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Comments: Martin #4058

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* Repl- one correction as noted.

**FINAL PANTEX REPORT
ON PLUTONIUM RELEASES TO THE ENVIRONMENT**

JULY 2005



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SUMMARY

The only two remaining issues on plutonium in the environment at Pantex are:

1. Closing out the 1961 plutonium incident; and
2. Finishing the characterization of the Nuclear Weapons Accident Residue (NWAR) facility as noted in the Pantex Plant Radiological Investigation Report (RIR).

Even though NWAR has no radiological data above the PRG, because of the history of NWAR, Pantex is completing a combined chemical - radiological risk assessment.

- **Pantex only has one plutonium release location.**
 - The 1961 internal plutonium incident did not release material to environment.
 - NWAR represents the only Pantex site with plutonium release.
 - **NWAR represents a limited source and limited potential pathway for plutonium to reach a receptor.**
 - The waste was removed in 1979 and NWAR was remediated in 1980-82.
 - NWAR is in upland settings with limited recharge (0.044 in/yr) because of high evapotranspiration rates.
 - **Pantex responded to comments by taking 71 additional plutonium samples after the RIR was submitted.**
 - Additional confirmatory plutonium samples were taken in the 1961 plutonium incident area, and beneath the shower drainpipe discharge area.
 - Additional confirmatory plutonium samples were taken at NWAR to substantiate the RIR conclusions.
 - **Pantex adequately sampled the site for plutonium (refer to Figure 5-14 RIR)**
 - 961 plutonium groundwater samples were taken out of 4313 total Site Relevant Contaminant (SRC) groundwater samples.
 - 22% of all groundwater samples were for plutonium with approximately 12% detects (114/961).
 - All current groundwater results are below the plutonium drinking water maximum contaminant level (MCL).
 - 1494 plutonium soil samples were taken out of 9619 total SRC soil samples.
 - 16% of soil samples were for plutonium with approximately 24% detects (361/1494).
 - All current soil sample values below plutonium PRG.
 - 541 plutonium surface water samples were taken out of 2258 total SRC surface water samples.
-

- 24% of all surface water samples were for plutonium (541/2258) with approximately 12% detects (63/541).
 - Surface water data of limited value due to periodicity of moisture
- **The detection limit for plutonium was sufficient to evaluate Pantex for risk-based environmental impact:**
 - $^{PX}MDA_{\text{groundwater (gw)}} = 0.1 \text{ pCi/L}$ in range of industry standard ($^{LANL\&SNL}MDA_{\text{gw}} \sim 0.05 - 0.1 \text{ pCi/L}$).
 - $^{PX}MDA_{\text{soil}} = 0.05 \text{ pCi/gm}$ in range of industry standard ($^{LANL\&SNL}MDA_{\text{soil}} \sim 0.03 - 0.05 \text{ pCi/g}$).
 - $MDA_{\text{soil}} = 0.05 \text{ pCi/g} \sim \text{background soil} = 0.05 \text{ pCi/gm} \rightarrow \text{can make impact evaluation above background.}$
 - $MDA_{\text{soil}} = 0.05 \text{ pCi/g} < PRG_{\text{soil}} = 25.1 \text{ pCi/g} \rightarrow \text{can easily make risk based site impact evaluation}$
 - $MDA_{\text{gw}} = 0.1 \text{ pCi/L} < MCL_{\text{water}} = 15 \text{ pCi/L} \rightarrow \text{can easily make risk based site impact evaluation}$
- **Pantex is not environmentally impacted by plutonium.**
 - Pantex re-sampled potential source locations around the 1961 plutonium incident area \rightarrow resulted in non-detects.
 - Pantex re-sampled NWAR < health based risk preliminary remediation goal \rightarrow going to risk assessment.
 - All Pantex plutonium samples \ll health based risk (PRG).

1.0 INTRODUCTION

The Pantex Plant Final Radiological Investigation Report (RIR), submitted to Region VI of the Environmental Protection Agency (EPA) in January 2004, provides a comprehensive assessment of all radiological environmental issues at Pantex to facilitate site radiological closure.

EPA Region VI and the Texas Commission on Environmental Quality (TCEQ) provided comments on the Pantex RIR on June 7 and again on July 6, 2004. The EPA included some of the public comments received at the agency for Pantex's consideration.

Pantex responded to Agency comments on December 21, 2004.

This report provides additional information and closes out remaining issues related to plutonium events at the Pantex Plant (the 1961 Internal Gravel Gertie event and the Nuclear Weapons Accident Residue (NWAR) site). The report also provides additional information regarding minimum analytical detection limits and plutonium background used in the Pantex RIR.

2.0 PLUTONIUM INCIDENTS WITH THE POTENTIAL TO RELEASE TO THE ENVIRONMENT

Section 2 of the RIR "Pantex Radioactive Site Relevant Contaminants" recognizes that past activities at NWAR potentially released plutonium to the environment. As noted in section 5.3.16.2 "Risk Assessment Screen for NWAR", there were two ²³⁹Pu results slightly above the background upper tolerance limit (UTL) (e.g., a maximum of 0.095 pCi/g vs. 0.05 pCi/g). Upon reviewing Plots 9 and 10, although small, there was a distinction between the two values and background. The two locations [SRS (NWAR Site 9) and SRS (NWAR Site 10)], where results exceeded the UTL, were on the southern edge of NWAR (Figure 5-55 of the RIR). Because the extent of the exceedances of the UTL had not been defined, additional data were required to make final judgment for NWAR. This additional data is provided in Section 2.2 to closeout the NWAR site.

In the July 6, 2004, EPA comments on the Pantex RIR, a request was made for additional information on the 1961 Internal Gravel Gertie (Cell) event. Information was provided in the December 2004 response to comments. In addition to providing this response, Pantex went an additional step and continued to research the 1961 internal Gravel Gertie event. As confirmed below, the 1961 internal Gravel Gertie event resulted in no release of plutonium to the environment and requires no further investigation.

