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June 01, 2006

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Arizona Department of Environmental Quality
Water Quality Compliance, Enforcement Unit
Mailcode: 5415B-1
1110 West Washington Street
Phoenix, Arizona 85007

Attention: Mr. Robert C. Casey
Mr. Henry Darwin
Mr. Jason Jones

Reference: Aquifer Protection Permit No. P-3507-100388

Dear Sirs:

Subject: Update to the Notification of Discharge of Non-hazardous Materials (Tritium) 30 Day Report Work Plan – Completion of Tasks 1a, 1b, 1c, 1d, 2a, and 2b

The Notification of Discharge of Non-hazardous Materials (Tritium) 30 Day Report submitted on April 3, 2006 includes a Tritium Investigation Work Plan and Schedule. Tasks associated with this work plan are summarized in Table 3 of the report.

Enclosed as Attachment 1, is a report prepared by CH2MHILL that summarizes the results of the evaluation of tritium deposition from atmospheric releases (Task 1) and the plant leak source evaluation (Task 2) as identified in Table 3 in the 30 Day Report. These evaluations were performed to identify the extent of the tritiated water in the subsurface and to establish the most probable source of the contamination. With the submission of this report, all actions associated with Tasks 1 and Task 2b can be closed. However, as discussed in the report, one underground pipe still needs to be tested before the remaining items associated with Tasks 2 can be closed. A work plan to address testing of the pipe is enclosed as Attachment 2. The submission of this work plan completes Task 2a. Tasks 2c, and 2d will remain open until testing is complete to confirm that this is not a potential leak source and that no additional recommendations beyond those discussed in the evaluation report are necessary. Testing is scheduled to be completed by July 1, 2006. Any follow-up recommendations will be presented in accordance with the original schedule for Tasks 2c and 2d.

The atmospheric modeling results presented in the evaluation suggest that Unit 1 should have the higher potential for tritium deposition, although not more than a factor of two times higher than Units 2 and 3. Because of the higher potential, an additional test hole will be placed in Unit 1 where there is the highest probability of tritiated subsurface water above action levels. The installation of this test hole and follow-up evaluation will be tracked separately and identified as Task 7 associated with the tritium investigation. The installation of the test hole and follow-up evaluation will be completed by July 20, 2006

Please note that the attached evaluation report contains minor changes that were identified after the report went to press. The affected pages are included in an *errata* section that has been attached to the back cover of the report. The pages in this section supersede those contained in the final report.

If you have any questions or require additional information, please contact me at (623) 393-6567 or Mr. Harvey Lesan at (623) 393-6490.

Sincerely,

HPD/HCL/hsc

Attachment

cc: Ms. Kristie Kilgore, ADEQ

Attachment 1
Tritium Evaluation
30 Day Follow-up Report

Tritium Evaluation
30 Day Follow-up Report

Task 1 - Evaluation of Tritium Deposition from Atmospheric Releases

Task 2 - Plant Leak Source Evaluation Report

Prepared for

Palo Verde Nuclear Generating Station

Prepared by

CH2MHILL

Denver, Colorado

Amy L. Lange, PE
Project Manager

May 31, 2006

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Appendices

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Acronyms and Abbreviations

agl	above ground level
ADEQ	Arizona Department of Environmental Quality
APS	Arizona Public Service
AQL	Aquifer Quality Limit
BAC	Boric Acid Concentrator
bgs	below ground surface
BPIP-Prime	EPA Building Profile Input Program
CP	containment purge
DEM	Digital Elevation Model
EPA	U.S. Environmental Protection Agency
EPDT	Essential Pipe Density Tunnel
ft	feet
ft/s	feet per second
ISCST3	Industrial Source Complex Short-Term Model
HUT	Holdup Tank
HVAC	heating, ventilation, and air conditioning
km	kilometer
LAU	Lower Alluvial Unit
MDA	Minimum Detectable Activity
MFU	Middle Fine Grained Unit
ml	Milliliter
MPRM	Meteorological Processor for Regulatory Models
NAD	North America Datum
µCi/mL	microCuries per milliliter
$\mu Ci/m^2$	microCuries per square meter
NCDC	National Climatic Data Center
NRC	Nuclear Regulatory Commission
PRIME	Plume Rise Model Enhancements
PV	Palo Verde
PVNGS	Palo Verde Nuclear Generating Station
RCA	Radiological Control Area

RWT	Refueling Water Tank
TOC	Top of Casing
UAU	Upper Alluvial Unit
USGS	United States Geological Service

Executive Summary

This report summarizes the results of the evaluation of tritium deposition from atmospheric releases (Task 1) and the plant leak source evaluation (Task 2) of the Tritium Evaluation 30 Day Follow-up Report for the Palo Verde Nuclear Generating Station (PVNGS). These evaluations were performed to identify the extent of the tritiated water in the subsurface and to establish the most probable source of the contamination.

Tritiated water is found in the subsurface soil at PVNGS Units 2 and 3, however only the Unit 3 RCA Yard contains tritium above action levels. The tritiated water is confined to areas within shallow basins formed by low permeability compacted soil and foundation structures. While constructed in a similar manner, the units have unique above and below ground construction features that influence how subsurface tritiated water accumulates. In particular, the presence of tritium in the subsurface is directly related to the presence of permeable areas at the surface where tritium can infiltrate into the subsurface.

As a result, the amount and concentration of tritiated water accumulated is different not only between the units but also in areas in close proximity within each unit. These unique features limit the migration of the subsurface tritiated water from the area where it has been identified. This limited migration is confirmed by the fact that tritium has not been identified in any of the on or off site monitoring wells. However, potential migration pathways for the tritium will be further investigated during the installation of new monitoring wells, performed under a separate task.

While one additional system pipe still remains to be evaluated, the tritium does not appear to be a result of an active process system leak. In addition, atmospheric modeling indicates that rain washout of tritium under the current operating conditions is not the source of the tritium in the subsurface. The source of the subsurface water with the higher tritium concentrations is believed to be a result of past operational practices or events.

Because current PVNGS operations differ from the past, the source or sources of the identified tritium can not be absolutely determined. However, the most probable causes are washout that occurred during the past when the Boric Acid Concentrator (BAC) may have operated during rain events, wash down of roofs or washout from rain during times when tritium condensation from the ventilation system was present, and possibly small volume spills within the area of the small, shallow basins.

This report completes Task 1, the Evaluation of the Tritium Deposition from Atmospheric Releases and a portion of Task 2. There are two additional follow up activities that will be reported separately. These are as follows:

- A leak evaluation will be performed for an additional 10-inch diameter, underground pipe that runs from the RMWT to an auxiliary feedwater pump located in the Main Steam Support Structure in each unit. This pipe is not expected to be the source of the tritium based on the condition of the other underground pipes tested, and because it is unlikely that leaks could result in the similar levels of tritiated water found in two separate units.
- The atmospheric modeling results suggest that Unit 1 should have the higher potential for tritium deposition, although not more than a factor of two times higher than Units 2 and 3. However, because of the higher potential, an additional test hole will be placed in Unit 1 where there is the highest probability of tritiated subsurface water above action levels. As

noted above, the presence of tritium in the subsurface is directly related to the presence of permeable areas at the surface where tritium can infiltrate into the subsurface. Therefore, locations where impermeable surfaces are present are not anticipated to contain subsurface tritium.

1.0 Introduction

This report summarizes Task 1 and Task 2 of the Tritium Evaluation 30 Day Follow-up Report for the Palo Verde Nuclear Generating Station (PVNGS). Task 1 is the Evaluation of the Tritium Deposition from Atmospheric Releases and Task 2 is the Plant Leak Source Evaluation.

The PVNGS is located in Maricopa County, Arizona, approximately 50 miles west of Phoenix and consists of three pressurized water reactor electrical generating units, named from northeast to southwest as Unit 1, Unit 2, and Unit 3. PVNGS comprises approximately 4,080 acres. Site elevations range from 890 feet above mean sea level at the southern boundary to 1,030 feet above mean sea level at the northern boundary (PVNGS, 2005).

1.1 Background and Scope

Water was observed seeping into the Unit 2 Essential Pipe Density Tunnel (EPDT) in mid-February 2006. The EPDT is a subsurface concrete pipe chase. The water appeared to be coming from outside of the tunnel through seals around the 24-inch spray pond pipes. These pipes exit the tunnel at the location where seepage was observed. Outside of the tunnel, the pipes are bedded in sand within the surrounding backfill material. Samples collected did not contain tritium above action levels and excavation of the area did not indicate that the lines were leaking. The other Units were then inspected to determine if similar conditions were present. Unit 1 was dry. Water was observed leaking into the EPDT at Unit 3.

At Unit 3, a test hole was dug to a depth of approximately thirteen feet outside the EPDT to characterize the water and identify its potential source. Reinforced slotted pipe was installed in the test hole to keep the hole open so that water samples could be obtained for analysis. Initial results from the Unit 3 laboratory indicated the presence of tritium. A verification sample was collected and analyzed by the PVNGS State Certified Laboratory on March 1, 2006. This sample showed tritium at 7.14×10^{-5} microCuries per milliliter (µCi/ml), above the Aquifer Water Quality Standard (action level) of 2.0×10^{-5} µCi/ml.

Immediately upon discovery of the tritium above action levels in Unit 3, several parallel investigations were initiated to determine the extent of the contamination and to evaluate the potential sources. The investigations consisted of the following:

- Conducting atmospheric modeling to determine the tritium component potentially derived from the stack emissions.
- Performing preliminary test hole investigations within the Unit Radiological Control Area (RCA) Yards to evaluate subsurface conditions.
- Evaluating the process systems as a potential source of the tritium.

This report describes the results, conclusions, and recommendations of these investigations.

1.1.1 Notifications

A Notification of Discharge of Non-Hazardous Materials was made to the Arizona Department of Environmental Quality (ADEQ) within 24 hours in accordance with the Station Aquifer Protection Permit, Section 2.6.5.3 on March 2, 2006 because of the potential to cause an aquifer quality limit (AQL) to be exceeded.

A followup 5-day notification was sent to the ADEQ on March 10, 2006 describing the incident and the immediate actions the PVNGS was taking. The 30-day followup report was submitted on April 3, 2006 and provided an update of the immediate actions taken and progress of long-term actions. Six tasks were identified in the 30-day follow-up report to complete the investigation.

The subtasks and schedule that were provided in the 30-day report are summarized in Table 1-1. This evaluation fulfills the requirements of Task 1 - Evaluation of Tritium Deposition from Atmospheric Releases and Task 2 – Complete Plant System Leak Source Determination. However, additional follow on tasks will be completed to evaluate an additional underground pipe system, and to evaluate the areas with the highest potential for tritium. These follow up actions are described in Section 7.5.

TABLE 1-1
Tasks 1 and 2 Investigation Work Plan and Schedule

Task Number	Description	Completion Date
1	Evaluation of tritium deposition from atmospheric releases.	
1a	Perform atmospheric modeling of tritium releases.	05/26/06
1b	Perform assessment of stormwater discharges from building roofs.	04/27/06
1c	Provide ADEQ report of evaluation results.	06/01/06
1d	Compile recommendations for monitoring, remediation, and/or mitigating strategies to minimize impacts from atmospheric tritium releases as required.	09/22/06
2	Complete plant system leak source determination.	
2a*	Develop work plan to systematically identify other potential leak sources through additional test hole sampling and/or plant engineering evaluations.	06/01/06
2b	Conduct a detailed characterization study to confirm affected area is localized. Include evaluation of potential impacts to underlying aquifer.	09/07/06
2c*	Compile recommendations for monitoring, remediation, and/or mitigating strategies related to tritium discharge.	10/06/06
2d*	Provide ADEQ report of evaluation results that includes recommended actions for their review and approval.	10/20/06

* Additional information will be required to close these subtasks. See section 7 for specifics.

1.2 Report Organization

The report is organized as follows:

Section 2, Site Description: This section presents the unit construction, subsurface geology, hydrogeologic setting, and stormwater evaluation.

Section 3, Tritium Test Hole Investigations: This section presents the test hole results for Units 1, 2, and 3. The initial testing was performed at Unit 3. Water level and tritium results are presented along with the summary and conclusion of the investigations.

Section 4, Atmospheric Modeling of Tritium Releases: This section presents the atmospheric dispersion modeling analyses under several different scenarios.

Section 5, Additional Source Investigation: The additional potential sources from the process systems and other potential sources are discussed.

Section 6, Site Conceptual Model: This section presents a site conceptual model based on the test-hole information, construction of the Units, atmospheric modeling, and additional source investigation.

Section 7, Conclusions and Recommendations: This section provides a summary of the Task 1 and Task 2 Tritium Evaluations along with recommended follow up activities.

Section 8, References

Appendix A – Water Levels

Appendix B – Test Hole Information

Appendix C – Analytical Data

2.0 Site Description

This section presents a summary of how the Units were constructed, the subsurface geology, hydrogeologic setting, and stormwater elevation.

2.1 Unit Construction

The three Units at PVNGS have similar site layouts and construction. Each of the Units was constructed within a large excavated basin approximately 60 feet below the initial grade. As the buildings were constructed, the area was backfilled with compacted structural fill material to ensure there was a stable base for the buildings. Buildings were then constructed within the excavation as the appropriate depth was reached. Because of this construction method, the operating unit buildings are mostly surrounded by and supported on compacted structural fill material; no undisturbed native material is present. Figure 2-1 is a representative section through a PVNGS operating unit showing the excavation depth, building placement, and backfill material. Details of the construction process are provided in the Final Safety Analysis Report (PVNGS, 1981).

As construction activities neared final grade and completion, less-compacted backfill was placed in limited areas where no additional building construction was to occur, particularly around the utility corridors. Utilities were placed in sand or coarser grained material as additional protection from settling and damage caused by compaction. As a result, the more permeable fill material is found at more shallow depths. The areas where less-compacted fill was used are isolated from each other by building foundations and the associated compacted structural fill.

2.2 Subsurface Geology

As described above, the subsurface immediately adjacent and beneath the Units consists entirely of backfill material, mostly structural backfill designed to support the weight of the buildings without shifting or subsiding. Structural backfill meets a minimum 95 percent compaction requirement in order to provide a stable base for building foundations. Minor amounts of less-compacted fill material are also present. The less-compacted fill is primarily fine grained material such as silt and clay, but also contains sand and gravel mixed throughout.

Beneath and further away from the Units, the subsurface geology consists of thin interbedded layers of clay, silty clay, silt, and fine grained sandstone associated with playa deposition overlying the primarily volcanic bedrock (Figure 2-1). The major, continuous geologic units in this area are the Upper Alluvial Unit (UAU), the Middle Fine Grained Unit (MFU) and the Lower Alluvial Unit (LAU). The LAU is the primary regional aquifer immediately overlying the volcanic bedrock in this area.

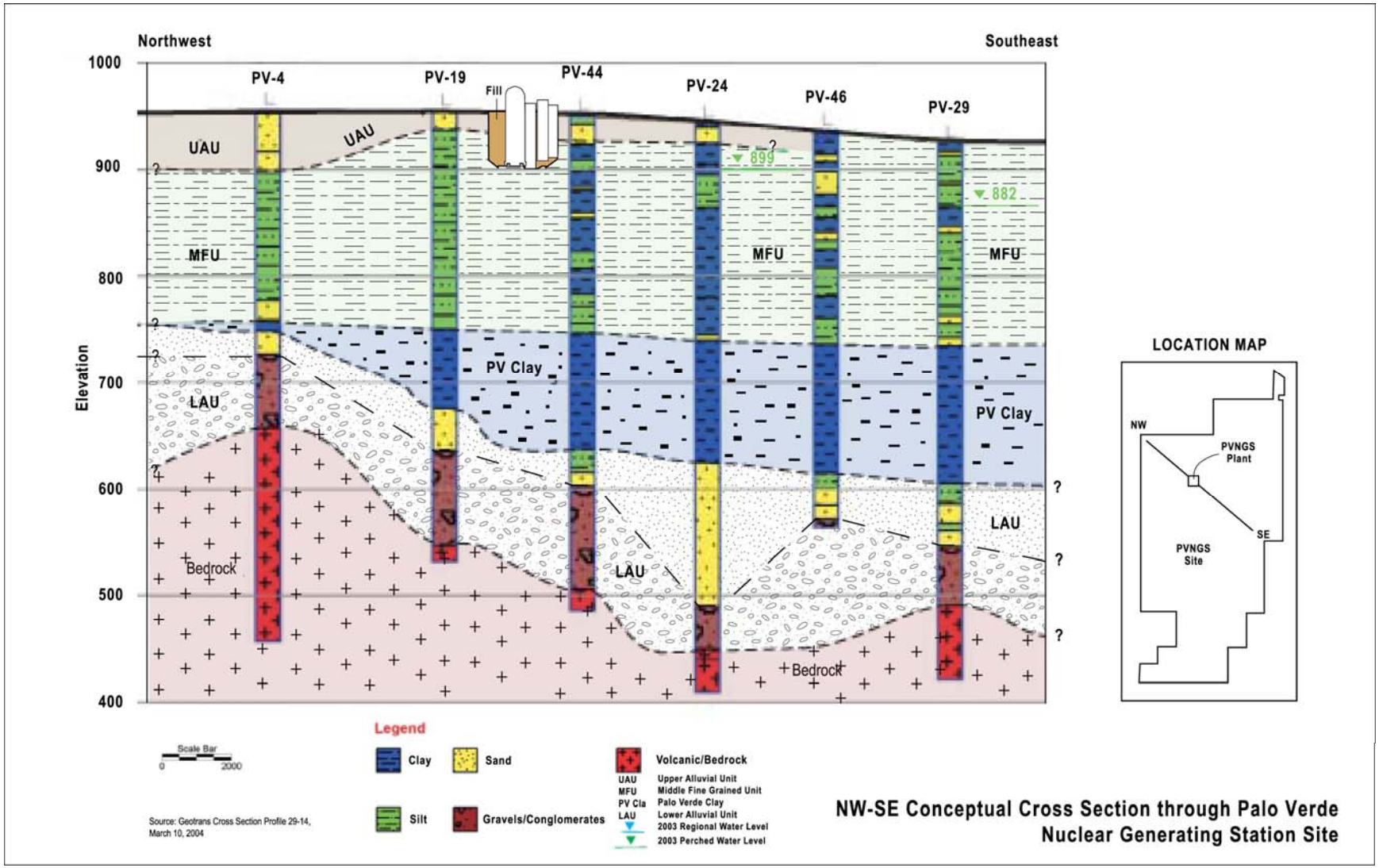


FIGURE 2-1
Conceptual Cross Section Through an Operating Unit Showing Complex Hydrogeology and Backfill

2.3 Hydrogeologic Setting

A shallow aquifer is present at an estimated depth of 80 to 100 feet below grade at Unit 3. The shallow aquifer is found in a localized area at the PVNGS. Water levels in this unit are declining indicating that recharge is not occurring. Although there is little data to the northwest of the Units, available data suggests that the general flow direction in the shallow aquifer is to the west. The regional aquifer is within the LAU and occurs at a depth of about 225 feet below Unit 3. The general flow direction is to the south-southwest.

Between the shallow and regional aquifers, fine grained, low permeability soils near the top of the MFU and within the MFU act as aquitards, limiting downward migration of groundwater. The Palo Verde (PV) Clay in the lower MFU is a significant aquitard. This low permeability unit is 20 to 80 feet thick, and is found at a depth of approximately 175 to more than 200 feet below ground surface (bgs).

In addition to the regional and shallow aquifers, there are also discontinuous, saturated zones within the more sandy parts of both the UAU and the upper portions of the MFU. A saturated zone is expected to be present at the top of the PV Clay. The hydrogeologic information is presented in greater detail in the PVNGS 30-Day Report (PVNGS, 2006b) and the Work Plan for Drilling, Sampling and Monitoring Well Installations Adjacent to Units 1, 2 and 3 (PVNGS, 2006c).

2.3.1 Hydrogeology of the Fill Material

Because of the way the Units were constructed, the compacted structural fill material forms a small, shallow basin in the RCA Yard area with the sides of the basin formed by compacted structural fill and building foundations. The interior of this small basin is filled with less-compacted fill material surrounding utilities, associated sand bedding, process piping, and duct banks. There are areas of structural fill within the basin around and beneath the pump house.

No hydrogeologic information has been collected to date on either the compacted structural fill material or the less-compacted fill material. However, the compacted structural fill material is believed to be limiting migration of water. Geological data collected as part of the monitoring well plan being implemented as a separate task will collect data to confirm the backfill properties.

Because of the lower permeability of the compacted structural fill material, water tends to flow preferentially through the sand bedding found around utilities, and also through the less-compacted fill material. There is limited connection between these zones of higher permeability material impeding the water flow. Where present, water is found pooled against the compacted structural fill material and the foundations in the deeper portion of these shallow basins.

There are several potential sources of water found in the fill material including stormwater runoff, water used to wash off buildings and pavement, leaks from fire water and demineralized water lines, and/or spills and leaks from other process systems. **Once water is introduced into the fill material, it tends to remain.** Because much of the area is paved or covered by structures and duct banks, it is less likely for water to evaporate. The utilities and associated sand bedding are higher in the basin than the ponded water. Most are restricted to the area within the basin and do not present a pathway out of the basin. Finally, the structural fill and foundations that form the sides of the basin also limit migration out of the basin.

2.4 Unit Stormwater Evaluation

Stormwater flow and the potential for infiltration were evaluated at each Unit to determine where stormwater could infiltrate into the subsurface. At each Unit, scuppers (downspouts) divert precipitation from the roofs of surrounding buildings to the ground. In addition to precipitation, when the buildings and paved areas are washed, water also flows from the building roofs and other areas into the RCA Yards. The RCA Yards are mostly covered with impermeable material and most of the water is collected by the PVNGS stormwater system.

While the three Units at PVNGS have similar site layouts and construction, there are differences in physical conditions that control collection and routing of stormwater within each RCA Yard. In each Unit, there are more permeable areas where infiltration may occur, particularly in Units 2 and 3. Additionally, seismic gaps between structures may also be preferential pathways for precipitation to enter the subsurface if water is pooled in these areas or if there is significant flow duration along the seismic gaps. The following describes the specific information for each Unit (PVNGS, 2006b).

2.4.1 Unit 1 Stormwater Drainage

Almost all of the Unit 1 RCA Yard is paved. Shallow drainage swales divert stormwater out of the area rather than collecting in the RCA Yard. The scuppers on the northwest and southwest corners of the Fuel Building drain onto paved surfaces. The scuppers on the northeast and southeast corners of the Fuel Building drain onto mostly paved areas, although there are unpaved areas less than 5 feet in diameter at the scupper outfalls. Figure 2-2 shows the limited areas where infiltration can occur. These are:

- Asphalt was recently cut away at the north side of the sump on the west side of the Refueling Water Tank to control drainage. This cutout can receive water from the scupper on the southwest corner of the Fuel Building.
- A very small area on the southwest side of the Holdup Tank (HUT) sump is not paved. In addition, the pavement is sloped towards the HUT sump and stormwater can enter the sump at this location. However, the sump does not show evidence of staining, indicating very little water enters at this location.

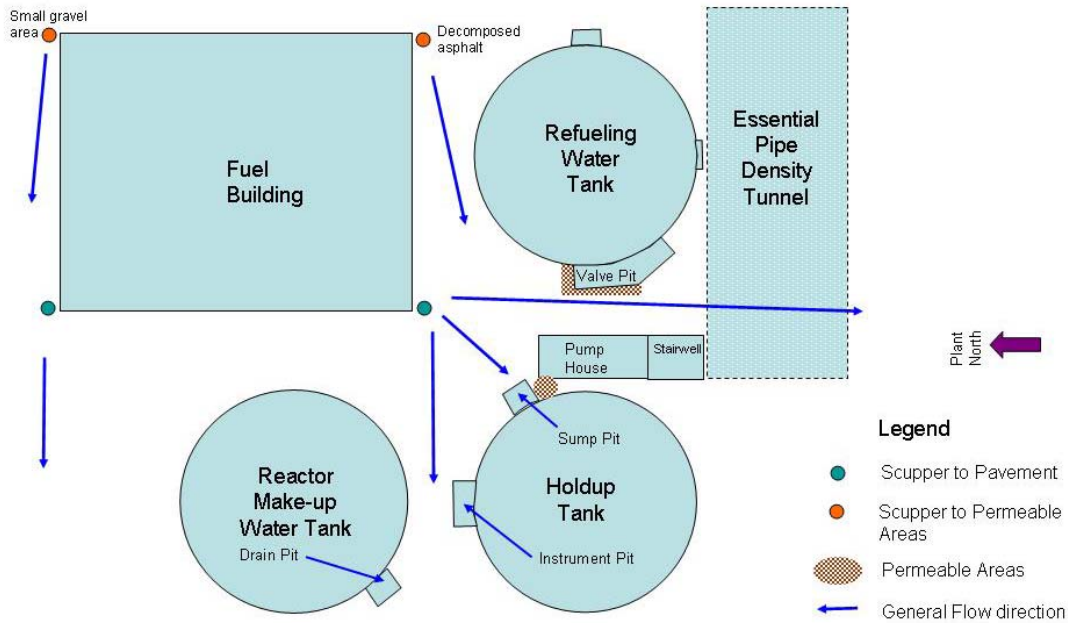


FIGURE 2-2
Conceptual Drawing Unit 1 RCA Yard Stormwater Drainage

The surface of the Unit 1 RCA Yard is mostly impervious except for a few openings cut into the asphalt to control stormwater drainage. There is limited potential for water to infiltrate into the subsurface, and the subsurface is dry. As verification, the Unit 1 EPDT is dry with little evidence of water staining. As discussed in Section 3, test hole data confirms this conclusion.

2.4.2 Unit 2 Stormwater Drainage

Similar to Unit 1, most of the Unit 2 RCA Yard is also paved. The ground surface slopes away from the buildings and shallow drainage swales divert most stormwater out of the area, rather than it collecting in the RCA Yard. Unlike Unit 1, there is a small lip on the HUT sump that acts as a barrier to stormwater flow into the sump. Figure 2-3 shows the limited areas where infiltration can occur:

- A large, unpaved area immediately north of the northwest Fuel Building roof scupper where water can enter the subsurface. Some of the introduced water may then flow along the permeable material under the buttress for the Fuel Building to the heating, ventilating, and air conditioning (HVAC) tunnel and from there to the EPDT. This pathway is further discussed in Section 3.
- Asphalt was recently cut away at the north side of the sump on the west side of the Refueling Water Tank to control drainage. This cutout can receive water from the scupper on the southwest corner of the Fuel Building.
- The northeast scupper of the Fuel Building also drains into a permeable area. However, as in Unit 1, there is no likely pathway for water to reach the RCA Yard from this scupper.
- The pavement in the Unit 2 RCA Yard has more cracks and is more degraded than the asphalt in Unit 1.

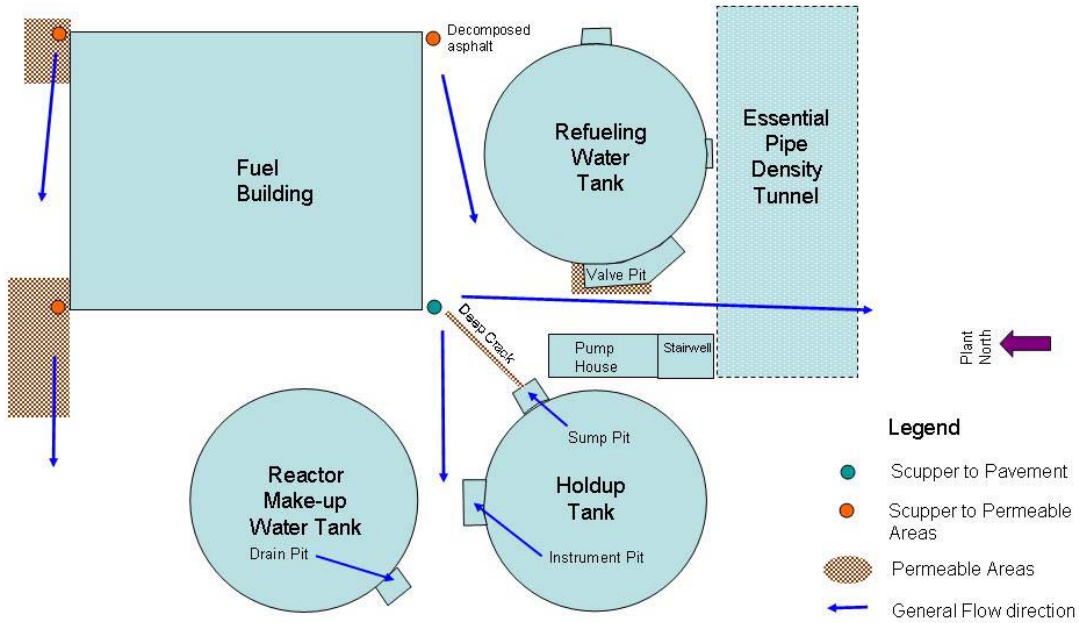


FIGURE 2-3
Conceptual Drawing Unit 2 RCA Yard Stormwater Drainage

The walls and floor of the Unit 2 EPDT are water stained. There is a small, approximately 2-inch-tall dam made of Plexiglas at the mouth of the HVAC tunnel where it enters into the EPDT. The dam was outfitted with a nipple and Tygon tubing to allow collected water to flow directly to the sump. The size of the dam and the small-diameter tubing indicates a low flow rate. The diversion prevents the water from dripping onto the floor causing housekeeping and worker safety issues. The Unit 2 EPDT appeared to have more water than Unit 3, however, the tritium results collected to date are lower than those from Unit 3 and are below action levels.

While the existing stormwater collection system limits stormwater infiltration into the subsurface, some stormwater is entering this area. As discussed in Section 3, test holes in Unit 2 found that there were more concrete structures in the subsurface that are directing water to the EPDT.

2.4.3 Unit 3 Stormwater Drainage

Much of the RCA Yard is paved or otherwise covered with impermeable material, and most of the stormwater flows into the stormwater system. However, the scuppers at the north and south side of the Fuel Building in Unit 3 are adjacent to more permeable areas within the small basin of unconsolidated fill material (see Figure 2-4). Additional unpaved areas are present to the west side of the RCA Yard, on the north side of the HUT, and around the Reactor Makeup Water Tank. These areas also provide a potential pathway for stormwater to enter into the subsurface.

The walls and floor of the Unit 3 EPDT are water stained. Tygon tubing is installed at three locations to divert water entering into the EPDT directly to the sump. As with Unit 2 EPDT, the small-diameter tubing indicates a low flow rate. Water collection prevents the water from dripping on the floor causing housekeeping and worker safety issues.

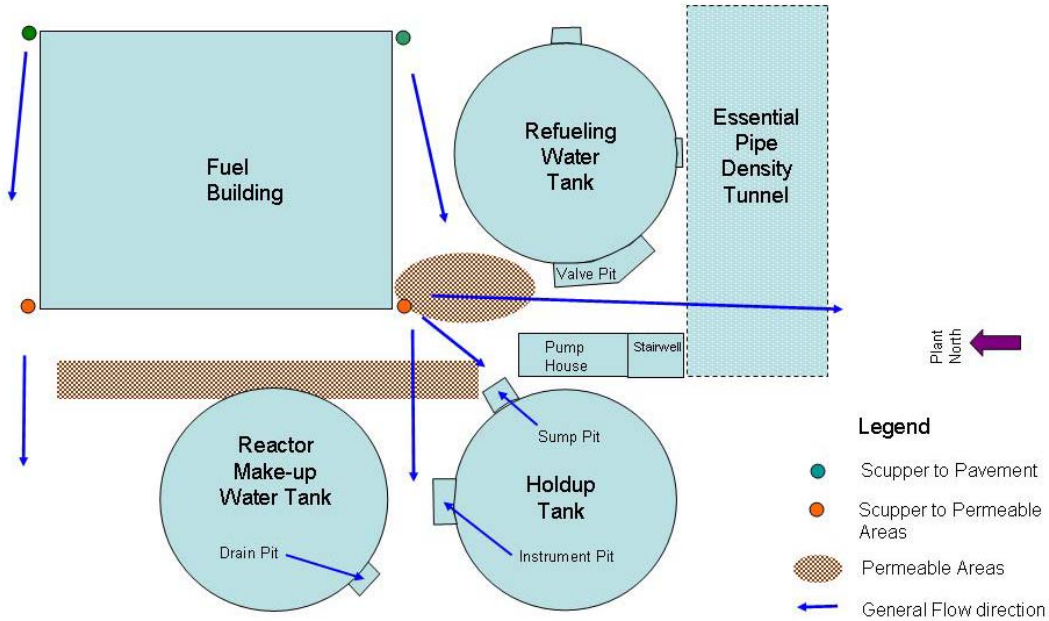


FIGURE 2-4
Conceptual Drawing Unit 3 RCA Yard Stormwater Drainage

There are numerous pathways for stormwater infiltration into the subsurface at Unit 3 as shown by the test hole results and by the conditions in the EPDT.

3.0 Tritium Test Hole Investigation

The purpose of the tritium test hole investigation was to determine tritium levels and extent in the subsurface beneath each of the Units and to investigate potential tritium sources in the subsurface. All test holes were excavated using a vacuum system (also known as soft excavation) to avoid damaging the numerous utilities in the area. The test holes are approximately one foot in diameter and 6 to 15.5 feet deep. Some of these test holes were offset up to five times until an area was located that was clear of utilities and structures. The alpha character on some of the test hole designations indicates the offset that successfully obtained the target depth. While little geologic data was obtained using this approach, this method clearly defined the areas of structural compacted fill. Details of the test holes are provided in Appendix A.

For test holes where compacted structural fill was encountered, a high-pressure wand was used to spray small quantities of clean water into the test hole to loosen the material sufficiently for vacuum removal. This introduced a small amount of clean water into the subsurface, however, frequent sampling has minimized the potential impact from the introduced water. After the test holes were completed, reinforced slotted pipe was installed in the test holes to keep the holes open so that water samples could be obtained for analysis. These test holes are not monitoring wells. Monitoring wells will be installed in this area as described in the work plan for the installation of new monitoring wells in Units 1, 2, and 3 (PVNGS, 2006c).

The initial test holes were placed in Units 1, 2, and 3 to evaluate whether tritium was present in the subsurface at these locations. After tritium was found in the subsurface at Unit 3, additional test holes were placed in Unit 3 to evaluate the extent of the tritium above action levels and to evaluate potential subsurface sources for the tritium. The test holes were intended to provide a quick determination of the extent of the problem and for use in planning follow-up actions. For this reason, these were biased to the following locations:

- In the vicinity of sumps and pipes that contain tritium in order to investigate these as potential tritium sources, and evaluate these other, high probability areas.
- At locations around the EPDT to determine the extent of tritium at this location.
- At additional locations within the RCA Yard to bound the extent of tritium.

Based on the results of these initial test holes, additional holes were placed in Units 1 and 2 to determine the extent of tritium in these areas. Results for Unit 3 are provided in Section 3.1 and results for Units 1 and 2 are provided in Section 3.2 and 3.3 respectively. Water level and tritium results are also discussed in each of these sections. Figure 3-1 presents the locations of the test holes for each unit.

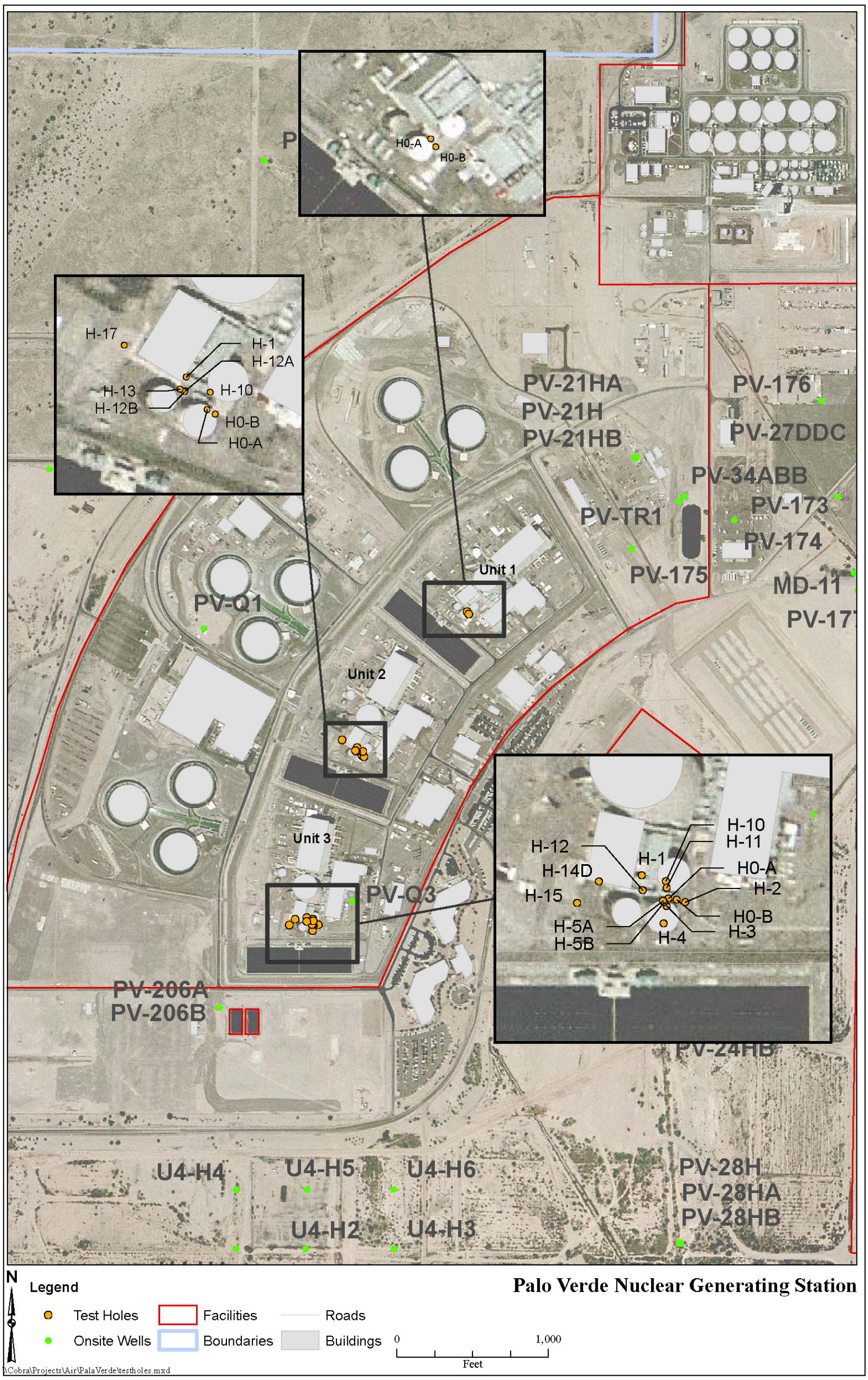


FIGURE 3-1
Approximate Test Hole Locations

3.1 Unit 3 Preliminary Investigation Results

Thirteen test holes were placed in Unit 3 to determine the occurrence and extent of tritium (see Figure 3-2). As discussed above, these test holes were placed where tritium was anticipated to be present. Additional test holes were then placed to determine the extent of the tritium and to bound the area where water is present. The investigation determined that there is a shallow basin of less-compacted fill in the area with the depth-to-compacted structural fill less than 15 feet bgs. The basin is of very limited extent and is bounded on all sides by deep foundations and compacted structural fill.

The investigation also determined that very little subsurface water is present in the area. As shown in Figure 3-1, only six test holes contain measurable water: H0-A, H0-B, H5-B, H10, H11, and H12. The remaining seven test holes are primarily within the compacted structural fill defining this shallow basin and did not contain measurable water.

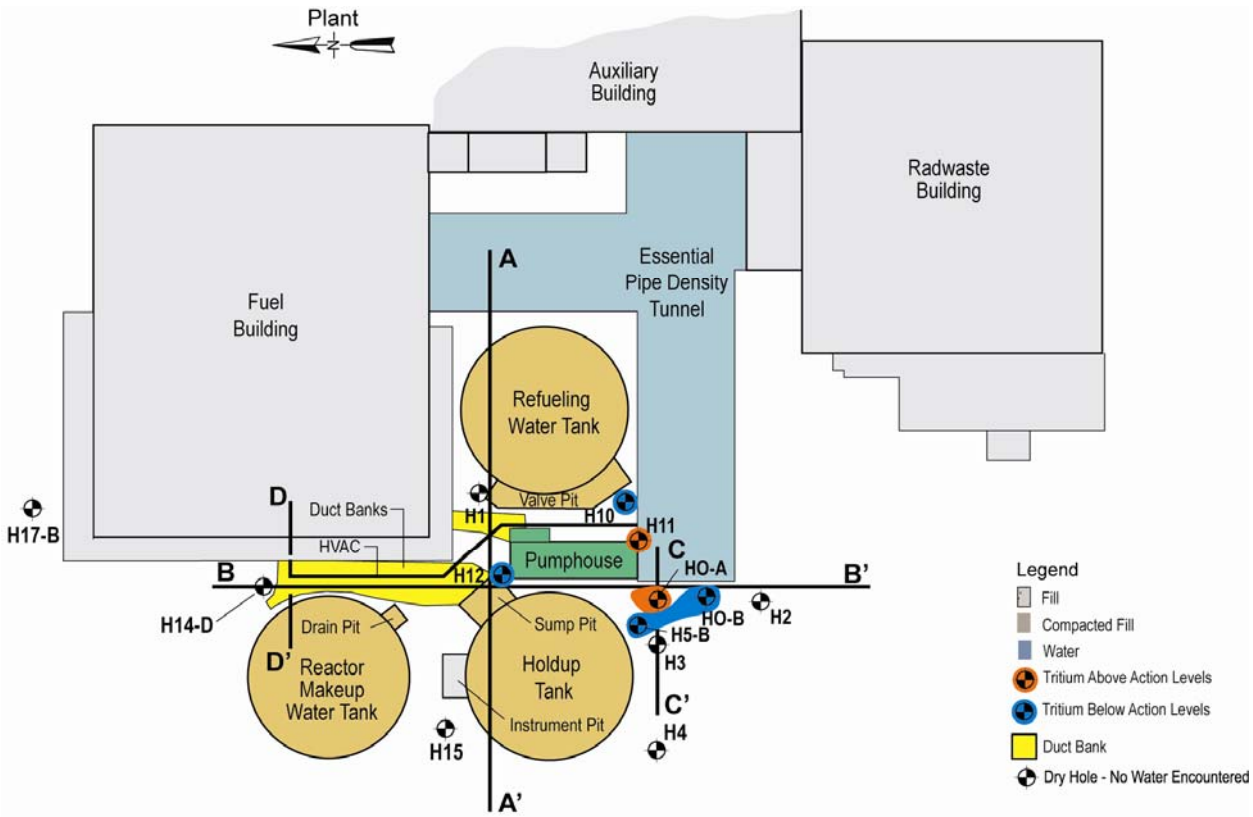


FIGURE 3-2
Unit 3 Test Hole Location Map

As shown on sections A, B, and C, where present, water is found at the top of the compacted structural fill material, pooled against foundation walls in the deeper portion of this shallow basin (Figures 3-3, 3-4, and 3-5). At Unit 3, the subsurface water is pooled in the less-compacted fill material in the downgradient areas outside of the EPDT and the courtyard area between the HUT and Refueling Water Tank (RWT). The depth to water is about 10 to 12 feet bgs, depending on the location, with a saturated thickness of approximately 1 foot.

Figure 3-3 (Section A-A') illustrates how water is trapped on top of the compacted fill material and held against the nearby structures. If water levels rise, the HVAC tunnel and sand bedding will tend to drain the water towards the EPDT.

Figure 3-4 (Section B-B') illustrates the conditions along the long axis of the basin. Because of the compacted structural fill associated with the pump house, water is trapped at a higher level near the HUT sump than at the EPDT. The higher tritium concentrations above action levels are found near the EPDT, trapped against this structure by the underlying compacted structural fill and the thick walls of the EPDT.

Figure 3-5 (Section C-C') illustrates the subsurface conditions at the termination of the EPDT. Four 24-inch diameter spray pond pipes exit the EPDT at this location. These pipes rise abruptly at this location. The underlying compacted structural fill also rises sharply upward, forming the downgradient edge of the small basin of less compacted fill material. Based on the tritium data, compacted structural fill may have been excavated to make room for the pipes as these exited the tunnels, resulting in ridges of structural compacted fill material between the pipes. These ridges will prevent subsurface water flow and explain why higher concentrations of tritium are found immediately adjacent to cleaner water.

The two areas of tritiated water above action levels (Figure 3-2) are believed to be in intermittent connection through the seismic gap between the EPDT and the pump house stairwell. This narrow gap between the two structures is covered by a water stained steel plate, indicating that water occasionally flows across this area when there are higher water levels in the subsurface. There is no evidence that higher water levels are a recent or common occurrence, and the water levels in the subsurface indicate that higher water levels are uncommon.

Section D-D' (Figure 3-6) further illustrates the complex nature of subsurface conditions in these small basins, and how these are dominated by utilities and structures. This section also illustrates how stormwater that infiltrates at the scuppers may be directed towards the EPDT. As shown, the EPDT exits the Fuel Building immediately beneath the buttress on the west side of the Fuel Building. The more permeable material placed at the base of the buttress is believed to be in connection with the sand bedding around the EPDT. As discussed in Section 2.4.1, the scupper on the northwest side of the Fuel Building outfalls into permeable material adjacent to the buttress at Units 2 and 3 (Figures 2-3 and 2-4).

The overlying duct bank prevented investigation of this connection. However, test hole H14-D (Figure 3-2 and 3-4) was placed as close as possible to this area and was completed entirely in compacted structural fill, indicating that it is outside of, and defines, the northern edge of the basin. However, the pathway illustrated in Figure 3-6 may allow stormwater to enter the basin from this area. Migration out of the basin is prevented by the compacted structural fill material.

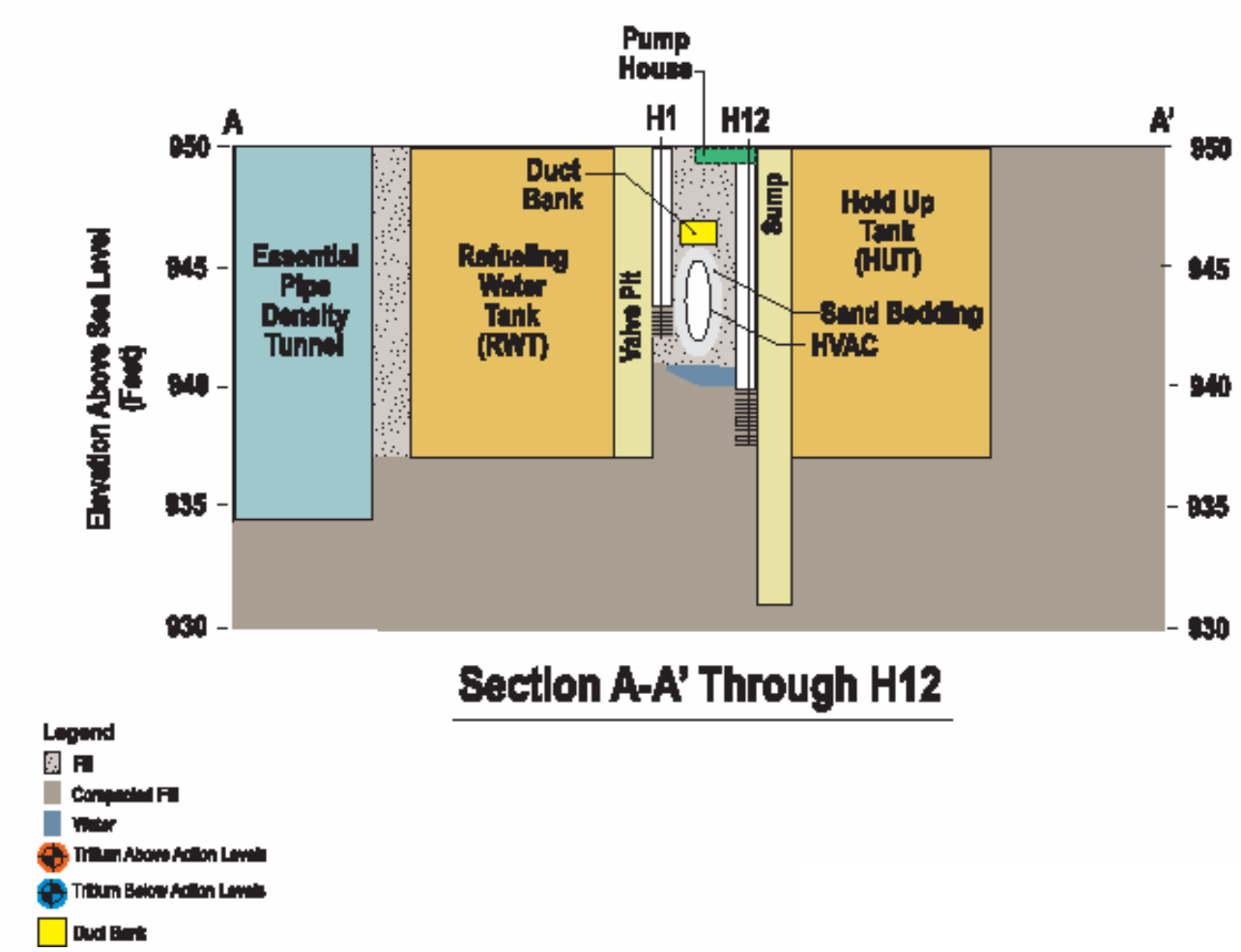


FIGURE 3-3
Palo Verde Nuclear Generating Station
Unit 3 Test Hole Results
Section A-A through H12

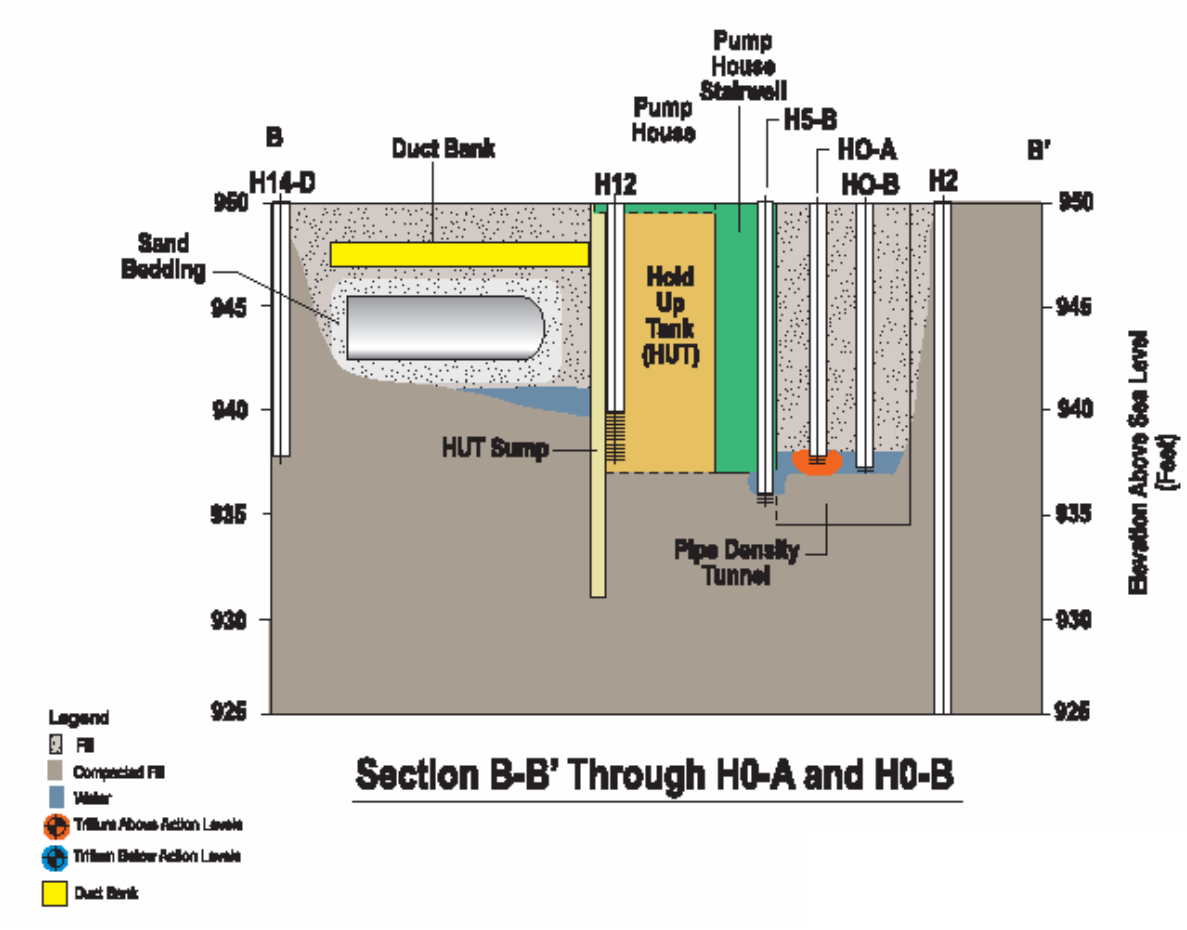


FIGURE 3-4
Palo Verde Nuclear Generating Station
Unit 3 Test Hole Results
Section B-B through H0-A and H0-B

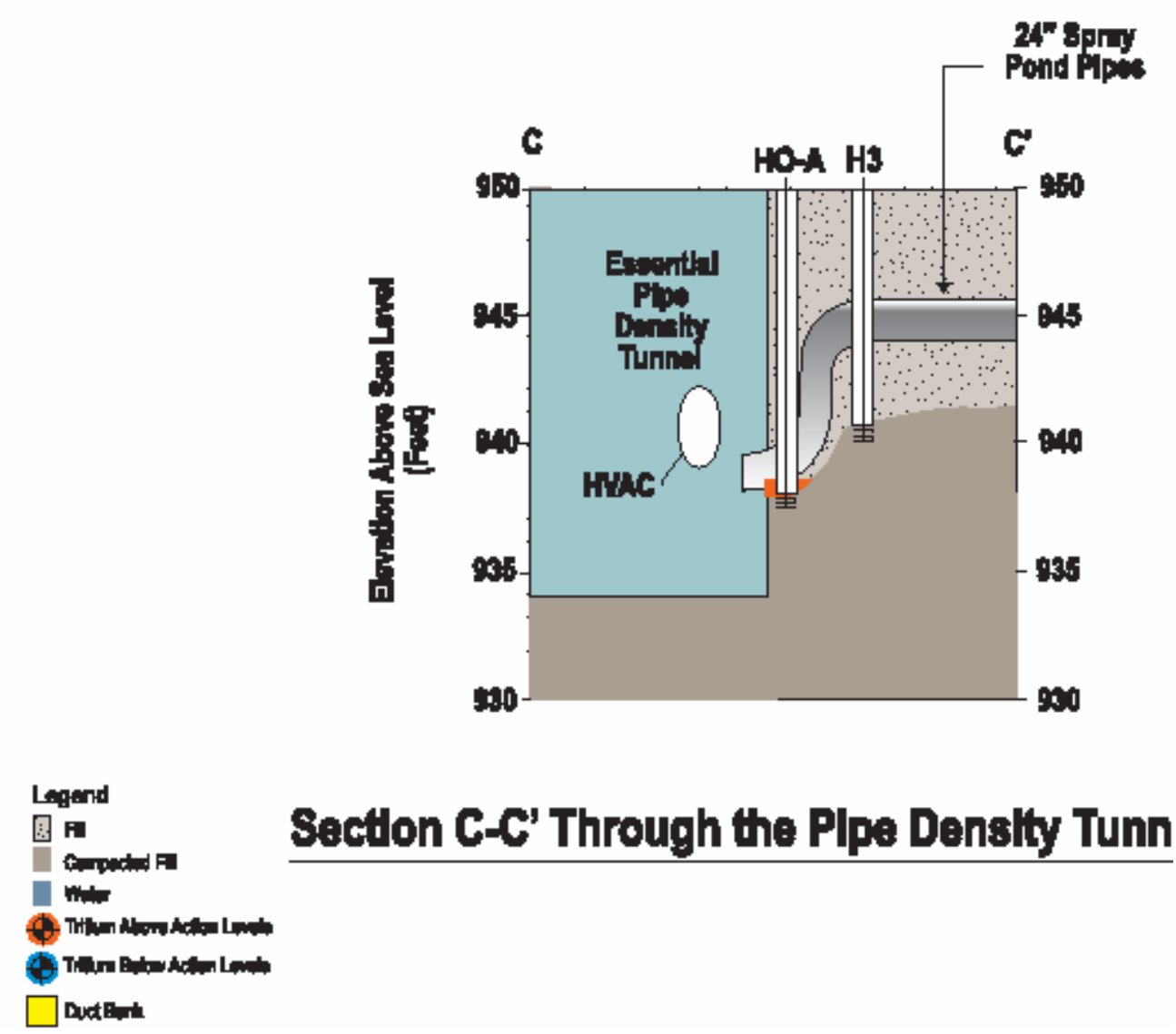


FIGURE 3-5
Palo Verde Nuclear Generating Station
Unit 3 Test Hole Results
Section C-C through the Pipe Density Tunnel

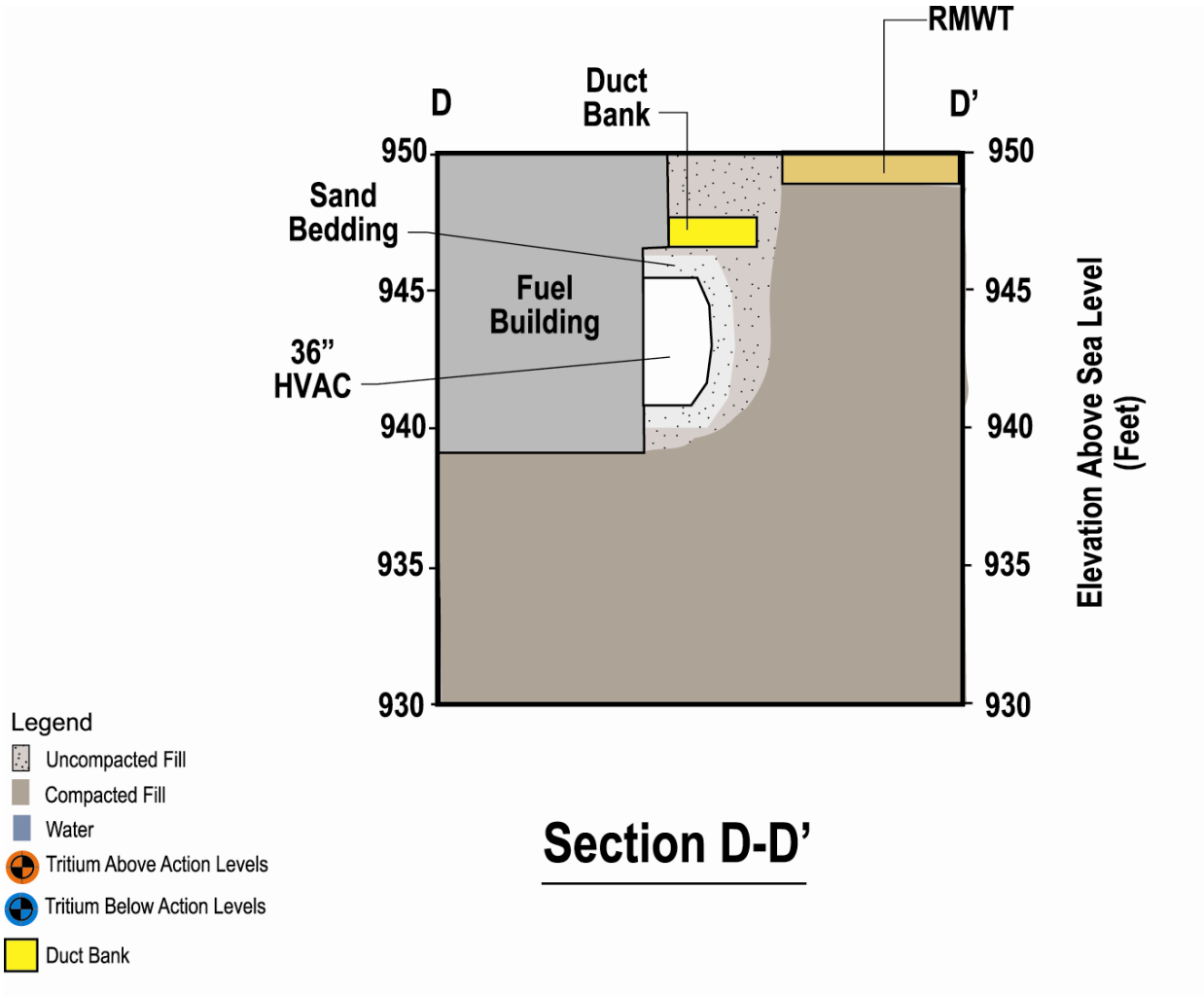


FIGURE 3-6
Palo Verde Nuclear Generating Station
Unit 3 Test Hole Results
Section D-D

3.1.1 Test Hole Sampling and Water Level Measurements

For the test holes that contained sufficient water, daily water level measurements were collected, then the test holes were sampled and pumped dry. Disposable bailers are used for the sampling to prevent cross contamination. This continued pumping resulted in decreased water levels across the area. The daily pumping was suspended in late March 2006, and the water levels recovered. This decline and recovery proves that there is communication between the different water-bearing portions of the small basin, although there is insufficient communication to develop a stable water table. Water level results are shown in Figure 3-7 and the data are contained in Appendix B.

