

# Worksheets

## Identifying Hazards

(UBC, 2017)

**Instructions** Use the following scenario to answer the questions below.

Two employees at a corn processing plant were instructed by a supervisor to make repairs to a cornstarch processing tank. Although the employees were unfamiliar with working in this type of environment, they entered the tank to make the repairs as instructed. Each entrant went into the space with tools and wearing gloves, a hard hat, and safety glasses.

The opening to the tank was 12" x 18" and the entrants were forced to crawl in order to enter the space. Once inside, they found the round interior to be coated with a slime that made walking upright difficult. After they were in the tank for only 15 minutes, a liquid began to pour into the tank through an opening. The liquid was clear and emitted no noticeable vapours or odor. While the entrants noticed the liquid, they remained inside and continued working. It did not take long before the entrants began to choke and found it extremely difficult to breathe.

One of the entrants manages to exit the tank, but the other did not. All calls into the tank to the entrant went unanswered. When a rescue was attempted, the opening to the tank was too small to allow entry with a self-contained breathing apparatus (SCBA). Emergency escape masks could not be used because the bottles were not filled with air. An attempt was made to blow air into the space with an air horn, but the vapours proved to be too strong for rescuers to remain near the opening. Personnel in the area complained that their skin felt as if it was on fire. By the time firefighters arrived on the scene and were able to enter the space, the entrant was found dead inside.

## Questions

1. Was the processing tank a confined space? \_\_\_\_\_

2. Why or why not?

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3. What clues indicated that an emergency escape could be difficult?

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4. Why was the emergency rescue attempt unsuccessful?

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5. Should the entrants have entered the space? \_\_\_\_\_

6. Why or why not?

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7. What should the entrants have done when they noticed the liquid?

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8. What should have been done to let the entrants know there was a hazardous atmosphere or a potentially hazardous atmosphere?

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## Landfill Scenario

(UBC, 2017)

**Instructions** Read the scenario and answer the questions below.

An inactive landfill has a manhole which has a flow meter used to track the amount of leachate – contaminated liquid – that may flow from the landfill. Batteries were changed in the flow meter weekly, and over an extended period the meter had not registered any flow. The worker and his assistant were performing a regular battery replacement. The entrance to the manhole was 24" in diameter, and the manhole was approximately 7'-0" deep. Four iron rungs, which served as a ladder, were mounted to the concrete wall of the manhole. The top rung was 36" below the entrance. The flow meter was attached to the top rung with a u-shaped, spring-loaded handle. A cord was looped and tied around the handle.

Upon removing the manhole cover, the worker bent a wire coat hanger and used it as a hook to catch the cord on the flow meter's handle. As the meter was being lifted, the weight proved too much for the wire. The hook straightened and the meter fell into the bottom of the manhole.

The worker entered the manhole wearing a hard hat, safety glasses, gloves, and boots. When the worker reached the bottom, he mentioned smelling a foul odor to his assistant. Before he was able to retrieve the meter, the worker collapsed in the manhole. The assistant called 911. Help arrived, but the victim was pronounced dead after being transported to a hospital. The cause of death was reported as asphyxia with methane gas.

According to the fire department monitoring data, the oxygen concentration at the bottom of the manhole was 2.1 percent, and the flammable vapours exceeded 60 percent of the LEL at the time of the rescue.

## Questions

1. What clues were present that should have indicated to the worker that it may have been unsafe to enter the manhole with only standard PPE?

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2. What did the worker do wrong?

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3. What could have prevented the victim's death?

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4. What kinds of atmospheres were present at the bottom of the manhole? Be specific.

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## Calculating Air Exchanges

(UBC, 2017)

**Instructions** Calculate how long it would take to ventilate a confined space. The size of the space and the effective airflow of the ventilation system are given. The time for one air exchange is determined by dividing the volume of the space by the effective airflow of the system, as shown below.

$$\frac{\text{Volume of space} = L \times W \times H}{\text{Effective airflow in cfm}} = \text{Time for one air exchange}$$

After calculating the time for one air exchange, calculate the time needed to ensure a clean, breathable atmosphere. To do this, multiply one air exchange by the NIOSH recommended 20 air exchanges.

### Questions

1. A confined space that is 30'-0" long, 30'-0" wide, and 10'-0" high, and the effective airflow of the ventilator is 600 cfm.

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2. A confined space that is 50'-0" long, 40'-0" wide, and 3'-0" high, and the effective airflow of the ventilator is 500 cfm.

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3. A confined space that is 10'-0" long, 10'-0" wide, and 4'-0" high, and the effective airflow of the ventilator is 400 cfm.

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4. A confined space that is 15'-0" long, 20'-0" wide, and 6'-0" high, and the effective airflow ventilator is 900 cfm.

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## Identify, Plan, and Execute – A Pit

(UBC, 2017)

**Instructions** Read the scenario below and answer the questions that follow.

While working in a preformed pit, the carpenters were forming concrete support columns and pile drivers were welding and underpinning tie down anchors to exposed pile. Another crew was blinding an old, exposed sewer pipe that was being rerouted. There were three different subcontractors working for the general contractor. It was summertime, and the heat and humidity were very high. All of the crews complained of headaches. All three crews had a difficult time breathing. All crews felt nauseous at the end of the workday. Generators and welding machines were outside the hole, and exhausted in a down wind direction. The general contractor's lack of coordination between the carpenters and pile drivers meant both crews were working the same shift. Also, both crews had a combined number of twenty workers and there was only one ladder to access the pit.

The GC's supervisor claimed that there was not a need to institute air monitoring or work within the OH&S/WSH Confined Space Construction standards because the pit was open to natural air movement.

As the foreman for one of the above crews, evaluate the situation and prepare a way to protect you fellow workers.

### Questions

1. Identify any necessary safety or health concerns.

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2. Plan the task and incorporate all necessary safety and health concerns.

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3. Execute the plan, while adhering to OH&S/WSH Standards.

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