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QUARTERLY REMEDIAL ACTION PROGRESS REPORT, SECOND QUARTER 2008
PSEG NUCLEAR, LLC, SALEM GENERATING STATION

Dear Ms. Tuccillo:

PSEG Nuclear LLC (PSEG) has prepared this Quarterly Remedial Action Progress Report (RAPR) summarizing groundwater remediation activities performed since the submission of the previous RAPR in June 2008 at the PSEG Nuclear, LLC, Salem Generating Station (Station). The Station is located on Artificial Island in Hancock's Bridge, Salem County, New Jersey. Groundwater remediation activities are being conducted to address tritium detected in shallow groundwater adjacent to and south of the Salem Unit 1 Reactor Containment and Fuel Handling Building. The Station site plan is depicted in **Figure 1**.

The release of tritium contaminated water to the environment ceased in February 2003 when the Salem Unit 1 telltale drains were cleared and the Spent Fuel Pool (SFP) water that had accumulated behind the liner was drained. Following draining activities, a regular program was instituted whereby the telltale drains are monitored for flow and the seismic gap is continuously drained.

Short-lived gamma-emitting radioisotopes, which are associated with site operations, had not been consistently detected in groundwater collected from the seismic gap since May 2004 until recently. Since May 2007 cobalt 58 has been sporadically detected in water samples collected from within the seismic gap. However, short-lived gamma-emitting radioisotopes have not been detected and tritium concentrations have continued to decline in groundwater samples collected outside of the seismic gap indicating that current draining protocols are adequately capturing groundwater.

At present, it is estimated that 1.2 to 4.2 Curies of tritium remain in the plume where it exists above the NJDEP Ground Water Quality Criteria. The range is dependent on the amount of tritium drawn back through the seismic gap, the actual degree of variability in the tritium concentrations of the groundwater, and the amount of mass held in dead end pore space.

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The following sections present the background of environmental investigation and remedial action at the site, the details and results of activities conducted since the submittal of the June 2008 RAPR, and provide a discussion of upcoming activities projected for the next reporting period.

1 Project Background

In April 2004, a Remedial Investigation Report (RIR) was submitted to the New Jersey Department of Environmental Protection Bureau of Nuclear Engineering (NJDEP-BNE) presenting the details and results of a groundwater investigation conducted following the discovery of tritium in groundwater adjacent to Salem Unit 1. The results of the remedial investigation indicated that the source of tritium detected in groundwater was the Spent Fuel Pool, the tritium release to the environment had been stopped, and that tritium had not migrated to the property boundary above the New Jersey GWQC.

Based on the results of the remedial investigation a remedial action strategy was developed to hydraulically limit further migration and reduce the concentration of tritium remaining in groundwater adjacent to Salem Unit 1. In April 2004, PSEG initiated a pilot study designed to demonstrate the effectiveness of groundwater extraction for achieving remedial objectives. The pilot study proved to be effective, and in July 2004, a Remedial Action Work Plan (RAWP) proposing the operation of a full-scale groundwater extraction system was prepared and submitted to the NJDEP-BN. The RAWP was approved by the NJDEP-BNE in November 2004 and a full-scale groundwater extraction system was subsequently installed.

Further, in September 2005, weekly draining of the Unit 1 seismic gap was initiated to ensure that the flow of water entering the seismic gap was directed toward the installed recovery drains rather than outward toward the environment. Continuous draining of the Unit 1 seismic gap was initiated in late February 2007 and the program has been continued to date.

2 Continued Groundwater Monitoring

Groundwater monitoring activities continued through this reporting period in accordance with the schedule provided to NJDEP-BNE. The sampling program is designed to provide representative data necessary to evaluate plume containment. Monitoring activities include the periodic collection of groundwater samples from the 36 Station monitoring wells. Plume monitoring well locations are depicted on **Figure 1.**

Groundwater samples are initially submitted to Salem Chemistry for analysis for tritium and short-lived gamma-emitting radioisotopes. Samples indicating tritium concentrations less than 50,000 picocuries per liter (pCi/L) are sent to Maplewood Testing Services for more refined analysis yielding lower detection limits.

Historical and current analytical data indicate that plant related gamma-emitting radioisotopes have not been detected in groundwater from any monitoring well since monitoring was initiated in 2003. Detailed historic analytical radioisotope groundwater results were presented in the previously submitted RIR and RAPRs and are not presented herein.

