

PHIL-27719

February 6, 2023

Project Number 08005-WE04

Ms. Sarah Kloss (3HS11)
U.S. Environmental Protection Agency
Four Penn Center
1600 John F Kennedy Boulevard
Philadelphia, Pennsylvania 19103

Reference: Contract No. N6247016D9008
Contract Task Order (CTO) No. WE04

Subject: Response to Comments on Willow Grove Draft Final Technical Memorandum for Soil Sampling at the Maple Avenue Parcel, October 2022
Former Naval Air Station Joint Reserve Base Willow Grove
Horsham Township, Pennsylvania

Dear Ms. Kloss:

On behalf of the Navy, Tetra Tech is pleased to provide the following response to comments on the Willow Grove Draft Final Technical Memorandum for Soil Sampling at the Maple Avenue Parcel, dated October 2022. After discussions held with EPA on December 21, 2022, and in response to comments provided to the Navy on November 30, 2022, the following are offered:

U.S. EPA Linda Watson, Toxicologist, Comments

- 1. Page 1-3. The report states, “Base-wide background values for NASJRB Willow Grove. Note that background values used for comparison were the mean concentrations of SVOCs and the 95 percent upper tolerance limit (UTL) from the metals referred to Background Values hereafter. The background study was conducted in conjunction with the RI for Site 1 (Tetra Tech, 2002).” Please note, the cited background report is more than 20 years old and thus several guidance policies have changed since this date. Although background statistical analysis is not required at this parcel, please keep in mind the cited background report will need to be updated (e.g., ProUCL means testing and graphical comparative analysis) when background investigation of metals is needed.**

Response: The process that was followed aligns with EPA guidance from 2002 and 2006. Note that chemicals were not eliminated from the human health risk evaluated based on background.

- 2. Section 3.1.1, Outside Land South. The report states, “Thallium results were rejected in all soil samples, and the results for eight VOCs were rejected in several soil samples.”**

In respect to thallium, the report indicates re-sampling is not recommended due to matrix interference and thallium is believed to not have been used or released at the site. These rationales are weak since data rejected due to matrix interference is not a sufficient rationale to eliminate a contaminant. Instead, consultation with the laboratory Chemist could offer potential sampling collection, methodologies and analysis solutions would yield acceptable thallium results. In addition, past site activities could have resulted in the release of thallium just as other metals were released, detected and exceeded for RSL's and these metals were also not expected to be present or released. Finally, the RSL for thallium in soil is extremely low (7.8E-02 mg/kg) which means it is very toxic at low doses. Therefore, it is imperative thallium concentrations be determined prior to unrestricted property transfer.

For VOCs, please be more specific in respect to the number of VOCs rejected compared to the number of samples analyzed. For example, the sentence should be revised to read, “Thallium results were rejected in all 10 soil samples. In addition, eight VOC non-detected results were rejected in 4 out of 10 samples.” Since six VOC samples were non-detected and not rejected, this offers some confidence in respect to VOC’s being adequately characterized.

Response: *While the thallium data were rejected, the Navy maintains that thallium is unlikely to be a chemical of concern. The following multiple lines of evidence support this conclusion.*

Thallium can be a difficult analyte to recover in some matrices. Serial dilution, matrix spike and/or matrix spike duplicate results for these metals indicate sample interferences affecting the quantitation of these analytes. Overall, the likelihood that thallium was not detected in soil, given that the rejected results were non-detect, still suggests that thallium is unlikely to be present at significant concentrations.

