Status Update - June 20, 2007

What We Know From The Event Followup This Week:

A significant source of the tritium (turbine building air wash system) has been identified and isolated from the waste stream going to the basin which then goes to the stabilization pond. The source of the tritium was condensate from the turbine building air wash system. The licensee is also controlling seepage and leakage from the stabilization pond. The licensee has built drains to route the pond seepage/leakage so it can be collected and pumped back into the stabilization pond.

The extent of condition is not fully determined. The licensee is continuing to review potential sources of tritium in to the basin and continuing to drill wells to determine the extent of groundwater contamination on-site.

There is no evidence that tritium has migrated off-site. This is based on surface water samples and samples in the deep aquifer (source of local drinking water). However, the licensee has not determined the extent of condition in the OCA. This week tritium was identified in the area that the ISFSI is being constructed. This is an ongoing effort by the licensee with the drilling of wells in to the shallow and intermediate aquifer (see photo for number of wells).

To date the licensee's actions in response to this issue appear appropriate/adequate. The inspectors, during their on-site review did not identify anything the licensee had overlooked or not done.

Based on the licensee's water samples and calculations there appear to be no dose consequences to the public.

Follow-Up Inspections:

We do not have a good time line which shows the development of this issue.

We have not reviewed and identified/acquired the information to determine when we believe licensee actions should have started.

The licensee is conducting a root cause investigation. This should be thoroughly reviewed when complete.

5-110

LPSB1 INSPECTION PLAN

Inspection of: Brunswick

Inspection Dates: 6/18/07 - 6/21/07 **Report Numbers:** 07-03 or 07-04

Type of Inspection: Radiation Protection, Reactive Inspection (Event Response - Tritium)

Planned Inspection Hours: ~ 45 inspector hours

Inspectors: George Kuzo (Lead), Adam Nielsen

Inspection Objectives: See attached plan details.

Past Plant Performance in this Inspection Area:

Risk-informed Inspection: This inspection does not use PRA. Risk is based on potential to receive dose. The attached plan uses dose-based risk considerations to determine certain inspection focus items.

Projects Branch Chief/ Senior Resident Perspective:

Outstanding Items to be Reviewed:

Lodging During Inspection: Comfort Suites, South Port, NC (800) 517-4000

In Charge of Exit Interview:

Date Projects Informed:

Date Licensee Informed: **Licensee Contact:** Philip Defogie

Branch Chief's Instructions:

Approving Branch Chief: Brian Bonser **Date:**

Date Plan Provided to Projects:
Copies Provided:

Original to Branch Files

INSPECTION OBJECTIVE - Event Followup (Tritium) - IP71153

Status Update - June 20, 2007

Evaluate licensee events and degraded conditions for plant status and mitigating actions in order to provide input in determining the need for an Incident Investigation Team (IIT), Augmented Inspection Team (AIT), or Special Inspection (SI). Management Directive (MD) 8.3, "NRC Incident Investigation Program," uses results from this activity to decide the level of agency response.

1. Develop a timeline of licensee actions upon May 7 discovery of tritium in manholes?

   Develop and discuss with licensee reps a timeline of significant events and actions taken since the initial discovery of tritium in 2006.

   Status: In -progress.
   G. Kuzo will complete next week (after RETS-REMP).

2. How was tritium identified in the two man holes on May 7? What was the source of the tritium identified in the two man holes?

   Discuss timeline with knowledgeable licensee staff. Review programmatic controls for sampling manways (sampling frequency? Analyses? Age of sampling program?). Discuss possible sources of tritium in manways with licensee staff (SBSP, TB roof). Are these reasonable explanations given the current data?
   Also review other sampling, e.g. ISFSI installation.

   Tritium was identified in the manholes when water was sampled in the manholes prior to maintenance on the met. tower. Until recently the water in the manholes had been sampled for gammas (cesium and cobalt) and not tritium. Tritium was first discovered in manholes in 2006, however the licensee did not followup on this because the levels were below NEI voluntary reporting levels. Programmatically, whenever a manhole is opened, if there's standing water inside, it's sampled for gammas and tritium. In the past (before 2006) they were only sampled for gammas.