As shown on Figure 3-6, the water levels in test hole H12 are inconsistent with the other test holes. H12 is in less-compacted fill material surrounded on three sides by compacted material associated with the HUT and the pump house (Figures 3-2 and 3-3). The water levels at this location rose rapidly shortly after the test hole was installed, to around 2 feet higher than the other test holes. At the same time, tritium activities decreased at this location. The nearby HUT sump was ruled out as a source of the water because the tritium levels within the sump were higher than the water in the test hole.

Because no precipitation events contributed clean water into the system, H12 and the HUT sump were pumped dry to determine if this higher water level was related to a transient event, such as a water line leak or clean water spill. H12 recovered to slightly lower than the original water level. Therefore, the higher water level at H12 appears to represent cleaner water partially contained by the compacted structural fill associated with the pump house and the HUT. Because the water level did not recover to the same level as before, it indicates that the area can be dewatered. H10 is located about 40 feet west of H12 but appears to be in hydraulic connection with H12. When H12 was pumped dry, H10 also went dry and has not recovered to its previous level. Given the almost 4 foot difference in water levels between these two test holes, this suggests that the subsurface conditions are complex.

3.1.2 Unit 3 Tritium Results

Tritium above action levels was found at only two locations (Figure 3-2). These locations were in the lowest portions of the basin, immediately adjacent to the EPDT. These locations are H11 where the 36-inch HVAC tunnel enters into the EPDT and at H0-A where the 24-inch lines exit the EPDT. Lower concentrations of tritium (on the order of 10^{-6} µCi/ml) were found where water was encountered at the other locations in the Unit 3 RCA Yard. Sample results are summarized below in Table 3-1. Complete results are provided in Appendix C.

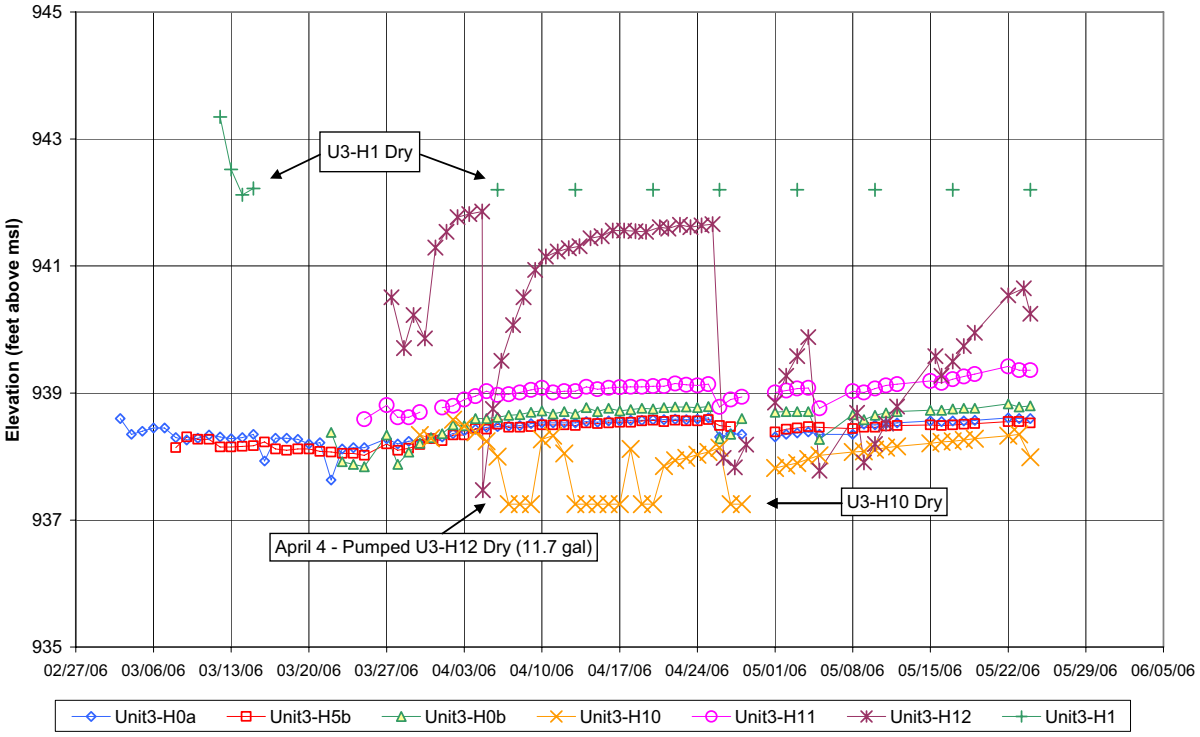


FIGURE 3-7
Unit 3 Water Level Data (As of May 24, 2006)

TABLE 3-1
Summary of Test Hole Sample Tritium Results for Unit 3

Test Hole	Tritium Concentration Range in µCi/ml	Comments
H0-A	2.96×10^{-5} to 1.10×10^{-4}	Initial sampling location
H0-B	1.85×10^{-6} to 7.27×10^{-6}	
H1	4.71×10^{-6} to 5.01×10^{-6}	Generally dry, only two samples were collected
H2	<MDA Minimum Detectable Activity	Dry. Initial sample was likely a result of water introduced during test hole drilling. The test hole has been dry since then.
H5-B	< MDA to 3.79×10^{-6}	
H10	1.27×10^{-6} to 4.20×10^{-6}	
H11	3.28×10^{-5} to 1.11×10^{-4}	
H12	< MDA to $7.93\ 10^{-6}$	The second highest result was used because the maximum data point was suspect. See text for the discussion.
Tritium action level	2×10^{-5}	

The two areas where tritium was found above action levels were limited in extent and adjacent to areas where tritium is below action levels (Figures 3-2, 3-4, and 3-5). The higher tritium concentrations are prevented from migrating out of the small basin of less-compacted fill by the compacted structural fill material and the structures that form the basin. The higher tritium concentration west of the EPDT is expected to be isolated from the adjacent area with lower concentrations by a barrier formed by compacted structural fill material and the 24-inch spray pond pipes (Figure 3-5).

As discussed above, there is a seismic gap between the EPDT and the pump house stairwell at all three Units. The plate covering the gap in Unit 3 is corroded and water stained, but is not stained and corroded at the other two Units. This suggests that a potential pathway for tritiated water to reach the area east of the EPDT is through this gap when water levels are sufficiently high. When water levels decrease, then the pathway no longer is present, isolating the two areas. Based on the water levels seen, higher water levels are an uncommon occurrence.

As discussed in Table 3-1, a sample was obtained from H12 that was higher than other results from this location. This result is suspect because no changes in water level or other factors indicated a higher concentration was reasonable. When this location was resampled the next day, the results were less than the MDA, consistent with the previous results and further suggesting that the higher value was not a valid result. Therefore, this result is considered to be not representative of this location and was not used.

Because the higher tritium levels are found in the area where the 36-inch HVAC tunnel enters the EPDT (Figure 3-2), the tunnel was additionally investigated. The tunnel is an emergency ventilation system that utilizes the Fuel Building essential ventilation system, and is not used on a regular basis. This only provides ventilation in the event of a safety injection activation signal (in plant emergency operating mode). The tunnel and the associated sand bedding slope downward from where the tunnel exits the Fuel Building to where the HVAC tunnel enters the EPDT with an approximate 2.5 percent downward slope. The 36-inch HVAC tunnel is a

preferential pathway for water, and water flows into the EPDT along this tunnel after significant rain events. Water samples collected during periods of water flow are in the same relative range as the tritium above action levels observed in the subsurface (in the range of 10^{-5} µCi/ml to 10^{-4} µCi/ml).

The area where the tunnel exits the Fuel Building was also evaluated as a potential source of the tritiated water. The tunnel enters the building at a sealed vault. When opened, there was no evidence of water staining, condensation, or other indications that water enters the HVAC tunnel at this location. As part of regular maintenance activities, a remote controlled camera previously videotaped the interior of the HVAC tunnel to determine whether repairs were needed. This was performed recently so that repairs could be performed during the outage when access to the tunnel was possible. The HVAC tunnel is generally dry, however, the videotape footage showed water staining starting at a pipe joint outside of the Fuel Building in the general vicinity of one of the roof scuppers. Evidence of water staining increased towards the EPDT. The water staining indicates that water, when present, enters the tunnel near the outfall of the roof scupper when water levels rise.

Because some residual water is suspected to remain in the bedding material even during periods of no flow, a sample was collected from the bedding material surrounding the HVAC tunnel. This sample could be collected because Unit 3 is currently in an outage and the emergency tunnel is not required as a safety feature. The HVAC tunnel has deteriorated over time, and areas where the tunnel has deteriorated provided better access to the underlying bedding material. Repairs were complete during the last outage.

A one liter composite water sample was collected in April 2006 from the bedding material beneath the HVAC tunnel. The tritium result was 8.64×10^{-4} µCi/ml, well above the action level of 2.00×10^{-5} µCi/ml. The sample was also analyzed for gamma emitting radionuclides and none were found above detection limits. This concentration is not consistent with the tritium concentrations observed in test holes H0-B, H1, H5-B, H10 and H12. In addition, this concentration is higher than tritium concentrations observed in rainwater collected March 11 from the plenum building scuppers. The HVAC tunnel and associated bedding may be acting as a reservoir that holds higher concentrations of tritium resulting from historic events. The tritium concentration of water currently infiltrating into this area would be affected by this reservoir and would increase within the tunnel and associated bedding to the area where the water collects in the subsurface (H0-A and H11 areas).

Work at the Pickering Nuclear Generating Station near Toronto and the Mound Site in Ohio also have shown that tritium has an affinity for concrete, concrete piping, and the associated bedding materials, acting as a secondary reservoir after the primary source is addressed. For this reason, the concrete of the EPDT is likely acting as a secondary reservoir for tritium above action levels as it has been in contact with tritium above action levels for a significant amount of time. (Jacques Whitford Environmental Limited, 2000) (Kurt Kehler, pers. comm.)

Results of the tritium evaluation were confirmed by the test holes placed recently in the general area to investigate if the spray pond piping was leaking. Tritium activities in these test holes were all below the action levels, indicating that the tritium is confined to the small basin area within the RCA Yard.

3.2 Unit 1 Preliminary Investigation Results

Based on the results observed in Unit 3, two test holes were placed in Unit 1 to investigate the potential for tritium to be present above action levels. H0-A and H0-B were placed at the west

termination of the Unit 1 EPDT (Figure 3-1) during the initial investigation. Additional test holes were attempted at the sites in Unit 1 that corresponded to where tritium was found above action levels in Unit 3. However, the extensive concrete at the surface in this area prevented placement of test holes. Further evaluation in this area is deferred until the Monitoring Plan is implemented (PVNGS, 2006c). The available results for the Unit 1 area are provided in Table 3-2.

TABLE 3-2
Summary of Test Hole Sample Tritium Results for Unit 1

Test Hole / Sample Location	Depth	Depth to water	Tritium in µCi/ml	Comments
H0-A		Dry	n/a	No water detected at this location.
H0-B		Dry	n/a	No water detected at this location.
HUT Instrument Pit	n/a	n/a	7.92×10^{-6}	One time sample collected in March, 2006.
HUT Sump	n/a	n/a	8.12×10^{-3}	One time sample collected in March, 2006.
Tritium action level			2×10^{-5}	

n/a = not applicable

Because the test holes that contained water in Units 2 and 3 are dry in Unit 1, the EPDT is dry, and the surface area is mostly impermeable, it appears that there is little water in the subsurface at this location. Higher tritium concentrations in the HUT sump do not appear to be leaking out because the adjacent Instrument Pit is three orders of magnitude lower, and there are no indications that water is present in the subsurface.

3.3 Unit 2 Preliminary Investigation Results

Based on the results observed in Unit 3, eight test holes were placed or attempted to be placed in Unit 2 to investigate the potential for tritium to be present. H0-A and H0-B were placed at the west termination of the Unit 2 EPDT (Figure 3-1) during the initial investigation. Additional test holes were placed at the other sites in Unit 2 where there was a higher potential of finding tritium. These included locations at the HUT sump (H12 and H13), and at the intersection of the HVAC tunnel and the EPDT (H10 and H11). Neither H12 nor H13 reached the target depth. H12 excavation contacted the duct bank on the first attempt, and the pump house foundation on the second. No additional test holes were attempted at this location because there were no locations identified where the duct bank, pump house foundation, and sump foundation could be avoided. It appears that concrete for the HUT sump extends further away from the sump than at Unit 3.

H11 did not reach the target depth of 14 feet because of the presence of concrete, assumed to be the foundation of the pump house. A step-out was not possible at this location because the surface is covered by concrete from the EPDT to within 1 foot of the pump house stairwell, leaving insufficient space for further test hole attempts.

H10 was initially dry. After the test hole was completed, water slowly seeped into the test hole from the surrounding fill material. This low flow rate indicates that there is little water in the subsurface. Sufficient water seeped into the test hole by the middle of May to collect samples.

Tritium results from these samples were approximately 1.6 x 10^{-5} µCi/ml, near the action level. However, while these concentrations are similar to the nearby RWT Instrument Pit, the low flow rate in the fill material does not indicate that an active source of water is present, and suggests that the sump is not leaking.

Two additional test holes were placed to verify that the subsurface bounding conditions were similar between the Units. These were H14, which could not be placed because of the extensive presence of a duct bank, and H17 that was placed at the northwest corner of the Fuel Building and verified that compacted structural fill was present to a depth of 14 feet. Test hole results are provided below in Table 3-3. Available water level data are shown in Figure 3-8.

The plate covering the seismic gap between the EPDT and the pump house stairwell shows no obvious signs of staining or corrosion, indicating that subsurface conditions are dryer than at Unit 3.

TABLE 3-3
Summary of Test Hole Sample Tritium Results for Unit 2

Test Hole / Sample Location	Depth (ft)	Depth to water (ft)	Tritium Concentration Range in µCi/ml	Comments
H0-A	13.26	11.5	<MDA to 5.39 x 10^{-6}	
H0-B	14.05	12	<MDA to 1.91 x 10^{-6}	
H10	14	12.7	1.57 x 10^{-5} to 1.58 x 10^{-5}	Adjacent to EPDT and HVAC tunnel
H11	4	n/a	n/a	Concrete at 4 feet, no room to offset
H12-A	3.2	n/a	2.29 x 10^{-6}	No measurable water level
H12-B	7	n/a	5.36 x10^{-6}	Concrete at 7 feet. No measurable water level
H13	4	n/a	3.53 x 10^{-6}	Concrete at 4 foot
H14	1	n/a	n/a	Concrete at 1 foot – duct bank
H17	14	Dry	n/a	Northwest of the Fuel Building
HUT Instrument Pit	n/a	n/a	7.97 x 10^{-6} to 8.56 x 10^{-6}	Two samples collected in March and April, 2006
HUT Sump	n/a	n/a	2.46 x 10^{-2} to 2.51 x 10^{-2}	Two samples collected in March and April, 2006
RWT Level pit	n/a	n/a	1.02 x 10^{-5}	One time sample collected in March, 2006
HVAC Condensate	n/a	n/a	1.92 x 10^{-4}	
Tritium action level			2 x 10^{-5}	

n/a = not applicable
ft = feet

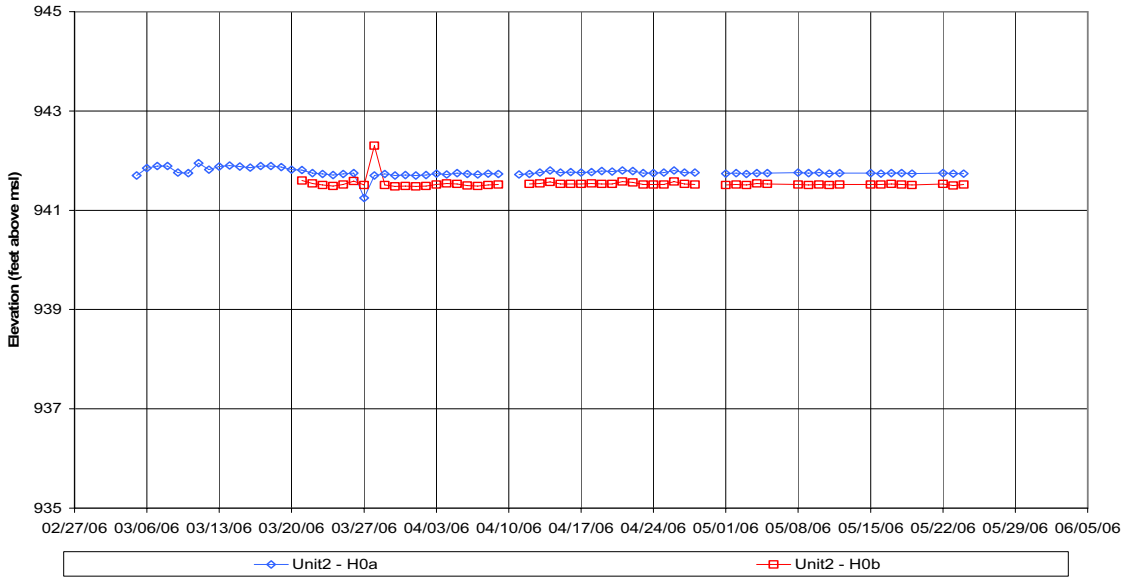


FIGURE 3-8
Unit 2 Test Hole Water Levels (As of May 24, 2006)

Based on this information, it appears that the subsurface is dominated by concrete, more so than in Unit 3. The concrete is a combination of duct banks, overpour from structure construction, and slightly larger foundations. These multiple concrete layers direct water flow downgradient to the EPDT, because there is little storage capacity in the basin area. Higher tritium concentrations in the HUT sump are not believed to be leaking into the fill material as the adjacent Instrument Pit is three orders of magnitude lower.

Water collected from the HVAC tunnel is above action levels. As discussed in Section 3.1.2, tritium has an affinity for concrete, concrete piping, and the associated bedding materials. These may act as a secondary reservoir and increase the concentrations in water currently infiltrating into this area as the water flows along the HVAC tunnel and associated bedding.

4.0 Atmospheric Modeling of Tritium Releases

This section presents a summary of a dispersion modeling analysis of tritium releases from the PVNGS. CH2M HILL met with Arizona Public Service (APS) personnel on March 29 and 30, 2006 to discuss and gather information for the modeling analysis. The modeling includes an assessment of the ground-level wet deposition resulting from releases of tritium from vents that serve the Boric Acid Concentrator (BAC) and the Fuel Building for each of the three Units at PVNGS. The modeling inputs, methodology, and results are described in detail below.

Tritium is naturally occurring and is also produced by nuclear power plants as a byproduct of the fission process. Tritium releases to the environment are regulated by the Nuclear Regulatory Commission (NRC) and are required in order to maintain plant tritium airborne concentrations below NRC Occupational Exposure Limits (PVNGS, 2006a).

In the United States, nuclear power plants typically discharge tritium primarily as a permitted liquid release. Because PVNGS is a zero liquid discharge facility, the plant tritium concentrations are maintained within the NRC limits by discharging a sufficient amount of BAC distillate as vapor through the unit's plant ventilation system. All airborne releases of tritium are performed in accordance with NRC regulations. The NRC regulates the amount of radioactivity that can be discharged to the environment by assessing the offsite dose impacts to members of the public and ensuring that all releases are within these limits. Releases are reported in the annual PVNGS Annual Radioactive Effluent Release Report (PVNGS, 2006a).

Tritium has been identified in water grab samples after rain events and is attributed to washout from plant airborne tritium releases. Concentrations are generally less than the aquifer water quality standard of 2.0×10^{-5} µCi/ml. In 1991, tritium concentrations in the 10^{-4} µCi/ml range were found in samples from puddles on rooftops in the operating Units, above the aquifer water quality standard. In 1998, washout was also identified as the potential source of tritium in water observed collecting in the EPDTs in Units 2 and 3. At this time, rain water puddles in the RCA were sampled and found to contain tritium concentrations around 10^{-5} µCi/ml. Samples from the pipe vault indicated tritiated water on the order of 10^{-3} to 10^{-4} µCi/ml (PVNGS, 2006a).

Several engineering modifications and operational changes were made to the plant ventilation system between 1990 and 1995 to reduce the potential impacts from washout. The ventilation system was modified to collect condensation from within the ventilation system duct work and plant stack and direct it back to the radioactive waste system. This modification minimized the possibility of condensation leaking onto the roof and being carried by rainwater. As an operational change, BAC discharges to the plant ventilation system were restricted when conditions were above 80 percent relative humidity in the plant stack and discharges were halted during rain events (PVNGS, 2006a).

To fully evaluate the potential for atmospheric deposition to contribute to the tritium seen in the subsurface above action levels, PVNGS conducted atmospheric modeling of tritium releases. The modeling determined the potential impact of atmospheric deposition near the release sources and also further downwind. Stormwater run off was also evaluated to identify areas where there is a potential for stormwater collection in the subsurface that may be impacted by the tritium releases (PVNGS, 2006a).

4.1 Modeling Input Data

4.1.1 Selected Model

Air quality impacts were determined with the U.S. Environmental Protection Agency (EPA) Industrial Source Complex Short-Term Model (ISCST3) that incorporates enhanced building downwash algorithms. The enhanced downwash algorithms are referred to as Plume Rise Model Enhancements (PRIME), and the model as ISC-PRIME. The ISCST3 model is the latest generation of the EPA's ISC short-term model, and is recommended for predicting impacts from industrial point sources.

4.1.2 Meteorological Input

Surface meteorological data collected at the on-site 60-meter (m) meteorological tower at PVNGS was used as input to the ISC-PRIME model. The surface data was processed with the EPA Meteorological Processor for Regulatory Models (MPRM). For the air impact analysis for this project, data for 2001 through 2005 were processed into model-ready format. Model-ready files with hourly wind speeds and directions from the 60-m level of the tower were produced. Hourly atmospheric stability was determined with the standard deviation fluctuations in horizontal wind direction (sigma theta). Surface data were combined with mixing heights from Tucson, Arizona to produce the model-ready files. All meteorological data were obtained from the National Climatic Data Center (NCDC). Figure 4-1 presents a 60-m windrose for the meteorological input data.

In order to model wet deposition, the meteorological input file included additional, extended parameters, including hourly precipitation. Hourly precipitation measured at the on-site meteorological station at PVNGS was used for this model. For cloud cover that was needed by the MPRM processor to produce the extended meteorological parameters, on-site data were not available, so concurrent surface data from the National Weather Service station at the Phoenix airport was used.

4.1.3 Receptor Grid

The modeling receptor grid originated at the center of the Containment Building for Unit 2 and extended from that point in a square pattern with 25-m receptor spacing to a distance of 1 kilometer (km). From the edges of that grid, receptors were placed at 100-m spacing to a distance of 3 km from the origin. Lastly, receptors were placed at 500-m spacing from beyond 3 km to a total distance of 10 km from the origin. Terrain in the vicinity of the project was accounted for by assigning elevations to each receptor. CH2M HILL used Digital Elevation Model (DEM) data from the U.S. Geological Survey (USGS) to determine receptor elevations. All receptors and DEM data were referenced to North American Datum (NAD) Zone 12.

4.1.4 Building Downwash

Building downwash effects for the modeled point sources at PVNGS were determined with the EPA Building Profile Input Program (BPIP-Prime). Electronic maps of the station were used to obtain building heights and horizontal dimensions of the major structures for use in the model. A height of 63.5 feet was used for all cooling towers. For the major structures associated with Units 1 through 3, the labeled roof heights were adjusted to account for a reference elevation of 100 feet. The building heights input to the model included the following:

- Turbine Building 142 feet above ground level (agl)
- Containment Building 190 feet agl

- Fuel Building 95 feet agl
- Radwaste Building 66 feet agl
- Control Building 81 feet agl
- Auxiliary Building 57 feet agl

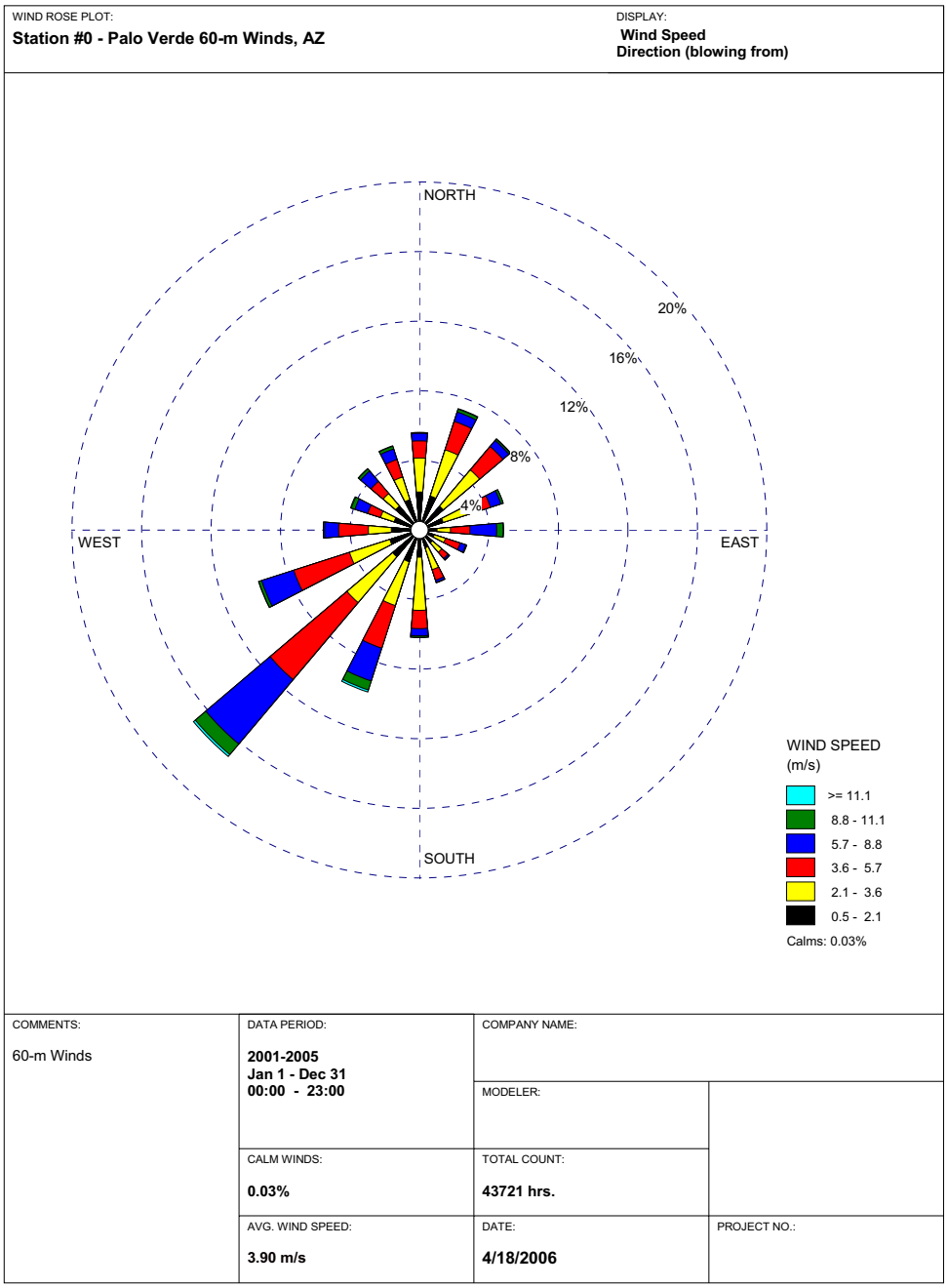


FIGURE 4-1
Windrose for Meteorological Input Data

4.2 Modeling Methodology

4.2.1 Source Representation

The BAC is physically located in the radwaste building. The exhaust from the BAC is routed to the auxiliary building exhaust ventilation system duct to the plant ventilation system exhaust. This plant ventilation system exhaust stack runs up the side of the turbine building. The Fuel Building has its own exhaust duct. Figure 4-2 shows the locations of the vents and the main structures.

The temperature of the vent through which the BAC exhausts is expected to be approximately ambient temperature. For the Fuel Building Vent, the temperature of the exhaust is estimated to be approximately 10 degrees Fahrenheit above ambient. Since the exit temperature is somewhat variable and close to ambient temperature, the ISC-Prime modeling was conducted using ambient temperatures for the exhaust temperatures for these sources. Table 4-1 presents a summary of the release parameters that were used for each vent.

The emissions from the cooling towers were not modeled because these have a limited impact on tritium deposition. The cooling towers are not a primary source for tritium, but contain entrained tritium from plant releases.

TABLE 4-1
Vent Release Parameters

Source	Release Height – (ft)	Stack Diameter – (ft)	Exit Velocity – (ft/s)	Exhaust Temperature (F)
BAC (Plant) Vent	145	7.3	31.0	See note
Fuel Building Vent	109.8	5.0	29.7	See note

Note: both vents modeled with exhaust temperatures equal to the ambient temperature at the time

ft/s = feet per second
F = Fahrenheit

4.2.2 Emissions Estimates

Three cases were modeled; Case A, Case B, and Case C. The emissions for Cases A through C are presented on Table 4-2.

Case A represents an average annual emission rate. This average rate is a weighted average of the Plant Vent and the Fuel Building Vent emission rates. The average Plant Vent emission rate is based on the number of hours the BAC ran in 2005 and the average emission for those hours, and the emission rate for the Plant Vent for the hours that the BAC did not run. Data provided by APS for 2005 was used to calculate this emission rate. This rate was assumed to be constant for all 5 years of modeling. Case A replicates the historic conditions by using the weighted average emission rate to approximate that the BAC could be running during times of higher humidities/precipitation.

Case B represents the average annual emission rate for the times when the BAC was not running. This rate excludes the contribution from the BAC, and was calculated from the Plant Vent emission rate when the BAC was not running and the Fuel Building Vent emission rate. This replicates the current operating conditions during rain events.

Case C represents a worst-case condition that assumes that the BAC was always running during past rain events. This scenario may be representative of conditions that occurred prior to the plant modifications, when the BAC was typically run without regard to rain events. However, as a worst case to demonstrate the maximum concentrations of tritium from wet deposition/washout, the BAC release rate plus the Fuel Building was used in the model.

TABLE 4-2
Emissions for Cases A through C

Case/Vent	Unit 1 Emissions (µCi/sec)	Unit 2 Emissions (µCi/sec)	Unit 3 Emissions (µCi/sec)
A – BAC (Plant)	24.4	16.9	18.2
A – Fuel Building	1.39	2.54	1.65
B – BAC (Plant)	0.352	0.377	0.368
B – Fuel Building	1.39	2.54	1.65
C – BAC (Plant)	93.77	116.75	104.41
C – Fuel Building	1.39	2.54	1.65

µCi/sec = microcuries per second

4.2.3 Wet Deposition Modeling

The wet deposition of tritium from the Plant Vents and Fuel Building vents was modeled. For this assessment, a tritium scavenging coefficient for liquid and frozen precipitation was input to the ISC-PRIME model. The scavenging coefficient is an empirical relationship of observed tritium washout amounts in the vicinity of nuclear power plant as described in Golubev et al (2003). The scavenging coefficient used was 0.000145 hr/s-mm. Precipitation rates were taken from the on-site PVNGS meteorological data for the years 2001 through 2005. Depletion of tritium from the plume due to wet deposition was accounted for in the modeling.

The ISC-PRIME model was used to produce 24-hour and 5-year period estimates of wet deposition in units of microCuries per square meters (µCi/m^2). The 24-hour results were calculated for each of Cases A through C. For the 24-hour results, the model outputs the maximum amount of wet deposition that accumulated at each receptor during any 24-hour period of the entire 5-year meteorological record. For the period results, the model outputs the total amount of wet deposition that accumulated at each receptor over the entire 5-year period. The 5-year period results were calculated for Cases A and B. A Case C 5-year accumulation requires assuming full-time operation of the BAC, resulting in an emission rate that is two- to three-times higher than the actual emission amount, resulting in very conservative modeling results.

4.3 Modeling Results

Table 4-3 presents a summary of the results of the wet deposition modeling. The results are presented for each case, and for 1) the overall maximum modeled impact, 2) the maximum modeled impact at or beyond the inner fence, and 3) the maximum modeled impact at or beyond the outer (site) fence. For each case, the modeled wet deposition is also presented in units of µCi/ml of rainwater. This conversion was done by converting the measured rainfall, either for the 24-hour event associated with a 24-hour result or the total 5-year rainfall for a 5-year result, to a volume of liquid. Figures 4-3 through 4-12 present contour plots of the modeled activity in units of µCi/m^2.

TABLE 4-3
Wet Deposition Modeling Results

	Modeled Wet Deposition of Tritium (μCi/m^2)	Total Precipitation (cm)	Volume of Precipitation per m^2 (cm^3)	Tritium Concentration in Rainwater (μCi/ml)
Overall Maximum				
Highest 24-Hour Total				
Case A	5.73	5.3	52,840	1.08E-4
Case B	0.25	5.3	52,840	4.69E-6
Case C	30.86	6.5	64,780	4.76E-4
5-Year Total				
Case A	30.84	95.6	956,000	3.23E-5
Case B	2.71	95.6	956,000	2.83E-6
Protected Area Fence				
Highest 24-Hour Total				
Case A	0.45	3.7	36,810	1.21E-5
Case B	0.05	6.5	64,780	7.41E-7
Case C	2.61	1.2	11,930	2.19E-4
5-Year Total				
Case A	3.14	95.6	956,000	3.29E-6
Case B	0.31	95.6	956,000	3.19E-7
Site Boundary Fence				
Highest 24-Hour Total				
Case A	0.30	5.3	52,840	5.70E-6
Case B	0.02	5.3	52,840	4.38E-7
Case C	1.44	5.3	52,840	2.72E-5
5-Year Total				
Case A	0.92	95.6	956,000	9.58E-7
Case B	0.08	95.6	956,000	8.15E-8

Rain water sampling of roof runoff from building scuppers during a precipitation event on March 11, 2006 (BAC not in operation) found tritium below action levels. Results ranged from not detected at the detection limits of the analytical equipment to 3.85 x 10^{-6} μCi/ml consistent with the 24-hour rainfall results in Case B. Samples of rainwater were collected at the same time, however, due to the small amount that could be collected, these results can only be used qualitatively to suggest that the model is predicting appropriate values.

As described above, past emissions from the BAC were known to have taken place during rain events and may have led to higher tritium concentrations in rainwater than what are currently seen. These are modeled and represented by Case C results. This practice was discontinued after the mid-1990s. However, these historic practices may have contributed to the tritium

concentrations found in the subsurface. Rain water samples collected in 1998 were equivalent in order of magnitude as the subsurface water found above action levels.

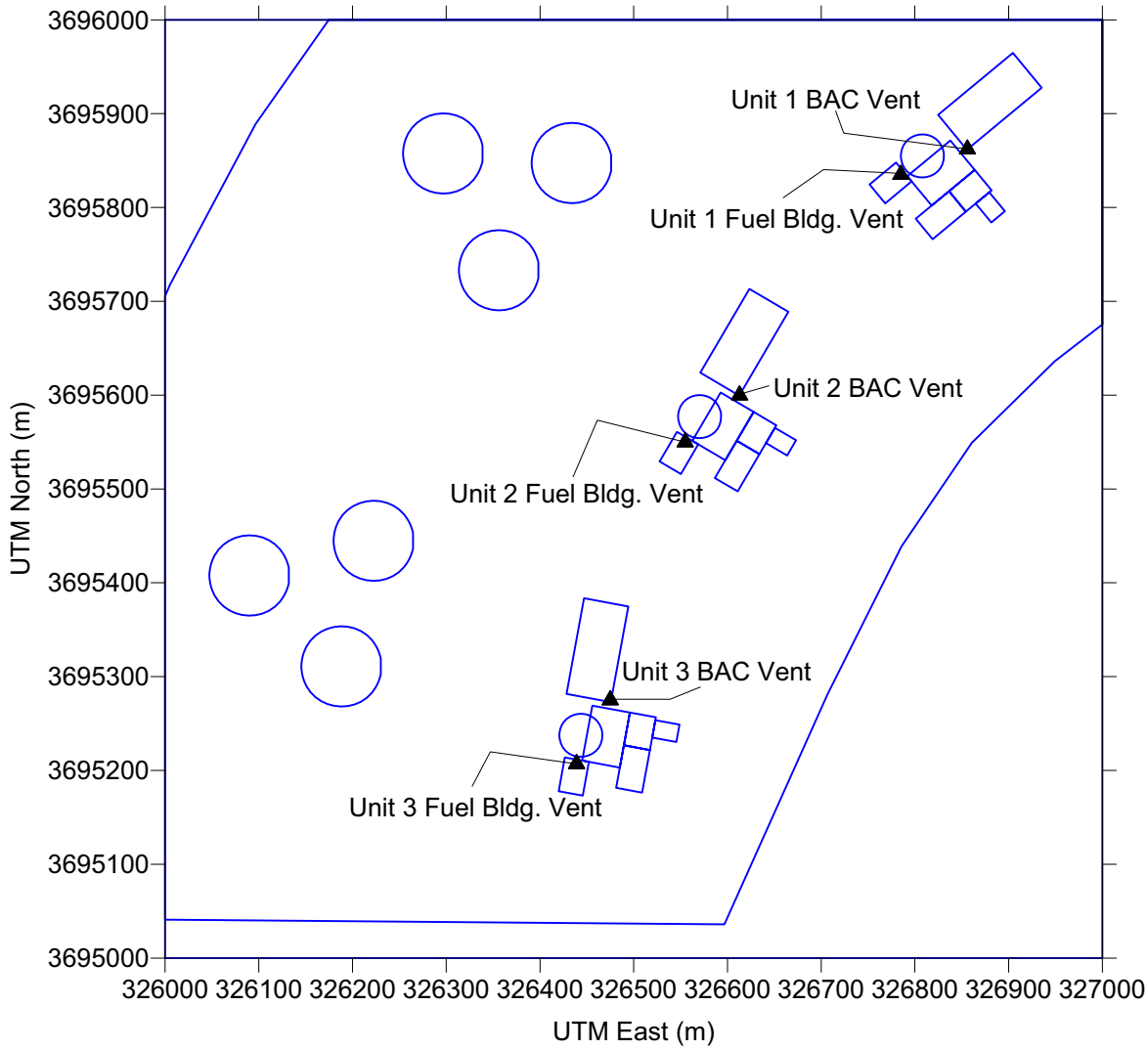


FIGURE 4-2
Locations of Sources and Structures

The atmospheric modeling indicates that Unit 1 could have the highest deposition, up to a factor of two times greater than Units 2 and 3. During precipitation events or when the building roofs were washed, this water would then run off onto the ground through the building scuppers. However, the RCA Yard surface is relatively impermeable with good drainage patterns that direct stormwater into the plant system rather than seeping into the subsurface. This configuration minimizes the potential for building washoff to accumulate in the soil and become a source of subsurface tritiated water.

The atmospheric modeling indicates that Unit 2 has lower deposition, almost entirely onto building roofs. During precipitation events or when the building roofs were washed, this water would then run off onto the ground through the building scuppers. However, when this water runs off the roofs and onto the ground, it is directed to the area that primarily drains away from the shallow basin. The Unit 2 RCA Yard is relatively impermeable with good drainage patterns

that direct stormwater into the storm drain system rather than seeping into the subsurface. The scupper that outfalls at a more permeable area is on the edge of the shallow basin, and should not contribute significant tritium into the subsurface. The mostly impermeable RCA Yard also minimizes the potential for building washoff to accumulate in the soil and become a source of subsurface tritiated water.

The atmospheric modeling shows that the deposition in Case A and C is centered onto building roofs and to the area north of the Unit 3 buildings. Case B deposition, modeled as the plant vent without BAC emissions, is the lowest emissions case modeled and shows deposition on the buildings roofs around the RCA Yard. Case B represents current operating conditions. The highest concentration in rainwater was predicted at 4.69×10^{-6} µCi/ml, consistent with the recent scupper samples collected. This suggests that current operations do not result in the higher tritium concentrations seen in the HVAC tunnel and in the subsurface. However, past operational practices could have produced higher rainwater runoff concentrations.

The overall conclusions of the modeling can be summarized as follows:

- Tritium deposition is primarily confined to the immediate area of the Units, and mostly within the protected area fence. Deposition is primarily onto the buildings.
- The atmospheric modeling results suggest that Unit 1 should have the higher potential for tritium deposition, although not more than a factor of two times higher than Units 2 and 3. However, the presence of tritium in the subsurface is directly related to the presence of permeable areas at the surface where tritium can infiltrate into the subsurface. Therefore, locations where impermeable surfaces are present are not anticipated to contain subsurface tritium.

Figure 4-3
Case A: Modeled 24-Hour Wet Deposition - Units 1 & 2
(uCi/m^2)

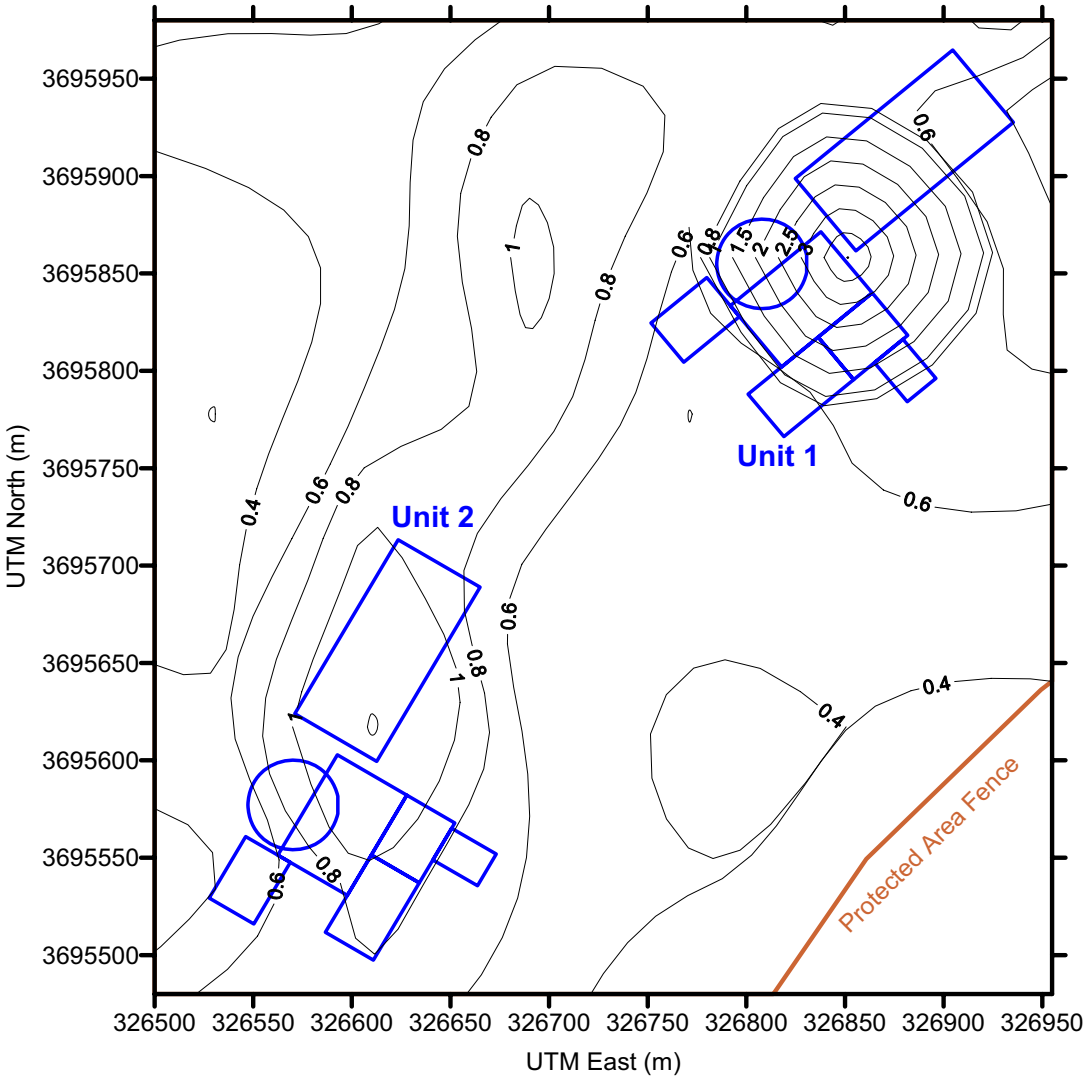


Figure 4-4
Case A: Modeled 24-Hour Wet Deposition - Unit 3
(uCi/m^2)

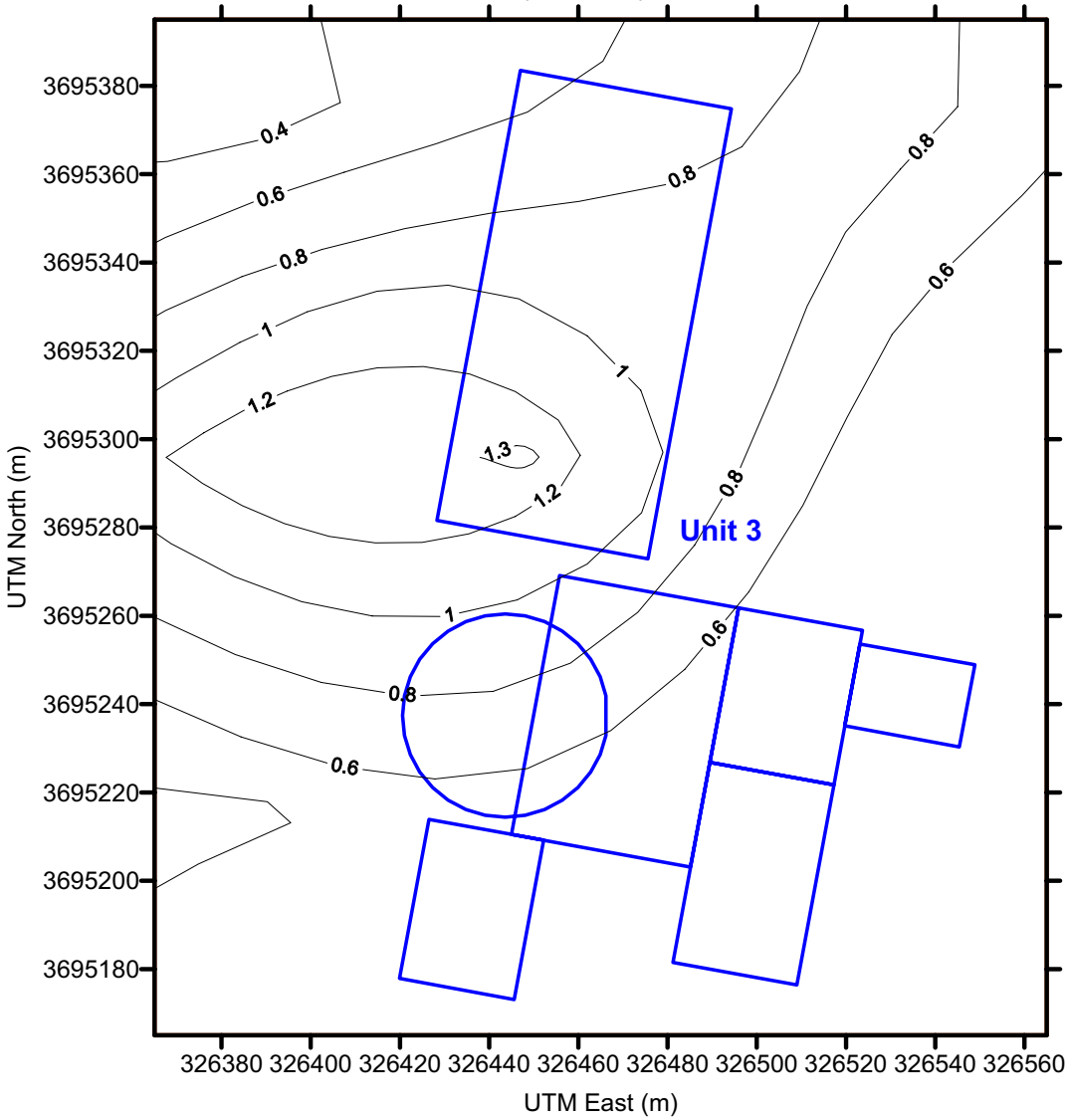


Figure 4-5
Case A: Modeled 5-Year Wet Deposition - Units 1 & 2
(uCi/m^2)

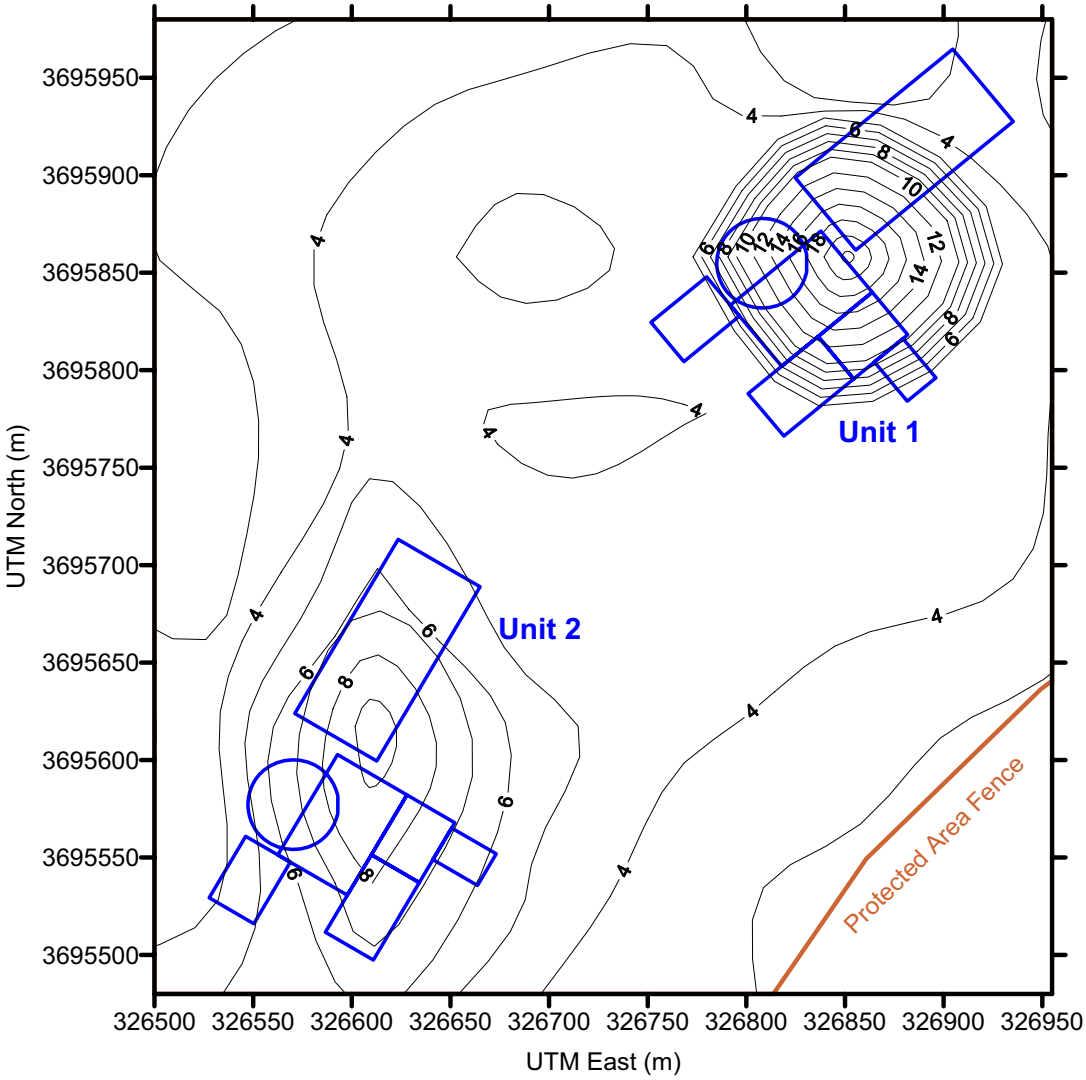


Figure 4-6
Case A: Modeled 5-Year Wet Deposition - Unit 3
(uCi/m^2)

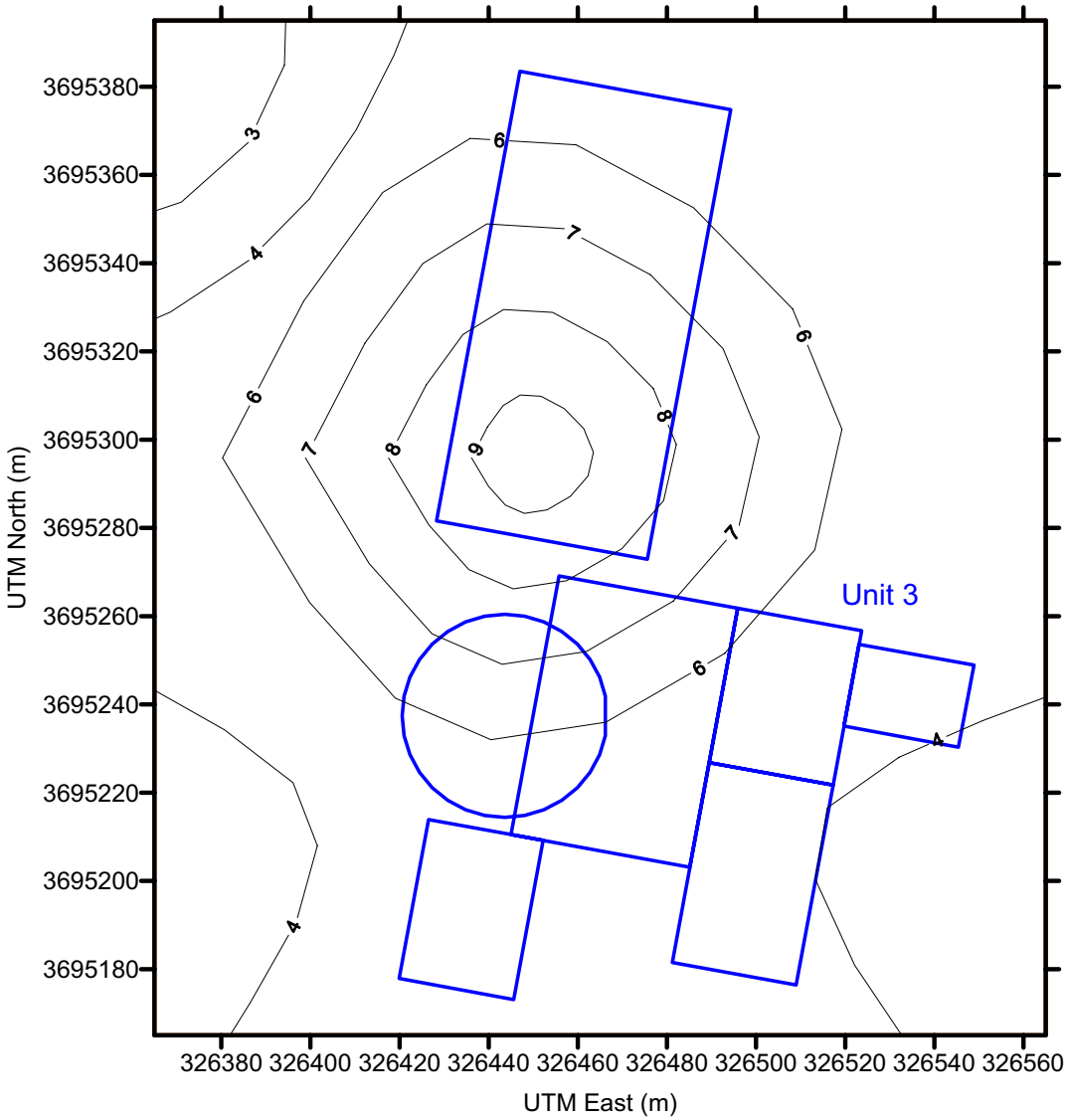


Figure 4-7
Case B: Modeled 24-Hour Wet Deposition - Units 1 & 2
(uCi/m^2)

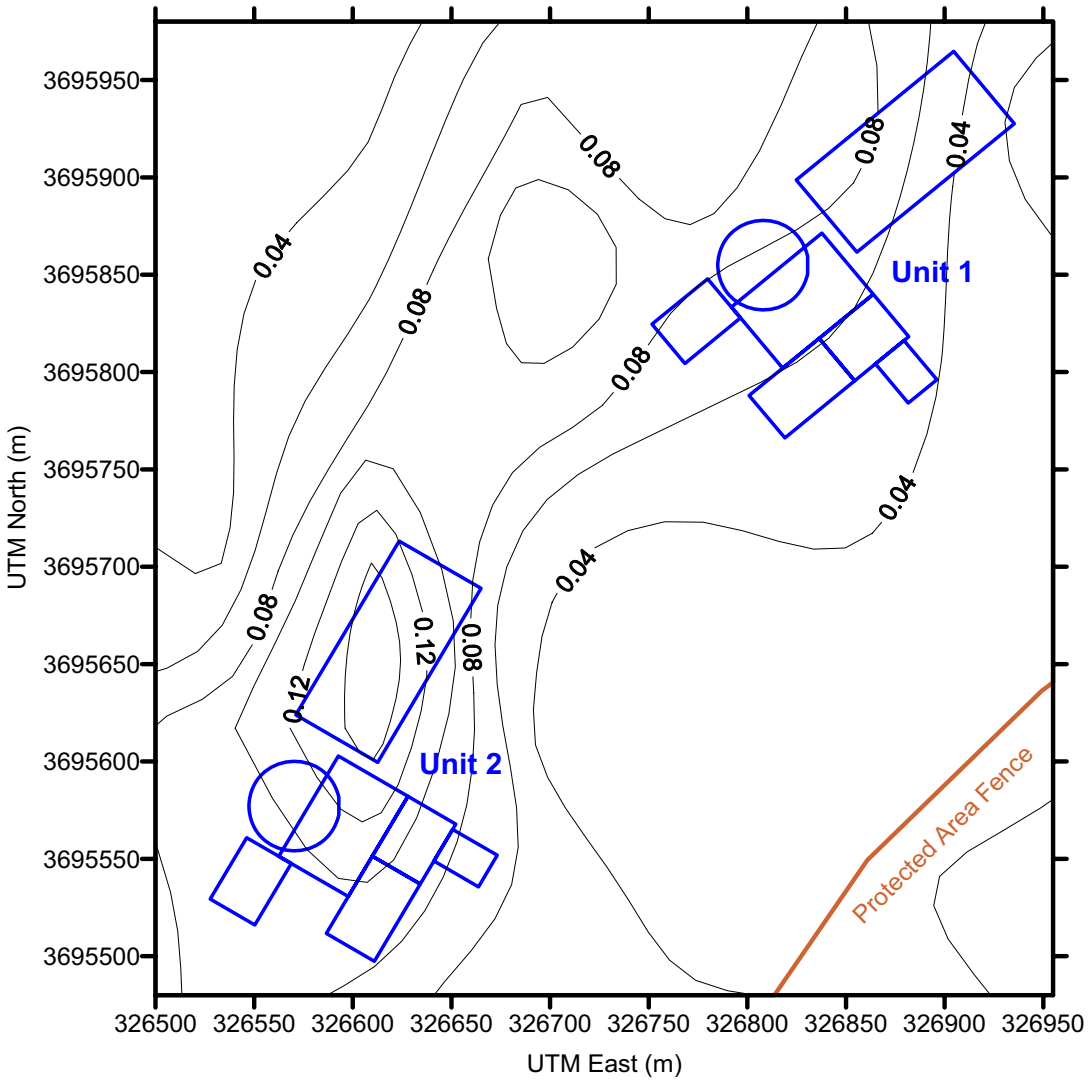


Figure 4-8
Case B: Modeled 24-Hour Wet Deposition - Unit 3
(uCi/m^2)

