

- Hamilton
Dec 10, 98

THE GEON COMPANY
Deer Park Plant

Board of Inquiry
SARA Release
VCM in OxyChem's Steam Piping
May 30, 1998

Summary

On Saturday May 30, 1998 at approximately 15:00, OxyChem-Deer Park experienced a sudden steam failure resulting in a complete loss of steam flow and header depressurization from 200 psi to approximately 60 psi in 6 minutes. During the time steam was lost, Geon was heating up a charge in Zebra poly and forced the poly contents into OxyChem's steam header. Subsequent investigation found Zebra poly lacking a check valve in the direct steam injection (DSI) line, and the main steam header pressure transmitter range was inadequately spanned to identify the loss of steam pressure. The incident resulted in a SARA release of 118 pounds of VCM. All regulatory notifications were made. Production losses were approximately two million pounds. No product quality issues resulted and there were no injuries or equipment damages.

Board of Inquiry

A Board of Inquiry was held at 22:00 on Saturday, May 30, 1998 in the Operations Building Conference room. The following were in attendance:

Brion Cann	Sr. Process Engineer / Acting Manufacturing Manager
Bob DesJardins	Sr. Safety Engineer
Steve Johnson	Sr. Process Control Engineer
Holly Livermore	Process/Environmental Engineer
Dave Hinson	Environmental Manager, Geon-LaPorte
Robert Brown	Shift Leader
Manuel Araujo	Shift Leader
	Head Operator
	Operator

Corrective Actions:

1. Change the range on the steam line pressure transmitter to span from 0 - 200 psi instead of 100-200 psi. (K. Miles). COMPLETE
2. Investigate the potential of adding priority alarms into the system or to put more emphasis on steam alarms. (S. Johnson by 7/1/98).
3. Verify check valves are in DSI steam lines to all polys. If not, add them. (B. Lindstrom). COMPLETE

REDACTED

NGC 13624

4. Investigate addition of interlocks or safeguards in the steam system. (S. Johnson).
COMPLETE
5. Investigate failure of OxyChem's Co-Gen alarm that did not energize at Geon. Develop a monthly PM to test the Co-Gen alarm. (S. Johnson by 8/1/98).
6. Offer medical surveillance to Geon employees working at the time of the incident. (B. DesJardins). COMPLETE
7. Evaluate check valves in other steam applications attached to VCM service. (S. Johnson).
COMPLETE
8. Install a chain operator on the main steam valve in the pipe rack. (Larry Henderson)
COMPLETE
9. Investigate interlocks to shut down stripping columns on high pressure. (Steve Johnson by 9/1/98)
10. Upgrade Emergency Response Plan to include order of notification of off site personnel. (B. DesJardins by 9/1/98)
11. Formalize semi-annual drills to practice usage of Emergency Response Plan. (B. DesJardins by 12/31/98)
12. Evaluate need for a check valve and automated block valve on main steam header at OxyChem's boundary. (B. Lindstrom by 12/31/98)
13. Follow-up with OxyChem on their investigation of remote equipment with the potential to cause a similar incident. (H. Livermore by 9/1/98)
14. Evaluate responsibility delegation with respect to technical and administrative decision making. (B. McWhirter) COMPLETE
15. Review 10/95 HAZOP of Zebra and Golf polys for interlock and check valve considerations on the DSI piping (J. Schwarz by 8/1/98)

Narrative:

On Saturday May 30, 1998 at approximately 1500, Geon Deer Park experienced a multitude of alarms (low steam flow, low column temperature and high pressure on all 4 columns, etc.). At the time of the alarms, there was no indication of a complete loss of steam pressure. The low pressure steam alarms, which are set at 125 psi and 110 psi, occurred at 1502 and 1504. Both alarms were acknowledged promptly. At 1510, the flow deviation alarms on A & B columns sounded indicating that they were not getting the required steam flow. All four columns had high pressure and the investigation by the operators began with the columns. Steam and slurry flow to the columns had been shut off, and Robert Brown (Shift Leader) went to check out the recovery area. Upon Robert's return to the control room, _____ (Operator), had noticed that Zebra poly was not heating up. The steam pressure was showing 86 psi but the steam flow was in alarm due to low flow rate. _____ called OxyChem's Powerhouse and found out they had lost all power and steam. The Co-Gen alarm from OxyChem never sounded in Geon's control room. The entire steam supply from OxyChem was lost at approximately 15:08 and no notification of a steam outage was received. Fox poly was charging and Zebra poly was in DSI heat-up when the steam flow ceased. Routine short stop was added twice to both polys, which secured the wet end of the plant.

