DRAFT FINAL

CORRECTIVE MEASURES IMPLEMENTATION REPORT / ADDENDUM REMOVAL CLOSURE VERIFICATION REPORT EAST SEPTIC TANK AND DRAIN FIELD, BUILDING 4541 TOOELE ARMY DEPOT – SOUTH STOCKTON, UTAH

July 2015

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FOR:
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TABLE OF CONTENTS

Section Page

List of Acronyms and Abbreviations iii
Certification of Closure iv
1.0 Introduction 1
2.0 Summary of Phase I Activities 1
2.1 Clay Pipe 2
2.2 Tank Soils 6
2.3 Drain Field 8
2.4 Overburden Soil 11
2.5 Waste Characterization Sampling of the Sludge 13
3.0 Summary of Phase II Activities 13
3.1 Removal and Disposal of Sludge, Concrete and Pipe 13
3.2 Removal of Soil Associated with the Septic Tank and Drain field 14
3.3 Waste Characterization Sampling Soil 16
3.4 Decontamination of Tools/Equipment 16
4.0 Confirmation Sampling Results and Risk Assessment 17
4.1 Analytical Results 17
4.2 Risk Assessment 17
4.2.1 Human Health 17
4.2.2 Ecological 39
4.2.3 Soil-to-Groundwater Migration 42
5.0 Uncertainty Analyses 44
5.1 Human Health Risk Assessment 44
5.2 Ecological Risk Assessment 45
6.0 Data Assessment and Usability 46
7.0 Site Restoration 47
8.0 Closure Verification 47
9.0 References 48

LIST OF TABLES

Table 1. Summary of Phase I soil sampling along the pipe at 4541 6
Table 2. Summary of Phase I and previous closure verification soil sampling at the septic tank at 4541 8
Table 3. Drain field sample results for Phase I 10
Table 4. Results of human health screening assessment for overburden soil samples 12
Table 5. Site attribution assessment for all confirmation data 17
Table 6. Residential risk based on maximum detections 37
Table 7. Refined risk screening using 95% UCL 38
Table 8. Tier 1 ecological screening assessment, deer mouse 40
Table 9. Modified Tier 2 assessment, deer mouse. 41
Table 10. Tier 1 ecological screening assessment, horned lark 40
Table 11. Modified Tier 2 assessment, horned lark 41
Table 12. Tier 1 ecological screening assessment, plants. 41

TABLE OF CONTENTS, CONT.

Table 13. Modified Tier 2 assessment, plants 42
Table 14. Tier 1 SSL evaluation. 42
Table 15. Derivation of the site-specific DAF 43
Table 16. Tier 2 SSL evaluation, site-specific DAF 43

LIST OF FIGURES

Figure 1. Photograph of the exposed pipe 3
Figure 2. Photo of cracks in the pipe 3
Figure 3. Phase I sample locations at Building 4541 5
Figure 4. Photograph of the geoprobe rig at the tank 7
Figure 5. Photograph of sampling in the drain field 9
Figure 6. Estimated removal area in the drain field 11
Figure 7. Photograph of overburden soil 12
Figure 8. Photograph of sludge in tote 14
Figure 9. Removal of soil at the septic tank inlet 15
Figure 10. Soil removal in the drain field 15
Figure 11. Confirmation sample location map 16

APPENDICES (provided on attached CD)

Appendix A – Sample Results
    Appendix A.1 Chain of Custody
    Appendix A.2 – Phase I Sample Data
    Appendix A.3 - Validated Confirmation Sample Results
Appendix B – Waste Characterization Data
    Appendix B.1 - Chain of Custody
    Appendix B.2 - Sample Results
Appendix C – ProUCL Output files

List of Acronyms and Abbreviations

atm-m^3/mole	atmospheres per cubic meter per mole
AUF	Area Use Factor
bgs	below ground surface
C/NC	Cancer/Noncancer
COPC	Constituent of Potential Concern
DAF	Dilution Attenuation Factor
DOT	Department of Transportation
DQO	Data Quality Objective
DSHW	Division of Solid and Hazardous Waste
ESL	Ecological Screening Level
ft	feet
g/mole	grams per mole
HDPE	High Density Polyethylene
HI	Hazard Index
HQ	Hazard Quotient
IDW	Investigation-derived waste
JPM-E	Office of Joint Project Manager for Elimination
LOD	Level of detection
LOQ	Level of quantitation
m	meters
MCL	Maximum Contaminant Level
mg/kg	milligrams per kilogram
NFA	No Further Action
PAH	Polycyclic aromatic hydrocarbon
PPE	Personal protective equipment
QA	Quality assessment
QC	Quality control
RAD	Risk Assumptions Document
RCRA	Resource Conservation and Recovery Act
RSL	Regional Screening Level
SSL	Soil Screening Level
SWMU	Solid Waste Management Unit
SVOC	Semi-volatile organic compound
TCLP	Toxicity Characteristic Leaching Procedure
TEAD-S	Tooele Army Depot South Area
THQ	Target Hazard Quotient
TSDF	Treatment Storage and Disposal Facility
UAC	Utah Administrative Code
UCL	Upper Confidence Level
UDEQ	Utah Department of Environmental Quality
USEPA	United States Environmental Protection Agency
UTL	Upper Tolerance Level
VOC	Volatile Organic Compound

