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PSEG Nuclear LLC

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QUARTERLY REMEDIAL ACTION PROGRESS REPORT, THIRD QUARTER 2007
PSEG NUCLEAR, LLC, SALEM GENERATING STATION

Dear Ms. Tuccillo:

PSEG Nuclear LLC (PSEG) has prepared this Quarterly Remedial Action Progress Report (RAPR) for the purpose of providing a summary of groundwater remediation activities conducted since the submission of the previous RAPR in September 2007 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 release of tritium contaminated water to the environment was effectively precluded 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 the liner draining activities, a regular program was instituted whereby the telltale drains are monitored for flow and the seismic gap is continuously drained with drain valves that were installed. This program has been continually refined over the course of the investigation and remediation. Data related to the seismic gap previously provided demonstrated that no short lived gamma radioisotopes had been consistently detected in the gap from May 2004 until May 2007. Sporadic detections of cobalt 58 (Co-58) have occurred at the unit 1 gap drain; this is discussed in the seismic gap section of this report. Data from outside the seismic gap continue to indicate that Plant related gammas are not exiting the seismic gap. These data include decreasing tritium concentrations in groundwater. At present, it is estimated that the previous estimate of mass remaining in the plume, 2 to 5 Curies (March 2006) of tritium where it exists above the NJDEP Ground Water Quality Criteria (GWQC) has been reduced by approximately 0.7 Curies since March 2006. The range is dependant 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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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 groundwater investigation activities that were 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 for tritium.

The remedial investigation produced a comprehensive body of knowledge that was used as the basis for developing a remedial action strategy designed to hydraulically contain the further migration of tritium in groundwater and to reduce the concentration of tritium in the shallow groundwater adjacent to Salem Unit 1. In July 2004, a Remedial Action Work Plan (RAWP) was prepared and submitted to the NJDEP-BNE presenting the proposed remedial actions for achieving these objectives. The RAWP, which proposed the operation of a groundwater extraction system, was approved by the NJDEP in November 2004. In April 2004, prior to the submittal of the RAWP, PSEG initiated a groundwater extraction pilot study designed to demonstrate the effectiveness of groundwater extraction for achieving the remedial objectives. The pilot study proved to be effective and a full-scale groundwater extraction system was subsequently installed. In September 2005 weekly draining of the Unit 1 seismic gap was implemented to ensure a gradient of any water that entered the seismic gap was into the building and not toward the environment. In late February 2007 continuous draining of the Unit 1 seismic gap was implemented.

The following sections present the details and results of activities conducted since the submittal of the September 2007 RAPR, document the progress of remedial actions conducted to date, and provide a discussion of upcoming activities projected for the next reporting period.

Continued Groundwater Monitoring

The data indicate that significant decreases in groundwater tritium concentrations have been accomplished to date. Groundwater monitoring activities continued through this reporting period in accordance with the schedule provided to NJDEP-BNE. These activities consisted of the periodic collection of groundwater samples from the 36 Station monitoring wells. The sampling program is designed to ensure representative data are collected that meet the objectives of the investigation and provide the information necessary to evaluate plume containment.

Groundwater samples are submitted to Salem Chemistry for analysis for tritium and gamma isotopes. Samples indicating tritium concentrations less than 20,000 picocuries per liter (pCi/L) are sent to Maplewood Testing Services for more refined analysis. The large volume of analytical data collected to date indicates that plant related gamma-

emitting isotopes have not been detected in any groundwater samples collected during the groundwater investigation.

An update of analytical results for groundwater samples from the Station monitoring wells through September 2007 are provided on **Figure 1**. Historic analytical results were presented in the RIR and previous RAPRs. Included on **Figure 1** are: panel 1) the extent of tritium in groundwater at the completion of the remedial investigation (Baseline Plume), which was completed in April 2004; panel 2) the extent of tritium in groundwater in September 2006 following eight months of the pilot groundwater remediation activities and eighteen months of the full scale system remediation activities; and, panel 3) the current extent of tritium in groundwater. Based on a review of the three panels on **Figure 1**, it is apparent that the mass of tritium in groundwater has been significantly reduced by the remedial efforts completed to date. Details regarding these activities are provided later in this report.

