औद्योगिक सुरक्षा निर्देशिका

Safe Working in Confined Space

राष्ट्रीय सुरक्षा परिषद
राजस्थान स्टेट चेप्टर

राष्ट्रीय सुरक्षा दिवस एवं सुरक्षा सप्ताह
4 मार्च
सुरक्षा एवं स्वास्थ्य के प्रति प्रतिज्ञा

आज के दिन में सत्यनिष्ठापूर्वक प्रतिज्ञा करता हूँ के मैं पुनः अपने आपको सुरक्षा, स्वास्थ्य तथा पर्यावरण के बचाव के प्रति समर्पित करूंगा और नियमों, विनियमों तथा कार्यविधियों के पालन हेतु यथा शक्ति प्रयत्न करूंगा और निश्चित रूप से इन लक्ष्यों को प्राप्त करने के लिए प्रेरणादायक अभिवृतियों, तथा आदतों का विकास करूंगा।

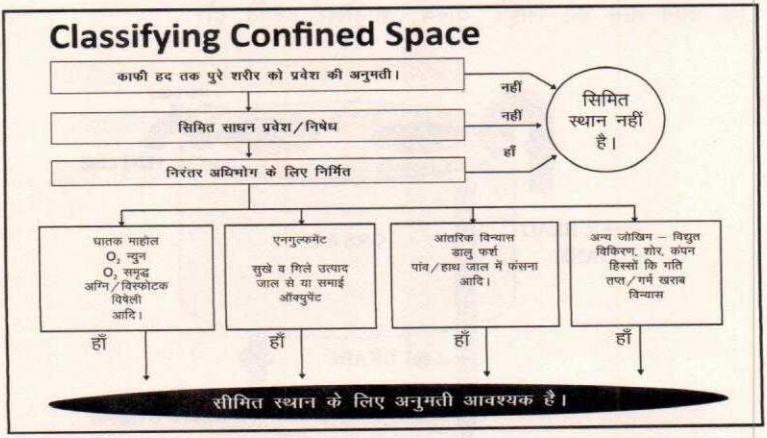
मेरी यह पूर्णरूप से मान्यता है कि दुर्घटनाऐं तथा बीमारियां राष्ट्रीय अर्थव्यवस्था को दुर्बल बनाती है तथा यह विकलांगता, मृत्यु स्वास्थ्य के लिए हानिकारक एवं सम्पत्ति की क्षति, सामाजिक कष्ट तथा पर्यावरण के अपकृष्ट का कारण बनती है।

मैं स्वयं अपने, परिवार, संगठनों, समाज एवं राष्ट्र के हित में इन दुर्घटनाओं व्यवसायिक बीमारियों की रोकथाम तथा पर्यावरण के बचाव के लिए हर संभव प्रयत्न करूंगा।

सीमित क्षेत्र की परिभाषा:

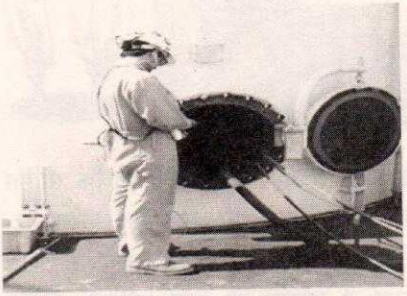
परिसीमित स्थल ढ़ँका हुआ अथवा आंशिक तौर पर ढँका हुआ स्थल होता है जो:

- किसी भी व्यक्ति के प्रवेश के लिये पर्याप्त रूप से बड़ा हो सकता है तथा/या
- प्रवेश/प्रस्थान के लिए सीमित/प्रतिबंधित कार्य स्थल/अथवा
- यह कार्य स्थल नहीं नामित किया गया है, अथवा
- खतरे का मूल्यांकन करते समय यथावत माना गया हो/पाया गया हो, तथा
- हो सकता है
  - ऐसे वातावरण से युक्त हो जिसमें हानिकारक स्तर पर विषैला प्रभाव हो। विस्फोटक पदार्थ की मात्रा पर्यावरण पर प्रभाव डाले /अथवा
  - -ऑक्सीजन का सुरक्षित स्तर उपलब्ध न हो या नाईटोजन की उपस्थिति अधिक हो, अथवा
  - -व्यक्ति ऐसे पर्यावरणीय माहौल मे झकड़ा हुआ पाया जाए या पकड़ में आकर खतरनाक स्थिति का शिकार हो जाए।



परिभाषाएँ :