Thallium is ubiquitous in nature, albeit at low concentrations. Thallium is also naturally occurring at concentrations of 0.3 to 0.7 mg/kg (EPA, 1988). Prior to 1981, the presence of thallium in soil was primarily attributable to flue dust and residuals from the smelting of zinc, copper, and lead ores through treatment by electrolysis, precipitation, or reduction. Thallium is used mostly in manufacturing electronic devices, switches, and closures, primarily for the semiconductor industry. It also has limited use in the manufacture of special glass and for certain medical procedures. Thallium is released into the environment primarily from industrial processes in which thallium is a trace contaminant of the raw materials, rather than from facilities producing or using thallium compounds. Industrial sources of thallium include combustion of fossil fuels, smelting operations (particularly of sulfide ores), cement manufacturing, and iron and steel production. Soil contamination by thallium occurs mainly from the solid wastes of coal combustion and smelting operations. These activities were not occurring at this site. Therefore, the likelihood of thallium being present on site at levels greater than EPA regional screening levels ([RSLs]; e.g., 0.78 mg/kg for residential soil at a hazard quotient [HQ] of 1.0) is also unlikely. The activities at the site do not warrant that thallium would be present in soil in significant quantities.

Additionally, groundwater thallium concentrations for all samples collected from sites near Maple Avenue (Sites 1, 2, 5, 10, and 12) were all below detection limits. The absence of thallium in groundwater suggests that any concentrations present in soil are less than the leachability criterion, thus unlikely to be present at significant concentrations impacting human health.

Moreover, other metals present in soil were at acceptable risk levels at this site. The following metals were detected at concentrations greater than their RSL (corresponding to the lesser of the value corresponding to a HQ of 0.1 or a cancer risk level of 1E-06): aluminum, arsenic, cobalt, iron, manganese, and vanadium.

- *Aluminum: Average site concentration is approximately 17,000 mg/kg. Less than HQ of 1.0.*
- *Arsenic: Average site concentration (4.6 mg/kg) is less than average background concentration (6.6 mg/kg).*
- *Cobalt: Average site concentration (6.4 mg/kg) is less than average background concentration (7.9 mg/kg). Less than HQ of 1.0.*
- *Iron: Less than HQ of 1.0.*
- *Manganese: Average site concentration (340 mg/kg) is less than average background concentration (642 mg/kg). Less than HQ of 1.0.*
- *Vanadium: Average site concentration (33 mg/kg) slightly greater than average background concentration (25 mg/kg). Less than HQ of 1.0.*

While metals may have exceeded the more restrictive RSL at an HQ of 1.0, their site-wide concentrations are less than the concentration corresponding to the threshold reference dose and/or less than the average site background concentration. Hence, metals were not posing a significant risk at this site.

Finally, there is a high potential for overestimating risk based on the screening provisional reference dose associated with exposure to thallium. The authors of the study that provides the basis for thallium's Provisional Peer-Reviewed Toxicity Value (PPRTV) reference dose concluded that the minor dose-related changes in this study did not affect the health status of the treated animals and therefore were not toxicologically significant.

References:

EPA, 1988. Health and environmental effects document for thallium and compounds. U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response. Cincinnati, OH. ECAO-CIN-G031. March.

The laboratory flagged the results accordingly and non-detect results for analytes were rejected appropriately according to data validation guidelines. More descriptive text describing sample results for VOC detections versus non-detects will be added.

- 3. Section 4.3.1, 2016 PFAS RI Phase 1 Surface Soil. The report indicates, "PFOS was detected in one of the two surface soil samples (OLSMSB01) at a concentration of 55.3 µg/kg," This sample can be seen in Figure 2-3 which was collected at a depth of 0-2 feet. Please explain why PFOS was not resampled at this location in 2022? According to the risk assessment, this concentration exceeds screening and EPA's acceptable non-cancer risk criteria.**

Response: *The Phase 2 on-base soil RI SAP and planning for the investigation was based on a focus on potential PFAS source areas which did not include the area below. The SAP did not attempt to re-sample any location with an exceedance. In addition, 55.3 µg/kg did not exceed the PFOS project screening level in place when the SAP sampling program was approved by the EPA on 12/16/21. The PSL in the project SAP current at that time was from DoD, 2021, Memorandum Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Programs, September. The sentence referred to in the comment will be changed to the following:*

PFOS was detected in one of the two surface soil samples (OLSMSB01) at a concentration of 55.3 µg/kg, which exceeds the EPA Residential RSL of 13 µg/kg at a target hazard quotient of 0.1 (EPA, 2022a); however, it did not exceed the RSL of 130 µg/kg, current during the time the Phase 2 SAP was written (Tetra Tech, 2021).

