



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 6

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June 4, 2004

Mr. Jerry S. Johnson
Assistant Manager for Environmental and
Site Engineering Programs
U.S. Department of Energy
National Nuclear Security Administration
Pantex Site Office
P.O. Box 30030
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Re: Comments - *Final Pantex Plant Radiological Investigation Report for the U.S. Department of Energy/National Nuclear Security Administration, Pantex Plant, Amarillo, Texas, January 2004*; EPA Site ID TX4890110527.

Dear Mr. Johnson,

The U.S. Environmental Protection Agency (EPA) Region 6 has completed the review of the Department of Energy (DOE)/BWXT *Final Pantex Plant Radiological Investigation Report, June 2004*, received by our office on February 17, 2004. The EPA review team, comprised of individuals from both Region 6 and the EPA's Office of Radiation and Indoor Air, agreed that the document was both comprehensive and well-organized. Site history is logically tied to expectations for the potential presence, or absence, of radionuclides in media. Those assumptions are further supported by a focused sampling approach.

The Agency does, however, have questions that should be addressed prior to document approval, as follows:

I. GENERAL COMMENTS:

(1.) Under the Texas Commission on Environmental Quality (TCEQ) Risk Reduction Program, site constituents are screened initially against a background 95% UTL concentration (Risk Reduction Standard RRS1). Any chemical constituent that exceeds background is then compared to media-specific concentrations (MSCs) for human health and ground water protection, as a RRS2 screen. Generally, those sites that exceed background and the media-specific screens under RRS 2, or with a higher level of uncertainty, go forward for further evaluation under the Baseline Risk Assessment (BRA) and closure under a RRS 3. The RRS2 MSC concentrations are provided by TCEQ.

The screening process for radionuclides, as outlined in the *Pantex Plant Radiological Investigation Report, January 2004*, is similar. Radionuclide concentrations are compared to background 95% UTL concentrations and site-specific Preliminary Screening Goals (PRGs). Pantex has calculated PRGs utilizing site-specific input

parameters and the Environmental Protection Agency's PRG Calculator for Radionuclides (<http://epa-prgs.ornl.gov/radionuclides>), for each Site Relevant Constituent (SRC) isotope. (Radionuclide activity PRGs were calculated for PU-239, U-234, U-235, U-238, Th-232, and Tritium; a mass PRG was calculated for Total U.)

To support consistency in screening approaches for radionuclides and chemical constituents, please:

- Provide a comparison of how the TCEQ RRS2 human health screening values were derived (input parameters, exposure assumptions/scenarios, etc.) to the assumptions used in calculating the radionuclide PRGs;
- Provide a radionuclide PRG for each Site Relevant Constituent (SRC) using RRS2 assumptions and input parameters.
- What are screening results when comparing maximum detects to background UTLs and these PRGs? Any significant differences?

(2.) Sample results summarized in this report generally indicate a small source term, with activity levels below background and calculated PRGs. However, EPA would recommend a more conservative approach to site screening. An initial comparison to background is appropriate, as background levels are below human health screening levels for the SRC radionuclides. (As we have discussed in prior conversations, risk will be calculated for chemical and radionuclide background and included as supplemental information in the Baseline Risk Assessment.) If maximum concentrations exceed the human health PRG, then the site is carried forward to the baseline risk assessment. At this point, an additional comparison of a 95% UCL area concentration cannot be compared to the PRG as another screening level. This is appropriate in the baseline risk assessment, but not when applied as another level of screening. Trend analysis, population comparisons, and isotopic ratios further support the argument that concentration levels are near background. However, screening should depend primarily on comparisons to background and risk-based PRGs. How would this change the recommendations of this report?

(3.) Pantex has elected to close groupings of sites (Burning Grounds, Zone 12, Zone 11, etc.) under the TCEQ Risk Reduction Program. If Pantex, or TCEQ, elects to close a group of sites under Risk Reduction Standard 3, that group will be further evaluated in the Baseline Risk Assessment. Any constituent, radionuclide or chemical, exceeding background will be carried forward into the Baseline Risk Assessment. Although the radionuclide contribution to overall risk may be minimal in most instances, this approach is conservative and ensures that both groups of constituents are fully evaluated in the risk process. This is a departure from the recommendations of this report, but will be considered in any EPA decisions for the site. Please consider this comment for on-going work; however, no response is necessary.

(4.) PRG screening values were developed for isotopic (Pu-239, Th-232, U-234, U-235, U-238) activity in pCi/g (soils) and for mass equivalents for total U in mg/kg (soils).