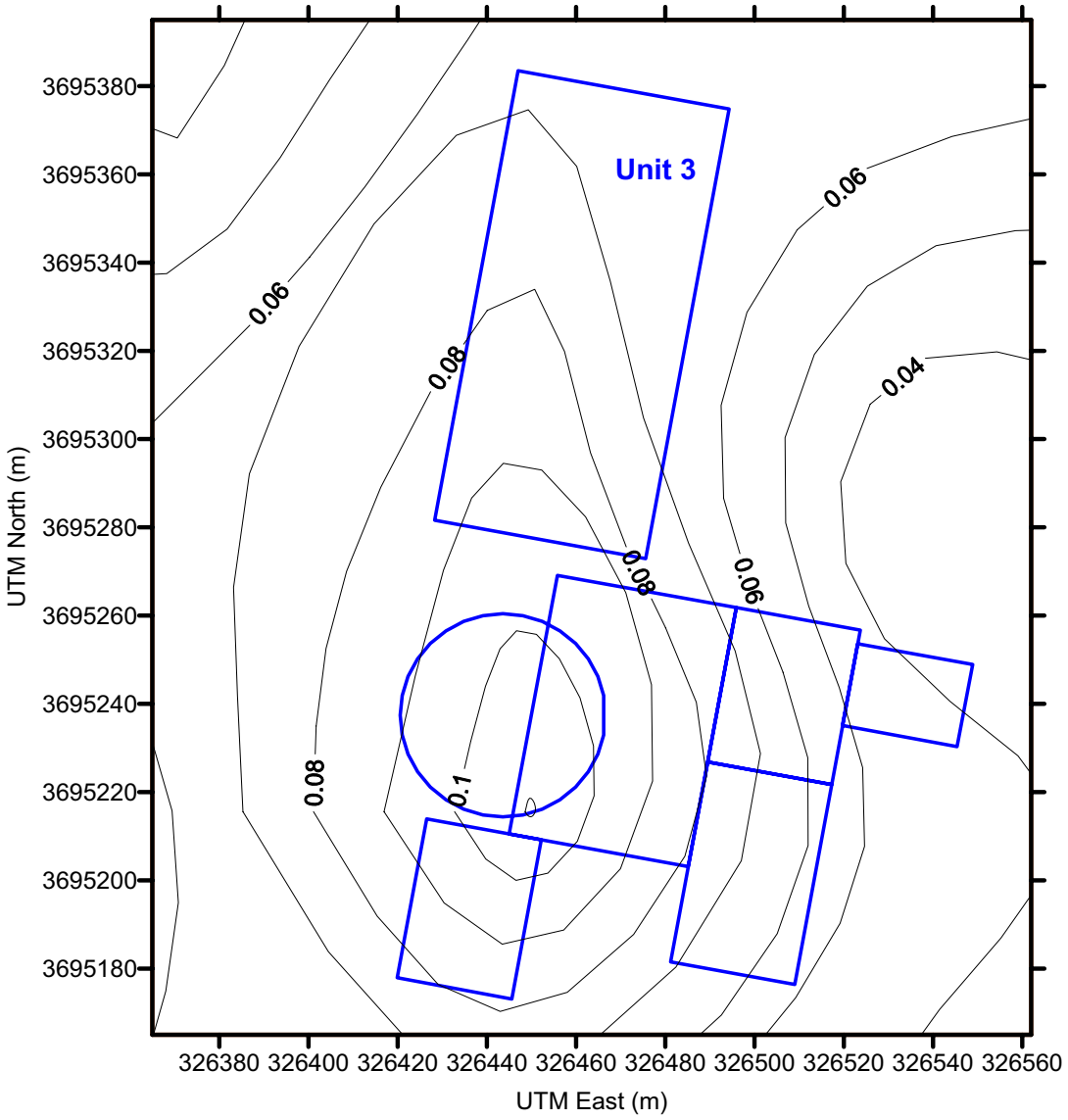


Figure 4-9
Case B: Modeled 5-Year Wet Deposition - Units 1 & 2
(uCi/m^2)

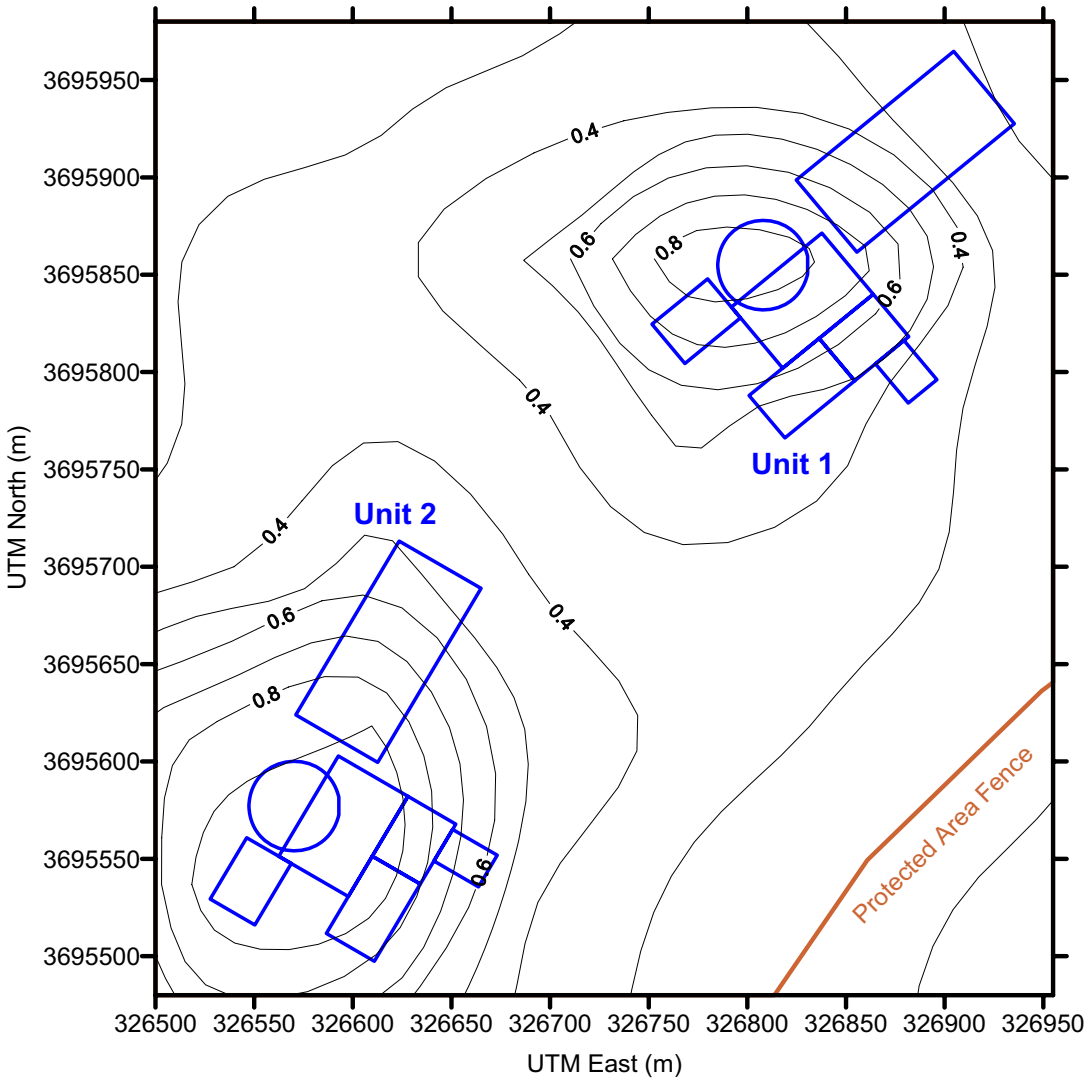


Figure 4-10
Case B: Modeled 5-Year Wet Deposition - Unit 3
(uCi/m^2)

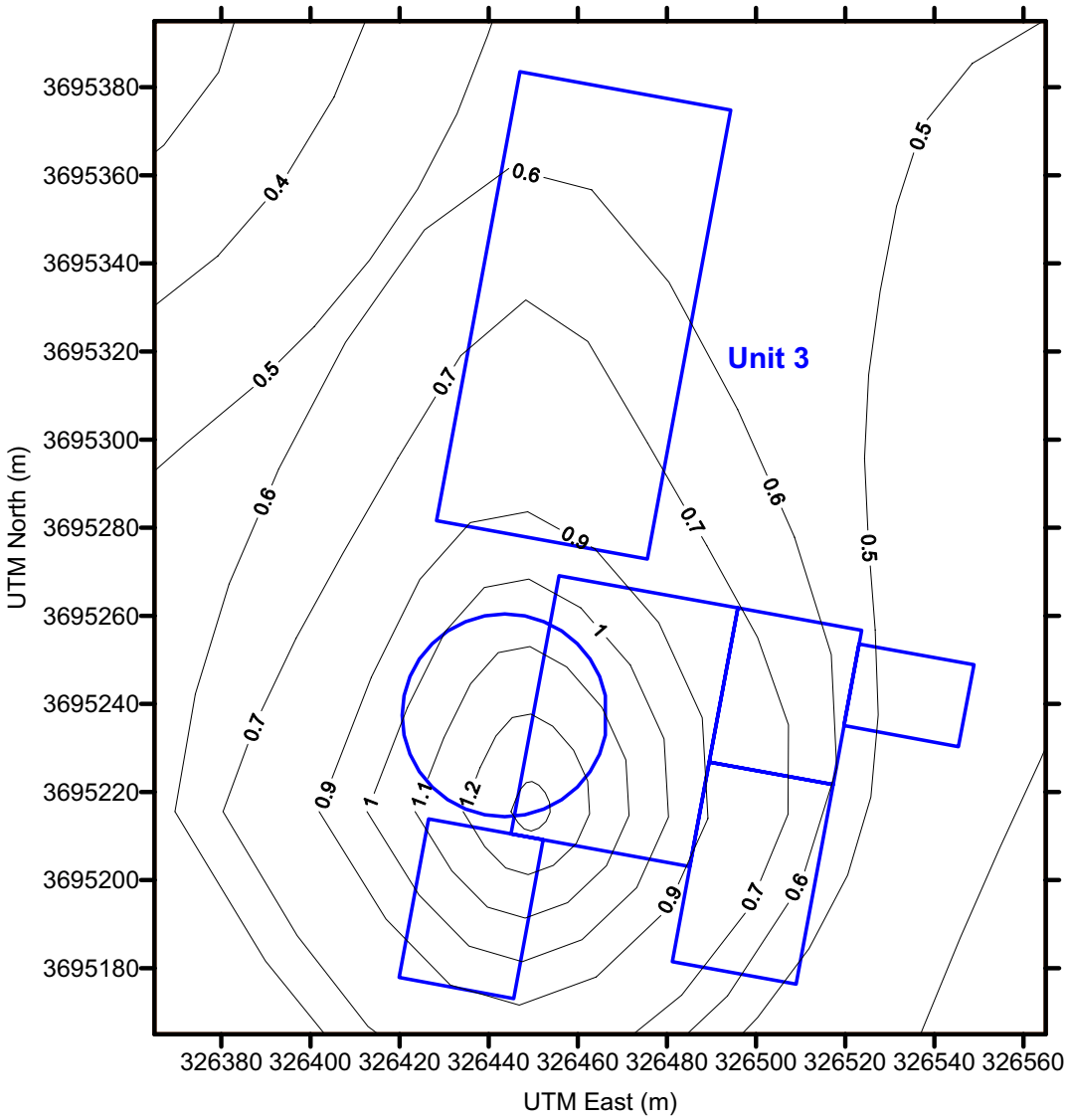


Figure 4-11
Case C: Modeled 24-Hour Wet Deposition - Units 1 & 2
(uCi/m^2)

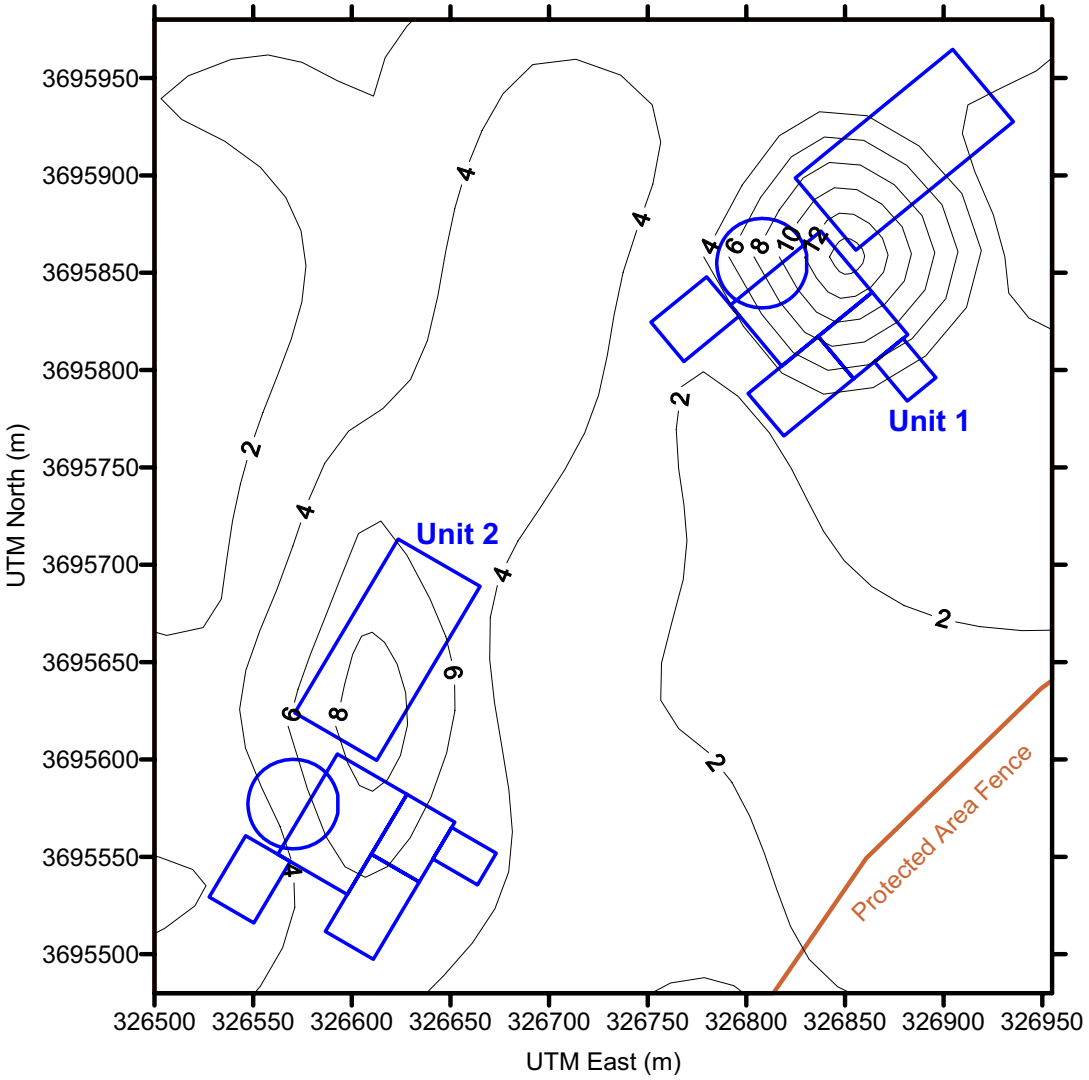
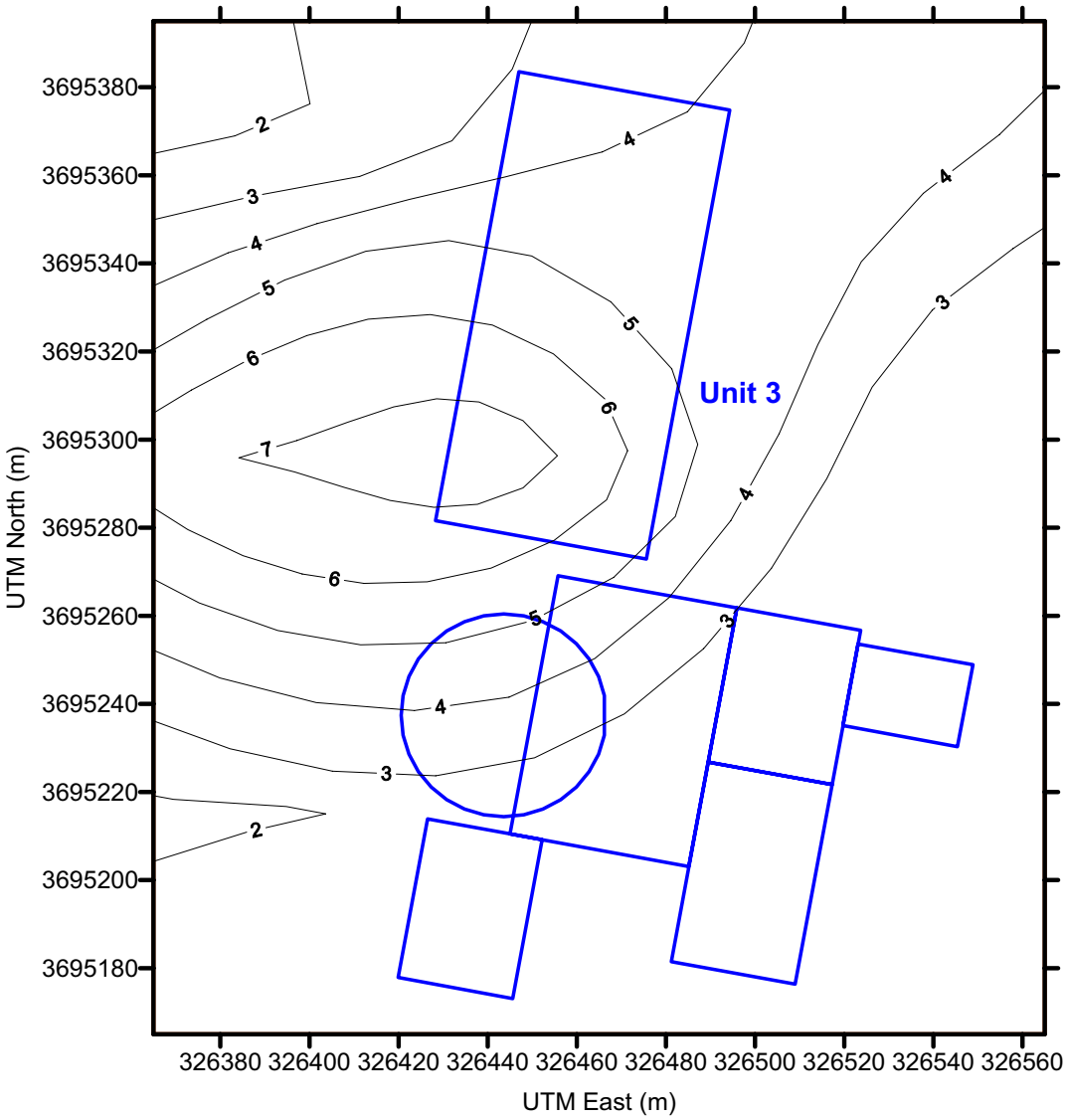
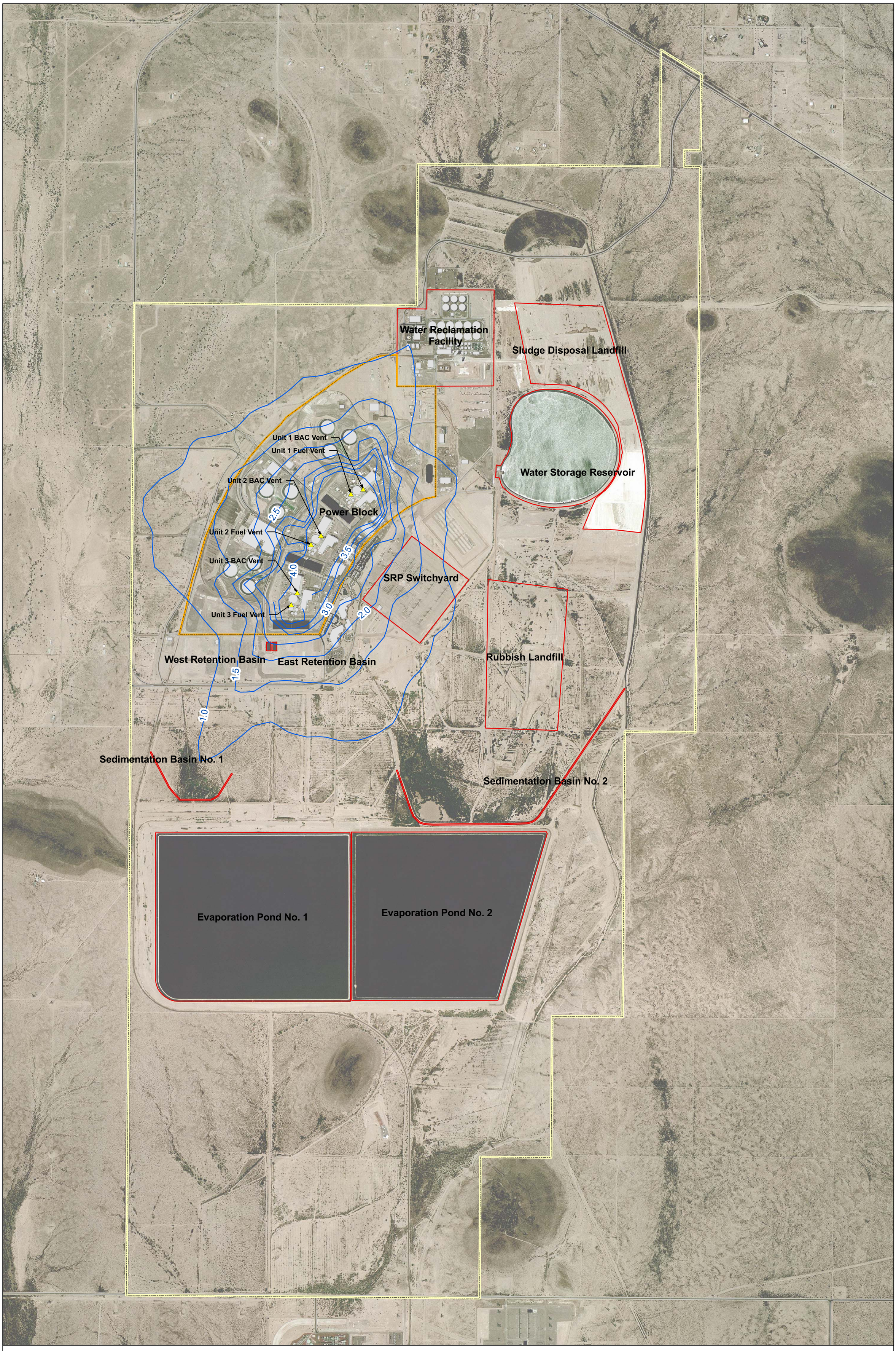


Figure 4-12
Case C: Modeled 24-Hour Wet Deposition - Unit 3
(uCi/m^2)





N

Legend

- Source Vents
- Isopleths
- Site Boundary Fence
- Protected Area Fence
- Roads
- Facilities
- Buildings

0 2,000
Feet
1:10,000

Palo Verde Nuclear Generating Station

Figure 4-13
Case A: Modeled 5 year
Wet Deposition (μCi/m^2)

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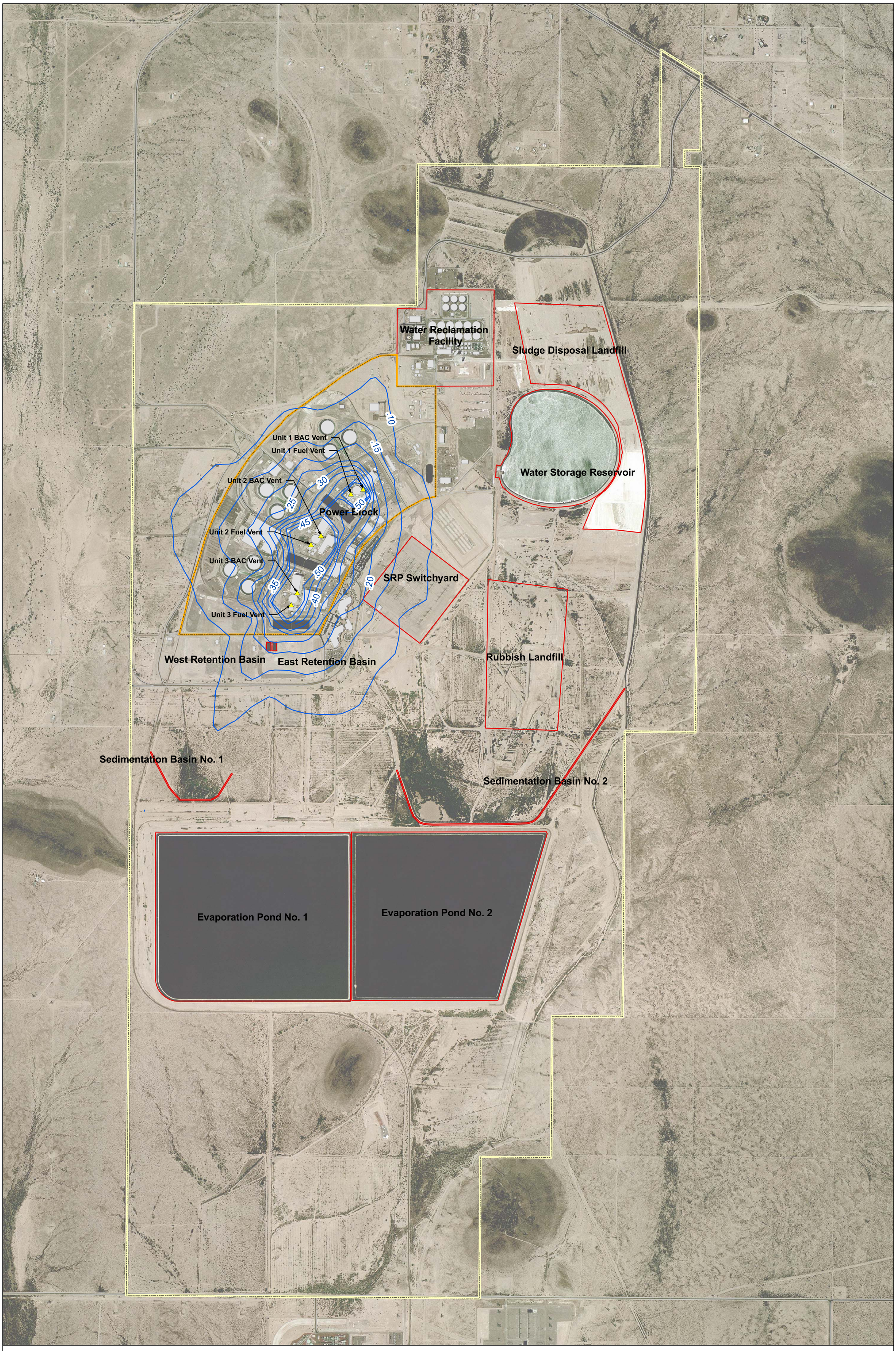

N

Legend

- Source Vents
- Isopleths
- Site Boundary Fence
- Protected Area Fence
- Roads
- Facilities
- Buildings

0 2,000
Feet
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Palo Verde Nuclear Generating Station

Figure 4-14
Case B: Modeled 5 year
Wet Deposition (μCi/m^2)

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5.0 Additional Source Investigation

Additional potential sources of the tritiated water were identified and evaluated. This evaluation is summarized below. The categories of potential sources are:

- Process systems
- Other potential sources
- Past Plant practices

5.1 Process Systems

Several of the process systems in the RCA Yards contain elevated tritium concentrations. The most likely sources are the underground process pipelines, the HUTs and RWTs, and the HUT sumps. Table 5-1 presents representative recent tritium concentrations for these process components within the RCA Yards. All results were obtained in 2006 as part of the tritium evaluation project.

TABLE 5-1
Representative Recent Tritium Concentrations

Component	pH	Cond (µs/cm)	Tritium (µCi/ml)
Unit 2 LR - Recycle Monitor Tank	6.42	0.96	8.06×10^{-2}
Unit 2 RMWT	6.65	1.1	2.2×10^{-2}
Unit 2 RWT	4.18	19.6	1.24×10^{-1}
Unit 2 HUT	4.45	14.8	4.69×10^{-1}
Unit 2 Essential Spray Pond System Train A	8.07	5100	1.89×10^{-6}
Unit 1 HUT Sump			8.12×10^{-3}
Unit 2 HUT Sump			2.46×10^{-2} to 2.51×10^{-2}

Underground pipelines in the Unit 3 RCA Yard with the highest potential to be a source of tritium above action levels were evaluated immediately following identification of tritium above action levels in this area. Leak tests and other evaluations indicated that these were not a source of the contamination. Other piping in the area was eliminated as potential sources because the tritium concentrations in these were less than the tritium concentrations seen in the RCA Yard (PVNGS, 2006a).

The HUT, RWTS, and adjacent sumps were identified as potential sources because of the higher tritium concentrations present. These were evaluated using process knowledge. The bottom of the tanks are about 9 feet 6 inches bgs and rest on concrete bases that are 4 feet 6 inches thick. The subsurface portion of the tanks are surrounded by a concrete wall that is integral with the concrete base and lined with 0.25 inch stainless steel plate (PVNGS, 2006a). While no method currently exists to determine if small leaks may have occurred, the higher

concentrations within these tanks indicate that no large leaks have occurred. Ongoing leaks would result in increasing tritium concentrations in the subsurface as a result of the influx of higher tritium concentrations into the small pool of water present in the subsurface.

The tank sumps are coated but not lined. There are no water stops between the floor and side walls of the structure. Recent inspection indicates that the interior coating appears to be bubbling and failing. The test hole investigation determined that the water levels inside the sump were lower than outside of the sump and that tritium concentrations within the sump were significantly higher that in the adjacent test hole. Therefore, the sumps were eliminated as a current source of contamination. In the interim, these will be inspected regularly and accumulated water pumped out as a best management practice.

5.2 Other Potential Sources

The spill records were reviewed to determine if there were significant historic releases in this area that potentially could have resulted in tritium entering the subsurface. While several very small leaks occurred over time in this area, these were approximately 1 gallon or less. While initially excluded as a source because of the small volume, these may be a potential source of the contamination because the volume of water in the subsurface is very small, and these spills were relatively high concentrations. The volume of tritiated water is estimated at 800 gallons. If a 1 gallon spill occurred with a concentration similar to the current HUT concentration (4.69×10^{-1} µCi/ml), diluted in 800 gallons would yield a concentration of 5.86×10^{-4} µCi/ml. For a spill to be considered as a potential source, it must occur on a permeable area with a pathway into the deeper portion of the basin where water has collected. Other spills either will not penetrate into the subsurface, or will evaporate in place. Unit 3 has the highest potential of this occurring because of the larger permeable areas. However, this is also possible in the other Units where similar conditions occur.

The 36-inch HVAC tunnel evaluation is described in detail in the tritium investigation section. It is not believed to be a primary source of tritium contamination, however, it is likely a secondary reservoir where tritium concentrations above action levels are captured. The concrete and associated sand bedding material of the EPDT is likely another secondary reservoir for tritium.

Leakage from the spent fuel pool was evaluated and eliminated for the following reasons:

- The spent fuel pools are equipped with telltale drains that collect any drainage that would indicate a leak.
- There was a minor leak in Unit 1 spent fuel pool that reached the outside. However, this spill was a very small volume, was contained on impermeable surfaces, and was immediately remediated. None of the spilled material reached soil.
- Samples were collected from the spent fuel pool and the water in the RCA Yard for offsite analysis to verify that the tritium is not a result of leaks from the spent fuel pool. While final results have not yet been received, the preliminary results indicate that the spent fuel pool analytes are not present above detection limits.

5.3 Past Plant Practices

The plant ventilation systems were previously reconfigured to capture condensation from the plant ventilation systems. However, in the past, condensation leakage from the Auxiliary and Radwaste Buildings exhaust ducting was observed during high humidity conditions. This

leakage was largely collected by radiological waste operations personnel, however, some leakage onto the roof was known to have occurred. The condensation that reached the roof could be diluted and transported to the ground and potentially into the subsurface during rain and washdown events. Condensation in the range of 10^{-1} to 10^{-2} µCi/ml tritium was historically possible. This potential pathway was also evaluated. Interviews were conducted with the personnel responsible for monitoring and collecting the condensation. From these interviews, it appears that:

- Condensation from the outside ventilation ductwork was regularly monitored as part of the operating rounds during BAC operations,
- Condensation was collected in containers and appropriately dispositioned as part of the operating rounds.
- Instances were described where containers overflowed during rain events and/or where small drips and wet areas were not collected. These are a small percentage of the condensation observed, likely in the range of a few gallons.

A sample was collected in March 2006 to evaluate current conditions. The maximum tritium concentration was 8.74×10^{-2} µCi/ml tritium and is representative of the historic concentrations. This condensation would be diluted by the amount of precipitation or roof wash water. However, as discussed in the spill evaluation, 1 gallon of this condensation when mixed with 800 gallons of rain or wash water could yield a tritium concentration of 1.1×10^{-4} µCi/ml. For this to be a credible potential source, the water must quickly reach a permeable area with a pathway into the deeper portion of the basin where water has collected before being diluted by additional precipitation or wash water, and before it can evaporate. This is more likely to occur in Unit 3 because of the larger permeable areas near the scuppers that connect to the subsurface. However, a similar event could occur at the other Units depending on the configuration of the drainage in the basin areas.

6.0 Site Conceptual Model

This section summarizes the site conceptual model for the three Units based on the construction information, test hole data, stormwater evaluation, and atmospheric modeling.

Small, shallow basins containing less-compacted fill material are found in each of the Units' RCA Yard areas. The sides and base of the basin are formed by compacted structural fill material and building foundations, limiting water migration out of the basin.

Clean water enters the basin through scuppers that direct stormwater from precipitation events onto unpaved surface areas and seismic gaps where there is a connection to the subsurface. There is a preferential pathway to the lower part of the basin along the HVAC tunnel and associated bedding material. If there are spills and/or leaks in this area, additional clean water may also enter the basins from the demineralized water and/or fire water systems.

The subsurface conditions are complex and do not allow complete mixing of water because of the suspected isolated sand and gravel lenses within the less-compacted fill, the disconnected nature of the utility bedding materials, the presence of subsurface structures and duct banks that direct water flow, and elevated areas of compacted structural fill within the basin.

As explained above, the horizontal migration of tritium is limited by the presence of compacted structural fill material and building foundations. Downward migration is also limited by the properties of the compacted structural fill (minimum 95 percent compaction). There is a minimum of 65 feet, primarily of compacted structural fill between the shallow aquifer and tritium above action levels.

6.1 Unit 1 Conceptual Model

Almost all of the Unit 1 RCA Yard is paved, limiting infiltration into the subsurface to small areas where pavement was removed to allow the area to drain. However, the pavement is sloped towards the HUT sump, and stormwater can enter the sump at this location. There is little evidence that this occurs. As a result, the subsurface is likely dry.

This conclusion is supported by conditions at the Unit 1 EPDT. This is dry, and does not have water staining on the floors or walls, or other indications of water condensation or collection, including the locations where the HVAC tunnel enters the EPDT, or at the locations where the 24-inch spray pond pipes leave this tunnel. No water management practices are in place as there is little or no water to control.

The preliminary test holes installed in this unit have been dry. If tritium is found, it will be isolated.

6.2 Unit 2 Conceptual Model

The Unit 2 RCA Yard is also mostly paved. However, there is an unpaved area immediately north of the northern Fuel Building roof scupper where water can enter the subsurface and then flow along the permeable material at the base of the buttress for the Fuel Building to the HVAC tunnel. Water then can flow along this tunnel and associated bedding material to the EPDT.

The Unit 2 EPDT is water stained and has a number of water management devices in place to handle the water that occasionally flows along the HVAC tunnel. These water management devices included a small, approximately 1-inch tall Plexiglas dam where the HVAC tunnel enters into the EPDT. The dam is outfitted with a nipple and Tygon tubing to allow collected water to flow directly to the sump. The size of the dam and the small diameter tubing indicates that the flow rate is low, and that the diversion is primarily for housekeeping purposes. This low water flow was confirmed by maintenance personnel.

The Unit 2 EPDT appeared to have more water than the Unit 3 and the preliminary test holes determined that there was more concrete present in this area than was found in Unit 3. The additional subsurface concrete may act to direct the water towards the EPDT, such as along a series of stair steps. This more continuous concrete may provide a preferential pathway for introduced water to quickly reach the EPDT, giving the impression that more water is present. In fact, less water may be present as more water may drain through the EPDT, and little less-compacted fill material may be present to provide storage.

Test holes installed in Unit 2 indicate the presence of tritium, but not currently above action levels.

6.3 Unit 3 Conceptual Model

Larger areas of the Unit 3 RCA Yard are unpaved, including areas immediately above the shallow basin of less-compacted fill material that are in direct communication with scupper outfall areas. Water that enters the shallow basin will tend to preferentially flow along the HVAC tunnel and associated sand bedding towards the EPDT.

As at Unit 2, the EPDT is water stained. Water from the HVAC tunnel is collected as it enters the EPDT and directed to the sump for management along with any other collected stormwater. Water flowing within the EPDT sand bedding is expected to flow down the EPDT foundation wall, where it forms pools against the EPDT at the top of the compacted structural fill.

Water within the HVAC sand bedding contains tritium concentrations above action levels. These higher concentrations are probably a result of stormwater that acquires a higher tritium activity from the residual contamination in the HVAC tunnel and sand bedding. The source of the tritium in the HVAC sand bedding is believed to be a result from past operational practices or events.

The test hole investigation found tritium above action levels at two locations in pools on the compacted structural fill material adjacent to the EPDT. The tritium is limited in extent by compacted structural fill and by foundations. Because tritium above action levels was found within the EPDT as early as the 1995-1998 timeframe, it is likely that tritium has been in the subsurface for at least this long, and probably longer. Because of the lack of a migration pathway, these pockets of higher tritium concentrations are expected to persist until these decay or are diluted with cleaner water entering the basin.

7.0 Conclusions and Recommendations

Tritiated water is found in the subsurface soil at PVNGS Units 2 and 3, however only the Unit 3 RCA Yard contains tritium above action levels. The tritiated water is confined to an area within shallow basins formed by low permeability compacted soil and foundation structures. Water infiltrating the basins tends to accumulate because the overlying asphalt and concrete surfaces restrict evaporation. As a result, there is minimal turnover of water accumulated in these areas.

While constructed in a similar manner, the Units have unique above and below ground construction features that influence how subsurface tritiated water accumulates. As a result, the amount and concentration of tritiated water accumulated is different not only between the units but also in areas in close proximity within each unit. These unique features limit the migration of the subsurface tritiated water from the area where it has been identified. Geological and monitoring data collected during the installation of new permanent monitoring wells being installed as part of the investigation will provide additional information to confirm that the water is confined to this area.

The tritium does not appear to be a result of an active process system leak because neither the water levels nor the concentrations are increasing. While one system pipe still remains to be evaluated, it is assumed that this is not the source of the tritiated water because of the similarities between the concentrations seen in Units 2 and 3, and that the pipe testing already completed shows that the underground piping systems are in good condition. For the remaining pipe to be the source, it would have to be leaking at the same time in two separate units.

Atmospheric modeling indicates that rain washout of tritium resulting from the current operating conditions of not operating the BAC during rain events, is not the source of the tritium in the subsurface. In addition, washout cannot explain the order of magnitude differences of concentrations observed in test holes in close proximity to each other in Units 2 and 3.

Because of the differences in concentrations and low turnover rates in the basin area, the source of the subsurface water with the higher tritium concentrations is believed to be a result of past operational practices or events. The most probable causes are washout that occurred during the past when the BAC may have operated during rain events, washdown of roofs or rain washoff during times when tritium condensation from the ventilation system was present, and possibly small volume spills within the area of the small, shallow basins.

7.1 Unit 1 Tritium Evaluation

Atmospheric modeling indicates that Unit 1 could have the higher deposition, possibly up to a factor of two greater than Units 2 and 3, with the highest concentrations mostly depositing on building roofs. Runoff from the roofs is directed into the RCA Yard, however, the surface is relatively impermeable with good drainage patterns that direct stormwater to the plant stormwater drainage system rather than allowing water to pond and seep into the subsurface. This minimizes the amount of building wash-off or rainwater runoff that can accumulate in the subsurface. The test hole investigation confirms that significant water has not accumulated in the subsurface at this location.

7.2 Unit 2 Tritium Evaluation

As in Unit 1, the atmospheric modeling shows that the highest concentration of tritium is deposited on the building roofs. However, the tritium deposition concentrations are lower than at either Unit 1 or Unit 3. The areas of highest deposition primarily drain away from the shallow basin. In addition the Unit 2 RCA Yard is relatively impermeable with good drainage patterns that direct stormwater into the plant stormwater drainage system rather than allowing water to pond and seep into the subsurface. The fuel building scupper that outfalls onto an unpaved area is located at the perimeter of the basin area and at a location where most of the storm water flow runs off. While not as impermeable as Unit 1, the surface in Unit 2 is mostly impermeable, which minimizes the amount of building wash-off or rain water runoff that can enter and accumulate below the ground.

The test hole investigation determined that the shallow basin in this area is dominated by concrete. Test hole data indicates that although some water has accumulated in the subsurface, it does not appear to be of the same extent as in Unit 3. Subsurface tritiated water is present, although not above action levels. Because of the limited amount of subsurface water detected, it is believed that the small pockets of tritiated water are most likely a legacy from past operation practices, including tritium rainout/washout, or a small spill that may have infiltrated the area rather than from an active process leak.

7.3 Unit 3 Tritium Evaluation

Atmospheric modeling shows that the deposition in Case A and C is centered around the building roofs and to the area north of the Unit 3 buildings. Case B deposition, modeled as the plant vent without BAC emissions, is the lowest emissions case modeled and shows deposition on the buildings roofs around the RCA Yard. Case B represents current operating conditions. The highest concentration in rainwater was predicted at 4.69 x 10-6 µCi/ml and is consistent with rain water samples collected from building scupper during a rain event that occurred on March 11, 2006.

Process systems were evaluated and were determined not to be a tritium source. As described above, one process system remains to be tested, but is an unlikely source of the tritiated water. The test hole investigation determined that the tritium was detected above action levels adjacent to the EPDT and is believed to be associated with the HVAC tunnel as a pathway and/or as a secondary source. Because the source for the higher tritium concentrations is not a result of current plant emissions or process system leaks, it is not possible to absolutely identify the source or sources. Therefore, the potential sources are listed below along with a brief evaluation:

- Historic leaks and spills onto permeable areas within the shallow basin in the Unit 3 RCA Yard. Spills would have been small and located in areas where there is communication with the HVAC tunnel and sand bedding. The RWT valves and piping is the most probable source, but the spills would have to have been very small volumes to account for the current tritium concentrations and volume observed. Therefore, there is low probability that this is the source of the tritiated water.
- Potential leakage from the HUT sump. The sump is below the level of compacted structural fill material in this area, and therefore, there is a limited migration pathway into the basin. Any water that leaked out of the sump would have to migrate upwards into the basin, through the compacted structural fill, requiring a higher hydraulic head. If water was entering

into the basin from this location, the nearby test hole should contain a similar concentration as water within the sump. Based on the difference in both water levels and tritium concentrations between the sump and the adjacent test hole, there is low probability that the sump is the source of the tritiated water.

- Potential leakage from the RWT sump. As with the HUT sump, leakage is possible out of this coated, but unlined sump. The higher tritium concentrations in this sump indicate that, if any leakage is occurring, it is a small amount. If significant leakage were occurring, then much higher tritium concentrations would be seen in the subsurface. However, the sump is located where there is the potential for communication with the HVAC tunnel and sand bedding and therefore provides a migration pathway to the EPDT. Therefore, minor leakage from this sump could be a source of the tritiated water.
- In the past, condensation leakage was observed from the Auxiliary and Radwaste Buildings exhaust ducting during high humidity conditions. While most was captured and dispositioned, some leaked onto the roof where it could be washed off by rain, or more likely by wash water, into the building scuppers. This tritiated water may have infiltrated into the subsurface at scupper outfalls located in permeable areas within the RCA Yard. The sand bedding of the HVAC tunnel then provided a migration pathway to the EPDT. If this occurred, then the historic higher concentrations of tritium could have saturated the HVAC tunnel and sand bedding. The tunnel and bedding then may continue to act as a secondary source of tritium resulting in higher tritium concentrations at the test holes adjacent to the EPDT (H0-A and H11) that are not representative of current rainwater concentrations.
- Atmospheric modeling for Unit 3 suggests the deposition was centered around the building roofs and to the area north of the Unit 3 buildings. Concentrations on the order of mid 10^{-5} µCi/ml have been estimated with this model for the Auxiliary Building roof.

While no single source can be absolutely identified, it is likely that the tritium is a result of historic practices that are no longer occurring. However, based on the potential likely sources, follow-up actions were identified and are described below.

7.4 Follow-Up Actions

Monitoring will be initiated to confirm the conclusions of this report. Best management practices and interim actions are recommended to dry out and to keep dry the small basins in the Units 1, 2, and 3 RCA Yards. The concrete, soil, and pipe bedding materials of these Units will continue to act as long term sources of residual contamination, so complete removal of the contaminated media is not possible.

7.4.1 Additional Follow-up Investigation and Monitoring

Because of the limited extent of tritium contamination identified that was above action levels, no formal follow-up characterization activities are planned. Therefore, the evaluation results and recommendations for remediation and mitigating strategies are provided in the following sections. A discussion on the follow-up tasks to confirm these conclusions is provided in Section 7.5.

7.4.2 Best Management Practices

The following best management practices will be initiated to minimize infiltration of water into the identified basin area:

- Pave and or repair pavement in areas at Units 1, 2, and 3 to minimize the potential for building roof run-off to infiltrate into the ground.
- Evaluate and if necessary modify the roof scuppers in the Units 1, 2 and 3 RCA Yards so that the travel path to the stormwater control system is entirely on paved or otherwise impermeable surfaces.
- Assess and improve as necessary stormwater drainage to minimize stormwater ponding and infiltration within the RCA Yard, particularly adjacent to structures that contain expansion or seismic joints or other areas where infiltration may occur.
- Modify the HUT Sump and/or surrounding pavement in Unit 1 to prevent stormwater flow into this sump.
- Routinely inspect and pump the sumps in the Units 1, 2, and 3 RCA Yards. The inspection frequency should be determined by the operational inputs to the sump and should be frequent enough to minimize the amount of standing water in the sumps. Additional methods may be implemented at these locations as alternatives to routine inspections and pumping if these methods also minimize the potential for infiltration into the subsurface.

The HVAC tunnel is now sealed, eliminating the pathway through the tunnel. However, the sand bedding will tend to act as a continuing pathway and secondary source of tritiated water.

7.4.3 Interim Actions

Tritium has been detected in Units 2 and 3 RCA yard areas, although tritium above action levels was only found in Unit 3. While the tritium in the RCA yards is limited in extent and the potential for migration is controlled by the presence of compacted structural fill and foundations, interim actions are proposed to remove as much tritium above action levels as possible.

Work plans have been submitted as part of Task 4b to convert some of the test holes to monitoring/collection wells and to install additional monitoring wells (PVNGS, 2006c). In the interim, removal of the tritiated water using the existing test holes is proposed prior to installation of these wells. Pumping from the existing test holes will reduce the volume of tritiated water present in the subsurface and expedite drying out this area in advance of monitoring/collection well installation.

Accumulated water will be pumped as it collects, at first from the test holes, then later from the collection/monitoring wells. The tritiated water will be actively managed and disposed of in accordance with the PVNGS radiation protection procedures. This water will not be placed into the PVNGS stormwater system.

Prior to installation of the monitoring/collection wells, quarterly sampling of the test holes/monitoring wells for tritium will be performed to determine the remaining tritium concentrations as water is being removed. Sampling of the wells after installation will be in accordance with the monitoring plan (PVNGS, 2006c). Based on the results, routine pumping will continue until the well no longer produces water or until tritium concentrations in the test holes/wells are below action levels for four consecutive quarters.

It is anticipated that cleaner water will be drawn into these areas as the water is removed from these locations. However, as a result of stopping infiltration that may be diluting the residual tritium concentrations, tritium concentrations potentially may increase.

The sample results and volume of water removed and disposed of per Unit will be provided in routine monitoring reports required to be submitted by the Station Aquifer Protection Permit. If

quarterly results indicate that pumping can be discontinued, the ADEQ will be notified prior to discontinuation.

7.4.4 Additional Interim Actions

Should tritium be found above action levels in other areas, such as in Units 1 or 2, or in areas outside the RCA Yards, this same approach will be applied after notification and discussions with ADEQ. The area with higher concentrations of tritium will be defined, then monitoring /collection wells will be installed as described above. Water will be routinely pumped until the well no longer produces water or until tritium concentrations are below action levels for four consecutive quarters.

7.5 Follow-up Actions for the Tritium Investigation Work Plan

During completion of this report, two additional actions were identified. These were for additional leak evaluation, and additional test hole installation. These actions will be completed within the next 30 working days as part of this initial investigation, with the results submitted separately.

7.5.1 Additional Leak Evaluation

A leak evaluation is still required for the 10-inch diameter, underground pipe that runs from the RMWT to an auxiliary feedwater pump located in the Main Steam Support Structure in each unit. As discussed in Section 7.0, this pipe is not expected to be the source of the tritium based on the condition of the other underground pipes tested, and because it is unlikely that leaks could result in the similar levels of tritiated water found in two separate units. However, the evaluation will be completed in accordance with PVNGS engineering guidelines as was performed for the other pipes tested previously. The results of this testing and any additional follow-up recommendations for monitoring, remediation, and/or mitigating strategies will be provided in a separate report.

7.5.2 Additional Unit 1 Test Hole

The atmospheric modeling results indicate that the highest potential for tritium deposition from rain out is in the Unit 1 area. An additional test hole will be placed in the area with the highest probability of subsurface water above action levels. This test hole will be located where there is a pathway into the subsurface from the scuppers and/or ponding of stormwater into a permeable area. Information from the additional test hole will be provided in a separate report. Based on the results of this test hole, additional test holes may be required in Units 2 and 3. If additional test holes are required, then these results will also be provided with the Unit 1 test hole results in a separate report.

If the additional information indicates that an additional monitoring well is needed, then the monitoring plan will be revised and submitted with the new monitoring well information (PVNGS, 2006c).

8.0 References

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Jacques Whitford Environment Limited, No. 50174, OPG-PNGS, Tritium Deposition Modeling, August 20, 2000 and Kurt Kehler, verbal 2006.

PVNGS, 2005, Palo Verde Nuclear Generating Station Units 1, 2, and 3, Annual Environmental Operating Report 2004, April

PVNGS, 2006a, Notification of Discharge of Non-hazardous Materials (Tritiated Water) 30 Day Follow-up Report, April

PVNGS, 2006b, 30-day Report Task 1b – Stormwater Evaluation Report, Palo Verde Nuclear Generating Station, April

PVNGS, 2006c, Work Plan For Drilling, Sampling, And Monitoring Well Installations Adjacent To Units 1, 2, And 3 In Support Of Compliance Activities Aquifer Protection Permit No. P-3507-100388, Palo Verde Nuclear Generating Station Units 1, 2 And 3, May

APPENDIX A

Test Hole Information

Test Hole Information

Unit	Test Hole	Ground Elevation	TOC Elevation	Diff in Feet	Diff in Inches	Northing	Easting	Northing	Easting
1	H0-A	**956.40**	957.15	0.75	9.00	876.67	2769.25	**870390.67**	**211342.77**
1	H0-B	956.40	956.94	0.54	6.48	866.33	2772.25	**870384.68**	**211351.72**
2	H0-A	953.37	953.30	-0.07	-0.84	881.67	2771.17	**869461.54**	**210660.88**
2	H0-B	953.37	953.60	0.23	2.76	866.75	2771.17	**869454.07**	**210673.80**
2	H-1					936.67	2799.5	**869513.57**	**210627.42**
2	H-10					891.17	2797.33	**869488.94**	**210665.73**
2	H-12A					927.17	2779.5	**869491.49**	**210625.64**
2	H-12B					927.17	2778.0	**869490.20**	**210624.89**
2	H-13					935.17	2777.5	**869493.77**	**210617.71**
2	H-17					1047.5	2794.0	**869564.22**	**210528.68**
3	H0-A	950.32	**950.60**	0.28	3.36	881.00	2771.50	**868351.27**	**210341.99**
3	H0-B	950.32	951.07	0.75	9.00	866.16	2772.25	**868349.42**	**210356.74**
3	H-1	951.06	951.42	0.36	4.32	934.04	2804.00	**868392.49**	**210295.40**
3	H-2	950.26	950.98	0.72	8.64	850.58	2770.50	**868344.99**	**210371.78**
3	H-3	950.42	951.26	0.84	10.08	881.34	2758.00	**868338.03**	**210339.32**
3	H-4	950.41	951.49	1.08	12.96	881.59	2726.60	**868307.15**	**210333.62**
3	H-5B	950.35	951.05	0.70	8.40	887.03	2763.80	**868344.73**	**210334.72**
3	H-5A	950.39	950.56	0.17	2.04	889.17	2766.17	**868347.43**	**210333.02**
3	H-6	950.49	No Casing						
3	H-10	950.68	951.25	0.57	6.84	890.52	2801.00	**868381.97**	**210337.74**
3	H-11	950.40	951.15	0.75	9.00	887.17	2789.67	**868370.24**	**210339.07**
3	H-12	950.86	952.27	1.41	16.92	928.03	2778.25	**868366.08**	**210296.85**
3	H-14D	951.14	951.64	0.50	6.00	1006.80	2780.30	**868381.77**	**210219.63**
3	H-15	951.01	951.51	0.50	6.00	945.77	2738.50	**868343.38**	**210180.70**
								State Plane Coordinates	

APPENDIX B

Water Levels

Unit 3

Test hole H-11 at the southeast corner of pump house hit concrete at 4 feet. The area around H-11 is configured a little different than in Unit 3. In the other area there is not as large of a gap to move the hole towards.

Test hole H-10 a few feet northeast of hole H-11 was excavated to full 14 feet.

Test hole H-12 between the HUT sump and northwest corner of pump house hit concrete at 7 feet. In the area of H12, it appears to be duct bank.

Test hole H-13 east of HUT sump hit concrete duct bank at 4 feet.

Test hole H-14 between RMWT and Fuel Building hit concrete at 1 foot.

Test hole H-17 at northeast corner of Fuel Building was excavated to full 14 feet.

