Problem Development Sheet - Groundwater

Related? No **Plant** Indian Point **OK to brief?** Yes

Continuing? No **Evaluator** TSH **Evaluation area** ER3

Performance Problem/Conclusion:

Leakage exists from the Unit 1 and Unit 2 spent fuels. Inspection and subsequent repairs remain to be completed on the Unit 2 transfer canal which has a pinhole leak. Elevated levels of Tritium and Strontium-90 have been detected in the ground surrounding the plant. An extensive monitoring and corrective action project is underway.

Actual and Potential Consequences:

Tritium and Strontium-90 have been observed in the area surrounding the plant from known leaks in the spent fuel pools. The Unit 2 pool does not have a tell tail drain collection system which poses vulnerability for additional activity leakage.

Factual Basis:

1. The initial leak dates back to the early 1990s when the Unit 2 fuel pool liner was nicked during a reracking project. The leak went undetected and unrepaired for one operating cycle. There are no tell-tale drains on Unit 2. Approximately 20 monitoring wells were installed around the station in 2000 but for the purposes of oil (PCB) detection. As such no monitoring for tritium took place. In September 2005, a hairline crack several feet in length was found at the 60 foot level of the Unit 2 spent fuel pool south wall. The crack had evidence of liquid seepage with trace amounts of cesium 134. The crack in the wall was found during the excavation of the area as a result of the dry cask storage project. Shortly thereafter tritium was detected in one of the wells. This initiated an extensive monitoring and corrective action project.
2. A structural evaluation of the concrete/rebar at the Unit 2 spent fuel pool wall was conducted and found acceptable. Visual inspections of the fuel pool wall along with some vacuum testing of suspect locations were conducted. In 2006, visual inspection of the transfer canal area indicated potential flaws and the canal was drained and cleaned in preparation for additional NDE and repair as necessary. The transfer canal NDE inspection effort was started in July 2007 with about 75% of the visual inspections completed, 30% UT's completed, and 40% vacuum box tests completed to date.
3. In February 2006, Strontium-90 was detected in one of the newly installed monitoring wells near discharge canal. Fourteen additional wells were installed as a result. The source of the Strontium-90 is the Unit 1 fuel pool. The unit 1 fuel will be moved out of the pool in 2008 to stop the leak. Only one pool contains fuel, other pools are drained. Spent fuel cask project is underway to remove all fuel from Unit 1. Fuel must be loaded into cask in Unit 1 building and transferred to the Unit 2 building for stacking due to height limitations. No repair actions are planned for Unit 1 pools. The strategy is to remove the source by evacuating the pools of the fuel and maintain pool drained.
4. Tritium in well water samples around the perimeter of the plant are below the EPA limit of 20,000 pCi/liter. Two plumes of radioactive material have been located based on hydrological modeling and groundwater samples. Strontium-90 was found in wells associated with unit 1. Levels of Sr-90 of 30 pCi/L in some wells near discharge canal. No Sr-90 other than background levels has been found offsite. Entergy holds weekly conference calls with NRC and DEC to report on sample results and other aspects of the investigation. Bi-weekly calls are held with local governmental stakeholders.

5. The radiological ground water monitoring program is described in CY -110. The program includes NEI and NRC Information Notice 2006-13 guidance. The 38 wells around the site provide long term monitoring/sampling and are sampled per procedure EN-CY-109. Samples are taken either quarterly, semi-annually, or annually based on location per CY-110.

6. Unit 1 and 2 have no telltale drains to determine leakage. Unit 3 does have a telltale drain. Chemistry performs monthly inspection and water sample of unit 3 telltale per procedure 3-CY-2325. No leaks detected from inspections. Unit 3 telltale is checked with boroscope for blockage every 2 years (task AC.850.001).

Primary Causes:

1. Managers picture of excellence:

Station management has the right appreciation and approach to identifying and correcting the leaks from the spent fuel. In many ways the station is leading the industry in this area by installing about 38 wells around the site to investigate the contamination and provide for long-term groundwater monitoring.

2. Managers aware of problem:

An opportunity may have been missed by not establishing a tritium monitoring program when the wells were first installed in 2000. Based on having a known leak for an operating cycle in the early 1990's, periodic monitoring for tritium could have been done sometime before the discovery of the wall crack in 2005.

Station personnel believe that poor work practices

3. *and 4. Managers understand causes, develop/implement solutions:*

The project is highly prioritized and well funded. After the discovery of Strontium-90, demineralizers have been in service continously in the Unit 1 pool and has reduced the concentration by a factor of 50. The long term plan for the Unit 1 pool is to remove all fuel and drain. These actions are scheduled to be completed by the end of 2008. A dry cask storage project is underway with the removal of the unit fuel as the first task.

A collection box has been installed in the area of the crack on the Unit 2 spent fuel pool wall.

The box is routed to a collection point and the station has been taking periodic samples. Presently the station is sampling weekly. An improving trend exists for leakage volume and activity. The September 19, 2008 values were 82.8 mls and 1.84 E-06 uCi/ml.

Inspections of the Unit 2 transfer canal are in progress. To date a pinhole leak in the liner has been detected and the canal is being maintained in a drained condition. The inspections are to be completed in October 2007. The station intends on repairing the pinhole leak and any other areas found during the inspection prior to the next Unit 2 RF outage in March 2008. In addition, the station will take the learnings from the transfer canal inspection and apply them to the Unit 2 spent fuel pool. As only a portion of the pool has been able to be inspected due to interference limitations, the findings from the transfer canal will be used to determine future corrective actions.

Other Insights/Related and Continuing Analysis:

Insights, Analysis results for Continuing/Related AFI (if applicable):

Although extensive investigative and corrective actions are in progress the causal investigation of the flaw identified (September 2007) in the unit 2 transfer canal has yet to be completed. This remains an important open item in the investigation to ensure the extent of condition is adequately understood. Entergy anticipates completing the analysis this fall.