Mass screening equivalents can also be derived using the EPA calculator and are helpful in relating residual mass to activity. Mass is particularly important in quantifying potential impacts from soil sources to ground water, and is consistent with evaluation of the soil-to-ground-water pathway under both RCRA and CERCLA. Presenting both an isotopic activity and mass also helps clarify how approaches to radionuclide remediation is consistent with the process for chemical sites. Please discuss how mass was considered in the overall screening process and in estimating site-specific source contributions in the fate and transport modeling. What are mass contributions per site or per zone?

(5.) The radionuclide ground water MCLs (Table 5-16) have been updated by EPA's November 6, 2001 Memorandum: *Use of Uranium Drinking Water Standards under 40 CFR 141 and 40 CFR 192 as Remediation Goals for Groundwater at CERCLA sites, Elaine Davies, Acting Director, Office of Emergency and Remedial Response (OERR), and Stephen Page, Director, Office of Radiation and Indoor Air (ORIA)*. Under this memorandum, MCLs for the Pantex SRCs would be:

Tritium (H+3)	20,000 pCi/l
Combined alpha MCL not to exceed (Pu-239 + Th-232 +)	15 pCi/l
Consideration of mass and activity for U:	
Total mass of U-234 and U-238	30 ug/l;
Total activity for U-234, U-235, U-238	30 pCi/l

Please revisit the fate and transport modeling, and soil screening calculations, using these end-point MCLs for both the Perched and Ogallala aquifers.

(6.) One reviewer noted that sewer laterals are common sources for releases of constituents to the environment. Was this considered in general for the Pantex site? Would this be a potential subsurface release path for radionuclides? Please discuss.

II. FATE AND TRANSPORT MODELING (APPENDIX E AND TEXT)

(1.) Appendix E states that several matrix parameter assumptions were made to develop the FEHM model simulations. For example, average formation thicknesses (Table E-1), recharge and infiltration rates, K_d values, etc. Since site-specific parameters were not yet available for this demonstration, a conservative approach should be applied. For example, a weighted average of data points nearer potential source areas (i.e. Firing Site 5) would be preferred to a site-wide average, simulating a worst case scenario for vertical migration. Other conservative approaches could include, for example:

(a.) If the model subsurface stratigraphy is based on the average thicknesses from Table E-1, the stratigraphy nearest the source areas should be used, unless those values are less conservative;

(b.) Section E.2.1.2, indicates that the caliche layer may not exist in some areas, which would contribute to increased recharge, and apparently, vertical hydraulic conductivity to the saturated zones. If no subsurface information exists near the source areas, the greater vertical hydraulic conductivities (i.e., no caliche layer) should be used.

(c.) Section E.2.1.5, states that depressions exist in the Fine-Grained Zone. How were these thinner FGZ sections considered in the model?

(2.) How were hydraulic conductivities for each Formation derived? If values were derived from literature, were the most conservative values for each formation used in the model simulations?

(3.) Please provide a schematic summarizing the type stratigraphic section, grid parameters used in the modeling (thickness, porosity, hydraulic conductivity, etc.), and results of the model run (e.g., the vertical concentration gradient per depth for the 1000+ year simulation).

(4.) Radionuclide-contaminated soils were removed at the Burning Grounds, NWAR, and Firing Site #5. Fate and transport modeling should conservatively consider the pre-removal mass concentrations and volumes in evaluating any potential impacts to ground water. PRG comparisons for site close-out for these three sites appear to consider confirmatory sample concentrations, not pre-removal concentrations. Please provide the necessary information (maximum concentrations, volumes, etc.) to quantify these source terms for fate and transport modeling. If pre-removal source areas are considered, Firing Site #5 may be the Aorse case scenario for potential impact to ground water. How would the fate and transport model be applied to this area (type section, key input parameters, etc.)?

(5.) Section E discusses radionuclide chemistry and carries those assumptions forward to the fate and transport model. However, soil pH and carbonate content (alkalinity) can significantly affect mobility of Uranium mass through the soil column. What are the pH values used for soils and ground water? Were these derived from site-specific samples or from literature values? If literature values were used, what are the references? What is the impact on the fate and transport modeling regarding pH, carbonate content, and distribution coefficients)?

(6.) Playa stratigraphy and structure can vary significantly from the surrounding geology. How were playas considered in the Fate and Transport model?