NGC 13625

At 15:45, Robert called OxyChem and told them there was a possibility of VCM in their steam header. Robert and [redacted] checked steam traps in Geon's plant by the chillers and found VCM levels slightly over 20 ppm. Meanwhile, OxyChem sounded their spill alarm and instructed all of their employees and contractors to shelter in place. OxyChem contacted us about 15 minutes later (16:00) requesting the use of our HNU meter. [redacted] took the meter to Mike Garza (OxyChem) and was allowed to witness limited sampling around OxyChem's cell house. The initial reading he witnessed was 68 ppm. OxyChem personnel were wearing Scott air packs to perform their monitoring. [redacted] offered to put on a Scott air pack and accompany them, but they were heading to the north end of their facility and would not allow him to continue with them. Geon's Mass Spec was picking up readings ranging from 0- 1191 ppm throughout our plant during this time period. The 1191 ppm reading was from the recovery area and rapidly decreased. The readings originated from various steam traps in the plant. Subsequently, Robert Brown instructed all traps to be closed and tagged. Ed Jefferson, Head Operator, isolated the 8" main steam valve in the pipe rack approximately 10 minutes after OxyChem sounded their spill alarm. The Geon spill alarm was never sounded. At approximately 16:25, Geon lab personnel (Lee LeBeouf) made all appropriate agency notifications. A message was also placed on the CAER line.

At approximately 1628, Robert Brown contacted Holly Livermore (Environmental Engineer). Holly notified David Hinson (Environmental Manager -LaPorte). Both reported to the plant. Meanwhile, Val O'Keefe, Sr. Process Engineer, was notified and continued to call other plant personnel including Brion Cann, Acting Manufacturing Manager, and Cheryl Polk, Acting Plant Manager. Cheryl Polk in turn notified One Geon Center Personnel.

At approximately 17:15, Robert Brown, [redacted], Holly Livermore, and David Hinson met with OxyChem personnel. The group from OxyChem included Dave Wingfield (Utilities Manager), Tom Vasco (Plant Manager), and Bill Higgins (VCM Plant Representative). During the meeting, we learned that OxyChem's Substation B failed along with Substation FF. This failure caused OxyChem to lose their boilers and Co-Gen plant. OxyChem had not regained power at this point and thought that it would be several hours before they were able to get steam back online. We discussed how to proceed with start up of steam and recovery of any VCM remaining in the steam system. It was agreed that Geon would recover as much of the system as possible before OxyChem attempted to bring steam back online, utilizing a poly for recovery of the steam header. During this meeting, we learned that OxyChem had offered medical surveillance to personnel and contractors in the plant during the incident. In addition, OxyChem was not getting any VCM readings in their steam traps as of 18:00. Dale Muehlenbrock, (OxyChem Environmental Engineer), met with Holly and David to discuss the agency notifications that were made by OxyChem and Geon. Both companies made all the necessary agency notifications.

At 18:15, OxyChem requested another meeting with Geon to discuss procedures for recovering VCM from the steam line and bringing steam on line. Geon's Robert Brown, Bob DesJardins, Holly Livermore, and David Hinson and OxyChem's Dan Danno, Earl Wooten, Gene Pearce (VCM), Bill Higgins (VCM), and Tom Vasco attended this meeting. Geon reviewed their effects of the incident. We informed OxyChem that our stripping columns had experienced high pressure and the Co-Gen trouble-alarm had not energized. At the time, we were unsure our

low pressure steam alarm had sounded and of the quantity of the release. We also indicated that a more in-depth investigation was necessary to determine which systems had failed. We learned that OxyChem considers a 100 pound VCM release a "massive" release and notifies OSHA. OxyChem informed us that they had offered medical surveillance for personnel that were potentially exposed. We were also notified that two non-employees were onsite at OxyChem's clubhouse. OxyChem's monitoring showed readings up to 2000 ppm in the Liquefaction Area and 6-20 ppm at steam traps throughout their facility. (OxyChem may not have taken readings according to our procedure and definition of air monitoring). This meeting concluded with the agreement that when OxyChem had re-established steam pressure, they could open the valve at their boundary, and Geon would start their wastewater stripper and begin recovering the remainder of the steam header system. The steam header on Geon's property had already been recovered through Golf poly.

Geon began receiving steam from OxyChem at approximately midnight on Saturday. As steam pressure started to increase, the wastewater stripper was returned to service. Around 03:00 Sunday May 31, two of the resin stripping columns were placed back in service.