- 4. Table 3.1 Summary of Surface and Subsurface Soil Sample Analytical Results for the Maple Avenue Parcel – 2014 Follow-Up CERFA Investigation. The table includes two separate columns for background. One column is identified as "Background" and the other column is identified as "Background UTL." What does "Background" represent?**

Response: *Basewide background values for NASJRB Willow Grove were the mean concentrations for SVOCs and the 95 percent upper tolerance limit (UTL) for metals and referred to in the report as "Background Value". The background study was conducted in conjunction with the RI for Site 1, Remedial Investigation Report for Site 1 – Privet Road Compound, NASJRB Willow Grove, Pennsylvania. July (Tetra Tech, 2002).*

5. **Table 5-2, Human Health Risk Evaluation – Exposure Point Concentrations Maple Avenue Parcel.** The table provide statistics for PFAS’s using depths of 0-15 feet. This is not correct since soils (0-1 ft) and subsurface soils (2 ft and below) should be evaluated separately.

Response: The maximum detections of PFAS were all at the surface interval of 0-1 feet or 0-2 feet. Phase 1 RI sampling program was approved at 0-2 feet for human health evaluation by EPA during that investigation. From the report:

Analyte	Maximum detection				Comment
	0.00054	mg/kg	location is 0-1 ft	1979AIASB03	
PFOA	0.00054	mg/kg	location is 0-1 ft	1979AIASB03	Max < RSL (HQ=0.1) and <MSC but included per professional judgment
PFOS	0.0553	mg/kg	location is 0-2 ft	OLSMSB01	Max > RSL (HQ=0.1)
PFNA	0.00036	mg/kg	location is 0-1 ft	1979AIASB01	Max < RSL (HQ=0.1) but included per professional judgment

6. **Table 5-3, Human Health Risk Evaluation – Summary of Residential Risks and Hazard Indices for Exposures to Surface Soil Maple Avenue Parcel.** Risk was calculated assuming one exposure area rather than two distinct exposure areas (Outside Land South and Additional Land South). Therefore, risks were re-calculated for each exposure area and for PFAS’s for surface and subsurface soils.

Outside Land South - Surface Soils (0-1 ft)

	95% UCL Concentration (mg/kg)	Child HI	Adult HI	Cancer Risk
Aluminum	19665	2.6E-01	2.5E-02	-
Arsenic	8.6	4.0E-01	3.9E-02	-
Chromium	24.7	2.1E-01	2.7E-02	1.6E-04
Cobalt	7.1	3.1E-01	3.0E-02	-
Iron	20423	3.8E-01	3.6E-02	-
Manganese	562	4.8E-01	5.8E-02	-
Vanadium	36.9	1.8E-01	2.3E-02	-
Benzo(a)pyrene	0.650	3.6E-02	4.0E-03	5.6E-06
Benzo(a)anthracene	0.302	-	-	2.6E-07
Benzo(b)fluoranthene	0.960	-	-	8.3E-07
Indeno(1,2,3-cd)pyrene	0.172	-	-	1.5E-07
PFOA	0.0054	2.9E-03	3.1E-04	-
PFOS	0.0054	4.3E-03	4.6E-04	-
PFNA	0.0026	1.4E-03	1.5E-04	-
Total Risks		2.3	2.4E-01	1.9E-04

Per EPA guidance, chromium is evaluated assuming it is present in the hexavalent form. Therefore, when assuming 100% of chromium is present in the hexavalent form, cancer risk is exceeded. When comparing the 95% UCL concentration of chromium, 24.7 mg/kg, to the background concentrations, (15.3 mg/kg and 19.3 mg/kg) site concentration exceeds reported background concentrations. Therefore, hexavalent chromium is considered a site COC unless it can be properly eliminated through means background testing and/or hexavalent chromium speciation analysis.