- **परिचारक (Attendant)**-एक अधिकृत व्यक्ति होता है जो कि सीमित स्थान से बाहर रहेगा जिसकी भूमिका अधिकृत व्यक्तियों के साथ संचार और निगरानी उपयोग के स्थान को नियंतित्र करने, व्यक्तियों की प्रविष्टि / निकासी के रिकार्ड बनाने, निर्दिष्ट अनुमति के रूप में निर्धारित प्रविष्टि शर्तो को बनाए रखने व बचाव योजना को लागू करने के लिए नियुक्त किया गया हो



- **Enterant**-वह व्यक्ति जो कि सीमित स्थान में प्रवेश के लिए अधिकृत हो जो संभावित खतरों को समझता हो, सावाधानी रखता हो, विस्तार और निर्धारित कार्य की सीमा पर निकासी व संचार की प्रकिया समझता हो और जो प्रविष्टि में शामिल अन्य व्यक्तियों को जानता हो।

- प्रविष्टि अनुमति – सीमित स्थान में प्रविष्टि नियंत्रण के लिए लिखित या छपा हुआ दस्तावेज जो कि प्रविष्टि के दौरान प्रदान किया जाता है।
- **बचाव दल** – यह दल, स्थल खोज व सीमित स्थानों पर प्रवेश कर अंदर कार्य कर रहे व्यक्तियों के बचाव के लिये नियुक्त किया जाता है। यह कर्मियों का ऐसा दल होता है जिन्हेंसीमित स्थान में बचाव के लिए प्रशिक्षित किया जाता है तथा प्राथमिक चिकित्सा एवं सी.पी.आर. प्रस्तावों द्वारा प्रमाणित भी किया जाता है।

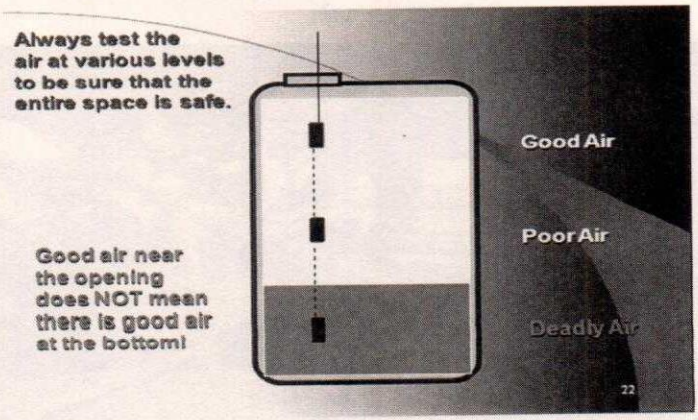
- यह सुनिश्चित करें कि सीमित क्षेत्र में जाने वाले व्यक्ति ने आवश्यक प्रशिक्षण प्राप्त किया हो।
- यह सुनिश्चित करें कि कर्मचारी अपने कर्तव्यों एवं जिम्मेदारी से अवगत है।
- बचाव प्रक्रिया की रूपरेखा तैयार करें।
- अनाधिकृत व्यक्तियों को चेतावनी चिन्हों तथा बाड-बंदी द्वारा सूचित रखें तथा उसे उन्हें क्षेत्र से बाहर रखें।
- प्रवेश परिचारक तथा स्वीकारकर्ता संयुक्त रूप से JSA (Job Safety Analysis) करें।
- सभी उर्जा के स्त्रोतों को अलग करके लॉक आउट तथा टेग आउट प्रक्रिया (Loto) से बंद/पृथक करें।
- वायुमंडलीय खतरों को वेन्टिलेशन के द्वारा शुद्धिकरण करके खत्म या नियंत्रित करें।
- सीमित क्षेत्र में गैस सिलेण्डर एवं वेल्डिंग मशीन कदापि साथ नही ले जाएं।
- कटिंग टार्च को सीमित क्षेत्र के बाहर से ही चालू करके अंदर ले जाएं।
- सीमित क्षेत्र में कार्य करने हेतु 24V लेम्प का ही प्रयोग करें।
- जब कार्य एक पारी से अधिक समय तक जारी रहे तो परमिट का नवीनीकरण सुनिश्चित करें।
- सभी उपयुक्त PPE पहनकर ही प्रवेश करें।
- अटेन्डेन्ट द्वारा पूछने पर Enterant द्वारा कोई जवाब या प्रतिक्रिया ना मिले तो तुरंत Rescue Team को सूचित करें।

सीमित क्षेत्र के खतरे :

- वातावरण में ऑक्सीजन की कमी
- वातारण में ऑक्सीजन की समृद्धता
- दहनशील, ज्वलनशील विस्फोटक वातावरण
- विषाक्त वातावरण (गैस / वाष्प)
- संक्षारक रसायन
- अत्यधिक तापमान
- जैविक खतरे
- इनगल्फमेंट जोखिम
- शोर, नम सतह एवं वस्तु का गिरना
- खराब प्रकाश व्यवस्था