3. What is the source, extent, and cause of tritium contamination onsite?

   Source - Evaluate the licensee's preliminary conclusion that the primary source of elevated levels is condensate from the turbine building chillers (air wash system). Review trends of tritium levels in storm drain collection basin going back 2 years (including recent daily results). Can spikes in the data be related to operational changes in the turbine building chillers or other plant systems? Create a list of other potential sources. e.g. storm and building drains.

   Samples on basin that drains to stabilization pond have dropped 2 - 3 orders of magnitude in tritium. Condensate from the air wash system is no longer routed to the basin (going to radwaste). The licensee is continuing

to look for sources. Looking at storm drains and building drains. The licensee is also flushing out turbine building drains (may lead to spike in tritium). The inspectors reviewed other possible sources of tritium into the storm drain basin e.g. washout of airborne tritium from normal effluent releases; leaks in intake structure equipment that are downstream of stab pond release point. However, the TB chiller condensate source is the only one capable of injecting high levels of tritium into the storm drain basin. A review of recent release permits from the TB vent showed significant amounts of tritium in the ambient air on the turbine deck. According to licensee staff, this is attributable to excessive steam leakage.

Extent - Site hydrological studies and sampling of various plant areas are ongoing. Review current adequacy of data to determine the extent of contamination as it stands now, with the understanding that new results could change the situation. For example, tritium identified in ISFSI construction activities. Create visual aids that capture notable sample results, new/old sample locations, and show the extent of contamination in relation to plant landmarks and the property boundary.

The licensee has completed 5 shallow wells and 2 intermediate wells around the stabilization pond. The completed wells are still developing for samples. Three more intermediate wells are planned (see picture). The intermediate aquifer (Yorktown aquifer @ 30') flows from west to east. Away from Nancy creek.

Samples from the long established 2 deep aquifer (150') wells on site were below detection limits for tritium. G. Kuzo took two deep well split samples. Deep aquifer (Castle Hayne) has a positive pressure and is the source of local drinking water.

G. Kuzo with the licensee took five samples on 6/19 from surrounding surface water bodies. Samples were from the Cape Fear river (2), Nancy Creek (2), and Gum Long Branch creek (1) on 6/19.

Determination of the extent of contamination is ongoing and will take some time. The licensee continues to find tritium onsite where they don't expect it e.g. ISFSI construction area. However there is strong evidence that the tritium has not migrated offsite. There has been no tritium detected in the deep aquifer (drinking water pathway) and there has been no tritium detected in the creeks adjacent to the property boundary (fish/crustacean pathway).

Cause - Licensee evaluations into the cause of the elevated tritium levels are ongoing. The inspectors should focus on changes in plant systems and effluent release levels.

4. What are the potential sources of tritium into the storm drain collection basin and the stabilization pond? What is the concentration of tritium in each of the sources?

Requested data (as available) regarding inputs into the storm drain collection basin. Has the licensee sampled each input at the source? Review sample

results as applicable. Review system P&IDs of storm drains, turbine building chiller drains, and other inputs into the storm drain collection basin. Have all inputs been accounted for?

Status: In-progress

The licensee has identified the turbine building air wash system as the primary source of tritium in to the stabilization pond. This source has been isolated from going to the basin. The levels of tritium has dropped significantly in the basin (see above).

5. What is the licensee doing to identify and stop the tritium sources?

Discuss the licensee's Tritium Action Plan with the licensee and corporate/contract hydrologists. Review immediate release mitigation strategies (french drains?). Also discuss plans with HQ experts to verify that identification/mitigation long-term strategies are reasonable.

Status: In-progress

The turbine air wash system condensate is being routed to radwaste. The licensee is collecting run-off and seepage from the stabilization pond and diverting back in to the pond.