CERTIFICATION OF CLOSURE

This Certification of Closure for Building 4541 East Septic Tank and Associated Drain Field at Tooele Army Depot South Area (TEAD-S) has been prepared by TEAD-S, Edgewood Chemical Biological Center (ECBC) and the Joint Project Manager – Elimination team in accordance with the State-approved Final Addendum Removal Work Plan for the East Septic Tank And Drain Field, Building 4541, Tooele Army Depot – South, Stockton, Utah, and the closure requirements specified under the Utah Administrative Code (UAC) 315, the 40 Code of Federal Regulations 265, Subpart G, and the TEAD-S Resource Conservation and Recovery Act (RCRA) part B permit.

The signature and seal certify that a licensed professional had reviewed the Closure Report in accordance with the above-referenced regulary requirements.

Repectfully submitted,

GAI Consultants, Inc.

XXX Singature and seal to be provided with final document

_____

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Draft Corrective Measures Implementation / Addendum Removal Closure Verification Report, East Septic Tank and Drain Field Building 4541
Tooele Army Depot South Area
July 2015

1.0 Introduction

The results of the "Final Closure Verification Sampling Report for Buildings 4541 and 4539" (Pike Pirnie, 2014), herein referred to as the Closure Verification Report, confirmed that the nature and extent of contamination as well as risk-based closure had been defined for all areas associated with Buildings 4541 and 4539 with the exception of the Building 4541 East Septic Tank and drain field. The Closure Verification Report recommended additional investigation of the East septic tank and the associated leach field along with removal of the East septic tank. The State of Utah approved the closure certification report with the caveat that Building 4541 may not be removed from the Tooele Army Depot South Area (TEAD-S) permit until corrective action following the TEAD-S Resource Conservation and Recovery Act (RCRA) part B permit (Attachment 5) is completed, and it can be demonstrated that the site meets residential risk.

TEAD-S, in conjunction with the Office of Joint Project Manager for Elimination (JPM E), prepared an Addendum Removal Work Plan to implement the recommendations of the Closure Verification Report, which was approved by the Division in a letter dated April 16, 2015. The project was completed in two phases. The first phase, Phase I, included the characterization of soils along the pipe from Building 4541 to the East Septic tank and step out samples to assess the lateral and defined extent of contamination around the East Septic tank and drain field. The second phase, Phase II, involved excavation of contaminated soil, removal of the East septic tank (and its contents) and associated piping. Following removals, confirmation samples were collected. This report contains a summary of the Phase I and II investigations and removals. The confirmation data are discussed with respect to TEAD-S closure performance requirements (Table 5-1 of Attachment 5 of the TEAD-S RCRA part B permit) and Utah Administrative Code (UAC) R315-101.

Screening level risk assessments were conducted for comparison to residential levels and for key ecological receptors. Evaluation of the soil-to-groundwater migration pathway was also conducted. Since volatile organic compounds (VOCs) were not are associated with this site or detected in historic samples, the vapor intrusion pathway is considered incomplete. The results of the risk assessments are presented and discussed in Section 4.0.

2.0 Summary of Phase I Activities

The following activities were conducted under Phase I of this project:

- Characterization of the soils underneath the clay pipe,
- Defining lateral and vertical extent of contamination around the East septic tank,
- Determining extent of contamination in the drain fields,
- Assessing characterization data by comparison to risk-based closure criteria to determination removals, and

- Collection of a waste characterization sample of the sludge in the East septic tank.

Field work was conducted the week of May 11, 2015. The work consisted of collection of the Phase I samples (Characterization Samples included in Table 2 of the removal plan) along with a waste sample for the sludge in the septic tank (refer to footnote 3 of Table 2 of the removal plan).

