



Safety Alert: Deadly Hydrogen Sulfide and Shipyard Sewage

Shipyard employers and employees must be fully aware of the hazards and dangers of sewage systems on ships and at shipyard shore facilities. In recent years there have been several fatal accidents where up to four workers were killed while working on a sewage system. The principal cause of these worker deaths was the inhalation of hydrogen sulfide (H₂S) gas, which can be generated by sewage. H₂S gas smells like “rotten eggs” and, when inhaled, can render a worker unconscious in seconds and kill them. With proper training and procedures, employers can prevent accidents involving H₂S gas from sewage systems. (Note: On Navy and Coast Guard vessels, the term “Collection, Holding and Transfer system” (CHT system) is commonly used for sewage systems.) For more information about H₂S, please review the [Hydrogen Sulfide Quick Card](#) at www.osha.gov.

BEFORE OPENING OR OTHERWISE BREAKING INTO A SEWAGE HANDLING SYSTEM, TAKE PRECAUTIONS:

SUPERVISION & MANAGEMENT:

- Consult with shipyard safety personnel before assigning work on sewage systems. They should be aware of and ready to help deal with these hazards.
- Ensure you and your workforce have carefully reviewed and understand the position, function, condition and use of all piping, valves, and back-flow prevention associated with the sewage system. (In vessel repair situations, discuss and review the intended work with the vessel's engineering staff or ship superintendent if available.)
- Verify that the system has been chlorinated or otherwise sanitized to kill potentially infectious waste.
- Verify that the system has been emptied, flushed with clean water and discharged to appropriate sewage disposal.
- Verify that the system is isolated (using positive mechanical means) from shore-based sewage disposal systems, and that back-flow prevention, such as check valves and vacuum breakers, is in place and functioning. (Remember, a vessel or pier-side tank connected to shore-side sewage discharge lines is usually downhill from the sewage treatment plant it is discharging to. Failure of isolation may result in the shore-side system's sewage flowing to the pier or into the ship!)
- Ensure that your shipyard competent person, a marine chemist or industrial hygienist are available to inspect and test the atmosphere of the piping or space before it is broken into. This will help verify how effective the flushing was.
- Investigate whether the system piping flows through sealed and otherwise inaccessible spaces, and have those spaces inspected and tested before work begins on the system. (Corroded and failed piping may allow the accumulation of dangerous sewage gases in connected sealed spaces.)
- When uncertain and until the system is proven to have no hazard potential, post a safety watch at the opening of the space who can summon rescue.
- On systems that are enclosed and aboard vessels, ensure that the system-containing space is supplied with exhaust (negative pressure) mechanical ventilation before breaking into the system. Ensure the discharge of the ventilation is to the weather-air and away from the vessel.
- Ensure there is an easy and unobstructed escape path for employees if sewage is released into the work area.
- Train and require that your employees evacuate the work area immediately if they smell sewage, if they sense anything unusual, or if unexpected amounts of liquid begin to enter the space from the system! Hydrogen sulfide smells terrible (like “rotten eggs”) but will quickly disable worker's sense of smell, make them dizzy, unconscious, and then kill them!
- Train and require that when employees must evacuate such a space, they must **NEVER RE-ENTER** until a shipyard competent person, a marine chemist or industrial hygienist tests the atmosphere and certifies that the work area is safe to enter.

ASSIGNED AND AFFECTED WORKERS:

- Follow direction of shipyard safety personnel when opening or working on a sewage system. They will help you do it safely.
- Ensure you have carefully reviewed and understand the position, function, condition and use of all piping, valves and back-flow prevention associated with the sewage system. Get answers to your questions about these systems - they are potentially very dangerous. (In a vessel repair situation, discuss and review the intended work with the vessel's engineering staff or ship superintendent if available.)
- Verify that the system has been emptied, flushed with clean water and discharged to appropriate sewage disposal.
- Verify that the system has been chlorinated or otherwise sanitized to kill potentially infectious waste.
- Verify employer has isolated the sewage system.
- Ensure that your shipyard competent person, a marine chemist or industrial hygienist has inspected and tested the atmosphere of the piping or space before you break into it. This will help verify how effective the flushing was.
- If the system piping flows through sealed and otherwise inaccessible spaces, make sure those spaces have been inspected and tested before breaking into the system. (Corroded and failed piping may allow the accumulation of sewage and dangerous gases in connected sealed spaces.)
- Until the system is proven to have no hazard potential, check that a safety watch is posted at the opening of the space who can summon rescue.
- On systems that are enclosed and aboard vessels, ensure that the space you are in is supplied with exhaust (negative pressure) mechanical ventilation before breaking into the system. Ensure the discharge of the ventilation is to the weather-air and away from the vessel.
- Ensure there is an easy and unobstructed path you can use to escape if sewage is released into the work area.
- Evacuate the work area immediately if you smell sewage, if you sense anything unusual, or if unexpected amounts of liquid begin to enter the space from the system! Hydrogen sulfide smells terrible (like "rotten eggs") but will quickly disable your sense of smell, make you dizzy, unconscious, and then kill you!
- When a space has been evacuated, **NEVER RE-ENTER** until a shipyard competent person, a marine chemist or industrial hygienist tests the atmosphere and certifies that the work area is safe to enter. Talk to the tester and read their posted report before re-entering the space.

Through OSHA's Alliance Program, this Safety Alert was developed through the American Industrial Hygiene Association, the American Shipbuilding Association, the National Shipbuilding Research Program and the Shipbuilders Council of America Alliances for informational purposes only. It does not necessarily reflect the official views of OSHA or the U.S. Department of Labor.