2.1 1961 Internal Gravel Gertie (Cell) Plutonium Event

In November 1961, while removing a weapon plutonium pit, a release of plutonium occurred contaminating the cell (Bay 6). A foreman and two technicians, wearing the appropriate personnel protection equipment (PPE), were in the cell at the time of the incident. As soon as the event occurred, and radiation monitoring system alarm activated, all personnel exited the area through a personnel passage and staged at a location just outside the passage inside a ramp next to the cell. The foreman proceeded to the nearby equipment room to call for assistance. The foreman returned immediately to the staging area. Soon after the call, a safety officer arrived and escorted all three personnel to an emergency shower located in nearby

Building 12-42 (based on personal interview with the foreman on March 23, 2005 after submission of the RIR). The men were issued clean clothing and all contaminated clothing was bagged for proper disposal.

Shortly after the incident, a Safety Engineer and the Chief Radiologist entered the cell, turned off the air conditioning and filtration system. They then removed the system sample filters for radiological surveys. The damaged pit was sealed with tape and placed in a shipping container base. The Safety Engineer and Chief Radiologist conducted a radiological survey of the cell and personal passageway. Measurements taken in close proximity to the pit location in the cell at the time of the incident measured 450,000 disintegrations per minute (dpm). Other radiological surveys were taken in the ramp where the personnel had exited, and the outside air exhaust vents from the air and filtration system; no significant radioactivity was measured.

Decontamination of the cell began two (2) days later. All surfaces were wiped and cleaned, the area was vacuumed with a filter to remove any loose particulate, and wire brushes, detergent and water were used, as necessary, to clean the cell to a non-detect level. The pathway taken from the cell to the emergency shower and the pathway taken by the foreman were surveyed to ensure that no other areas had been contaminated. Any contamination detected in the internal pathways was removed and packaged for proper disposal. Any equipment or materials that could not be cleaned to a non-detect level, and the waste generated from the decontamination effort were then disposed at Los Alamos National Laboratory (LANL).

Two high explosive (HE) subassemblies from the plutonium component were surveyed to ensure that no radiological contamination was present. Upon release from any radiological contaminant, they were held in an approved storage location for disposition at the Pantex Burning Grounds. During this period, the Burning Grounds (BG) pads were periodically cleaned and the residues placed in the BG trenches. Due to the non-detect release criteria, no measurable level of plutonium material was released at the Burning Grounds.

The potential for releasing plutonium particulate to the environment from this incident was very low through any of the three potential pathways: (1) air release to outside via air conditioning exhaust and filtering system ductwork and vents; (2) decontamination waste and; (3) personnel transport. The fact of no release to the environment is confirmed for each pathway below.

2.1.1 Air Release to Outside via Air Conditioning Exhaust , Filtering System Ductwork, and Vents

Survey results indicated that the plutonium particulate was contained, as-designed, within the HEPA filter banks and circulating chamber of the air conditioning and filtering system. This containment is demonstrated in Table 1, which shows the results of the radiological survey.

**Table 1. Survey Results In Disintegrations Per Minute (dpm)
by Chief Radiologist and Safety Engineer (11/7/1961)**

Cell Immediate Area	450,000 dpm
Desk Tops/Flat Surfaces	5,000/10,000 dpm
Passageway/Tooling Empty Containers	0-1,000 dpm
A&B Cubicles	0-1,000 dpm
A/C Front Filter Surface Facing Cell	1,500 dpm
A/C Back Filter Surface Facing Cell	500 dpm
Circulation Chamber	100-500 dpm
Duct Work Leading to Outside	Non-detect
Interlock	Non-detect
Exhaust Vents	Non-detect

The exhaust ductwork and vents, and the area below the exhaust stack were radiologically surveyed at the time of the incident and no plutonium was detected. Therefore, this pathway was eliminated as a potential source of plutonium particulate that could have been released to the environment.

2.1.2 Decontamination Waste

Equipment was decontaminated and reused in the facility or containerized and sent to LANL for disposal. Records indicate that all materials and equipment were required to meet design agency release criteria prior to release. Materials and equipment not meeting these requirements were shipped to LANL for disposal. HE was ultimately released to the Burning Grounds for sanitization (thermal destruction) after being held for confirmation of no radiological contamination. Decontamination release limits were non-detect for all materials (Reference 1961 Decontamination Plan). During this period, the burn pads were periodically cleaned and the residues were placed in the burning ground trenches. Due to the design agency release criteria, no plutonium was released at the Burning Grounds. Sampling of the pads and trenches confirm that no measurable levels of plutonium were released (Reference Burning Grounds RCRA Facility Investigation (RFI)).

2.1.3 Personnel Transport

The two technicians and the foreman directly involved in the incident had the potential to carry plutonium particulate on their PPE or any exposed area of their bodies resulting in potential contamination of the area outside of the cell, the internal passageway to the equipment room and to the emergency shower inside of Building 12-42. Particulate may have fallen off and contaminated the exit pathway and the internal pathway taken by the foreman when calling for assistance from the equipment room. All three personnel waited for assistance in the ramp staging area just outside of the cell before being escorted to the Building 12-42 emergency shower. The pathways taken by the personnel involved in the incident are along routes that are

inside buildings, hallways or access/egress ramps that are enclosed and protected from the environment. These pathways were radiologically surveyed after the incident. The emergency shower and the ramp where the personnel staged after the incident were decontaminated and cleaned in accordance with Plant procedures. Any other detectable contamination identified along the pathway(s) was recovered and included with other decontamination waste that was ultimately sent to LANL for disposition. Therefore, the only remaining pathway for release of particulate to the environment was by means of wastewater from the emergency shower. The emergency shower drainpipe exited Building 12-42 approximately 1 foot above the surface. The emergency showers in Building 12-42 have been demolished, however, the drainpipes that serviced the emergency shower are still in place (see Figures 2 and 3 showing where the emergency shower drain pipe exited and where wastewater from the drainpipe created a surface soil depression over time). Currently other accommodations are in place to decontaminate personnel should an emergency arise, and wastewater generated from the decontamination activity would be collected for proper disposal. Currently, the heating, ventilation and air conditioning system condensate drip drains out this pipe, as can be seen in Figure 2.