A Phase I risk screening was conducted on the Phase I data only as a tool to assess whether removals were needed and if so, the extent of removal. The site attribution analysis was conducted following the methodology in the Risk Assumptions Document (RAD) (AQS, 2014). Background levels used for the site attribution analysis for metals were taken from Table 5, Summary Statistics and Background Reference Values for Metals, of the TEAD-S RAD. The maximum detected concentration for each metal was compared to the background reference value (95% upper tolerance level, UTL) from the RAD. If the site maximum was greater than the background reference value, the metal was retained as a constituent of potential concern (COPC) and metal was included in the risk assessment. If a background value was not available for a metal, the metal was also retained as a COPC. All organics that had at least one detect were retained as COPCs. Since there is no known source for arsenic or hexavalent chromium based on site history and previous sampling, the background level of 35 milligrams per kilogram (mg/kg) was applied for arsenic; whereas, chromium was compared to the total chromium background level of 19.8 mg/kg. Per the RAD, all detected organics and all metals, with maximum detections above background, were retained for risk screening. A formal closure risk assessment was conducted after Phase II removals and confirmation sampling (refer to Section 4).

2.1 Clay Pipe

A six inch clay pipe extended approximately 120 feet from Building 4541 to the East Septic Tank. Soil overlying the pipe was removed using a backhoe and placed in stockpiles on either side of the pipe line and covered with a tarp pending waste characterization and removal operations. Once the pipe was exposed (Figure 1), a visual inspection was conducted to assess if there were any cracks or breaks in the pipe. While the pipe was cracked and broken in several places, the pipe was mostly broken on the surface (i.e., the bottom half of the pipe line was mostly intact) as shown in Figure 2. It is likely that equipment used to remove the overlying soil had caused the breakages.

Figure 1. Photograph of the exposed pipe

Figure 2. Photo of cracks in the pipe

As shown in Figure 3, soil samples were taken every 30 feet starting at the outlet from Building 4541 resulting in four sample locations (sample locations 541-SS-P01, 541-SS-P02, 541-SS-P04,

and 541-SS-P06). In addition, two biased samples (samples 541-SS-P03 and 541-SS-P05) were collected at areas of significant cracks or breaks in the pipe, visual signs of leakage.

A push rig/geoprobe was used to extract soil cores from which samples were collected at three unique intervals: from immediately beneath the pipe, two (2) to four (4) feet and six (6) to eight (8) feet below the pipe. The samples were analyzed for semi-volatile organic compounds (SVOCs) and metals.

The only deviation from the work plan was collection of the sample for the 6-8 feet (ft) below ground surface (bgs) interval at sample location 541-SS-P03. Due to the high rock content, the plastic sample tube melted in the metal rod, resulting in the inability to extract the sample. Results in this location revealed detections of calcium, silver and thallium in the shallower sample intervals that were above background concentrations; however, the maximum concentrations were well below risk-based levels and did not exhibit increasing concentrations with depth. Additionally, no organics were detected in any of the samples associated with the pipe. Since the shallower intervals did not indicate contamination and there were no other sample results indicating vertical contamination, the lack of data for the 6-8 foot interval at sample 541-SS-P03 did not result in a data gap.

All of the sample cores were dry and none exhibited odors or showed any staining or other signs of contamination. In many cases, side-by-side borings were needed in order to collect sufficient soil for analyses, due to the high volume of rock.

