

Board Of Review
VCM Release of October 26, 1995

Attending:

Dave Laubacher	Plant Manager
Mark Reynolds	Manufacturing and Environmental Manager
Ron Paige	Maintenance & Engineering Manager
Mike Cherry	Shift Leader
Steve Johnson	Sr. Process Control Engineer
L.C. Smith	Outside Head Operator
	DCS Operator
Bill Lindstrom	Maintenance Engineer

Introduction

At 10 am October 26 1995 the relief valve on Able Poly lifted, due to a hydrofull condition, releasing 1.9 lbs of VCM into the atmosphere. The release exceeded the SARA reporting threshold and was subsequently reported to local, State and Federal authorities.

Corrective Actions

The following measures shall be taken to prevent reoccurrence of the incident:

1. Review backflushing procedures and actions to take in response to hydrofull conditions with all operating personnel. - Lewis Payne
2. Update existing procedures with improvements considering the newly installed A-Train equipment. - L.C. Smith, Lewis Payne
3. Consider automation to vent a hydrofull poly condition from the control room. - R. Paige
4. Review incident at all monthly communication meetings in November. - M. Reynolds
5. Review logic of water adjustment made prior to charging phase and decide best practice. - S. Johnson
6. Complete checks of injection and seal water meters and cause of meter error. - L. Hendersen
7. Consider injection water shutoff at a 3 psi pressure drop. - S. Johnson
8. Reinforce the need for "immediate reporting" with all plant personnel. - M. Reynolds
9. Update Emergency Communications Procedures with new TNRCC Regional office telephone number. - M. Reynolds
10. Take appropriate disciplinary action. - Wayne Sullivan, M. Reynolds
11. Submit written reports to the Deer Park LEPC, TNRCC Regional & State offices, Harris County Pollution Control Board and EPA Region 6. - M. Reynolds
12. Consider direct tie in of Gas Alarm with rupture disk pressure switches. - R. Paige
13. Determine if existing poly relief design requires upgrade to Geon engineering standard ST-524. - R. Paige

Narrative

On the morning of October 26 1995, 110x427 charge #1278 in Able Poly had completed reaction and was in "pressure drop". Equipment problems at the product stripper had created high inventory levels which resulted in charge 1278 being held in the poly longer than normal. the DCS operator had just returned the product stripper to service and had started to process a charge that had been held in Baker Poly. Before Baker Poly had been emptied, Able poly began showing signs of a hydrofull condition.

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shut off the flow of injection water to Able Poly to slow the pressure rise. interrupted the drop of Baker Poly and opened the drop valve on Able Poly. Able Poly pressure immediately dropped from 141 to 129 psig and stopped abruptly indicating the poly drop header or bottom valve had plugged. L.C. Smith, the Outside Head operator, reported to the drop pump area to investigate. L.C. opened the flush water on the pump suction and flushed through the pump and found no blockage. He then shut the valve to the suction of the pump to backflush into the poly. Approximately 20 seconds later radioed that the poly pressure was on a severe rise. L.C. immediately opened the pump suction and shut off the flush water.

noticed the rupture disk pressure switch alarm had activated. Mike Cherry, the shift leader, was notified. Mike proceeded to the top of Able Poly to determine whether the relief valve had lifted. Upon reaching the area he met Lewis Payne who had also reported to the area to make a similar determination. Lewis had just started to drain the vent stacks. The east vent stack was cool and determined to be intact. A small amount of rainwater was drained from that stack. The west rupture disk stack was warm and contained a larger quantity of water. Near the completion of draining, a small amount of resin and vinyl vapor came out of the stack drain confirming the relief valve had lifted.

Mike reported the event to Mark Reynolds. Mark indicated he would make the required notifications to outside agencies. Mark immediately called the Deer Park LEPC at 10:33am. He continued to notify the TNRCC Regional office, the Harris County Pollution Control Board, the TNRCC Austin office (SERC) and the National Response Center. All calls were completed by 11:11 am.

As notifications were being made, and L.C. vented Able poly to A-Column Feed Tank and successfully cleared the blockage by backflushing the poly. The poly was dropped without further incident. The poly was placed on recovery and prepared for opening. When the poly was opened only a few very small resin chunks were found. Maintenance began replacing the rupture disks and relief valves.

