

Crime Scene

Crime Scene Rescue and Emergency Response

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When investigating or evaluation a scene in a confined space or elevated area, it's important to have rescue support with specialty retrieval and medical equipment in case of an emergency

Photo by SAFETRAN

You are asked to participate in a crime scene investigation involving entry into a vertical manhole (water well, or sewer-type confined space). Although your investigations may often be conducted in unique environments, you may be unclear about entry into a confined space, and what exactly is required by the OSHA standards and regulations.

Depending on the specific hazards of the space, entry into vertical spaces, such as wells and sewers, often require a special written confined space entry permit pursuant to the OSHA Permit Required Confined Space Standard (CFR, 1910.146), with mandatory safety rules and regulations.

Although you may have been previously involved in confined

space entry, it is important to remember that entry into a Permit-Space has OSHA requirements regarding emergency rescue. Current OSHA regulations mandate that employers, “develop and implement procedures for summoning rescue and emergency services, for rescuing entrants from permit spaces, and for providing necessary emergency services to rescued employees.”

Critical rescue response time

First, do you know the response time for emergency responders (rescue) to react to an onsite injury or emergency in your confined space?

Before planning confined space projects, you must factor in the response time for emergency rescue to your site or the crime scene. The decisions you make regarding rescue will ultimately affect the health and safety of your employees and staff. In examining a worst case scenario, let’s concentrate on response time interval, starting with notification of injury through final transport to the hospital.

First, upon notification of injury or entrapment, we activate our emergency response system, and make the initial phone call to a rescue team or 911. We provide details to the dispatcher, the type of injury, site location, etc. Dispatch then relays this detail to the rescuers—then add responder drive time and interval in locating the injury or rescue site. Upon arrival, responders perform an interview with staff, and conduct a scene size-up. They obtain details on the victim’s location, and begin set up of rescue retrieval equipment, air testing and written documentation. Next is actuation of physical entry into the space by the rescue team. Once contact with the victim is made (contingent upon depth or configuration), they’ll assess the patient’s status, and conduct packaging for final removal from the confined space. This is followed by a ground level basic life support (BLS), or advanced life support (ALS) assessment and, if required, pre-hospital treatment and transport to an emergency facility. How much time has transpired here?

When planners have awareness of critical response time, intelligent rescue decisions can be made. Before planning rescue operations, documented confined space safety training must be completed. OSHA requires employers to protect workers from the potential hazards of confined space via safety training and specialized rescue equipment. A prerequisite for confined space entry is familiarity and awareness of the site-specific hazards, which may include potential of hazardous atmospheres and/or unique site-specific issues affecting entry teams.

How to be safe

Operations within a vertical sewer-based confined space having a depth of 5 to 30 feet increases the potential of serious falls and fatality. Beyond just a logistic challenge, confined space entry into pipelines may expose forensic specialists to a blend of risks and challenges.

Communication: The ability to transmit and receive radio signals inside concrete sewer pipes is substantially reduced, often requiring special equipment and satellite transmission. Echo and reverberation of relayed communication within a pipeline can be considerable.

Explosive atmosphere: Sewer gas or methane is often found in active sewer pipelines. OSHA requires that a calibrated direct-reading instrument be readily available and used.

Infection potential: Untreated sewage may contain water, solids, pathogens (including bacteria, viruses and protozoa); as well as helminthes (intestinal worms and worm-like parasites), hypodermic needles and more. Plan ahead and think carefully before entry.

Special PPE: Personal protective equipment including fall protection, protective ensembles (Tyvek, impervious boots, gloves, goggles, hardhat, respiratory protection), hip-waders, personal flotation device (PFD), etc., should all be used.

Inadequate illumination: Entry into a pipeline means inadequate illumination, increasing the hazard to workers, especially during an emergency situation. Explosion-proof (intrinsically safe) lighting is always recommended.

Slippery footing/falls: Entering and traversing a pipeline with active flow can be very dangerous to the entry team—fall hazards, slippery surface conditions, lack of a hand hold, and pressure from horizontal flow can impede or endanger investigators and workers.