At the time of the RIR preparation, the identity and location of the emergency shower used to decontaminate the foreman and two technicians was not definitely known but was pieced together from existing documentation. One possibility was that showers in the facility where the incident occurred might have been used. These facilities drained to leaching beds. As provided in RIR Table D-1, "Surface Soil Radionuclide Background Results", soil sample results showed non-detects, or no plutonium detections above expected background levels from the leaching bed area, the ditches around Bay 6 and the equipment room, the former sewage treatment facility area, and Pantex Lake. Samples taken at Pantex Lake were all non-detects, and were analyzed in 2003 using virgin glassware and low detection limits (large sample sizes and long count times, see enhanced plutonium measurement method in section 3).

Subsequent to the RIR it was confirmed from personal interviews with the foreman (March 23, 2005) that the 12-42 emergency shower was used for showering, not showers in the facility where the incident occurred. When the RIR was issued, no soil samples had been taken from beneath the former Building 12-42 emergency shower wastewater drainpipe. Therefore, to eliminate the shower wastewater drain as a potential plutonium release pathway, Pantex collected soil samples directly under the drainpipe and the surrounding area where the water depression exists in July and August of 2004. Figure 1 illustrates the soil sample locations at the drainpipe discharge area. The soil sample results are provided in Table 2, "Soil Samples From Emergency Shower Drainpipe". As can be seen in Table 2, all but three results were below detection. All of the detected results were well below background levels. Note plutonium is not mobile in the Pantex environment, plutonium is not volatile, and plutonium has an extremely long half-life. Any plutonium from 1961 would be expected to settle first in the shower sump, and if plutonium were released from the Building 12-42 emergency showers, would remain in the near vicinity of the shower drainpipe.

As a result of additional investigation after the RIR, it has now been established that the contaminated personnel showered in nearby Building 12-42 following the incident, and that the wastewater drained through a drainpipe to surface soil on the west side of the building. The soil sample results from under the drainpipe and surrounding area, obtained using the enhanced plutonium measurement method, showed non-detects or measured results below background

levels. In addition, samples taken from the drainage ditch in this area and samples taken from the receiving Playa 4 were either at background concentrations or non-detects. These results support the RIR conclusion that there was no detectable release of plutonium to the environment from this incident or impact to the environment.

2.2 Nuclear Weapons Accident Residue (NWAR) Site

As noted in section 5.3.16.2 "Risk Assessment Screen" of the RIR, for the interval from 0-2 Feet interval: "Two ²³⁹Pu results are slightly above the background UTL (e.g., a maximum of 0.095 pCi/g vs. 0.05 pCi/g). Upon reviewing Plots 9 and 10, although small, there is a distinction between the two values and background. The two locations [SRS (NWAR Site 9) and SRS (NWAR Site 10)] where results exceed the UTL are on the southern edge of NWAR (Figure 5-55). Because the extent of the exceedances of the UTL has not been defined, ²³⁹Pu will be carried forward to the PRG screen." No detections of ²³⁹Pu were noted for the 2-15 foot or the greater than 15 foot interval.

It was noted in the RIR for the Risk Screens that the "maximum concentrations of ²³⁹Pu and ²³⁵U are less than their respective PRGs, thus additional evaluation of ²³⁹Pu and ²³⁵U is not required based on risk screens. However, the nature and extent of ²³⁹Pu has not been defined and additional data are required to make final judgment for NWAR. Based on these risk screens for SWMU-82, no SRCs in the 0-2 feet interval were detected at concentrations that would require further evaluation in a BRA, however the risk will be further evaluated following the definition of extent of ²³⁹Pu."

To close out the RIR for defining the nature and extent of residual contamination at NWAR following completion of remediation, additional soil samples were taken in April, May, and September 2004. Figure 4 depicts the locations where these additional soil samples were taken, and the soil sample results are provided in Table 3 (obtained using the enhanced plutonium measurement method). As indicated in Table 3, the majority of the results are non-detects. The eight (8) detected results ranging from 0.018 to 0.105 pCi/g are either below background (six out of the eight detections), or well below the preliminary remediation goal limit of 25.1 pCi/g for an industrial worker. Also note the entire NWAR site is located in an upland recharge environment (0.044 in/yr recharge) with little potential for migration to the subsurface. Therefore, residual plutonium contamination at NWAR presents no adverse impact to human health or the environment. Since the RIR, Pantex has decided to go a step further, complete a risk assessment for the NWAR site, and forward it to fully bring NWAR to closure.

3.0 PLUTONIUM SAMPLING, ANALYSIS AND RESULT SUMMARIES

3.1 Detection Limit, Minimum Detectable Activity

The plutonium samples taken at the Pantex Plant were analyzed using alpha spectrometry. The standard analytical method referenced in the guidance document is the EML HASL 300 Method. The EML HASL 300 Method uses a maximum sample size for soils of 100 g, but gives 10 g or less as the routine optimal sample aliquot. The "lower limit of detection" (LLD) for ²³⁹Pu is 0.5 mBq (~0.013 pCi) achievable in 1000 minutes.

The Pantex minimum detectable activity (MDA) for soil noted in the RIR was approximately 0.05 pCi/g, which is higher than the value quoted above, but within the range of MDAs quoted by Los Alamos and Sandia (0.03 - 0.05 pCi/gm). For purposes of closing out plutonium issues, Pantex has recently used an enhanced plutonium measurement method. Currently, the routinely attainable MDA that Pantex laboratories have been able to achieve by using this enhanced method is about 0.003 pCi/g or 3 fCi/g. To achieve this low MDA all of the following conditions must be met; chemical recoveries must be excellent, only extremely low background detectors can be used, virgin glassware must be used, long count times must be used, large (10 g) sample aliquots must be used, and disposable one-use filters must be used. This extremely low MDA has been very difficult to routinely and reliably achieve in a production measurement process and is quite costly. Pantex has however been able to consistently achieve MDAs in the range of 0.01 - 0.02 pCi/g using this enhanced method in a production mode, which is comparable to the values noted above.

