

## SIGNIFICANT INCIDENT ALERT

### CS Energy Ltd.

Frank Welch  
Health and Safety Manager  
Postal Address: GPO Box 769,  
Brisbane. Qld. 4001.  
Phone: (07) 32229395  
Fax: (07) 32229553

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**INCIDENT DATE:** 20/12/2004

**INCIDENT NUMBER:** 1969

### INCIDENT DETAILS

#### Swanbank Power E Station Gas Yard - Personal Injury

A CS Energy Operator was injured when a vent pipe, which bent as a result of venting gas, struck him. The work was being performed to restore the gas line pressure within the Gas Yard in preparation for bringing the Gas Turbine on line. High-pressure natural gas at 6.3 MPa was vented during the incident.

The vent pipe is fabricated from 25mm nominal bore black pipe and had a 90 degree bend at the top of the pipe to prevent ingress of water and vent the gas away from the operator standing at the valves. The end of the pipe was covered with fine steel mesh to prevent ingress by vermin.

During venting of the line the undetectable reactive forces resulted in excess mechanical stress forces at the base of the vent pipe causing it, without prior warning, to “whip” over and unexpectedly hit the worker engaged in the venting operation

### EXTENT OF INJURY/ DAMAGE

The vent pipe struck the worker and the force knocked him to the ground. He suffered injuries to his head, neck and shoulder. The head injury laceration required stitches. The injuries to his neck included two compressed vertebrae.

The discharge pipe was damaged and the pressure relief valves were removed and required replacement.

### SEVERITY OF INCIDENT

**HIGH:** The incident resulted in serious injury. Minor plant damage occurred to the vent pipe however there was a potential for an explosion if the pipe had struck the crushed aggregate ground and caused a spark creating an ignition source.

### ACTION TAKEN

The worker was given first aid on site and taken to hospital to for treatment.

All work associated with venting of gas lines in the gas yard was stopped until immediate control measures were taken and the area made safe. A design review was undertaken on the gas yard as part of the incident investigation.

Recommendations to control the risks associated with vent lines include:

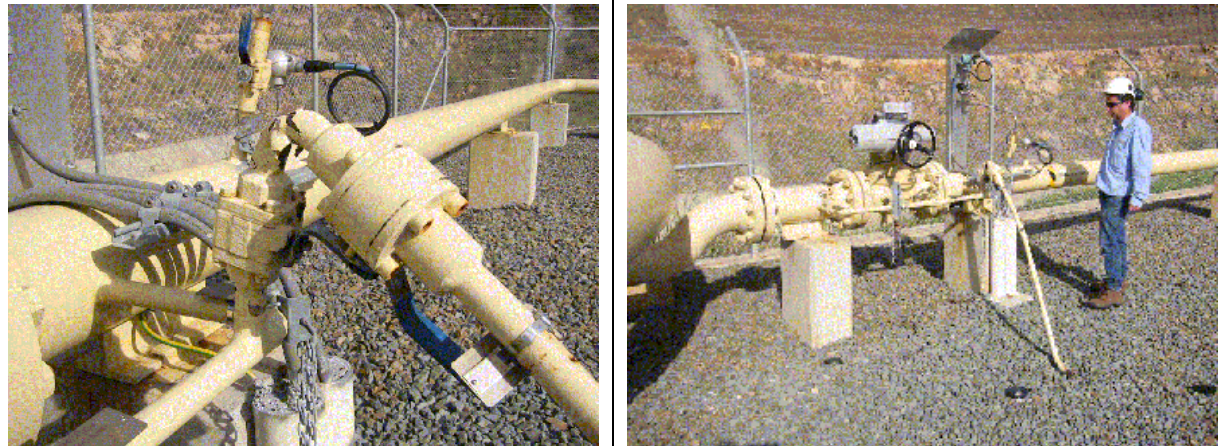
- The type of valves used on vent lines – a globe valve should be used in series with another valve (ball, globe, gate) to allow venting of the gas to be “throttled”.
- Locating the vent pipe discharge point away from the area where the valves are operated.
- The vent pipe design and installation is to be analyzed to assess the stresses imposed on the disposal piping as a result of reaction forces created when the pressure relief valves are discharged.
- Provisions should be made for anchoring or restraining vent pipes related to these valves where analysis indicates that is necessary.
- Where the atmospheric vent handles combustible vapors, the outlet from the vent should be elevated 3 meters above any adjacent equipment, building, chimney, or other structure.

- Provisions should be made for drainage of each vent pipe so that liquid cannot accumulate in the vent.
- The height of vent pipes and bends of 90 degrees or 180 degrees should be designed, arranged and supported so as to withstand reaction forces due to let down or discharge.
- Fitting flapper style caps at the vent outlet (which fall shut under gravity and open under pressure of the gas flow). This will stop rainwater ingress and can be designed in lieu of bends in the pipe. The flapper caps are to be adequately secured to the pipe to prevent them become a “missile”.

### LEARNINGS

- The worker was wearing an industrial safety helmet at the time of the incident. That item of personal protective equipment substantially reduced the severity of the injuries associated with being struck on the head by the vent pipe.
- There were no operating procedure failures or environmental factors that contributed to this incident

### PHOTOGRAPHS



**CONTACT:** Frank Welch, CS Energy Health & Safety Manager.  
Phone: 07 32229395 Mobile: 0408 721 455. Email: [fwelch@csenergy.com.au](mailto:fwelch@csenergy.com.au)