Palo Verde Nuclear Generating Station
Unit 2 Test Hole Water Level and Tritium Sampling History

DATE	Unit 2 Test Well - H0a [Depth=13.25ft]					Unit 2 Test Well - H0b [Depth=14.20ft]					Unit 2 Test Well - H10 [Depth=13.38ft]				
	Tritium	Static Water Level		Volume Pumped (gal)		Tritium	Static Water Level		Volume Pumped (gal)		Tritium	Static Water Level		Volume Pumped (gal)	
		DTW	WL - Elev		Cumulative		DTW	WL - Elev	Daily	Cumulative		DTW	WL - Elev	Daily	Cumulative
03/05/06	5.39E-06	11.60	941.70		2.50										
03/06/06	2.36E-06	11.45	941.85		6.86										
03/07/06	3.42E-06	11.41	941.89		9.89										
03/08/06	2.55E-06	11.41	941.89		12.91										
03/09/06	1.26E-06	11.54	941.76		16.74										
03/10/06	2.41E-06	11.55	941.75		19.27										
03/11/06	2.63E-06	11.35	941.95		21.80										
03/12/06	2.07E-06	11.48	941.82		24.03										
03/13/06	2.95E-06	11.42	941.88		26.26										
03/14/06	2.45E-06	11.40	941.90		28.88										
03/15/06	<MDA	11.42	941.88		32.71										
03/16/06	2.39E-06	11.44	941.86		35.34										
03/17/06	2.44E-06	11.41	941.89		37.77										
03/18/06	2.01E-06	11.41	941.89		40.99										
03/19/06	1.61E-06	11.43	941.87		43.82										
03/20/06	1.71E-06	11.48	941.82		46.25										
03/21/06	<MDA	11.49	941.81		47.77	<MDA	12.00	941.60		4.93					
03/22/06	1.98E-06	11.55	941.75		50.20	<MDA	12.06	941.54		7.75					
03/23/06	1.51E-06	11.57	941.73		52.63	<MDA	12.09	941.51		11.38					
03/24/06	2.54E-06	11.59	941.71		54.65	<MDA	12.11	941.49		15.41					
03/25/06	3.75E-06	11.57	941.73		55.38	1.91E-06	12.08	941.52		16.13					
03/26/06	2.31E-06	11.55	941.75		56.10	1.14E-06	12.01	941.59		16.86					
03/27/06	2.18E-06	12.05	941.25		58.53	<MDA	12.09	941.51		20.09					
03/28/06	2.04E-06	11.60	941.70		59.26	<MDA	11.30	942.30		20.81					
03/29/06	1.72E-06	11.57	941.73		59.98	1.41E-06	12.09	941.51		21.54					
03/30/06	<MDA	11.60	941.70		60.71	<MDA	12.12	941.48		22.26					
03/31/06		11.59	941.71		60.71		12.11	941.49		22.26					
04/01/06		11.60	941.70		60.71		12.12	941.48		22.26					
04/02/06		11.59	941.71		60.71		12.11	941.49		22.26					
04/03/06		11.56	941.74		60.71		12.08	941.52		22.26					
04/04/06		11.58	941.72		60.71		12.06	941.54		22.26					
04/05/06		11.55	941.75		60.71		12.07	941.53		22.26					
04/06/06		11.57	941.73		60.71		12.10	941.50		22.26					
04/07/06		11.58	941.72		60.71		12.11	941.49		22.26					
04/08/06		11.56	941.74		60.71		12.09	941.51		22.26					
04/09/06		11.57	941.73		60.71		12.08	941.52		22.26					
04/10/06					60.71					22.26					
04/11/06	2.01E-06	11.58	941.72		61.44					22.26					
04/12/06		11.57	941.73		61.44		12.07	941.53		22.26					
04/13/06		11.54	941.76		61.44		12.06	941.54		22.26					
04/14/06		11.50	941.80		61.44		12.03	941.57		22.26					
04/15/06		11.54	941.76		61.44		12.07	941.53		22.26					
04/16/06		11.53	941.77		61.44		12.07	941.53		22.26					

Palo Verde Nuclear Generating Station
Unit 2 Test Hole Water Level and Tritium Sampling History

DATE	Unit 2 Test Well - H0a [Depth=13.25ft]					Unit 2 Test Well - H0b [Depth=14.20ft]					Unit 2 Test Well - H10 [Depth=13.38ft]				
	Tritium	Static Water Level		Volume Pumped (gal)		Tritium	Static Water Level		Volume Pumped (gal)		Tritium	Static Water Level		Volume Pumped (gal)	
		DTW	WL - Elev		Cumulative		DTW	WL - Elev	Daily	Cumulative		DTW	WL - Elev	Daily	Cumulative
04/17/06		11.54	941.76		61.44		12.07	941.53		22.26					
4/18/2006		11.53	941.77		61.44	<MDA	12.06	941.54		22.99					
4/19/2006		11.51	941.79		61.44		12.07	941.53		22.99					
4/20/2006		11.52	941.78		61.44		12.07	941.53		22.99					
4/21/2006		11.50	941.80		61.44		12.02	941.58		22.99					
4/22/2006		11.51	941.79		61.44		12.04	941.56		22.99					
4/23/2006		11.55	941.75		61.44		12.08	941.52		22.99					
4/24/2006		11.55	941.75		61.44		12.08	941.52		22.99					
4/25/2006		11.54	941.76		61.44		12.08	941.52		22.99					
4/26/2006		11.50	941.80		61.44	<MDA	12.02	941.58		23.72					
4/27/2006		11.54	941.76		61.44		12.07	941.53		23.72					
4/28/2006		11.54	941.76		61.44		12.08	941.52		23.72					
4/29/2006					63.44					26.22					
4/30/2006					63.44					26.22					
5/1/2006		11.56	941.74		63.44		12.09	941.51		26.22					
5/2/2006	2.36E-06	11.55	941.75		65.29	1.73E-06	12.08	941.52		28.07					
5/3/2006		11.57	941.73		65.29		12.09	941.51		28.07					
5/4/2006		11.55	941.75		65.29		12.06	941.54		28.07					
5/5/2006		11.55	941.75		65.29		12.07	941.53		28.07					
5/8/2006		11.54	941.76		65.29		12.08	941.52		28.07					
5/9/2006		11.55	941.75		65.29		12.09	941.51		28.07					
5/10/2006		11.54	941.76		65.29		12.08	941.52		28.07					
5/11/2006	2.51E-06	11.56	941.74		66.01	1.44E-06	12.09	941.51		28.79					
5/12/2006		11.55	941.75		66.01		12.08	941.52		28.79					
5/15/2006		11.55	941.75		66.01		12.08	941.52		28.79		12.71			0.00
5/16/2006		11.56	941.74		66.01		12.08	941.52		28.79	1.57E-05	12.70			0.20
5/17/2006		11.55	941.75		66.01		12.07	941.53		28.79	1.58E-05	12.71			0.40
5/18/2006		11.55	941.75		66.01		12.08	941.52		28.79		12.72			0.40
5/19/2006		11.56	941.74		66.01		12.09	941.51		28.79		12.69			0.40
5/22/2006		11.55	941.75		66.01		12.07	941.53		28.79		12.48			0.40
5/23/2006		11.56	941.74		66.01		12.10	941.50		28.79		12.57			0.40
5/24/2006		11.56	941.74		66.74		12.08	941.52		29.52		12.56			0.40

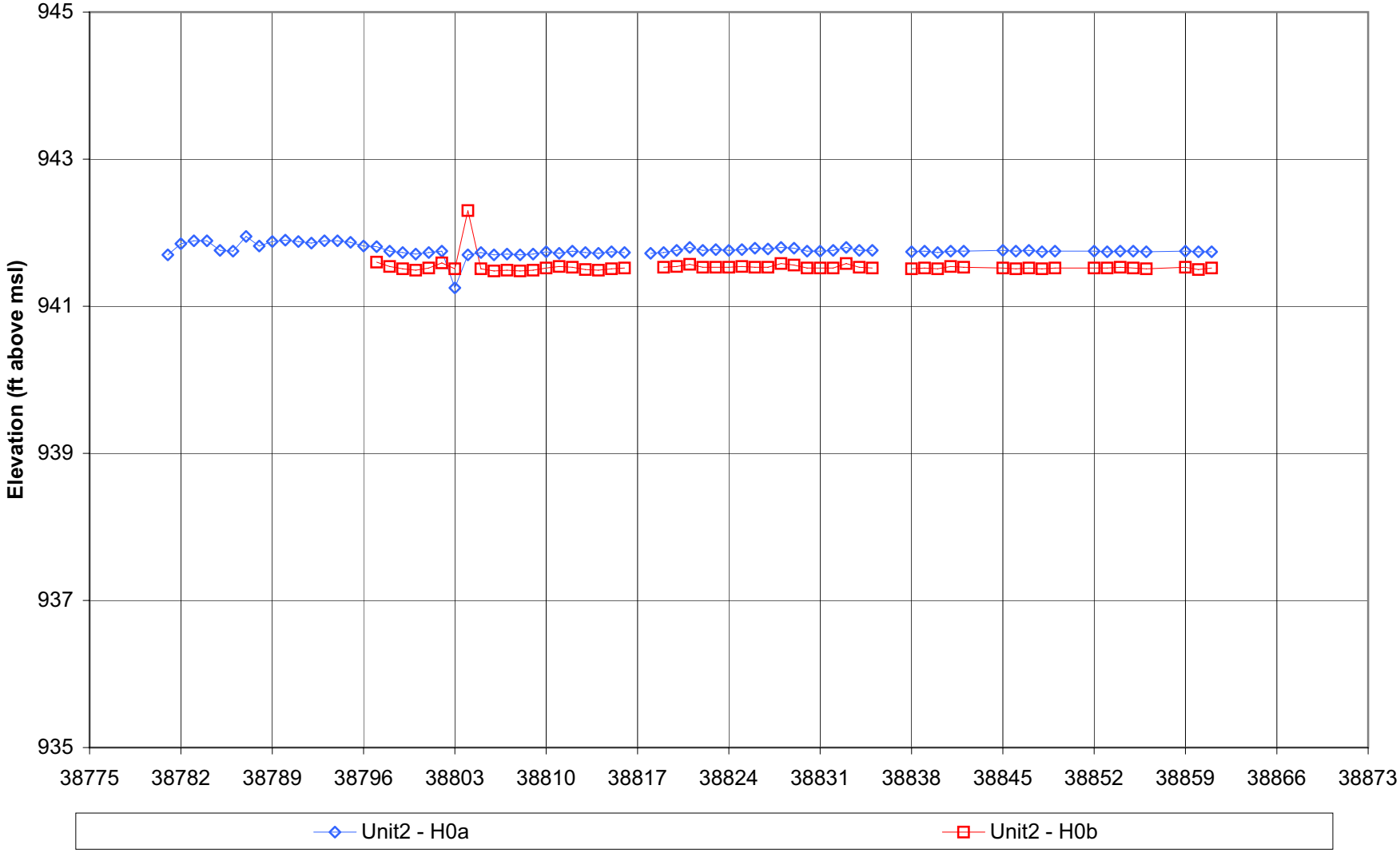
Palo Verde Nuclear Generating Station
Unit 2 Test Hole Water Level and Pumping History

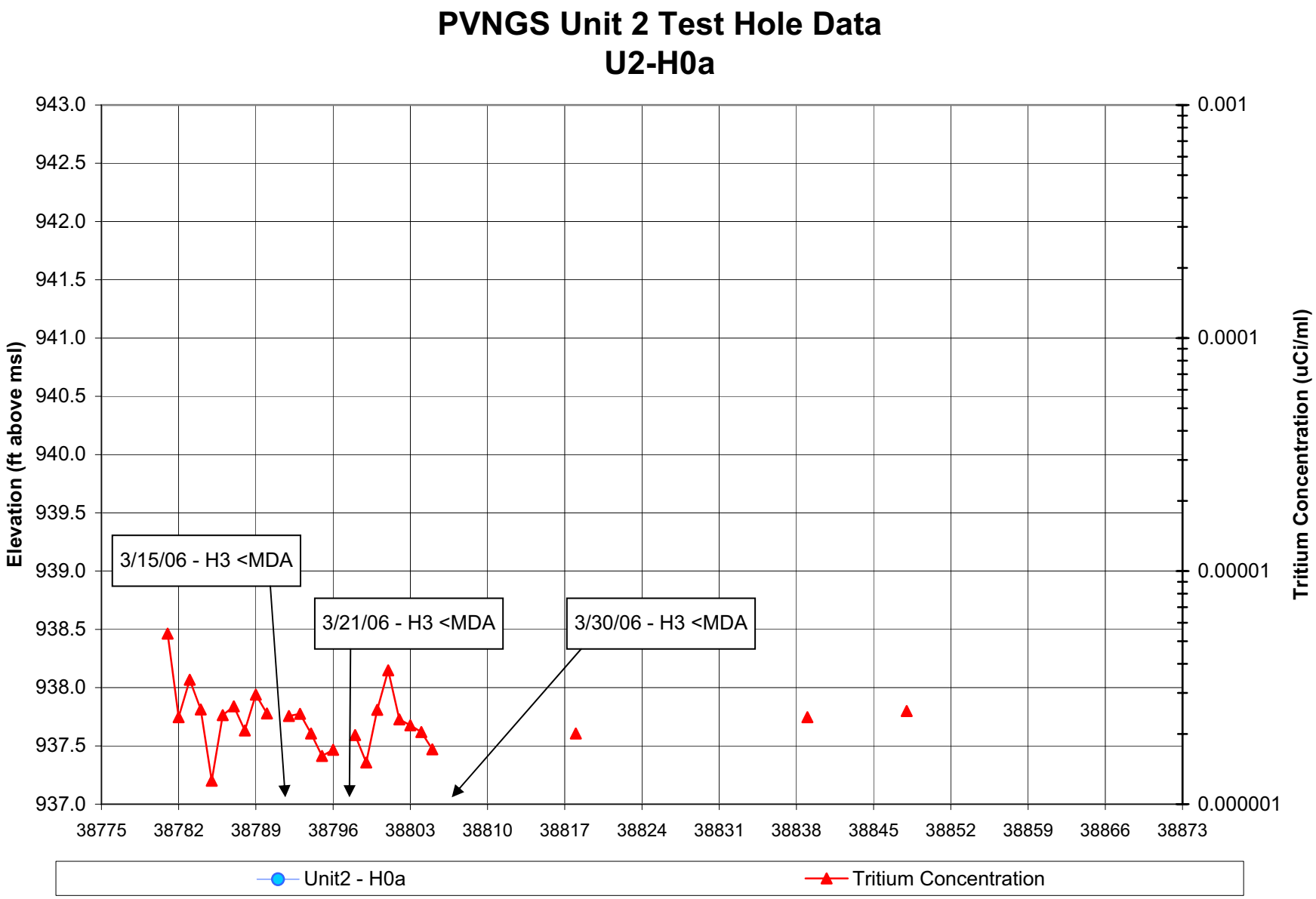
DATE	Unit 2 Test Well - H0a [Depth=13.25ft]					Unit 2 Test Well - H0b [Depth=14.20ft]					Unit 2 Test Well - H10 [Depth=13.38ft]				
	MP	Static Water Level		Volume Pumped (gal)		MP	Static Water Level		Volume Pumped (gal)		MP	Static Water Level		Volume Pumped (gal)	
		DTW	WL - Elev	Daily	Cumulative		DTW	WL - Elev	Daily	Cumulative		DTW	WL - Elev	Daily	Cumulative
03/05/06	953.30	11.60	941.70	2.50	2.5										
03/06/06	953.30	11.45	941.85	4.36	6.9										
03/07/06	953.30	11.41	941.89	3.03	10										
03/08/06	953.30	11.41	941.89	3.03	13										
03/09/06	953.30	11.54	941.76	3.83	17										
03/10/06	953.30	11.55	941.75	2.53	19										
03/11/06	953.30	11.35	941.95	2.53	22										
03/12/06	953.30	11.48	941.82	2.23	24										
03/13/06	953.30	11.42	941.88	2.23	26										
03/14/06	953.30	11.40	941.90	2.63	29										
03/15/06	953.30	11.42	941.88	3.83	33										
03/16/06	953.30	11.44	941.86	2.63	35										
03/17/06	953.30	11.41	941.89	2.43	38										
03/18/06	953.30	11.41	941.89	3.23	41										
03/19/06	953.30	11.43	941.87	2.83	44										
03/20/06	953.30	11.48	941.82	2.43	46										
03/21/06	953.30	11.49	941.81	1.53	48	953.60	12.00	941.60	4.93	4.9					
03/22/06	953.30	11.55	941.75	2.43	50	953.60	12.06	941.54	2.83	7.8					
03/23/06	953.30	11.57	941.73	2.43	53	953.60	12.09	941.51	3.63	11.4					
03/24/06	953.30	11.59	941.71	2.03	55	953.60	12.11	941.49	4.03	15.4					
03/25/06	953.30	11.57	941.73	0.73	55	953.60	12.08	941.52	0.73	16.1					
03/26/06	953.30	11.55	941.75	0.73	56	953.60	12.01	941.59	0.73	16.9					
03/27/06	953.30	12.05	941.25	2.43	59	953.60	12.09	941.51	3.23	20.1					
03/28/06	953.30	11.60	941.70	0.73	59	953.60	11.30	942.30	0.73	20.8					
03/29/06	953.30	11.57	941.73	0.73	60	953.60	12.09	941.51	0.73	21.5					
03/30/06	953.30	11.60	941.70	0.73	61	953.60	12.12	941.48	0.73	22.3					
03/31/06	953.30	11.59	941.71	0.00	61	953.60	12.11	941.49	0.00	22.3					
04/01/06	953.30	11.60	941.70	0.00	61	953.60	12.12	941.48	0.00	22.3					
04/02/06	953.30	11.59	941.71	0.00	61	953.60	12.11	941.49	0.00	22.3					
04/03/06	953.30	11.56	941.74	0.00	61	953.60	12.08	941.52	0.00	22.3					
04/04/06	953.30	11.58	941.72	0.00	61	953.60	12.06	941.54	0.00	22.3					
04/05/06	953.30	11.55	941.75	0.00	61	953.60	12.07	941.53	0.00	22.3					
04/06/06	953.30	11.57	941.73	0.00	61	953.60	12.10	941.50	0.00	22.3					
04/07/06	953.30	11.58	941.72	0.00	61	953.60	12.11	941.49	0.00	22.3					
04/08/06	953.30	11.56	941.74	0.00	61	953.60	12.09	941.51	0.00	22.3					
04/09/06	953.30	11.57	941.73	0.00	61	953.60	12.08	941.52	0.00	22.3					
04/10/06	953.30			0.00	61	953.60			0.00	22.3					
04/11/06	953.30	11.58	941.72	0.73	61	953.60			0.00	22.3					
04/12/06	953.30	11.57	941.73	0.00	61	953.60	12.07	941.53	0.00	22.3					
04/13/06	953.30	11.54	941.76	0.00	61	953.60	12.06	941.54	0.00	22.3					
04/14/06	953.30	11.50	941.80	0.00	61	953.60	12.03	941.57	0.00	22.3					
04/15/06	953.30	11.54	941.76	0.00	61	953.60	12.07	941.53	0.00	22.3					
04/16/06	953.30	11.53	941.77	0.00	61	953.60	12.07	941.53	0.00	22.3					
04/17/06	953.30	11.54	941.76	0.00	61	953.60	12.07	941.53	0.00	22.3					
4/18/2006	953.30	11.53	941.77	0.00	61	953.60	12.06	941.54	0.73	23.0					
4/19/2006	953.30	11.51	941.79	0.00	61	953.60	12.07	941.53	0.00	23.0					
4/20/2006	953.30	11.52	941.78	0.00	61	953.60	12.07	941.53	0.00	23.0					
4/21/2006	953.30	11.50	941.80	0.00	61	953.60	12.02	941.58	0.00	23.0					
4/22/2006	953.30	11.51	941.79	0.00	61	953.60	12.04	941.56	0.00	23.0					
4/23/2006	953.30	11.55	941.75	0.00	61	953.60	12.08	941.52	0.00	23.0					
4/24/2006	953.30	11.55	941.75	0.00	61	953.60	12.08	941.52	0.00	23.0					
4/25/2006	953.30	11.54	941.76	0.00	61	953.60	12.08	941.52	0.00	23.0					

Palo Verde Nuclear Generating Station
Unit 2 Test Hole Water Level and Pumping History

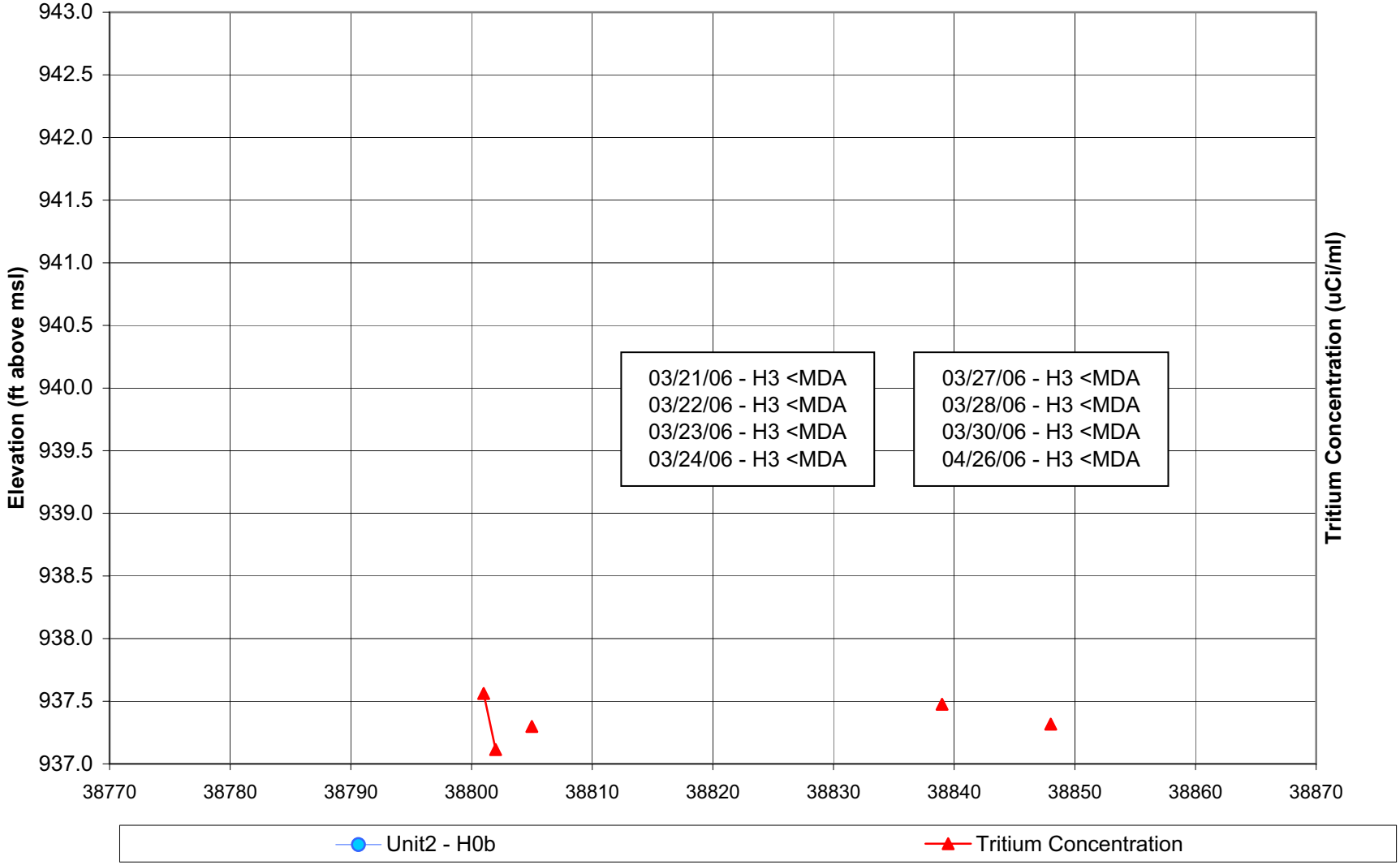
DATE	Unit 2 Test Well - H0a [Depth=13.25ft]					Unit 2 Test Well - H0b [Depth=14.20ft]					Unit 2 Test Well - H10 [Depth=13.38ft]				
	MP	Static Water Level		Volume Pumped (gal)		MP	Static Water Level		Volume Pumped (gal)		MP	Static Water Level		Volume Pumped (gal)	
		DTW	WL - Elev	Daily	Cumulative		DTW	WL - Elev	Daily	Cumulative		DTW	WL - Elev	Daily	Cumulative
4/26/2006	953.30	11.50	941.80	0.00	61	953.60	12.02	941.58	0.73	23.7					
4/27/2006	953.30	11.54	941.76	0.00	61	953.60	12.07	941.53	0.00	23.7					
4/28/2006	953.30	11.54	941.76	0.00	61	953.60	12.08	941.52	0.00	23.7					
4/29/2006				2.00	63				2.50	26.2					
4/30/2006				0.00	63				0.00	26.2					
5/1/2006	953.30	11.56	941.74	0.00	63	953.60	12.09	941.51	0.00	26.2					
5/2/2006	953.30	11.55	941.75	1.85	65	953.60	12.08	941.52	1.85	28.1					
5/3/2006	953.30	11.57	941.73	0.00	65	953.60	12.09	941.51	0.00	28.1					
5/4/2006	953.30	11.55	941.75	0.00	65	953.60	12.06	941.54	0.00	28.1					
5/5/2006	953.30	11.55	941.75	0.00	65	953.60	12.07	941.53	0.00	28.1					
5/8/2006	953.30	11.54	941.76	0.00	65	953.60	12.08	941.52	0.00	28.1					
5/9/2006	953.30	11.55	941.75	0.00	65	953.60	12.09	941.51	0.00	28.1					
5/10/2006	953.30	11.54	941.76	0.00	65	953.60	12.08	941.52	0.00	28.1					
5/11/2006	953.30	11.56	941.74	0.73	66	953.60	12.09	941.51	0.73	28.8					
5/12/2006	953.30	11.55	941.75	0.00	66	953.60	12.08	941.52	0.00	28.8					
5/15/2006	953.30	11.55	941.75	0.00	66	953.60	12.08	941.52	0.00	28.8		12.71		0.00	0.0
5/16/2006	953.30	11.56	941.74	0.00	66	953.60	12.08	941.52	0.00	28.8		12.70		0.20	0.2
5/17/2006	953.30	11.55	941.75	0.00	66	953.60	12.07	941.53	0.00	28.8		12.71		0.20	0.4
5/18/2006	953.30	11.55	941.75	0.00	66	953.60	12.08	941.52	0.00	28.8		12.72		0.00	0.4
5/19/2006	953.30	11.56	941.74	0.00	66	953.60	12.09	941.51	0.00	28.8		12.69		0.00	0.4
5/22/2006	953.30	11.55	941.75	0.00	66	953.60	12.07	941.53	0.00	28.8		12.48		0.00	0.4
5/23/2006	953.30	11.56	941.74	0.00	66	953.60	12.10	941.50	0.00	28.8		12.57		0.00	0.4
5/24/2006	953.30	11.56	941.74	0.73	67	953.60	12.08	941.52	0.73	29.5		12.56		0.00	0.4

PVNGS Unit 2 Test Hole Data

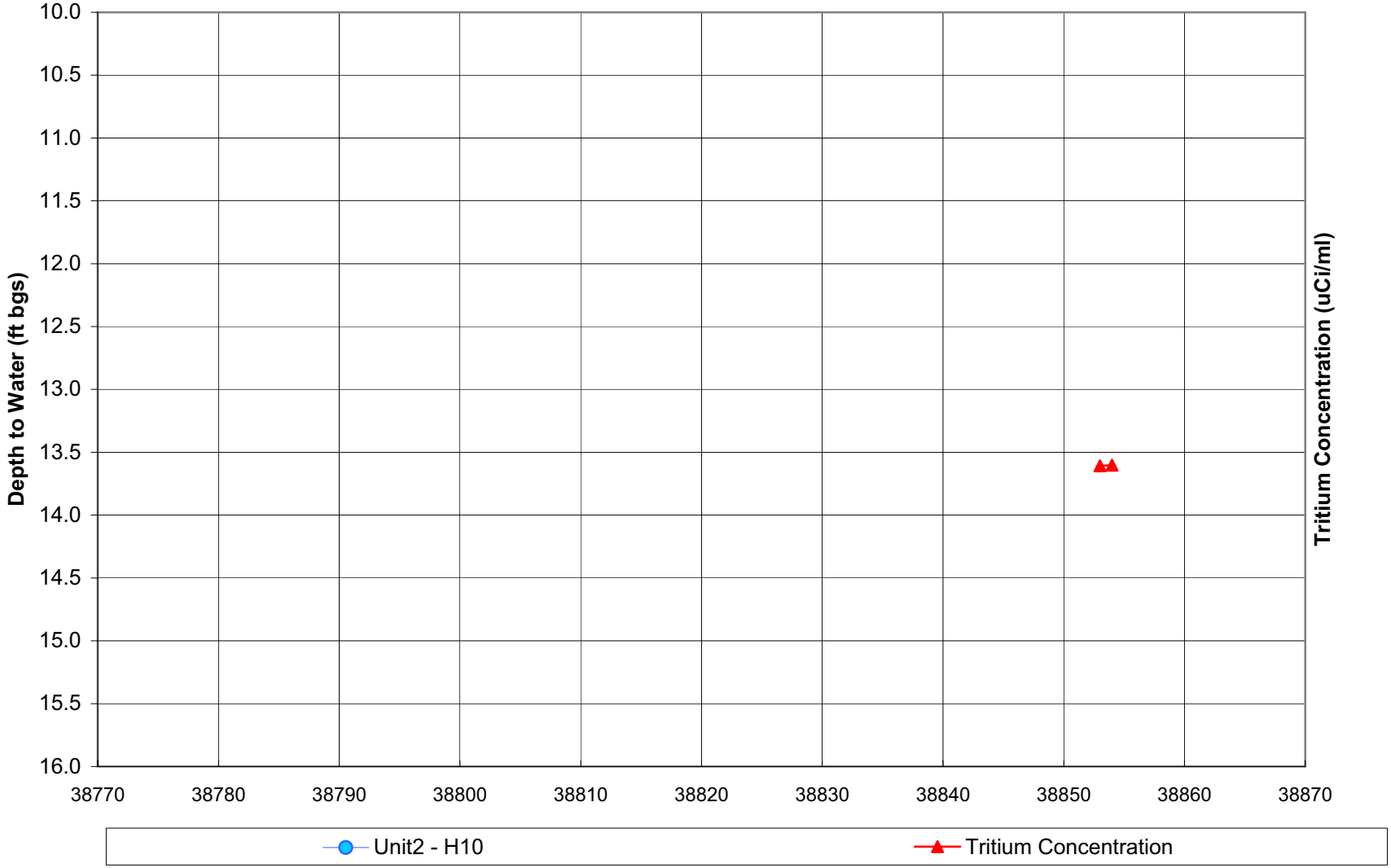


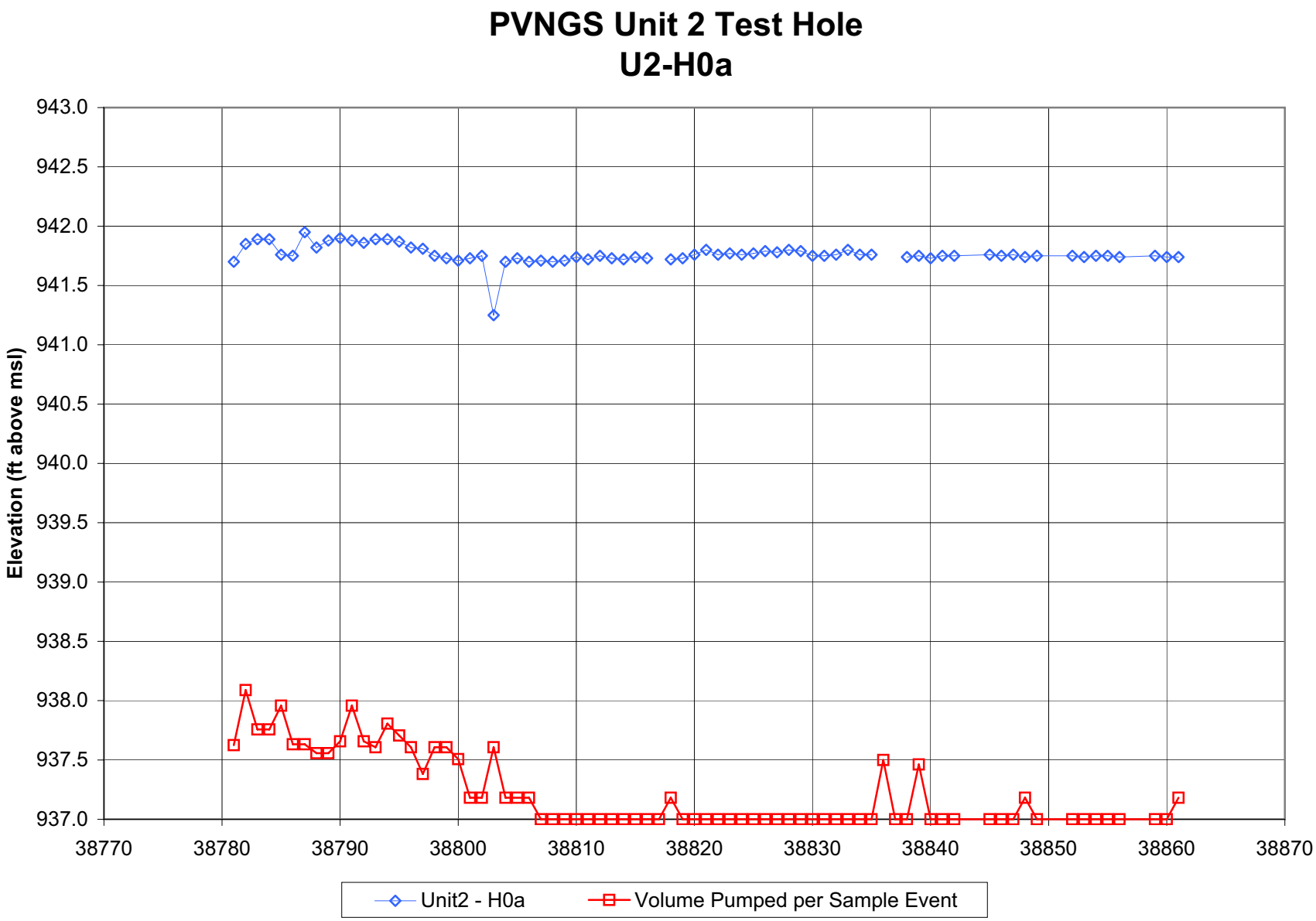

PVNGS Unit 2 Test Hole Data
U2-H0a
Elevation (ft above msl)
Tritium Concentration (uCi/ml)
943.0
942.5
942.0
941.5
941.0
940.5
940.0
939.5
939.0
938.5
938.0
937.5
937.0
0.001
0.0001
0.00001
0.000001
38775
38782
38789
38796
38803
38810
38817
38824
38831
38838
38845
38852
38859
38866
38873
3/15/06 - H3 <MDA
3/21/06 - H3 <MDA
3/30/06 - H3 <MDA
Unit2 - H0a
Tritium Concentration

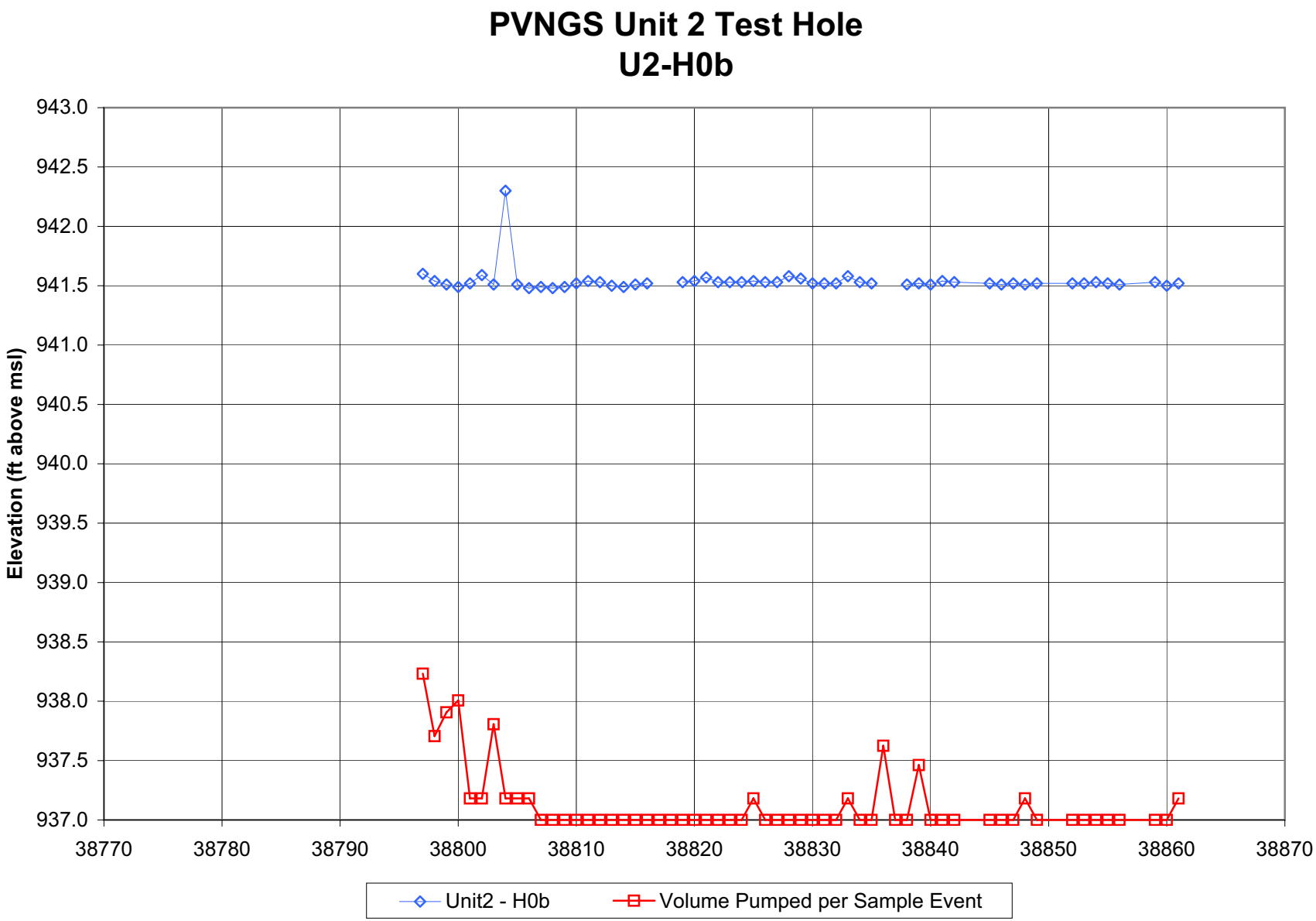
PVNGS Unit 2 Test Hole Data
U2-H0b



PVNGS Unit 2 Test Hole Data
U2-H10




PVNGS Unit 2 Test Hole
U2-H0a
Elevation (ft above msl)
943.0
942.5
942.0
941.5
941.0
940.5
940.0
939.5
939.0
938.5
938.0
937.5
937.0
38770
38780
38790
38800
38810
38820
38830
38840
38850
38860
38870
Unit2 - H0a
Volume Pumped per Sample Event


PVNGS Unit 2 Test Hole
U2-H0b
Elevation (ft above msl)
943.0
942.5
942.0
941.5
941.0
940.5
940.0
939.5
939.0
938.5
938.0
937.5
937.0
38770
38780
38790
38800
38810
38820
38830
38840
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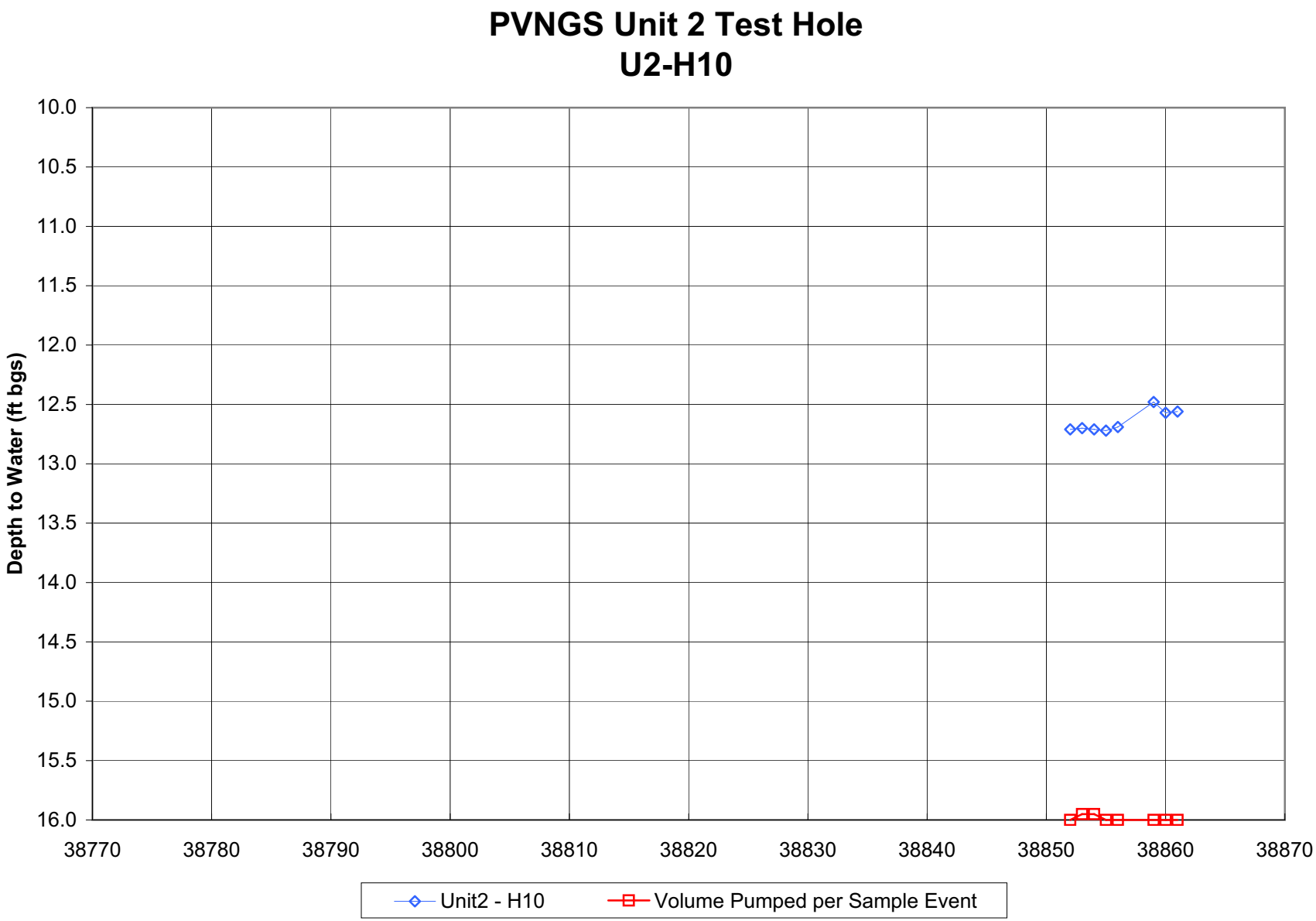
38870
Unit2 - H0b
Volume Pumped per Sample Event


PVNGS Unit 2 Test Hole
U2-H10
Depth to Water (ft bgs)
10.0
10.5
11.0
11.5
12.0
12.5
13.0
13.5
14.0
14.5
15.0
15.5
16.0
38770
38780
38790
38800
38810
38820
38830
38840
38850
38860
38870
Unit2 - H10
Volume Pumped per Sample Event

Sample Results

U2 H-0A Test Hole Samples (Hole depth = 13.26')

Source: 24May2006 PVNGS Chemistry Data Sheet

Date	Time	pH	Cond (uS/cm)	Si (ppm)	Isotopic (uci/ml)	Tritium (uci/ml)	Cl	TTA	Zn	Ca. Hrd	Alk	Phos	Mo	Boron	Depth Feet	SmpVol (L)	Vol Pumped (g)
3/5/2006	1200	9.95	1650	20	<MDA	5.39E-06	0	1.1	0.6	<50	200	<2	0.34		11.60'		2.5
3/6/2006	1230	10.25	1750		<MDA	2.36E-06			0.2					0.7	11.45' 11. 71'	4	3.3
3/7/2006	1130	10.26	1690		<MDA	3.42E-06			0.1					1.6	11.41' 11.50'	2	2.5
3/8/2006	1130	10.4	1967		<MDA	2.55E-06			0.1					3.12	11.41' 11.49'	2	2.5
3/9/2006	1152	10.23	1740		<MDA	1.26E-06			0.1					2.57	11.54' 11.61'	2	3.3
3/10/2006	1130	10.17	1667		<MDA	2.41E-06			0.1					1.55	11.55' 11.64'	2	2
3/11/2006	1045	10.18	1735		<MDA	2.63E-06									11.35' 11.44'	2	2
3/12/2006	1030	10.27	1683		<MDA	2.07E-06									11.48' 11.71'	2	1.7
3/13/2006	1200	9.69	1167		<MDA	2.95E-06									11.42' 11.52'	2	1.7
3/14/2006	1320	9.99	1395		<MDA	2.45E-06									11.40' 11.65'	2	2.1
3/15/2006	1015	9.77	1195		<MDA	<MDA									11.42' 11.74'	2	3.3
3/16/2006	820	9.63	1095		<MDA	2.39E-06									11.44' 11.78'	2	2.1
3/17/2006	1300	10.07	1365		<MDA	2.44E-06									11.41' 11.79'	2.75	1.7
3/18/2006	1448	10.02	1450		<MDA	2.01E-06									11.41' 11.46'	2.75	2.5
3/19/2006	830	10.18	1531		<MDA	1.61E-06			0					1.33	11.43' 11.78'	2.75	2.1
3/20/2006	840	9.96	1199		<MDA	1.71E-06									11.48' 11.86'	2.75	1.7
3/21/2006	1430	9.79	1060		<MDA	<MDA									11.49' 12.90'	2.75	0.8
3/22/2006	1430	10.03	1062		<MDA	1.98E-06									11.55' 12.97'	2.75	1.7
3/23/2006	1130	10.09	1059		<MDA	1.51E-06									11.57' 11.93'	2.75	1.7
3/24/2006	925	9.98	1514		<MDA	2.54E-06									11.59' 12.02'	2.75	1.3
3/25/2006	1231	9.94	1498		<MDA	3.75E-06									11.57' 12.03'	2.75	N/A
3/26/2006	1020	9.82	1460		<MDA	2.31E-06									11.55' 12.00'	2.75	N/A
3/27/2006	1533	9.95	1555		<MDA	2.18E-06									12.05'	2.75	1.7

Sample Results

U2 H-0A Test Hole Samples (Hole depth = 13.26')

Source: 24May2006 PVNGS Chemistry Data Sheet

Date	Time	pH	Cond (uS/cm)	Si (ppm)	Isotopic (uci/ml)	Tritium (uci/ml)	Cl	TTA	Zn	Ca. Hrd	Alk	Phos	Mo	Boron	Depth Feet	SmpVol (L)	Vol Pumped (g)
															12.65'		
3/28/2006	1316	10.05	1515		<MDA	2.04E-06									11.60' 11.00'	2.75	N/A
3/29/2006	1549	10.04	1602		<MDA	1.72E-06									11.57' 11.95'	2.75	N/A
3/30/2006	1356	9.99	1546		<MDA	<MDA									11.60' 11.91'	2.75	N/A
3/31/2006															11.59'		
4/1/2006															11.60'		
4/2/2006															11.59'		
4/3/2006															11.56'		
4/4/2006															11.58'		
4/5/2006															11.55'		
4/6/2006															11.57'		
4/7/2006															11.58'		
4/8/2006															11.56'		
4/9/2006															11.57'		
4/10/2006																	
4/11/2006	1716	9.72	1315		<MDA	2.01E-06									11.58' 11.93'	2.75	N/A
4/12/2006															11.57'		
4/13/2006															11.54'		
4/14/2006															11.50'		
4/15/2006															11.54'		
4/16/2006															11.53'		
4/17/2006															11.54'		
4/18/2006															11.53'		
4/19/2006															11.51'		
4/20/2006															11.52'		
4/21/2006															11.50'		
4/22/2006															11.51'		
4/23/2006															11.55'		
4/24/2006															11.55'		
4/25/2006															11.54'		
4/26/2006															11.50'		
4/27/2006															11.54'		
4/28/2006															11.54'		
4/29/2006																	2
4/30/2006																	
4/31/2006																	
5/1/2006															11.56'		
5/2/2006					<MDA	2.36E-06									11.55' 11.82'	7	

Sample Results

U2 H-0A Test Hole Samples (Hole depth = 13.26')
Source: 24May2006 PVNGS Chemistry Data Sheet

Date	Time	pH	Cond (uS/cm)	Si (ppm)	Isotopic (uci/ml)	Tritium (uci/ml)	Cl	TTA	Zn	Ca. Hrd	Alk	Phos	Mo	Boron	Depth Feet	SmpVol (L)	Vol Pumped (g)
5/3/2006															11.57'		
5/4/2006															11.55'		
5/5/2006															11.55'		
5/8/2006															11.54'		
5/9/2006															11.55'		
5/10/2006															11.54'		
5/11/2006	800	10	1565		<MDA	2.51E-06									11.56' 11.98'	2.75	
5/12/2006															11.55'		
5/15/2006															11.55'		
5/16/2006															11.56'		
5/17/2006															11.55'		
5/18/2006															11.55'		
5/19/2006															11.56'		
5/22/2006															11.55'		
5/23/2006															11.56'		
5/24/2006															11.56' 11.96'	2.75	

Sample Results

U2 H-0B Test Hole Samples (Hole depth =14.05')

Source: 24May2006 PVNGS Chemistry Data Sheet

Date	Time	pH	Cond (uS/cm)	Isotopic (uci/ml)	Tritium (uci/ml)	Zn	Boron	Depth Feet	SmpVol (L)	Vol Pumped (g)
3/21/2006	1435	8.09	770	<MDA	<MDA			12.00' 12.23'	2.75	4.2
3/22/2006	1440	8.07	734	<MDA	<MDA	0	0.458	12.06' 12.35'	2.75	2.1
3/23/2006	1157	8.03	763	<MDA	<MDA	0.04	0.51	12.09' 12.37'	2.75	2.9
3/24/2006	930	8.19	785	<MDA	<MDA			12.11' 12.39'	2.75	3.3
3/25/2006	1243	8.05	722	<MDA	1.91 E-06			12.08' 12.2	2.75	N/A
3/26/2006	1021	7.92	730	<MDA	1.14 E-06			12.01' 12.36'	2.75	N/A
3/27/2006	1536	8.07	792	<MDA	<MDA			12.09' 12.35'	2.75	2.5
3/28/2006	1332	8.07	781	<MDA	<MDA			11.30' 12	2.75	N/A
3/29/2006	1617	7.97	807	<MDA	1.41 E-06			12.09' 12.29'	2.75	N/A
3/30/2006	1412	8.05	802	<MDA	<MDA			12.12' 12.28'	2.75	N/A
3/31/2006								12.11'		
4/1/2006								12.12'		
4/2/2006								12.11'		
4/3/2006								12.08'		
4/4/2006								12.06'		
4/5/2006								12.07'		
4/6/2006								12.10'		
4/7/2006								12.11'		
4/8/2006								12.09'		
4/9/2006								12.08'		
4/10/2006										
4/11/2006										
4/12/2006								12.07'		
4/13/2006								12.06'		
4/14/2006								12.03'		
4/15/2006								12.07'		
4/16/2006								12.06'		
4/17/2006								12.06'		
4/18/2006	1300	8.22	781	<MDA	<MDA			12.06' 12.28'	2.75	N/A
4/19/2006								12.04'		
4/20/2006								12.05'		
4/21/2006								12.02'		
4/22/2006								12.04'		
4/23/2006								12.08'		
4/24/2006								12.08'		
4/25/2006								12.08'		
4/26/2006	1751	8.17	856	<MDA	<MDA			12.02' 12.26'	2.75	N/A
4/27/2006								12.07'		

Sample Results

U2 H-0B Test Hole Samples (Hole depth =14.05')

Source: 24May2006 PVNGS Chemistry Data Sheet

Date	Time	pH	Cond (uS/cm)	Isotopic (uci/ml)	Tritium (uci/ml)	Zn	Boron	Depth Feet	SmpVol (L)	Vol Pumped (g)
4/28/2006								12.08'		
4/29/2006										2.5
4/30/2006										
5/1/2006								12.09'		
5/2/2006				<MDA	1.73 E-06			12.08' 12.26'	7	
5/3/2006								12.09'		
5/4/2006								12.06'		
5/5/2006								12.07'		
5/8/2006								12.08'		
5/9/2006								12.09'		
5/10/2006								12.08'		
5/11/2006	821	8.28	827	<MDA	1.44 E-06			12.09' 12.35'	2.75	
5/12/2006								12.08'		
5/15/2006								12.08'		
5/16/2006								12.08'		
5/17/2006								12.07'		
5/18/2006								12.08'		
5/19/2006								12.09'		
5/22/2006								12.07'		
5/23/2006								12.10'		
5/24/2006								12.08' 12.36'	2.75	

Sample Results

U2 H-10 Test Hole Samples (Hole depth =13.38')

Source: 24May2006 PVNGS Chemistry Data Sheet

Date	Time	pH	Cond (uS/cm)	Isotopic (uci/ml)	Tritium (uci/ml)	Depth Feet	SmpVol (L)	Vol Pumped (g)
5/15/2006						12.71'		
5/16/2006	1130	8.4	4596		1.57 E-05	12.70'	0.75	
5/17/2006	1031	8.43	4555		1.58 E-05	12.71'	0.75	
5/18/2006						12.72'		
5/19/2006						12.69'		
5/22/2006						12.48'		
5/23/2006						12.57'		
5/24/2006						12.56'		

Sample Results

U2 H-12A Test Hole Samples (Hole depth =7.0')

Source: 24May2006 PVNGS Chemistry Data Sheet

Date	Time	pH	Cond (uS/cm)	Isotopic (uci/ml)	Tritium (uci/ml)	Depth Feet	SmpVol (L)	Vol Pumped (g)
5/16/2001	1111	10.36	3492		2.29 E-06	Not Measurable	0.75	
5/24/2006						DRY		

Sample Results

U2 H-12B Test Hole Samples (Hole depth =3.2')

Source: 24May2006 PVNGS Chemistry Data Sheet

Note 1 – Getting casing installed to allow depth measurement. Level increasing

Date	Time	pH	Cond (uS/cm)	Isotopic (uci/ml)	Tritium (uci/ml)	Depth Feet	SmpVol (L)	Vol Pumped (g)
5/16/2001	1101	8.85	1715		5.36 E-06	Not Measurable	0.75	
5/24/2006						Note 1		

Sample Results

U2 H-13 Test Hole Samples (Hole depth =3.6')

Source: 24May2006 PVNGS Chemistry Data Sheet

Date	Time	pH	Cond (uS/cm)	Isotopic (uci/ml)	Tritium (uci/ml)	Depth Feet	SmpVol (L)	Vol Pumped (g)
5/16/2001	1116	8.81	2138		3.53 E-06	Not Measurable	0.75	
5/24/2006						DRY		

Unit	Test Hole	Ground Elevation	TOC Elevation	Diff in Ft.	Diff in In.	Northing	Easting	Northing	Easting	
1	H-O-A	**956.40**	957.15	0.75	9.00	876.67	2769.25	**870390.67**	**211342.77**	
1	H-O-B	956.40	956.94	0.54	6.48	866.33	2772.25	**870384.68**	**211351.72**	
2	H-O-A	953.37	953.30	-0.07	-0.84	881.67	2771.17	**869461.54**	**210660.88**	
2	H-O-B	953.37	953.60	0.23	2.76	866.75	2771.17	**869454.07**	**210673.80**	
2	H-1					936.67	2799.5	**869513.57**	**210627.42**	
2	H-10					891.17	2797.33	**869488.94**	**210665.73**	
2	H-12A					927.17	2779.5	**869491.49**	**210625.64**	
2	H-12B					927.17	2778.0	**869490.20**	**210624.89**	
2	H-13					935.17	2777.5	**869493.77**	**210617.71**	
2	H-17					1047.5	2794.0	**869564.22**	**210528.68**	
3	H-O-A	950.32	**950.74**	0.42	5.04	881.00	2771.50	**868351.27**	**210341.99**	
3	H-O-B	950.32	951.07	0.75	9.00	866.16	2772.25	**868349.42**	**210356.74**	
3	H-1	951.06	951.42	0.36	4.32	934.04	2804.00	**868392.49**	**210295.40**	
3	H-2	950.26	950.98	0.72	8.64	850.58	2770.50	**868344.99**	**210371.78**	
3	H-3	950.42	951.26	0.84	10.08	881.34	2758.00	**868338.03**	**210339.32**	
3	H-4	950.41	951.49	1.08	12.96	881.59	2726.60	**868307.15**	**210333.62**	
3	H-5B	950.35	951.05	0.70	8.40	887.03	2763.80	**868344.73**	**210334.72**	
3	H-5A	950.39	950.56	0.17	2.04	889.17	2766.17	**868347.43**	**210333.02**	
3	H-6	950.49	No Casing							
3	H-10	950.68	951.25	0.57	6.84	890.52	2801.00	**868381.97**	**210337.74**	
3	H-11	950.40	951.15	0.75	9.00	887.17	2789.67	**868370.24**	**210339.07**	
3	H-12	950.86	952.27	1.41	16.92	928.03	2778.25	**868366.08**	**210296.85**	
3	H-14D	951.14	951.64	0.50	6.00	1006.80	2780.30	**868381.77**	**210219.63**	
3	H-15	951.01	951.51	0.50	6.00	945.77	2738.50	**868343.38**	**210180.70**	
3	H-16					993.00	2770.50	**868369.73**	**210231.52**	
3	H-17A					1043.00	2784.00	**868391.71**	**210184.62**	
3	H-17B					1047.75	2784.00	**868392.53**	**210179.95**	

TOC = Top of Casing

State Plane Coordinates

Old Surveys

Unit	Test Hole	Ground Elevation	TOC Elevation	Diff in Ft.	Diff in In.	Northing	Easting	Northing	Easting
1	H-O-A	**956.40**	957.15	0.75	9.00	876.67	2769.25	**870390.67**	**211342.77**
1	H-O-B	956.40	956.94	0.54	6.48	866.33	2772.25	**870384.68**	**211351.72**
2	H-O-A	953.37	953.30	-0.07	-0.84	881.67	2771.17	**869461.54**	**210660.88**
2	H-O-B	953.37	953.60	0.23	2.76	866.75	2771.17	**869454.07**	**210673.80**
3	H-O-A	950.32	**950.60**	0.28	3.36	881.00	2771.50	**868351.27**	**210341.99**
3	H-O-B	950.32	951.07	0.75	9.00	866.16	2772.25	**868349.42**	**210356.74**
3	H-1	951.06	951.42	0.36	4.32	934.04	2804.00	**868392.49**	**210295.40**
3	H-2	950.26	950.98	0.72	8.64	850.58	2770.50	**868344.99**	**210371.78**
3	H-3	950.42	951.26	0.84	10.08	881.34	2758.00	**868338.03**	**210339.32**
3	H-4	950.41	951.49	1.08	12.96	881.59	2726.60	**868307.15**	**210333.62**
3	H-5B	950.35	951.05	0.70	8.40	887.03	2763.80	**868344.73**	**210334.72**
3	H-5A	950.39	950.56	0.17	2.04	889.17	2766.17	**868347.43**	**210333.02**
3	H-6	950.49	No Casing						
3	H-10	950.68	951.25	0.57	6.84	890.52	2801.00	**868381.97**	**210337.74**
3	H-11	950.40	951.15	0.75	9.00	887.17	2789.67	**868370.24**	**210339.07**
3	H-12	950.86	952.27	1.41	16.92	899.81	2778.25	**868361.18**	**210324.64**

TOC = Top of Casing

State Plane Coordinates

28March2006 Data

Unit	Test Hole	Ground Elevation	TOC Elevation	Diff in Ft.	Diff in In.	Northing	Easting
1	H-O-A	**956.40**	957.15	0.75	9.00	876.67	2769.25
1	H-O-B	956.40	956.94	0.54	6.48	866.33	2772.25
2	H-O-A	953.37	953.30	-0.07	-0.84	881.67	2771.17
2	H-O-B	953.37	953.60	0.23	2.76	866.75	2771.17
3	H-O-A	950.32	**950.60**	0.28	3.36	881.00	2771.50
3	H-O-B	950.32	951.07	0.75	9.00	866.16	2772.25
3	H-1	951.06	951.42	0.36	4.32	934.04	2804.00
3	H-2	950.26	950.98	0.72	8.64	850.58	2770.50
3	H-3	950.42	951.26	0.84	10.08	881.34	2758.00
3	H-4	950.41	951.49	1.08	12.96	881.59	2726.60
3	H-5B	950.35	951.05	0.70	8.40	887.03	2763.80
3	H-5A	950.39	950.56	0.17	2.04	889.17	2766.17
3	H-6	950.49	No Casing				
3	H-10	950.68	951.25	0.57	6.84	890.52	2801.00
3	H-11	950.40	951.15	0.75	9.00	887.17	2789.67
3	H-12	950.86	952.27	1.41	16.92	899.81	2778.25

TOC = Top of Casing

Palo Verde Nuclear Generating Station
Unit 3 Test Hole Water Level and Tritium Sampling History

DATE	Unit 3 Test Well - H0a [Depth=13.25ft]					Unit 3 Test Well - H0b [Depth=14.20ft]					Unit 3 Test Well - H1 [Depth=9.19ft]					Unit 3 Test Well - H5b [Depth=15.57]				
	Tritium	Static Water Level		Volume Pumped (gal)		Tritium	Static Water Level		Volume Pumped (gal)		Tritium	Static Water Level		Volume Pumped (gal)		Tritium	Static Water Level		Volume Pumped (gal)	
		DTW	WL - Elev		Cumulative		DTW	WL - Elev	Daily	Cumulative		DTW	WL - Elev	Daily	Cumulative		DTW	WL - Elev	Daily	Cumulative
03/03/06	6.84E-05	12.00	938.60		0.00															
03/04/06	6.68E-05	12.25	938.35		0.40															
03/05/06	7.54E-05	12.20	938.40		0.79															
03/06/06	8.05E-05	12.15	938.45		6.32															
03/07/06	7.53E-05	12.15	938.45		11.85															
03/08/06	8.43E-05	12.30	938.30		14.76											2.28E-06	12.91	938.14		0.40
03/09/06	5.30E-05	12.34	938.26		18.59											2.09E-06	12.74	938.31		1.59
03/10/06	8.76E-05	12.31	938.29		22.42											3.10E-06	12.78	938.27		2.11
03/11/06	9.45E-05	12.26	938.34		27.15											2.84E-06	12.78	938.27		9.74
03/12/06	1.08E-04	12.29	938.31		31.88						4.71E-06	8.07	943.35	0.26	0.26	2.30E-06	12.90	938.15		15.27
03/13/06	1.10E-04	12.32	938.28		34.90						5.01E-06	8.90	942.52	0.26	0.53	1.65E-06	12.90	938.15		21.60
03/14/06	9.07E-05	12.30	938.30		40.30							9.30	942.12	0.00	0.53	2.38E-06	12.89	938.16		26.19
03/15/06	9.64E-05	12.25	938.35		44.90							9.20	942.22	0.00	0.53	3.26E-06	12.88	938.17		32.39
03/16/06	8.45E-05	12.67	937.93		49.38											2.34E-06	12.82	938.23		39.37
03/17/06	7.55E-05	12.31	938.29		54.30											2.42E-06	12.93	938.12		48.50
03/18/06	7.77E-05	12.31	938.29		57.13											2.64E-06	12.95	938.10		54.23
03/19/06	7.52E-05	12.33	938.27		61.16											2.30E-06	12.93	938.12		60.35
03/20/06	7.91E-05	12.40	938.20		65.18											2.34E-06	12.93	938.12		66.08
03/21/06	6.91E-05	12.38	938.22		68.01											1.62E-06	12.97	938.08		71.80
03/22/06	6.30E-05	12.97	937.63		70.84	2.50E-06	12.69	938.38		4.03						1.91E-06	12.98	938.07		77.53
03/23/06	5.04E-05	12.48	938.12		73.33	4.78E-06	13.15	937.92		6.92						1.54E-06	13.00	938.05		83.72
03/24/06	6.14E-05	12.46	938.14		76.16	6.45E-06	13.19	937.88		9.75						3.79E-06	13.00	938.05		89.85
03/25/06	5.34E-05	12.46	938.14		76.88	7.27E-06	13.23	937.84		10.47						2.42E-06	13.03	938.02		90.58
03/27/06	5.83E-05	12.32	938.28		80.91	5.03E-06	12.73	938.34		14.50						2.75E-06	12.85	938.20		97.10
03/28/06	7.12E-05	12.40	938.20		81.64	5.92E-06	13.19	937.88		15.22						2.62E-06	12.95	938.10		97.83
03/29/06	6.53E-05	12.36	938.24		82.36	5.22E-06	13.00	938.07		15.95						2.62E-06	12.92	938.13		98.56
03/30/06	6.31E-05	12.34	938.26		83.09	3.60E-06	12.86	938.21		16.68						1.72E-06	12.86	938.19		99.28
03/31/06		12.32	938.28		83.09	4.46E-06	12.77	938.30		17.40							12.77	938.28		99.28
04/01/06		12.29	938.31		83.09		12.71	938.36		17.40							12.80	938.25		99.28
04/02/06		12.24	938.36		83.09	1.85E-06	12.57	938.50		18.13						1.40E-06	12.71	938.34		100.01
04/03/06	6.80E-05	12.19	938.41		83.81		12.58	938.49		18.13							12.71	938.34		100.01
04/04/06		12.17	938.43		83.81	3.43E-06	12.47	938.60		18.86						2.47E-06	12.61	938.44		100.74
04/05/06		12.14	938.46		83.81		12.47	938.60		18.86							12.62	938.43		100.74
04/06/06		12.13	938.47		83.81		12.45	938.62		18.86		DRY	942.20	0.00	0.53	1.94E-06	12.54	938.51		101.47
04/07/06		12.12	938.48		83.81		12.42	938.65		18.86						<MDA	12.59	938.46		102.20
04/08/06		12.11	938.49		83.81		12.41	938.66		18.86							12.59	938.46		102.20
04/09/06		12.08	938.52		83.81		12.37	938.70		18.86							12.58	938.47		102.20
04/10/06	6.86E-05	12.07	938.53		84.54	2.11E-06	12.35	938.72		19.58						3.39E-06	12.55	938.50		102.93
04/11/06		12.07	938.53		84.54		12.40	938.67		19.58							12.55	938.50		102.93
04/12/06	7.18E-05	12.07	938.53		85.27	4.79E-06	12.36	938.71		20.31						3.63E-06	12.55	938.50		103.65
04/13/06		12.07	938.53		85.27		12.40	938.67		20.31		DRY	942.20	0.00	0.53		12.56	938.49		103.65
04/14/06		12.05	938.55		85.27	4.31E-06	12.30	938.77		21.04							12.52	938.53		103.65
04/15/06		12.06	938.54		85.27		12.36	938.71		21.04							12.53	938.52		103.65
04/16/06		12.04	938.56		85.27	3.16E-06	12.31	938.76		21.76							12.52	938.53		103.65
04/17/06		12.04	938.56		85.27		12.35	938.72		21.76							12.51	938.54		103.65
04/18/06		12.03	938.57		85.27		12.33	938.74		21.76							12.51	938.54		103.65
04/19/06		12.03	938.57		85.27		12.31	938.76		21.76							12.49	938.56		103.65
04/20/06		12.02	938.58		85.27		12.32	938.75		21.76		DRY	942.20	0.00	0.53		12.48	938.57		103.65
04/21/06		12.02	938.58		85.27		12.30	938.77		21.76							12.50	938.55		103.65

Palo Verde Nuclear Generating Station
Unit 3 Test Hole Water Level and Tritium Sampling History