Additional Land South - Surface Soils (0-1 ft)

	95% UCL Concentration (mg/kg)	Child HI	Adult HI	Cancer Risk
Aluminum	16760	2.2E-01	2.1E-02	-
Arsenic	9.1	4.2E-01	4.1E-02	-
Chromium	35.6	3.0E-01	3.8E-02	2.4E-04
Cobalt	9.3	4.1E-01	3.9E-02	-
Iron	25000	4.7E-01	4.5E-02	-
Manganese	450	3.8E-01	4.6E-02	-
Vanadium	47.3	2.3E-01	3.0E-02	-
Benzo(a)pyrene	0.134	7.5E-03	8.3E-04	1.2E-06
Benzo(a)anthracene	0.09	-	-	7.8E-08
Benzo(b)fluoranthene	0.216	-	-	1.9E-07
Indeno(1,2,3-cd)pyrene	0.172	-	-	1.5E-07
PFOA	0.0054	2.9E-02	3.1E-03	-
PFOS	0.0054	4.3E-02	4.6E-03	-
PFNA	0.0026	1.4E-02	1.5E-03	-
Total Risks		2.5	2.7E-01	2.6E-04

When comparing the 95% UCL concentration of chromium, 35.6 mg/kg, to the background concentrations, (15.3 mg/kg and 19.3 mg/kg) site concentration exceeds reported background concentrations. Therefore, hexavalent chromium is considered a site COC unless it can be properly eliminated through means background testing and/or hexavalent chromium speciation analysis.

Additional Land South Sub-Surface Soils (2-8 ft) (OLSMSB01)

	95% UCL Concentration (mg/kg)	Child HI	Adult HI	Cancer Risk
PFOS	0.0553	4.4E-01	4.7E-02	-

All risks are below EPA's acceptable threshold.

Response: Agree to evaluate based on separate exposure units (EUs) for Outside Land South and Additional Land South and separate depth intervals for surface soil and subsurface soil for each EU.

Please note that Tetra Tech could not duplicate the risk/HI calculations in the tables above.

We respectfully disagree that all chromium results should be evaluated as hexavalent chromium at the Maple Avenue parcel based on the following rationale:

- The parcel is outside the perimeter of the operational areas of NASJRB Willow Grove, and there is no known record of hazardous waste generation or accumulation areas on or near the Maple Avenue Parcel.
- Refer to response to comment number 2. Metals in general are not a contamination issue at the Maple Avenue parcel.

- *Hexavalent chromium is unlikely to be the dominant species of chromium near the parcels discussed for transfer in the Maple Ave Tech memo. Hexavalent chromium species analysis was conducted at NASJRB Willow Grove Site 12, which is located approximately 1,200 feet northeast of the Maple Avenue parcel. As stated in the Final Feasibility Study for Site 12, hexavalent chromium species in soil was detected at levels representing only around 6 percent of total chromium concentrations. The background 95% UTL value for chromium (III) was 19.8 mg/kg.*

Therefore, it is proposed that chromium be evaluated as trivalent chromium. Additional rationale described above will be added to the document, including details of the speciation study conducted at Site 12.

7. **Conclusion and Recommendations:** I disagree with the decision to transfer the property with unrestricted land use since risk is exceeded for hexavalent chromium and the concentration of thallium is unknown. I recommend consulting with a laboratory chemist in respect to thallium sampling and analysis as well as hexavalent chromium speciation and/or background means testing to properly eliminate hexavalent chromium as a COC.

Response: See response to comment number 2 for thallium. See response to comment number 6 for chromium.

Please do not hesitate to contact me if you have any questions.

Sincerely,



Tricia E. Moore, PG
Senior Project Manager

TM/nfs

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