Specific details regarding the analytical results for the groundwater samples are presented in the following sections. The analytical results for the monitoring wells were evaluated based on the water-bearing zone in which the monitoring wells are screened. The three primary water-bearing units being investigated beneath the Station are: 1) the Vincentown Formation; 2) the shallow, water-bearing unit within the limits of the cofferdam; and, 3) the shallow, water-bearing unit outside of the limits of the cofferdam.

Tritium Analytical Results for the Vincentown Formation

Groundwater quality for wells screened in the Vincentown Formation, which consist of Well V, Well K, Well L, Well P, Well Q, and Well CB are currently monitored on a semi-annual basis. Groundwater samples collected from these wells are analyzed for tritium and gamma-emitting isotopes. Analytical results of groundwater samples collected from Wells P and Q indicate concentrations of tritium below the laboratory detection limits. Tritium was last detected at a concentration above laboratory detection limits (July 2004) in groundwater from Well L; however, the tritium concentration was well below GWQC. Based on the long term trend for this well, it is believed that the July 2004 data point was not indicative of actual tritium concentrations. Analytical results of groundwater samples collected from Well K have never indicated tritium concentrations greater than 1,170 pCi/L, approximately four years ago, and are currently in the lower fifth of its range (<153 to 1,170 pCi/L). At the request of the NJDEP BNE, an additional monitoring well, Well CB, was installed in the vicinity of Well K to provide additional data for this substrate. Analytical results from groundwater samples collected from Well CB shortly after installation indicated tritium concentration of 156 pCi/L. All four subsequent samples from this location in the Vincentown formation have indicated concentrations below laboratory detection limits.

Well V continues to exhibit low concentrations of tritium (presently 154 pCi/L). The maximum concentration observed in samples collected from Well V was 402 pCi/L in September of 2004.

Analytical results of groundwater samples collected from the monitoring wells screened in the Vincentown Formation continue to indicate that the release of water from the Spent Fuel Pool has not migrated below the shallow water-bearing unit.

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

Wells screened in the shallow, water-bearing unit within the limits of the cofferdam consist of Well M, Well N, Well O, Well R, Well AC, Well AE, Well AI, Well AM, Well AN, and Well AO. Based upon their location relative to the Salem Unit 1 seismic gap, analytical results of groundwater samples collected from these wells have historically and do presently indicate the highest tritium concentrations in groundwater at the Station.

Historic tritium concentration data is presented on **Figure 1**. Analytical trends for wells screened within this unit exhibiting tritium concentrations above NJDEP GWQC continue to show generally decreasing trends. This provides an indication that operation of the groundwater extraction system are successful in decreasing tritium concentrations within this unit.

Well AC is located directly southeast of the Salem Unit 1 seismic gap and has indicated tritium concentrations as high as 15,000,000 pCi/L. Analytical results of more recent groundwater samples collected from this well indicate tritium concentrations of 31,152 pCi/L. The decrease in tritium concentrations at Well AC is additional confirmation that the release of water from the SFP to the environment has been stopped and the operation of the seismic gap drain and the groundwater recovery system (discussed later in the report) are effectively reducing concentrations of tritium in groundwater and providing hydraulic control of the plume.

The mobile groundwater extraction unit has been redeployed to Well AM to recover additional groundwater with elevated concentrations of Tritium. The mobile unit has previously been used with success at this and other wells to remediate localized portions of the tritium plume. Well O presently exhibits concentrations at the lower end of its established range of concentrations.

Tritium concentrations in groundwater within the cofferdam zones have generally decreased by one order of magnitude or more. This is a positive indication that the selected remedial strategy is effectively removing mass from the areas of greatest concentration.