Facts Surrounding The Incident

That afternoon a Board of Review was held to review information from the incident. During the Board of Review the following was discussed:

1. **The operators failed to vent the poly prior to the first backflush.**
L.C. had witnessed the sharp drop in pressure when the reactor bottom valve was opened. He assumed the sharp drop to indicate enough of the reactor contents had dropped to allow a backflush. Later review of the blowdown tank level revealed that no material had been transferred. L.C. was aware that the drop had stopped due to pluggage. He was not aware that the reactor pressure had returned to 150 psig prior to starting the initial backflush.
2. **The previous charge in Able Poly had plugged during its "drop phase".**
The charge dropped from Able poly prior to charge 1278 had experience similar drop problems. For this reason the bottom nozzle was inspected when the reactor was opened. Nothing significant was found.
3. **Able Poly Charge 1278 did not reach the "end of run pressure drop"**
As charge 1278 started into "pressure drop" the reactor had already become hydrofull. The hydrofilled condition prevented the pressure from falling below 135 psig. This prevented the Provox software from detecting it's "end of run" pressure drop and thus did not shut off the injection water. This resulted in an increased pressure rise until the operator shut it off manually. Provox logic does shut off injection water should poly pressure exceeded 155 psig. or reaches a maximum run time for the recipe. It was agreed to consider a much smaller pressure drop to shut off the injection water.

Two likely causes which create hydrofull conditions were considered; i) Prior charge or rinses not adequately emptied, or ii) meter errors. Since the prior charge had problems draining, it was suspected that the rinse phase might not have emptied properly. Inspection of the "time to second empty light" indicated the rinse had properly drained. Meter accuracy was also discussed. The poly injection water and seal water meters were recalibrated by maintenance. A 15% error was found in the seal water rate and a 50 % error was found in the injection water rate. These meter had been calibrated two months prior. That calibration and reason for the shift is still under investigation.

Finally a portion of the Provox precharge logic was discussed. Prior to charging a reactor, the software allows operators to repump seal water accumulation out of the poly or adjusts the initial charge water in an amount equal to the seal water metered into the poly. There was a 3 hour delay prior to the charging of charge 1278. The operator chose not to repump the accumulated water. Since the meters were in error, the Provox was not able to properly compensate the initial charge water. It was agreed to add guidance to require a pumpout rather than accept the adjustment whenever delays exceed specified values.

4. Observations of the release

The area monitor systems did not detect any ambient VCM concentrations at the time of the release. Craftsmen working near Able poly did not notice any venting from the poly. Inspection of the vent stack found less than one pound of pvc resin residue. Upon inspection, no sign of materials exiting the top of the stack pipe was found. It is suspected that the shock created from the rupture disk failure only caused an instantaneous lift of the relief valve. Independent estimates made by the Lewis Payne and Mike Cherry indicated between 5 to 10 gallons of slurry was drained to the stack.

5. Design of Relief System

During a review of the incident with other Geon Plants, variations in relief designs were discussed. The current Geon design standard for poly relief systems require an automatic valve or relief valve be present between the rupture disk and relief valve to insure that no pressure develops between the relief devices so as to affect the relief design. The Geon standard ST-524 states that ASME Vessel Code only requires a sensing device but Geon design standards require automatic venting. The current polys were built under Diamond Shamrock standards and have no autovent between the disk and relief valve. Ron Paige will confirm whether a retrofit is required and submit an AR for upgrading this system.

Management Systems Investigation

1. Reporting Procedures

The plant emergency reporting procedures requires notification to outside agencies to begin within 30 minutes of an event. The first calls were initiated just at the 30 minute limitation. Efforts to improve agency notification will be emphasized.

A minor problem in notification occurred due to a change in the telephone number of the TNRCC Regional Office. The plant Emergency Procedures will be updated accordingly.

2. Training

The operators involved with the incident had proper training and were very knowledgeable of the process and the procedures. Both operators are considered to be very capable. I has 19 year experience in the area and has operated the Provox console since its installation in 1993. L.C. Smith has 21 years experience in the area. Both operators have been trained for the tasks they were doing.

Conclusions

The following conclusions were reached from this inquiry:

1. The release was the direct result of backflushing the reactor under a hydrofull condition.
2. The reactor had become hydrofilled after being held in the reactor longer than normal.
3. A metering error in the injection water rate accelerated the hydrofull condition.
4. The reactor discharge nozzle plugged when attempting to transfer the charge to the blowdown tank.
5. The Outside Head operator incorrectly evaluated enough reactor freeboard was available to allow a "backflush" into the reactor.
6. The reactor was not "vented" before attempting a backflush.

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