DATE	Unit 3 Test Well - H0a [Depth=13.25ft]					Unit 3 Test Well - H0b [Depth=14.20ft]					Unit 3 Test Well - H1 [Depth=9.19ft]					Unit 3 Test Well - H5b [Depth=15.57]				
	Tritium	Static Water Level		Volume Pumped (gal)		Tritium	Static Water Level		Volume Pumped (gal)		Tritium	Static Water Level		Volume Pumped (gal)		Tritium	Static Water Level		Volume Pumped (gal)	
		DTW	WL - Elev		Cumulative		DTW	WL - Elev	Daily	Cumulative		DTW	WL - Elev	Daily	Cumulative		DTW	WL - Elev	Daily	Cumulative
04/22/06		12.01	938.59		85.27		12.29	938.78		21.76							12.48	938.57		103.65
04/23/06		12.02	938.58		85.27		12.29	938.78		21.76							12.49	938.56		103.65
04/24/06		12.01	938.59		85.27		12.30	938.77		21.76							12.49	938.56		103.65
04/25/06		11.99	938.61		103.47		12.28	938.79		26.76							12.47	938.58		103.65
04/26/06		12.29	938.31		103.47		12.79	938.28		28.79		DRY	942.20	0.00	0.53		12.56	938.49		103.65
04/27/06		12.24	938.36		103.47		12.72	938.35		28.79							12.58	938.47		103.65
04/28/06		12.25	938.35		103.47	3.01E-06	12.47	938.60		29.52										103.65
04/29/06					115.47					29.52										107.65
04/30/06					115.47					29.52										107.65
05/01/06		12.29	938.31		115.47		12.37	938.70		29.52							12.66	938.39		107.65
05/02/06		12.25	938.35		116.98		12.36	938.71		31.02							12.62	938.43		107.65
05/03/06		12.23	938.37		116.98		12.36	938.71		31.02		DRY	942.20	0.00	0.53		12.60	938.45		107.65
05/04/06		12.21	938.39		116.98		12.36	938.71		35.62							12.58	938.47		107.65
05/05/06		12.25	938.35		116.98		12.80	938.27		35.62							12.59	938.46		107.65
05/08/06		12.25	938.35		116.98	3.47E-06	12.41	938.66		35.62							12.61	938.44		107.65
05/09/06		12.23	938.51		116.98		12.49	938.58		35.62							12.59	938.46		107.65
05/10/06		12.24	938.50		116.98		12.42	938.65		35.62		DRY	942.20	0.00	0.53		12.59	938.46		107.65
05/11/06		12.22	938.52		116.98		12.38	938.69		35.62							12.57	938.48		107.65
05/12/06	5.30E-05	12.21	938.53		117.70	2.68E-06	12.36	938.71		36.35							12.56	938.49		107.65
05/15/06		12.18	938.56		117.70		12.34	938.73		36.35						3.12E-06	12.55	938.50		108.38
05/16/06		12.19	938.55		117.70		12.34	938.73		36.35							12.56	938.49		108.38
05/17/06		12.18	938.56		117.70		12.32	938.75		36.35		DRY	942.20	0.00	0.53		12.55	938.50		108.38
05/18/06		12.18	938.56		117.70		12.31	938.76		36.35							12.54	938.51		108.38
05/19/06		12.17	938.57		117.70		12.31	938.76		36.35							12.53	938.52		108.38
05/22/06		12.13	938.61		117.70		12.24	938.83		36.35							12.50	938.55		108.38
05/23/06		12.14	938.60		117.70		12.29	938.78		36.35							12.50	938.55		108.38
05/24/06		12.14	938.60		117.70		12.27	938.80		36.35		DRY	942.20	0.00	0.53		12.52	938.53		108.38

DRY= approx 9.2 to 9.3 feet, Elevation 942.2 feet

Palo Verde Nuclear Generating Station
Unit 3 Test Hole Water Level and Tritium Sampling History

DATE	Unit 3 Test Well - H10 [Depth=14.0ft]					Unit 3 Test Well - H11 [Depth=15.10ft]					Unit 3 Test Well - H12 [Depth=14.85ft]					Unit 3 Test Well - H19 [Depth=9ft]				
	Tritium	Static Water Level		Volume Pumped (gal)		Tritium	Static Water Level		Volume Pumped (gal)		Tritium	Static Water Level		Volume Pumped (gal)		Tritium	Static Water Level		Volume Pumped (gal)	
		DTW	WL - Elev	Daily	Cumulative		DTW	WL - Elev	Daily	Cumulative		DTW	WL - Elev	Daily	Cumulative		DTW	WL - Elev	Daily	Cumulative
03/03/06																				
03/04/06																				
03/05/06																				
03/06/06																				
03/07/06																				
03/08/06																				
03/09/06																				
03/10/06																				
03/11/06																				
03/12/06																				
03/13/06																				
03/14/06																				
03/15/06																				
03/16/06																				
03/17/06																				
03/18/06																				
03/19/06																				
03/20/06																				
03/21/06																				
03/22/06																				
03/23/06																				
03/24/06																				
03/25/06						1.11E-04	12.56	938.59		0.73										
03/27/06						3.87E-05	12.34	938.81		6.05	2.50E-06	11.76	940.51		4.03					
03/28/06						7.73E-05	12.53	938.62		6.78	1.43E-06	12.56	939.71		4.75					
03/29/06						5.29E-05	12.53	938.62		7.51	7.93E-06	12.04	940.23		5.48					
03/30/06	2.61E-06	12.91	938.34		0.73	4.93E-05	12.45	938.70		8.23	1.61E-06	12.41	939.86		6.21					
03/31/06	2.36E-06	12.96	938.29		1.45					8.23	1.75E-06	10.98	941.29		6.93					
04/01/06					1.45		12.38	938.77		8.23		10.73	941.54		6.93					
04/02/06	1.27E-06	12.67	938.58		2.18		12.35	938.80		8.23	<MDA	10.50	941.77		7.66					
04/03/06	2.26E-06	12.77	938.48		2.91	4.06E-05	12.25	938.90		8.96	<MDA	10.45	941.82		8.39					
04/04/06	2.42E-06	12.87	938.38		3.63	4.22E-05	12.20	938.95		9.69	1.92E-06	10.41	941.86		20.39					
04/05/06	4.20E-06	13.01	938.24		4.36	4.15 E-05	12.12	939.03		10.41		13.52	938.75		20.39					
04/06/06	2.27E-06	13.25	938.00		4.76	3.28 E-05	12.18	938.97		11.14	1.32E-06	12.76	939.51		21.11					
04/07/06		DRY	937.25		4.76		12.17	938.98		11.14	2.02E-06	12.20	940.07		21.84					
04/08/06		DRY	937.25		4.76		12.14	939.01		11.14	1.46E-06	11.76	940.51		22.56					
04/09/06		DRY	937.25		4.76		12.10	939.05		11.14	1.43E-06	11.33	940.94		23.29	1.07E-06	8.50			0.07
04/10/06		12.98	938.27		4.76	3.32E-05	12.07	939.08		11.86	<MDA	11.12	941.15		24.02	2.46E-05	8.52			0.79
04/11/06	3.96E-06	12.92	938.33		5.49		12.14	939.01		12.59	2.18E-06	11.04	941.23		24.74	1.39E-06	>8.5			1.52
04/12/06	3.63E-06	13.20	938.05		6.15	3.33E-05	12.12	939.03		13.32	2.24E-06	10.99	941.28		25.47		>8.5			1.52
04/13/06		DRY	937.25		6.15		12.12	939.03		13.32		10.96	941.31		25.47	2.95E-06	>8.5			1.85
04/14/06		DRY	937.25		6.15	3.89E-05	12.05	939.10		14.04	4.31E-06	10.83	941.44		26.20		N/A			
04/15/06		DRY	937.25		6.15		12.09	939.06		14.04		10.80	941.47		26.20		N/A			
04/16/06		DRY	937.25		6.15		12.07	939.08		14.04	Note2	10.71	941.56		26.92	3.44E-06	N/A			
04/17/06		DRY	937.25		6.15		12.06	939.09		14.04	<MDA	10.71	941.56		27.65	6.08E-06	N/A			
04/18/06	3.55E-06	13.13	938.12		6.87		12.05	939.10		14.04	1.11 E-06	10.72	941.55		28.38					
04/19/06		DRY	937.25		6.87		12.05	939.10		14.04		10.73	941.54		28.38					
04/20/06		DRY	937.25		6.87		12.04	939.11		14.04	1.93 E-06	10.66	941.61		29.10					
04/21/06		13.40	937.85		6.87		12.04	939.11		14.04		10.68	941.59		29.10					

Palo Verde Nuclear Generating Station
Unit 3 Test Hole Water Level and Tritium Sampling History

DATE	Unit 3 Test Well - H10 [Depth=14.0ft]					Unit 3 Test Well - H11 [Depth=15.10ft]					Unit 3 Test Well - H12 [Depth=14.85ft]					Unit 3 Test Well - H19 [Depth=9ft]				
	Tritium	Static Water Level		Volume Pumped (gal)		Tritium	Static Water Level		Volume Pumped (gal)		Tritium	Static Water Level		Volume Pumped (gal)		Tritium	Static Water Level		Volume Pumped (gal)	
		DTW	WL - Elev	Daily	Cumulative		DTW	WL - Elev	Daily	Cumulative		DTW	WL - Elev	Daily	Cumulative		DTW	WL - Elev	Daily	Cumulative
04/22/06		13.31	937.94		6.87		12.00	939.15		14.04	3.27E-06	10.62	941.65		29.83					
04/23/06		13.27	937.98		6.87		12.02	939.13		14.04		10.66	941.61		29.83					
04/24/06		13.22	938.03		6.87		12.03	939.12		14.04		10.63	941.64		29.83					
04/25/06		13.18	938.07		6.87		12.01	939.14		18.54		10.61	941.66		38.33					
04/26/06	2.89E-06	13.11	938.14		7.60		12.37	938.78		20.05		14.29	937.98		39.27					
04/27/06		DRY	937.25		7.60		12.25	938.90		20.05		14.44	937.83		39.27					
04/28/06		DRY	937.25		7.60		12.21	938.94		20.05	2.99E-06	14.08	938.19		39.99					
04/29/06					7.60					20.05					39.99					
04/30/06					7.60					20.05					39.99					
05/01/06		13.43	937.82		7.60		12.14	939.01		20.05		13.42	938.85		39.99					
05/02/06		13.39	937.86		7.60		12.11	939.04		20.05		13.00	939.27		39.99					
05/03/06		13.35	937.96		7.60		12.08	939.07		20.05		12.69	939.58		39.99					
05/04/06		13.29	938.02		7.60		12.07	939.08		26.75		12.39	939.88		43.29					
05/05/06		13.23	938.07		7.60		12.39	938.76		26.75		14.49	937.78		43.29					
05/08/06		13.18	938.08		7.60	3.59E-05	12.12	939.03		26.75	6.33E-06	13.58	938.69		43.29					
05/09/06		13.17	938.11		7.60		12.14	939.01		26.75		14.36	937.91		43.29					
05/10/06		13.14	938.14		7.60		12.08	939.07		26.75		14.07	938.20		43.29					
05/11/06		13.11	938.16		7.60		12.03	939.12		26.75		13.75	938.52		43.29					
05/12/06		13.09	938.21		7.60		12.01	939.14		26.75		13.48	938.79		43.29					
05/15/06		13.04	938.23		7.60	2.73E-05	11.96	939.19		27.48	1.56E-06	12.69	939.58		44.02					
05/16/06		13.02	938.24		7.60		11.99	939.16		27.48		13.00	939.27		44.02					
05/17/06		13.01	938.26		7.60		11.93	939.22		27.48		12.77	939.50		44.02					
05/18/06		12.99	938.28		7.60		11.89	939.26		27.48		12.53	939.74		44.02					
05/19/06		12.97	938.33		7.60		11.85	939.30		27.48		12.32	939.95		44.02					
05/22/06		12.92	938.35		7.60		11.73	939.42		27.48		11.73	940.54		44.02					
05/23/06	2.24E-06	12.90	937.99		8.33	1.80E-05	11.79	939.36		28.21	1.13E-06	11.62	940.65		44.75					
05/24/06		13.26	0.00		8.33		11.79	939.36		28.21		12.02	940.25		44.75					

Note 1 – **10Apr06** Tritium analysis suspect -backup analysis of same aliquot showed 5.44 E-5 -- suspect chemical interference.

DRY=approx. 14 feet or Elevation 937.25 feet

Note 1 -- H12 pumped dry Tuesday afternoon, **04/04/06** -DTW=14.8 ft, Elev=937.47 ft

Note 2 – **13Apr2006**: Hole removed by excavation – water samples from trench will continue to be called H-19 in this area

Note 2-- 04/16/06 tritium analysis suspect (H3=1.41E-05). Sample taken 4/17/06 showed <MDA

Note 3 – **15Apr2006:** Sample taken from Plant SW water puddle in trench

Note 4 – **15Apr2006:** Sample taken from Plant NE water puddle in trench at base of where H-19 hole was. Appears to be localized elevated pH and conductivity

Note 5 – Area backfilled on **4/18/2006**

Note 6 – New H-19 installed – Depth of hole is 8.5'. Will monitor and record levels if water is present.

Palo Verde Nuclear Generating Station
Unit 3 Test Hole Water Level and Pumping History

DATE	Unit 3 Test Well - H0a [Depth=13.25ft]					Unit 3 Test Well - H0b [Depth=14.20ft]					Unit 3 Test Well - H1 [Depth=9.19ft]					Unit 3 Test Well - H5b [Depth=15.57]					Unit 3 Test Well - H10 [Depth=14.0ft]				
	MP	Static Water Level		Volume Pumped (gal)		MP	Static Water Level		Volume Pumped (gal)		MP	Static Water Level		Volume Pumped (gal)		MP	Static Water Level		Volume Pumped (gal)		MP	Static Water Level		Volume Pumped (gal)	
		DTW	WL - Elev	Daily	Cumulative		DTW	WL - Elev	Daily	Cumulative		DTW	WL - Elev	Daily	Cumulative		DTW	WL - Elev	Daily	Cumulative		DTW	WL - Elev	Daily	Cumulative
03/03/06	950.60	12	938.60																						
03/04/06	950.60	12.25	938.35	0.40	0.4																				
03/05/06	950.60	12.2	938.40	0.40	0.8																				
03/06/06	950.60	12.15	938.45	5.53	6.3																				
03/07/06	950.60	12.15	938.45	5.53	12																				
03/08/06	950.60	12.3	938.30	2.91	15											951.05	12.91	938.14	0.40	0.4					
03/09/06	950.60	12.34	938.26	3.83	19											951.05	12.74	938.31	1.19	1.6					
03/10/06	950.60	12.31	938.29	3.83	22											951.05	12.78	938.27	0.53	2.1					
03/11/06	950.60	12.26	938.34	4.73	27											951.05	12.78	938.27	7.63	9.7					
03/12/06	950.60	12.29	938.31	4.73	32						951.42	8.07	943.35	0.26	0.3	951.05	12.90	938.15	5.53	15					
03/13/06	950.60	12.32	938.28	3.03	35						951.42	8.90	942.52	0.26	0.5	951.05	12.90	938.15	6.33	22					
03/14/06	950.60	12.30	938.30	5.40	40						951.42	9.30	942.12	0.00	0.5	951.05	12.89	938.16	4.60	26					
03/15/06	950.60	12.25	938.35	4.60	45						951.42	9.20	942.22	0.00	0.5	951.05	12.88	938.17	6.20	32					
03/16/06	950.60	12.67	937.93	4.48	49											951.05	12.82	938.23	6.98	39					
03/17/06	950.60	12.31	938.29	4.93	54											951.05	12.93	938.12	9.13	48					
03/18/06	950.60	12.31	938.29	2.83	57											951.05	12.95	938.10	5.73	54					
03/19/06	950.60	12.33	938.27	4.03	61											951.05	12.93	938.12	6.13	60					
03/20/06	950.60	12.40	938.20	4.03	65											951.05	12.93	938.12	5.73	66					
03/21/06	950.60	12.38	938.22	2.83	68											951.05	12.97	938.08	5.73	72					
03/22/06	950.60	12.97	937.63	2.83	71	951.07	12.69	938.38	4.03	4.0						951.05	12.98	938.07	5.73	78					
03/23/06	950.60	12.48	938.12	2.49	73	951.07	13.15	937.92	2.89	6.9						951.05	13.00	938.05	6.19	84					
03/24/06	950.60	12.46	938.14	2.83	76	951.07	13.19	937.88	2.83	9.7						951.05	13.00	938.05	6.13	90					
03/25/06	950.60	12.46	938.14	0.73	77	951.07	13.23	937.84	0.73	10.5						951.05	13.03	938.02	0.73	91					
03/27/06	950.60	12.32	938.28	4.03	81	951.07	12.73	938.34	4.03	14.5						951.05	12.85	938.20	**6.53**	97					
03/28/06	950.60	12.40	938.20	0.73	82	951.07	13.19	937.88	0.73	15.2						951.05	12.95	938.10	0.73	98					
03/29/06	950.60	12.36	938.24	0.73	82	951.07	13.00	938.07	0.73	16.0						951.05	12.92	938.13	0.73	99					
03/30/06	950.60	12.34	938.26	0.73	83	951.07	12.86	938.21	0.73	16.7						951.05	12.86	938.19	0.73	99	951.25	12.91	938.34	0.73	0.7
03/31/06	950.60	12.32	938.28	0.0	83	951.07	12.77	938.30	0.73	17.4						951.05	12.77	938.28	0.00	99	951.25	12.96	938.29	0.73	1.5
04/01/06	950.60	12.29	938.31	0.0	83	951.07	12.71	938.36	0.0	17.4						951.05	12.80	938.25	0.00	99	951.25			0.00	1.5
04/02/06	950.60	12.24	938.36	0.0	83	951.07	12.57	938.50	0.73	18.1						951.05	12.71	938.34	0.73	100	951.25	12.67	938.58	0.73	2.2
04/03/06	950.60	12.19	938.41	0.73	84	951.07	12.58	938.49	0.0	18.1						951.05	12.71	938.34	0.00	100	951.25	12.77	938.48	0.73	2.9
04/04/06	950.60	12.17	938.43	0.0	84	951.07	12.47	938.60	0.73	18.9						951.05	12.61	938.44	0.73	101	951.25	12.87	938.38	0.73	3.6
04/05/06	950.60	12.14	938.46	0.0	84	951.07	12.47	938.60	0.0	18.9						951.05	12.62	938.43	0.00	101	951.25	13.01	938.24	0.73	4.4
04/06/06	950.60	12.13	938.47	0.0	84	951.07	12.45	938.62	0.0	18.9	951.42	DRY	942.20	0.0	0.5	951.05	12.54	938.51	0.73	101	951.25	13.25	938.00	0.40	4.8
04/07/06	950.60	12.12	938.48	0.0	84	951.07	12.42	938.65	0.0	18.9						951.05	12.59	938.46	0.73	102	951.25	DRY	937.25	0.00	4.8
04/08/06	950.60	12.11	938.49	0.0	84	951.07	12.41	938.66	0.0	18.9						951.05	12.59	938.46	0.00	102	951.25	DRY	937.25	0.00	4.8
04/09/06	950.60	12.08	938.52	0.0	84	951.07	12.37	938.70	0.0	18.9						951.05	12.58	938.47	0.00	102	951.25	DRY	937.25	0.00	4.8
04/10/06	950.60	12.07	938.53	0.73	85	951.07	12.35	938.72	0.73	19.6						951.05	12.55	938.50	0.73	103	951.25	12.98	938.27	0.00	4.8
04/11/06	950.60	12.07	938.53	0.0	85	951.07	12.40	938.67	0.0	19.6						951.05	12.55	938.50	0.00	103	951.25	12.92	938.33	0.73	5.5
04/12/06	950.60	12.07	938.53	0.73	85	951.07	12.36	938.71	0.73	20.3						951.05	12.55	938.50	0.73	104	951.25	13.20	938.05	0.66	6.1
04/13/06	950.60	12.07	938.53	0.0	85	951.07	12.40	938.67	0.0	20.3	951.42	DRY	942.20	0.0	0.5	951.05	12.56	938.49	0.00	104	951.25	DRY	937.25	0.00	6.1
04/14/06	950.60	12.05	938.55	0.0	85	951.07	12.30	938.77	0.73	21.0						951.05	12.52	938.53	0.00	104	951.25	DRY	937.25	0.00	6.1
04/15/06	950.60	12.06	938.54	0.0	85	951.07	12.36	938.71	0.0	21.0						951.05	12.53	938.52	0.00	104	951.25	DRY	937.25	0.00	6.1
04/16/06	950.60	12.04	938.56	0.0	85	951.07	12.31	938.76	0.73	21.8						951.05	12.52	938.53	0.00	104	951.25	DRY	937.25	0.00	6.1
04/17/06	950.60	12.04	938.56	0.0	85	951.07	12.35	938.72	0.0	21.8						951.05	12.51	938.54	0.00	104	951.25	DRY	937.25	0.00	6.1
04/18/06	950.60	12.03	938.57	0.0	85	951.07	12.33	938.74	0.0	21.8						951.05	12.51	938.54	0.00	104	951.25	13.13	938.12	0.73	6.9
04/19/06	950.60	12.03	938.57	0.0	85	951.07	12.31	938.76	0.0	21.8						951.05	12.49	938.56	0.00	104	951.25	DRY	937.25	0.00	6.9
04/20/06	950.60	12.02	938.58	0.0	85	951.07	12.32	938.75	0.0	21.8	951.42	DRY	942.20	0.0	0.5	951.05	12.48	938.57	0.00	104	951.25	DRY	937.25	0.00	6.9
04/21/06	950.60	12.02	938.58	0.0	85	951.07	12.30	938.77	0.0	21.8						951.05	12.50	938.55	0.00	104	951.25	13.40	937.85	0.00	6.9
04/22/06	950.60	12.01	938.59	0.0	85	951.07	12.29	938.78	0.0	21.8						951.05	12.48	938.57	0.00	104	951.25	13.31	937.94	0.00	6.9
04/23/06	950.60	12.02	938.58	0.0	85	951.07	12.29	938.78	0.0	21.8						951.05	12.49	938.56	0.00	104	951.25	13.27	937.98	0.00	6.9
04/24/06	950.60	12.01	938.59	0.0	85	951.07	12.30	938.77	0.0	21.8						951.05	12.49	938.56	0.00	104	951.25	13.22	938.03	0.00	6.9
04/25/06	950.60	11.99	938.61	18.2	103	951.07	12.28	938.79	5.00	26.8						951.05	12.47	938.58	0.00	104	951.25	13.18	938.07	0.00	6.9
04/26/06	950.60	12.29	938.31	0.0	103	951.07	12.79	938.28	2.03	28.8	951.42	DRY	942.20	0.0	0.5	951.05	12.56	938.49	0.00	104	951.25	13.11	938.14	0.73	7.6
04/27/06	950.60	12.24	938.36	0.0	103	951.07	12.72	938.35	0.0	28.8						951.05	12.58	938.47	0.00	104	951.25	DRY	937.25	0.00	7.6
04/28/06	950.60	12.25	938.35	0.0	103	951.07	12.47	938.60	0.73	29.5									0.00	104	951.25	DRY	937.25	0.00	7.6
04/29/06				12.0	115				0.0	29.5									4.00	108				0.00	7.6
04/30/06				0.0	115				0.0	29.5									0.00	108				0.00	7.6
05/01/06	950.60	12.29	938.31	0.0	115	951.07	12.37	938.70	0.0	29.5						951.05	12.66	938.39	0.00	108	951.25	13.43	937.82	0.00	7.6
05/02/06	950.60	12.25	938.35	1.51	117	951.07	12.36	938.71	1.51	31.0						951.05	12.62	938.43	0.00	108	951.25	13.39	937.86	0.00	7.6
05/03/06	950.60	12.23	938.37	0.0	117	951.07	12.36	938.71	0.0	31.0	951.42	DRY	942.20	0.0	0.5	951.05	12.60	938.45	0.00	108	951.25	13.35	937.90	0.00	7.6
05/04/06	950.60	12.21	938.39	0.0	117	951.07	12.36	938.71	4.6	35.6						951.05	12.58	938.47	0.00	108	951.25	13.29	937.96	0.00	7.6
05/05/06	950.60	12.25	938.35	0.0	117	951.07	12.80	938.27	0.0	35.6						951.05	12.59	938.46	0.00	108	951.25	13.23	938.02	0.00	7.6
05/08/06	950.60	12.25	938.35	0.0	117	951.07	12.41	938.66	0.0	35.6						951.05	12.61	938.44	0.00	108	951.25	13.18	938.07	0.00	7.6
05/09/06	950.74	12.23	938.51	0.0	117	951.07	12.49	938.58	0.0	35.6						951.05	12.59	938.46	0.00	108	951.25	13.17	938.08	0.00	7.6
05/10/06	950.74	12.24	938.50	0.0	117	951.07	12.42	938.65	0.0	35.6	951.42	DRY	942.20	0.0	0.5	951.05	12.59	938.46	0.00	108	951.25	13.14	938.11	0.00	7.6
05/11/06	950.74	12.22	938.52	0.0	117	951.07	12.38	938.69	0.0	35.6						951.05	12.57	938.48	0.00	108	951.25	13.11	938.14	0.00	7.6
05/12/06	950.74	12.21	938.53	0.73	118	951.07	12.36	938.71	0.73	36.4						951.05	12.56	938.49	0.00	108	951.25	13.09	938.16	0.00	7.6
05/15/06	950.74	12.18	938.56	0.0	118	951.07	12.34	938.73	0.0	36.4						951.05	12.55	938.50	0.73	108	951.25	13.04	938.21	0.00	7.6
05/16/06	950.74	12.19	938.55	0.0	118	951.07	12.34	938.73	0.0	36.4						951.05	12.56	938.49	0.00	108	951.25	13.02	938.23	0.00	7.6
05/17/06	950.74	12.18	938.56	0.0	118	951.07	12.32	938.75	0.0	36.4	951.42	DRY	942.20	0.0	0.5	951.05	12.55	938.50	0.00	108	951.25	13.01	938.24	0.00	7.6
05/18/06	950.74	12.18	938.56	0.0	118	951.07	12.31	938.76	0.0	36.4						951.05	12.54	938.51	0.00	108	951.25	12.99	938.26	0.00	7.6

Palo Verde Nuclear Generating Station
Unit 3 Test Hole Water Level and Pumping History

DATE	Unit 3 Test Well - H0a [Depth=13.25ft]					Unit 3 Test Well - H0b [Depth=14.20ft]					Unit 3 Test Well - H1 [Depth=9.19ft]					Unit 3 Test Well - H5b [Depth=15.57]					Unit 3 Test Well - H10 [Depth=14.0ft]				
	MP	Static Water Level		Volume Pumped (gal)		MP	Static Water Level		Volume Pumped (gal)		MP	Static Water Level		Volume Pumped (gal)		MP	Static Water Level		Volume Pumped (gal)		MP	Static Water Level		Volume Pumped (gal)	
		DTW	WL - Elev	Daily	Cumulative		DTW	WL - Elev	Daily	Cumulative		DTW	WL - Elev	Daily	Cumulative		DTW	WL - Elev	Daily	Cumulative		DTW	WL - Elev	Daily	Cumulative
05/19/06	950.74	12.17	938.57	0.0	118	951.07	12.31	938.76	0.0	36.4						951.05	12.53	938.52	0.00	108	951.25	12.97	938.28	0.00	7.6
05/22/06	950.74	12.13	938.61	0.0	118	951.07	12.24	938.83	0.0	36.4						951.05	12.50	938.55	0.00	108	951.25	12.92	938.33	0.00	7.6
05/23/06	950.74	12.14	938.60	0.0	118	951.07	12.29	938.78	0.0	36.4						951.05	12.50	938.55	0.00	108	951.25	12.90	938.35	0.73	8.3
05/24/06	950.74	12.14	938.60	0.0	118	951.07	12.27	938.80	0.0	36.4	951.42	DRY	942.20	0.0	0.5	951.05	12.52	938.53	0.00	108	951.25	13.26	937.99	0.00	8.3
											DRY= approx 9.2 to 9.3 feet, Elevation 942.2 feet										DRY=approx. 14 feet or Elevation 937.25 feet				

Palo Verde Nuclear Generating Station
Unit 3 Test Hole Water Level and Pumping History

DATE	Unit 3 Test Well - H11 [Depth=15.10ft]					Unit 3 Test Well - H12 [Depth=14.85ft]					Unit 3 Test Well - H19 [Depth=9ft]				
	MP	Static Water Level		Volume Pumped (gal)		MP	Static Water Level		Volume Pumped (gal)		MP	Static Water Level		Volume Pumped (gal)	
		DTW	WL - Elev	Daily	Cumulative		DTW	WL - Elev	Daily	Cumulative		DTW	WL - Elev	Daily	Cumulative
03/03/06															
03/04/06															
03/05/06															
03/06/06															
03/07/06															
03/08/06															
03/09/06															
03/10/06															
03/11/06															
03/12/06															
03/13/06															
03/14/06															
03/15/06															
03/16/06															
03/17/06															
03/18/06															
03/19/06															
03/20/06															
03/21/06															
03/22/06															
03/23/06															
03/24/06															
03/25/06	951.15	12.56	938.59	0.73	0.7										
03/27/06	951.15	12.34	938.81	**5.33**	6.1	952.27	11.76	940.51	**4.03**	4.0					
03/28/06	951.15	12.53	938.62	0.73	6.8	952.27	12.56	939.71	0.73	4.8					
03/29/06	951.15	12.53	938.62	0.73	7.5	952.27	12.04	940.23	0.73	5.5					
03/30/06	951.15	12.45	938.70	0.73	8.2	952.27	12.41	939.86	0.73	6.2					
03/31/06	951.15			0.00	8.2	952.27	10.98	941.29	0.73	6.9					
04/01/06	951.15	12.38	938.77	0.00	8.2	952.27	10.73	941.54	0.00	6.9					
04/02/06	951.15	12.35	938.80	0.00	8.2	952.27	10.50	941.77	0.73	7.7					
04/03/06	951.15	12.25	938.90	0.73	9.0	952.27	10.45	941.82	0.73	8.4					
04/04/06	951.15	12.20	938.95	0.73	9.7	952.27	10.41	941.86	12.00	20.4					
04/05/06	951.15	12.12	939.03	0.73	10.4	952.27	13.52	938.75	0.00	20.4					
04/06/06	951.15	12.18	938.97	0.73	11.1	952.27	12.76	939.51	0.73	21.1					
04/07/06	951.15	12.17	938.98	0.00	11.1	952.27	12.20	940.07	0.73	21.8					
04/08/06	951.15	12.14	939.01	0.00	11.1	952.27	11.76	940.51	0.73	22.6					
04/09/06	951.15	12.10	939.05	0.00	11.1	952.27	11.33	940.94	0.73	23.3		8.50		0.066	0.07
04/10/06	951.15	12.07	939.08	0.73	11.9	952.27	11.12	941.15	0.73	24.0		8.52		0.73	0.79
04/11/06	951.15	12.14	939.01	0.73	12.6	952.27	11.04	941.23	0.73	24.7		>8.5		0.73	1.52
04/12/06	951.15	12.12	939.03	0.73	13.3	952.27	10.99	941.28	0.73	25.5		>8.5		0.00	1.52
04/13/06	951.15	12.12	939.03	0.00	13.3	952.27	10.96	941.31	0.00	25.5		>8.5		0.33	1.85
04/14/06	951.15	12.05	939.10	0.73	14.0	952.27	10.83	941.44	0.73	26.2		N/A			
04/15/06	951.15	12.09	939.06	0.00	14.0	952.27	10.80	941.47	0.00	26.2		N/A			
04/16/06	951.15	12.07	939.08	0.00	14.0	952.27	10.71	941.56	0.73	26.9		N/A			
04/17/06	951.15	12.06	939.09	0.00	14.0	952.27	10.71	941.56	0.73	27.7		N/A			
04/18/06	951.15	12.05	939.10	0.00	14.0	952.27	10.72	941.55	0.73	28.4					
04/19/06	951.15	12.05	939.10	0.00	14.0	952.27	10.73	941.54	0.00	28.4					
04/20/06	951.15	12.04	939.11	0.00	14.0	952.27	10.66	941.61	0.73	29.1					
04/21/06	951.15	12.04	939.11	0.00	14.0	952.27	10.68	941.59	0.00	29.1					
04/22/06	951.15	12.00	939.15	0.00	14.0	952.27	10.62	941.65	0.73	29.8					
04/23/06	951.15	12.02	939.13	0.00	14.0	952.27	10.66	941.61	0.00	29.8					
04/24/06	951.15	12.03	939.12	0.00	14.0	952.27	10.63	941.64	0.00	29.8					
04/25/06	951.15	12.01	939.14	4.50	18.5	952.27	10.61	941.66	8.50	38.3					
04/26/06	951.15	12.37	938.78	1.51	20.1	952.27	14.29	937.98	0.94	39.3		DRY			
04/27/06	951.15	12.25	938.90	0.00	20.1	952.27	14.44	937.83	0.00	39.3					
04/28/06	951.15	12.21	938.94	0.00	20.1	952.27	14.08	938.19	0.73	40.0					
04/29/06				0.00	20.1				0.00	40.0					
04/30/06				0.00	20.1				0.00	40.0					
05/01/06	951.15	12.14	939.01	0.00	20.1	952.27	13.42	938.85	0.00	40.0					
05/02/06	951.15	12.11	939.04	0.00	20.1	952.27	13.00	939.27	0.00	40.0					
05/03/06	951.15	12.08	939.07	0.00	20.1	952.27	12.69	939.58	0.00	40.0		DRY			
05/04/06	951.15	12.07	939.08	6.7	26.8	952.27	12.39	939.88	3.30	43.3					
05/05/06	951.15	12.39	938.76	0.00	26.8	952.27	14.49	937.78	0.00	43.3					
05/08/06	951.15	12.12	939.03	0.00	26.8	952.27	13.58	938.69	0.00	43.3					
05/09/06	951.15	12.14	939.01	0.00	26.8	952.27	14.36	937.91	0.00	43.3					
05/10/06	951.15	12.08	939.07	0.00	26.8	952.27	14.07	938.2	0.00	43.3		DRY			
05/11/06	951.15	12.03	939.12	0.00	26.8	952.27	13.75	938.52	0.00	43.3					
05/12/06	951.15	12.01	939.14	0.00	26.8	952.27	13.48	938.79	0.00	43.3					
05/15/06	951.15	11.96	939.19	0.73	27.5	952.27	12.69	939.58	0.73	44.0					
05/16/06	951.15	11.99	939.16	0.00	27.5	952.27	13.00	939.27	0.00	44.0					
05/17/06	951.15	11.93	939.22	0.00	27.5	952.27	12.77	939.5	0.00	44.0		DRY			
05/18/06	951.15	11.89	939.26	0.00	27.5	952.27	12.53	939.74	0.00	44.0					

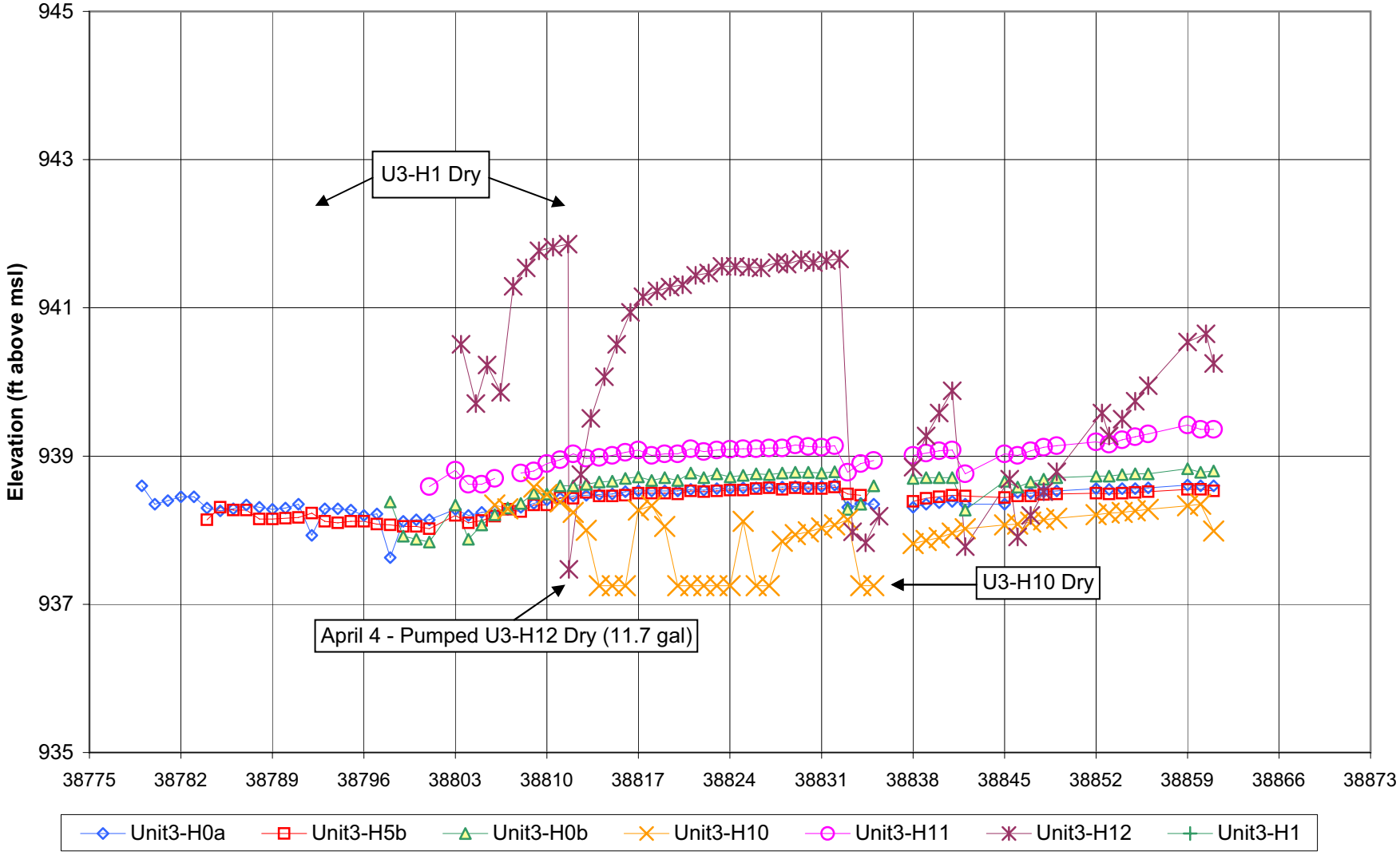
Palo Verde Nuclear Generating Station
Unit 3 Test Hole Water Level and Pumping History

DATE	Unit 3 Test Well - H11 [Depth=15.10ft]					Unit 3 Test Well - H12 [Depth=14.85ft]					Unit 3 Test Well - H19 [Depth=9ft]				
	MP	Static Water Level		Volume Pumped (gal)		MP	Static Water Level		Volume Pumped (gal)		MP	Static Water Level		Volume Pumped (gal)	
		DTW	WL - Elev	Daily	Cumulative		DTW	WL - Elev	Daily	Cumulative		DTW	WL - Elev	Daily	Cumulative
05/19/06	951.15	11.85	939.30	0.00	27.5	952.27	12.32	939.95	0.00	44.0					
05/22/06	951.15	11.73	939.42	0.00	27.5	952.27	11.73	940.54	0.00	44.0					
05/23/06	951.15	11.79	939.36	0.73	28.2	952.27	11.62	940.65	0.73	44.7					
05/24/06	951.15	11.79	939.36	0.00	28.2	952.27	12.02	940.25	0.00	44.7		DRY			
											Note 1 – **10Apr06** Tritium analysis suspect -backup analysis of same aliquot showed 5.44 E-5 -- suspect chemical interference.				
						Note: H12 pumped dry Tuesday afternoon, **04/04/06** -DTW=14.8 ft, Elev=937.47 ft					**Note 2** – **13Apr2006**: Hole removed by excavation – water samples from trench will continue to be called H-19 in this area				
											Note 3 – **15Apr2006:** Sample taken from Plant SW water puddle in trench				
											Note 4 – **15Apr2006:** Sample taken from Plant NE water puddle in trench at base of where H-19 hole was. Appears to be localized elevated pH and conductivity				
											Note 5 – Area backfilled on **4/18/2006**				
											Note 6 – New H-19 installed – Depth of hole is 8.5'. Will monitor and record levels if water is present.				

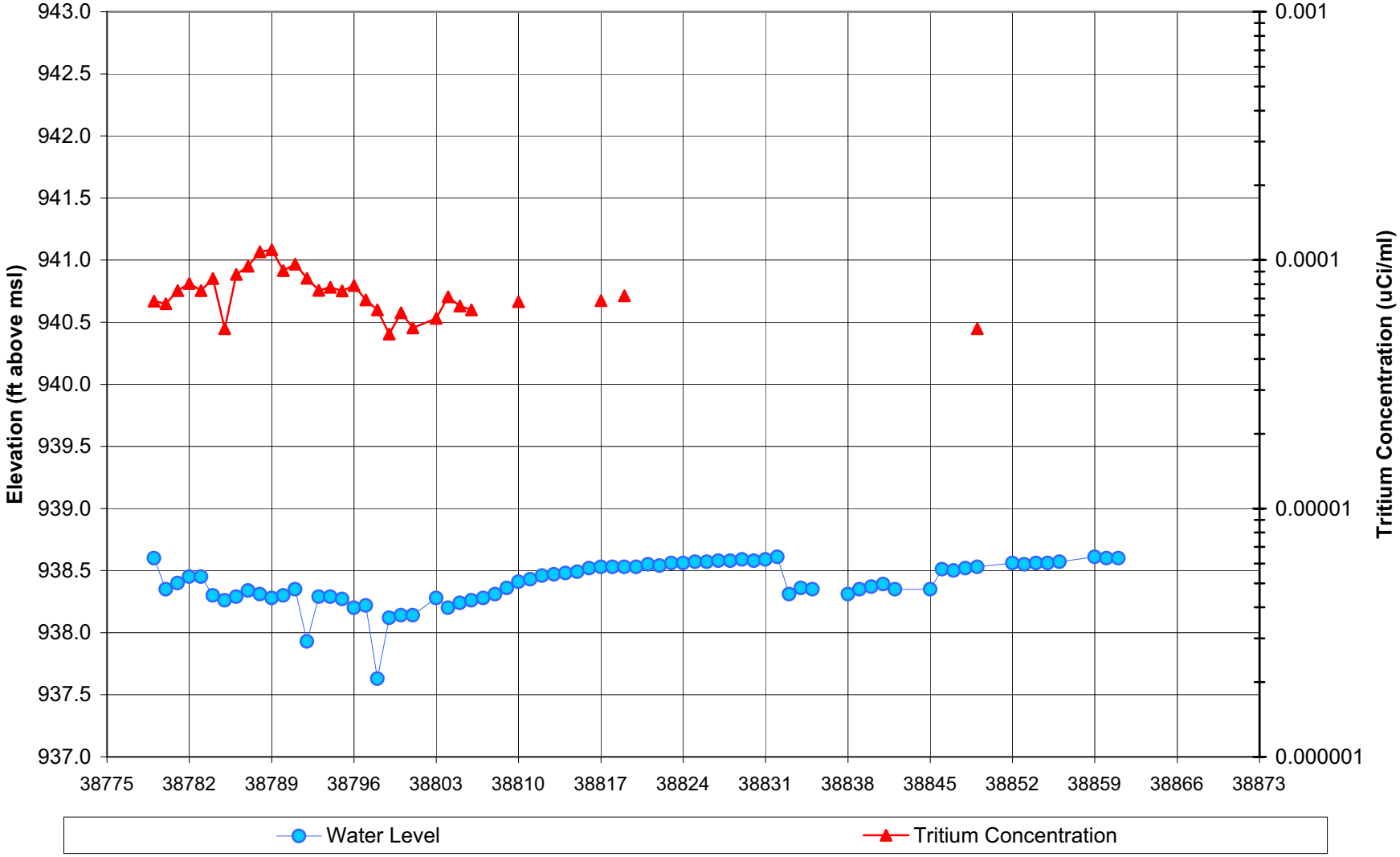
Date	Time	Date-time	MP	Tritium	Static DTW	Static WL	WL after pumping		Plotted Tritium Values	
3/27/2006	10:21 AM	3/27/2006 10:21	952.27	2.50E-06	11.76	940.51	11.94	940.33	2.50E-06	
3/28/2006	1:36 PM	3/28/2006 13:36	952.27	1.43E-06	12.56	939.71	12.9	939.37	1.43E-06	
3/29/2006	10:03 AM	3/29/2006 10:03	952.27	7.93E-06	12.04	940.23	12.21	940.06	7.93E-06	
3/30/2006	10:50 AM	3/30/2006 10:50	952.27	1.61E-06	12.41	939.86	12.6	939.67	1.61E-06	
3/31/2006	9:40 AM	3/31/2006 9:40	952.27	1.75E-06	10.98	941.29	11.1	941.17	1.75E-06	
4/1/2006	9:40 AM	4/1/2006 9:40	952.27		10.73	941.54				
4/2/2006	9:08 AM	4/2/2006 9:08	952.27	<MDA	10.5	941.77	11.6	940.67		
4/3/2006	10:55 AM	4/3/2006 10:55	952.27	<MDA	10.45	941.82				
4/4/2006	2:36 PM	4/4/2006 14:36	952.27	1.92E-06	10.41	941.86	10.53	941.74	1.92E-06	
4/4/2006										Static WL for this time step is est. based on note that well pumped dry (depth of test hole=14.85ft-4inches deadpool water)
	4:00 PM	4/4/2006 16:00	952.27		14.80	937.47				
4/5/2006	2:01 PM	4/5/2006 14:01	952.27		13.52	938.75				
4/6/2006	8:31 AM	4/6/2006 8:31	952.27	1.32E-06	12.76	939.51	13.34	938.93	1.32E-06	
4/7/2006	9:23 AM	4/7/2006 9:23	952.27	2.02E-06	12.2	940.07	12.7	939.57	2.02E-06	
4/8/2006	8:07 AM	4/8/2006 8:07	952.27	1.46E-06	11.76	940.51	12.26	940.01	1.46E-06	
4/9/2006	9:15 AM	4/9/2006 9:15	952.27	1.43E-06	11.33	940.94	11.84	940.43	1.43E-06	
4/10/2006	8:18 AM	4/10/2006 8:18	952.27	<MDA	11.12	941.15				
4/11/2006	10:01 AM	4/11/2006 10:01	952.27	2.18E-06	11.04	941.23	11.26	941.01	2.18E-06	
4/12/2006	10:01 AM	4/12/2006 10:01	952.27	2.24E-06	10.99	941.28	11.15	941.12	2.24E-06	
4/13/2006		4/13/2006 9:00	952.27		10.96	941.31				
4/14/2006	8:47 AM	4/14/2006 8:47	952.27	4.31E-06	10.83	941.44	10.92	941.35	4.31E-06	
4/15/2006		4/15/2006 9:00	952.27		10.8	941.47				
4/16/2006				see Note						**Note-- 04/16/06** tritium analysis suspect (H3=1.41E-05). Sample taken 4/17/06 showed <MDA
	9:11 AM	4/16/2006 9:11	952.27		10.71	941.56	10.78	941.49		
4/17/2006	9:41 AM	4/17/2006 9:41	952.27	<MDA	10.71	941.56	10.78	941.49		
4/18/2006	10:21 AM	4/18/2006 10:21	952.27	1.11E-06	10.72	941.55	10.79	941.48	1.11E-06	
4/19/2006		4/19/2006 9:00	952.27		10.73	941.54				
4/20/2006	2:46 PM	4/20/2006 14:46	952.27	1.93E-06	10.66	941.61	10.72	941.55	1.93E-06	
4/21/2006		4/21/2006 9:00	952.27		10.68	941.59				
4/22/2006	10:26 AM	4/22/2006 10:26	952.27	3.27E-06	10.62	941.65	10.71	941.56	3.27E-06	
4/23/2006		4/23/2006 9:00	952.27		10.66	941.61				
4/24/2006		4/24/2006 9:00	952.27		10.63	941.64				
4/25/2006		4/25/2006 9:00	952.27		10.61	941.66	14.6	937.67		
4/26/2006		4/26/2006 9:00	952.27		14.29	937.98				
4/27/2006		4/27/2006 9:00	952.27		14.44	937.83				
4/28/2006	9:40 AM	4/28/2006 9:40	952.27	2.99E-06	14.08	938.19	14.59	937.68	2.99E-06	
4/29/2006		4/29/2006								
4/30/2006		4/30/2006								

Date	Time	Date-time	MP	Tritium	Static DTW	Static WL	WL after pumping		Plotted Tritium Values	
5/1/2006		05/01/06	952.27		13.42	938.85				
5/2/2006		05/02/06	952.27		13.00	939.27				
5/3/2006		05/03/06	952.27		12.69	939.58				
05/04/06		05/04/06	952.27		12.39	939.88				6.33E-06
05/05/06		05/05/06	952.27		14.49	937.78				1.56E-06
05/08/06	9:30 AM	5/8/2006 9:30	952.27	6.33 E-06	13.58	938.69			6.33 E-06	1.13E-06
05/09/06		05/09/06	952.27		14.36	937.91				
05/10/06		05/10/06	952.27		14.07	938.20				
05/11/06		05/11/06	952.27		13.75	938.52				
05/12/06		05/12/06	952.27		13.48	938.79				
05/15/06	10:51 AM	5/15/2006 10:51	952.27	1.56 E-06	12.69	939.58	13.23	939.04	1.56 E-06	
05/16/06		05/16/06	952.27		13.00	939.27				
05/17/06		05/17/06	952.27		12.77	939.50				
05/18/06		05/18/06	952.27		12.53	939.74				
05/19/06		05/19/06	952.27		12.32	939.95				
05/22/06		05/22/06	952.27		11.73	940.54				
05/23/06	10:01 AM	5/23/2006 10:01	952.27	1.13 E-06	11.62	940.65	12.2	940.07	1.13 E-06	
05/24/06		05/24/06	952.27		12.02	940.25				