Historical analytical tritium results for groundwater collected from the Station monitoring wells are presented on **Figure 1**. Included on **Figure 1** are: panel 1) the extent of tritium in groundwater at the completion of the remedial investigation (Baseline Plume); panel 2) the extent of tritium in groundwater in June 2007; and, panel 3) the extent of tritium in groundwater in June 2008. Based on a review of **Figure 1**, it is apparent that the mass of tritium in groundwater has been significantly reduced by the remedial efforts conducted to date. Details regarding these activities are discussed below.

The analytical results for groundwater samples collected from the monitoring wells were evaluated based on the water-bearing zone in which they are screened. The three primary water-bearing units investigated beneath the Station are: 1) the Vincentown Formation; 2) the shallow water-bearing unit within the limits of the cofferdam surrounding Salem Unit 1; and, 3) the shallow, water-bearing unit outside the limits of the cofferdam.

2.1 Tritium Analytical Results for the Vincentown Formation

The following wells are screened in the Vincentown Formation: Well V, Well K, Well L, Well P, Well Q, and, Well CB. Groundwater quality for Well K, Well L, Well P, and Well Q is currently monitored on a semi-annual basis. Groundwater quality for Well V and Well CB is currently monitored on a quarterly and monthly basis, respectively.

Tritium has consistently not been detected above laboratory detection limits or detected at relatively low levels in groundwater at all monitoring wells screened within the Vincentown formation since the initiation of monitoring at these locations with the recent exception of Well CB. A spike in tritium was observed in the May and June 2008 sampling, however these results were still below the New Jersey Groundwater Quality Criteria. The groundwater monitoring results continue to indicate that the previous release of tritium impacted water from the SFP has not significantly migrated below the shallow water-bearing unit.

2.2 Tritium Analytical Results for Wells Installed Within the Limits of the Cofferdam

The following wells are screened in the shallow, water-bearing unit within the limits of the cofferdam: Well M, Well N, Well O, Well R, Well AC, Well AE, Well AI, Well AM, Well AN, and Well AO. Groundwater quality for these wells is currently monitored on a monthly basis. However, Well AO has been inaccessible due to site constraints and has not been sampled since January 2007.

Groundwater collected from Well AC, Well AM, and Well AN exhibit some of the highest concentrations of tritium at the Site, likely due to their location relative to the previous release from the Salem Unit 1 seismic gap. However, groundwater at these wells exhibits general decreasing temporal tritium concentration trends since the initiation of monitoring in 2003. For instance, tritium concentrations at Well AC, located directly southeast of the Salem Unit 1 seismic gap, have steadily declined from a maximum of 15,000,000 pCi/L in April 2003 to 26,056 pCi/L during the June 2008 sampling event. Furthermore, the decrease in tritium concentrations observed at Well AC is additional confirmation that tritium impacted groundwater is no longer being released from the seismic gap into the environment and that the remedial groundwater recovery system is effectively reducing concentrations of previously released tritium. Recent concentration fluctuations observed at Well AM were addressed using the mobile groundwater extraction unit. Since the initiation of mobile extraction unit activities at Well AM tritium concentrations have demonstrated a steady generally decreasing trend.

The mobile extraction unit was moved from Well AM to Well O and then to Well AR during the previous quarters to address seasonal fluctuations. As a result, the tritium concentrations at Well O are currently below GWQC.

Tritium concentrations at Well M, Well N, Well R, Well AE, and Well AI are below GWQC and generally show consistent declining temporal trends. Tritium concentrations at all well locations within the cofferdam have generally decreased by one order of magnitude or more since the initiation of monitoring, indicating that remedial activities are effectively removing mass from the areas of greatest concentration.

2.3 Tritium Analytical Results for Wells Installed Outside the Limits of the Cofferdam

The wells installed in the shallow, water-bearing unit beyond the limits of the cofferdam are Well S, Well T, Well U, Well W, Well Y, Well Z, Well AA, Well AB, Well AD, Well AF, Well AG (Shallow and Deep), Well AH (Shallow and Deep), Well AJ, Well AL, Well AP, Well AQ, Well AR, Well AS, Well AT, and Well CA. These wells are screened either just above the clay confining unit that separates the shallow water-bearing unit from the Vincentown Formation, or in the interval indicating the highest tritium concentrations found in the shallow water-bearing unit at each boring location at the time of the Supplemental Investigation completed in August 2003.