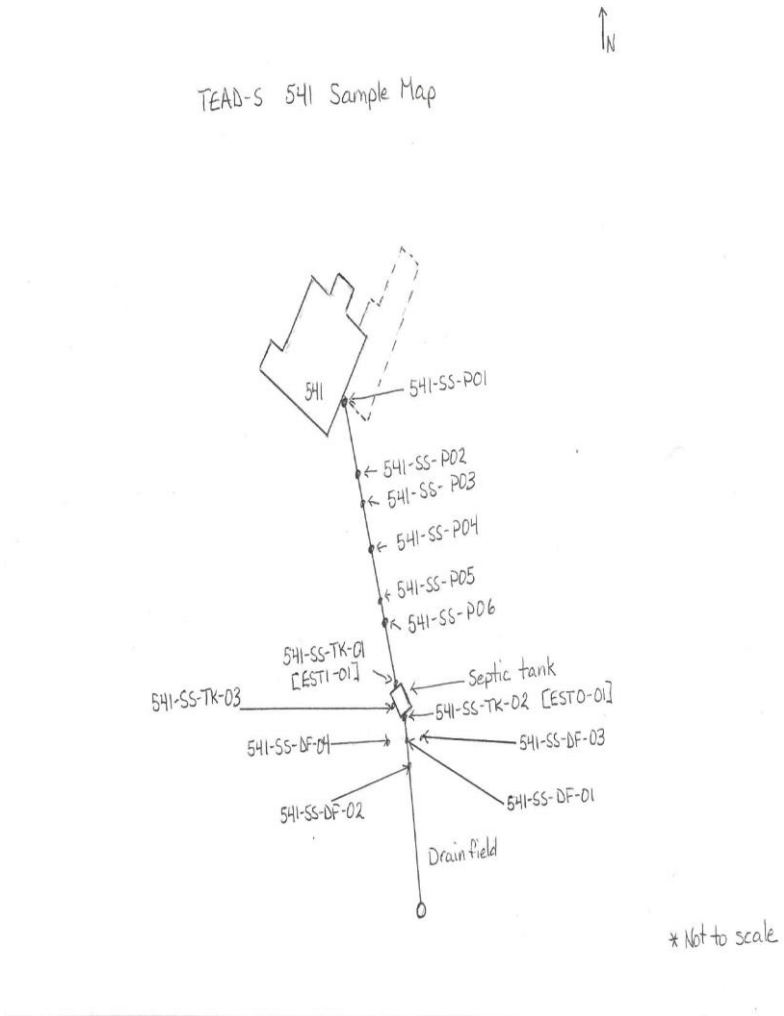

Figure 3. Phase I sample locations at Building 4541

Table 1 shows compares the maximum detected concentrations from the pipeline samples to the June 2015 residential Regional Screening Levels (RSLs). The maximum detected concentration from samples 541-SS-P01 through 541-SS-P06 was retained. Appendix A contains all of the Phase I analytical results.

Table 1. Summary of Phase I soil sampling along the pipe at 4541.

Analyte	Maximum Detection (mg/kg)	Residential RSL[a,b] (mg/kg)	C/NC	Cancer Risk	NonCancer HQ
Cadmium	1.4	70	NC		0.02
Calcium	240000	1.30E+07	NC		0.02
Magnesium	27000	3.39E+05	NC		0.08
Mercury	1.1	9.4	NC		0.12
Nickel	17	1500	NC		0.01
Silver	2.4	390	NC		0.01
Thallium	0.23	0.78	NC		0.29
Zinc	79	2300	NC		0.03
			Total Risk or HI =	**None**	**0.58**

a - Residential RSL, June 2015.
b - Calcium and Magnesium screening levels calculated using RSL equations and the tolerable upper intake level from the Institute of Medicine of the National Academy of Sciences
C/NC - Cancer/Noncancer
HQ - hazard quotient
HI - hazard index

As the sample results along the pipeline were well-below risk-based levels (HI of 0.58 compared to the target level of 1.0), removals in Phase II were not required along the pipeline. The soil met all the conditions for No Further Action (NFA) as defined in UAC-R315-101. Since no removals were required, these characterization data were retained as confirmation data and used in the closure risk assessment (Section 4).

Removal of the pipe and backfilling of the trench was conducted as part of Phase II operations.

2.2 Tank Soils

Sampling conducted as part of the 2014 Closure Verification effort (Pika Pirnie) included a surface sample directly below both the inlet (sample ESTI-01) and outlet (sample ESTO-01) ports to the septic tank. As part of the Phase I sampling, additional subsurface samples were collected at the both the inlet and outlet ports at depths of 2-4 and 6-8 ft bgs (samples 541-SS-TK-01 and 541-SS-TK-02, as shown in Figure 3).

In addition, a third sample was collected along the southwest edge of the septic tank (541-SS-TK-03). The boring was advanced to the depth of the septic tank and then increased to allow for

collection of samples from 0-1, 2-4, and 6-8 ft bgs (below the bottom of the septic tank). The results of the sampling are provided in Appendix A.

None of the samples exhibited any odor or showed signs of staining or other contamination.

The below photo (Figure 4) is representative of the sampling associated with the tank soils.