IIa. TEXT-REFERENCED COMMENTS - FATE AND TRANSPORT MODELING

(1.) Page E-17, Section E.4 - "A dilution factor of 20 is applied..." Please describe how

the dilution factor was applied and why this particular DAF (Dilution Attenuation Factor) was chosen. Was there consideration for a site-specific DAF?

(2.) Page E-17, Section E.4 - "Radioactive decay is included, but daughter products are not tracked through the soil column." Please explain why daughter products were not considered.

(3.) Page E-21, Section E.4.2 - "Site specific measurements of Kd or the SRCs are not yet available. Column studies are in progress..." Will these site-specific values be applied to radionuclide fate and transport when available?

(4.) Does the model take into account exhaustion of sorption sites (foc) in the aquifer as radionuclides migrate over time?

(5.) Page E-22; Section E.4.3 - "Two recharge rates of 0.044 and 72 in/yr were simulated." Please clarify how recharge was applied in the simulations. For example, was there one simulation with 0.044 in/yr for the total area and then a second run using 72 in/yr?

(6.) Section E.4.3, page E-23 - "The vadose zone attenuation factor is calculated..." Were specific Kd values, or the attenuation factor, used in the model simulation? If the latter, was the attenuation factor calculated using a weighted average based on the thickness of the Black Water Draw, Caliche and Upper Ogallala Formations and their corresponding Kd values? In other words, are different Kd values used for each formation in the type column or is an average Kd used throughout? A literature value may not be appropriate to use here as that would tend to increase uncertainties into the model results. Similarly, using an average Kd would also increase uncertainties. Both would significantly skew mobility estimates.

III. TEXT-REFERENCED COMMENTS:

EXECUTIVE SUMMARY

Page ES-4, Section ES.2 - "...a fraction of the tritium was scavenged from the atmospheric release and deposited in the soils around Cell 1." Where was Cell 1 located?

Page ES-7, Table ES-1 and Subsequent Tables - Please clarify sites as "Closure Approved by State." Also Footnote 2 is incomplete; please clarify.

Page ES-8, First Paragraph - A site is considered "impacted" if constituents are detected over background concentrations, or if organic constituents are present. Comparison to risk-based screening levels, or further evaluation in a risk evaluation, determines whether existing concentrations pose a significant risk to human health or the environment.

Although remedial action is unlikely at a $10E-06$ risk level, EPA and TCEQ consider that level to be a point of departure for the site screening phase. Risk management decisions can consider a risk range, typically $10E-04$ to $10E-06$, but is not applied at the site screening phase.

CHAPTER 2

Page 2- 15 to 2-16 - The report estimates a maximum bounding effect for non-weapon SRCs for the three time periods of Pantex history. This is based on a percentage of the total mCi activities carried forward from potential non-weapon sources detailed in Tables 2-2, 2-3, and 2-4. However, a *maximum* bounding activity (or worst case scenario) would be based on the assumption that none of the isotopes with the highest activities would be lost. This approach would more conservatively estimate a potential activity term for radionuclides released to the environment. Also, please derive a mass equivalent for the maximum bounding effect and discuss what part of that may have been sent to the landfills.

Also, the maximum bounding effect is estimated in mCi. Sources were inventoried only when a baseline was exceeded (i.e. 1.35 mCi for the 1967 inventory). Risk-based action levels are set at the pCi activity level; most samples in this report do not exceed background or the PRG screening levels. But is there a potential to underestimate activity or source term for non-weapon sources? Please discuss.

Page 2-12 provides a comprehensive listing of Plant Standards in place to document a history of controls for rad-related operations. Is there any potential to deviate from operating standards? When could operations vary from standards? How might these be corrected? (For example, consider the non-conformance examples discussed on Page 2-14)

Page 2-16, Second Paragraph - "Figure 2-3 shows which of the general-purpose landfills were in operation during each time period. This provides insight into possible places where potential environmental non-weapon radioactive source material could have been placed in landfills if it were, indeed, lost." SRCs for landfills summarized in this report did not vary from the focused SRCs applied to other potential radionuclide-impacted sites (Pu-239, Th-232, U-238, U-234, U-235). Although Chapter 2 supports that there would be minimal impact from other non-weapon source SRCs, were other SRCs considered when sampling soil in the landfills? How?

Page 2-18 - "...radioactive trash with portable instruments. If no contamination was found greater than the radioactive release limits provided by the Plant standard, the trash was routed as landfill wasted." What was the limit?