In 2007, higher concentrations of tritium (approximately 80,000 pCi/L) were observed in groundwater samples from Well AR. Additionally in the early part of 2008 slight increases in tritium concentration were observed at Well AS and Well AT located further downgradient however subsequent servicing of the GRS indicated that some of the recent samples may have been inaccurate as a result of check valve failures in the control shed. Grab samples collected at the wells indicated that the concentrations in Well AT were below GWQC which was inconsistent with the results obtained from the sampling port in the control shed. System service revealed that the check valves in the control shed had failed but that the check valves on the pumps remained closed preventing backflow of system water into the wells. Therefore the increases at wells AT and AS are believed to be a artifact caused but the secondary check valve failures in the control shed. The increased concentrations in Well AR represent material not captured upgradient at well AM while the mobile groundwater recovery unit was not operational. The mobile unit was deployed to Well AR to capture this additional volume and tritium concentrations have been steadily decreasing since November 2007. The tritium concentration at Well AR in June 2008 was 16,288 pCi/L. Current tritium concentrations at Wells AR, AS, and AT are below GWQC.

Tritium concentration trends for wells screened in the shallow, water-bearing unit indicate that the operation of the groundwater extraction system is achieving the remedial action objectives (i.e., reduce the mass of tritium in groundwater and maintain hydraulic control). The distribution of tritium in groundwater in June 2008 is presented on **Figure 1**, along with the distribution of tritium prior to the initiation of the pilot study in March 2004, and in June 2007. As shown on **Figure 1**, the mass of tritium in groundwater has continued to decrease through the operation of the groundwater extraction pilot study system and operation of the full-scale system.

3 Groundwater Extraction

Groundwater extraction as a remedial strategy at the site was initiated with the operation of a pilot test from April 2004 to February 2005. In accordance with the RAWP developed for the site, a full-scale groundwater recovery system (GRS) was subsequently implemented in February 2005 and has continued to operate to the present. System service was scheduled and performed in October 2008 to address valve and pump difficulties. This service will be discussed in more detail during the third quarter report.

3.1 Full-Scale System

The objectives of the full-scale GRS consist of:

- maintaining hydraulic containment of the tritium plume; and
- reducing tritium concentrations in groundwater.

The present operation of the GRS consists of groundwater extraction from Wells AB, AD, AJ, AN, AS, and AT. Pumping at Well S is has not occurred since 2006 as a result of low yield and resulting pump failures. The system was inactive for several weeks during the first quarter of 2008 for system servicing. Groundwater extracted from the wells is processed in accordance with the Station's United States Nuclear Regulatory Commission (USNRC) license and plant procedures. Details of the extracted effluent are discussed below.

3.2 Mobile Groundwater Recovery Unit

The mobile groundwater recovery unit was designed and built to target specific areas of the plume exhibiting greater tritium activity. The mobile unit typically operates between March and November (weather permitting). The mobile unit collects water in nominal 1,000 gallon batches for handling in accordance with the station's permits. The mobile unit has historically been used successfully at Wells AP, AM, and AR. Recently it has operated at Wells O and AR which have shown relatively elevated concentrations with respect to the remainder of the plume.

3.3 Total System Effluent Data and Evaluation

GRS operations were initiated on February 16, 2005. The system operated in various configurations as part of the optimization process for approximately the first month. The GRS discharges continuously in accordance with the Station's USNRC permit allowing the GRS to be more effective and efficient than the pilot-scale system. As of June 30, 2008, the GRS has recovered greater than 18 million gallons of groundwater. This is equivalent to an average recovery rate of approximately 11.2 gallons per minute or greater than 16 times the recharge rate for the extraction area (calculated to be 0.7 gallons per minute, based upon an assumed percentage of annual precipitation).

3.4 Water-Level Data and Evaluation

Water level measurements from the extraction and select observation wells have been monitored to confirm hydraulic containment of the tritium groundwater plume. Water levels are periodically collected and evaluated according to the schedule described in the Q4 2006 RAPR submitted in February 2007. Ongoing groundwater level gauging indicates that the GRS system continues to control the flow of groundwater in the Salem Unit 1 yard area and effectively captures the extent of the tritium groundwater plume.

3.5 Cumulative Curies Removed

The various groundwater recovery activities conducted to date have been successful in recovering tritium from groundwater at and downgradient of the Salem Unit 1 seismic gap.