The MDA for Pantex groundwater is approximately 0.01 pCi/L, which is in the range with Los Alamos and Sandia (0.05 - 0.1 pCi/L).

The Pantex MDA for soil is on the same order as the plutonium soil background (0.05 pCi/gm). This allows Pantex the ability to evaluate the Pantex environment for impact above background.

The MDA for both soils and groundwater are much lower than the respective PRG making the detection limit more than sufficient to make risk-based impact evaluations.

3.2 Plutonium Sample Results

As noted in the Section 2 of the RIR "Pantex Radioactive Site Relevant Contaminants," all past activities at NWAR potentially released plutonium to the environment. As previously confirmed, the 1961 internal Gravel Gertie event resulted in no release of plutonium to the environment and requires no further investigation. Based upon this, Pantex has extensively sampled the Pantex site to cover not only the above areas but other areas and pathways to every playa potentially affected by site nuclear operations. The coverage and sample density can be seen in Figure 5.

3.2.1 Groundwater

Background Results

Background plutonium groundwater concentrations could not be established from the 26 Ogallala Aquifer samples (see RIR Table C-10, "Background Groundwater Results"). As a result, Pantex adopted EPA's screening level groundwater concentration of 15 pCi/L in accordance with the EPA drinking water MCL (see RIR Table 5-20).

Site Results

Site groundwater was sampled for plutonium 961 times (the majority of samples taken from perched groundwater) with 114 reported detections (94 detections in perched groundwater and 20 detections in the Ogallala Aquifer). The Ogallala Aquifer detections ranged from 0.01 to 0.244 pCi/L, and the majority of these detections were extremely close to the sample-specific MDA and rad error count (REC). The perched groundwater results ranged from 0.005 to 2.58 pCi/L. Pantex has concluded that many of the limited number of detections so close to the

sample-specific MDA and REC are either false positives, or detections resulting from laboratory artifact contamination before Pantex began implementing extraordinary means to reduce false positive detections.

3.2.2 Soil

Background Results

Pantex assessed and compared the proposed site background plutonium levels with other DOE facilities in fairly close proximity. Pantex background results are presented in RIR Table C-8, which contains 286 soil sample results with 98 reported detections of plutonium. The reported range of detections was 0.0049 to 0.16 pCi/g. As previously discussed, the RIR reported the maximum concentration of 0.16 pCi/g as an outlier. Physical review of the laboratory data package, and other sample results at the same location, indicate that this result is a false positive. Table C-4 indicates that there were three other sample results that were outliers. Comparison of these outlier results with other sample results taken at the same location, demonstrates that these results were also false positive. With the outliers (as identified in Table C-4 in the RIR) removed the maximum detection becomes 0.05 pCi/g, which is comparable to other DOE sites in the surrounding area. The Nevada Test Site (NTS) had background soil levels from 0.03 to 0.42 pCi/g; none of Pantex's background soil results, including outliers, come close to the upper background soil range at NTS. As noted in Section C.2.5 of the RIR, Pantex did not use the NTS for comparison, and chose Los Alamos and Sandia National Laboratories since they are geographically closer and have similar soil characteristics and meteorological factors. The 0.05 pCi/g background soil concentrations are consistent with other DOE facilities in the area.

RIR Table 3-3 "Soil Background Results for SRCs (Outliers Removed)" inadvertently reported playa concentrations ranging from 0.0045 to 0.08 pCi/g, and upland concentrations ranging from 0.0045 to 0.080 pCi/g. The table should read that the upland concentrations ranged from 0.0049 to 0.049 pCi/g (outliers removed), and playa concentrations ranged from 0.0071 to 0.040 pCi/g (outliers removed). Table 3-3 reported the total number of samples taken and should be revised to show the numbers of samples taken in each media. Therefore, Table 3-3 should indicate that there were actually 17/61 playa samples and 76/219 upland samples where the results were equal to or greater than the detection limit.

RIR Table C-6, "Soil Radionuclide Background Concentrations (No Outliers Removed)", inadvertently reported background playa and upland plutonium results as 0.0045 to 0.16 pCi/g, with 98/286 results greater than the detection limit. This table should reflect playa concentrations ranging from 0.0071 to 0.16 pCi/g, with 21/66 background playa samples equal to or greater than the detection limit. Further, Table C-6 shows a background upland soil concentration 0.0045 to 0.16 pCi/g with 98/286 sample results greater than detection limit. This table should reflect background upland soil results ranging from 0.0049 to 0.049 pCi/g, with 77/220 sample results equal to or greater than the detection.

Site Results

The majority of the Table D-1 plutonium soil data results are 1992-2000 samples, which were analyzed using less efficient alpha spectroscopy detectors with higher background activities,

and without using a blank population to determine the sample-specific MDA. Over time, alpha spectroscopy detector technology improved, producing lower background measurements and increasing efficiency. In order to achieve the lowest MDAs in the shortest amount of counting time, the alpha spectroscopy analysis detector should have the lowest possible background activity and the highest efficiency, while the chemistry process must optimize yields and maximize sample quantity without degrading resolution. For very low background detectors, not using a blank population to determine the sample-specific MDA results in a low bias MDA. As a result of this low bias MDA, many (107 out of 299 detected results) of the measured results are close, or equal to, their respective MDA or REC, or both; and many are most likely false positive results. In June 2002, Pantex began using a blank population to determine sample-specific MDAs, more efficient background detectors as technology improved, and enhanced means to prevent contamination of Pantex samples from laboratory artifacts. These measures reduced the potential for reporting of false positive results.