Tritium Analytical Results for Wells Installed Beyond 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, and Well AT. At the request of the NJDEP BNE, an additional monitoring well, Well CA, was installed in the vicinity of Well U. Analytical results from recent samples collected from Well CA indicate that the tritium

concentration in groundwater in this area is approximately 599 pCi/L, This is greater than the concentration observed in Well U but has been generally decreasing since Well CA was installed and is well below the NJDEP GWQC. 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 outside the cofferdam at the time of the Supplemental Investigation completed in August 2003.

As discussed in previous RAPRs, increased concentrations of tritium were detected in Wells W and AP in 2005. PSEG responded by activating the mobile groundwater extraction unit to spot remediate the area. Subsequently concentrations of tritium in groundwater at these well locations exhibited a generally downward trend in concentrations. Tritium concentrations in these wells are currently well below the GWQC.

Recently higher concentrations of tritium (around 80,000 pCi/L in July 2006 dropping to ~60,000 in September 2007) have been observed in groundwater samples from Well AR. Although these are well below the peak concentrations observed at this well (589,000 pCi/L, they are greater than the samples observed in spring 2006 (12,000 – 16,000 pCi/L) and are believed to be associated with the higher concentrations observed in Well AM. These slightly elevated concentrations represent material not captured by the operation of the mobile groundwater recovery unit. The mobile unit was deployed to Well AR to capture this additional volume and as a result concentrations at Well AR have since decreased.

The tritium concentration trends for wells screened in the shallow, water-bearing unit indicate that the groundwater extraction system has demonstrated the ability to achieve the remedial action objectives (i.e., reduce the mass of tritium in groundwater, and maintain hydraulic control). The current distribution of tritium in groundwater (September 2007) is presented on **Figure 1**, along with the distribution of tritium prior to the initiation of the pilot study (March 2004) and in September 2006. 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.

Groundwater Extraction

In accordance with the RAWP, groundwater extraction activities completed to date consisted of the operation of the pilot-study from April 26, 2004 to February 11, 2005 and operation of the full scale groundwater recovery system (GRS) from February 16, 2005 to the present.

Full-Scale System

Based on the results of the pilot study, a full-scale system GRS was designed and installed. The objectives of the full-scale system are the following: 1) to maintain

hydraulic containment of the tritium plume; and, 2) to reduce tritium concentrations in groundwater.

The present full-scale system consists of the extraction of groundwater from Wells AB, AD, AJ, AN, AS, and AT. Well S was removed from the GRS as a result of its low yield and resulting pump failures. Groundwater extracted from the wells is processed in accordance with the Station's United States Nuclear Regulatory Commission (USNRC) license and plant procedures.

Mobile Groundwater Recovery Unit

The mobile groundwater recovery unit was designed and built to target specific areas of the plume that exhibit areas of greater tritium activity. The use of the Mobile Unit is targeted reducing the required period for remediation. 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 and AM. Recently it has operated at Wells AR and AM which have shown relatively elevated concentrations with respect to the remainder of the plume.

Total System Effluent Data and Evaluation

The full-scale GRS became operational on February 16, 2005. The system operated in various configurations as part of the shakedown process for approximately the first month. The full-scale system discharges continuously in accordance with the Station's USNRC permit allowing the full-scale system to be more effective and efficient than the pilot-scale system. As of September 30, 2007, the full-scale system has recovered greater than 16 million gallons of groundwater. This is equivalent to an average recovery rate of approximately 12 gallons per minute or greater than 17 times the recharge rate for the extraction area (calculated to be 0.7 gallons per minute, based upon an assumed percentage of annual precipitation).

Water-Level Data and Evaluation

Water-level measurements from the extraction and select observation wells have been monitored to demonstrate that the full-scale groundwater extraction system has hydraulically contained the migration of tritium in groundwater. To demonstrate this effectiveness, water levels are periodically collected and evaluated as was provided 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.