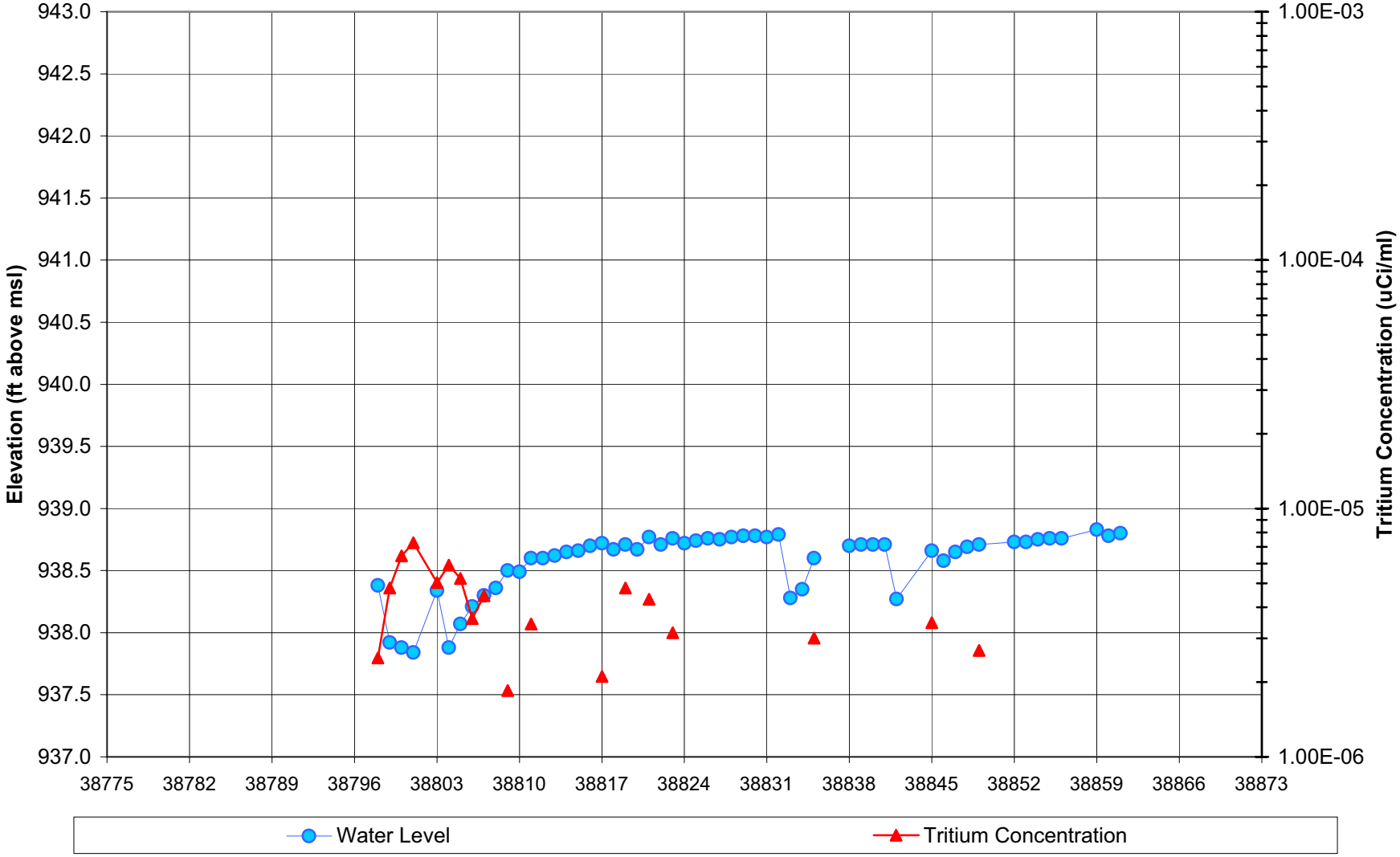
PVNGS Unit 3 Test Hole Data



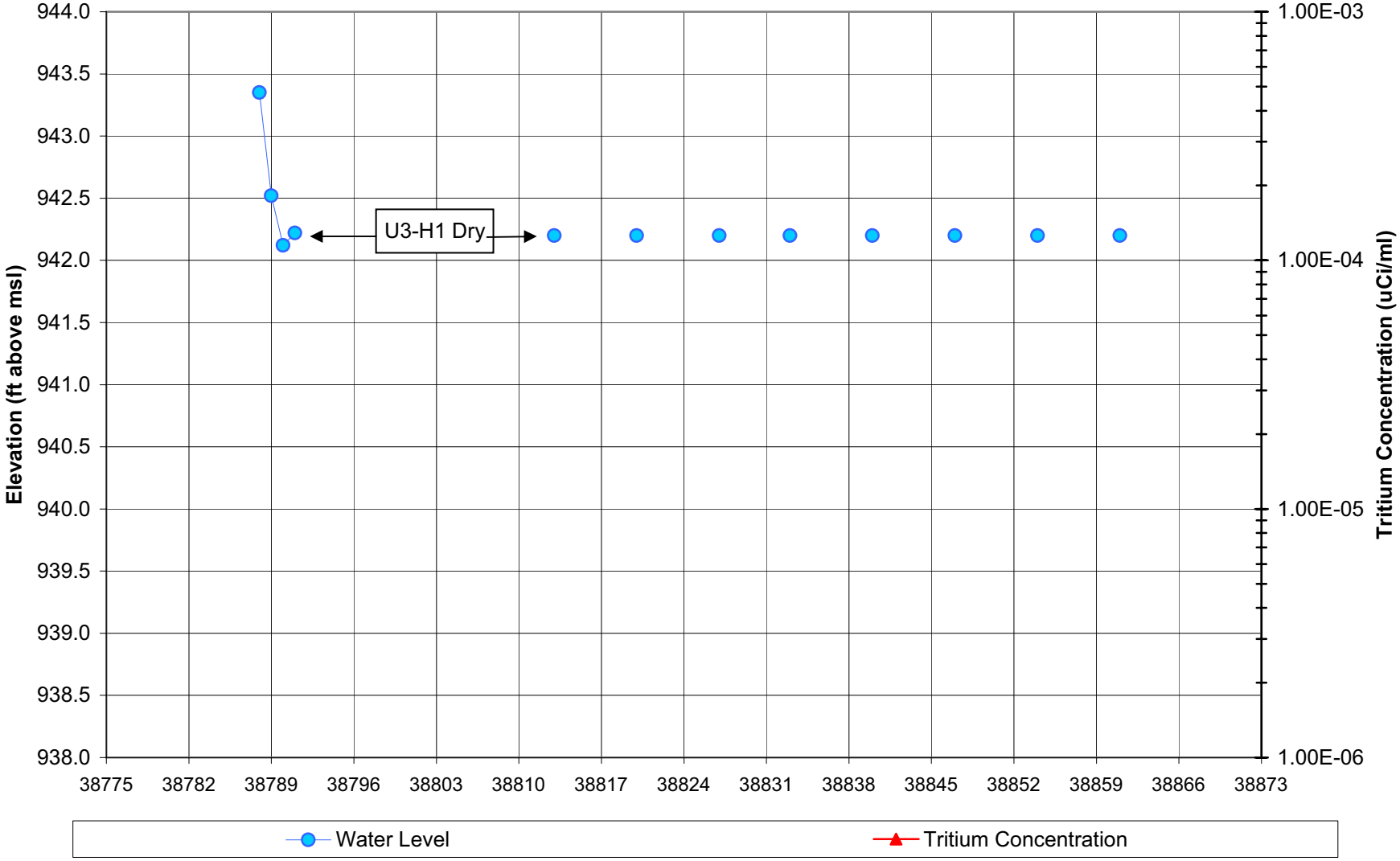
PVNGS Unit 3 Test Hole Data
H0a



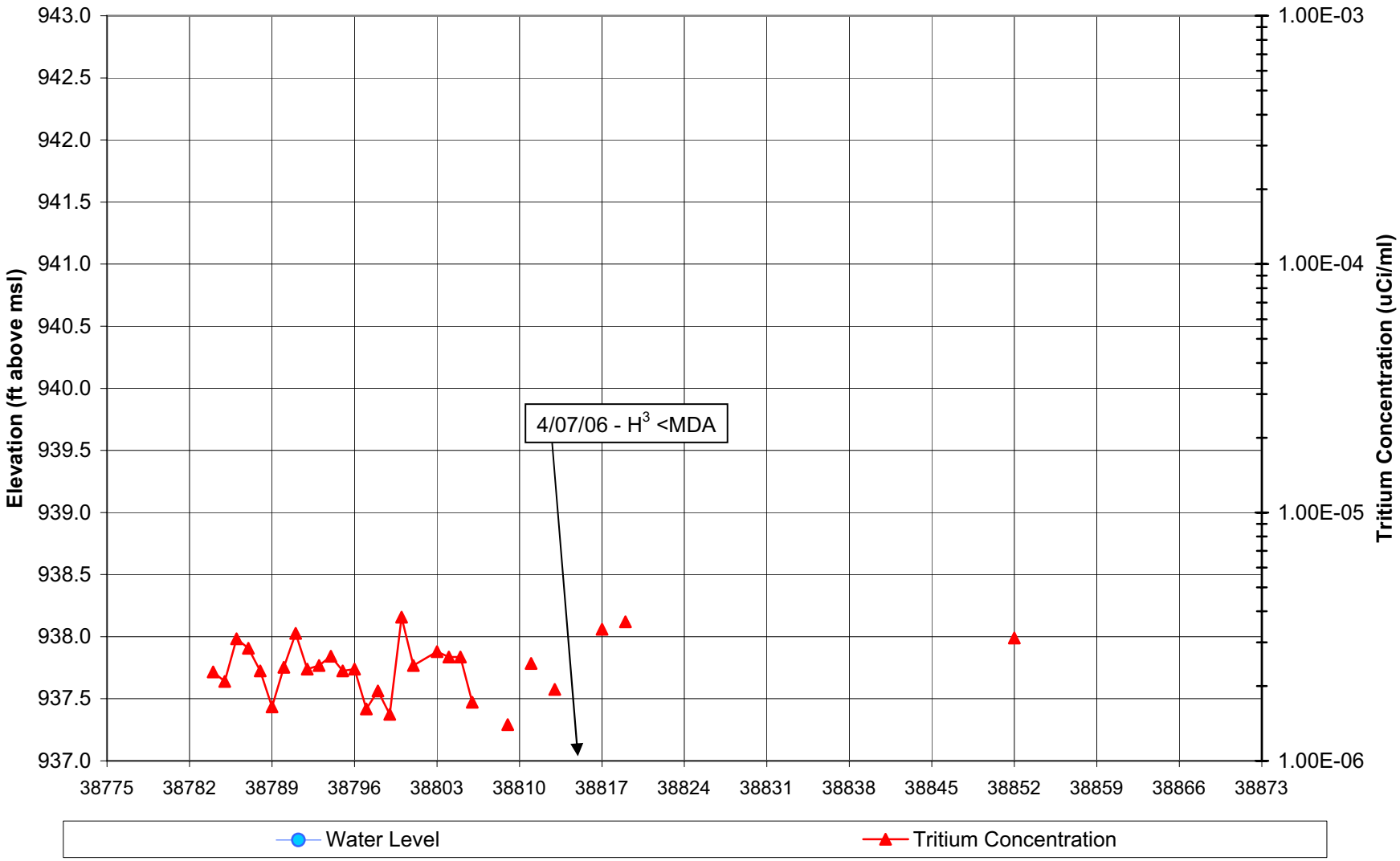
PVNGS Unit 3 Test Hole Data
H0b



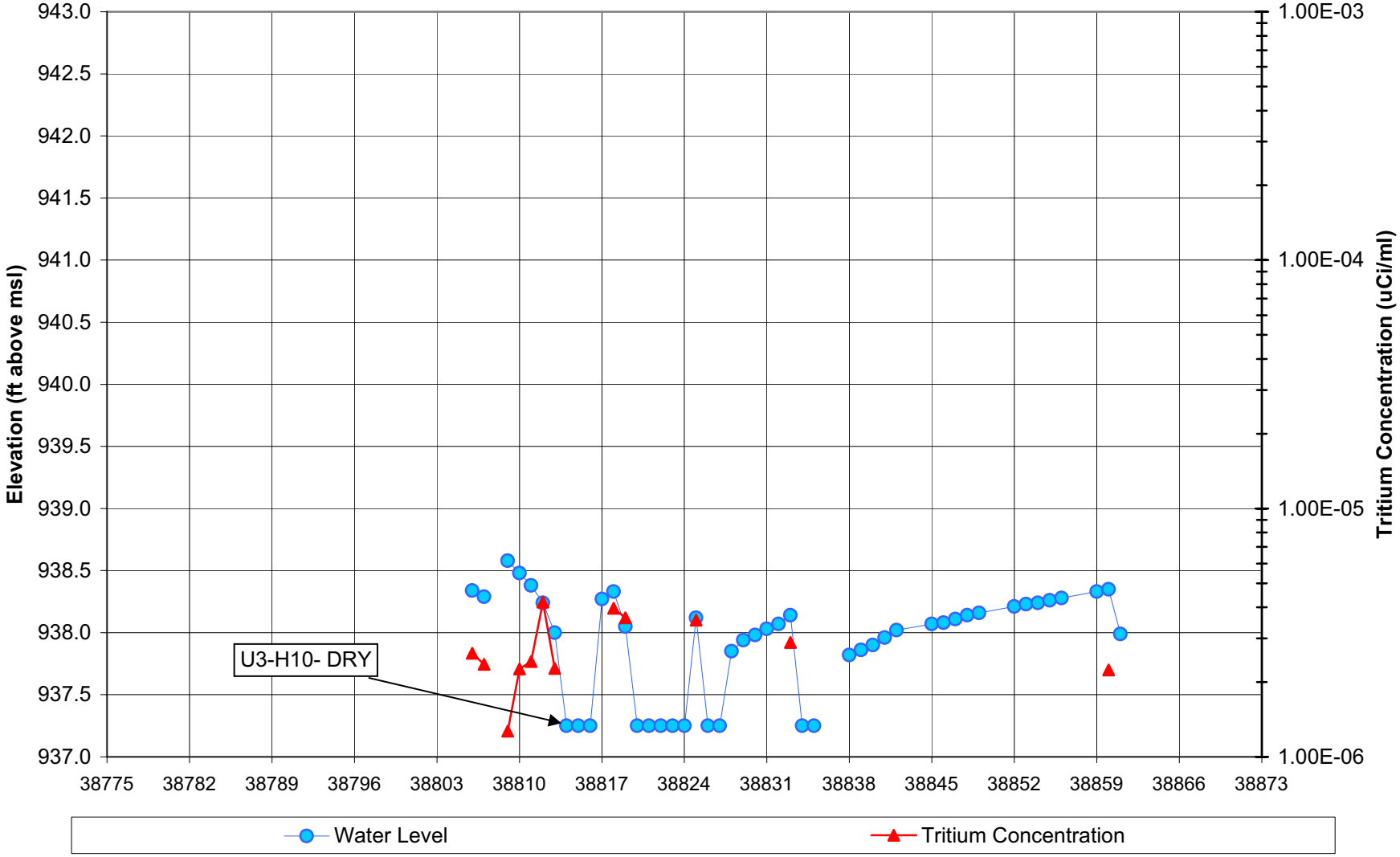
PVNGS Unit 3 Test Hole Data
H1



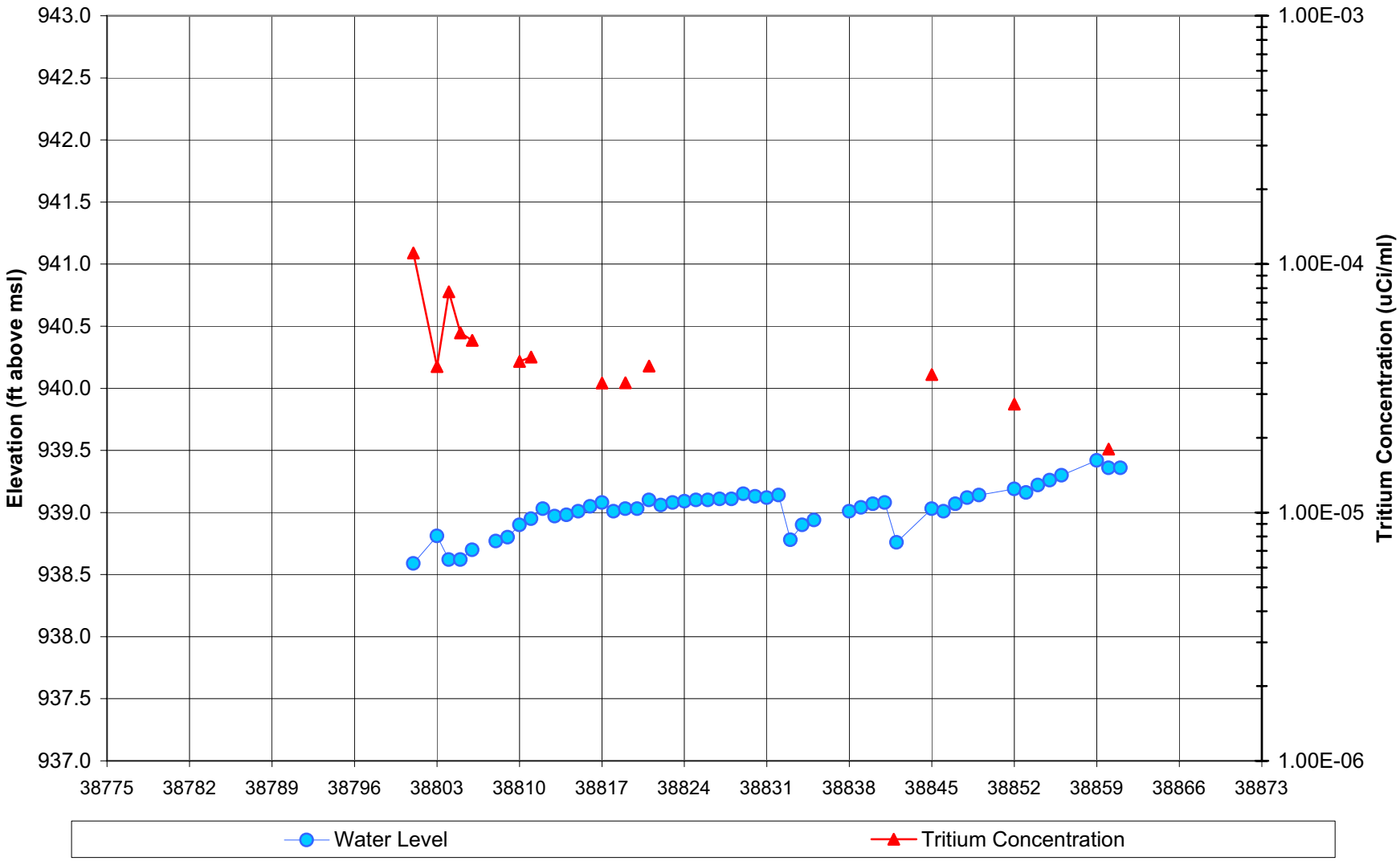
PVNGS Unit 3 Test Hole Data
H5a



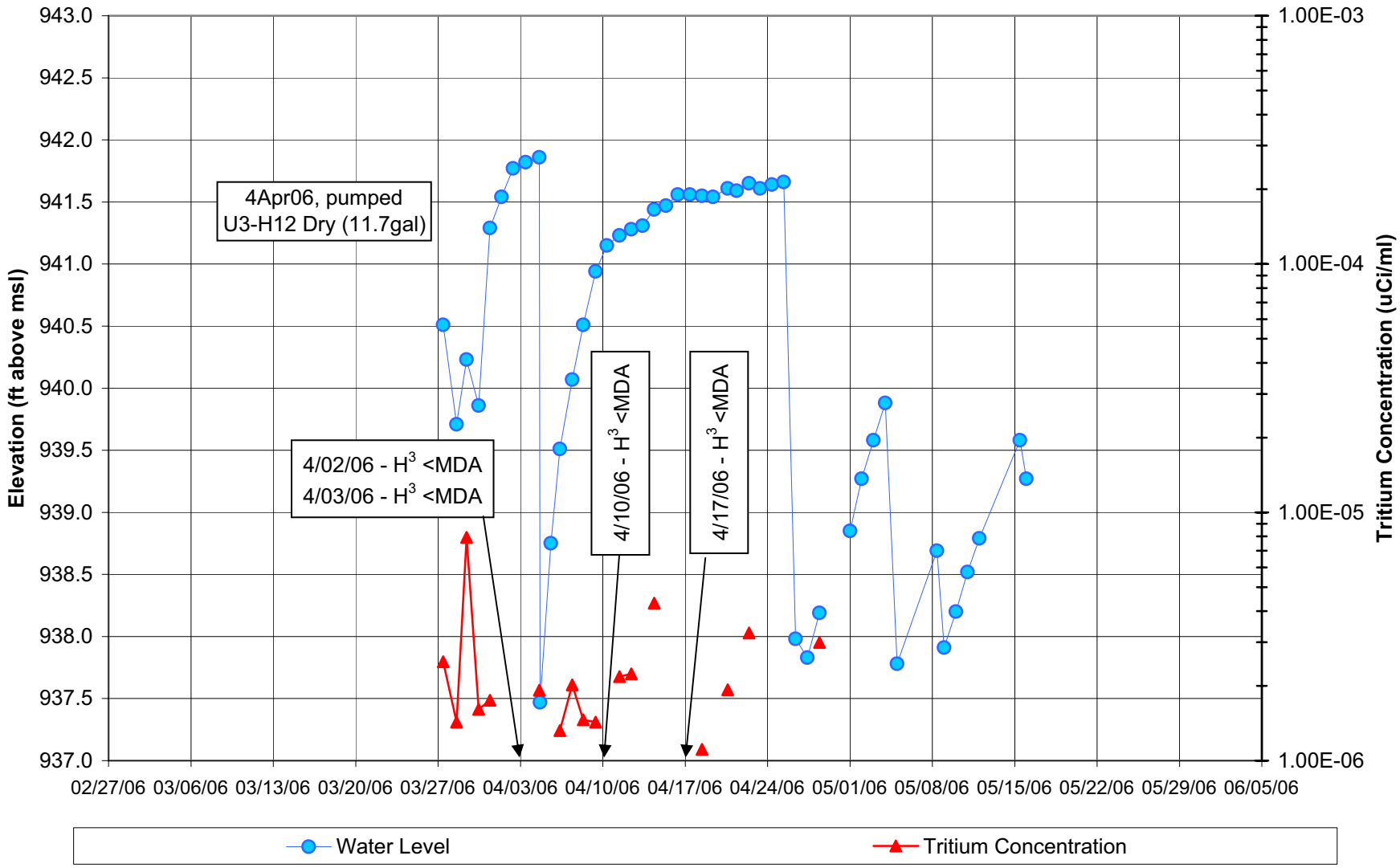
PVNGS Unit 3 Test Hole Data
H10



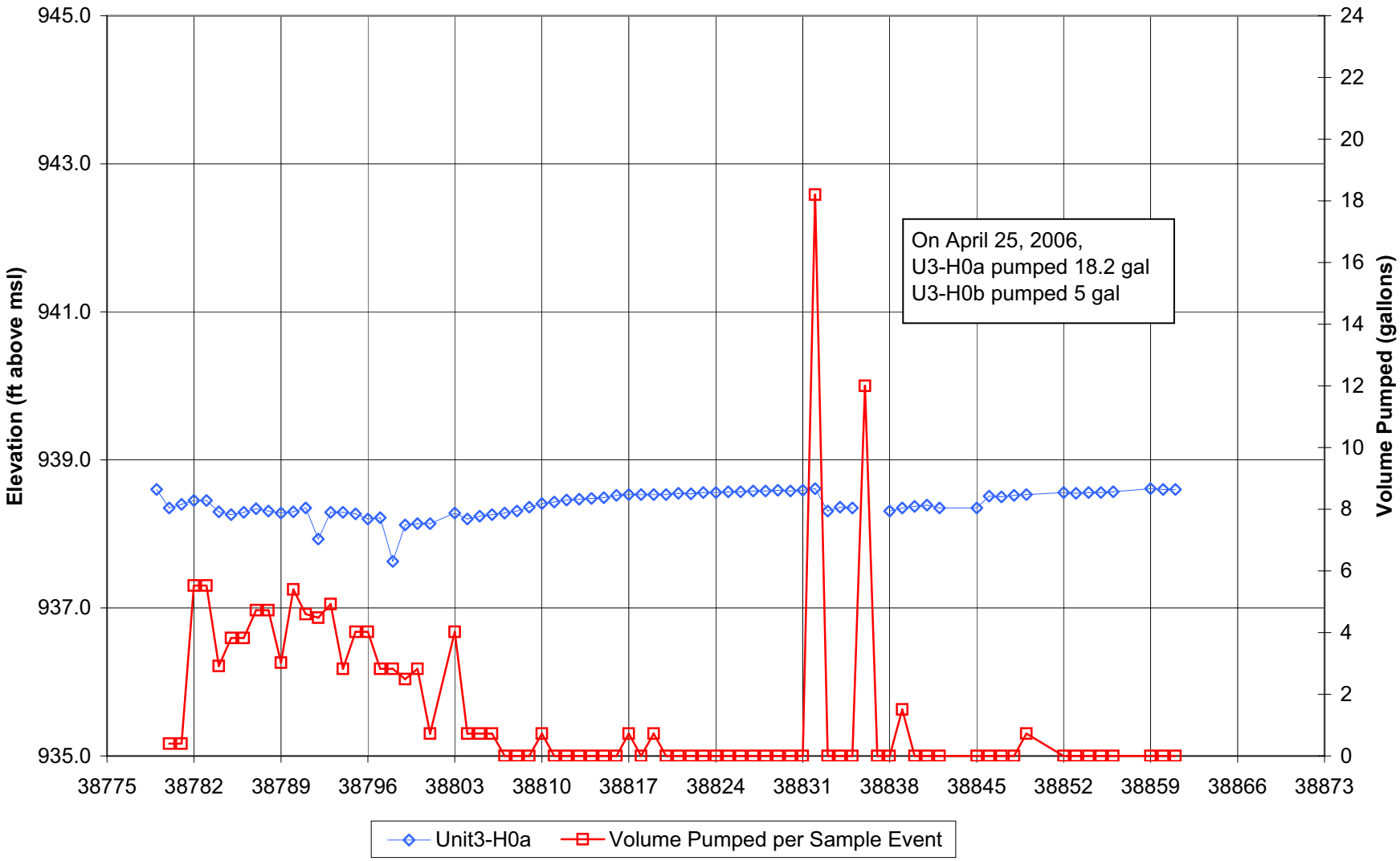
PVNGS Unit 3 Test Hole Data
H11



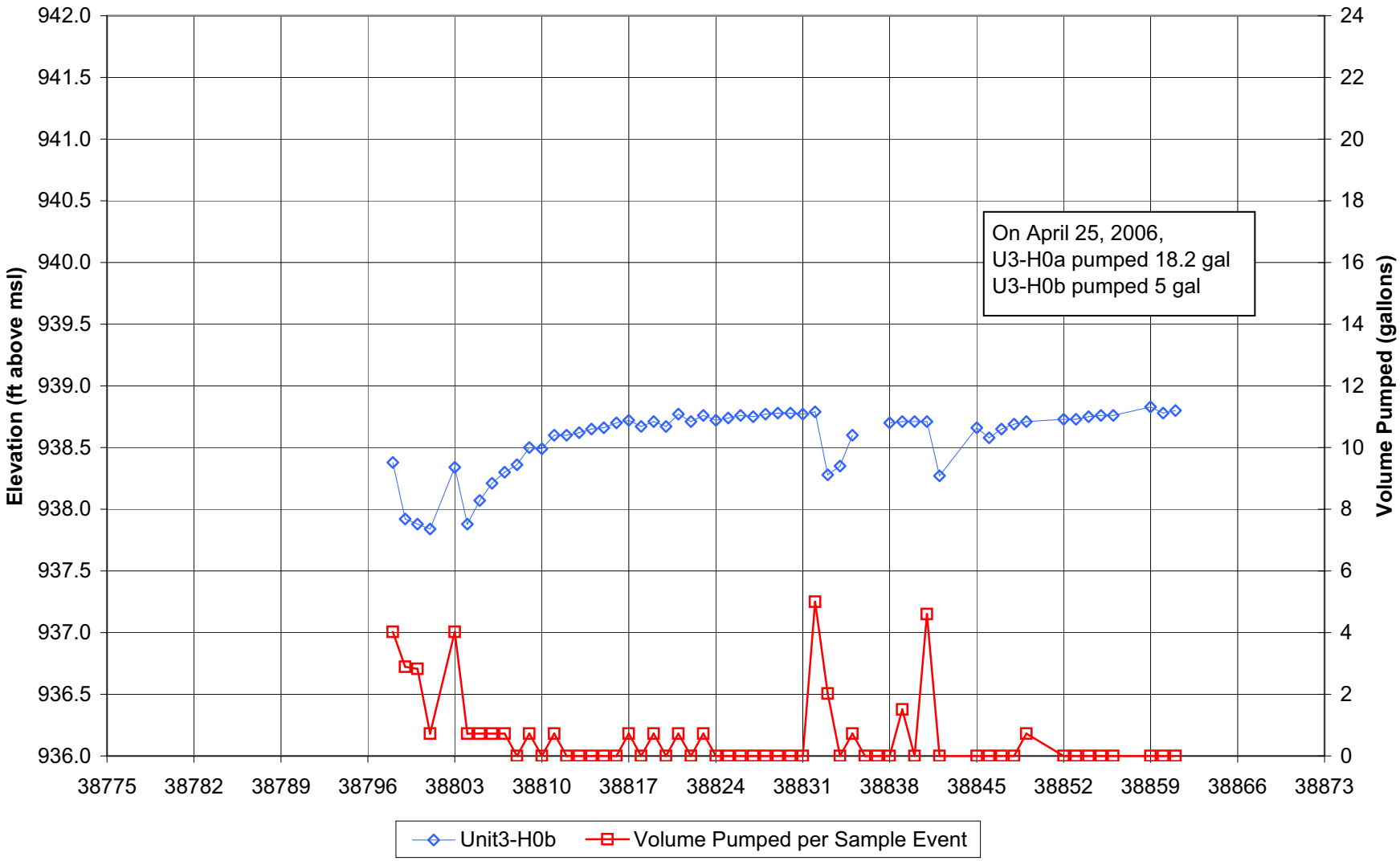
PVNGS Unit 3 Test Hole Data
H12



PVNGS Unit 3 Test Hole H0a



PVNGS Unit 3 Test Hole H0b



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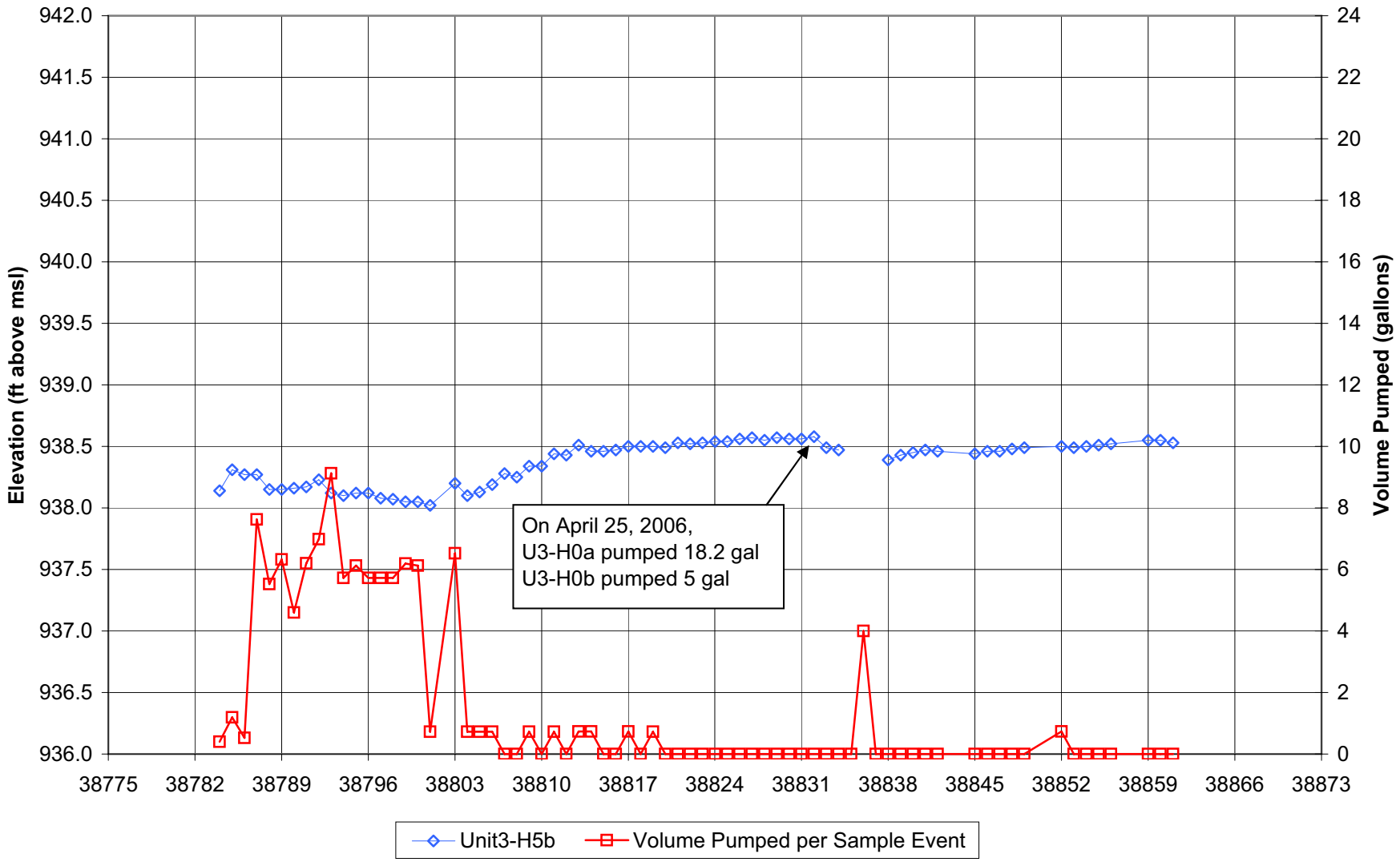
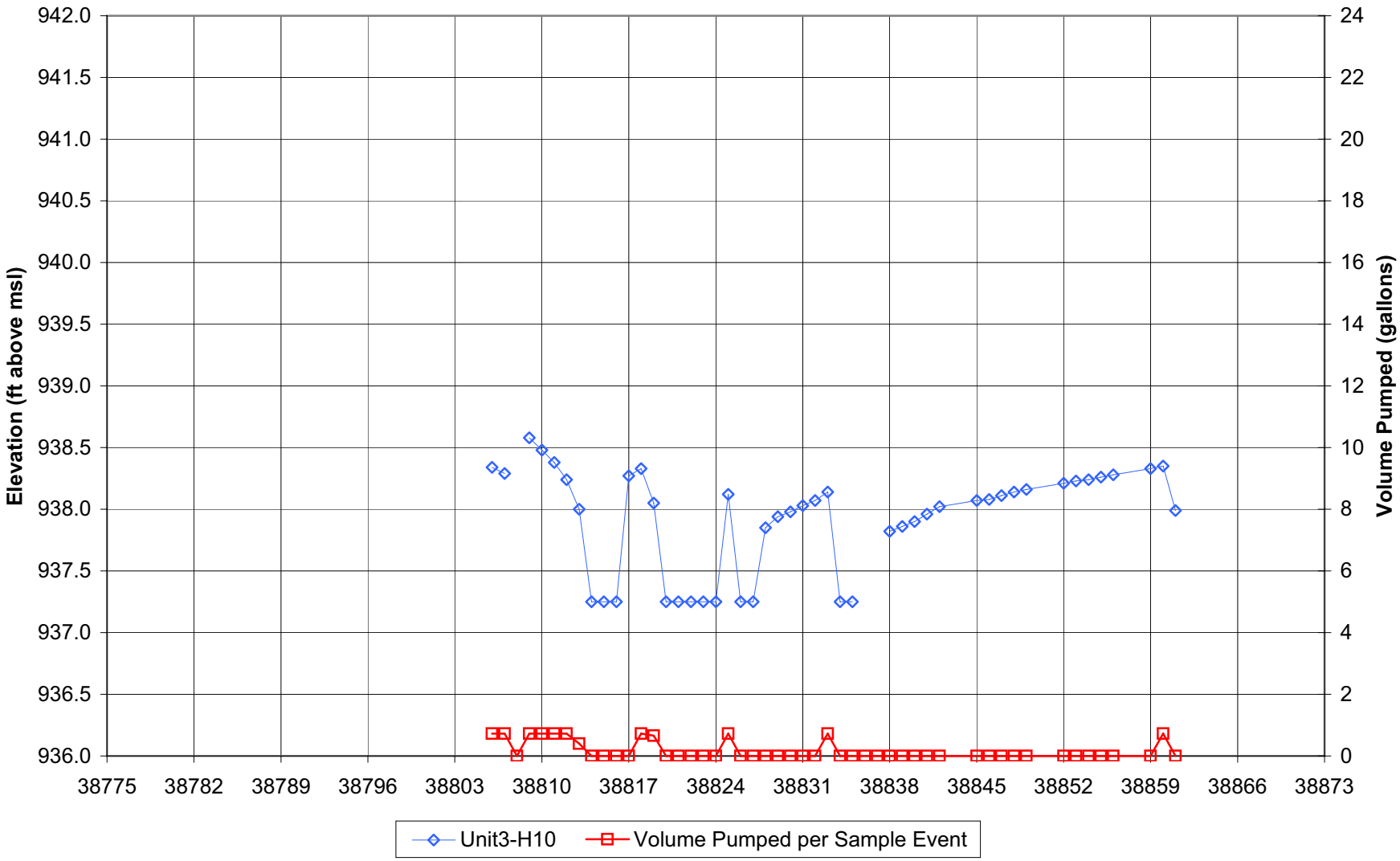
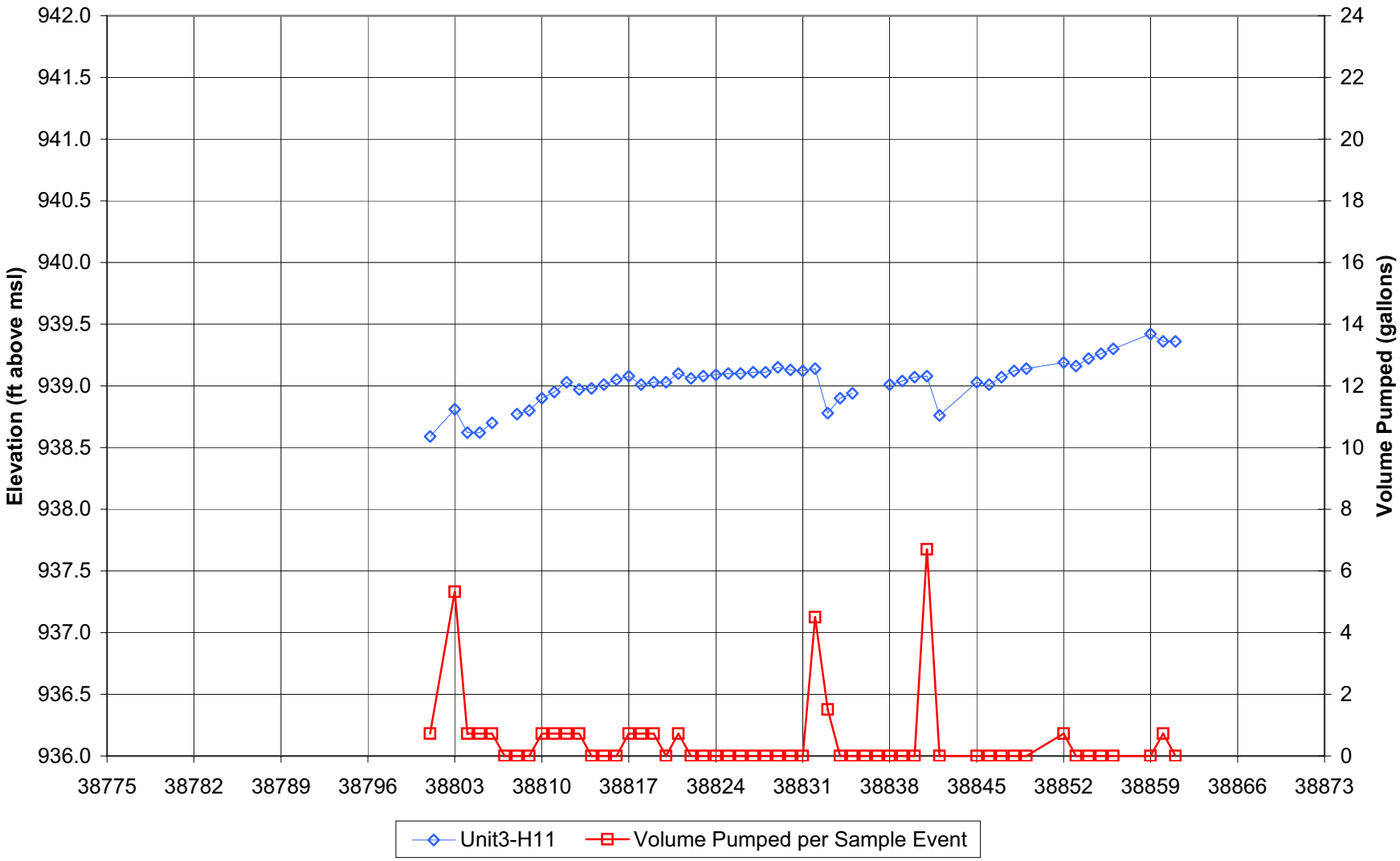


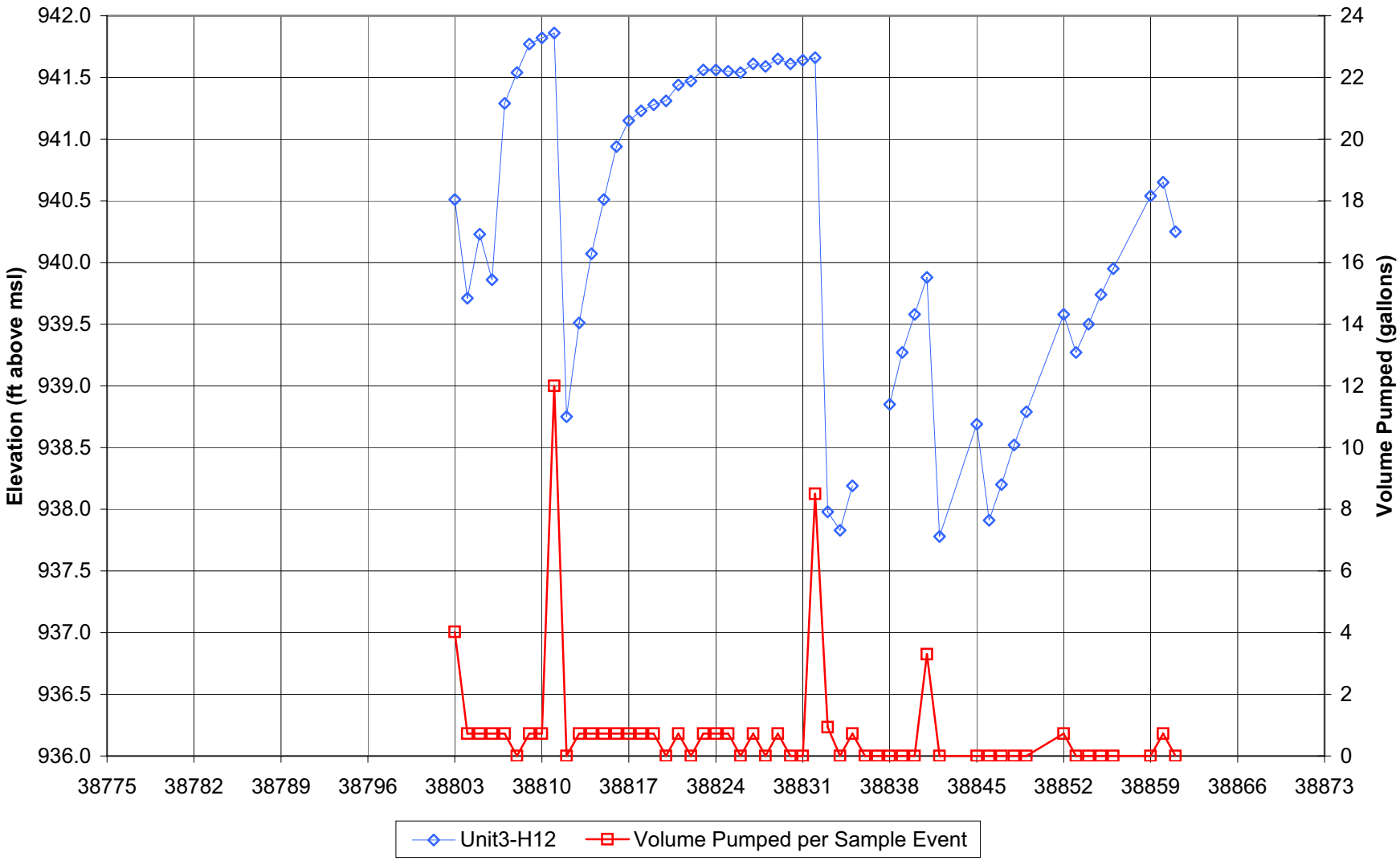
PVNGS Unit 3 Test Hole H10



PVNGS Unit 3 Test Hole H11



PVNGS Unit 3 Test Hole H12



Sample Results

U3 H-0ATest Hole Samples (Depth of hole = 13.25')

Source: 24May2006 PVNGS Chemistry Data Sheet

Note 1 – Data suspect - sample not distilled

Note 2 – Sample analyzed in Central Lab and Unit 3. Results in agreement. Reported value is from Central Lab

Note 3 – Sample originally showed Cs-137 @ 5.04 E-08 uCi/ml but the MCA peak was deformed. Recount≤ 4.67E-08 uCi/ml.

Note 4 – Sulfite data removed as only done on 2/27 sample and was < 1.0 ppm

Note 5 – Level recovered to initial level during sampling

Date	Time	pH	Cond (us/cm)	Si	Isotopic (uci/ml)	Tritium (uci/ml)	Cl	TTA	Zn	Ca. Hrdnes	Alk	Phos	Mo	Boron	Depth Feet	Sample Vol (L)	Vol Pumped (g)
2/27/2006	1540	9.31	555	27	<MDA	7.48 E-05 Note 1	0	0.29	0.74	>1000	75	<2	0.24				
2/28/2006	1430	9.03	550	32	<MDA	2.96 E-05	0	0.27	0.09	>1000	100	0					
3/1/2006	1345	8.95	580		<MDA	7.14 E-05 Note 2			0.11								
3/2/2006	1445	8.88	550		<MDA	6.51 E-05			0.07								
3/3/2006 Sample split with NRC	1209	8.69	322		<MDA NRC Result <MDA	6.7 E-05 Note 2 NRC Result 7.80E-05			0.07						12		
3/3/2006 ADEQ sample	1915				<MDA	6.84 E-05 7.8E-05 (ARRA)											
3/4/2006	1003	8.9	569		<MDA	6.68 E-05			0.03						12.25	1.5	
3/5/2006	1005	8.83	550		<MDA Note 3	7.54 E-05			0.04						12.2'	1.5	
3/6/2006	1055	8.8	530		<MDA	8.05 E-05			0.104					0.3	12.15' 12.16'	2	5
3/7/2006	1039	8.88	585		<MDA	7.53 E-05			0.113					0.3	12.15' 12.19'	2	5
3/8/2006	1030	8.83	568		<MDA	8.43 E-05			0.085					0.2	12.30' 12.39'	8	0.8
3/9/2006	1015	8.64	565		<MDA	5.30 E-05			0.083						12.34' 12.38'	2	3.3
3/10/2006	955	8.89	577		<MDA	8.76E-05			0.089					1.41	12.31' 12.32'	2	3.3
3/11/2006	1015	8.95	531		<MDA	9.45E-05									12.26' 12.30'	2	4.2
3/12/2006	925	9.07	532		<MDA	1.08E-04			0.013					1.38	12.29' 12.30'	2	4.2
3/13/2006	1020	8.95	525		<MDA	1.10E-04									12.32' 12.36'	2	2.5
3/14/2006	1100	8.82	580		<MDA	9.07 E-05								1.47	12.30' 12.32'	1.5	5
3/15/2006	925	8.9	568		<MDA	9.64 E-05									12.25' 12.29'	1.5	4.2
3/16/2006	1125	8.88	550		<MDA	8.45 E-05									12.67' 13.28'	7.5	2.5

Sample Results

U3 H-0ATest Hole Samples (Depth of hole = 13.25')

Source: 24May2006 PVNGS Chemistry Data Sheet

Note 1 – Data suspect - sample not distilled

Note 2 – Sample analyzed in Central Lab and Unit 3. Results in agreement. Reported value is from Central Lab

Note 3 – Sample originally showed Cs-137 @ 5.04 E-08 uCi/ml but the MCA peak was deformed. Recount≤ 4.67E-08 uCi/ml.

Note 4 – Sulfite data removed as only done on 2/27 sample and was < 1.0 ppm

Note 5 – Level recovered to initial level during sampling

Date	Time	pH	Cond (us/cm)	Si	Isotopic (uci/ml)	Tritium (uci/ml)	Cl	TTA	Zn	Ca. Hrdnes	Alk	Phos	Mo	Boron	Depth Feet	Sample Vol (L)	Vol Pumped (g)
3/17/2006	1015	8.84	565		<MDA	7.55 E-05			0					1.78	12.31' 12.35'	2.75	4.2
3/18/2006	945	8.83	544		<MDA	7.77 E-05									12.31' 12.36'	2.75	2.1
3/19/2006	1000	8.93	540		<MDA	7.52 E-05									12.33' 12.35'	2.75	3.3
3/20/2006	1005	8.88	540		<MDA	7.91 E-05			0.004					0.91	12.40' 12.43'	2.75	3.3
3/21/2006	840	8.85	593		<MDA	6.91 E-05									12.38' 12.41'	2.75	2.1
3/22/2006	900	8.6	632		<MDA	6.30 E-05			0					1.48	12.97' 13.20'	2.75	2.1
3/23/2006	936	8.49	617		<MDA	5.04 E-05			0					1.29	12.48' 12.63'	3	1.7
3/24/2006	1300	8.63	644		<MDA	6.14 E-05									12.46' 12.75'	2.75	2.1
3/25/2006	850	8.52	608		<MDA	5.34 E-05									12.46' 12.72'	2.75	N/A
3/27/2006	1231	8.58	645		<MDA	5.83 E-05									12.32' 12.34'	2.75	3.3
3/28/2006	1310	8.66	621		<MDA	7.12 E-05									12.40' 12.45'	2.75	N/A
3/29/2006	840	8.65	615		<MDA	6.53 E-05									12.36' 12.41'	2.75	N/A
3/30/2006	937	8.81	605		<MDA	6.31 E-05									12.34' 12.38'	2.75	N/A
3/31/2006															12.32'		
4/1/2006															12.29'		
4/2/2006															12.24'		
4/3/2006	1007	8.4	596		<MDA	6.80 E-05									12.19' 12.22'	2.75	N/A
4/4/2006															12.17'		
4/5/2006															12.14'		
4/6/2006															12.13'		
4/7/2006															12.12'		
4/8/2006															12.11'		
4/9/2006															12.08'		
4/10/2006	851	8.67	600		<MDA	6.86 E-05									12.07' 12.09'	2.75	N/A
4/11/2006															12.07'		
4/12/2006	1041	8.56	572		<MDA	7.18 E-05									12.07' 12.07'	2.75	N/A

Sample Results

U3 H-0ATest Hole Samples (Depth of hole = 13.25')

Source: 24May2006 PVNGS Chemistry Data Sheet

Note 1 – Data suspect - sample not distilled

Note 2 – Sample analyzed in Central Lab and Unit 3. Results in agreement. Reported value is from Central Lab

Note 3 – Sample originally showed Cs-137 @ 5.04 E-08 uCi/ml but the MCA peak was deformed. Recount≤ 4.67E-08 uCi/ml.

Note 4 – Sulfite data removed as only done on 2/27 sample and was < 1.0 ppm

Note 5 – Level recovered to initial level during sampling

Date	Time	pH	Cond (us/cm)	Si	Isotopic (uci/ml)	Tritium (uci/ml)	Cl	TTA	Zn	Ca. Hrdnes	Alk	Phos	Mo	Boron	Depth Feet	Sample Vol (L)	Vol Pumped (g)
4/13/2006															12.07'		
4/14/2006															12.05'		
4/15/2006															12.06'		
4/16/2006															12.04'		
4/17/2006															12.04'		
4/18/2006															12.03'		
4/19/2006															12.03'		
4/20/2006															12.02'		
4/21/2006															12.02'		
4/22/2006															12.01'		
4/23/2006															12.02'		
4/24/2006															12.01'		
4/25/2006															11.99' 12.32'		18.2
4/26/2006															12.29'		
4/27/2006															12.24'		
4/28/2006															12.25'		
4/29/2006																	12
4/30/2006																	
5/1/2006															12.29'		
5/2/2006															12.25'		
5/3/2006															12.23'		
5/4/2006															12.21'		
5/5/2006															12.25'		
5/8/2006															12.25'		
5/9/2006															12.23'		
5/10/2006															12.24'		
5/11/2006															12.22'		
5/12/2006	945	8.5	674		<MDA	5.30 E-05									12.21' 12.21' Note 5	2.75	
5/15/2006															12.18'		
5/16/2006															12.19'		
5/17/2006															12.18'		
5/18/2006															12.18'		
5/19/2006															12.17'		
5/22/2006															12.13'		
5/23/2006															12.14'		
5/24/2006															12.14'		

Sample Results

U3 H-0B Test Hole Samples (Depth of hole = 14.20')

Source: 24May2006 PVNGS Chemistry Data Sheet

Date	Time	pH	Cond (us/cm)	Isotopic (uci/ml)	Tritium (uci/ml)	Zn	Boron	Depth Feet	Sample Vol (L)	Vol Pumped (g)
3/22/2006	920	10.63	3462	<MDA	5.85 E-06	0.053	5.28	12.69' 12.91'	2.75	3.3
3/23/2006	909	10.5	3278	<MDA	4.78 E-06	0.021	4.3	13.15' 13.34'	3	2.1
3/24/2006	1020	10.32	3337	<MDA	6.45 E-06			13.19' 13.40'	2.75	2.1
3/25/2006	908	10.35	3322	<MDA	7.27 E-06			13.23' 13.53	2.75	N/A
3/27/2006	1232	10.45	3682	<MDA	5.03 E-06			12.73' 12.91'	2.75	3.3
3/28/2006	953	10.43	3320	<MDA	5.92 E-06			13.19' 13.41'	2.75	N/A
3/29/2006	920	10.42	3589	<MDA	5.22 E-06			13.00' 13.16'	2.75	N/A
3/30/2006	958	10.5	3682	<MDA	3.60 E-06			12.86' 13.03'	2.75	N/A
3/31/2006	839	10.54	3711	<MDA	4.46E-06			12.77' 12.94'	2.75	N/A
4/1/2006								12.71'		
4/2/2006	955	10.55	3601	<MDA	1.85 E-06			12.57' 12.80'	2.75	N/A
4/3/2006								12.58'		
4/4/2006	1316	10.58	3839	<MDA	3.43 E-06			12.47' 12.65'	2.75	N/A
4/5/2006								12.47'		
4/6/2006								12.45'		
4/7/2006								12.42'		
4/8/2006								12.41'		
4/9/2006								12.37'		
4/10/2006	921	10.67	3965	<MDA	2.11 E-06			12.35' 12.56'	2.75	N/A
4/11/2006								12.40'		
4/12/2006	1431	10.58	3835	<MDA	4.79 E-06			12.36' 12.54'	2.75	N/A
4/13/2006								12.40'		
4/14/2006	907	10.67	4066	<MDA	4.31 E-06			12.30' 12.50'	2.75	N/A
4/15/2006								12.36'		
4/16/2006	921	10.61	3432	<MDA	3.16 E-06			12.31' 12.52'	2.75	N/A
4/17/2006								12.35'		
4/18/2006								12.33'		
4/19/2006								12.31'		
4/20/2006								12.32'		
4/21/2006								12.30'		
4/22/2006								12.29'		

Sample Results

U3 H-0B Test Hole Samples (Depth of hole = 14.20')

Source: 24May2006 PVNGS Chemistry Data Sheet

Date	Time	pH	Cond (us/cm)	Isotopic (uci/ml)	Tritium (uci/ml)	Zn	Boron	Depth Feet	Sample Vol (L)	Vol Pumped (g)
4/23/2006								12.29'		
4/24/2006								12.30'		
4/25/2006								12.28' 14.20'		5
4/26/2006								12.79'		
4/27/2006								12.72'		
4/28/2006	1000	10.63	3766	<MDA	3.01 E-06			12.47' 12.63'	2.75	
4/29/2006										
4/30/2006										
5/1/2006								12.37'		
5/2/2006								12.36'		
5/3/2006								12.36'		
5/4/2006								12.36'		4.6
5/5/2006								12.80'		
5/8/2006	831	10.58	3693	<MDA	3.47 E-06			12.41' 12.85'		
5/9/2006								12.49'		
5/10/2006								12.42'		
5/11/2006								12.38'		
5/12/2006	901	10.6	3941	<MDA	2.68 E-06			12.36' 12.54'	2.75	
5/15/2006								12.34'		
5/16/2006								12.34'		
5/17/2006								12.32'		
5/18/2006								12.31'		
5/19/2006								12.31'		
5/22/2006								12.24'		
5/23/2006								12.29'		
5/24/2006								12.27'		

Sample Results

U3 H-1 Test Hole Samples (Depth of hole = 9.19')

Source: 24May2006 PVNGS Chemistry Data Sheet

Date	Time	pH	Cond (us/cm)	Isotopic (uci/ml)	Tritium (uci/ml)	Zn	Depth Feet	Sample Vol (L)	Vol Pumped (g)
3/12/2006	908	9.02	306	<MDA	4.71E-06		8.07' 8.36'	1	N/A
3/13/2006	1100	8.98	297	<MDA	5.01E-06	0	8.90' 9.10'	1	N/A
3/14/2006	1115	*	*	*	*	*	9.3'	0	N/A
3/15/2006	940	*	*	*	*	*	9.2'	0	N/A
4/6/2006							DRY		
4/13/2006							DRY		
4/20/2006							DRY		
4/26/2006							DRY		
5/3/2006							DRY		
5/10/2006							DRY		
5/17/2006							DRY		
5/24/2006							DRY		

Sample Results

U3 H-2 Test Hole Samples (Depth of hole = 24.8')

Source: 24May2006 PVNGS Chemistry Data Sheet

Note 1 - Approximate – water level is less than 1.5" in Test Hole

Date	Time	pH	Cond (us/cm)	Isotopic (uci/ml)	Tritium (uci/ml)	Zn	Depth Feet	Sample Vol (L)	Vol Pumped (g)
3/8/2006	940				<MDA		15.4' Note 1	0.15	
3/9/2006	720	8.21	6640		<MDA		15.4' Note 1	0.2	
3/10/2006							DRY		
3/13/2006	1045						DRY		
4/6/2006							DRY		
4/13/2006							DRY		
4/20/2006							DRY		
4/26/2006							DRY		
5/3/2006							DRY		
5/10/2006							DRY		
5/17/2006							DRY		
5/24/2006							DRY		

Sample Results

U3 H-3 Test Hole Samples (Depth of hole = 9.7')

Source: 24May2006 PVNGS Chemistry Data Sheet

Date	Time	pH	Cond (us/cm)	Isotopic (uci/ml)	Tritium (uci/ml)	Zn	Depth Feet	Sample Vol (L)	Vol Pumped (g)
							DRY		
4/6/2006							DRY		
4/13/2006							DRY		
4/20/2006							DRY		
4/26/2006							DRY		
5/3/2006							DRY		
5/10/2006							DRY		
5/17/2006							DRY		
5/24/2006							DRY		

Sample Results

U3 H-4 Test Hole Samples (Depth of hole = 9.1')

Source: 24May2006 PVNGS Chemistry Data Sheet

Date	Time	pH	Cond (us/cm)	Isotopic (uci/ml)	Tritium (uci/ml)	Zn	Depth Feet	Sample Vol (L)	Vol Pumped (g)
							DRY		
4/6/2006							DRY		
4/13/2006							DRY		
4/20/2006							DRY		
4/26/2006							DRY		
5/3/2006							DRY		
5/10/2006							DRY		
5/17/2006							DRY		
5/24/2006							DRY		

Sample Results

U3 H-5B Test Hole Samples (Depth of hole = 15.57')

Source: 24May2006 PVNGS Chemistry Data Sheet

Date	Time	pH	Cond (us/cm)	Isotopic (uci/ml)	Tritium (uci/ml)	Zn	Boron	Depth Feet	Sample Vol (L)	Vol Pumped (g)
3/8/2006	1740	8.45	774	<MDA	2.28 E-6	0.083	0.512	12.91	1.5	N/A
3/9/2006	600	8.41	710	<MDA	2.09 E-06			12.7	3	N/A
3/9/2006	1055			<MDA				12.74 12.74	1.5	N/A
3/10/2006	1015	8.41	772	<MDA	3.10 E-06	0.124	1.29	12.78' 12.80'	2	N/A
3/11/2006	1040	8.46	731	<MDA	2.84E-06	0.043	1.45	12.78' 12.80'	2	7.1
3/12/2006	853	8.93	805	<MDA	2.30E-06			12.90' 12.91'	2	5
3/13/2006	1100	8.42	805	<MDA	1.65E-06	0	1.63	12.90' 12.92	2	5.8
3/14/2006	1110	8.42	950	<MDA	2.38 E-06			12.89' 12.89'	1.5	4.2
3/15/2006	935	8.57	825	<MDA	3.26E-06			12.88' 12.90'	1.5	5.8
3/16/2006	1245	8.59	785	<MDA	2.34E-06			12.82' 12.90'	7.5	5
3/17/2006	1040	8.58	975	<MDA	2.42 E-06	0	1.63	12.93' 12.95	2.75	8.4
3/18/2006	1012	8.76		<MDA	2.64 E-06			12.95' 13.00'	2.75	5
3/19/2006	1220	8.87	905	<MDA	2.30 E-06			12.93' 12.95'	2.75	5.4
3/20/2006	1030	9	956	<MDA	2.34 E-06			12.93' 12.99'	2.75	5
3/21/2006	921	8.95	1093	<MDA	1.62 E-06	0	1.68	12.97' 13.20'	2.75	5
3/22/2006	940	9.22	874	<MDA	1.91 E-06	0	1.48	12.98' 13.03'	2.75	5
3/23/2006	952	9.16	848	<MDA	1.54 E-06	0	1.22	13.00' 13.15'	3	5.4
3/24/2006	1301	9.09	893	<MDA	3.79 E-06			13.00' 13.03'	2.75	5.4
3/25/2006	835	9.16	1054	<MDA	2.42 E-06			13.03' 13.12'	2.75	N/A
3/27/2006	1230	8.78	1043	<MDA	2.75 E-06			12.85' 12.88'	2.75	5.8
3/28/2006	1226	9.12	984	<MDA	2.62 E-06			12.95' 13.03'	2.75	N/A
3/29/2006	921	8.88	973	<MDA	2.62 E-06			12.92' 12.97'	2.75	N/A
3/30/2006	1040	8.79	982	<MDA	1.72 E-06			12.86' 12.88'	2.75	N/A
3/31/2006								12.77'		
4/1/2006								12.80'		
4/2/2006	1000	8.26	1047	<MDA	1.40 E-06			12.71' 12.75'	2.75	N/A

Sample Results

U3 H-5B Test Hole Samples (Depth of hole = 15.57')

Source: 24May2006 PVNGS Chemistry Data Sheet

Date	Time	pH	Cond (us/cm)	Isotopic (uci/ml)	Tritium (uci/ml)	Zn	Boron	Depth Feet	Sample Vol (L)	Vol Pumped (g)
4/3/2006								12.71'		
4/4/2006	1346	8.49	976	<MDA	2.47 E-06			12.61' 12.63'	2.75	
4/5/2006								12.62'		
4/6/2006	1021	8.31	836	<MDA	1.94 E-06			12.54' 12.58'	2.75	N/A
4/7/2006	933	8.54	830	<MDA	<MDA			12.59' 12.65'	2.75	N/A
4/8/2006								12.59'		
4/9/2006								12.58'		
4/10/2006	1006	8.57	830	<MDA	3.39 E-06			12.55' 12.58'	2.75	N/A
4/11/2006								12.55'		
4/12/2006	1446	8.61	756	<MDA	3.63 E-06			12.55' 12.57'	2.75	N/A
4/13/2006								12.56'		
4/14/2006								12.52'		
4/15/2006								12.53'		
4/16/2006								12.52'		
4/17/2006								12.51'		
4/18/2006								12.51'		
4/19/2006								12.49'		
4/20/2006								12.48'		
4/21/2006								12.50'		
4/22/2006								12.48'		
4/23/2006								12.49'		
4/24/2006								12.49'		
4/25/2006								12.47'		
4/26/2006								12.56'		
4/27/2006								12.58'		
4/28/2006										
4/29/2006										4
4/30/2006										
5/1/2006								12.66'		
5/2/2006								12.62'		
5/3/2006								12.60'		
5/4/2006								12.58'		
5/5/2006								12.59'		
5/8/2006								12.61'		
5/9/2006								12.59'		
5/10/2006								12.59'		
5/11/2006								12.57'		
5/12/2006								12.56'		
5/15/2006	1130	8.67	701	<MDA	3.12 E-06			12.55' 12.61'	2.75	
5/16/2006								12.56'		
5/17/2006								12.55'		

Sample Results

U3 H-5B Test Hole Samples (Depth of hole = 15.57')

Source: 24May2006 PVNGS Chemistry Data Sheet

Date	Time	pH	Cond (us/cm)	Isotopic (uci/ml)	Tritium (uci/ml)	Zn	Boron	Depth Feet	Sample Vol (L)	Vol Pumped (g)
5/18/2006								12.54'		
5/19/2006								12.53'		
5/22/2006								12.50'		
5/23/2006								12.50'		
5/24/2006								12.52		

Sample Results

U3 H-10 Test Hole Samples (Depth of hole =14')

Source: 24May2006 PVNGS Chemistry Data Sheet

Date	Time	pH	Cond (us/cm)	Isotopic (uci/ml)	Tritium (uci/ml)	Depth Feet	Sample Vol (L)	Vol Pumped (g)
3/30/2006	1542	8.69	1599	<MDA	2.61 E-06	12.91' 13.22'	2.75	N/A
3/31/2006	910	8.63	1540	<MDA	2.36 E-06	12.96' 13.26'	2.75	N/A
4/1/2006						12.97		
4/2/2006	859	8.57	1351	<MDA	1.27 E-06	12.67' 12.99'	2.75	N/A
4/3/2006	1046	8.64	1404	<MDA	2.26 E-06	12.77' 13.05'	2.75	N/A
4/4/2006	1456	8.67	1392	<MDA	2.42 E-06	12.87' 13.18'	2.75	N/A
4/5/2006	916	8.65	1414	<MDA	4.20 E-06	13.01' 13.46'	2.75	N/A
4/6/2006	902	8.65	1633	<MDA	2.27 E-06	13.25' DRY	1.5	
4/7/2006						DRY		N/A
4/8/2006						DRY		N/A
4/9/2006						DRY		N/A
4/10/2006						12.98'		N/A
4/11/2006	1026	8.64	1526	<MDA	3.96 E-06	12.92' 13.31'	2.75	N/A
4/12/2006	1501	8.62	1520	<MDA		13.20' 13.50'	2.5	N/A
4/13/2006						DRY		
4/14/2006						DRY		
4/15/2006						DRY		
4/16/2006						DRY		
4/17/2006						DRY		
4/18/2006	1006	8.47	1640	<MDA	3.55 E-06	13.13' DRY	2.75	N/A
4/19/2006						DRY		
4/20/2006						DRY		
4/21/2006						13.40'		
4/22/2006						13.31'		
4/23/2006						13.27'		
4/24/2006						13.22'		
4/25/2006						13.18'		
4/26/2006	1636	8.58	1765	<MDA	2.89 E-06	13.11' DRY	2.75	N/A
4/27/2006						DRY		
4/28/2006						DRY		

Sample Results

U3 H-10 Test Hole Samples (Depth of hole =14')
Source: 24May2006 PVNGS Chemistry Data Sheet

Date	Time	pH	Cond (us/cm)	Isotopic (uci/ml)	Tritium (uci/ml)	Depth Feet	Sample Vol (L)	Vol Pumped (g)
4/29/2006								
4/30/2006								
5/1/2006						13.43'		
5/2/2006						13.39'		
5/3/2006						13.35'		
5/4/2006						13.29'		
5/5/2006						13.23'		
5/8/2006						13.18'		
5/9/2006						13.17'		
5/10/2006						13.14'		
5/11/2006						13.11'		
5/12/2006						13.09'		
5/15/2006						13.04'		
5/16/2006						13.02'		
5/17/2006						13.01'		
5/18/2006						12.99'		
5/19/2006						12.97'		
5/22/2006						12.92'		
5/23/2006	931	8.61	1980	<MDA	2.24 E-06	12.90' 13.31'	2.75	
5/24/2006						13.26'		

Sample Results

U3 H-11 Test Hole Samples (Depth of hole = 15.10')
Source: 24May2006 PVNGS Chemistry Data Sheet

Date	Time	pH	Cond (us/cm)	Isotopic (uci/ml)	Tritium (uci/ml)	Depth Feet	Sample Vol (L)	Vol Pumped (g)
3/25/2006	948	9.6	661	<MDA	1.11 E-04	12.56' 12.67'	2.75	N/A
3/27/2006	1020	9.21	598	<MDA	3.87 E-05	12.34' 12.51'	2.75	4.6
3/28/2006	1235	9.84	709	<MDA	7.73 E-05	12.53' 12.79'	2.75	N/A
3/29/2006	950	9.49	589	<MDA	5.29E-05	12.45' 12.67'	2.75	N/A
3/30/2006	1014	9.34	564	<MDA	4.93 E-05	12.45' 12.64'	2.75	N/A
3/31/2006						12.42'		
4/1/2006						12.38'		
4/2/2006						12.35'		
4/3/2006	1026	9.17	666	<MDA	4.06 E-05	12.25' 12.35'	2.75	N/A
4/4/2006	1416	9.22	671	<MDA	4.22 E-05	12.20' 12.27'	2.75	N/A
4/5/2006	901	9.23	674	<MDA	4.15 E-05	12.12' 12.26'	2.75	N/A
4/6/2006	935	9.18	663	<MDA	3.28 E-05	12.18' 12.36'	2.75	N/A
4/7/2006						12.17'		
4/8/2006						12.14'		
4/9/2006						12.10'		
4/10/2006	830	9.2	688	<MDA	3.32 E-05	12.07' 12.18'	2.75	N/A
4/11/2006						12.14		
4/12/2006	1020	9.14	683	<MDA	3.33 E-05	12.12' 12.31'	2.75	N/A
4/13/2006						12.12'		
4/14/2006	900	9.2	730	<MDA	3.89 E-05	12.05' 12.15'	2.75	N/A
4/15/2006						12.09'		
4/16/2006						12.07'		
4/17/2006						12.06'		
4/18/2006						12.05'		
4/19/2006						12.05'		
4/20/2006						12.04'		
4/21/2006						12.04'		
4/22/2006						12.00'		
4/23/2006						12.02'		

Sample Results

U3 H-11 Test Hole Samples (Depth of hole = 15.10')
Source: 24May2006 PVNGS Chemistry Data Sheet

Date	Time	pH	Cond (us/cm)	Isotopic (uci/ml)	Tritium (uci/ml)	Depth Feet	Sample Vol (L)	Vol Pumped (g)
4/24/2006						12.03'		
4/25/2006						12.01' 14.41'		4.5
4/26/2006						12.37'		
4/27/2006						12.25'		
4/28/2006						12.21'		
4/29/2006								
4/30/2006								
5/1/2006						12.14'		
5/2/2006						12.11'		
5/3/2006						12.08'		
5/4/2006						12.07'		6.7
5/5/2006						12.39'		
5/8/2006	900	9.06	795	<MDA	3.59 E-05	12.12'		
5/9/2006						12.14'		
5/10/2006						12.08'		
5/11/2006						12.03'		
5/12/2006						12.01'		
5/15/2006	1031	9.14	712	<MDA	2.73 E-05	11.96' 12.09'	2.75	
5/16/2006						11.99'		
5/17/2006						11.93'		
5/18/2006						11.89'		
5/19/2006						11.85'		
5/22/2006						11.73'		
5/23/2006	911	9.16	712	<MDA	1.80 E-05	11.79' 11.98'	2.75	
5/24/2006						11.79'		

Sample Results

U3 H-12 Test Hole Samples (Depth of hole = 14.85')

Source: 24May2006 PVNGS Chemistry Data Sheet

Note: H-12 in Unit 3 was pumped essentially dry on Tuesday (4Apr06). Approximately 12 gallons were pumped out. As of yesterday morning (5April06) the level had increased approximately 1.3 feet.