Figure 2 summarizes the results of groundwater remediation activities conducted using the well field including both the pilot study and the permanent system. As shown on **Figure 2,** greater than 2.8 curies of tritium have been recovered from the operation of the GRS through June 29, 2008. Approximately 0.93 curies of tritium were removed by the pilot system. As the mass remaining in the plume decreases so will the rate of tritium recovery by the GRS. The effectiveness of the GRS is emphasized by the decrease and stabilization of system effluent concentrations since the activation of the full scale system in February 2005. System effluent concentrations averaged 52,069 pCi/L during the second quarter 2008. This indicates that the GRS has been successful at significantly decreasing tritium concentrations in groundwater as discharge concentrations are now less than 25 percent of the peak concentration (109,000 pCi/L) observed in March 2005. The mass of tritium in the plume was recalculated in early 2006 to be approximately 2 to 5 Curies (depending on the amount of tritium drawn back through the seismic gap, the actual variability in discharge concentrations and the amount of tritium remaining in dead end pore spaces) at concentrations above the NJDEP GWQC. Based upon the tritium removed since the last recalculation, the present estimate would indicate that the plume retains 1.2 to 4.2 Curies of tritium. Therefore, GRS operations may achieve end criteria for tritium removal ahead of the previously communicated schedule. Ongoing data collection will provide additional data to confirm this preliminary conclusion later in 2008.

4.0 Operation of the Seismic Gap Drain

In addition to the operation of the GRS and mobile groundwater recovery unit, the seismic gap drains in Salem Unit 1 and Unit 2 are being used to continuously drain the water from these gaps, resulting in the recovery of residual tritium concentrations recovering concentrations from the seismic gap. The operation of these permanent gap drains creates an inward gradient towards the gaps facilitating the recovery of water from low accessibility areas.

Water samples from the seismic gap drains are periodically collected for tritium analysis. **Figure 3** summarizes the results of periodic tritium analysis from the seismic gap. A comparison of **Figure 1** and **Figure 3** indicates that concentrations of tritium in water recovered in the Unit 1 seismic gap have been consistently significantly higher than those detected in groundwater samples collected from Well AC and Well AM located to the southeast and southwest of the seismic gap, respectively. Thus, continuous operation of the Unit 1 seismic gap drain is effectively removing residual SFP water in the seismic gap, resulting in the reduction of tritium concentrations in groundwater adjacent to the seismic gap. Significant concentrations of tritium continue to be removed from the Unit 1 seismic gap, however the exact mass removed can no

longer be accurately determined due to monitoring limitations imposed at the initiation of continuous draining. The concentration distribution of tritium at the gap drains will vary with the source of the water being drained, the amount of precipitation since the last draining, and the movement of the water within the seismic gap.

Continuous or nearly continuous draining (resulting in a hydraulic head less than that which is present in the geologic materials present outside the seismic gap) provides a positive assurance of an inward gradient of groundwater to the seismic gap and assures that there is no further potential to discharge to the environment. Concentrations of tritium from the Unit 1 seismic gap (summarized by week) are shown on **Figure 3.**

Monitoring of water drained from the Unit 2 seismic gap acts as a screen for a potential release from the Unit 2 SFP. Currently, plant related gamma-emitting radioisotopes have not been detected in samples collected from the Unit 2 seismic gap drain.

Water samples will continue to be periodically obtained from the Unit 1 and Unit 2 seismic gap drain to evaluate the potential for the release of radioisotopes to the environment.

5.0 Upcoming Activities

Activities projected for the third quarter of 2008 (July through September) include the following:

- Continue to monitor continuous draining of seismic gap drains;
- Ongoing evaluation of the Unit 1 Seismic Gap to refine the procedures and protocols as necessary to adaptively manage the operation and sampling of the GRS;
- Continue to measure groundwater levels and evaluate flow and plume containment;
- Continued groundwater sampling and analysis;
- GRS System service and implementation of a regular service program; and,
- Continued operation and evaluation of the GRS performance.

If you have any questions or comments regarding the contents of this report, please do not hesitate to contact me at (856) 339-5066.