वायुमंडलीय परीक्षण श्रेणी

- ऑक्सीजन-सुरक्षित श्रेणी 19.5 से 23.5 प्रतिशत
- दहनशील गैस LEL (Lower Explosive Limit) से कम हो
- विषैली गैस TLV (Threshold Limit Volume) से कम हो
- हर दो घंटे बाद वायुमंडलीय परीक्षण करें



बचाव की तैयारी:

बचाव की तैयारी का दस्तावेज तैयार किया जाना चाहिये। सीमित क्षेत्र में कार्य करने से पहले बचाव तैयारी में निम्न बातों का ध्यान रखना चाहिये।

- सहायता के लिए किसको बुलाना है
- कैसे बुलाना है
- किसी भी आपातकालिन स्थिति में सीमित क्षेत्र में फसे हुए व्यक्तियों को कैसे बाहर निकालना है।

प्रशिक्षण:

- सभी व्यक्ति जो कि सीमित क्षेत्र में कार्यरत हैं उनका प्रशिक्षण होना आवश्यक है ये लोग हैं-
  - स्वीकृति देने वाले
  - परिचारक
  - स्वीकार करने वाले
  - शामिल होने वाले
  - प्रविष्टि पर्यवेक्षक
  - बचाव दल के कर्मचारी

Confined Space Entry Program Implementation

Location: Valero Energy Corporation Refinery, Delaware City, Delaware
Date : 5.11.05

Incident Description:

One contract worker was overcome by Nitrogen while trying to retrieve a tape roll from the Hydrocracker Unit Reactor R1 and died of nitrogen asphyxiation and the other died while trying to rescue him.

During a shutdown the reactor was opened for loading of new catalyst . After completion of loading The Catalyst Handling contractor installed a temporary N2 low flow purging system (valve opened 1 -2 turns) to prevent newly loaded catalyst from reacting with oxygen until boxing up as a part of loading procedure.

The nitrogen flowed out through the only top man way opening which had a 24 inch pipeline connected to downstream equipment (Figure 2)that was removed during the catalyst filling operation. The Catalyst contractor has placed a plastic tarp and wooden cover over this opening to prevent moisture and debris falling into the reactor. (Figure 1)

They also wrapped red danger tape around the studs on the opening to alert workers of an unsecured opening and attached a Confined space warning. (Figure 1)

The eyewitness next saw the night shift contractor administrator approach the ladder, hesitate and then call for help on his Walkie Radio.

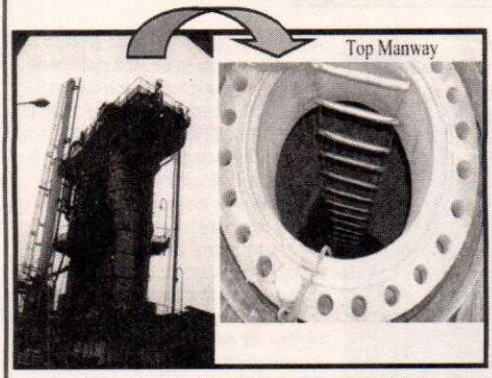
The emergency responders and Matrix contractor safety personnel immediately arrived at site and checked oxygen level and decided to put on their SCBA and then retrieved one by one both the victims. They closed the nitrogen purging valve and then carried out rescue.

The two victims retrieved from the space could not be revived and were declared dead.

Discussions: Incident Analysis:

1. The work permit was issued (approved) by the operator without a joint site visit/inspection. (By issuer – Valero Operator and CSES – Matrix Contractor Foreman).
2. The permit was issued without a proper JSA done at site of work.
3. There was no tool box talk held before start of work where in the foremen discussed the work, JSA and other work and safety measures before start of work.
4. The permit issued did not mention in writing "Set up work" only (was only between verbal between the issuer and the foreman) and since tool box talk did not happen the workers finding and opportunity went ahead with the re installation of pipeline elbow. Clear work description needs to be mentioned.
5. N2 purge status was marked N/A on the permit though the purging was on . The Catalyst filling work permit was probably not referred for its closure status.
6. The site did not have warning signage informing Nitorgen purging at the designated opening & leak points. The red tape was not effective means to indicate this condition. Oxygen depleted hazardous atmosphere may be present outside the

Do You See the Hazard?



You Can't. The Hazard is Invisible !

What Happened?

An employee was assigned to sample the atmosphere in a reactor by using a flexible hose equipped with a rubber hand pump. To do so, he went to the open top man way and was later found dead. The reactor had been opened for catalyst unloading and was being purged with nitrogen. While the cause of this accident has not been positively determined, it is quite possible that nitrogen exiting the vessel overcame (asphyxiated) the employee.

How Did This Happen?