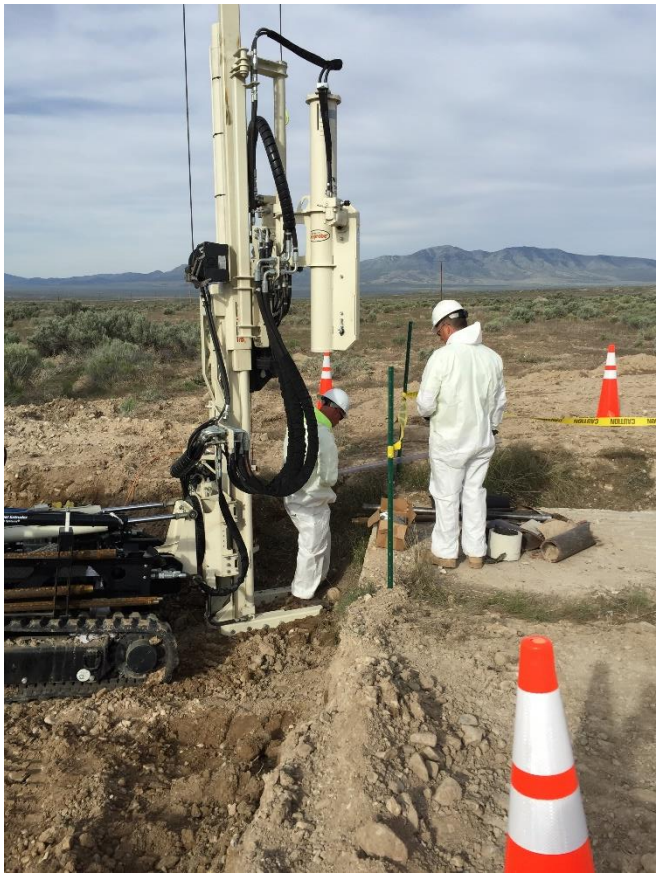

Figure 4. Photograph of the geoprobe rig at the tank

The only detections in the samples collected during the Phase I sample event were metals. However, during the 2014 closure verification sampling, some organics and mercury were detected immediately beneath the inlet and outlet pipes. The Phase I data and the 2014 closure verification data have been combined for purposes of assessing risk and potential removals.

Table 2 summarizes the risk screening for the samples collected at and beneath the inlet (ESTI-01) and outlet (ESTO-01) pipes of the septic tank along with the subsurface sample collected beneath the tank along the southwest edge. As the shallow samples are known to exceed risk (based on conclusions presented in the Closure Verification Report), data collected immediately beneath the pipes (samples ESTI-01 and ESTO-01) were evaluated separately from the Phase I data in order to assess whether there was vertical migration of contamination above risk-based levels that may require removal of soil to a greater depth.

Table 2. Summary of Phase I and previous closure verification soil sampling at the septic tank at 4541.

Analyte	Maximum Detection (mg/kg)	Residential RSL (mg/kg)	C/NC	Cancer Risk	NonCancer HQ
Calcium	220000	1.30E+07	NC		0.02
Copper	56	3.10E+03	NC		0.02
Mercury	4.6	9.40E+00	NC		0.49
Nickel	15	1500	NC		0.01
Silver	26	390	NC		0.07
Thallium	0.19	0.78	NC		0.24
Zinc	590	23000	NC		0.03
			Total Risk or HI =	**None**	**0.87**

(ESTI-01) Analyte	Maximum Detection (mg/kg)	Residential RSL (mg/kg)	C/NC	Cancer Risk	NonCancer HQ
Benzo(b)fluorene	0.16	0.15	C	**1.07E-06**	
Mercury	270	9.40E+00	NC		**28.72**
Pika Pirnie Data - ESTI-01 is collected at inlet pipe (equivalent to TK-01-0)					

(ESTO-01) Analyte	Maximum Detection (mg/kg)	Residential RSL (mg/kg)	C/NC	Cancer Risk	NonCancer Hazard (HQ)
Mercury	270	9.40E+00	NC		**28.72**
ESTO-01 is collected at the outlet pipe (equivalent to TK-04-0)					

Only a few metals were detected above background in the surface samples collected at the three Phase I tank locations. This indicates that contamination is limited to the areas immediately beneath the inlet and outlet ports and that vertical extent of contamination has been bound by the samples collected from 2-4 feet below the inlet and outlet pipes.

Removals of soil at the inlet port to a minimum depth of 2 feet and laterally out a minimum of 2 feet (approximately 16 cubic feet of soil) was recommended for Phase II. Removal of soil at the outlet port was also recommended. However, extent of removals was further bound by additional step out samples in the drain field (see Section 2.3). Removal of soil and confirmation results are discussed in Section 3.

2.3 Drain Field

The 2014 closure verification samples which were collected towards the southern end of the drain field (refer to Closure Verification Report and removal work plan) did not show any detectable contamination in the drain field. However, as contamination had been detected at the

outlet port, step out sampling was conducted as part of the Phase I effort. Samples in the drain field (541-SS-DF-01 through 541-SS-DF-04) were collected at the intervals of 0-2, 2-4, and 6-8 ft bgs and analyzed for metals and SVOCs. A sample was collected from five (5) feet from the outlet port, 10 feet from the outlet and three (3) feet to either side of the 5 foot sample (see Figure 3). Sample 541-SS-DF-02 was collected using the Geoprobe, as shown in the below photo. However, because of the rocky nature of the soil and the difficulty in obtaining sufficient amounts of soil for analyses, it was decided that samples would be more effectively collected using the backhoe. Soils were carefully removed to the depth specified and soil was collected from the bucket. All soil was placed back in the hole at its original depth.