At 09:45 on Sunday May 31, a third meeting with OxyChem was conducted. In attendance were Geon's Tim Manning, LaPorte Plant Manager, (Byron McWhirter, Deer Park Plant Manager, was out of town), Steve Johnson, Cheryl Polk, Holly Livermore, Brion Cann, and Robert Brown and OxyChem's Dave Wingfield and Earl Wooten. During this meeting, we discussed the conditions that caused the incident to occur. Several conditions allowed VCM to back into OxyChem's steam header. Geon's main steam pressure transmitter was spanned over the normal operating range of 100-200 psi. Once steam pressure had dropped below this range, the transmitter stopped at 86 psi. The poly direct steam injection (DSI) valve should close if the poly pressure and steam pressure have a differential of less than 10 psi. Since poly pressure was less than 76 psi (86 psi minus the 10 psi differential), the DSI valve did not automatically close. We communicated to OxyChem that the range of the pressure transmitter had been changed, and is now spanned from 0-200 psi to prevent a recurrence of this incident.

OxyChem communicated that their failure was the result of a bad cable on a spare piece of equipment which started a chain reaction of failures including Co-Gen. They have several pieces of remote equipment that are not operated on a regular basis and will review them for the same potential. We also discussed communication between the plants. Both facilities agreed that a coordinated monthly test of the Co-Gen alarm should be conducted. Until operation of the alarm has been verified, OxyChem will notify Geon by phone if any steam losses occur. OxyChem had 40-50 employees and contractors on-site during the incident, approximately 30 people had bloodwork done. Although OxyChem had seen readings of 2000 ppm while conducting area monitoring, Earl Wooten stated they did not feel these readings were accurate. In fact, he stated that OxyChem had a lot of "bad" monitoring data and he believes most of the readings ranged from 0-60 ppm. OxyChem did have VCM readings in their million gallon boiler feed water tanks of 1ppm on Saturday night and in their Chlorowax collection basin of 4.2 ppm on Sunday morning. Based on this data and other assumptions, the VCM released was estimated at 118 lbs., primarily through steam traps on the main steam header. At this point, the Co-Gen plant, one

NGC 13627

boiler, and OxyChem production areas were online. At the conclusion of this meeting, OxyChem agreed that Geon could charge one poly at a time upon being given notice from OxyChem.

Facts surrounding the incident:

1. Two low pressure steam alarms were acknowledged by the console head operator as required.
2. High pressure alarms sounded on all 4 columns as designed.
3. Geon did not receive the alarm or notice from OxyChem on steam loss as designed.
4. We had three meetings with OxyChem to resolve the situation (two on Saturday and one Sunday morning). All communication was well coordinated, constructive, and essential to minimize the effects of the release.
5. Geon stopped production for 24-36 hours after the incident.
6. Zebra and Golf polys did not have check valves in their direct steam injection (DSI) lines. The engineering design did not include these check valves. A hazop was conducted in October 1995.
7. The steam pressure transmitter was spanned from 100 to 200 psi, as originally installed. OxyChem's steam pressure transmitter was spanned with the same range.
8. Geon's emergency response was according to procedure and effective.
9. The console operator had to respond to multiple alarms in a short period of time. The large number of alarms, including deviation alarms, proved to be confusing and sometimes overwhelming.
10. Both the Plant Manager and Manufacturing Manager were out of town and had delegated their responsibilities as required.
11. Holly Livermore, Environmental Engineer, communicated with the EPA 24-hr Onsite Coordinator throughout the weekend. He wanted reassurance that the incident was under control and contained within the Geon/OxyChem boundaries.

Management Systems Investigation:

1. The preventative maintenance system included PM's for the steam pressure transmitter and was effective.
2. The HAZOP on Golf and Zebra polys was conducted in October 1995. This HAZOP must be reviewed to verify the check valve consideration and the interlocks between steam supply pressure and poly pressure.
3. Our DCS system includes many alarms. This system should be evaluated to determine the necessity of streamlining during periods of multiple, urgent alarm conditions.
4. An emergency response procedure and spill alarm are available for use by the shift leader. At the time of the incident, the shift leader decided not to sound the spill alarm or initiate sheltering in place, due to the nature of the incident on Geon's site and the control of the situation immediately after it occurred.

Conclusion:

A SARA reportable release of 118 lbs. of VCM and a significant production loss occurred during an unplanned steam outage. A check valve on Zebra poly's DSI header could have minimized or prevented the release and minimized the production lost. Additionally, the main steam pressure transmitter was ranged inadequately, preventing logic interlocks in the process computer system from isolating the poly during heat up.