

SAFETY SYSTEMS HAWAII, INC.

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Safety Awareness Sheet

Confined Space Safety

A GENERAL OVERVIEW OF PROPER CONFINED SPACE ENTRY

OR

WHAT NOT TO DO!

By L.Z. Mitch, Safety Systems Hawaii

To help everyone better understand the importance of Confined Space Safety, the following story is loosely based upon a compilation of reports from the National Institute for Occupational Safety and Health (NIOSH). The Hana Hou Waste Water Treatment Plant, Tim and George are all fictional. Any similarity to actual people or companies is purely coincidental.

The early morning rain put Tim in a dour mood. Not only did it slow his morning commute to work at the Hana Hou Waste Water Treatment Plant, it also meant he had to go clean out the “wet well” that served as a filtration point for sewer water entering the plant. More rain meant more large waste being caught in the bar-screen meant to trap large debris, and that in turn meant more time going into the well to clean the screen. “Ho, so much humbug!” Tim exclaimed as he parked his car in the spot marked “Maintenance” at 7am.



As Tim approached the well area, he softly grumbled about the broken comminuter; that piece of machinery which grinds up debris into small bits that are eventually filtered out. “But noooo! Da luna gotta save da budget he says! Wait fo’ next month to fix’em, he says! ‘Tim, you go clean em, yeah?’ Shee!” That was two weeks ago, and every day since then, Tim entered the wet well at least 6 times a day to clear out the blockage from the bar-screens.

Sure enough, the rain brought with it branches, rubbish and other debris from the streets, and the bar-screen was just shy of being completely blocked. Setting his lunch-cooler down, Tim picked up the heavy duty rake and a bucket then began to lower himself down the ladder entering the 25 foot deep, 15 foot wide, 30 foot long well area. Softly mumbling about how

he was going to make sure *someone* heard about this in upper management, and *someone* is going to give him a raise, Tim moved cautiously down the steel rungs of the ladder. “Auwe! So pilau! Smell like auntie’s rotten egg salad!” Tim exclaimed after going down only a few rungs. A few more feet down, and he became dizzy, slipped, and fell onto the catwalk 10 feet below.

George, the General Manager, decided to do his routine check just before lunch. He knew the rains meant the wet-well would need to be cleared frequently, so he decided to check it himself. Approaching the well area around 11:30 am, he noticed Tim’s cooler sitting near the stairs to the entry area. “Funny place to eat lunch,” George thought. He then noticed a rope leading into the well, and heard a clanging sound from within. George covered his nose as the stench was awful, and peeked over the side of the well’s retaining rails. His first glimpse was of the metal bucket, tied to the rope, then Tim lying on the catwalk far below.

Ten minutes later, Tim’s body was pulled from the wet-well area by the local fire & rescue squad, and pronounced dead at the scene. The autopsy concluded the cause of death was by asphyxiation by an “unknown substance”. The only other injury Tim sustained was a broken leg, most likely from the 10 foot fall.

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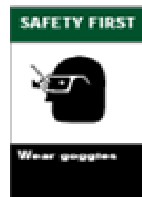
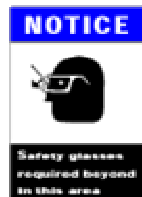
WHAT WENT WRONG HERE?

Tim's death was unnecessary. Despite the budgetary woes of this fictional waste water treatment plant, proper training, enforcement of that training, and other safety precautions would have raised the awareness of the hapless employee.

Several questions raised by this story will be addressed. This is by no means a complete rundown of OSHA regulations, but a wake-up call for everyone to be more alert in their work environment.

The big question is, "Did Tim realize he was entering a confined space?" By definition, a Confined Space is "an area whose configuration hinders the activities and the safety of any employee who must enter, work in, and exit the area." This definition is clarified by OSHA (Occupational Safety and Health Administration) which elaborates that a Confined Space...

- Is not primarily designed or intended for human occupancy.
- Has a restricted entrance or exit by way of location, size or means.
- Can represent a risk for the health and safety of anyone who enters, due to one or more of the following factors:
 - Its design, construction, location or atmosphere,
 - The materials or substances in it,
 - Work activities being carried out in it,
 - Mechanical, process and safety hazards present.
- Permit-Required confined spaces meet the conditions for a confined space AND has one or more of the following characteristics
 - Contains or has the potential to contain a hazardous atmosphere.
 - Contains a material that could engulf an entrant.
 - The internal configuration may cause an entrant to be trapped or asphyxiated by inwardly converging walls or a floor that slopes downward and tapers.
 - Contains other recognized serious safety or health hazards.



People are made aware of a confined space by several things, first of which are signs. It is the facility owner's responsibility to make sure the proper signage is in place for all hazards, including confined spaces. Permit-required confined spaces are especially important, and must be blocked off to prevent unauthorized entry. A written program is also required, as well as complete training in the entry, exit, use of any PPE, monitors and other equipment necessary to complete a job. A bucket tied with rope to the ladder is far from proper fall protection, or even a valid way of moving objects in and out of a confined space.