Figure 5. Photograph of sampling in the drain field.

None of the samples had any odors or signs of staining.

Several polycyclic aromatic hydrocarbons (PAHs) and metals were detected in soils, but the locations were limited to sample 541-SS-DF-01 and 541-SS-DF-04 (that is, the 5 foot sample and the sample located 3 feet west of the 5 foot sample). No SVOCs or metals were detected above background levels in the sample ten feet out from the outlet port (541-SS-DF-03) nor from the sample collect 3 feet east of 541-SS-DF-01. Table 3 summarizes the risk screening for the samples collected in the drain field. Appendix A contains all the Phase I sample results.

Table 3. Drain field sample results for Phase I.

Analyte	Maximum Detection (mg/kg)	Residential RSL[a] (mg/kg)	C/NC	Cancer Risk	NonCancer HQ
Anthracene	0.15	1.70E+04	NC		8.82E-06
Benzo(a)pyrene	0.6	1.50E-02	C	4.00E-05	
Benzo(a)anthracene	0.8	0.15	C	5.33E-06	
Benzo(b)fluoranthene	0.85	0.15	C	5.67E-06	
Benzo(g,h,i)perylene[b]	0.28	1.70E+03	NC		1.65E-04
Benzo(k)fluoranthene	0.32	1.5	C	2.13E-07	
Chrysene	0.92	15	C	1.93E-08	
Dibenzo(a,h)anthracene	0.083	0.015	C	5.53E-06	
Fluoranthene	1.2	2.30E+03	NC		5.22E-04
Indeno(1,2,3-cd)pyrene	0.32	0.15	C	2.13E-06	
Perylene[b]	0.29	1.70E+03	NC		6.47E-04
Phenanthrene	0.6	3.8	C	1.58E-07	
Pyrene	1.1	1.70E+03	NC		6.47E-04
Chromium	20	1.20E+05	NC		1.67E-04
Cobalt	6.8	23	NC		2.96E-01
Iron	17000	5.50E+04	NC		3.09E-01
Mercury	18	9.40E+00	NC		1.91E+00
Nickel	17	1.50E+03	NC		1.13E-02
Silver	22	3.90E+02	NC		5.64E-02
Thallium	0.49	7.80E-01	NC		6.28E-01
Zinc	200	2.30E+04	NC		8.70E-03
			Total Risk or HI =	**5.91E-05**	**3.23**

a - Residential RSL, June 2015.

b - Pyrene RSL used as a surrogate

The detections driving risk are limited to sample 541-SS-DF-01 (five feet from the outlet port) and 541-SS-DF-04 (three feet west of sample 541-SS-DF-01). SVOCs were detected in sample 541-SS-DF-01 to a depth of 4 feet. bgs while SVOCs were detected in sample 541-SS-DF-04 within the 6-8 ft bgs interval. Removals of soil at these locations is recommended. It was recommended that soil be removed from the outlet port to about eight feet south of the port and to the west to about 10 feet. Depth of removals is estimated to be 10 feet (see Figure 6), up to an estimated 1,000 cubic feet of soil.

