jeopardizes the safety of the entrants or the conditions required by the permit are no longer present.

NOTE - NOTIFY SBAR EH&S OR EQUIVALENT ANYTIME THE PERMIT IS CANCELED FOR CAUSE AND DO NOT ALLOW REENTRY UNTIL SBAR EH&S OR EQUIVALENT HAS REVIEWED THE SITUATION AND A NEW PERMIT HAS BEEN ISSUED.

- Verify that rescue services are immediately available and that the means of summoning additional emergency services (e.g., the fire department, ambulance, etc.) are also present.
- Deny entry to unauthorized individuals and remove unauthorized entrants from the space.
- Whenever responsibility for Permit Space entry is transferred to SBAR, review the conditions of the permit and verify these conditions are acceptable and are still present in the confined space. SBAR then issues a new permit prior to SBAR personnel entering the space.

5.6 Rescue and Emergency Services

NOTE - RESCUE PERSONNEL ARE ASSIGNED NO OTHER DUTIES (OTHER THAN ATTENDANT) WHILE PERSONNEL ARE IN THE PERMIT SPACE.

For each Permit Space, **AT LEAST** one trained, standby person is on-site and immediately available to perform rescue and emergency services. Normally, the Attendant doubles as the rescue force.



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The following requirements apply to rescue personnel:

- Rescue personnel are properly trained on the hazards associated with the Permit Space, how to use the required personal protective equipment (e.g., respirator) and rescue equipment, and how to perform their assigned rescue duties. Additionally, they receive the same training Authorized Entrants receive.
- Each rescue member practices making Permit Space rescue before assuming rescue duties and at least yearly thereafter. These simulations involve actual techniques and equipment, live personnel or training dummies, and are held at actual permit locations.
- Each rescue team member is currently certified/trained in first aid and cardiopulmonary resuscitation (CPR).
- Normally, SBAR only relies upon SBAR employees to provide rescue services. If another company is to provide Rescue Services for SBAR personnel, SBAR EH&S or equivalent first verifies that firm's level of training, competency, and compliance with applicable OSHA directives.

NOTE - THE LOCAL FIRE DEPARTMENT IS NOT THE PRIMARY RESCUE SERVICE FOR SBAR OPERATIONS.

To facilitate non-entry rescue, retrieval systems or methods are used, unless the retrieval equipment would increase the overall risk of injury or would not contribute to the rescue of the entrant. Retrieval systems meet the following requirements:

- Each entrant uses a chest or full body harness, with a retrieval line attached at a suitable point so that when rescued (removed from the space), the entrant presents the smallest possible profile. However, wristlets are used in lieu of the chest or body harness if the EH&S staff or equivalent believes a chest/body harness will not work or wristlets are the safest and most effective means of extracting a worker.
- The other end of the retrieval line is attached to a mechanical device (e.g., winch) or fixed point outside the Permit Space in such a manner that rescue can begin as soon as the rescuer becomes aware that rescue is necessary. A mechanical device is required for vertical type Permit Spaces more than five feet deep.

5.7 Non-Permit Confined Space (Non-Permit Space)

The EH&S office or equivalent, on a case-by-case basis, can waive or reclassify the above requirements for a Permit Required Entry providing the following conditions exist:

- The only hazard present in the confined space is an actual or potential hazardous atmosphere. This fact is verified by the EH&S office or equivalent via monitoring and inspection data, witnessed by Affected Employees and/or their authorized representative.



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- Continuous forced air ventilation alone is sufficient to maintain an acceptable atmosphere in the confined space. Sufficient monitoring and inspection data is maintained to also document this fact.
- If an initial entry is needed to confirm the two areas listed above, this entry will be conducted under the permit required entry procedure.

The determinations and supporting documentation necessary to support a Non-Permit Space is made available to all personnel (and their authorized representative) who enter the confined space in question. Monitoring data will be collected for one year to substantiate reclassification or waiver of the space as long as no changes have been made to the space configuration that could alter the collected data.

Procedures for entry to a Non-Permit Space:

- Where there is an entrance cover and prior to removal of the cover (e.g., below ground vault), any unsafe conditions are removed.
- Where applicable (e.g., below ground vaults), when the entrance cover is removed, barriers are erected to keep personnel, equipment, etc. from falling into the confined space.
- Prior to employee entry, the EH&S staff or equivalent may require atmospheric testing of the internal atmosphere. A calibrated direct-reading instrument is used for testing, for the following conditions in the order given:
 - Oxygen content.
 - Flammable gases and vapors, and
 - Potential toxic air contaminants.

NOTE - THE EH&S STAFF OR EQUIVALENT MAY ALSO REQUIRE PERIODIC TESTING THROUGHOUT THE ENTRY.

- No hazardous atmosphere exists in the Non-Permit Space when an employee is present.
- When continuous forced air ventilation is necessary, the following applies:
 - Employees may not enter until forced ventilation has eliminated all potential atmospheric hazards.
 - The forced ventilation is so directed as to ventilate the immediate areas where an employee is present within the space and will continue ventilating until all employees have left the space.
 - The forced ventilation air supply is from a clean source and does not increase the hazards within the confined space.



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- The atmosphere is tested continuously throughout the entry to ensure the air remains safe.
- If a hazardous atmosphere is detected in a Non-Permit Space, or any other hazard arises, all personnel immediately evacuate. The EH&S office or equivalent is notified and, along with the affected employees and/or authorized representative, determines if the hazards can be abated or if the Non-Permit Space needs to be redesignated a Permit Space. In any event, personnel do not reenter without eliminating all hazards and with the prior concurrence of the EH&S office or equivalent. Non-Permit Spaces are also identified in the MEL.

5.8 Training

SBAR [Confined Space Training Syllabus \(CP-00-7000-05-A\)](#) is used for confined spaces training. Training program requirements include:

- Training of all personnel who enter confined spaces, their supervisors, and EH&S personnel. This training is also part of newcomers' safety orientation, as required.
- Annual refresher training is required for employees and supervisory personnel.
- Personnel performing rescue services receive separate training in addition to the basics of the confined space program. Rescue training will be conducted annually.
- Personnel authorized to conduct atmospheric testing using a direct-reading instrument also receive specialized training.
- Personnel are retrained before entry into a Permit Space where a new hazard exists and/or there has been a change in entry procedures.
- Personnel are retrained when there is a lack of knowledge concerning confined space entry or rescue and/or there are deviations from established procedures.
- Finally, the EH&S office or equivalent maintains the training records (paper or electronic) and this documentation is made available for review by employees and their authorized representatives.



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