

National Energy
Board



Office national
de l'énergie

File AFMSA-INC-2005 48
23 December 2005

To: All companies under National Energy Board jurisdiction
Canadian Energy Pipeline Association
Canadian Association of Petroleum Producers, and
provincial regulators

**National Energy Board Safety Advisory
NEB SA 2005-03**

Attached is a safety advisory regarding the hazards associated with the possible ramifications of a programmable logic controller (PLC) failure. The Board expects that this advisory be given wide circulation to personnel involved in maintenance and pipeline operations within your organization.

If you have questions concerning this initiative, please call Karen Duckworth at (403) 299-3669 or Ken Paulson at (403) 299-3194.

Yours truly,

A handwritten signature in cursive script that reads "Mary Lou Schatz".

for
Michel L. Mantha

Attachment

444 Seventh Avenue SW
Calgary, Alberta T2P 0X8

444, Septième Avenue S.-O.
Calgary (Alberta) T2P 0X8

Canada The word "Canada" in a bold, sans-serif font, with a small Canadian flag to its right.

Telephone/Téléphone : (403) 292-4800
Facsimile/Télécopieur : (403) 292-5503
<http://www.neb-one.gc.ca>



Programmable Logic Controller (PLC) Failure

Incident Description

In October 2005, a programmable logic controller (PLC) controlling the compressor unit failed. Immediately after the failure, the suction and discharge valves closed, but the electric motor for the unit continued to operate and went into surge. This resulted in excessive vibration of the piping, severing a NPS 2 load and purge line at the flange connection outside the compressor building. Approximately 25 minutes after the PLC failure, the motor experienced an explosion. The venting of gas from the two inch pipe and the subsequent explosion caused considerable damage to the facility.

Preliminary Observations

The incident is under investigation by the National Energy Board and the Transportation Safety Board. At this point, it appears that the low signal generated by the PLC at the time of failure did not trip the breaker feeding the motor allowing the motor to continue to operate against closed valves and begin to surge. All other systems had shut down, including the lube oil system, which allowed the compressor seals to dry out. Natural gas may have entered the compressor motor via the compressor seals where an ignition source was present.

Preventive Actions

Failure of PLCs may not result in a fail safe condition. In the above case, the motor continued to operate after the suction and discharge valves closed resulting in overheating of the compressor, excessive vibration and eventual failure of the NPS 2 load and purge line, and an explosion within the motor casing.

Breaker operations should be tested regularly to ensure breakers function appropriately for all foreseeable failure modes including PLC failure.

For further information regarding this advisory please contact Karen Duckworth of the National Energy Board at 403-299-3669.