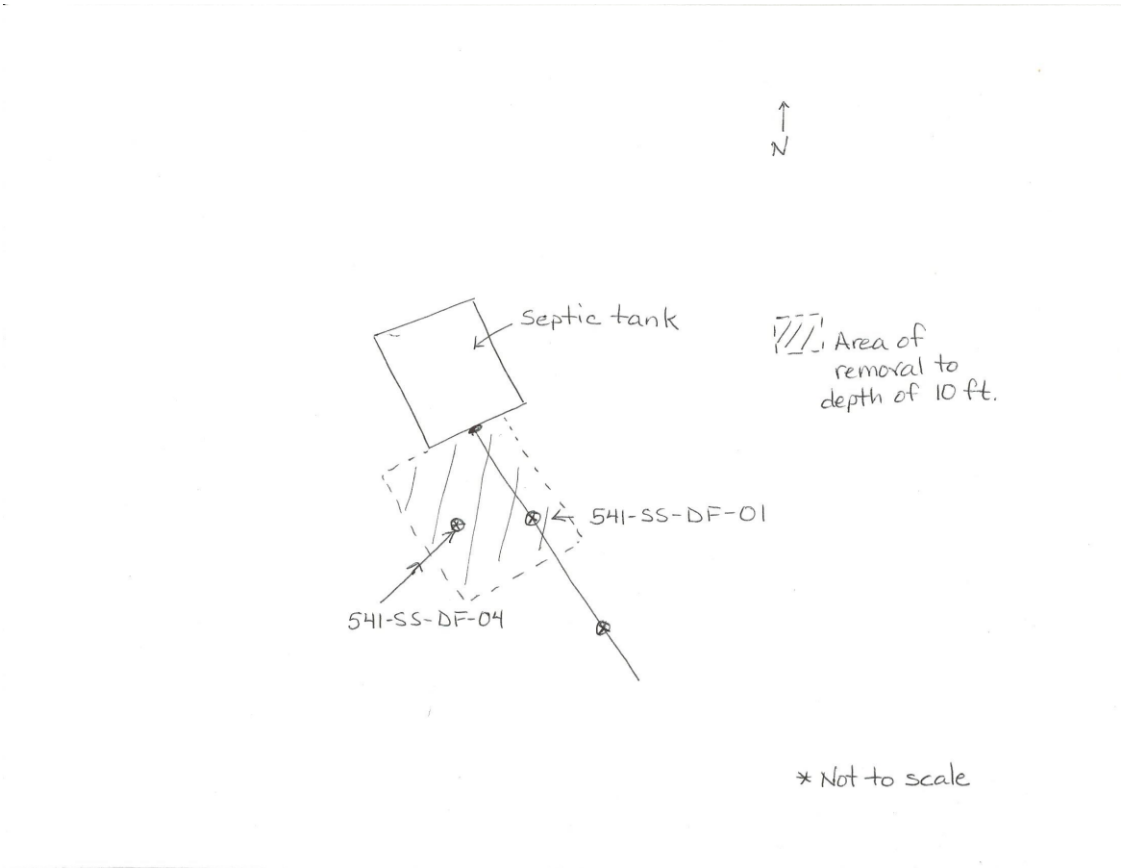

Figure 6. Estimated removal area in the drain field

2.4 Overburden Soil

Soil above the pipe line was removed and stockpiled. Soil to the southwest of the septic tank down to the bottom of the depths of the inlet/outlet ports were also removed and stockpiled. Four five-point composite samples were collected from four distinct stockpile areas (Sample No. 541-SS-OB-1 through 541-SS-OB-4).

The below photo shows some of the overburden soil piles from which composite samples were collected.

Figure 7. Photograph of overburden soil

The results of the samples indicated minimal detections of a few metals above background concentrations. Risk screening, as shown in Table 4 indicates that the soil meets residential risk levels and is recommended for use as clean backfill.

Table 4. Results of human health screening assessment for overburden soil samples.

Analyte	Maximum Detection (mg/kg)	Residential RSL[a,b] (mg/kg)	C/NC	Cancer Risk	NonCancer HQ
Cobalt	6	23	NC		0.26
Mercury	0.7	9.40E+00	NC		0.07
Nickel	15	1.50E+03	NC		0.01
Silver	0.23	390	NC		0.00
Sodium	990	7.82E+06	NC		0.00
Thallium	0.23	0.78	NC		0.63
		Total Risk or HI =		**None**	**0.97**

a - Residential RSLs, June 2015.
b - Sodium screening level calculated using RSL equations and the tolerable upper intake level from the Institute of Medicine of the National Academy of Sciences

2.5 Waste Characterization Sampling of the Sludge

Waste characterization samples were collected of the sludge. A long handled scoop was used to dig into the sludge and extract a sample. The sludge was placed into an aluminum pan and mixed before placing into the sample jars. The results of the toxicity characteristic leaching procedure (TCLP) analyses indicated the sludge did not meet criteria for hazardous waste. The results of the TCLP sludge analyses are provided in Appendix B.

In accordance with the work plan, it was assumed that the results of the TCLP analyses for the sludge would also dictate how the concrete and pipe would also be disposed; the concrete and pipe would carry the same waste codes as the sludge. As discussed in Section 3, the sludge, concrete, and pipe was disposed of as nonhazardous waste at a managed landfill facility.

3.0 Summary of Phase II Activities

The following activities were conducted under Phase II of this project:

- Disposal of sludge, concrete, and pipe;
- Removal of soil at the inlet pipe to the septic tank;
- Removal of soil within the drain field and to the outlet pipe;
- Characterization and disposal of removed soil; and
- Collection of confirmation samples.

