

EN/2/09

In-Scope A1

MRC Review  
1/19

**PROMPT INVESTIGATION REPORT**

- 1. **IR Number:** 442540
- 2. **IR Title:** Leak at Circ Water Blowdown Vacuum Breaker
- 3. **Chairperson and Team Members:**
  - Chairperson: Gary Dudek (Ops)
  - Investigator: David Gustafson (Plant Eng.)  
Jason Eggart (Chemistry)
  - Contributor: John Kijowski (Plant Eng.)
- 3. **Event Date:** 01/16/2006
- 4. **Event Time:** ~0900

**5. Summary of the Event:**

At ~0900 on 1/16/05, security was notified by a local area resident that there appeared to be water leakage at one of the vacuum breaker pits (0CW066) in a field on the makeup/blowdown line right of way. Security notified the Shift Manager who immediately dispatched an NLO to investigate the concern. In addition, blowdown flow was reduced and Chemistry was dispatched to sample the leakage and determine the water propagation path. Sampling identified no concerns and the water had not reached any drainage or runoff ditches. Vacuum breaker 0CW066 was isolated and leakage was visually verified to have stopped.

Based upon review of the NPDES permit and the Exelon Reportability Manual, this event does not appear to be an NPDES violation. This event will be evaluated for an Equipment Reliability Clock Reset. This event is not reportable.

**6. Time Line (Pertinent Dates and Times):**

At ~0900 on 1/16/05, security was notified by a local area resident that there appeared to be water leakage at one of the vacuum breaker pits (0CW066) in a field on the makeup/blowdown line right of way. Leakage location was ~0.5 miles east of Essex Rd. and 0.2 miles north of Smiley Rd. Security notified the Shift Manager who dispatched an NLO to investigate the concern. At that time the Shift Manager also notified the Station Duty Officer (SDO).

At ~0956, Circulating Water (CW) blowdown was reduced from >20,000 gpm to ~11,000 gpm by securing CW booster pumps per BwOP CW-12. This was done in an effort to try and reduce the leakage volume.

At ~1100, based on observation of the area, it was confirmed by Operations/Chemistry that the apparent source of the leakage (obvious from area inspections) was the pit for 0CW066.

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It was also visually verified that leakage was reduced/eliminated and water level was subsiding in the pit for 0CW066 (likely due to the reduction in CW blowdown flow). Rough estimates of leakage volume based on visual inspection of the affected area were on the order of thousands of gallons, however it is very difficult to estimate with more accuracy than this.

Subsequently, Chemistry was contacted and dispatched to sample the leakage and determine the water propagation path. The sampling was needed to determine if any unanticipated radioactive release had occurred. Review of the water propagation path was needed to ensure that the leakage had not propagated to a runoff or drainage ditch. Either of these scenarios would result in a NPDES permit violation.

At ~1250, local inspection by the Chemistry Environmental personnel again confirmed no active leakage at the vacuum breaker and none of the leakage had entered a runoff ditch or navigable waterway. Preliminary sample results showed no radioactive isotopes in the leakage effluent.

At 1445, final sample results confirmed there were no radioactive isotopes in the sample and tritium levels were below lower limits of detection for station analysis equipment.

At 1515, a telecon was held with the station duty team to review the actions taken, chemistry sample results and evaluate any additional required actions. Actions determined on this call were to attempt to manually isolate the vacuum breaker from outside the pit, reconfirm the NPDES permit violation status with Corporate Environmental and engage appropriate personnel to ensure pump down, troubleshooting and repair of the valve would be ready for execution on shift two on 1/17/06.

At 1648, review of the chemistry sample results and water propagation with Corporate Chemistry Environmental was completed to validate the site assessment of reportability. Based upon review of the NPDES permit and the Exelon Reportability Manual, this event does not appear to be an NPDES violation and is not reportable.

At ~1655, 0CW066 was manually isolated by Operations.

**7. Equipment Damaged and/or Personnel Injured:**

No equipment damage or personnel injury identified as part of this investigation. See Section 10 for discussion on potentially failed equipment.

**8. Pertinent Information (subsequent to the event):**

The Circulating Water (CW) Blowdown system allows lake water to be pumped to the Kankakee River at a normal rate of approximately 25,000 gallons per minute as a means to maintain lake chemistry. The CW Blowdown system is also designed to accept liquid radioactive and sewage treatment releases. The CW Blowdown piping, which runs from the station to the Kankakee River, is buried underground and contains a series of vacuum breaker components placed along the piping run. The vacuum breaker assembly consists of a butterfly isolation valve, surge protection valve, vacuum breaker valve, and an air

release valve (see attached diagram). The vacuum breakers allow air to enter the piping during system shutdown in order to prevent a vacuum condition from damaging the concrete piping and air to exit and water fill the piping during system start up.

Followup water sampling confirmed there were no radioactive isotopes in the sample and tritium levels were below lower limits of detection. Sewage treatment release levels are sampled routinely and have been maintained within acceptable levels.

**9. Conflicts or Problems (which may have contributed to the event):**

Previous vacuum breaker leakage issues have led to tritium releases from station property. Currently a Root Cause Evaluation (AR# 428868) is in progress to evaluate the station responses to previous vacuum breaker leakage that allowed tritium to propagate offsite. In addition, a PM maintenance program was implemented based on a previous leakage concern in the year 2000 (AR# 38237).