Sincerely,

Greg Suey
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"PSEG NUCLEAR, LLC
SALEM GENERATING STATION
GROUNDWATER TRITIUM RESULTS
FIGURE 1"

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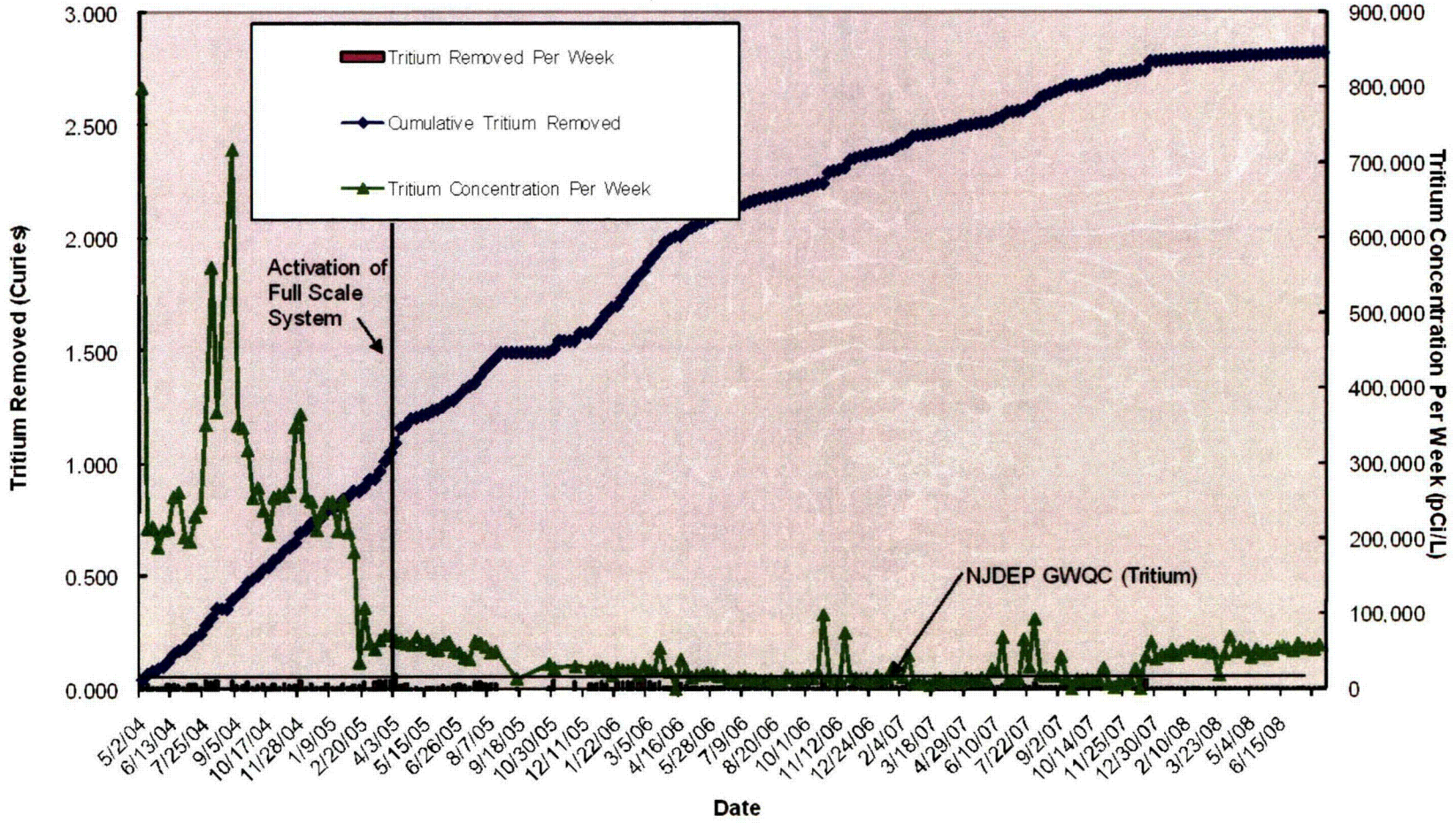
PSEG Nuclear, LLC Salem Generating Station - Unit 1
Tritium Recovered Through Well Field Operation