3.2.3 Surface Water

There have been 541 plutonium surface water samples taken at Pantex. Table D-5, "SRC Site Surface Water Radionuclide Results", reported 63 detections of plutonium in surface water. Pantex used a conservative 2-sigma REC when screening data for non-detects. As Pantex noted in Appendix I, Section I.2.4.4 of the RIR, the sample-specific REC was divided by 2 and multiplied by 1.65, producing a one-sided 95% confidence decision level. It is particularly important to note that of the 59 plutonium detections in surface water, 36 of the 59 measured results (61%) are equivalent or less than the corresponding REC.

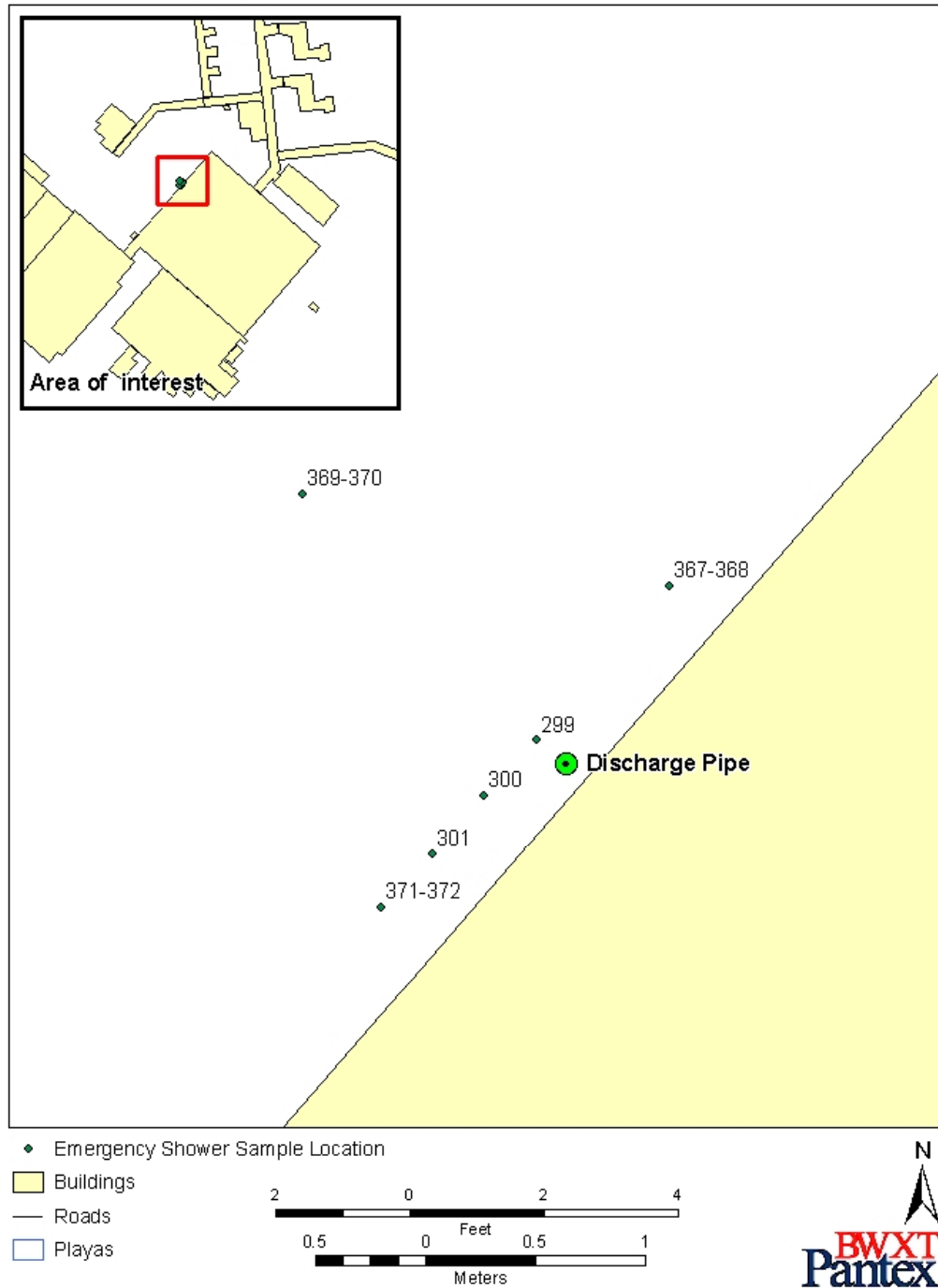


Figure 1 – Building 12-42 Drainpipe and Soil Sample Locations



Figure 2 - Drainpipe Location With Flagged Sample Locations



Figure 3– Side View of Building Showing Drainpipe and Flagged Sample Locations

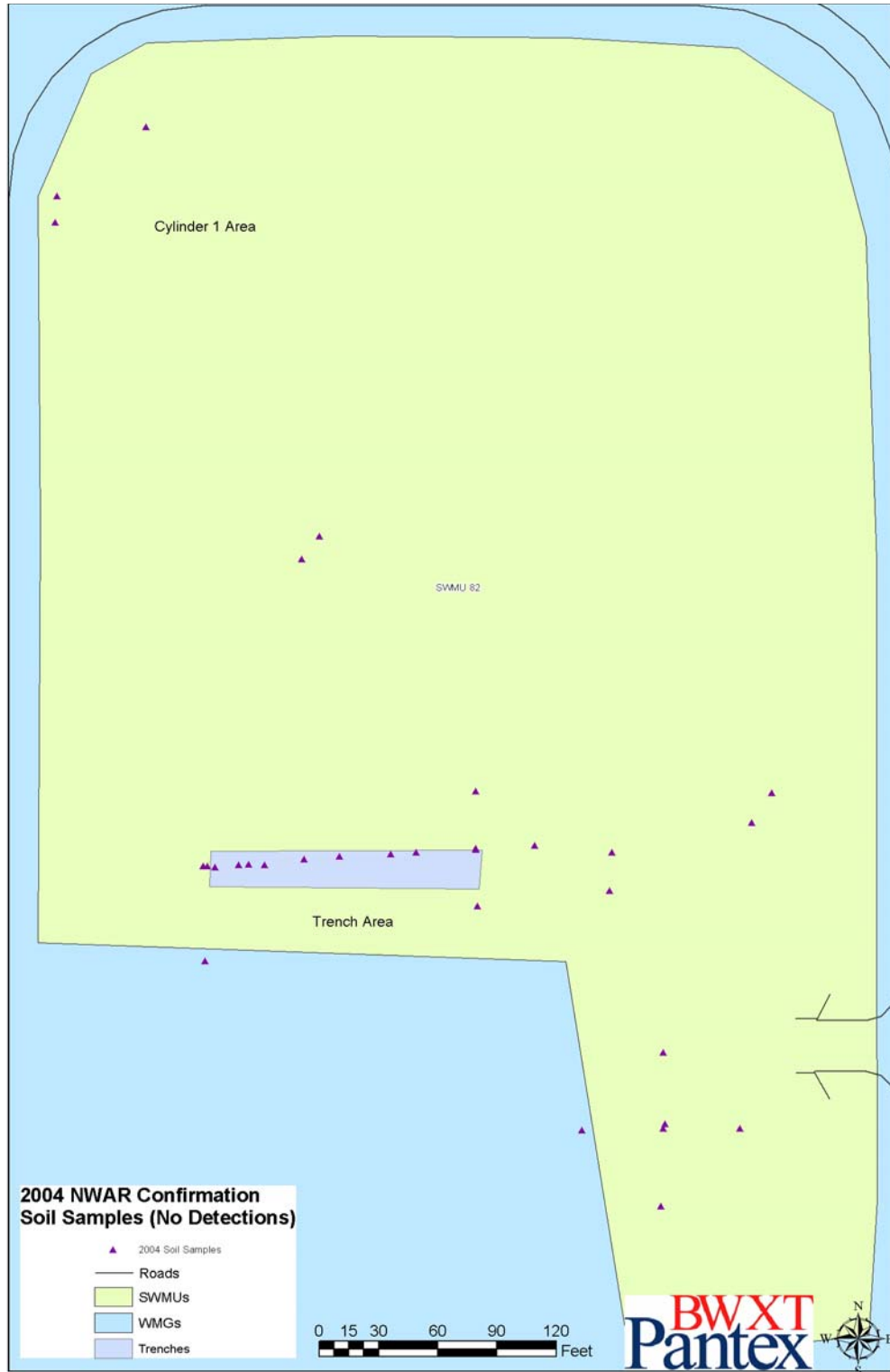


Figure 4 – 2004 Pu-239 Soil Samples at NWAR

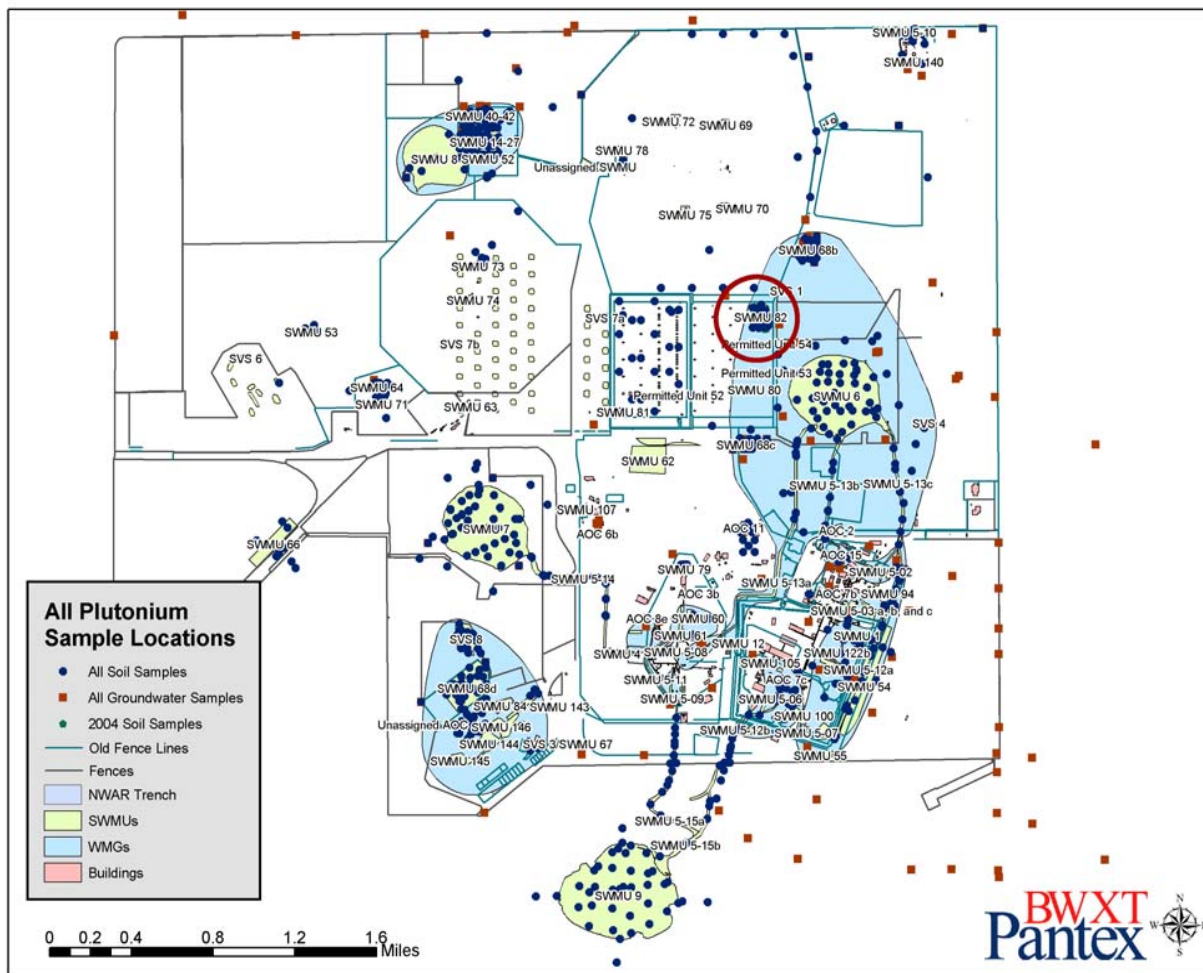


Figure 5 – Pantex Pu-239 Sample Locations

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Table 2 – Soil Samples from Exit Area of Emergency Shower Drainpipe