Note 1 – 4/16/06 Tritium Analysis Data Suspect. Sample taken 4/17/06 showed <MDA

Date	Time	pH	Cond (us/cm)	Isotopic (uci/ml)	Tritium (uci/ml)	Depth Feet	Sample Vol (L)	Vol Pumped (g)
3/27/2006	1021	9.99	879	<MDA	2.50 E-06	11.76' 11.94'	2.75	3.3
3/28/2006	1336	9.91	833	<MDA	1.43 E-06	12.56' 12.90'	2.75	N/A
3/29/2006	1003	9.99	857	<MDA	7.93 E-06	12.04' 12.21'	2.75	N/A
3/30/2006	1050	10	819	<MDA	1.61 E-06	12.41' 12.60'	2.75	N/A
3/31/2006	940	10	814	<MDA	1.75 E-06	10.98' 11.10'	2.75	N/A
4/1/2006						10.73		
4/2/2006	908	10.09	749	<MDA	<MDA	10.50' 11.60'	2.75	N/A
4/3/2006	1055	10.04	764	<MDA	<MDA	10.45' 10.53'	2.75	N/A
4/4/2006	1436	10.05	773	<MDA	1.92 E-06	10.41'	2.75	11.7
4/5/2006	1401					13.52'		
4/6/2006	831	9.96	852	<MDA	1.32 E-06	12.76' 13.34'	2.75	N/A
4/7/2006	923	9.94	805	<MDA	2.02 E-06	12.20' 12.70'	2.75	N/A
4/8/2006	807	9.84	750	<MDA	1.46 E-06	11.76' 12.26	2.75	N/A
4/9/2006	915	9.77	780	<MDA	1.43 E-06	11.33' 11.84	2.75	N/A
4/10/2006	818	9.74	735	<MDA	<MDA	11.12'	2.75	N/A
4/11/2006	1001	9.73	745	<MDA	2.18 E-06	11.04' 11.26'	2.75	N/A
4/12/2006	1001	9.66	728	<MDA	2.24 E-06	10.99' 11.15'	2.75	N/A
4/13/2006						10.96'		
4/14/2006	847	9.68	709	<MDA	4.31 E-06	10.83' 10.92'	2.75	N/A
4/15/2006						10.80'		
4/16/2006	911	9.61	708	<MDA	1.41 E-05 **Note 1**	10.71' 10.78'	2.75	N/A
4/17/2006	941	9.53	652	<MDA	<MDA	10.71' 10.78'	2.75	N/A
4/18/2006	1021	9.53	675	<MDA	1.11 E-06	10.72' 10.79'	2.75	N/A

Sample Results

U3 H-12 Test Hole Samples (Depth of hole = 14.85')

Source: 24May2006 PVNGS Chemistry Data Sheet

Note: H-12 in Unit 3 was pumped essentially dry on Tuesday (4Apr06). Approximately 12 gallons were pumped out. As of yesterday morning (5April06) the level had increased approximately 1.3 feet.

Note 1 – 4/16/06 Tritium Analysis Data Suspect. Sample taken 4/17/06 showed <MDA

Date	Time	pH	Cond (us/cm)	Isotopic (uci/ml)	Tritium (uci/ml)	Depth Feet	Sample Vol (L)	Vol Pumped (g)
4/19/2006						10.73'		
4/20/2006	1446	9.54	693	<MDA	1.93 E-06	10.66' 10.72'	2.75	N/A
4/21/2006						10.68'		
4/22/2006	10.26	9.58	707	<MDA	3.27 E-06	10.62' 10.71'	2.75	
4/23/2006						10.66'		
4/24/2006						10.63'		
4/25/2006						10.61' 14.60'		8.5
4/26/2006						14.29'		
4/27/2006						14.44'		
4/28/2006	940	9.72	1013	<MDA	2.99 E-06	14.08' 14.59'	2.75	
4/29/2006								
4/30/2006								
5/1/2006						13.42'		
5/2/2006						13.00'		
5/3/2006						12.69'		
5/4/2006						12.39'		3.3
5/5/2006						14.49'		
5/8/2006	930	9.75	1134	<MDA	6.33 E-06	13.58'		
5/9/2006						14.36'		
5/10/2006						14.07'		
5/11/2006						13.75'		
5/12/2006						13.48'		
5/15/2006	1051	9.64	1146	<MDA	1.56 E-06	12.69' 13.23'	2.75	
5/16/2006						13.00'		
5/17/2006						12.77'		
5/18/2006						12.53'		
5/19/2006						12.32'		
5/22/2006						11.73'		
5/23/2006	1001	9.7	1156	<MDA	1.13 E-06	11.62' 12.20'	2.75	
5/24/2006						12.02'		

Sample Results

U3 H-19 Test Hole Samples (Depth of hole = 8.72')

Source: 24May2006 PVNGS Chemistry Data Sheet

Note 1 – Data suspect -backup analysis of same aliquot showed 5.44 E-5 – suspect chemical interference.

Note 2 – Hole removed by excavation – water samples from trench will continue to be called H-19 in this area

Note 3 – Sample taken from Plant SW water puddle in trench

Note 4 – Sample taken from Plant NE water puddle in trench at base of where H-19 hole was. Appears to be localized elevated pH and conductivity

Note 5 – Area backfilled on 4/18/2006

Note 6 – New H-19 installed – Depth of hole is 8.5'. Will monitor and record levels if water is present.

Date	Time	pH	Cond (us/cm)	Isotopic (uci/ml)	Tritium (uci/ml)	Depth Feet	Sample Vol (L)	Vol Pumped (g)
4/9/2006	900	12.12	9890	<MDA	1.07 E-06	8.50' DRY	0.25	N/A
4/10/2006	951	12.17	9736	<MDA	2.46 E-05 Note 1	8.52' 8.70'	2.75	N/A
4/11/2006	1530	12.18	9284	<MDA	1.39 E-06	> 8.5'	2.75	N/A
4/12/2006						>8.5'		
4/13/2006	1000	11.82	6249	<MDA	2.95 E-06	>8.5'	1.25	N/A Note 2
4/14/2006	1755	11.58	5620			N/A		
4/15/2006	1600	11.28	6245			N/A		Note 3
4/15/2006	1601	11.87	7830			N/A		Note 4
4/16/2006	940	11.68	7849	<MDA	3.44 E-06	N/A	N/A	N/A
4/17/2006	800	11.6	8143	<MDA	6.08 E-06	N/A	N/A	N/A
4/18/2006								Note 5
4/19/2006								Note 6
4/26/2006						DRY		
5/3/2006						DRY		
5/10/2006						DRY		
5/17/2006						DRY		
5/24/2006						DRY		

Unit	Test Hole	Ground Elevation	TOC Elevation	Diff in Ft.	Diff in In.	Northing	Easting	Northing	Easting
1	H-O-A	**956.40**	957.15	0.75	9.00	876.67	2769.25	**870390.67**	**211342.77**
1	H-O-B	956.40	956.94	0.54	6.48	866.33	2772.25	**870384.68**	**211351.72**
2	H-O-A	953.37	953.30	-0.07	-0.84	881.67	2771.17	**869461.54**	**210660.88**
2	H-O-B	953.37	953.60	0.23	2.76	866.75	2771.17	**869454.07**	**210673.80**
2	H-1					936.67	2799.5	**869513.57**	**210627.42**
2	H-10					891.17	2797.33	**869488.94**	**210665.73**
2	H-12A					927.17	2779.5	**869491.49**	**210625.64**
2	H-12B					927.17	2778.0	**869490.20**	**210624.89**
2	H-13					935.17	2777.5	**869493.77**	**210617.71**
2	H-17					1047.5	2794.0	**869564.22**	**210528.68**
3	H-O-A	950.32	**950.74**	0.42	5.04	881.00	2771.50	**868351.27**	**210341.99**
3	H-O-B	950.32	951.07	0.75	9.00	866.16	2772.25	**868349.42**	**210356.74**
3	H-1	951.06	951.42	0.36	4.32	934.04	2804.00	**868392.49**	**210295.40**
3	H-2	950.26	950.98	0.72	8.64	850.58	2770.50	**868344.99**	**210371.78**
3	H-3	950.42	951.26	0.84	10.08	881.34	2758.00	**868338.03**	**210339.32**
3	H-4	950.41	951.49	1.08	12.96	881.59	2726.60	**868307.15**	**210333.62**
3	H-5B	950.35	951.05	0.70	8.40	887.03	2763.80	**868344.73**	**210334.72**
3	H-5A	950.39	950.56	0.17	2.04	889.17	2766.17	**868347.43**	**210333.02**
3	H-6	950.49	No Casing						
3	H-10	950.68	951.25	0.57	6.84	890.52	2801.00	**868381.97**	**210337.74**
3	H-11	950.40	951.15	0.75	9.00	887.17	2789.67	**868370.24**	**210339.07**
3	H-12	950.86	952.27	1.41	16.92	928.03	2778.25	**868366.08**	**210296.85**
3	H-14D	951.14	951.64	0.50	6.00	1006.80	2780.30	**868381.77**	**210219.63**
3	H-15	951.01	951.51	0.50	6.00	945.77	2738.50	**868343.38**	**210180.70**
3	H-16					993.00	2770.50	**868369.73**	**210231.52**
3	H-17A					1043.00	2784.00	**868391.71**	**210184.62**
3	H-17B					1047.75	2784.00	**868392.53**	**210179.95**

TOC = Top of Casing

State Plane Coordinates

Old Surveys

Unit	Test Hole	Ground Elevation	TOC Elevation	Diff in Ft.	Diff in In.	Northing	Easting	Northing	Easting
1	H-O-A	**956.40**	957.15	0.75	9.00	876.67	2769.25	**870390.67**	**211342.77**
1	H-O-B	956.40	956.94	0.54	6.48	866.33	2772.25	**870384.68**	**211351.72**
2	H-O-A	953.37	953.30	-0.07	-0.84	881.67	2771.17	**869461.54**	**210660.88**
2	H-O-B	953.37	953.60	0.23	2.76	866.75	2771.17	**869454.07**	**210673.80**
3	H-O-A	950.32	**950.60**	0.28	3.36	881.00	2771.50	**868351.27**	**210341.99**
3	H-O-B	950.32	951.07	0.75	9.00	866.16	2772.25	**868349.42**	**210356.74**
3	H-1	951.06	951.42	0.36	4.32	934.04	2804.00	**868392.49**	**210295.40**
3	H-2	950.26	950.98	0.72	8.64	850.58	2770.50	**868344.99**	**210371.78**
3	H-3	950.42	951.26	0.84	10.08	881.34	2758.00	**868338.03**	**210339.32**
3	H-4	950.41	951.49	1.08	12.96	881.59	2726.60	**868307.15**	**210333.62**
3	H-5B	950.35	951.05	0.70	8.40	887.03	2763.80	**868344.73**	**210334.72**
3	H-5A	950.39	950.56	0.17	2.04	889.17	2766.17	**868347.43**	**210333.02**
3	H-6	950.49	No Casing						
3	H-10	950.68	951.25	0.57	6.84	890.52	2801.00	**868381.97**	**210337.74**
3	H-11	950.40	951.15	0.75	9.00	887.17	2789.67	**868370.24**	**210339.07**
3	H-12	950.86	952.27	1.41	16.92	899.81	2778.25	**868361.18**	**210324.64**

TOC = Top of Casing

State Plane Coordinates

28March2006 Data

Unit	Test Hole	Ground Elevation	TOC Elevation	Diff in Ft.	Diff in In.	Northing	Easting
1	H-O-A	**956.40**	957.15	0.75	9.00	876.67	2769.25
1	H-O-B	956.40	956.94	0.54	6.48	866.33	2772.25
2	H-O-A	953.37	953.30	-0.07	-0.84	881.67	2771.17
2	H-O-B	953.37	953.60	0.23	2.76	866.75	2771.17
3	H-O-A	950.32	**950.60**	0.28	3.36	881.00	2771.50
3	H-O-B	950.32	951.07	0.75	9.00	866.16	2772.25
3	H-1	951.06	951.42	0.36	4.32	934.04	2804.00
3	H-2	950.26	950.98	0.72	8.64	850.58	2770.50
3	H-3	950.42	951.26	0.84	10.08	881.34	2758.00
3	H-4	950.41	951.49	1.08	12.96	881.59	2726.60
3	H-5B	950.35	951.05	0.70	8.40	887.03	2763.80
3	H-5A	950.39	950.56	0.17	2.04	889.17	2766.17
3	H-6	950.49	No Casing				
3	H-10	950.68	951.25	0.57	6.84	890.52	2801.00
3	H-11	950.40	951.15	0.75	9.00	887.17	2789.67
3	H-12	950.86	952.27	1.41	16.92	899.81	2778.25

TOC = Top of Casing

APPENDIX C

Analytical Data

Unit 1
Tritium Evaluation Data

U1 H-0A Test Hole Samples (Hole depth = 14.95')

Date	Time	pH	Cond (uS/cm)	Si (ppm)	Isotopic (uci/ml)	Tritium (uci/ml)	Cl	TTA	Zn	Ca. Hrd	Alk	Phos	Mo	Boron	Depth Feet	SmpVol (L)	Vol Pumped (g)
3/4/2006	1340														DRY		
3/10/2006	1000														DRY		
3/17/2006	1010														DRY		
3/24/2006	1014														DRY		
4/06/2006															DRY		
4/13/2006															DRY		
4/20/2006															DRY		
4/26/2006															DRY		
5/3/2006															DRY		
5/10/2006															DRY		
5/17/2006															DRY		

U1 H-0B Test Hole Samples (Hole depth = 14.65')

Date	Time	pH	Cond (uS/cm)	Si (ppm)	Isotopic (uci/ml)	Tritium (uci/ml)	Cl	TTA	Zn	Ca. Hrd	Alk	Phos	Mo	Boron	Depth Feet	SmpVol (L)	Vol Pumped (g)
3/23/2006	1100														DRY		
3/24/2006	1014														DRY		
4/06/2006															DRY		
4/13/2006															DRY		
4/20/2006															DRY		
4/26/2006															DRY		
5/3/2006															DRY		
5/10/2006															DRY		
5/17/2006															DRY		

Unit 1
Tritium Evaluation Data

Unit 1 Miscellaneous Samples

Sample Type	Date/Time	Tritium (uCi/ml)	Isotopic (uCi/ml)	pH	Cond	Zinc	Boron	Vol. Pumped (gal)
CVCS HUT Instrument Pit	3/15/2006 1450	7.92 X 10-6	1.45 X 10-6 Note 1	8.96	905	0.1	3.91	
CVCS Hut Sump	3/17/2006 1005	8.12 X 10-3	6.12 X 10-5	7.95	455			
North Yard Sump	3/22/2006 2010	<MDA	<MDA	7.33	293			

Note 1 - C0-58 – 8.6 X 10-7, Co60 – 1.39 X 10-7, Nb-95 – 2.44 X 10-7, Zr-95 – 3.33 X 10-8

Unit 1
Tritium Evaluation Data

Common Area Miscellaneous Samples

Sample Type	Date/Time	Tritium (uCi/ml)	Isotopic (uCi/ml)	pH	Cond	Zinc	Boron	Vol. Pumped (gal)
Sedementation Basin	3/13/1405	4.82 X 10-7	<MDA					
Access Rd. runoff retention basin at Wintersburg Rd.	3/15/2006 1120	<MDA	<MDA	8.71	740			
Access Rd. runoff retention basin 0.15 miles off Wintersburg Rd.	3/15/2006 1135	<MDA	<MDA	8.89	676			
1EZV10NKFM34 (Manway at CW)	3/28/2006 1500	2.25 X 10-6	<MDA	8.28	>100000			
1EZV10NKAM07 (Manway at CW)	3/28/2006 1501	2.90 X 10-6	3.77 X 10-8 (I-131)	7.65	>50000			
Manhole FM01	4/03/2006 1040	1.14 X 10-6						
Manhole FM03	4/03/2006 1045	<MDA						
Manhole KKM89	4/03/2006 1050	<MDA						

Unit 1
Tritium Evaluation Data

Well Sample Results

Well	Date	Tritium (pCi/l)	Isotopic (pCi/l)	
Berryman	2/28/2006	<MDA		
Gavett	2/28/2006	<MDA		
McArthur	2/28/2006	<MDA		
Chowonec	2/28/2006	<MDA		
PV206A	3/2/2006	<MDA		
PV206B	3/2/2006	<MDA		
Q8	3/3/2006	<MDA		
198AR	3/3/2006	<MDA		
Berryman	3/21/2006	<MDA		
Gavett	3/21/2006	<MDA		
McArthur	3/21/2006	<MDA		
Chowonec	3/21/2006	<MDA		
Berryman	4/18/2006	<MDA		
Gavett	4/18/2006	<MDA		
McArthur	4/18/2006	<MDA		
Chowonec	4/18/2006	<MDA		

Unit 1
Tritium Evaluation Data

Scupper Samples Tritium Results (uci/ml)

Sample Point	Date	Time	Unit 1	Unit 2	Unit 3	RP Sample #
West Side of OSB	3/11/2006	U1 0822 U2 0800 U3 0723	<MDA	<MDA	<MDA	U1 1-06-00164 U2 2-06-00138 U3 3-06-00096
S.W. Corner of Fuel Bldg	3/11/2006	U1 0833 U2 0821 U3 0859	<MDA	<MDA	<MDA	U1 1-06-00171 U2 2-06-00142 U3 3-06-00106
S.E. Corner of Fuel Bldg	3/11/2006	U1 0834 U2 0820 U3 0856	<MDA	3.85 X 10-6	2.24 X 10-6	U1 1-06-00170 U2 2-06-00141 U3 3-06-00105
Aux. Bldg Plant N.W. Scupper	3/11/2006	U1 0829 U2 0825 U3 0840	<MDA	<MDA	2.06 X 10-6	U1 1-06-00169 U2 2-06-00143 U3 3-06-00104
Aux. Bldg Plant S.W. Scupper	3/11/2006	U1 0832 U2 0835 U3 0852	<MDA	<MDA	<MDA	U1 1-06-00168 U2 2-06-00145 U3 3-06-00103
N.W. Corner R.W. Bldg	3/11/2006	U1 0831 U2 0830 U3 0850	<MDA	<MDA	<MDA	U1 1-06-00167 U2 2-06-00144 U3 3-06-00102
Cont. Bldg Plant S.W. Scupper	3/11/2006	U1 0825 U2 0845 U3 0840	<MDA	<MDA	<MDA	U1 1-06-00166 U2 2-06-00147 U3 3-06-00100
D.G. Bldg Plant East Scupper	3/11/2006	U1 0820 U2 0600 U3 0720	<MDA	<MDA	<MDA	U1 1-06-00163 U2 2-06-00137 U3 3-06-00095
Aux. Bldg Plant S.E. Scupper	3/11/2006	U1 0815 U2 U3 0730	<MDA		<MDA	U1 1-06-00162 U2 U3 3-06-00097
Aux. Bldg Plant N. E. Scupper	3/11/2006	U1 0815 U2 0805 U3 0731	<MDA	1.12 X 10-6	<MDA	U1 1-06-00161 U2 2-06-00139 U3 3-06-00098
MSSS Scupper	3/11/2006	U1 0815 U2 0810 U3 0819	<MDA	<MDA	<MDA	U1 1-06-00160 U2 2-06-00140 U3 3-06-00099
U1 Pipe Density Tunnel	3/11/2006	1001	3.62 X 10-5 Central Lab 3.69 X 10-5			1-06-00172
U2 Pipe Density Tunnel	3/11/2006	1000		1.99 X 10-5 Central Lab 1.90 X 10-5		2-06-00148
U3 Pipe Density Tunnel	3/11/2006	0935			1.77 X 10-5	3-06-00107
U3 Pipe Density Tunnel	3/11/2006	0937			1.09 X 10-5	3-06-00108
U2 Aux Bldg Roof	3/12/2006	1030		2.11X 10-5		2-06-00149
U3 Aux Bldg Roof	3/12/2006	1420			1.66 X 10-5	3-06-00149
U1 Laundry Bldg	3/11/2006	0825	<MDA			1-06-00165

Unit 1
Tritium Evaluation Data

Rain Water Sample Tritium Results (uci/ml)

Sample Point	Date	Time	Unit 1	Unit 2	Unit 3	RP Sample #
T.B Roof Center Drain Plant North Puddle	3/19/2006	U1 U2 0730 U3 1115		6.18 X 10-6	8.52 X 10-6	U1 U2 2-06-00162 U3 3-06-00130
T.B. Roof Center Drain Plant South Puddle	3/19/2006	U1 U2 0735 U3 1105		5.41 X 10-6	8.03 X 10-5	U1 U2 2-06-00163 U3 3-06-00129
Aux Bldg Roof Central Area Puddle	3/19/2006	U1 U2 0750 U3		1.60 X 10-5		U1 U2 2-06-00164 U3
Aux. Bldg Roof Plant East Puddle	3/19/2006	U1 U2 0755 U3		1.45 X 10-5	1.92 X 10-5	U1 U2 2-06-00165 U3 3-06-00128
Aux. Bldg. Roof Plant West Puddle	3/19/2006	U1 U2 U3 1030			1.39 X 10-5	U1 U2 U3 3-06-00127
Fuel Bldg. Plant S.E. Scupper	3/19/2006	U1 U2 0800 U3		2.72 X 10-5		U1 U2 2-06-00166 U3
Aux. Bldg Plant N.W. Scupper	3/19/2006	U1 U2 0805 U3		1.29 X 10-5		U1 U2 2-06-00167 U3
Tritium Bubbler ~25' Plant East of Plant Vent	U2 3/19/2006 U3 3/18/2006	U2 0255 U3 0305		2.36 E-10	3.79 X 10-8	U2 2-06-00161 U3 3-06-00124

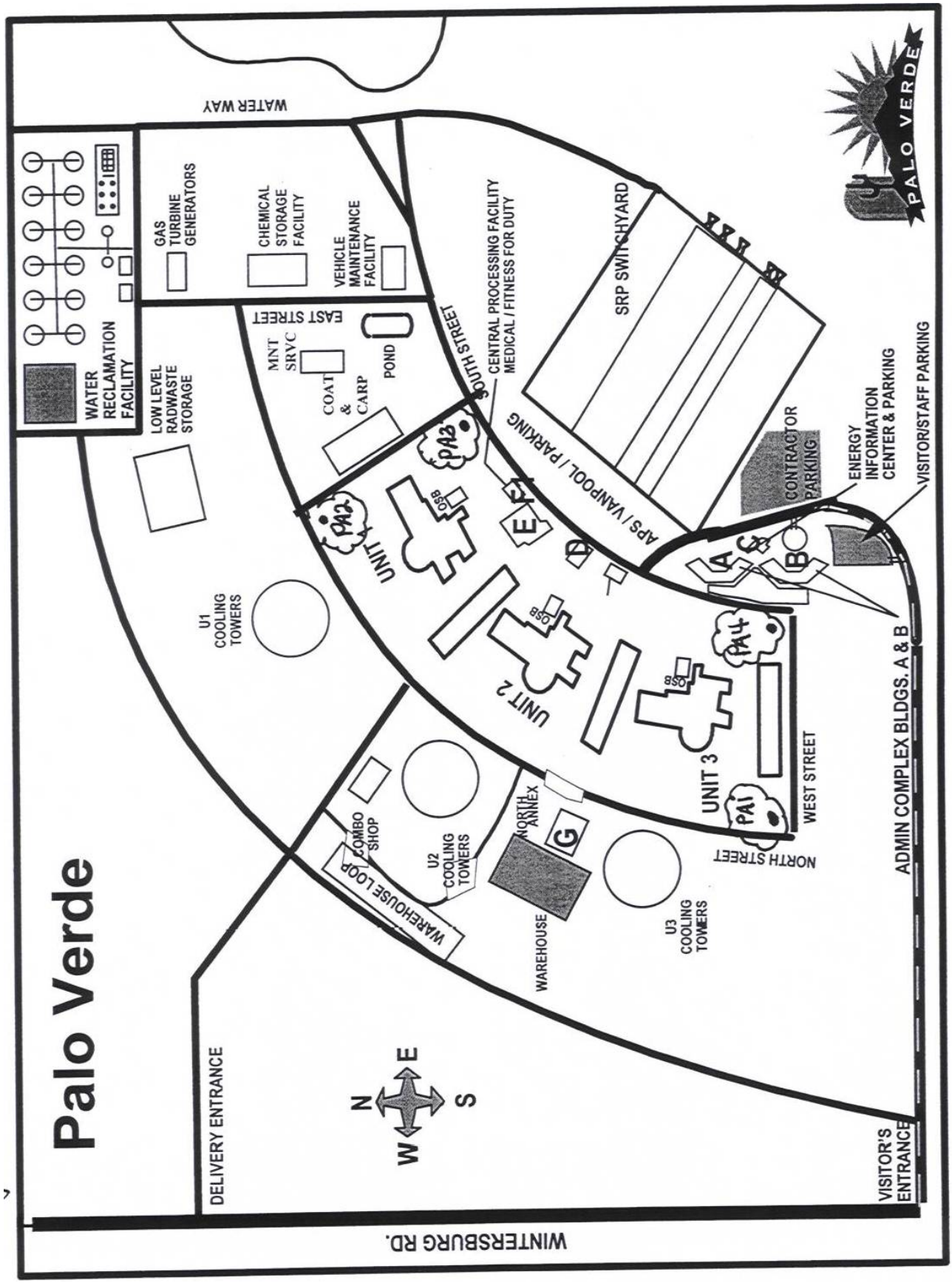
Unit 1
Tritium Evaluation Data

Tritium Deposition Pan Tritium Results (uci/ml)

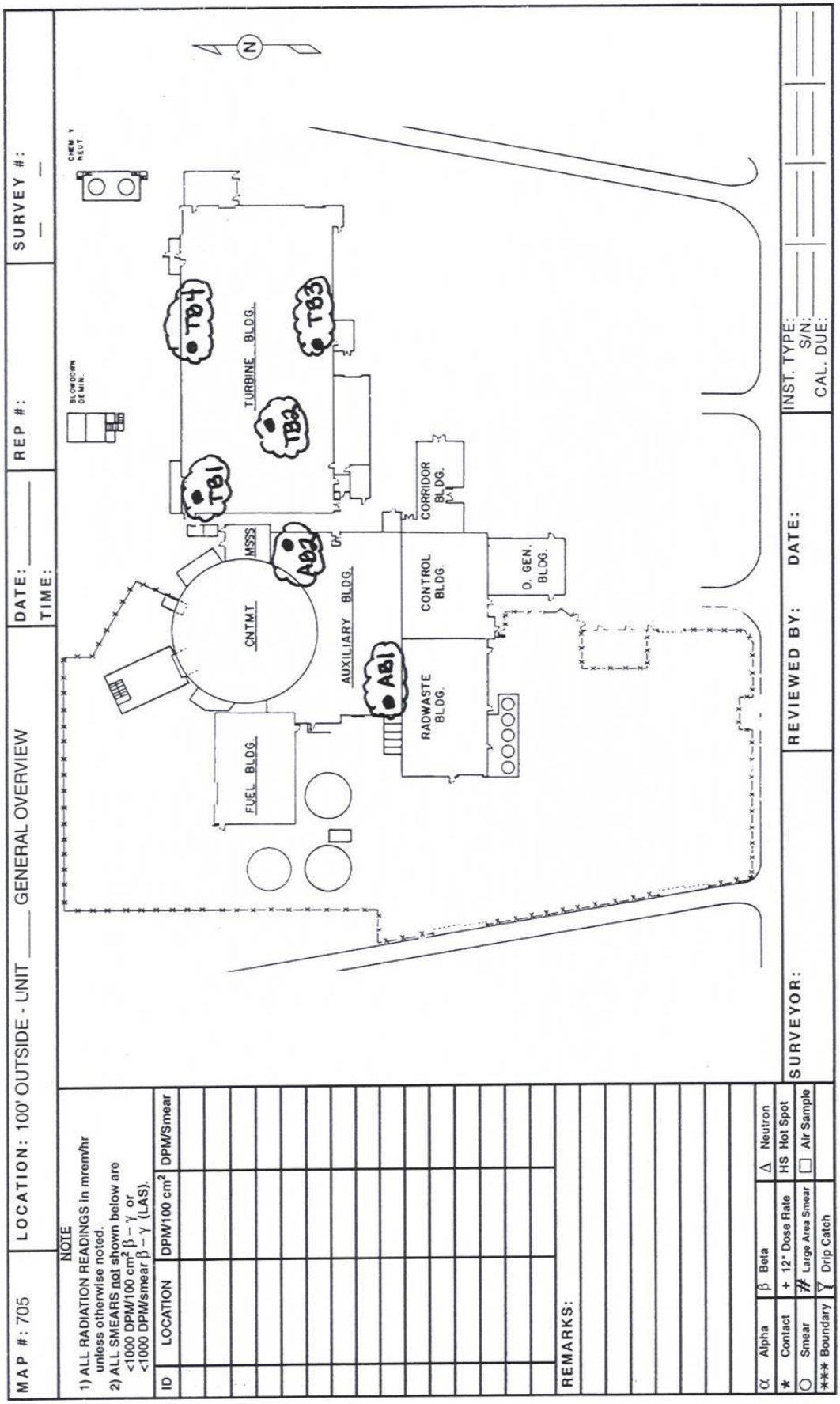
Sample Point (Note 1)	Date	Time	Unit 2	Unit 3	Non Unit Specific	Rain Water *(Due to small volume, no filtration or distillation) Unit 2	Unit 3
AB1/DW	3/19/2006	U2 1324 U3 0953	6.65 X 10-6	<MDA			
AB2/DW	3/19.2006	U2 1326 U3 0955	4.39 X 10-6	1.42 X 10-6			
TB1/DW	3/19/2006	U2 1346 U3 1050	<MDA	2.09 X 10-5			
TB2/DW	3/19/2006	U2 1347 U3 1051	2.94 X 10-6	1.36 X 10-5			
TB3/DW	3/19/2006	U2 1348 U3 1053	4.73 X 10-6	5.71 X 10-6			
TB4/DW	3/19/2006	U2 1350 U3 1052	<MDA	1.97 X 10-5			
PA1/DW	3/19/2006	1153			<MDA		
PA2/DW	3/19/2006	1146			2.27 X 10-6		
PA3/DW	3/19/2006	1139			3.75 X 10-6		
PA4/DW	3/19/2006	1157			<MDA		
RCA1/DW	3/19/2006	0959		<MDA			
AB1/DW	3/20/2006	U2 1043 U3 1423	7.07X 10-6	<MDA		4.15 X 10-6*	Note 2
AB2/DW	3/20/2006	U2 1047 U3 1428	4.35 X 10-6	1.49 X 10-6		<MDA*	5.52 X 10-6*
TB1/DW	3/20/2006	U2 1226 U3 1338	3.46X 10-6	1.28 X 10-5		6.70 X 10-6*	7.97 X 10-5*
TB2/DW	3/20/2006	U2 1229 U3 1353	1.98X 10-6	1.51 X 10-5		4.94 X 10-6*	5.68 X 10-5*
TB3/DW	3/20/2006	U2 1236 U3 1404	5.62X 10-6	1.93 X 10-5		4.35 X 10-6*	3.14 X 10-5*
TB4/DW	3/20/2006	U2 1240 U3 1400	<MDA	6.55 X 10-6		Note 2	Note 2
PA1/DW	3/20/2006	0850			<MDA	<MDA*	
PA2/DW	3/20/2006	0857			2.30 X 10-6	<MDA*	
PA3/DW	3/20/2006	0826			4.15 X 10-6	<MDA*	
PA4/DW	3/20/2006	0931			<MDA	<MDA*	
RCA1/DW	3/20/2006	1436		<MDA			<MDA*
AB1/DW	3/21/2006	U2 1525 U3 1639	6.96 X 10-6	<MDA			
AB2/DW	3/21/2006	U2 1526 U3 1641	5.07 X 10-6	2.04 X 10-6			
TB1/DW	3/21/2006	U2 1540 U3 1618	3.85 X 10-6	1.32 X 10-5			
TB2/DW	3/21/2006	U2 U3					
TB3/DW	3/21/2006	U2 1341 U3	5.14 X 10-6				
TB4/DW	3/21/2006	U2 1342 U3 1617	1.45 X 10-6	5.75 X 10-6			
PA1/DW	3/21/2006	1603			<MDA		
PA2/DW	3/21/2006	1600			2.17 X 10-6		
PA3/DW	3/21/2006	1558			<MDA		
PA4/DW	3/21/2006	1605			<MDA		
RCA1/DW	3/21/2006	1640		<MDA			

Note 1 – For specific locations see pages 8, 9 and 10
Note 2 – Inadequate sample volume for analysis

Unit 1
Tritium Evaluation Data



Unit 1
Tritium Evaluation Data



Unit 2
Tritium Evaluation Data

The goal of this sampling is to help identify the source of the water leaking through the penetration seal in the Essential Pipe Density Tunnel. Results of samples from the test hole are being compared to the chemistry in the various systems. Two “blank samples” were also prepared from soil and water in Unit 3. These blank samples can be used as a comparison also in Unit 2 to determine the effects on analysis of soil mixed with water.

The following tables show the system chemistry and the test hole chemistry. All values except pH, Cond, Isotopic and Tritium are in units of ppm.

SYSTEM Results

Fire Protection

Date	Time	pH	Cond range (us/cm)	Sulfite
2/23/2006	1030	8.9	1800 to 1900 *	100

*Typical values – DS runs in the range of 400 – 500 us/cm for conductivity and well water runs in the range of 1100 – 1200 us/cm.

LR- Recycle Monitor Tank – Unit 2

Date	Time	pH	Cond (us/cm)	Silica	Isotopic (uci/ml)	Tritium (uci/ml)
1/27/2006	1312	6.42	0.96	2	<MDA	8.06 X 10-2

RMWT – Unit 2

Date	Time	pH	Cond (us/cm)	Silica	Boron	Isotopic (uci/ml)	Tritium (uci/ml)
3/01/2006	2300	6.65	1.1	7.7	1.4	<MDA	2.2 X 10-2

RWT – Unit 2

Date	Time	pH	Cond (us/cm)	Silica	Boron	Isotopic (uci/ml)	Tritium (uci/ml)
3/08/2006	2035	4.18	19.6	1.911	4180	3.25X 10-5	1.24X 10-1

Unit 2
Tritium Evaluation Data

CVCS HUT – Unit 2

Date	Time	pH	Cond (us/cm)	Silica	Boron	Isotopic (uci/ml)	Tritium (uci/ml)
2/08/2006	1545	4.45	14.8	1.7	4260	3.34 X 10-4	4.69 X 10-1

ESPS A – Unit 2

Date	Time	pH	Cond	Silica	Isotopic (uci/ml)	Tritium (uci/ml)	Chlorine	TTA	Zinc	Ca. Hrd.	Alk	Phos.	Moly
3/02/2006	0855	8.07	5100	10.3	<MDA	1.89 X 10-6	0.8	1.3	1.15	150	80	15	0.469

Unit 2
Tritium Evaluation Data

Sample Results

U2 H-0A Test Hole Samples (Hole depth = 13.26')

Date	Time	pH	Cond (uS/cm)	Si (ppm)	Isotopic (uci/ml)	Tritium (uci/ml)	Cl	TTA	Zn	Ca. Hrd	Alk	Phos	Mo	Boron	Depth Feet	SmpVol (L)	Vol Pumped (g)
3/05/2006	1200	9.95	1650	20	<MDA	5.39X 10-6	0	1.1	0.6	<50	200	<2	0.34		11.60'		2.5
3/06/2006	1230	10.25	1750		<MDA	2.36X 10-6			0.2					0.7	11.45' 11. 71'	4	3.3
3/07/2006	1130	10.26	1690		<MDA	3.42X 10-6			0.1					1.6	11.41' 11.50'	2.0	2.5
3/08/2006	1130	10.4	1967		<MDA	2.55X 10-6			0.1					3.12	11.41' 11.49'	2.0	2.5
3/09/2006	1152	10.23	1740		<MDA	1.26X 10-6			0.1					2.57	11.54' 11.61'	2.0	3.3
3/10/2006	1130	10.17	1667		<MDA	2.41X 10-6			0.1					1.55	11.55' 11.64'	2.0	2.0
3/11/2006	1045	10.18	1735		<MDA	2.63X 10-6									11.35' 11.44'	2.0	2.0
3/12/2006	1030	10.27	1683		<MDA	2.07X 10-6									11.48' 11.71'	2.0	1.7
3/13/2006	1200	9.69	1167		<MDA	2.95X 10-6									11.42' 11.52'	2.0	1.7
3/14/2006	1320	9.99	1395		<MDA	2.45X 10-6									11.40' 11.65'	2.0	2.1
3/15/2006	1015	9.77	1195		<MDA	<MDA									11.42' 11.74'	2.0	3.3
3/16/2006	0820	9.63	1095		<MDA	2.39X 10-6									11.44' 11.78'	2.0	2.1
3/17/2006	1300	10.07	1365		<MDA	2.44X 10-6									11.41' 11.79'	2.75	1.7
3/18/2006	1448	10.02	1450		<MDA	2.01X 10-6									11.41' 11.46'	2.75	2.5
3/19/2006	0830	10.18	1531		<MDA	1.61X 10-6			0.0					1.33	11.43' 11.78'	2.75	2.1
3/20/2006	0840	9.96	1199		<MDA	1.71X 10-6									11.48' 11.86'	2.75	1.7
3/21/2006	1430	9.79	1060		<MDA	<MDA									11.49' 12.90'	2.75	0.8
3/22/2006	1430	10.03	1062		<MDA	1.98X 10-6									11.55'	2.75	1.7

Unit 2
Tritium Evaluation Data

Date	Time	pH	Cond (uS/cm)	Si (ppm)	Isotopic (uci/ml)	Tritium (uci/ml)	Cl	TTA	Zn	Ca. Hrd	Alk	Phos	Mo	Boron	Depth Feet	SmpVol (L)	Vol Pumped (g)
															12.97’		
3/23/2006	1130	10.09	1059		<MDA	1.51X 10-6									11.57’ 11.93’	2.75	1.7
3/24/2006	0925	9.98	1514		<MDA	2.54X 10-6									11.59’ 12.02’	2.75	1.3
3/25/2006	1231	9.94	1498		<MDA	3.75X 10-6									11.57’ 12.03’	2.75	N/A
3/26/2006	1020	9.82	1460		<MDA	2.31X 10-6									11.55’ 12.00’	2.75	N/A
3/27/2006	1533	9.95	1555		<MDA	2.18X 10-6									12.05’ 12.65’	2.75	1.7
3/28/2006	1316	10.05	1515		<MDA	2.04X 10-6									11.60’ 11.00’	2.75	N/A
3/29/2006	1549	10.04	1602		<MDA	1.72X 10-6									11.57’ 11.95’	2.75	N/A
3/30/2006	1356	9.99	1546		<MDA	<MDA									11.60’ 11.91’	2.75	N/A
3/31/2006															11.59’		
4/01/2006															11.60’		
4/02/2006															11.59’		
4/03/2006															11.56’		
4/04/2006															11.58’		
4/05/2006															11.55’		
4/06/2006															11.57’		
4/07/2006															11.58’		
4/08/2006															11.56’		
4/09/2006															11.57’		
4/10/2006																	
4/11/2006	1716	9.72	1315		<MDA	2.01X 10-6									11.58’ 11.93’	2.75	N/A
4/12/2006															11.57’		
4/13/2006															11.54’		
4/14/2006															11.50’		
4/15/2006															11.54’		
4/16/2006															11.53’		
4/17/2006															11.54’		
4/18/2006															11.53’		
4/19/2006															11.51’		
4/20/2006															11.52’		

Unit 2
Tritium Evaluation Data

Date	Time	pH	Cond (uS/cm)	Si (ppm)	Isotopic (uci/ml)	Tritium (uci/ml)	Cl	TTA	Zn	Ca. Hrd	Alk	Phos	Mo	Boron	Depth Feet	SmpVol (L)	Vol Pumped (g)
4/21/2006															11.50’		
4/22/2006															11.51’		
4/23/2006															11.55’		
4/24/2006															11.55’		
4/25/2006															11.54’		
4/26/2006															11.50’		
4/27/2006															11.54’		
4/28/2006															11.54’		
4/29/2006																	2.0
5/01/2006															11.56’		
5/02/2006					<MDA	2.36X 10-6									11.55’ 11.82’	5.7	
5/03/2006															11.57’		
5/04/2006															11.55’		
5/05/2006															11.55’		
5/08/2006															11.54’		
5/09/2006															11.55’		
5/10/2006															11.54’		
5/11/2006	0800	10.0	1565		<MDA	2.51X 10-6									11.56’ 11.98’	2.75	
5/12/2006															11.55’		
5/15/2006															11.55’		
5/16/2006															11.56’		
5/17/2006															11.55’		
5/18/2006															11.55’		
5/19/2006															11.56’		
5/22/2006															11.55’		
5/23/2006															11.56’		
5/24/2006															11.56’ 11.96’	2.75	

Unit 2
Tritium Evaluation Data

U2 H-0B Test Hole Samples (Hole depth =14.05')

Date	Time	pH	Cond (uS/cm)	Isotopic (uci/ml)	Tritium (uci/ml)	Zn	Boron	Depth Feet	SmpVol (L)	Vol Pumped (g)
3/21/2006	1435	8.09	770	<MDA	<MDA			12.00' 12.23'	2.75	4.2
3/22/2006	1440	8.07	734	<MDA	<MDA	0.0	0.458	12.06' 12.35'	2.75	2.1
3/23/2006	1157	8.03	763	<MDA	<MDA	0.040	0.510	12.09' 12.37'	2.75	2.9
3/24/2006	0930	8.19	785	<MDA	<MDA			12.11' 12.39'	2.75	3.3
3/25/2006	1243	8.05	722	<MDA	1.91 X 10-6			12.08' 12.20	2.75	N/A
3/26/2006	1021	7.92	730	<MDA	1.14 X 10-6			12.01' 12.36'	2.75	N/A
3/27/2006	1536	8.07	792	<MDA	<MDA			12.09' 12.35'	2.75	2.5
3/28/2006	1332	8.07	781	<MDA	<MDA			11.30' 12.00	2.75	N/A
3/29/2006	1617	7.97	807	<MDA	1.41 X 10-6			12.09' 12.29'	2.75	N/A
3/30/2006	1412	8.05	802	<MDA	<MDA			12.12' 12.28'	2.75	N/A
3/31/2006								12.11'		
4/01/2006								12.12'		
4/02/2006								12.11'		
4/03/2006								12.08'		
4/04/2006								12.06'		
4/05/2006								12.07'		
4/06/2006								12.10'		
4/07/2006								12.11'		
4/08/2006								12.09'		
4/09/2006								12.08'		
4/10/2006								12.06'		
4/11/2006								12.07'		
4/12/2006								12.07'		
4/13/2006								12.06'		
4/14/2006								12.03'		
4/15/2006								12.07'		
4/16/2006								12.06'		
4/17/2006								12.06'		

Unit 2
Tritium Evaluation Data

Date	Time	pH	Cond (uS/cm)	Isotopic (uci/ml)	Tritium (uci/ml)	Zn	Boron	Depth Feet	SmpVol (L)	Vol Pumped (g)
4/18/2006	1300	8.22	781	<MDA	<MDA			12.06' 12.28'	2.75	N/A
4/19/2006								12.04'		
4/20/2006								12.05'		
4/21/2006								12.02'		
4/22/2006								12.04'		
4/23/2006								12.08'		
4/24/2006								12.08'		
4/25/2006								12.08'		
4/26/2006	1751	8.17	856	<MDA	<MDA			12.02' 12.26'	2.75	N/A
4/27/2006								12.07'		
4/28/2006								12.08'		
4/29/2006										2.5
4/30/2006										
5/01/2006								12.09'		
5/02/2006				<MDA	1.73 X 10-6			12.08' 12.26'	5.7	
5/03/2006								12.09'		
5/04/2006								12.06'		
5/05/2006								12.07'		
5/08/2006								12.08'		
5/09/2006								12.09'		
5/10/2006								12.08'		
5/11/2006	0821	8.28	827	<MDA	1.44 X 10-6			12.09' 12.35'	2.75	
5/12/2006								12.08'		
5/15/2006								12.08'		
5/16/2006								12.08'		
5/17/2006								12.07'		
5/18/2006								12.08'		
5/19/2006								12.09'		
5/22/2006								12.07'		
5/23/2006								12.10'		
5/24/2006								12.08' 12.36'	2.75	

Unit 2
Tritium Evaluation Data

U2 H-10 Test Hole Samples (Hole depth =13.38')

Date	Time	pH	Cond (uS/cm)	Isotopic (uci/ml)	Tritium (uci/ml)	Depth Feet	SmpVol (L)	Vol Pumped (g)
5/15/2006						12.71'		
5/16/2006	1130	8.40	4596		1.57 X 10-5	12.70'	0.75	
5/17/2006	1031	8.43	4555		1.58 X 10-5	12.71'	0.75	
5/18/2006						12.72'		
5/19/2006						12.69'		
5/22/2006						12.48'		
5/23/2006						12.57'		
5/24/2006						12.56'		

Unit 2
Tritium Evaluation Data

U2 H-12A Test Hole Samples (Hole depth =7.0')

Date	Time	pH	Cond (uS/cm)	Isotopic (uci/ml)	Tritium (uci/ml)	Depth Feet	SmpVol (L)	Vol Pumped (g)
5/16/2001	1111	10.36	3492		2.29 X 10-6	Not Measurable	0.75	
5/24/2006						DRY		

U2 H-12B Test Hole Samples (Hole depth =3.2')

Date	Time	pH	Cond (uS/cm)	Isotopic (uci/ml)	Tritium (uci/ml)	Depth Feet	SmpVol (L)	Vol Pumped (g)
5/16/2001	1101	8.85	1715		5.36 X 10-6	Not Measurable	0.75	
5/24/2006						Note 1		

Note 1 – Getting casing installed to allow depth measurement. Level increasing

U2 H-13 Test Hole Samples (Hole depth =3.6')

Date	Time	pH	Cond (uS/cm)	Isotopic (uci/ml)	Tritium (uci/ml)	Depth Feet	SmpVol (L)	Vol Pumped (g)
5/16/2001	1116	8.81	2138		3.53 X 10-6	Not Measurable	0.75	
5/24/2006						DRY		

Unit 2
Tritium Evaluation Data

Unit 2 Miscellaneous Samples

Sample Type	Date/Time	Tritium (uCi/ml)	Isotopic (uCi/ml)	pH	Cond	Zinc	Boron	Vol. Pumped (gal)
RWT Level pit	3/07/2006 1400	1.02X 10-5	<MDA	9.63	3850	0.17	550	
HVAC Condensate RP# 2-06-00158	3/16/2006 2300	1.92 X 10-4						
U2 CVCS HUT Sump	3/17/2006 1320	2.46 X 10-2	2.54 X 10-5	7.99	501	0.7	1737	
U2 CVCS HUT Sump Inst. Pit	3/17/2006 1310	7.97 X 10-6	<MDA	8.43	1440	0.2	16.82	
Hatch 2Y1H02A	3/17/2006 1620	2.14 X 10-6	<MDA	6.80	1280			
North Yard Sump	3/22/2006 1900	1.46X 10-6	<MDA	8.26	390			
CVCS HUT Instrument Pit	4/10/2006 0850	8.56 X 10-6	<MDA	8.42	1540			
CVCS HUT Sump pit	4/10/2006 0900	2.51 X 10-2	4.12 X 10-5 Note 1	8.05	4780			

Note 1 - Co-58, Co-60, Cs-134, Cs137 and Sb-125

Unit 3
Tritium Evaluation Data

There are 4 buried lines in the vicinity of the test hole. They are CH, LR, FP and spray pond lines. The CH line is from the RMWT makeup pump which would essentially carry RMWT water. The LR line is the makeup to the RMWT from the LR recycle monitor tanks or the makeup to the RMWT from the BAC ion exchanger outlet. The FP line is the fire protection line and spray pond lines have spray pond water in them.

The following tables show the system chemistry, the blank water chemistry and the test hole chemistry. All values except pH, Cond, Isotopic and Tritium are in units of ppm.

SYSTEM Results

Fire Protection

Date	Time	pH	Cond range (us/cm)	Sulfite
2/23/2006	1030	8.9	1800 to 1900 *	100

*Typical values – DS runs in the range of 400 – 500 us/cm for conductivity and well water runs in the range of 1100 – 1200 us/cm.

LR- Recycle Monitor Tank – Unit 3

Date	Time	pH	Cond (us/cm)	Silica	Isotopic (uci/ml)	Tritium (uci/ml)
2/21/2006	1000	7.60	1.19	0	<MDA	3.08×10^{-2}

RMWT – Unit 3

Date	Time	pH	Cond (us/cm)	Silica	Boron	Isotopic (uci/ml)	Tritium (uci/ml)
02/01/2006	2015	6.28	1.1	1.0	<1.0	<MDA	1.55×10^{-2}

RWT – Unit 3

Date	Time	pH	Cond (us/cm)	Silica	Boron	Isotopic (uci/ml)	Tritium (uci/ml)
3/01/2006	2142	4.09	20.0	1.376	4341	9.3×10^{-6}	1.26×10^{-1}

Unit 3
Tritium Evaluation Data

CVCS HUT – Unit 3

Date	Time	pH	Cond (us/cm)	Silica	Boron	Isotopic (uci/ml)	Tritium (uci/ml)
3/01/02006	2225	4.51	18	1.721	3824	1.2×10^{-4}	3.01×10^{-1}

ESPS A – Unit 3

Date	Time	pH	Cond	Silica	Isotopic (uci/ml)	Tritium (uci/ml)	Chlorine	TTA	Zinc	Ca. Hrd.	Alk	Phos.	Moly
2/09/2006	0835	8.13	4190	12.6	<MDA	<MDA	0.8	1.1	1.35	160	80	10	0.453

CVCS HUT Condensate Pot – Unit 3

Date	Time	pH	Cond (us/cm)	Boron	Isotopic (uci/ml)	Tritium (uci/ml)
3/02/2006	1620	6.15	1.4	6.52	<MDA	4.04E-2

Unit 3
Tritium Evaluation Data

Blank Results

Blank #1 (DI water mixed with dirt)

Date	pH	Cond (us/cm)	Silica	Isotopic (uci/ml)	Tritium (uci/ml)	Chlorine	TTA	Zinc	Ca. Hrd.	Alk	Phos.	Moly	Sulfite
2/27/2006	9.89	561	85	<MDA	<MDA	0.0		15.6	>500	100	3		<1.0

Blank #2 (ESPS water mixed with dirt)

Date	pH	Cond (us/cm)	Silica	Isotopic (uci/ml)	Tritium (uci/ml)	Chlorine	TTA	Zinc	Ca. Hrd	Alk	Phos	Moly	Sulfite
2/27/2006	8.48	4765	25	<MDA	1.50×10^{-6}	0.0	0.15	41.4	125	175	8	0.410	<1.0

Blank #3 (RMWT water mixed with dirt)

Date	pH	Cond (us/cm)	Silica	Isotopic (uci/ml)	Tritium (uci/ml)	Chlorine	TTA	Zinc	Ca. Hrd	Alk	Phos	Moly	Sulfite
3/01/2006	10.04	550	*	<MDA	1.18×10^{-2}	*	*	**	*	*	*	**	*

* Unable to perform analysis, dirt will not separate from liquid to perform colorimetric analysis.

** Solids clog nebulizer

Unit 3
Tritium Evaluation Data

Sample Results

U3 H-0A Test Hole Samples (Depth of hole = 13.25')

Date	Time	pH	Cond (us/cm)	Si	Isotopic (uci/ml)	Tritium (uci/ml)	Cl	TTA	Zn	Ca. Hrdnes	Alk	Phos	Mo	Boron	Depth Feet	Sample Vol (L)	Vol Pumped (g)
2/27/2006	1540	9.31	555	27	<MDA	7.48×10^{-5} Note 1	0.0	0.29	0.74	>1000	75	<2	0.24				
2/28/2006	1430	9.03	550	32	<MDA	2.96×10^{-5}	0.0	0.27	0.09	>1000	100	0					
3/1/2006	1345	8.95	580		<MDA	7.14×10^{-5} Note 2			0.11								
3/2/2006	1445	8.88	550		<MDA	6.51×10^{-5}			0.07								
3/3/2006 Sample split with NRC	1209	8.69	322		<MDA NRC Result <MDA	6.7×10^{-5} Note 2 NRC Result 7.8×10^{-5}			0.07						12.00		
3/3/2006 ADEQ sample	1915				<MDA	6.84×10^{-5} 7.8×10^{-5} (ARRA)											
3/4/2006	1003	8.9	569		<MDA	6.68×10^{-5}			0.03						12.25	1.5	
3/05/2006	1005	8.83	550		<MDA Note 3	7.54×10^{-5}			0.04						12.2'	1.5	
3/06/2006	1055	8.80	530		<MDA	8.05×10^{-5}			0.104					0.3	12.15' 12.16'	2.0	5
3/07/2006	1039	8.88	585		<MDA	7.53×10^{-5}			0.113					0.3	12.15' 12.19'	2.0	5
3/08/2006	1030	8.83	568		<MDA	8.43×10^{-5}			0.085					0.2	12.30' 12.39'	8	0.8
3/09/2006	1015	8.64	565		<MDA	5.30×10^{-5}			0.083						12.34' 12.38'	2.0	3.3
3/10/2006	0955	8.89	577		<MDA	8.76×10^{-5}			0.089					1.41	12.31' 12.32'	2.0	3.3
3/11/2006	1015	8.95	531		<MDA	9.45×10^{-5}									12.26' 12.30'	2.0	4.2
3/12/2006	0925	9.07	532		<MDA	1.08×10^{-4}			0.013					1.38	12.29'	2.0	4.2

Unit 3
Tritium Evaluation Data

Date	Time	pH	Cond (us/cm)	Si	Isotopic (uci/ml)	Tritium (uci/ml)	Cl	TTA	Zn	Ca. Hrdnes	Alk	Phos	Mo	Boron	Depth Feet	Sample Vol (L)	Vol Pumped (g)
															12.30’		
3/13/2006	1020	8.95	525		<MDA	$1.10X\ 10^{-4}$									12.32’ 12.36’	2.0	2.5
3/14/2006	1100	8.82	580		<MDA	$9.07\ X\ 10^{-5}$								1.47	12.30’ 12.32’	1.5	5.0
3/15/2006	0925	8.90	568		<MDA	$9.64\ X\ 10^{-5}$									12.25’ 12.29’	1.5	4.2
3/16/2006	1125	8.88	550		<MDA	$8.45\ X\ 10^{-5}$									12.67’ 13.28’	7.5	2.5
3/17/2006	1015	8.84	565		<MDA	$7.55\ X\ 10^{-5}$			0.0					1.78	12.31’ 12.35’	2.75	4.2
3/18/2006	0945	8.83	544		<MDA	$7.77\ X\ 10^{-5}$									12.31’ 12.36’	2.75	2.1
3/19/2006	1000	8.93	540		<MDA	$7.52\ X\ 10^{-5}$									12.33’ 12.35’	2.75	3.3
3/20/2006	1005	8.88	540		<MDA	$7.91\ X\ 10^{-5}$			0.004					0.91	12.40’ 12.43’	2.75	3.3
3/21/2006	0840	8.85	593		<MDA	$6.91\ X\ 10^{-5}$									12.38’ 12.41’	2.75	2.1
3/22/2006	0900	8.60	632		<MDA	$6.30\ X\ 10^{-5}$			0.0					1.48	12.97’ 13.20’	2.75	2.1
3/23/2006	0936	8.49	617		<MDA	$5.04\ X\ 10^{-5}$			0.0					1.29	12.48’ 12.63’	3.0	1.7
3/24/2006	1300	8.63	644		<MDA	$6.14\ X\ 10^{-5}$									12.46’ 12.75’	2.75	2.1
3/25/2006	0850	8.52	608		<MDA	$5.34\ X\ 10^{-5}$									12.46’ 12.72’	2.75	N/A
3/27/2006	1231	8.58	645		<MDA	$5.83\ X\ 10^{-5}$									12.32’ 12.34’	2.75	3.3
3/28/2006	1310	8.66	621		<MDA	$7.12\ X\ 10^{-5}$									12.40’ 12.45’	2.75	N/A
3/29/2006	0840	8.65	615		<MDA	$6.53\ X\ 10^{-5}$									12.36’ 12.41’	2.75	N/A
3/30/2006	0937	8.81	605		<MDA	$6.31\ X\ 10^{-5}$									12.34’ 12.38’	2.75	N/A
3/31/2006															12.32’		
4/01/2006															12.29’		

Unit 3
Tritium Evaluation Data

Date	Time	pH	Cond (us/cm)	Si	Isotopic (uci/ml)	Tritium (uci/ml)	Cl	TTA	Zn	Ca. Hrdnes	Alk	Phos	Mo	Boron	Depth Feet	Sample Vol (L)	Vol Pumped (g)
4/02/2006															12.24’		
4/03/2006	1007	8.40	596		<MDA	6.80×10^{-5}									12.19’ 12.22’	2.75	N/A
4/04/2006															12.17’		
4/05/2006															12.14’		
4/06/2006															12.13’		
4/07/2006															12.12’		
4/08/2006															12.11’		
4/09/2006															12.08’		
4/10/2006	0851	8.67	600		<MDA	6.86×10^{-5}									12.07’ 12.09’	2.75	N/A
4/11/2006															12.07’		
4/12/2006	1041	8.56	572		<MDA	7.18×10^{-5}									12.07’ 12.07’	2.75	N/A
4/13/2006															12.07’		
4/14/2006															12.05’		
4/15/2006															12.06’		
4/16/2006															12.04’		
4/17/2006															12.04’		
4/18/2006															12.03’		
4/19/2006															12.03’		
4/20/2006															12.02’		
4/21/2006															12.02’		
4/22/2006															12.01’		
4/23/2006															12.02’		
4/24/2006															12.01’		
4/25/2006															11.99’ 12.32’		18.2
4/26/2006															12.29’		
4/27/2006															12.24’		
4/28/2006															12.25’		
4/29/2006																	12.0
5/01/2006															12.29’		
5/02/2006															12.25’		
5/03/2006															12.23’		
5/04/2006															12.21’		

Unit 3
Tritium Evaluation Data

Date	Time	pH	Cond (us/cm)	Si	Isotopic (uci/ml)	Tritium (uci/ml)	Cl	TTA	Zn	Ca. Hrdnes	Alk	Phos	Mo	Boron	Depth Feet	Sam ple Vol (L)	Vol Pumped (g)
5/05/2006															12.25’		
5/08/2006															12.25’		
5/09/2006															12.23’		
5/10/2006															12.24’		
5/11/2006															12.22’		

Unit 3
Tritium Evaluation Data

5/12/2006	0945	8.50	674		<MDA	5.30×10^{-5}									12.21' 12.21' Note 5	2.75	
5/15/2006															12.18'		
5/16/2006															12.19'		
5/17/2006															12.18'		
5/18/2006															12.18'		
5/19/2006															12.17'		
5/22/2006															12.13'		
5/23/2006															12.14'		
5/24/2006															12.14'		

Note 1 – Data suspect - sample not distilled
Note 2 – Sample analyzed in Central Lab and Unit 3. Results in agreement. Reported value is from Central Lab
Note 3 – Sample originally showed Cs-137 @ 5.04×10^{-8} uCi/ml but the MCA peak was deformed. Recount $\leq$ 4.67X 10-8 uCi/ml.
Note 4 – Sulfite data removed as only done on 2/27 sample and was < 1.0 ppm
Note 5 – Level recovered to initial level during sampling

Unit 3
Tritium Evaluation Data

Sample Results

U3 H-0B Test Hole Samples (Depth of hole = 14.20')

Date	Time	pH	Cond (us/cm)	Isotopic (uci/ml)	Tritium (uci/ml)	Zn	Boron	Depth Feet	Sample Vol (L)	Vol Pumped (g)
3/22/2006	0920	10.63	3462	<MDA	5.85×10^{-6}	0.053	5.28	12.69' 12.91'	2.75	3.3
3/23/2006	0909	10.50	3278	<MDA	4.78×10^{-6}	0.021	4.30	13.15' 13.34'	3.0	2.1
3/24/2006	1020	10.32	3337	<MDA	6.45×10^{-6}			13.19' 13.40'	2.75	2.1
3/25/2006	0908	10.35	3322	<MDA	7.27×10^{-6}			13.23' 13.53	2.75	N/A
3/27/2006	1232	10.45	3682	<MDA	5.03×10^{-6}			12.73' 12.91'	2.75	3.3
3/28/2006	0953	10.43	3320	<MDA	5.92×10^{-6}			13.19' 13.41'	2.75	N/A
3/29/2006	0920	10.42	3589	<MDA	5.22×10^{-6}			13.00' 13.16'	2.75	N/A
3/30/2006	0958	10.50	3682	<MDA	3.60×10^{-6}			12.86' 13.03'	2.75	N/A
3/31/2006	0839	10.54	3711	<MDA	4.46×10^{-6}			12.77' 12.94'	2.75	N/A
4/01/2006								12.71'		
4/02/2006	0955	10.55	3601	<MDA	1.85×10^{-6}			12.57' 12.80'	2.75	N/A
4/03/2006								12.58'		
4/04/2006	1316	10.58	3839	<MDA	3.43×10^{-6}			12.47' 12.65'	2.75	N/A
4/05/2006								12.47'		
4/06/2006								12.45'		
4/07/2006								12.42'		
4/08/2006								12.41'		
4/09/2006								12.37'		
4/10/2006	0921	10.67	3965	<MDA	2.11×10^{-6}			12.35' 12.56'	2.75	N/A
4/11/2006								12.40'		
4/12/2006	1431	10.58	3835	<MDA	4.79×10^{-6}			12.36' 12.54'	2.75	N/A
4/13/2006								12.40'		
4/14/2006	0907	10.67	4066	<MDA	4.31×10^{-6}			12.30' 12.50'	2.75	N/A
4/15/2006								12.36'		
4/16/2006	0921	10.61	3432	<MDA	3.16×10^{-6}			12.31' 12.52'	2.75	N/A
4/17/2006								12.35'		
4/18/2006								12.33'		
4/19/2006								12.31'		
4/20/2006								12.32'		
4/21/2006								12.30'		
4/22/2006								12.29'		
4/23/2006								12.29'		
4/24/2006								12.30'		
4/25/2006								12.28' 14.20'		5.0
4/26/2006								12.79'	7.7	
4/27/2006								12.72'		