Since nitrogen is a colorless, odorless gas that does not provide any indication of danger, it is truly an invisible hazard.

Air normally contains approximately 20.8% oxygen. However reducing that level just a little reduces a person's ability to function.

Atmospheres with less than 19½% oxygen are defined by OSHA as "oxygen deficient" and can be fatal over a relatively short period of time.

Normal breathing is controlled by the amount of carbon dioxide in the body. Excess exposure to nitrogen can replace the carbon dioxide and cause breathing to stop completely.

Nitrogen "tricks" the body into not breathing.

What You Can Do to Prevent it from Happening to You

We all recognize the hazard of entering a confined space with an atmosphere containing a low oxygen level, but we should also remember that....

While purging an open vessel:

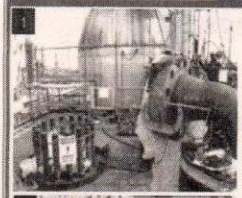
- Be aware that possible oxygen deficient areas can extend beyond a confined space, especially during initial gas testing and monitoring of a vessel.
- If there are any doubts, use a self contained breathing apparatus and an observer to call for help, if needed, when working near purged equipment openings. – This is especially true for emergency responders to a possible asphyxiation accident.
- Control access to the potentially dangerous area, post Danger Signs at vessel openings, and use a Safe-to-Work permitting system that includes a sign-in/sign-out log system separate from the Confined space log.

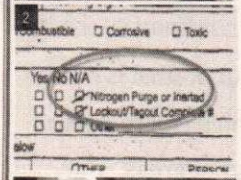
See the Chemical Safety and Hazard Investigation Board (CSB) Web site, http://www.csb.gov/safety_publications/docs/SB-Nitrogen-6-11-03.pdf, for additional information on nitrogen asphyxiation.

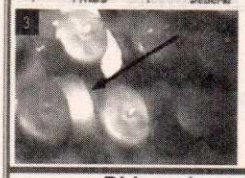
PSID Sponsors see: Free Search—Nitrogen Purge

If in Doubt... Please Stay Out !!!

Safe Work Practices







A maintenance crew was re-installing piping at the top of a reactor in a refinery. The reactor was being purged with nitrogen to keep oxygen in the air from contacting the catalyst inside, and the top of the reactor was open (1). A sign indicated that the reactor was a confined space and a permit was required for entry, but no sign warned about the presence of nitrogen. On the job permit, the box indicating "Nitrogen Purge or Inerted" was checked "N/A" – Not Applicable (2).

When the maintenance workers began the job, they observed a roll of duct tape inside the reactor (3), which would have to be removed. They attempted to remove the tape from outside using a long wire to hook the tape, without success. What happened next is not clear. A worker may have intentionally entered the reactor to remove the tape, intending to exit quickly. Another possibility is that the worker tried to get closer to the tape by sitting on the edge of the reactor opening, and either slipped and fell in, or lost consciousness from the reduced oxygen atmosphere near the reactor opening and fell into the reactor.

A co-worker observed the unconscious man inside the reactor and entered himself for an attempted rescue. He also lost consciousness and collapsed. A properly equipped rescue team arrived and removed the unconscious men, but it was too late. Both were pronounced dead at the hospital.

US CSB report and video on this incident: http://www.csb.gov/valero-refinery-asphyxiation-incident/

Did you know?

- "Safe Work Practices" refers to the processes we use to authorize non-routine work activities, and to control the hazards and manage the risks associated with these activities.
- Safe Work Practices often authorize work through permits, which often include checklists of potential hazards associated with the work.
- A "non-routine activity" has nothing to do with how often the activity is done. Instead it refers to activities that are NOT part of the normal process for converting raw materials to finished product, and NOT COVERED by the plant's standard operating procedures for normal operations.
- Some examples of where Safe Work Practices are applied: line breaking, vessel entry, other confined space entry, control of energy sources, lock out/tag out, hot work permits, elevated work permits, excavation in process areas.

What can you do?

- Understand all of the Safe Work Practices in your plant and your work area, including authorization and permit systems. Know what activities require a permit, and what the process is for obtaining a permit.
- If you are authorizing non-routine work activities covered by your plant's work permit systems, make sure you are properly trained, understand the permit systems, and understand the hazards associated with the work.
- If you issue a permit, make sure the people doing the job understand all of the hazards.
- Don't rely on others to verify that a system is properly prepared for the work. If you are going to sign the permit, check everything yourself!
- If you are doing the non-routine work activity, make sure that you have the required permit, follow all of the required procedures to control hazards, and use the proper personal protective equipment. If the job changes while in progress, contact the person authorizing the work for permission and to determine if any additional safety precautions are needed.

Understand your plant's work permit systems!

टिप्पणी