6. Develop a diagram that shows relative locations of potential tritium sources (e.g. turbine air wash system) to settling pond.

Develop a diagram using the information gathered under bullet 4.

Status: **In-progress (6/20/2007) The licensee is continuing to evaluate and measure inputs to the basin.**

7. What has the licensee done to assess the extent of condition? What is our assessment of the adequacy of these actions?

Discuss extent of condition evaluations with the licensee. Evaluate plan for new and future planned monitoring wells reasonably located and of sufficient number to gauge the extent of contamination? Has corrective action program been adequately utilized (CRs/ of appropriate significance level? Root cause(s) initiated?)

Status: In-progress

The licensee has a root cause team reviewing this issue. Based on sample results will determine where new wells are drilled to determine extent of tritium. A level 1 NCR has been initiated to address the tritium issue. This is the highest priority NCR in their CAP system.

8. Review licensee surveillances and results of pressure testing for onsite radwaste and other piping handling radioactive liquids.

Review last 2 radwaste line pressure tests for each unit and review procedural guidance for performing the tests. Review system diagrams for radwaste lines and include as visual aids.

Status: In-progress.

Test results were Sat. The lines are held at 15 psi each RFO. It appears the radwaste lines are intact and have not been leaking for several years. However, a plume of contamination may still exist from leaks back in the early 1990's. The licensee has not addressed whether this plume exists or which way it is going.

9. Overall assessment of the adequacy of the licensee's actions to date.

Ongoing - discuss with licensee geologist and well specialist.

Licensee actions appear to be determining the source and extent of condition. They have also determined that tritium is not in the Castle Hayne aquifer. The local source of drinking water and that the dose to the local population from surface water is minimal.

10. Independent analysis of split samples taken from licensee's monitoring wells.

Collect selected samples from properly developed wells on and offsite. Evaluate adequacy of wells for sampling and determining water flow in shallow, intermediate, and deep aquifer. Discuss with hydrology experts whether new monitoring wells are ready for sampling and sample as appropriate. Collect 1-2 split samples - onsite; 3 split samples - offsite. prep samples iaw ORISE guidance.

Status: In-progress

We will collect shallow and intermediate samples when the wells stabilize.

11. Collect and analyze samples from creeks/streams/rivers on and bordering site and waterways.

Collect split samples from Nancy Creek and Gum Log Branch, along the property boundary, and the Cape Fear River.

Status: In-progress

These samples were collected on 6/19/2007 by George Kuzo.

These may take more time than we have next week and can be developed through additional inspection:

12. History of spills onsite, source, level of contamination and radionuclides, licensee actions in response to spills (monitoring wells, enhanced sampling program).

This information can be found in the licensee's 10 CFR Part 50.75(g) file. This

was previously reviewed by Heather and documented in IR 07-02. Review updates since last inspection.

H. Gepford is reviewing information from recent Brunswick inspection.

13. Review the info provided by the licensee in their answers to the NEI questionnaire - letter to NRC dated July 28, 2006. Provides data on inadvertent releases and program description.

    List to provide data for discussion.

14. Is it reasonable that the licensee is just now indentifying the contamination? Should they have id'd it sooner through their monitoring program? Did the contamination occur recently or has it been occurring over a long period of time?

    The high tritium concentrations have increased in effluents due to elevated boron levels in the RCS. Verify monitoring iaw with ODCM. What are the programmatic controls that would drive them to sample for tritium onsite? Historically, was their program set up with a reasonable attempt made to identify tritium contamination before it is released to the environment? Review approved ODCM onsite-sampling - may monitor intermediate zone aquifer, but not shallow saturation zone. Should ODCM be modified? The requirement is 10% change in dose.

15. Evaluate preliminary dose caluclations.

    Bounding dose calculations were performed assuming the contamination has spread into Nancy Creek in the area where frequent crabbing and fishing takes place. The dose was $1X10^{-3}$ mrem/yr.

16. Follow-up activities - evaluate saturation zone monitoring.

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