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.

Full-Scale System

As shown on **Figure 2,** greater than 2.5 curies of tritium have been recovered from the operation of the full-scale GRS through September 30, 2007. Approximately 0.93 curies of tritium were removed by the pilot system. This figure summarizes the results of the groundwater remediation activities conducted using the well field which includes both the pilot study and the permanent system. As the mass remaining in the plume decreases so will the rate of tritium recovery by the GRS. The effectiveness of the system 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 28,038 pCi/L during the third quarter of 2007. This indicates that the GRS has been successful in significantly decreasing the concentrations of tritium in the subsurface as discharge concentrations are now 25 percent of the peak concentration (109,000 pCi/L) discharged by the GRS in March 2005. The mass of tritium in the plume was recalculated in early 2006 to be in the 2 to 5 Curie range (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 (approximately 0.7 Curie), the present estimate would indicate that the plume retains 1.3 to 4.3 Curies of tritium. Therefore, it remains a distinct possibility that the GRS tritium removal may achieve end criteria ahead of the previously communicated schedule. The ongoing data collection will provide additional data to confirm this preliminary conclusion later in 2007.

Other Remedial Actions

In addition to the operation of the GRS, a mobile groundwater recovery is used to address specific areas of the plume and seismic gap drains in Salem Unit 1 and Unit 2 are being used to drain the water from these gaps recovering concentrations of residual tritium from the seismic gap. The mobile unit was discussed above and the following sections provide a brief overview of the seismic gap draining activities.

Operation of the Seismic Gap Drain

The permanent drains installed in the Salem Unit 1 and 2 seismic gaps facilitate the continuous draining, periodic collection, and characterization of groundwater accumulating in the seismic gaps. The operation of these gap drains creates an inward gradient towards the gaps facilitating the recovery of water from low accessibility areas. **Figure 3** summarizes the results of the seismic gap draining activities. A comparison of **Figure 1** and **Figure 3** reveals the concentrations of tritium in the water recovered in the Unit 1 drain have been 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. The Unit 1 seismic gap drain is effectively removing Spent Fuel Pool water in the seismic gap, and is resulting in the reduction of tritium concentrations in groundwater adjacent to the seismic gap. Based on controlled draining of the seismic gap when the drain valve was first installed, greater than 4 curies of tritium had been recovered from the operation of the Unit 1 seismic gap drain as of

March 2007. Significant concentrations of tritium continue to be removed from the Unit 1 seismic gap, however, the continuous draining precludes accurate flow measurement to determine total curie removal. 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. The continuous draining provides the inward gradient from the seismic gap.

During last winter, increased levels of tritium were detected in samples collected from the Unit 1 seismic gap drain. The concentrations began declining in early January and by late January had decreased significantly from the peak concentrations observed. Since mid February the concentrations have fluctuated around 70 million pCi/L with an increasing range of fluctuation. During July the lowest concentration since early 2005 was reported in the Unit 1 seismic gap. Additionally the highest concentration since January 2007 was detected in September. This indicates that under the present (continuous) draining program, instituted in late February 2007, portions of the seismic gap previously unaffected by the draining program may be supplying water to the gap drain or that the seismic gap continues to receive contribution from the spent fuel pool.

Continuous or nearly continuous draining 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.**

Analytical results for water samples are collected from the Unit 2 seismic gap drain to provide data on radionuclide concentrations of constituents to assure that there is not an indication of constituents that would indicate a similar release occurred from the Unit 2 Spent Fuel Pool, or that the water in the seismic gap near Unit 1 is not migrating to Unit 2. Additionally, no plant related gamma emitting isotopes have been found in samples collected from the Unit 2 seismic gap drain.

Beginning in May 2007 sporadic detections of Co-58 have occurred in the water collected from the Unit-1 seismic gap drain. Additionally Antimony-125 (Sb-125) has been detected on a reasonable consistent basis since May 2007. PSEG is presently evaluating the gap draining program.