Unit 3
Tritium Evaluation Data

Date	Time	pH	Cond (us/cm)	Isotopic (uci/ml)	Tritium (uci/ml)	Zn	Boron	Depth Feet	Sample Vol (L)	Vol Pumped (g)
4/28/2006	1000	10.63	3766	<MDA	3.01×10^{-6}			12.47' 12.63'	2.75	
5/01/2006								12.37'		
5/02/2006								12.36'		
5/03/2006								12.36'		
5/04/2006								12.36'		4.6
5/05/2006								12.80'		
5/08/2006	0831	10.58	3693	<MDA	3.47×10^{-6}			12.41' 12.85'		
5/09/2006								12.49'		
5/10/2006								12.42'		
5/11/2006								12.38'		
5/12/2006	0901	10.60	3941	<MDA	2.68×10^{-6}			12.36' 12.54'	2.75	
5/15/2006								12.34'		
5/16/2006								12.34'		
5/17/2006								12.32'		
5/18/2006								12.31'		
5/19/2006								12.31'		
5/22/2006								12.24'		
5/23/2006								12.29'		
5/24/2006								12.27'		

Unit 3
Tritium Evaluation Data

U3 H-1 Test Hole Samples (Depth of hole = 9.19')

Date	Time	pH	Cond (us/cm)	Isotopic (uci/ml)	Tritium (uci/ml)	Zn	Depth Feet	Sample Vol (L)	Vol Pumped (g)
3/12/2006	0908	9.02	306	<MDA	$4.71X\ 10^{-6}$		8.07' 8.36'	1.0	N/A
3/13/2006	1100	8.98	297	<MDA	$5.01X\ 10^{-6}$	0.0	8.90' 9.10'	1.0	N/A
3/14/2006	1115	*	*	*	*	*	9.3'	0	N/A
3/15/2006	0940	*	*	*	*	*	9.2'	0	N/A
4/06/2006							DRY		
4/13/2006							DRY		
4/20/2006							DRY		
4/26/2006							DRY		
5/03/2006							DRY		
5/10/2006							DRY		
5/17/2006							DRY		
5/24/2006							DRY		

*No sample obtained – level to low

U3 H-2 Test Hole Samples (Depth of hole = 24.8')

Date	Time	pH	Cond (us/cm)	Isotopic (uci/ml)	Tritium (uci/ml)	Zn	Depth Feet	Sample Vol (L)	Vol Pumped (g)
3/08/2006	0940				<MDA		15.4' Note 1	0.150	
3/09/2006	0720	8.21	6640		<MDA		15.4' Note 1	.200	
3/10/2006							DRY		
3/13/2006	1045						DRY		
4/06/2006							DRY		
4/13/2006							DRY		
4/20/2006							DRY		
4/26/2006							DRY		
5/03/2006							DRY		
5/10/2006							DRY		
5/17/2006							DRY		
5/24/2006							DRY		

Note 1 - Approximate – water level is less than 1.5" in Test Hole

Unit 3
Tritium Evaluation Data

U3 H-3 Test Hole Samples (Depth of hole = 9.7')

Date	Time	pH	Cond (us/cm)	Isotopic (uci/ml)	Tritium (uci/ml)	Zn	Depth Feet	Sample Vol (L)	Vol Pumped (g)
							DRY		
4/06/2006							DRY		
4/13/2006							DRY		
4/20/2006							DRY		
4/26/2006							DRY		
5/03/2006							DRY		
5/10/2006							DRY		
5/17/2006							DRY		
5/24/2006							DRY		

U3 H-4 Test Hole Samples (Depth of hole = 9.1')

Date	Time	pH	Cond (us/cm)	Isotopic (uci/ml)	Tritium (uci/ml)	Zn	Depth Feet	Sample Vol (L)	Vol Pumped (g)
							DRY		
4/06/2006							DRY		
4/13/2006							DRY		
4/20/2006							DRY		
4/26/2006							DRY		
5/03/2006							DRY		
5/10/2006							DRY		
5/17/2006							DRY		
5/24/2006							DRY		

Unit 3
Tritium Evaluation Data

U3 H-5B Test Hole Samples (Depth of hole = 15.57')

Date	Time	pH	Cond (us/cm)	Isotopic (uci/ml)	Tritium (uci/ml)	Zn	Boron	Depth Feet	Sample Vol (L)	Vol Pumped (g)
3/08/2006	1740	8.45	774	<MDA	2.28 E-6	0.083	0.512	12.91	1.5	N/A
3/09/2006	0600	8.41	710	<MDA	2.09×10^{-6}			12.7	3.0	N/A
3/09/2006	1055			<MDA				12.74 12.74	1.5	N/A
3/10/2006	1015	8.41	772	<MDA	3.10×10^{-6}	0.124	1.29	12.78' 12.80'	2.0	N/A
3/11/2006	1040	8.46	731	<MDA	2.84×10^{-6}	0.043	1.45	12.78' 12.80'	2.0	7.1
3/12/2006	0853	8.93	805	<MDA	2.30×10^{-6}			12.90' 12.91'	2.0	5
3/13/2006	1100	8.42	805	<MDA	1.65×10^{-6}	0.0	1.63	12.90' 12.92	2.0	5.8
3/14/2006	1110	8.42	950	<MDA	2.38×10^{-6}			12.89' 12.89'	1.5	4.2
3/15/2006	0935	8.57	825	<MDA	3.26×10^{-6}			12.88' 12.90'	1.5	5.8
3/16/2006	1245	8.59	785	<MDA	2.34×10^{-6}			12.82' 12.90'	7.5	5.0
3/17/2006	1040	8.58	975	<MDA	2.42×10^{-6}	0.0	1.63	12.93' 12.95	2.75	8.4
3/18/2006	1012	8.76		<MDA	2.64×10^{-6}			12.95' 13.00'	2.75	5.0
3/19/2006	1220	8.87	905	<MDA	2.30×10^{-6}			12.93' 12.95'	2.75	5.4
3/20/2006	1030	9.0	956	<MDA	2.34×10^{-6}			12.93' 12.99'	2.75	5.0
3/21/2006	0921	8.95	1093	<MDA	1.62×10^{-6}	0.0	1.68	12.97' 13.20'	2.75	5.0
3/22/2006	0940	9.22	874	<MDA	1.91×10^{-6}	0.0	1.48	12.98' 13.03'	2.75	5.0
3/23/2006	0952	9.16	848	<MDA	1.54×10^{-6}	0.0	1.22	13.00' 13.15'	3.0	5.4
3/24/2006	1301	9.09	893	<MDA	3.79×10^{-6}			13.00' 13.03'	2.75	5.4
3/25/2006	0835	9.16	1054	<MDA	2.42×10^{-6}			13.03' 13.12'	2.75	N/A
3/27/2006	1230	8.78	1043	<MDA	2.75×10^{-6}			12.85' 12.88'	2.75	5.8
3/28/2006	1226	9.12	984	<MDA	2.62×10^{-6}			12.95' 13.03'	2.75	N/A
3/29/2006	0921	8.88	973	<MDA	2.62×10^{-6}			12.92' 12.97'	2.75	N/A

Unit 3
Tritium Evaluation Data

Date	Time	pH	Cond (us/cm)	Isotopic (uci/ml)	Tritium (uci/ml)	Zn	Boron	Depth Feet	Sample Vol (L)	Vol Pumped (g)
3/30/2006	1040	8.79	982	<MDA	1.72×10^{-6}			12.86' 12.88'	2.75	N/A
3/31/2006								12.77'		
4/01/2006								12.80'		
4/02/2006	1000	8.26	1047	<MDA	1.40×10^{-6}			12.71' 12.75'	2.75	N/A
4/03/2006								12.71'		
4/04/2006	1346	8.49	976	<MDA	2.47×10^{-6}			12.61' 12.63'	2.75	N/A
4/05/2006								12.62'		
4/06/2006	1021	8.31	836	<MDA	1.94×10^{-6}			12.54' 12.58'	2.75	N/A
4/07/2006	0933	8.54	830	<MDA	<MDA			12.59' 12.65'	2.75	N/A
4/08/2006								12.59'		
4/09/2006								12.58'		
4/10/2006	1006	8.57	830	<MDA	3.39×10^{-6}			12.55' 12.58'	2.75	N/A
4/11/2006								12.55'		
4/12/2006	1446	8.61	756	<MDA	3.63×10^{-6}			12.55' 12.57'	2.75	N/A
4/13/2006								12.56'		
4/14/2006								12.52'		
4/15/2006								12.53'		
4/16/2006								12.52'		
4/17/2006								12.51'		
4/18/2006								12.51'		
4/19/2006								12.49'		
4/20/2006								12.48'		
4/21/2006								12.50'		
4/22/2006								12.48'		
4/23/2006								12.49'		
4/24/2006								12.49'		
4/25/2006								12.47'		
4/26/2006								12.56'		
4/27/2006								12.58'		
4/28/2006								12.61'		
4/29/2006										4.0

Unit 3
Tritium Evaluation Data

Date	Time	pH	Cond (us/cm)	Isotopic (uci/ml)	Tritium (uci/ml)	Zn	Boron	Depth Feet	Sample Vol (L)	Vol Pumped (g)
5/01/2006								12.66’		
5/02/2006								12.62’		
5/03/2006								12.60’		
5/04/2006								12.58’		
5/05/2006								12.59’		
5/08/2006								12.61’		
5/09/2006								12.59’		
5/10/2006								12.59’		
5/11/2006								12.57’		
5/12/2006								12.56’		
5/15/2006	1130	8.67	701	<MDA	3.12×10^{-6}			12.55’ 12.61’	2.75	
5/16/2006								12.56’		
5/17/2006								12.55’		
5/18/2006								12.54’		
5/19/2006								12.53’		
5/22/2006								12.50’		
5/23/2006								12.50’		
5/24/2006								12.52		

Unit 3
Tritium Evaluation Data

U3 H-10 Test Hole Samples (Depth of hole =13.53')

Date	Time	pH	Cond (us/cm)	Isotopic (uci/ml)	Tritium (uci/ml)	Depth Feet	Sample Vol (L)	Vol Pumped (g)
3/30/2006	1542	8.69	1599	<MDA	2.61×10^{-6}	12.91' 13.22'	2.75	N/A
3/31/2006	0910	8.63	1540	<MDA	2.36×10^{-6}	12.96' 13.26'	2.75	N/A
4/01/2006						12.97		
4/02/2006	0859	8.57	1351	<MDA	1.27×10^{-6}	12.67' 12.99'	2.75	N/A
4/03/2006	1046	8.64	1404	<MDA	2.26×10^{-6}	12.77' 13.05'	2.75	N/A
4/04/2006	1456	8.67	1392	<MDA	2.42×10^{-6}	12.87' 13.18'	2.75	N/A
4/05/2006	0916	8.65	1414	<MDA	4.20×10^{-6}	13.01' 13.46'	2.75	N/A
4/06/2006	0902	8.65	1633	<MDA	2.27×10^{-6}	13.25' DRY	1.5	N/A
4/07/2006						DRY		N/A
4/08/2006						DRY		N/A
4/09/2006						DRY		N/A
4/10/2006						12.98'		N/A
4/11/2006	1026	8.64	1526	<MDA	3.96×10^{-6}	12.92' 13.31'	2.75	N/A
4/12/2006	1501	8.62	1520	<MDA	3.16×10^{-6}	13.20' 13.50'	2.50	N/A
4/13/2006						DRY		
4/14/2006						DRY		
4/15/2006						DRY		
4/16/2006						DRY		
4/17/2006						DRY		
4/18/2006	1006	8.47	1640	<MDA	3.55×10^{-6}	13.13' DRY	2.75	N/A
4/19/2006						DRY		
4/20/2006						DRY		
4/21/2006						13.40'		
4/22/2006						13.31'		
4/23/2006						13.27'		
4/24/2006						13.22'		
4/25/2006						13.18'		

Unit 3
Tritium Evaluation Data

Date	Time	pH	Cond (us/cm)	Isotopic (uci/ml)	Tritium (uci/ml)	Depth Feet	Sample Vol (L)	Vol Pumped (g)
4/26/2006	1636	8.58	1765	<MDA	2.89×10^{-6}	13.11' DRY	2.75	N/A
4/27/2006						DRY		
4/28/2006						DRY		
5/01/2006						13.43'		
5/02/2006						13.39'		
5/03/2006						13.35'		
5/04/2006						13.29'		
5/05/2006						13.23'		
5/08/2006						13.18'		
5/09/2006						13.17'		
5/10/2006						13.14'		
5/11/2006						13.11'		
5/12/2006						13.09'		
5/15/2006						13.04'		
5/16/2006						13.02'		
5/17/2006						13.01'		
5/18/2006						12.99'		
5/19/2006						12.97'		
5/22/2006						12.92'		
5/23/2006	0931	8.61	1980	<MDA	2.24×10^{-6}	12.90' 13.31'	2.75	
5/24/2006						13.26'		

Unit 3
Tritium Evaluation Data

U3 H-11 Test Hole Samples (Depth of hole = 15.10')

Date	Time	pH	Cond (us/cm)	Isotopic (uci/ml)	Tritium (uci/ml)	Depth Feet	Sample Vol (L)	Vol Pumped (g)
3/25/2006	0948	9.60	661	<MDA	1.11×10^{-4}	12.56' 12.67'	2.75	N/A
3/27/2006	1020	9.21	598	<MDA	3.87×10^{-5}	12.34' 12.51'	2.75	4.6
3/28/2006	1235	9.84	709	<MDA	7.73×10^{-5}	12.53' 12.79'	2.75	N/A
3/29/2006	0950	9.49	589	<MDA	5.29×10^{-5}	12.45' 12.67'	2.75	N/A
3/30/2006	1014	9.34	564	<MDA	4.93×10^{-5}	12.45' 12.64'	2.75	N/A
3/31/2006						12.42'		
4/01/2006						12.38'		
4/02/2006						12.35'		
4/03/2006	1026	9.17	666	<MDA	4.06×10^{-5}	12.25' 12.35'	2.75	N/A
4/04/2006	1416	9.22	671	<MDA	4.22×10^{-5}	12.20' 12.27'	2.75	N/A
4/05/2006	0901	9.23	674	<MDA	4.15×10^{-5}	12.12' 12.26'	2.75	N/A
4/06/2006	0935	9.18	663	<MDA	3.28×10^{-5}	12.18' 12.36'	2.75	N/A
4/07/2006						12.17'		
4/08/2006						12.14'		
4/09/2006						12.10'		
4/10/2006	0830	9.20	688	<MDA	3.32×10^{-5}	12.07' 12.18'	2.75	N/A
4/11/2006						12.14		
4/12/2006	1020	9.14	683	<MDA	3.33×10^{-5}	12.12' 12.31'	2.75	N/A
4/13/2006						12.12'		
4/14/2006	0900	9.20	730	<MDA	3.89×10^{-5}	12.05' 12.15'	2.75	N/A
4/15/2006						12.09'		
4/16/2006						12.07'		
4/17/2006						12.06'		
4/18/2006						12.05'		
4/19/2006						12.05'		
4/20/2006						12.04'		

Unit 3
Tritium Evaluation Data

Date	Time	pH	Cond (us/cm)	Isotopic (uci/ml)	Tritium (uci/ml)	Depth Feet	Sample Vol (L)	Vol Pumped (g)
4/21/2006						12.04'		
4/22/2006						12.00'		
4/23/2006						12.02'		
4/24/2006						12.03'		
4/25/2006						12.01' 14.41'		4.5
4/26/2006						12.37'	5.71	
4/27/2006						12.25'		
4/28/2006						12.21'		
5/01/2006						12.14'		
5/02/2006						12.11'		
5/03/2006						12.08'		
5/04/2006						12.07'		6.7
5/05/2006						12.39'		
5/08/2006	0900	9.06	795	<MDA	3.59×10^{-5}	12.12'		
5/09/2006						12.14'		
5/10/2006						12.08'		
5/11/2006						12.03'		
5/12/2006						12.01'		
5/15/2006	1031	9.14	712	<MDA	2.73×10^{-5}	11.96' 12.09'	2.75	
5/16/2006						11.99'		
5/17/2006						11.93'		
5/18/2006						11.89'		
5/19/2006						11.85'		
5/22/2006						11.73'		
5/23/2006	0911	9.16	712	<MDA	1.80×10^{-5}	11.79' 11.98'	2.75	
5/24/2006						11.79'		

Unit 3
Tritium Evaluation Data

U3 H-12 Test Hole Samples (Depth of hole = 14.85')

Date	Time	pH	Cond (us/cm)	Isotopic (uci/ml)	Tritium (uci/ml)	Depth Feet	Sample Vol (L)	Vol Pumped (g)
3/27/2006	1021	9.99	879	<MDA	2.50×10^{-6}	11.76' 11.94'	2.75	3.3
3/28/2006	1336	9.91	833	<MDA	1.43×10^{-6}	12.56' 12.90'	2.75	N/A
3/29/2006	1003	9.99	857	<MDA	7.93×10^{-6}	12.04' 12.21'	2.75	N/A
3/30/2006	1050	10.00	819	<MDA	1.61×10^{-6}	12.41' 12.60'	2.75	N/A
3/31/2006	0940	10.00	814	<MDA	1.75×10^{-6}	10.98' 11.10'	2.75	N/A
4/01/2006						10.73		
4/02/2006	0908	10.09	749	<MDA	<MDA	10.50' 11.60'	2.75	N/A
4/03/2006	1055	10.04	764	<MDA	<MDA	10.45' 10.53'	2.75	N/A
4/04/2006	1436	10.05	773	<MDA	1.92×10^{-6}	10.41'	2.75	11.7
4/05/2006	1401					13.52'		
4/06/2006	0831	9.96	852	<MDA	1.32×10^{-6}	12.76' 13.34'	2.75	N/A
4/07/2006	0923	9.94	805	<MDA	2.02×10^{-6}	12.20' 12.70'	2.75	N/A
4/08/2006	0807	9.84	750	<MDA	1.46×10^{-6}	11.76' 12.26	2.75	N/A
4/09/2006	0915	9.77	780	<MDA	1.43×10^{-6}	11.33' 11.84	2.75	N/A
4/10/2006	0818	9.74	735	<MDA	<MDA	11.12'	2.75	N/A
4/11/2006	1001	9.73	745	<MDA	2.18×10^{-6}	11.04' 11.26'	2.75	N/A
4/12/2006	1001	9.66	728	<MDA	2.24×10^{-6}	10.99' 11.15'	2.75	N/A
4/13/2006						10.96'		
4/14/2006	0847	9.68	709	<MDA	4.31×10^{-6}	10.83' 10.92'	2.75	N/A
4/15/2006						10.80'		
4/16/2006	0911	9.61	708	<MDA	1.41×10^{-5} Note 1	10.71' 10.78'	2.75	N/A
4/17/2006	0941	9.53	652	<MDA	<MDA	10.71' 10.78'	2.75	N/A
4/18/2006	1021	9.53	675	<MDA	1.11×10^{-6}	10.72' 10.79'	2.75	N/A
4/19/2006						10.73'		

Unit 3
Tritium Evaluation Data

Date	Time	pH	Cond (us/cm)	Isotopic (uci/ml)	Tritium (uci/ml)	Depth Feet	Sample Vol (L)	Vol Pumped (g)
4/20/2006	1446	9.54	693	<MDA	1.93×10^{-6}	10.66' 10.72'	2.75	N/A
4/21/2006						10.68'		
4/22/2006	1026	9.58	707	<MDA	3.27×10^{-6}	10.62' 10.71'	2.75	
4/23/2006						10.66'		
4/24/2006						10.63'		
4/25/2006						10.61' 14.60'		8.5
4/26/2006						14.29'	3.55	
4/27/2006						14.44'		
4/28/2006	0940	9.72	1013	<MDA	2.99×10^{-6}	14.08' 14.59'	2.75	
5/01/2006						13.42'		
5/02/2006						13.00'		
5/03/2006						12.69'		
5/04/2006						12.39'		3.3
5/05/2006						14.49'		
5/08/2006	0930	9.75	1134	<MDA	6.33×10^{-6}	13.58'		
5/09/2006						14.36'		
5/10/2006						14.07'		
5/11/2006						13.75'		
5/12/2006						13.48'		
5/15/2006	1051	9.64	1146	<MDA	1.56×10^{-6}	12.69' 13.23'	2375	
5/16/2006						13.00'		
5/17/2006						12.77'		
5/18/2006						12.53'		
5/19/2006						12.32'		
5/22/2006						11.73'		
5/23/2006	1001	9.70	1156	<MDA	1.13×10^{-6}	11.62' 12.20'	2.75	
5/24/2006						12.02'		

Note 1 – Data Suspect

Unit 3
Tritium Evaluation Data

U3 H-19 Test Hole Samples (Depth of hole = 8.72')

Date	Time	pH	Cond (us/cm)	Isotopic (uci/ml)	Tritium (uci/ml)	Depth Feet	Sample Vol (L)	Vol Pumped (g)
4/09/2006	0900	12.12	9890		1.07×10^{-6}	8.50' DRY	0.25	N/A
4/10/2006	0951	12.17	9736	<MDA	2.46×10^{-5} Note 1	8.52' 8.70'	2.75	N/A
4/11/2006	1530	12.18	9284	<MDA	1.39×10^{-6}	> 8.5'	2.75	N/A
4/12/2006						>8.5'		
4/13/2006	1000	11.82	6249	<MDA	2.95×10^{-6}	>8.5'	1.25	N/A Note 2
4/14/2006	1755	11.58	5620			N/A		
4/15/2006	1600	11.28	6245			N/A		Note 3
4/15/2006	1601	11.87	7830			N/A		Note 4
4/16/2006	0940	11.68	7849	<MDA	3.44×10^{-6}	N/A	N/A	N/A
4/17/2006	0800	11.60	8143	<MDA	6.08×10^{-6}	N/A	N/A	N/A
4/18/2006								Note 5
4/19/2006								Note 6
4/26/2006						DRY		
5/03/2006						DRY		
5/10/2006						DRY		
5/17/2006						DRY		
5/24/2006						DRY		

Note 1 – Data suspect -backup analysis of same aliquot showed 5.44 E-5 – suspect chemical interference.
Note 2 – Hole removed by excavation – water samples from trench will continue to be called H-19 in this area
Note 3 – Sample taken from Plant SW water puddle in trench
Note 4 – Sample taken from Plant NE water puddle in trench at base of where H-19 hole was. Appears to be localized elevated pH and conductivity
Note 5 – Area backfilled on 4/18/2006
Note 6 – New H-19 installed – Depth of hole is 8.5'. Will monitor and record levels if water is present.

Unit 3
Tritium Evaluation Data

Unit 3 Miscellaneous Samples

Sample Type	Date/Time	Tritium (uCi/ml)	Isotopic (uCi/ml)	pH	Cond	Zinc	Boron	Vol. Pumped (gal)
Spray Pond Hatch	3/4/2006 11:43	1.68×10^{-6}	<MDA	8.83	1640			
Dirt Sample #1	3/04/2006 1055	<MDA				19.8 Note 1		
Dirt Sample #2	3/04/2006 1106	<MDA				24.3 Note 1		
Dirt Sample #3	3/04/2006 1116	<MDA				56.9 Note 1		
Dirt Sample #4	3/04/2006 1127	<MDA				11.5 Note 1		
RWT Level Pit	3/07/2006 1450	4.06×10^{-6}	<MDA	8.77	850	0.16	7.3	380
CVCS HUT Instrument Pit	3/14/2006 1040	1.34×10^{-6}	<MDA	9.46	464			
HVAC Condensate RP# 3-06-00122	3/17/2006 0315	8.74×10^{-6}						
CVCS HUT Sump Inst. Pit	3/17/2006 1426	1.90×10^{-6}	<MDA	8.19	546	0.0	3.35	
CVCS HUT Sump	3/17/20061425	4.21×10^{-6}	8.51 X 10-5 Note 2	7.85	1065	0.168	1604	
Hatch 3Y1H02A	3/17/2006 1640	<MDA	<MDA	7.95	890			
U3 Pipe Density Tunnel	3/19/2006	1.28×10^{-6} Note 3						
U3 North Yard Sump	3/22/2006 1900	4.50×10^{-6}	<MDA	7.73	610			
3MHTNA02A 176' Turb. Bldg	3/27/2006 1135	5.00×10^{-6}						
3MHTNA01B 100' Turb. Bldg	3/27/2006 1140	2.54×10^{-6}						
3MHTNA01A 100' Turb. Bldg	3/27/2006 1145	1.70×10^{-6}						
3MHTNA01C 100' Turb. Bldg	3/27/2006 1150	1.73×10^{-6}						
Pipe Density Tunnel	4/03/2006 1125	1.15×10^{-6} Note 4						

Unit 3
Tritium Evaluation Data

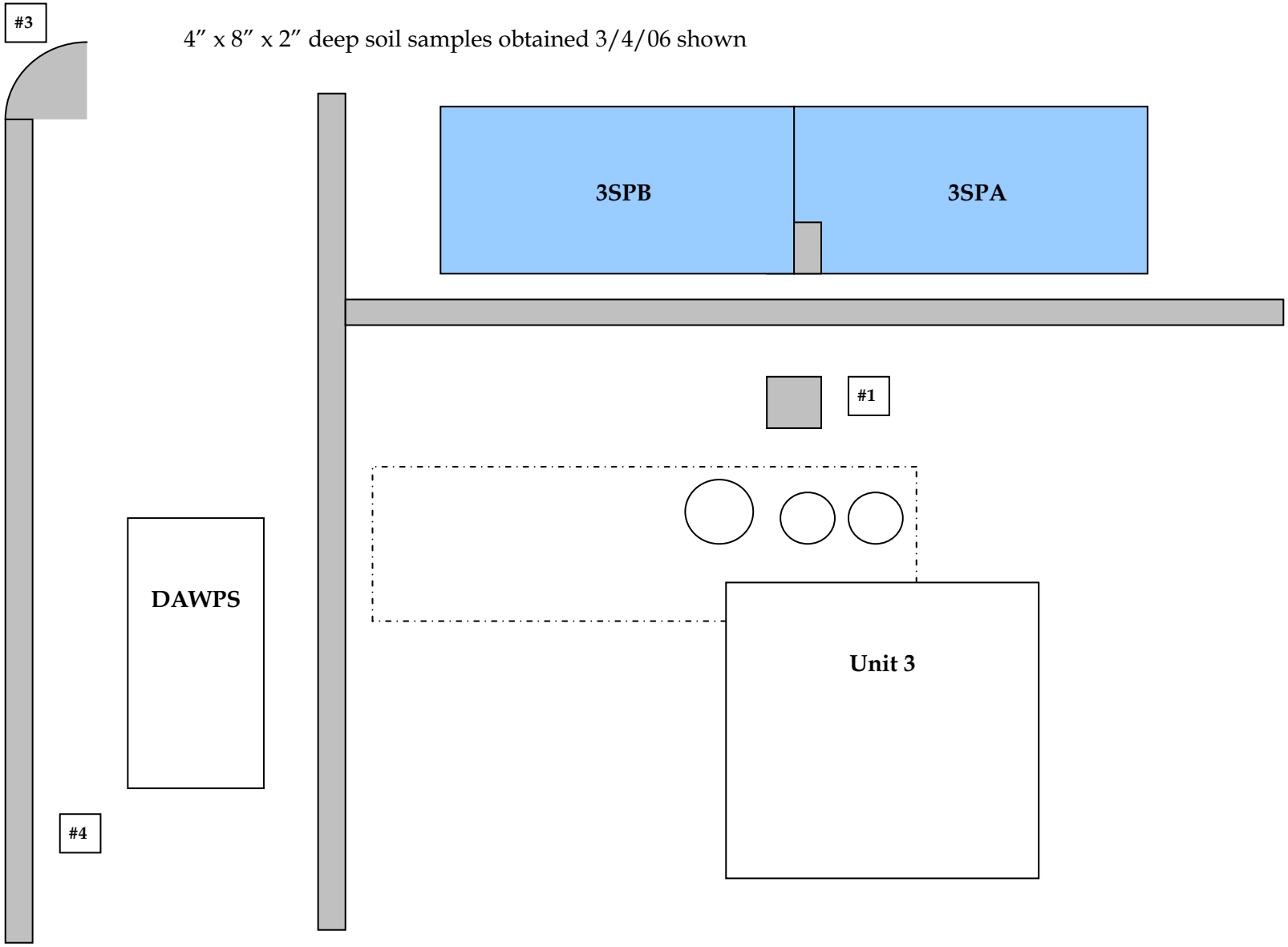
Sample Type	Date/Time	Tritium (uCi/ml)	Isotopic (uCi/ml)	pH	Cond	Zinc	Boron	Vol. Pumped (gal)
CVCS HUT Sump Inst. Pit	4/05/2006 1450	5.72×10^{-6}	<MDA	8.18	564			
ESPS A Pipe Vault Hatch 3AZYNDY1H07A	3/31/2006 1200	<MDA		8.64	1546			
ESPS **B** Pipe Vault Hatch 3AZYNDY1H07A	3/31/2006 1201	<MDA		8.48	1438			
ESPS Hatch 3Y1H07A	4/06/2006 1640			8.62	1589			
Fuel Building / Tendon Gallery Annulus	4/07/2006 1035	1.27×10^{-6}	<MDA	7.74	850		3.3	
Fuel Building / Tendon Gallery Annulus	4/13/2006 1046	1.30×10^{-6}					0.3	
ESPB 50A/B Vault				8.54				
Density Tunnel HVAC Plenum	4/17/2006 1145	8.64×10^{-6}		9.44	2180			
Density Tunnel HVAC Plenum	4/18/2006 1543		<MDA Note 5					
Fuel Building / Tendon Gallery Annulus	5/04/2006 1700	1.30×10^{-6}	<MDA	8.25	820			1200
HFNA01A – Unit 3 Fuel Building Air Washer	5/18/2006 1000	1.07×10^{-6}						
U3 Rad Waste Bldg Air Washer	5/18/2006 1005	<MDA						
3MHTNA01C – Unit 3 Turb. Bldg. Air Washer	5/18/2006 1045	3.74×10^{-6}						
3MHTNA01B – Unit 3 Turb. Bldg. Air Washer	5/18/2006 1046	2.93×10^{-6}						

Note 1 - See page 24 for location
Note 2 – Mn-54 – 4.35×10^{-7}, Co-58 – 2.56×10^{-6}, Co-60 – 8.22×10^{-6}, Sb-122 – 1.42×10^{-8}, Sb-125 – 1.59×10^{-5}
Note 3 – Sample from floor. Results are suspect
Note 4 – Sample from floor. Sample filtered and distilled
Note 5 – 250 ml sample – MDA's in the $\times 10^{-7}$ range. Will collect more sample and composite if possible.

Unit 3
Tritium Evaluation Data

Surface Dirt Samples for zinc

4″ x 8″ x 2″ deep soil samples obtained 3/4/06 shown



Errata

The following pages supersede those in the contained in the report.

2.0 Site Description

This section presents a summary of how the Units were constructed, the subsurface geology, hydrogeologic setting, and stormwater evaluation.

2.1 Unit Construction

The three Units at PVNGS have similar site layouts and construction. Each of the Units was constructed within a large excavated basin approximately 60 feet below the initial grade. As the buildings were constructed, the area was backfilled with compacted structural fill material to ensure there was a stable base for the buildings. Buildings were then constructed within the excavation as the appropriate depth was reached. Because of this construction method, the operating unit buildings are mostly surrounded by and supported on compacted structural fill material; no undisturbed native material is present. Figure 2-1 is a representative section through a PVNGS operating unit showing the excavation depth, building placement, and backfill material. Details of the construction process are provided in the Final Safety Analysis Report (PVNGS, 1981).

As construction activities neared final grade and completion, less-compacted backfill was placed in limited areas where no additional building construction was to occur, particularly around the utility corridors. Utilities were placed in sand or coarser grained material as additional protection from settling and damage caused by compaction. As a result, the more permeable fill material is found at more shallow depths. The areas where less-compacted fill was used are isolated from each other by building foundations and the associated compacted structural fill.

2.2 Subsurface Geology

As described above, the subsurface immediately adjacent and beneath the Units consists entirely of backfill material, mostly structural backfill designed to support the weight of the buildings without shifting or subsiding. Structural backfill meets a minimum 95 percent compaction requirement in order to provide a stable base for building foundations. Minor amounts of less-compacted fill material are also present. The less-compacted fill is primarily fine grained material such as silt and clay, but also contains sand and gravel mixed throughout.

Beneath and further away from the Units, the subsurface geology consists of thin interbedded layers of clay, silty clay, silt, and fine grained sandstone associated with playa deposition overlying the primarily volcanic bedrock (Figure 2-1). The major, continuous geologic units in this area are the Upper Alluvial Unit (UAU), the Middle Fine Grained Unit (MFU) and the Lower Alluvial Unit (LAU). The LAU is the primary regional aquifer immediately overlying the volcanic bedrock in this area.

2.4 Unit Stormwater Evaluation

Stormwater flow and the potential for infiltration were evaluated at each Unit to determine where stormwater could infiltrate into the subsurface. At each Unit, scuppers (downspouts) divert precipitation from the roofs of surrounding buildings to the ground. In addition to precipitation, when the buildings and paved areas are washed, water also flows from the building roofs and other areas into the RCA Yards. The RCA Yards are mostly covered with impermeable material and most of the water is collected by the PVNGS stormwater system.

While the three Units at PVNGS have similar site layouts and construction, there are differences in physical conditions that control collection and routing of stormwater within each RCA Yard. In each Unit, there are more permeable areas where infiltration may occur, particularly in Units 2 and 3. Additionally, seismic gaps between structures may also be preferential pathways for precipitation to enter the subsurface if water is pooled in these areas or if there is significant flow duration along the seismic gaps. The following describes the specific information for each Unit (PVNGS, 2006b).

2.4.1 Unit 1 Stormwater Drainage

Almost all of the Unit 1 RCA Yard is paved. Shallow drainage swales divert stormwater out of the area rather than collecting in the RCA Yard. The scuppers on the northwest and southwest corners of the Fuel Building drain onto paved surfaces. The scuppers on the northeast and southeast corners of the Fuel Building drain onto mostly paved areas, although there are unpaved areas less than 5 feet in diameter at the scupper outfalls. Figure 2-2 shows the limited areas where infiltration can occur. These are:

- Asphalt was recently cut away at the north side of the valve pit on the west side of the Refueling Water Tank to control drainage. This cutout can receive water from the scupper on the southwest corner of the Fuel Building.
- A very small area on the northwest side of the Holdup Tank (HUT) sump is not paved. In addition, the pavement is sloped towards the HUT sump and stormwater can enter the sump at this location. However, the sump does not show evidence of staining, indicating very little water enters at this location.

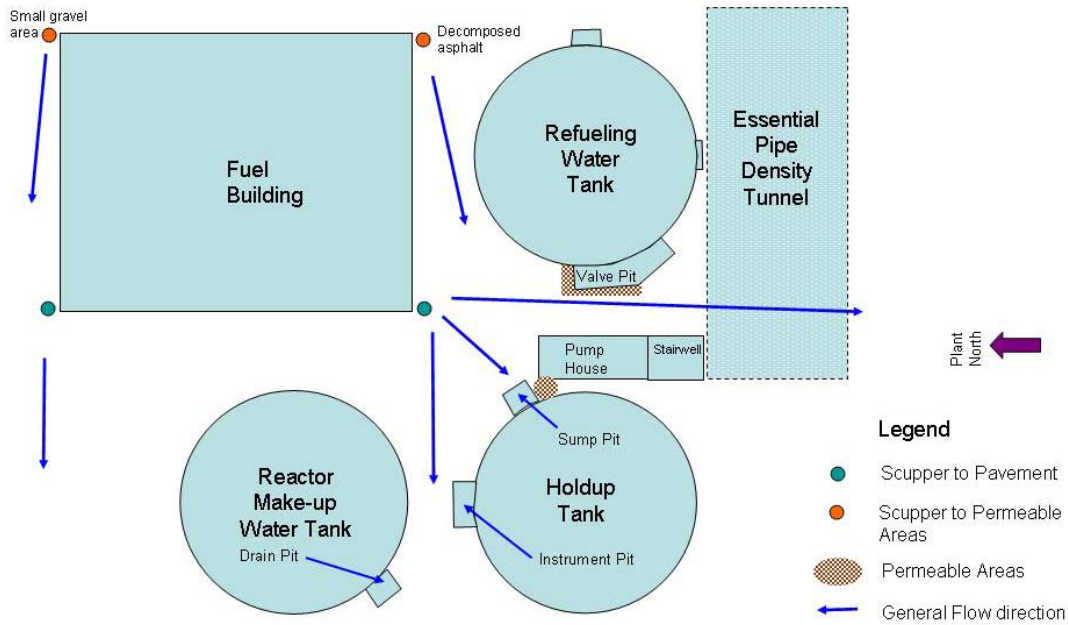


FIGURE 2-2
Conceptual Drawing Unit 1 RCA Yard Stormwater Drainage

The surface of the Unit 1 RCA Yard is mostly impervious except for a few openings cut into the asphalt to control stormwater drainage. There is limited potential for water to infiltrate into the subsurface, and the subsurface is dry. As verification, the Unit 1 EPDT is dry with little evidence of water staining. As discussed in Section 3, test hole data confirms this conclusion.

2.4.2 Unit 2 Stormwater Drainage

Similar to Unit 1, most of the Unit 2 RCA Yard is also paved. The ground surface slopes away from the buildings and shallow drainage swales divert most stormwater out of the area, rather than it collecting in the RCA Yard. Unlike Unit 1, there is a small lip on the HUT sump that acts as a barrier to stormwater flow into the sump. Figure 2-3 shows the limited areas where infiltration can occur:

- A large, unpaved area exists immediately north of the northwest Fuel Building roof scupper where water can enter the subsurface. Some of the introduced water may then flow along the permeable material under the buttress for the Fuel Building to the heating, ventilating, and air conditioning (HVAC) tunnel and from there to the EPDT. This pathway is further discussed in Section 3.
- Asphalt was recently cut away at the north side of the valve pit on the west side of the Refueling Water Tank to control drainage. This cutout can receive water from the scupper on the southwest corner of the Fuel Building.
- The northeast scupper of the Fuel Building also drains into a permeable area. However, as in Unit 1, there is no likely pathway for water to reach the RCA Yard from this scupper.
- The pavement in the Unit 2 RCA Yard has more cracks and is more degraded than the asphalt in Unit 1.

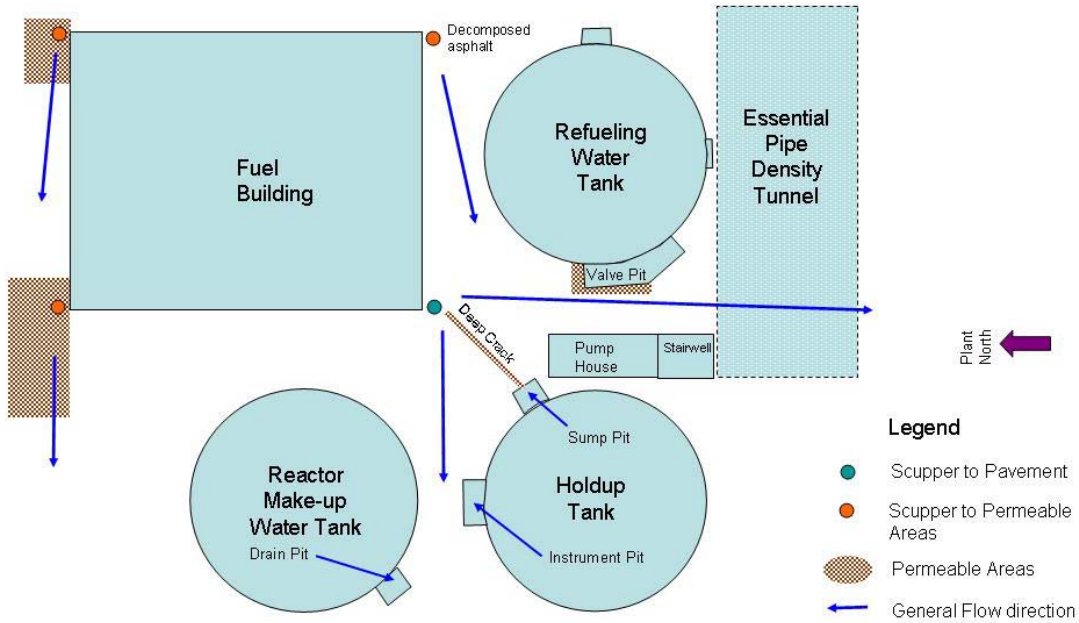


FIGURE 2-3
Conceptual Drawing Unit 2 RCA Yard Stormwater Drainage

The walls and floor of the Unit 2 EPDT are water stained. There is a small, approximately 2-inch-tall dam made of Plexiglas at the mouth of the HVAC tunnel where it enters into the EPDT. The dam was outfitted with a nipple and Tygon tubing to allow collected water to flow directly to the sump. The size of the dam and the small-diameter tubing indicates a low flow rate. The diversion prevents the water from dripping onto the floor causing housekeeping and worker safety issues. The Unit 2 EPDT appeared to have more water than Unit 3, however, the tritium results collected to date are lower than those from Unit 3 and are below action levels.

While the existing stormwater collection system limits stormwater infiltration into the subsurface, some stormwater is entering this area. As discussed in Section 3, test holes in Unit 2 found that there were more concrete structures in the subsurface that are directing water to the EPDT.

2.4.3 Unit 3 Stormwater Drainage

Much of the RCA Yard is paved or otherwise covered with impermeable material, and most of the stormwater flows into the stormwater system. However, the scuppers at the north and south side of the Fuel Building in Unit 3 are adjacent to more permeable areas within the area of less compacted fill material (see Figure 2-4). Additional unpaved areas are present to the west side of the RCA Yard, on the north side of the HUT, and around the Reactor Makeup Water Tank. These areas also provide a potential pathway for stormwater to enter into the subsurface.

The walls and floor of the Unit 3 EPDT are water stained. Tygon tubing is installed at three locations to divert water entering into the EPDT directly to the sump. As with Unit 2 EPDT, the small-diameter tubing indicates a low flow rate. Water collection prevents the water from dripping on the floor causing housekeeping and worker safety issues.

3.1 Unit 3 Preliminary Investigation Results

Thirteen test holes were placed in Unit 3 to determine the occurrence and extent of tritium (see Figure 3-2). As discussed above, these test holes were placed where tritium was anticipated to be present. Additional test holes were then placed to determine the extent of the tritium and to bound the area where water is present. The investigation determined that there is a shallow basin of less-compacted fill in the area with the depth-to-compacted structural fill less than 15 feet bgs. The basin is of very limited extent and is bounded on all sides by deep foundations and compacted structural fill.

The investigation also determined that very little subsurface water is present in the area. As shown in Figure 3-2, only six test holes contain measurable water: H0-A, H0-B, H5-B, H10, H11, and H12. The remaining seven test holes are primarily within the compacted structural fill defining this shallow basin and did not contain measurable water.

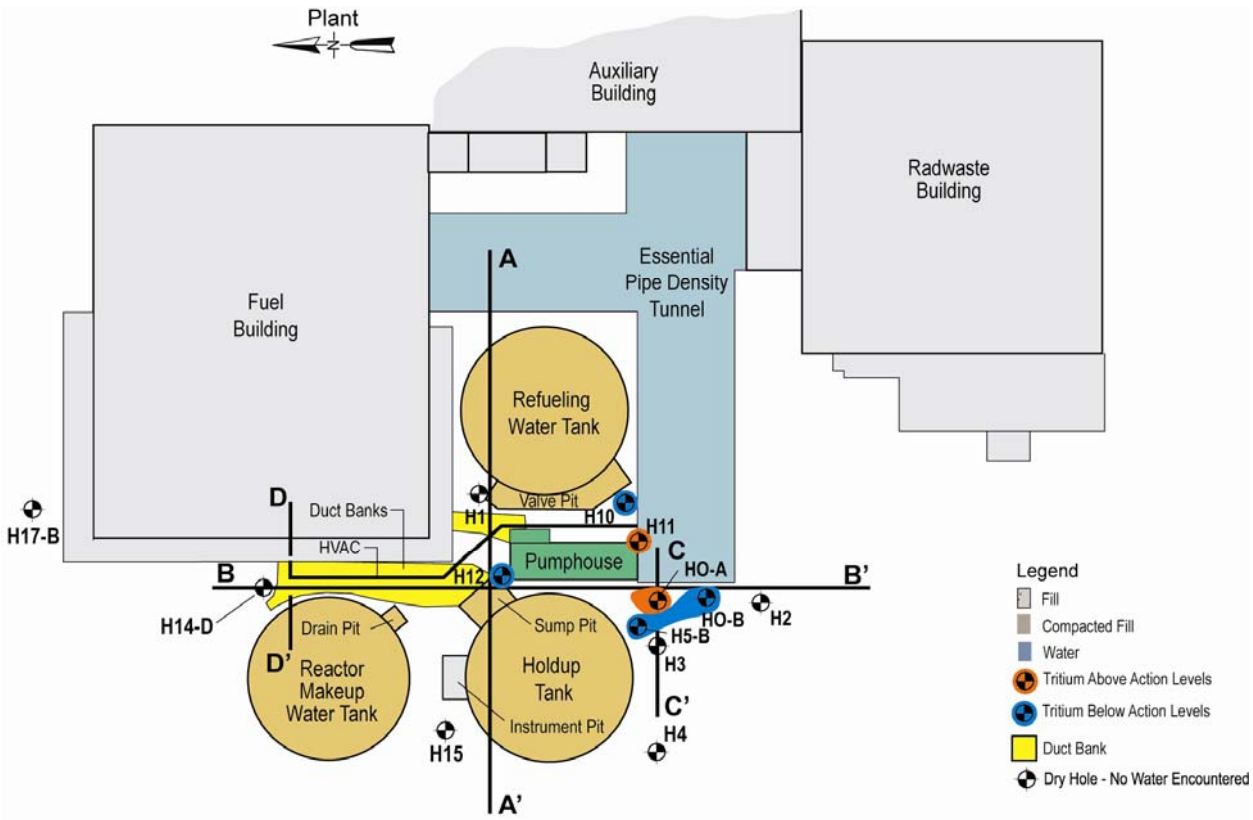


FIGURE 3-2
Unit 3 Test Hole Location Map

As shown on sections A, B, and C, where present, water is found at the top of the compacted structural fill material, pooled against foundation walls in the deeper portion of this shallow basin (Figures 3-3, 3-4, and 3-5). At Unit 3, the subsurface water is pooled in the less-compacted fill material in the downgradient areas outside of the EPDT and the courtyard area between the HUT and Refueling Water Tank (RWT). The depth to water is about 10 to 12 feet bgs, depending on the location, with a saturated thickness of approximately 1 foot.

Figure 3-3 (Section A-A') illustrates how water is trapped on top of the compacted fill material and held against the nearby structures. If water levels rise, the HVAC tunnel and sand bedding will tend to drain the water towards the EPDT.

Figure 3-4 (Section B-B') illustrates the conditions along the long axis of the basin. Because of the compacted structural fill associated with the pump house, water is trapped at a higher level near the HUT sump than at the EPDT. The higher tritium concentrations above action levels are found near the EPDT, trapped against this structure by the underlying compacted structural fill and the thick walls of the EPDT.

Figure 3-5 (Section C-C') illustrates the subsurface conditions at the termination of the EPDT. Four 24-inch diameter spray pond pipes exit the EPDT at this location. These pipes rise abruptly at this location. The underlying compacted structural fill also rises sharply upward, forming the downgradient edge of the small basin of less compacted fill material. Based on the tritium data, compacted structural fill may have been excavated to make room for the pipes as these exited the tunnels, resulting in ridges of structural compacted fill material between the pipes. These ridges will prevent subsurface water flow and explain why higher concentrations of tritium are found immediately adjacent to cleaner water.

The two areas of tritiated water above action levels (Figure 3-2) are believed to be in intermittent connection through the seismic gap between the EPDT and the pump house stairwell. This narrow gap between the two structures is covered by a water stained steel plate, indicating that water occasionally flows across this area when there are higher water levels in the subsurface. There is no evidence that higher water levels are a recent or common occurrence, and the water levels in the subsurface indicate that higher water levels are uncommon.

Section D-D' (Figure 3-6) further illustrates the complex nature of subsurface conditions in these small basins, and how these are dominated by utilities and structures. This section also illustrates how stormwater that infiltrates at the scuppers may be directed towards the EPDT. As shown, the HVAC tunnel exits the Fuel Building immediately beneath the buttress on the west side of the Fuel Building. The more permeable material placed at the base of the buttress is believed to be in connection with the sand bedding around the HVAC Tunnel. As discussed in Section 2.4.1, the scupper on the northwest side of the Fuel Building outfalls into permeable material adjacent to the buttress at Units 2 and 3 (Figures 2-3 and 2-4).

The overlying duct bank prevented investigation of this connection. However, test hole H14-D (Figure 3-2 and 3-4) was placed as close as possible to this area and was completed entirely in compacted structural fill, indicating that it is outside of, and defines, the northern edge of the basin. However, the pathway illustrated in Figure 3-6 may allow stormwater to enter the basin from this area. Migration out of the basin is prevented by the compacted structural fill material.

3.1.1 Test Hole Sampling and Water Level Measurements

For the test holes that contained sufficient water, daily water level measurements were collected, then the test holes were sampled and pumped dry. Disposable bailers are used for the sampling to prevent cross contamination. This continued pumping resulted in decreased water levels across the area. The daily pumping was suspended in late March 2006, and the water levels recovered. This decline and recovery proves that there is communication between the different water-bearing portions of the small basin, although there is insufficient communication to develop a stable water table. Water level results are shown in Figure 3-7 and the data are contained in Appendix B.

As shown on Figure 3-7, the water levels in test hole H12 are inconsistent with the other test holes. H12 is in less-compacted fill material surrounded on three sides by compacted material associated with the HUT and the pump house (Figures 3-2 and 3-3). The water levels at this location rose rapidly shortly after the test hole was installed, to around 2 feet higher than the other test holes. At the same time, tritium activities decreased at this location. The nearby HUT sump was ruled out as a source of the water because the tritium levels within the sump were higher than the water in the test hole.

Because no precipitation events contributed clean water into the system, H12 and the HUT sump were pumped dry to determine if this higher water level was related to a transient event, such as a water line leak or clean water spill. H12 recovered to slightly lower than the original water level. Therefore, the higher water level at H12 appears to represent cleaner water partially contained by the compacted structural fill associated with the pump house and the HUT. Because the water level did not recover to the same level as before, it indicates that the area can be dewatered. H10 is located about 40 feet east of H12 but appears to be in hydraulic connection with H12. When H12 was pumped dry, H10 also went dry and has not recovered to its previous level. Given the almost 4 foot difference in water levels between these two test holes, this suggests that the subsurface conditions are complex.

3.1.2 Unit 3 Tritium Results

Tritium above action levels was found at only two locations (Figure 3-2). These locations were in the lowest portions of the basin, immediately adjacent to the EPDT. These locations are H11 where the 36-inch HVAC tunnel enters into the EPDT and at H0-A where the 24-inch lines exit the EPDT. Lower concentrations of tritium (on the order of 10^{-6} µCi/ml) were found where water was encountered at the other locations in the Unit 3 RCA Yard. Sample results are summarized below in Table 3-1. Complete results are provided in Appendix C.

5.0 Additional Source Investigation

Additional potential sources of the tritiated water were identified and evaluated. This evaluation is summarized below. The categories of potential sources are:

- Process systems
- Other potential sources
- Past Plant practices

5.1 Process Systems

Several of the process systems in the RCA Yards contain elevated tritium concentrations. The most likely sources are the underground process pipelines, the HUTs, RMWTs and RWTs, and the HUT sumps. Table 5-1 presents representative recent tritium concentrations for these process components within the RCA Yards. All results were obtained in 2006 as part of the tritium evaluation project.

TABLE 5-1
Representative Recent Tritium Concentrations

Component	pH	Cond (µs/cm)	Tritium (µCi/ml)
Unit 2 LR - Recycle Monitor Tank	6.42	0.96	8.06×10^{-2}
Unit 2 RMWT	6.65	1.1	2.2×10^{-2}
Unit 2 RWT	4.18	19.6	1.24×10^{-1}
Unit 2 HUT	4.45	14.8	4.69×10^{-1}
Unit 2 Essential Spray Pond System Train A	8.07	5100	1.89×10^{-6}
Unit 1 HUT Sump			8.12×10^{-3}
Unit 2 HUT Sump			2.46×10^{-2} to 2.51×10^{-2}

Underground pipelines in the Unit 3 RCA Yard with the highest potential to be a source of tritium above action levels were evaluated immediately following identification of tritium above action levels in this area. Leak tests and other evaluations indicated that these were not a source of the contamination. Other piping in the area was eliminated as potential sources because the tritium concentrations in these were less than the tritium concentrations seen in the RCA Yard (PVNGS, 2006a). The base of the RMWT is at grade and not a subsurface source for tritium.

The HUT, RWTS, and adjacent sumps were identified as potential sources because of the higher tritium concentrations present. These were evaluated using process knowledge. The bottom of the tanks are about 9 feet 6 inches bgs and rest on concrete bases that are 4 feet 6 inches thick. The subsurface portion of the tanks are surrounded by a concrete wall that is integral with the concrete base and lined with 0.25 inch stainless steel plate (PVNGS, 2006a). While no method currently exists to determine if small leaks may have occurred, the higher

Attachment 2
Leak Source Work Plan

Engineering Action Plan to Leak Test Line 3PCHNL385 (Rev 0)

SCOPE OF TESTING:

Line to be Tested: 3PCHNL385 (FROM RMWT 3MCHNT02 TO AUX FEED)
Test Description: Pressure Decay Test Using Demineralized Water
Reference Drawings: P&IDs 03-M-CHP-0003, 03-M-AFP-0001
Reference: 30DP-9MP15, Hydrostatic and Pneumatic Pressurization Guidelines
Implementing WM: TBD

Prerequisites:
(1). Notify Effluents Tech and RP prior to starting this evolution.

REQUIRED SYSTEM LINEUP TO ESTABLISH / ISOLATE THE TEST BOUNDARY:

Upstream Boundary:

(1). CLOSE Valve 3PCHNV019

Valve is located at the northeast quadrant of the Reactor Makeup Water Tank:

NOTE: If the valve does not isolate, there does not appear to be sufficient space for a freeze seal as an alternate method of isolation.

Engineering Action Plan to Leak Test Line 3PCHNL385 (Rev 0)

<u>Downstream Boundaries</u>:

(1). CHECK CLOSED valves 3PAFAV058 and 3PAFAV090
Valves are located 88' MSSS NORTHEAST AFA-P01 BAY UPPER LEVEL:

(2). CHECK CLOSED valves 3PAFBV028 and 3PAFBV093.
Valves are located 88' MSSS SOUTHEAST AFB-P01 BAY UPPER LEVEL:

NOTE: If any of the valves do not isolate, a freeze seal may be utilized as an alternate method of isolation.

<u>Test Pressure Connection</u>:

(1). Valve 3PCHNVM69
This valve is located in the 90' TUNNEL UNDER CONDENSATE STORAGE TANK:

NOTE: this valve is located in the overhead of the tunnel approximately 20 feet south of the stairs. A ladder / scaffold will be necessary to access this valve.

Engineering Action Plan to Leak Test Line 3PCHNL385 (Rev 0)

PRESSURE TEST PLAN

1. At valve **3PCHNVM69**:

(a). Connect a test rig consisting of a supply hose, a manual control valve, and a backflow preventer (check valves) to a convenient source of Demineralized water (DW). DS water is NOT recommended due to its potable nature. See Appendix A for suggested locations of DW Valves.

(b). Install a pressure gauge, capable of reading at least 120 psi (minimum gradations of 2 psi, if available), and the necessary Swagelok fittings and tubing or hose connections at valve.

2. Open valve **3PCHNVM69**.

NOTE: In the following steps, existing DW header pressure will be used to pressurize the Line.

3. Slowly throttle open the test rig control valve and until a pressure reading in the approximate range of 40 - 120 psig is obtained. NOTE: Minimum design pressure of the pipe is 200 psi (ref: 13-P-ZZG-012 Rev 27 pipe class HCDA).

4. Close test rig isolation valve. Record initial pressure reading.

5. If applicable, take acoustic soundings during the pressurization to determine if water is being expelled from the pipe into the pot hole or other location.

NOTE: Packing adjustment of manual valves within the test boundary can be made as needed to reduce / prevent leakage.

6. Observe the test rig pressure gauge for a minimum of ~ 10 minutes (or as determined by Engineering). Record final pressure reading.

7. Report results to Engineering. Test may be repeated as necessary and / or as determined by Engineering.

RESTORATION

1. To depressurize the line, disconnect the test rig (DW hose), crack open test rig drain valve (utilizing proper RP precautions / requirements), and drain excess water to a floor drain (or as directed by RP).

2. Monitor the pressure gauge at the valve while depressurizing.

3. Close valve **3PCHNVM69**.

4. Disconnect all other remaining hardware from **3PCHNVM69**. Replace and tighten pipe cap.

5. If utilized, ensure freeze seals are removed.

6. Return the system to Operations.

APPENDIX A: SUGGESTED DW VALVE LOCATIONS

(1). DWNV393:
This is a DW header drain valve located in the overhead of the 90' TUNNEL UNDER CONDENSATE STORAGE TANK (approximately 25' NORTH OF E/W TURN IN PIPE TUNNEL).

NOTE: this valve is located in the overhead of the tunnel approximately 150 feet south of valve **3PCHNVM69**. A ladder / scaffold will be necessary to access this valve.

Simpkins, John A (Z99702)

Digitally signed by Simpkins, John A(Z99702)
DN: CN = Simpkins, John A (Z99702)
Reason: I am the author of this document.
Date: 2006.05.31 12:22:10 -07'00'

Jones, Stephen B (Z02094)

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Reason: I have reviewed this document.
Date: 2006.05.31 12:38:34 -07'00'

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VERIFICATION OF ACCURACY:

Originator / Regulatory Review: I have verified that the information contained in the submittal meets the requirements of the Source Documents.

Signature	Printed	Date
	Harvey C. Lesan	6-1-06

Peer Reviewer: I have reviewed the attached document for completeness and submittal quality.

Signature	Printed	Date
Frank DiVito	Frank DiVito	6/1/2006

COMMITMENTS:

None

ACTION TRACKING:

None

Lesan, Harvey C(Z99540)

From: Gray, Thomas S(Z99610)
Sent: Thursday, June 01, 2006 3:53 PM
To: Lesan, Harvey C(Z99540)
Subject: FW: 30 Day Report Update - Tasks 1 and 2 for REVIEW/COMMENT

Attachments: 30 Day Report Update - Tasks 1 and 2.pdf

Yes, looks good. Tom

From: Salinas-Card, Henedina (Z81436)
Sent: Thursday, June 01, 2006 1:32 PM
To: Gray, Thomas S(Z99610)
Cc: Lesan, Harvey C(Z99540); Divito, Franklin D(Z32650); Day, Henry P(Z05294)
Subject: 30 Day Report Update - Tasks 1 and 2 for REVIEW/COMMENT

Tom,

Please review the attached and email your comments to Environmental asap.

30 Day Report Update - Tasks 1...

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BRIEF DESCRIPTION:

Palo Verde is submitting supplemental information to the 30 day report for the notification of discharge of non-hazardous material (tritium). This information completes Tasks 1a, 1b, 1c, 1d, 2a, and 2b.

☐ **Due To Agency By:** ☒ **Post-mark By:** June 1, 2006	**Hard Due Date: Yes** ☒ **No** ☐

To Final Approver		
Target Date:	**Actual Date:**	**Signature Date:**

ROUTE TO INDIVIDUAL	STA.	SIGNATURE REQUIRED	REVIEW REQUIRED	DATE REVIEWED/ APPROVED	COMMENTS
H. Salinas-Card	7626	☐	☒	6/1/06	
Harvey Lesan	7626	☒	☒	6/1/06	Sign as Originator
Tom Gray	7397	☐	☒	6/1/06 Per E-mail	See attached
Frank DiVito	7626	☒	☒	6/1/06	Sign as Peer Reviewer
Henry Day	7626	☒	☒	HPD 6-1-06	
Return to:	**STA:**	**FOR QUESTIONS, CONTACT:**			**EXT.:**
H. Salinas-Card	7626	Harvey C. Lesan			82-6490