



# SAFETY ALERT

## Short Circuit in Connector Assembly Causes H<sub>2</sub>S Gas Leak

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| <b>Safety Alert:</b> #22 - 2010        | <b>Release Date:</b> August 24, 2010     |
| <b>Incident Type:</b> Faulty Equipment | <b>Country of Origin:</b> Western Canada |

### Description of Incident:

- A production well with approximately 29% H<sub>2</sub>S concentration was prone to tubing hydrate formation during start-ups due to low temperatures, high pressures, high H<sub>2</sub>S content, and the presence of water and hydrocarbons.
- Because of these ongoing hydrate problems, a triskelion and connector assembly were installed in the well and attached to the production tubing.
- Operations and technical advisors were in the process of entering start parameters into the VFD logic, when a sudden release of gas was heard around the wellhead.
- Through initial observations, it was concluded that the leak was coming from below the master valve but above the wellhead bonnet, and therefore they would be unable to stop the leak.
- A Level 2 emergency was assessed and emergency response procedures were implemented.

### What Caused it:

Examination of the equipment revealed excessive overheating which contributed to this incident. Damage observed to the heat tape assembly;

- Manufacturer found that the failure was caused by excessive temperature created by a short circuit in one of the connector wires; mostly on the centre connector of the three connectors in the assembly,
- The outer two connectors did not show signs of excessive heat; however, the components in the centre connector were completely charred, indicating temperatures in excess of 500°F.
- The short was most likely above the connector assembly, directing the current from the outer two legs back through the grounded centre leg, which created a current overload and excessive heat.
- Amperage chart showed when the heat tape assembly was started, two of the three connectors were running at 120 amps, while the third never got above 22 amps. The low amperage in the third connector indicated that this was most likely the short circuit location.
- The excessive heat of the short circuit destroyed the centre connector, allowing down hole gas pressure to push the wire located inside the connector to surface.
- This connector wire was found burnt off and wadded up in the surface junction box.
- The pressure was too high for the bracket assembly seal, and the seal ruptured.
- The heat tape passed inspection, indicating that the short did not originate in the heat tape.

Based on the location of the heat damage, it is believed that the short circuit occurred either in the connector assembly or in the wires between the connector assembly and the wellhead. Based on the heat-affected areas on the exterior and interior of the centre connector, this is believed to be the most likely short circuit location.

Investigation identified that a short circuit could be caused by contact with H<sub>2</sub>S gas leaking into the connector assembly and damaging the wires or by a blown or faulty fuse in the connector assembly, because of the extensive heat damage to the interior of the centre connector. Unfortunately, nobody was able to conclusively determine the cause of the short circuit.

### Corrective Actions Taken

All wells with these appliances were removed from operation.

### Contact:

For more information of event, please contact [safety@enform.ca](mailto:safety@enform.ca)

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