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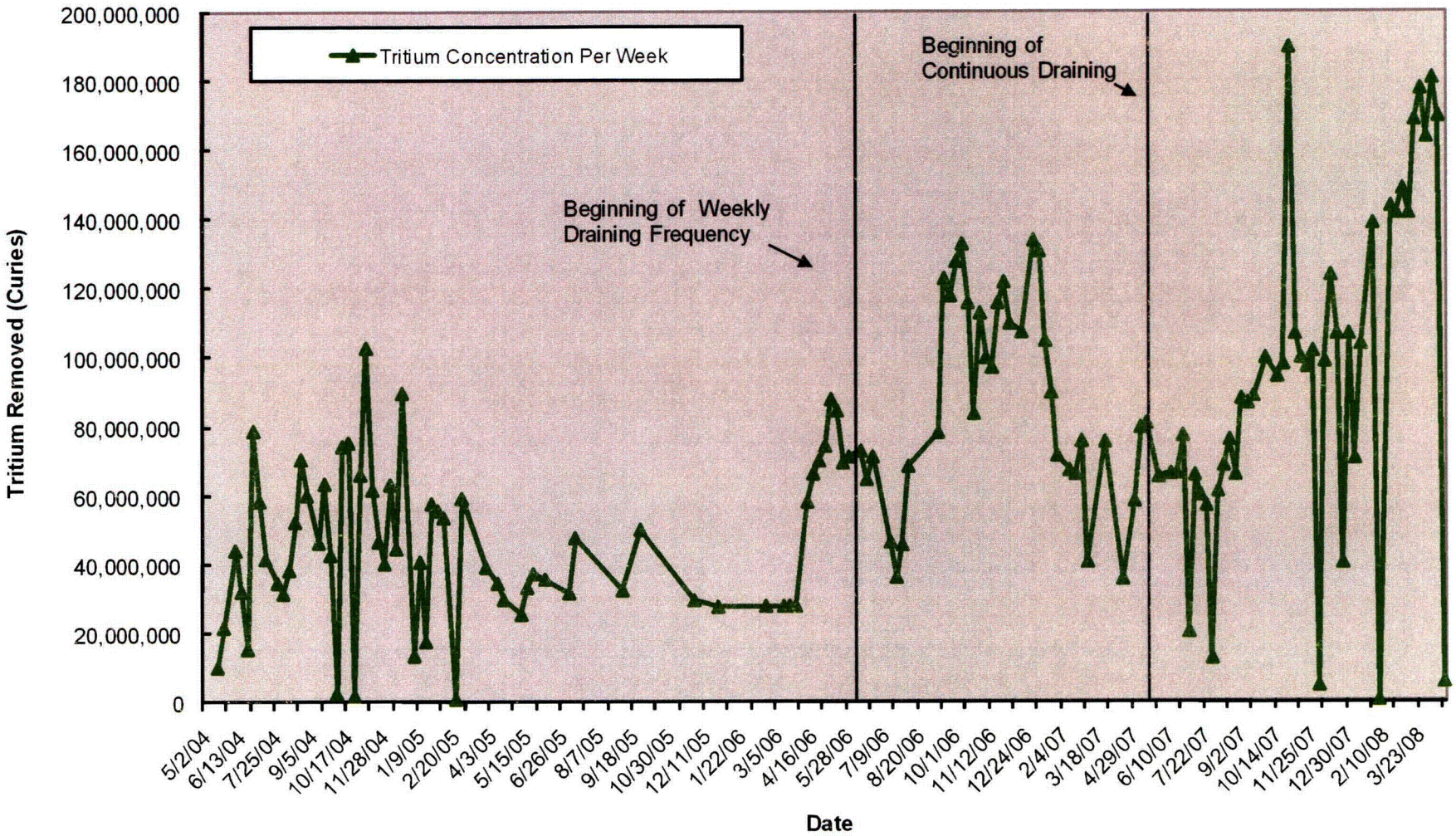
PSEG NUCLEAR, LLC
SALEM GENERATING STATION

HISTORIC TRITIUM RECOVERED THROUGH WELL FIELD OPERATION

HANCOCK'S BRIDGE, NEW JERSEY

Project Number	NP000571.0007
Drawing Date	18 NOVEMBER, 2008
Figure	2

PSEG Nuclear, LLC Salem Generating Station - Unit 1
Concentrations of Tritium in Water Recovered Through Seismic Gap Drain Operation



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PSEG NUCLEAR, LLC
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HISTORIC TRITIUMCONCENTRATIONS OBSERVED DURING SEISMIC GAP DRAIN OPERATION

HANCOCK'S BRIDGE, NEW JERSEY

Project Number	NP000571.0007
Drawing Date	18 NOVEMBER, 2008
Figure	3