Location	Sample ID	Sample Date	Medium Type	Analyte	Reported Result	Units	Minimum Detectable Activity	Rad Error Count	Laboratory Qualifier Code	Review Qualifier Code	Detected Result (Y or N?)
Site 7; Discharge West Wall of 12-42S of Door NW-3	20040716D00299	20040716	Soil Surface	Pu-239/240	0.0304	pCi/g	0.021	0.015		J	Y
1 foot South of Sample D00299	20040716D00300	20040716	Soil Surface	Pu-239/240	0.0141	pCi/g	0.022	0.0093	U	BD	N
1 foot South of Sample D00300	20040716D00301	20040716	Soil Surface	Pu-239/240	0.0225	pCi/g	0.02	0.0112		J	Y
Building 12-42 West Wall; South Door Area; 3 feet North of Large Drainpipe	20040826D00367	20040826	Soil 1' Deep	Pu-239/240	0.00744	pCi/g	0.015	0.00809	U	BD	N
Beside Sample D00367;	20040826D00368	20040826	Soil Surface	Pu-239/240	0.0117	pCi/g	0.014	0.0069	U	BD	N
6 feet West of Drain Pipe and 1 foot deep	20040826D00369	20040826	Soil 1' Deep	Pu-239/240	0.00303	pCi/g	0.014	0.00715	U	BD	N
Beside Sample D00369 Subsurface	20040826D00370	20040826	Soil Surface	Pu-239/240	0.00375	pCi/g	0.013	0.00582	U	BD	N
Building 12-42 West Wall; South of Door NW-3; 3 feet South of Large Drainpipe	20040826D00371	20040826	Soil 1'Deep	Pu-239/240	0.00384	pCi/g	0.014	0.00533	U	BD	N
Beside Sample D00371; Surface	20040826D00372	20040826	Soil Surface	Pu-239/240	0.0153	pCi/g	0.015	0.0101		J	Y

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Table 3 – 2004 Plutonium Soil Sample Results at NWAR

Location	Easting	Northing	Sample ID	Sample Date	Medium Type	Analyte	Reported Result	Units	Minimum Detectable Activity	Rad Error Count	Laboratory Qualifier Code	Review Qualifier Code	Detected Result (Y or N?)
NWAR13	637532.19	3765971.75	20040415D00142	20040415	Soil	Pu239/Pu240	-0.0027	pCi/g	0.019	0.0053	U	BD	N
NWAR14	637534.25	3765971.75	20040415D00143	20040415	Soil	Pu239/Pu240	0.005	pCi/g	0.024	0.0087	U	BD	N
NWAR15	637538.19	3765971.25	20040415D00144	20040415	Soil	Pu239/Pu240	0.0047	pCi/g	0.022	0.0069	U	BD	N
NWAR15	637538.19	3765971.25	20040415D00145	20040415	Soil	Pu239/Pu240	0	pCi/g	0.02	0.132	U	BD	N
NWAR16	637549.81	3765972.25	20040415D00146	20040415	Soil	Pu239/Pu240	0.0017	pCi/g	0.023	0.0148	U	BD	N
NWAR18	637555.31	3765972.50	20040415D00147	20040415	Soil	Pu239/Pu240	-0.006	pCi/g	0.021	0.0057	U	BD	N
NWAR19	637563.12	3765972.25	20040415D00148	20040415	Soil	Pu239/Pu240	0.013	pCi/g	0.018	0.0107	U	BD	N
NWAR20	637582.69	3765975.25	20040415D00149	20040415	Soil	Pu239/Pu240	0.005	pCi/g	0.022	0.0067	U	BD	N
NWAR21	637601.31	3765976.75	20040415D00150	20040415	Soil	Pu239/Pu240	0.013	pCi/g	0.02	0.0093	U	BD	N
NWAR22	637627.06	3765978.00	20040415D00151	20040415	Soil	Pu239/Pu240	0.02	pCi/g	0.022	0.0123	U	BD	N
NWAR23	637532.88	3765922.00	20040415D00152	20040415	Soil	Pu239/Pu240	0	pCi/g	0.022	0.0061	U	BD	N
NWAR24	637669.94	3765981.00	20040415D00153	20040415	Soil	Pu239/Pu240	0.103	pCi/g	0.02	0.025			Y
NWAR25	637765.81	3765837.00	20040415D00154	20040415	Soil	Pu239/Pu240	-0.002	pCi/g	0.023	0.0072	U	BD	N
NWAR29	637804.38	3765834.50	20040525D00210	20040525	Soil	Pu239/Pu240	-0.003	pCi/g	0.022	0.0086	U	BD	N
NWAR30	637764.56	3765834.50	20040525D00211	20040525	Soil	Pu239/Pu240	0	pCi/g	0.023	0.118	U	BD	N
NWAR31	637724.25	3765833.75	20040525D00212	20040525	Soil	Pu239/Pu240	0.003	pCi/g	0.012	0.0055	U	BD	N
NWAR32	637763.88	3765794.00	20040525D00213	20040525	Soil	Pu239/Pu240	0	pCi/g	0.02	0.13	U	BD	N
NWAR33	637765.44	3765874.25	20040525D00214	20040525	Soil	Pu239/Pu240	0	pCi/g	0.021	0.0041	U	BD	N
NWAR33	637765.44	3765874.25	20040826D00373	20040826	Soil	Pu239/Pu240	-0.003	pCi/g	0.013	0.006	U	BD	N
NWAR29	637804.38	3765834.50	20040826D00374	20040826	Soil	Pu239/Pu240	0.105	pCi/g	0.015	0.0223			Y
NWAR29	637804.38	3765834.50	20040826D00374	20040826	Soil	Pu239/Pu240	0.026	pCi/g	0.022	0.0141		J	Y
NWAR29	637804.38	3765834.50	20040826D00374	20040826	Soil	Pu239/Pu240	0.042	pCi/g	0.034	0.023		J	Y
NWAR32	637763.88	3765794.00	20040826D00375	20040826	Soil	Pu239/Pu240	0.01	pCi/g	0.014	0.0081	U	BD	N
NWAR30	637764.56	3765834.50	20040826D00376	20040826	Soil	Pu239/Pu240	0.008	pCi/g	0.014	0.0073	U	BD	N
NWAR34	637669.81	3765980.50	20040909D00388	20040909	Soil	Pu239/Pu240	0.002	pCi/g	0.014	0.0088	U	BD	N
NWAR35	637670.12	3766011.00	20040909D00389	20040909	Soil	Pu239/Pu240	0.003	pCi/g	0.013	0.0063	U	BD	N
NWAR35	637670.12	3766011.00	20040909D00390	20040909	Soil	Pu239/Pu240	0.004	pCi/g	0.017	0.0078	U	BD	N
NWAR36	637639.56	3765978.75	20040909D00391	20040909	Soil	Pu239/Pu240	0.056	pCi/g	0.016	0.0184			Y
NWAR36	637639.56	3765978.75	20040909D00391	20040909	Soil	Pu239/Pu240	0.05	pCi/g	0.022	0.0198		J	Y
NWAR36	637639.56	3765978.75	20040909D00391	20040909	Soil	Pu239/Pu240	0.021	pCi/g	0.027	0.0155	U	BD	N
NWAR36	637639.56	3765978.75	20040909D00392	20040909	Soil	Pu239/Pu240	0.013	pCi/g	0.017	0.0118	U	BD	N
NWAR36	637639.56	3765978.75	20040909D00393	20040909	Soil	Pu239/Pu240	0.033	pCi/g	0.015	0.0121		J	Y
NWAR37	637670.69	3765950.75	20040909D00394	20040909	Soil	Pu239/Pu240	0.011	pCi/g	0.019	0.0084	U	BD	N
NWAR37	637670.69	3765950.75	20040909D00395	20040909	Soil	Pu239/Pu240	0.003	pCi/g	0.015	0.0045	U	BD	N
NWAR38	637699.81	3765982.50	20040909D00396	20040909	Soil	Pu239/Pu240	0.018	pCi/g	0.013	0.0082		J	Y
NWAR38	637699.81	3765982.50	20040909D00397	20040909	Soil	Pu239/Pu240	0.001	pCi/g	0.015	0.0037	U	BD	N
NWAR39	637737.94	3765958.75	20040909D00398	20040909	Soil	Pu239/Pu240	0.0014	pCi/g	0.019	0.006	U	BD	N