There are presently no indications that the observed concentrations are migrating beyond the Unit 1 seismic gap. Support for this is provided by the lack of plant related gamma detections in wells located outside the seismic gap and the continuing generally decreasing trend in the concentration of tritium in groundwater samples collected from wells outside the seismic gap. Water samples will continue to be obtained from both gap drains on a periodic basis to evaluate the water that has accumulated in the respective seismic gaps.

Upcoming Activities

Activities projected for the fourth Quarter of 2007 (October through December) include the following:

- Ongoing evaluation of the Unit 1 Seismic Gap. Refine the procedures and protocols as necessary to adaptively manage the operation and sampling of the full scale groundwater extraction system;
- Continue to measure groundwater levels and evaluate flow and plume containment;
- Continued monitoring wells groundwater sampling and analysis activities;
- Continued operation and evaluation of data obtained through the full-scale groundwater extraction system;
- Winterization of the mobile groundwater recovery unit; and,
- Continue to monitor continuous draining of seismic gap drains.

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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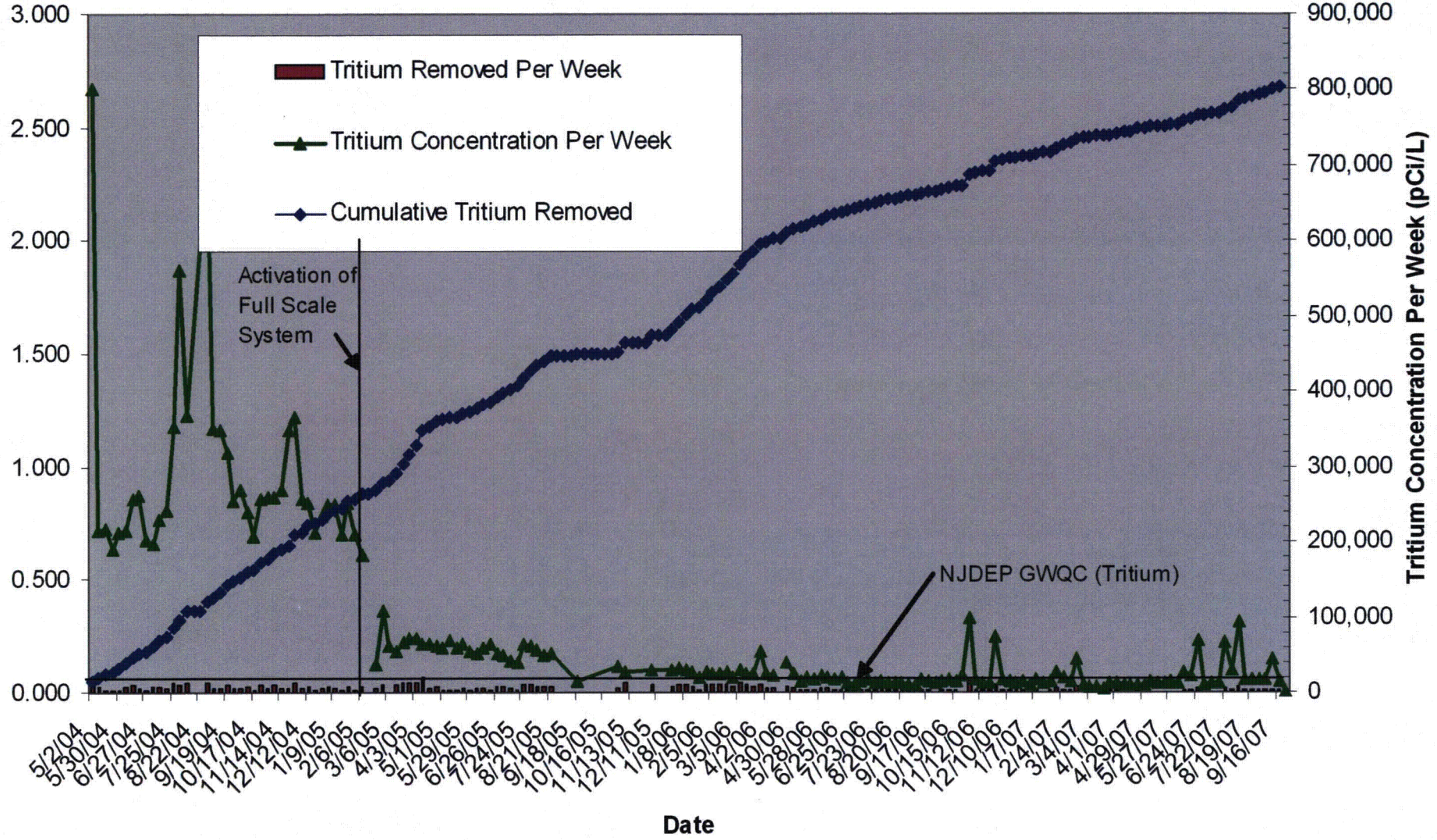
Tritium Recovered Through Well Field Operation



