

# Risk Management – Chlorine Release

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This drill requires hazmat responders to assess the hazards present and use the ALOHA air model to evaluate the potential risks of exposure.

Cost of Drill: \$0.00

Time required: 60 minutes

## Teaching Points

1. Identify the risks present in an incident.
2. Select appropriate response actions (non-intervention, defensive actions or offensive actions).
3. Demonstrate the ability to identify risks and benefits present and evaluate possible courses of action.
4. Demonstrate the ability to distinguish between acceptable and unacceptable risks.
5. Identify factors that indicate an unacceptable risk.

## Note

1. There is no “school solution” and there are no right answers (but there may be a few wrong ones).
2. If you want more information, ask for it (you may not get it but you can still ask!).

## Materials List

1. ALOHA sir model software
2. Projector, screen and laptop to display simulated incident scene (optional)
3. Standard classroom and furniture (tables, chairs, etc.)
4. Appropriate number of laptop computers for exercise participants to use.

## Setup Directions

Arrange the exercise room as desired. Take precautions to minimize safety issues generated by the number of power strips and extension cords needed.

## Initiating the Drill

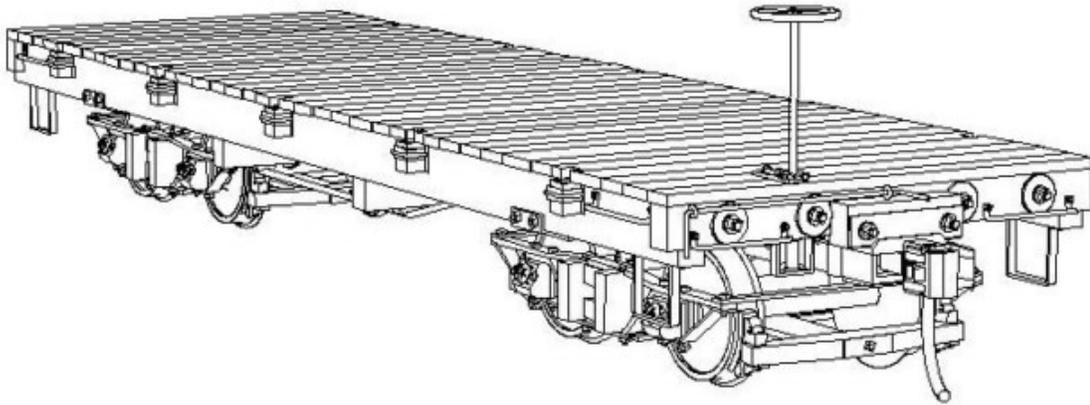
Give the drill participants the initial narrative (see below):

## Initial Narrative

On July 21<sup>st</sup> at about 0500 two freight trains were traveling on the same track. One train was westbound. The other was eastbound. As the eastbound train was leaving the main line to enter a parallel siding it was struck by the westbound train. The westbound train struck the midpoint of the 123-car eastbound train.

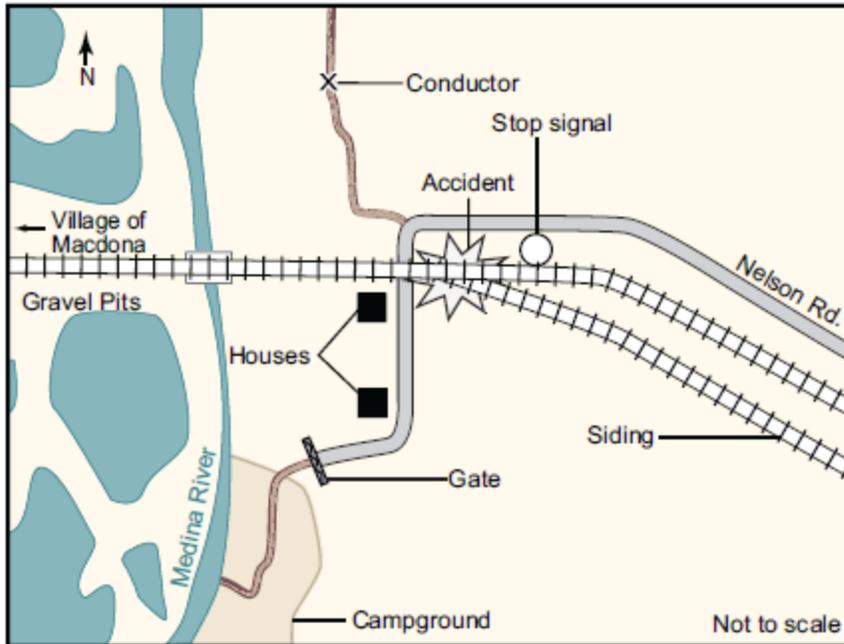
The accident occurred at the west end of the rail siding. The collision derailed 4 locomotive units and 19 cars of one train and 17 cars of the other. As a result of the derailment and pileup of railcars, a pressure tank car loaded with liquefied chlorine, was punctured.

