

**SAFETY ALERT # 05 – 2010**  
**H<sub>2</sub>S INCIDENTS EXPOSE NEED FOR IMPROVED HAZARD MANAGEMENT**

<b>Function:</b> All Oil and Gas Operations	<b>Release Date:</b> March 18, 2010
<b>Incident Type:</b> Hazardous Substance Exposure	<b>Country and Region:</b> Western Canada

**Summary:**

Recent H<sub>2</sub>S incidents highlight the importance of effective hazard identification and control.

**Description of Incidents:**

**Case Study #1 – Trucker Knocked Down While Disconnecting Load Line in Central Alberta**

The incident occurred when a contract fluid hauler was delivering a tank truck of 4% sour produced water to a battery site. When the tank truck was empty, the driver put his pump lever into neutral and isolated the tank truck from the battery tankage by closing the load line valve. He walked back to his truck pump controls to shift the pump controller into suck mode (i.e. load). Instead he shifted the control lever into pump mode (i.e. unload). This caused the hose to pressure up with 9% sour gas from the vapour recovery unit (VRU) vent line.

The driver walked back to the load line isolation valves and connections, which were located inside the utilidor creating a restricted space hazard. As the driver unhooked his load line, the pressure inside the hose began to release blowing sour gas and an oil mist into the area where the driver was standing. The trucker's H<sub>2</sub>S monitor alarmed but he was overcome by H<sub>2</sub>S before he could evacuate the area. A second tank truck operator waiting to unload his truck saw the driver lying unconscious and was able to safely rescue and revive the downed worker. Poorly labelled pump controls and failure to observe company requirements for wearing respiratory protective equipment while connecting and disconnecting load lines were identified as contributing factors.



**Photo showing the truck loading facility where the H<sub>2</sub>S knockdown occurred**



**Photo showing position of trucker when connecting and disconnecting load lines**

In Case #1, the following corrective measures were taken to prevent future incidents:

1. Revise the design of load out at this and similar facilities to eliminate the restricted space hazard created by the utilidor and the spill containment system.
2. The labelling of truck pump controls was improved ensure all pump levers are clearly marked.



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3. Complete a site-specific orientation with all truckers loading and unloading at facility and the use of safe work agreements.
4. Confirm truck loading and unloading procedures at facility including a review of the design of loading and unloading equipment, site-specific procedures for facility and company rules regarding the use of respiratory equipment when disconnecting load and vent lines.

#### **Case Study #2 – Well Service Crew Member Exposed to H<sub>2</sub>S in SE Saskatchewan**

Well workover operations were begun to repair the well, which was down due to a suspected rod failure. The well was 'killed' using sour (2000 ppm) produced water from the same well. The well servicing crew had finished running rods into the hole. While they were laying down the remaining rods, the rig manager noticed that well was starting to vent. He instructed the driller to remove the rod table and install the stabbing valve. While installing the stabbing valve, the driller was exposed to approximately 34-ppm H<sub>2</sub>S gas as recorded by his 4-head personal monitor. The rig manager noticed the driller hunched over coughing and dry heaving and went over to see what was wrong. Operations were shut down and the driller was transported to a near-by hospital to be examined by a doctor. Increased crew turnover and lack of crew familiarity was identified as a contributing factor.

In Case #2, the following corrective measures were taken to prevent future incidents:

1. Review well workover standards. Revise workover procedures to utilize non-sour kill fluids or an H<sub>2</sub>S scavenger to reduce / eliminate sour gas hazards during well repair operations.
2. When using an H<sub>2</sub>S scavenger, ensure MSDS is reviewed in detail with rig crew to confirm hazards and handling requirements prior to commencing well operations.
3. Review and confirm Sour Service Code of Practice with well site supervisors. Identify and enforce site-specific rules and procedures with all contractors.
4. Reviewed skill level and experience of rig crews with service provider. Confirm that all crews have the required training and experience to complete planned activities safely.

#### **Case Study #3 – Sour Gas Release from Production Storage Tank in NE BC**

H<sub>2</sub>S gas was released from a production storage tank at a sour gas compressor station when a separator dump valve stuck in the open position. The separator dumped directly to the storage tank resulting in a high gas flow, which overloaded the tank vent system. Increased pressure in the tank caused the thief hatch to lift releasing a large volume of 26% H<sub>2</sub>S gas. Once the release occurred, operating and maintenance personnel were able to safely evacuate the plant area but were unable to access their vehicles, communication equipment and personal protective equipment for close to an hour. Outside temperatures were -25 °C.

In Case #3, the following corrective measures were taken to prevent future incidents:

1. The 'V' ball dump valve was replaced with a plug and cage style control valve to improve flow control.
2. The design of the fluid dump system was changed to eliminate direct dumping to the storage tanks.
3. Upgraded communication and emergency egress equipment.
4. Revised plant emergency procedures and equipment including parking, muster areas and location of PPE.



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#### We Need To Learn More From These Incidents:

While our industry works hard to reduce H<sub>2</sub>S exposure and the potential for worker fatalities, this continues to be a critical hazard. Key questions for you to consider at your next safety meeting:

**1. Identify Stakeholders => Confirm Roles and Responsibilities**

*Is this job safe to do as planned or is a change required to create a safe work situation? Is additional planning and communication required by each of the parties involved to identify the hazards and improve worksite safety?*

**2. Identify and Control Hazards => Reduce Risk of Planned Operations**

*Is it necessary to complete a safety review of the design to reduce potential safety hazards? Is additional effort required to identify the general and industry-specific requirements that apply to the planned operations?*

**3. Review Effectiveness of the Controls => Assess Potential for Human Error**

*What hazard controls have been put in place and are they working effectively? Are all stakeholders monitoring their operations to ensure 'rules' are being enforced? Has the potential for errors been considered and is there a need for additional or improved controls?*

A more detailed "Lessons Learned Report" on hazardous exposure incidents is planned for 2010.

#### H<sub>2</sub>S Safety Resources:

The following publication related to H<sub>2</sub>S safety are available and may be useful references at future safety meetings:

**Canadian Association of Petroleum Producers (CAPP)**

- [Occupational Health and Safety of Hydrogen Sulphide \(H<sub>2</sub>S\)](#)

**WorkSafe Alberta, BC and Manitoba** have each published bulletins on this hazard:

- Alberta: [Hydrogen Sulphide at the Worksite \(CH029\)](#)
- British Columbia: [Hydrogen Sulphide in Industry](#)
- British Columbia: [Safe Procedures for Vacuum Truck Operators \(WS 2009-05\)](#)
- British Columbia: [Vac Truck and Fluid Hauling Inspection Checklist](#)
- Manitoba: [Hydrogen Sulphide \(H<sub>2</sub>S\) Exposure in the Petroleum Industry - Bulletin 173](#)

*Note: H<sub>2</sub>S – The Killer is currently being updated by WorkSafe Alberta. The Alberta Occupational Health and Safety Bulletin titled "Occupational Health and Safety Guidelines for the Handling and Transportation of Bulk Sour Products" was rescinded and is no longer in effect.*

**Alberta Transportation** has issued three documents detailing relevant TDG requirements:

- [Transportation of Dangerous Goods in the Oilpatch](#)
- [Transportation of Sour Water and Sour Crude Oil](#)
- [Transportation of Dangerous Goods by Bulk Dealers](#)

#### Contact:

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