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HISTORIC TRITIUM RECOVERED THROUGH WELL FIELD OPERATION

HANCOCK'S BRIDGE, NEW JERSEY

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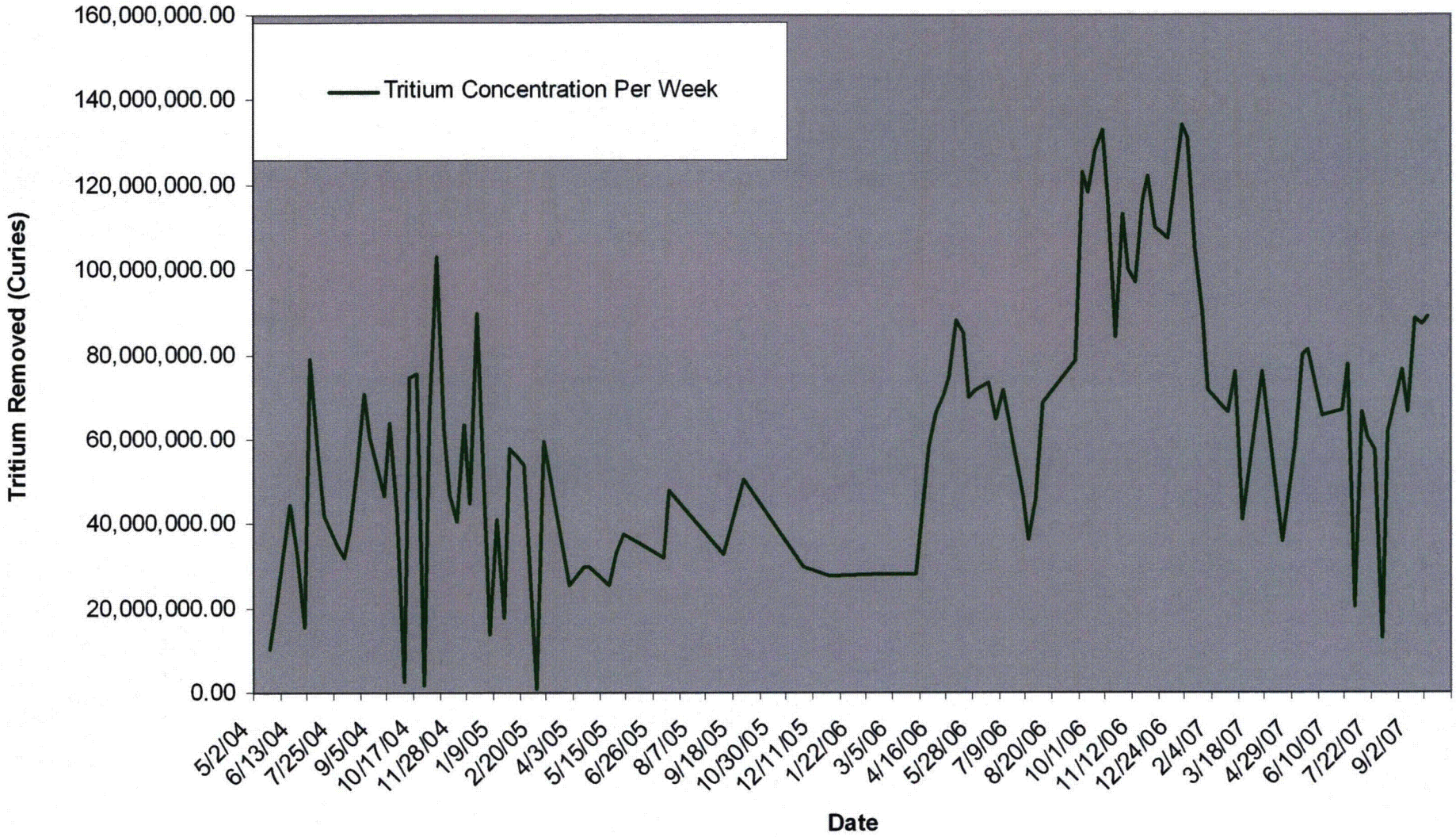
Figure	2