Page 2-24 - Cesium is not attributable to Plant activities at the levels it was found during the landfills investigation..." What are the levels of Cs-137?

CHAPTER 3

Page 3-6, Table 3-1 - The lowest daily minimum (annual average) is listed as -14. Is this correct? Evapotranspiration is not discussed in Chapter 3 although it may be a key consideration in potential vertical migration of contaminants. What is the estimated effect?

Page 3-5 - Define “bgs” in the text and the listing of abbreviations and acronyms.

Page 3-8, Third Paragraph - “The tailwater pit...released water to Playa 1, via an underground pipe.” Was the underground pipe ever shown to be a factor in releases to subsurface soils?

Page 3-14, Table 3-3 - The background UTL for Pu-239 is .050 pCi/g. The UTL is a non-parametric derivation, which defaults to the maximum concentration, which in this case is .080 pCi/g. Footnote 4 indicates that outliers were removed from the background data set. Was this the case for Pu-239 at Playa and Upland locations?

Page 3-15, Second Paragraph - Should reference to Table 3-2 actually be to Table 3-3?

Page 3-11, Last Paragraph - “Agricultural lands within the combined main Pantex Plant area and Pantex Lake are owned by DOE/NNSA, but managed by TTRF. TTU uses the land for farming and ranching, with 3817 acres available for cultivation and 1954 for grazing? How much of this area is included within Pantex Plant boundaries? Are any of these areas potentially impacted by radionuclides?”

Page 3-25 - In discussions on the ASER monitoring program, U-235, Th-232, and total U were not included in radiological ground water, surface water, or flora monitoring. Why were these not included?

CHAPTER 5

Page 5-2, Section 5.1 - In the first paragraph, are areas designated “un-impacted” by radiological operations done so via historical site knowledge only, or has there been some confirmatory sampling in the past?

Page 5-13, Table 5-4 - A summary of Playas and Ditches was not included in the Executive Summary. Please clarify.

Page 5-18, Section 5.1.11.1 - Soil samples were taken immediately outside the Firing Site source areas, but airborne dispersion effects are typically seen at a distance away from the source area. How was this considered in surface sampling or monitoring?

Page 5-28, Table 5-14 - Clarify whether the industrial worker is considered to be an indoor or outdoor worker? The values for certain exposure parameters in this table suggest an indoor worker. More recent soil screening guidance from EPA (*Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites*, Dec. 2002) recommends a soil intake rate for a construction worker of 330 mg/day. This particular parameter is provided only for informational purposes, as the selected soil intake rate of 480 mg/day already provides a conservative estimate.

Page 5-35, Section 5.3 - A screening-level risk assessment should only involve comparison of data sets with risk-based screening levels, as the risk-based procedure gives the strongest justification for excluding an area from being evaluated. Comparisons with background, tests of significant difference, and evaluations of 95% UCLs should not be used in the initial screening process. They may be used in the risk management phase in order to determine which areas of the site must be addressed. (See Comment I. (2.))

Page 5-39, Section 5.3.2.1 - MCLs should not be used in what is described as a “risk screen”; particularly MCLs for radionuclides. While MCLs for non-carcinogens can be based on toxicity data, MCLs for carcinogens/radionuclides are based on the lowest concentration that can be feasibly achieved via technology (since theoretically, even the smallest dose has some probability, however small, of causing cancer). A screen against MCLs would be considered a “regulatory screen”.

Page 5-52, Third Paragraph - “The isotopic ratio of U-234:U-238 is about 2 in Ogallala ground water.” Please provide a reference for this ratio as ground water ratios can range from .5 to 40.

Page 5-80, Section 5.3.15.1 - “The detected activities of cesium 137...and strontium 80/90...were well below their respective NRC and Texas Department of Health (TDH) criteria.” What were those criteria?

APPENDICES

Appendix C, Table C-8 - Please clarify what is meant by “rad count error.”

Appendix I, Page I-1 - The report states that the contract labs were audited under the Albuquerque Operations Analytical Management Program. What were the results or recommendations of the audit?

Please do not hesitate to call if you have any questions regarding these comments. I can be reached at (214) 665-2231. And thank you for your support in developing this radionuclide-specific document and for the continued success of the Pantex remediation project.

Sincerely,

[signed 6/4/04]

Camille D. Hueni

Remedial Project Manager
Region 6 Superfund Division

cc: Mr. Dennis Huddleston, BWXT
Mr. Robert Musick, TCEQ