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Location	Easting	Northing	Sample ID	Sample Date	Medium Type	Analyte	Reported Result	Units	Minimum Detectable Activity	Rad Error Count	Laboratory Qualifier Code	Review Qualifier Code	Detected Result (Y or N?)
NWAR39	637737.94	3765958.75	20040909D00399	20040909	Soil	Pu239/Pu240	0.0175	pCi/g	0.042	0.0215	U	BD	N
NWAR40	637738.88	3765978.75	20040909D00400	20040909	Soil	Pu239/Pu240	0.0014	pCi/g	0.02	0.0073	U	BD	N
NWAR40	637738.88	3765978.75	20040909D00401	20040909	Soil	Pu239/Pu240	-0.0054	pCi/g	0.019	0.0092	U	BD	N
NWAR43	637809.69	3765994.50	20040909D00406	20040909	Soil	Pu239/Pu240	-0.0015	pCi/g	0.021	0.0118	U	BD	N
NWAR43	637809.69	3765994.50	20040909D00407	20040909	Soil	Pu239/Pu240	-0.003	pCi/g	0.021	0.0041	U	BD	N
NWAR44	637819.75	3766010.00	20040909D00408	20040909	Soil	Pu239/Pu240	-0.0027	pCi/g	0.038	0.0274	U	BD	N
NWAR44	637819.75	3766010.00	20040909D00409	20040909	Soil	Pu239/Pu240	-0.0046	pCi/g	0.022	0.0067	U	BD	N
NWAR46	637581.56	3766131.75	20040909D00412	20040909	Soil	Pu239/Pu240	0.0057	pCi/g	0.02	0.0104	U	BD	N
NWAR46	637581.56	3766131.75	20040909D00413	20040909	Soil	Pu239/Pu240	-0.0092	pCi/g	0.019	0.0068	U	BD	N
NWAR47	637590.69	3766143.75	20040909D00414	20040909	Soil	Pu239/Pu240	0	pCi/g	0.022	0.107	U	BD	N
NWAR51	637502.75	3766357.75	20040909D00422	20040909	Soil	Pu239/Pu240	0.0044	pCi/g	0.021	0.0076	U	BD	N
NWAR51	637502.75	3766357.75	20040909D00423	20040909	Soil	Pu239/Pu240	-0.0013	pCi/g	0.018	0.0055	U	BD	N
NWAR52	637458.25	3766321.75	20040909D00424	20040909	Soil	Pu239/Pu240	0.0108	pCi/g	0.022	0.0117	U	BD	N
NWAR52	637458.25	3766321.75	20040909D00425	20040909	Soil	Pu239/Pu240	0.0071	pCi/g	0.02	0.0083	U	BD	N
NWAR53	637457.19	3766308.00	20040909D00426	20040909	Soil	Pu239/Pu240	-0.0045	pCi/g	0.021	0.0078	U	BD	N
NWAR53	637457.19	3766308.00	20040909D00427	20040909	Soil	Pu239/Pu240	-0.0058	pCi/g	0.021	0.009	U	BD	N