Crewmembers said they saw a flatcar strike the end of the car carrying the chlorine. They said the corner of the flatcar hit the right corner of the A-end of the chlorine car about two feet below the top of the car. The corner of the flatcar was about 12 inches high (see below).



Members of the local Volunteer Fire Department arrived on scene about 0515. They reported seeing a yellow cloud that smelled like bleach. They immediately requested assistance from the County FD hazmat team.

There are a handful of single-family dwellings and other structures southwest of the accident scene. They are less than 200 yards from the accident site. The derailed trains are blocking the only road that leads to the houses. A flooded river blocks access to the other side of the residential area. This is a rural area and is covered with trees and other vegetation. Responders can only access the area on foot.



The engineer of one train radioed the dispatch center and told them both he and the conductor were injured. He said they were going to “Make a run for it...” but he didn’t say which direction they would go. Several minutes later the engineer called his dispatch center on his cell phone and said he was less than 100 yards from the accident scene and that he was suffering from severe respiratory distress. He said the conductor was overcome by the gas and collapsed soon after exiting the train. The conductor weighed over 325 pounds and the engineer wasn’t able to carry him to safety.

The incident commander asks you for information to use in evaluating the “risk versus gain” of ordering a rescue attempt. She is considering sending responders into the hot zone to attempt to rescue the residents of the houses near the accident scene. The IC wants to you to evaluate whether or not the residents of the houses may still be viable.

Weather: air temperature: 75° F. humidity: 92%. Winds are from the southeast at 5 knots. Skies are partly cloudy.

Use the ALOHA air model to evaluate the threat the chlorine gas poses to responders who may attempt to rescue the residents of the area near the accident.

Toxicological data for chlorine:

AEGL 3: 50 ppm (10 minute exposure)

IDLH: 10 ppm

LClo: 550 ppm (5 minutes)

Intense coughing: 30 ppm

Serious damage: 60 ppm

# Questions to Answer

If responders enter the area downwind of the incident scene, is this an acceptable or unacceptable risk?

Would responders need respiratory protection? If so, what type?

Based on the results you obtain from the ALOHA air model, what type of response action do you recommend to the IC?

Based on the results you obtain from the ALOHA air model, do you recommend to the IC that responder attempt to rescue the occupants of the house nearest to the incident scene?

Based on the results you obtain from the ALOHA air model, what protective actions (if any) do you recommend the IC implement?

Assuming the release rate doesn't change, will expected changes to weather conditions change the recommendation(s) you make?

The ALOHA air model requires various inputs. One piece of information it will want is the size of the opening the chlorine is leaking from. The chlorine cloud is obscuring the incident scene so responders can't see exactly where the leak is coming from or the size of the opening.

## Suggested Findings

The ALOHA air model should show that the atmosphere in the houses in the hot zone is likely to be well above life-threatening levels.

The exercise participants can select different Levels of Concern in the air model. Using this feature will allow them to more accurately evaluate the viability of the residents. The same is true of the Concentration at Point feature. Using this will allow the exercise participants to estimate the chlorine concentration in structures at various points.

The length and width of the Toxic Threat Zone the air model calculates should show that responders need to wear appropriate respiratory protection when entering the hot zone.

The incident occurred early in the morning. The atmospheric conditions will change as the sun comes up. The exercise participants should use the Date and Time Options in the air model to calculate predictions for different times. They should also use the Atmospheric Options feature to calculate predictions for different weather conditions.

Someone has suggested sending a helicopter to rescue the persons trapped in the nearby houses. Based on the ALOHA air model calculations do you think this a reasonable tactic?

Note: in the incident this scenario is based on, three people died. One was a train conductor. The other two were occupants of the residential structure closest to the accident site. Six responders were exposed to chlorine. All were treated and released from the local hospital.