As part of the station response to tritium, SPP-05-012 was generated to perform leak checks of the blowdown lines. Review of SPP-05-012 shows that part of the leak check increased pressure in the blowdown lines to above normal values to perform the testing. The increased pressure appears to have been well within the ratings of the affected components and does not appear to be a direct contributor to the identified problem. As part of the SPP, a walkdown/leak check was performed to ensure no leakage after the line was initially pressurized. No significant leakage of the concrete line was identified as part of the SPP performance. The physical testing has been completed, system pressure was returned to normal and test restoration is in progress. Upon completion of the SPP, a walkdown/leak test will be performed (directed by SPP) to validate the as left conditions.

**10. For Equipment Events, document the following:**

- What specific component failed?

Vacuum breaker 0CW066 or other component(s) in associated pit have developed external leakage.

- When was the component last worked on?

0CW066 was worked via WO# 99243229 and taken to finished on 10/17/05, Ops PMT Leak Check Complete SAT on 11/30/05. Note: Work initially finished on 11/12/2001; it appears the breaker was replaced at that time and the work package maintained open until the gearbox was replaced in October 2005.

- What work was performed?

0CW066 was replaced via WO# 99243229, initially finished 11/12/2001, complete 10/17/05, Ops PMT Leak Check Complete on 11/30/05.

- Are the PCM template recommendations being followed?

No Template Applicable however a PM program was generated as part of the year 2000 RC# 38237. PM's are within defined periodicity. PM periodicity not apparent contributor since vacuum breaker replaced via WO# 99243229

**11. Review of plant response versus simulator modeling:**

Not Applicable.

**12. Extent of Condition Review:**

Based on the recent leak testing performed on the blowdown lines to support the ongoing tritium investigation (SPP-05-012), and the fact the cause of current leakage is unknown, walkdown of all the remaining vacuum breaker to determine leakage status is recommended. Walkdowns should be performed immediately and if blowdown is still at reduced values, should be performed again after blowdown has been restored to >20,000 gpm.

**13. Recommendations for Follow Up:**

The troubleshooting and repair of this issue will be performed via WO# 883925. Based on the findings of this work order potential causes associated with this event will be identified A Department Evaluation should be performed for IR# 442540 to determine the appropriate level of cause evaluation based on the risk/uncertainty determination in LS-AA-120.

Preliminary discussions with Corporate Environmental indicated this event was not an NPDES permit violation and was not reportable. HU-AA-1212 should be reviewed to

ensure this is the appropriate level of independent review for this determination. Consideration should be given to engaging the Regulators to ensure this is the correct assessment for reportability. In addition, consideration should be given to a courtesy notification to the IEPA. All communications should be coordinated with the tritium communications team to ensure a unified story is presented.

Followup communications with the citizen who identified the leakage and any affected individuals should be performed to update the status of the leakage and sample results.

Samples were taken and analyzed onsite with no detectable radioactive isotopes identified. Samples should be sent to an offsite vendor for confirmation of results. This will ensure validity of station results and allow a more detailed analysis using the vendor's more sensitive sampling equipment (vendor equipment detect to 200 Pico curies/liter vs. 2000 at station).

**14. Immediate Actions Taken (including regulatory notifications):**

- NLO dispatched to investigate reported leakage
- SDO notified of concern
- Blowdown reduced per BwOP CW-12, leakage verified stopped
- IR# 442540 generated to document the concern
- Chemistry performed sampling of leaking water to determine release status
- Chemistry performed walkdown of local area to determine leakage propagation status
- Duty Team telcon held to discuss findings and evaluate further actions
- 0CW066 valve manually isolated by Operations
- Work packages and C/O preparation initiated to allow draining valve pit and subsequent troubleshooting and repair
- Shift manager initiated a prompt investigation per OP-AA-106-1001.

**15. The Suspected or Apparent Cause:**

The apparent cause is difficult to determine at this time, the breaker and affected components are submerged due to the leakage in the valve pit. Troubleshooting, initial cause determination and repair will be performed via WO# 883925.

The vacuum breaker is a float type design, which seals against an elastomer seat as water fills the pipe and opens when water level lowers. The function of the air release valve is to allow small amounts of air in the piping to be released without unseating the main vacuum breaker float/seal. The isolation, surge protection, and vacuum breaker valves all have flanged joints that bolt in series to the blowdown piping. The air release valve has a threaded joint and is connected to the vacuum breaker via pipe nipples and a local isolation valve. The most probable leakage locations are the vacuum breaker float/elastomer seat either from degradation or debris trapped in seating area, air release valve internal elastomer seat, and flanged/threaded joints. A review of maintenance history on the

leaking vacuum breaker valve assembly, OCW066, determined the vacuum breaker was recently replaced in November 2001. Therefore, as a minimum, a new vacuum breaker elastomer seat and gasket between the vacuum breaker and surge protection valve were installed. It is unclear from the WO documentation if the air release valve was replaced at that time. A more detailed review of the recently performed Work Order is needed to determine if the air release valve assembly was also replaced. This should be addressed in the suggested work group eval associated with IR# 442540.

**16. Actions to Prevent Recurrence:**

The troubleshooting and repair of this issue will be performed via WO# 883925. Based on the findings of this work, identification of potential causes associated with this event will be identified. A Department Evaluation should be performed for IR# 442540 to determine the appropriate level of cause evaluation based on the risk/uncertainty determination in LS-AA-120.

Experience would dictate a potential alternate solution/technology exists to replace the vacuum breakers with a more robust/simpler device (i.e. standpipes installed at Limerick). As part of the Department Evaluation for IR# 442540, consideration should be given to evaluation of a mod to replace the vacuum breakers with an alternate technology.

**17. Copies of Written Statements from Personnel Involved (if applicable):**

None

Diagram 1, Typical Vacuum Breaker Arrangement