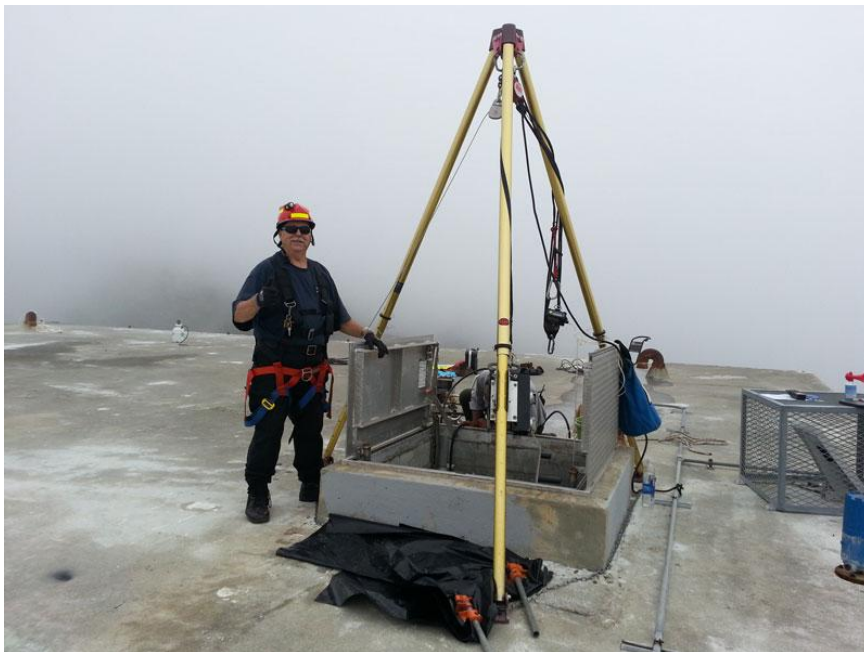
Emergency response: Entry teams performing forensic or pathology operations in an active sewer are strongly cautioned to consider the difficulty of responding to a team member injury or illness during an emergency. Locating, packaging and transmitting a victim safely to the surface will take considerable effort and time.

Emergency medical: Injuries common in confined space workplaces require immediate emergency medical intervention. An onsite rescue team with EMTs can provide prompt first aid, medical care and special medical equipment for emergency care.

Emergency rescue equipment: OSHA specifies mandatory rescue equipment be onsite, including an effective means of retrieval for entries more than five feet into a vertical space. Tripods, winches, rigging, emergency stretcher, ropes, self-contained breathing apparatus (SCBA), etc., are all recommended.

Technical rescue: To adequately protect the forensic entry team, an onsite technical rescue squad with emergency medical technicians (EMTs) is highly recommended.

Ventilation: OSHA requires forced air ventilation shall be so directed as to ventilate the immediate areas where an employee is or will be present within the space and shall continue until all employees have left the space. (CFR 1910.146(c)(5)(ii)(E)(2))



Since confined spaces often contain invisible toxic atmospheric hazards, respiratory protection and special training is required. Photo: SAFETRAN/Daniel J. O'Connell

Air hazards

Since confined spaces often contain invisible toxic atmospheric hazards, respiratory protection and special training is also required. Many confined spaces contain dangerous low oxygen levels, often reduced or deficient in safe quantities of life sustaining breathable air.

Due to bio-activation or oxidation in some confined spaces, oxygen levels may be reduced or deficient. Common explosive or toxic gases like methane, hydrogen sulfide and carbon monoxide are frequently found. Gas or atmospheric testing must be performed before entry with a direct-read instrument, also known as "sniffers." Compulsory atmospheric testing must be performed to determine if acceptable entry conditions exist, prior to and during employee entry. The most common cause of fatality in confined space is low oxygen levels or O₂ depletion. In addition to low air, respirable levels of hydrogen sulfide gas can affect our olfactory acuity, effectively shutting down our ability to smell or detect H₂S gas, and seriously endangering the lives of entrants. Therefore, use of a four-gas detector is a proven means to determine if the confined space has a safe atmosphere.

A written permit required by OSHA before entry is a checklist protocol that helps entrants track and identify hazards, and log entrant in and out of the space. Gas testing enables workers to determine whether atmospheric hazards are present, and if so, ongoing monitoring and ventilation of the confined space must be performed. Gas detectors can alert workers to the presence of invisible hazardous gases and low oxygen. These detectors are explosion-proof direct-read instruments, providing instantaneous digital readouts of atmospheric conditions. Ongoing air monitoring should be maintained throughout the entry, and entrants should carry an air testing instrument with them into the confined space. Should a low air, toxic or explosive concentration be detected, workers must evacuate immediately as audible and visual alarms activate.

The Centers for Disease Control and Prevention (CDC) indicates, "confined space refers to a space which by design has limited openings for entry and exit, unfavorable natural ventilation which could contain or produce dangerous air contaminants, and which is not intended for continuous employee occupancy. Confined spaces include but are not limited to storage tanks, compartments of ships, process vessels, pits, silos, vats, degreasers, reaction vessels, boilers, ventilation and exhaust ducts, sewers, tunnels, underground utility vaults, and pipelines."

Dangerous assumption

Since many confined space atmospheric hazards are invisible or undetectable by sight or smell, employers often assume that a confined space is just another work zone, and fail to understand the complexity of hazards, or to adequately prepare workers for the task.

Operations in vertical confined space with depths greater than five feet may increase the potential for serious fall injury and/or fatality. OSHA mandates that a means of mechanical retrieval must be in place, for safe removal of injured workers during an emergency.

Employers are cautioned to remember that investigations conducted within confined space may have the potential to expose crime scene investigators to the risk of high-hazard safety and health dangers without warning. The importance of adequate safety training, onsite air monitoring, ventilation and careful selection of emergency equipment cannot be overemphasized.

A final thought on Murphy’s Law and confined space rescue—always remember, if anything can go wrong, it will, and in confined space there is no exception to the rule. A proactive approach for protecting employees requires you to have an onsite rescue team ready to take immediate action. This is more than just a good idea, it is a mandatory minimum OSHA regulation.

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