



Safe procedures for vacuum truck operations

At the site of an oil and gas well, three workers were exposed to highly toxic gases while transferring hydrochloric acid from a tank truck to a vacuum truck. The vacuum truck cargo tank already contained tank bottom sludge from a sour gas site as well as chemical-containing waste water from another well. As the hydrochloric acid mixed with the hazardous waste fluid already in the vacuum truck tank, a chemical reaction occurred. As a result, toxic gas escaped from the vacuum truck discharge vent and likely from its pressure relief valve as well.

One worker experienced dizziness but managed to walk away to safety. However, the other two workers passed out. Only one slowly regained consciousness by himself. The other worker needed first aid to be revived.

Risk of exposure to toxic gases during vacuum truck operations

During vacuum truck operations, workers are at risk of being exposed to toxic gases. The potential for releasing toxic gases exists whenever vacuum trucks suck up liquid waste to be transported to disposal sites. For example, the waste water from oil and gas wells might contain highly toxic gases such as hydrogen sulfide (H₂S). Low levels of exposure to H₂S can result in symptoms such as eye irritation, sore throat, nausea, and vomiting. At high levels of exposure, workers not wearing the appropriate protective equipment will pass out. Too much of the gas can kill a worker in seconds.

H₂S is only one of the toxic gases that may result from vacuum truck operations. Any mixing of liquid waste with other waste products can result in unpredictable chemical reactions that produce other gases just as dangerous as H₂S. For example, the hydrochloric acid used at oil and gas sites may react with the waste products already in a tank to release hydrochloric acid fumes. Workers may be exposed to potentially lethal levels of hydrochloric acid fumes if they aren't wearing the appropriate protective equipment.

This bulletin reviews the responsibilities of prime contractors and employers for ensuring safe vacuum truck operations.

Prime contractor and employer responsibilities

Part 23 of the Occupational Health and Safety Regulation sets out the requirements for the operations of the oil and gas industry – including vacuum truck operations. The responsibility for compliance rests not only with the employer of the workers involved in vacuum truck operations but also with the prime contractor at multiple-employer work sites. The following are key points from Part 23 of the Regulation.

At a multiple-employer workplace where overlapping activities may create hazards, the prime contractor must appoint a qualified site safety coordinator. The coordinator's responsibilities include informing all employers about the hazardous products used and produced on site. The coordinator must ensure that employers and workers are aware of the hazards that may arise from overlapping work activities. The coordinator must also ensure that these hazards are adequately addressed during work activities.

Employers are responsible for identifying work activities or circumstances – including the release of toxic gases – that may injure workers. Employers must implement safe work procedures to eliminate or minimize the risk of exposure to toxic gases. In addition to providing safe work procedures, employers are responsible for the training and supervision of workers involved in vacuum truck operations.

Safe work procedures for vacuum truck operations

Safe work procedures for vacuum truck operations must address the potential for chemical reactions and the potential release of toxic gas or fumes. They must also take into account the variety of fluids or substances that vacuum trucks typically carry.

Before starting any vacuum truck operations –

- Make sure that workers understand the following:
 - the hazards associated with the liquids or substances to be vacuumed or transferred
 - the evacuation and rescue procedures in the event of a toxic gas leak
- Ensure that air quality monitoring at the work site is continuous at such locations as the discharge area of the vacuum truck venting hose.
- Ensure that first aid is readily available on site in the event of exposure to toxic gas.
- Consult the manufacturer's instructions to confirm that the vacuum equipment is designed for the particular transfer operation.
- Ensure that all equipment – including tank and vacuum trucks, and pumping equipment – is in safe working condition. Ensure that the tank interior, filter baghouse, and cyclone separators are clean and free of any substances that may react with the liquids to be vacuumed or transferred.

To prevent exposure to toxic gases during transfer operations –

- Never transfer fluids from one truck to another unless it has been established that no chemical reaction will occur.
- Position trucks to minimize exposure to any discharged gases and fumes.
- Ensure that discharge lines are long enough and large enough for safe operation.
- Position vent lines away from workers and workstations, including control panels, valve handles, gauges, shut-offs, and hose attachment points. If possible, use a vertical exhaust stack to divert exhaust gases away from workers and ignition sources.
- Check air monitoring equipment during operations to confirm that venting is proceeding safely.

- Monitor the following:
 - tank level indicators to avoid overfilling
 - tank pressure gauges to avoid over-pressurizing receiving tanks or creating excessive vacuum in supply tanks
 - tank temperature gauges to help identify possible chemical reactions
- Minimize the air introduced into the system when pressure loading or unloading. Submerge the suction line in liquid, or reduce the vacuum pump speed when skimming or nearing the end of a load.
- Maintain a log of transported fluids and any potential residue.
- Use gravity loading and unloading whenever possible.
- Use a vapour recovery system – when available – to avoid venting tanks directly to the atmosphere.

Instruction, training, and supervision of vacuum truck operators

Employers are responsible for properly training, instructing, and supervising workers. These responsibilities include the following:

- Ensure that all workers attend pre-work meetings. These meetings should cover the hazards to which workers are exposed by their work.
- Train workers how to use personal protective equipment – such as H₂S personal alarms and air-supplied respirators.
- Ensure that all workers are adequately instructed in the hazards of toxic gas exposure and trained to know what to do in case of a release.
- Ensure that all workers have completed a site-specific orientation.

For a checklist on the safe operation of vacuum trucks and fluid haulers, go to WorkSafeBC.com. At the top of the home page, click on **Safety at Work**. Then under the **Industries** heading, click on **Petroleum (Oil and Gas)**. “Vac Truck and Fluid Hauling Inspection Checklist” will appear under **Popular Picks**.



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