AHS 4

CONOCO

Interoffice Communication

CONFIDENTIAL

To : Distribution

From : P. E. Markey

Date : February 9, 1981

Subject : OLD REACTOR MODULE RECOVERY SYSTEM INCIDENT
14:45 FEBRUARY 6, 1981

INCIDENT DESCRIPTION

At 14:30 David Sprowell, Lead Operator - Old Reactor Module, started to recover D-300 reactor with both A & B compressor trains. Several minutes into the recovery phase, Sprowell noted the recovery compressors weren't pulling as determined by a pressure higher than set point on the recovery K.O. drums and panel indications of a closed pressure control valve upstream of the K.O. pots. At 14:35 Sprowell asked Larry Frye, Chief Lead Operator (Reactor "A" operator, Lee Childers was in his annual physical examination) to check the compressors and reset if necessary. Frye was inside the old control room and on his way to the recovery area when he heard an explosion at approximately 14:45. Frye exited the old control room from the south door and therefore heard, but did not witness the explosion. Eyewitnesses, Charles McCain and Ricky Hodnett of Boss Insulation Co. were insulating the new hot water charge tank. Upon hearing the explosion the insulators observed a "white cloud" of about 5' diameter billowing from the second deck of the V-11 recovery building. McCain was on scaffolding about 10' from grade on the tank's north side, Hodnett was at ground level on the tank's west side. McCain climbed down from the scaffolding and McCain along with Hodnett headed towards the control room. Within one minute, a second louder explosion was heard and a 10-15' diameter cloud was observed billowing from the recovery deck. Flying debris accompanied the second explosion. Shortly after the second explosion Panel Operator Sprowell shut down the recovery system from the control panel and Bobby Hawkins, Vinyl Shift Supervisor, made his way from the control room to the east side of the recovery building when he manually set off the deluge system. Concurrently, at 14:48, Steve Kilgore, Lead Operator - New Reactor Module, sounded the vapor release alarm and the area was evacuated with the aid of the Gai-tronics communications system. Hawkins, still in the field, directed the monitors at the second floor recovery area.. The water was left on for several minutes then the deluge water was shut-off and the fire monitors were diverted so entry into the area could be made.

Al Sather and Larry Frye entered the area equipped with Scott air packs. They found both A and B recovery compressors were ruptured and appeared to be quite hot. The area was scattered with debris. Process valves on both the suction and discharge of the compressors were noted in the closed position, which was not unexpected since Sprowell had earlier shutdown the recovery system from the control panel. However, Frye discovered upon removing the air supply lines from the automated valves that there was no air pressure on any of the air supply lines. About this time VCM readings in excess of 5 ppm were being picked up on Honeywell Stations #2 (2nd floor recovery building), #3 (old unit dump Sweco), and #4 (3rd recovery compressor).

Gerald Uptain monitored the surrounding area with an HNU analyzer and found no significant readings. Readings throughout the rest of the plant were at normal levels so the "All Clear" alarm was sounded at 1530 with Sprowell advising returning personnel to stay out of the old reactor area via the Gai-tronics System.

No one was in the recovery area when the compressors ruptured and to our knowledge, no one was overexposed to vinyl chloride or injuried as a result of the incident.

INCIDENT INVESTIGATION

Upon investigation, it was determined the recovery compressors suction and discharge valves remained in the closed position when the recovery system was started up due to lack of air pressure. The valves operate on the "air to open"/"air to close" principle. Running the compressor essentially blocked in generated steam of sufficient pressure to rupture the compressor casings. This would explain the "white cloud" observed by Boss Insulation. In tracing out the air supply line it was determined an air supply valve at the east end of the V-11 recovery building (near the water filter pack) had been closed. In efforts to narrow down the time frame in which this valve was closed it was discovered the valve was closed sometime between the last recovery which completed at 12:45 and the time D-300 reactor recovery began at 14:30. Further investigation showed "blips" in the D-300 cooling water flow indicating a change in air pressure. The attached strip charts indicate the unusual "blips" occurred at 13:42 and 14:20. This is significant in that the D-300 cooling water valve air supply is off the same air header as the recovery area and downstream of the valve found closed. As a preventative measure the valve was sealed open and tagged "Do Not Close".

At this time we do not know who closed the control valve or for what reason, but this valve's closure was the not cause of the incident. Monday we will be talking with contractor's who were working in area at the time of the explosions in efforts to obtain their observations and input. Speculation would be someone attempted to shut off a hose connection valve located underneath the critical valve. The valve was in poor condition so it's possible somebody shut the critical valve to stop air flow from the hose connection. (see attached photo).

The incident resulted in the destruction of two compressors with their replacements requiring long delivery times. However, the major concern of this kind of occurrence is the potential injury to our personnel. We were very fortunate no personnel were in the area during the explosions. Positive steps are necessary to ensure incidents of this nature do not occur in the future.

RECOMMENDATIONS

In the short time frame since the indicent occurred these are my preliminary recommendations:

Recommendation #1

Reiterate the safety policy to Plant and Contract Personnel that "Only those personnel assigned to an operating unit are authorized to operate valves or start and stop equipment." (Section 1.310 Aberdeen Safety and Health Mannual)

Although it is possible, in my opinion it is highly unlikely Vinyl operations personnel closed the critical air valve, as experienced operators they should know the valve and its function, while other personnel may not have realized the significance of this valve.

Action Step #1

Operations will be "cracking down" on the above plant safety rule. Reiteration of this rule from the Safety Department with other plant and contract groups is requested.

Recommendation #2

Design modifications are necessary to the recovery system to prevent reoccurrence.

The recovery compressors were not equipped with any pressure relieving device, making a casing rupture inevitable if the compressor was operated "blocked in". Consideration should be given to installing pressure relieving device. While the system does include an interlock provision that the suction and discharge valves on the compressor are signaled to open, there is nothing in the interlock to ensure the valves are actually open when the compressor is started. In this case air pressure failure was the cause. It's conceivable other malfunctions could also cause the valve to remain closed. Consideration should be given to incorporating positive valve position into the interlock for starting the compressor.

Operators currently operate somewhat blindly as to whether the compressor is even operating. Amp meters are on the panel but have never been connected for unknown reasons. The compressor start button will light when the button is pushed, the compressor need not be running. Consideration should be given to completing the amp meter circuits.

Action Step #2

Process Engineering is requested to perform a detailed recovery system design study and a project be developed to improve system reliability.

RECOMMENDATIONS - (continued)

Recommendation #3

There is some question in my mind as to the reliability of other critical systems. I would recommend a thorough "Fault Tree" type reliability analysis be conducted to determine any other "weak links" in our systems.

Action Step #3

A thorough plant system reliability analysis is requested from plant and PED engineering resources. I believe OKC conducted this type of system audit after their last major reactor release.

While my recommendations are preliminary in nature, I believe they have merit and should be pursued on a high priority basis. If there are any questions, comments, or further recommendations, please advise.

P. E. Markey
Operations Superintendent

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c: CLM, CRM