Confined spaces can be above or below ground. They can be geographical or man-made, large or small, readily accessible or inaccessible. Almost every workplace has at least one confined space area. That phone closet down the hall from you can be considered a confined space if the circumstances are right. Employers need to be aware of their confined spaces, and make sure employees, sub-contractors and service vendors are aware of them. The phone closet is not necessarily a *permit-required* confined space, but a good safety program will ensure your technicians are aware that minimal air circulation and rising

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temperatures within the phone closet are not the best work conditions. Examples of permit-required confined spaces include grain silos, manholes, sewer systems, vaults, culverts, cargo holds, and tanks. Non-permit spaces could include sub-basements, low attics, crawl spaces, walk-in refrigeration areas and tunnels. Even some trenches and ditches may be considered confined spaces if their access and egress are limited or restricted by purpose, design or poor air quality.

SO WHAT OTHER PROBLEMS DID TIM HAVE?

OSHA considers the most hazardous confined space is one which combines limited access and mechanical devices.¹ Take Hana Hou's wet-well. There is an inlet where raw sewage enters, and an outlet where the blocked bar-screen is located, but what other hazards could be there? The broken comminuter is one. This machine mashes and grinds tree limbs, bricks, even stones to filter past the bar-screen to the aerated grit chambers which filters out small stones and sand. It takes a lot of power to grind up bricks and stones – imagine if a hand or leg were caught in there! Power-driven equipment should have power sources turned off, locked and tagged out prior to anyone entering the confined space. Granted the comminuter is broken, but is the power to the unit off? Did Tim know that? Again, proper training and awareness would clarify the situation.



Before Tim entered the wet-well, he didn't check the air quality below. Various gases are heavier than oxygen, thus they settle to the bottom of a confined space and push out breathable air. Without proper air circulation, many gases can build up and completely remove breathable air. Normal atmosphere contains roughly 78% nitrogen and 21% oxygen, with trace amounts of other gases.² As Tim started down the ladder, a gas detector or monitoring unit would have told him the air quality was poor. Most bad smells are a sure sign of toxicity, particularly around raw sewage. The procedure calls for a gas monitor and the correct form of respirator unit before entering the space. Also PPE such as fall protection equipment, glasses, gloves, boots and a hard hat should have been worn. Tim got to work and went immediately to the wet-well; technically, he was an "unauthorized entrant".

THE ULTIMATE RESPONSIBILITY

George, the general manager, should be aware of all dangerous work zones located at the plant. Training, retraining and making sure any and all certifications are current would have let George know who is and isn't qualified for certain job duties, including entering and cleaning the wet-well. George should also manage a confined space written program, and make sure it is enforced within the plant – not only for his employees' safety, but also those he contracts to work on repairs and broken equipment. He also needs to make sure welders have a "hot-permit" to work with their welding units within a confined space.



Required Confined Spaces (29 CFR 1910.146).

Specifically, permit-required confined space entries involve three (3) people. The Entrant, a person entering the space to perform various duties; the Attendant who monitors the environment, atmosphere, Entrant and performs any other duties assigned by the employer's written confined space program; and the Entry Supervisor, who determines if entry conditions are acceptable, authorizes and oversees entry and terminate any permits for a confined space if necessary. Specific duties are outlined by OSHA Permit

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Over all of this, the lack of proper training is what ultimately caused Tim's demise. Outlining every violation that contributed to this fictional story would create a rather long document. OSHA clearly states that Management (employer, host-employer and/or facility owner) is to...

- Ensure proper training for entry and rescue teams
- Provide proper equipment for entry and rescue teams
- Ensure confined space assessments have been conducted
- Ensure all permit required confined spaces are posted (with signs)
- Annually review their written program and all entry permits
- Evaluate rescue teams/service to ensure they are adequately trained and available for immediate response
- Ensure rescue team has access during entry into spaces with IDLH atmospheres³

Safety Systems Hawaii offers confined space classes at the Kalihi location on O'ahu. Registration is easy – online, call the store, by fax or visit with a member of the sales team. If the scheduled classes are not convenient, call to discuss alternative dates. The training covers OSHA Regulations, types of hazards and how to prepare for them. Equipment such as gas monitors and PPE will be demonstrated. Real-world examples will be shown via videos, and each attendee receives a training book containing portions of the OSHA 1910.146 Subpart J (General Environmental Controls) for Permit-required confined spaces as well as a Competent Person Certificate and Card (if they pass the test!).



Previous seminars held at Safety Systems Hawaii. Call 808-847-4017 for up to date information on this and other seminars.

¹ *Confined Space Hazards* U.S. Department of Labor, OSHA website
<http://www.osha.gov/SLTC/smallbusiness/sec12.html>

² *Earth's Atmosphere*, Wikipedia website
http://en.wikipedia.org/wiki/Earth%27s_atmosphere

³ OSHA Permit Required Confined Spaces (29 CFR 1910.146)