PSEG Nuclear, LLC Salem Generating Station - Unit 1
Tritium 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	NP000571.005
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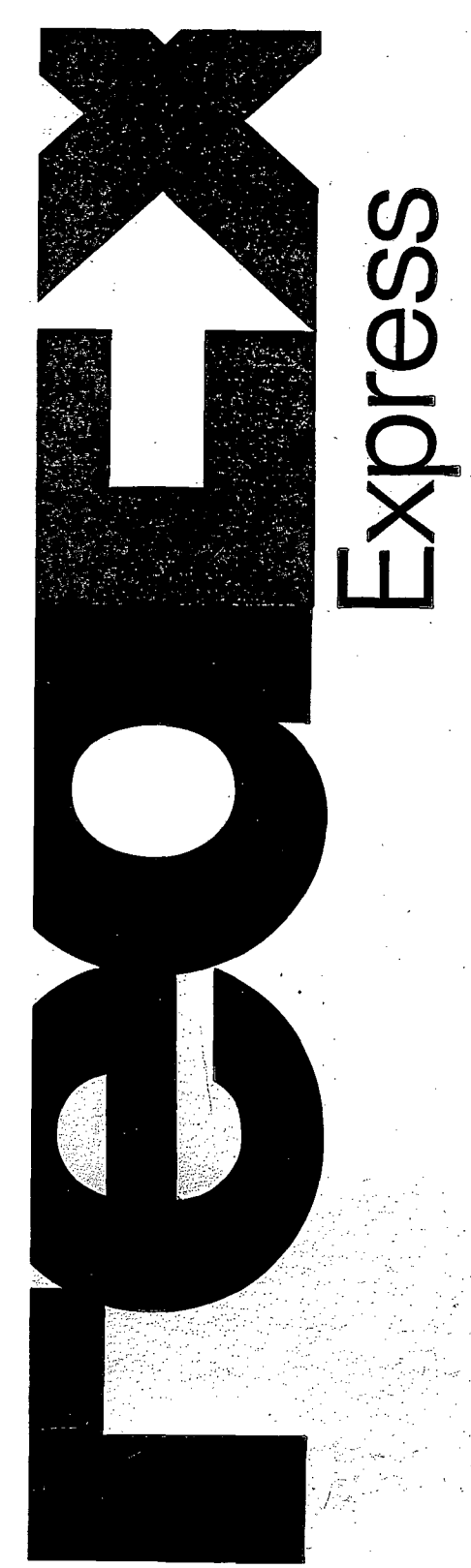

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