3.1 Removal and Disposal of Sludge, Concrete and Pipe

Since the Phase I investigation, several heavy rain fall events occurred at TEAD-S resulting in rain water build up on top of the sludge in the septic tank. The rain water along with the sludge was removed from the tank using pumps and dredging and placed into totes (Figure 8) and labeled as non-hazardous. Once removed, the concrete tank was broken and removed and placed onto high density polyethylene (HDPE) plastic liners pending receipt of rolloffs. The pipe was also removed and placed on plastic.

Figure 8. Photograph of sludge in tote.

The sludge, concrete and pipe, along with the plastic sheeting, was placed into two roll offs and sent to the Wasatch Landfill for disposal.

3.2 Removal of Soil Associated with the Septic Tank and Drain field

Prior to removal of the concrete septic tank, soil was removed from around the inlet port. As shown in Figure 9, soil was removed to a depth of two and a half foot below the base of the inlet pipe and out about two feet on all sides. The soil was placed in a drum pending waste characterization analyses. The soil was consolidated into a roll off with soil removed from the outlet area and drain field for waste characterization and final disposition.

Soil was removed along the outlet side of the septic tank from the outlet pipe out to about 8-9 feet and to a depth of about 11 feet. Soil was removed west to about 10 feet, as shown in Figures 6 and 10. The soil was direct loaded into a roll off for waste characterization sampling. A total of two roll offs (about 30-40 cubic yards) of soil was removed.

Figure 9. Removal of soil at the septic tank inlet.

Figure 10. Soil removal in the drain field.

A total of four confirmation samples were collected from the removal areas plus an additional sample from the footprint of the septic tank (Figure 11). A four-point composite sample was collected from the bottom of the excavation area at the inlet port (sample 541-S-1C and duplicate). Three samples were collected from the outlet port side and drain field removal area (samples 541-S-3 (and duplicate), 541-S-4C, and 541-S-5C). While not specified in the work plan, an additional four-point composite sample was collected from the footprint of the former

septic tank (sample 541-S-2C). Samples were analyzed for metals and SVOCs in accordance with the work plan. Section 4 contains a discussion of the results of the confirmation sampling.

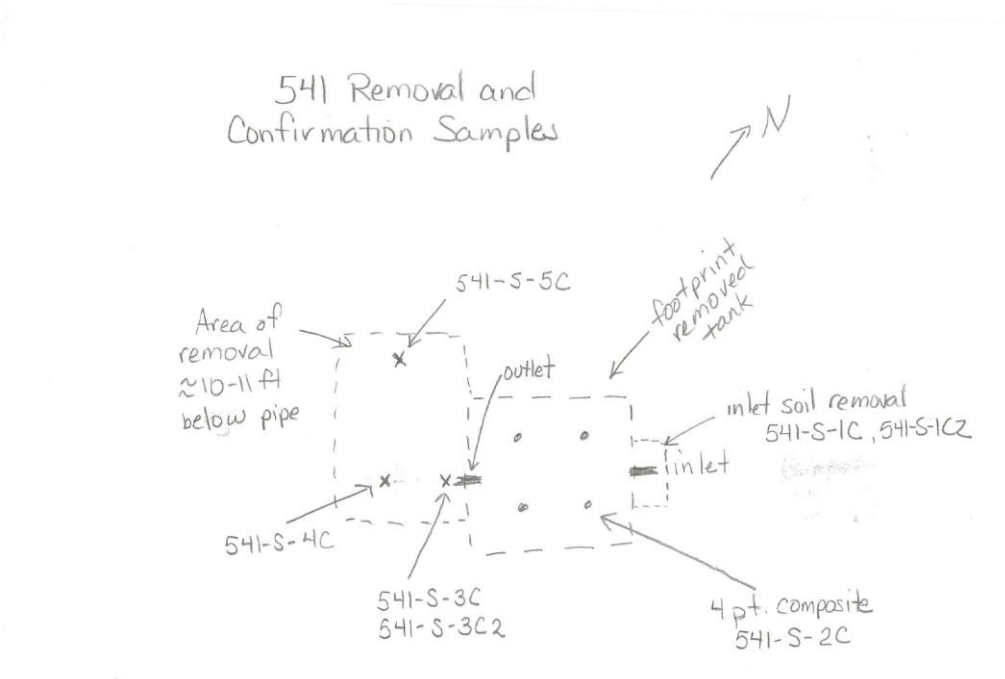

Figure 11. Confirmation sample location map.

3.3 Waste Characterization Sampling Soil

Waste characterization sampling of the soil was required at a rate of one sample for 100 cubic yards of soil. In total, about 30-40 cubic yards of soil was removed from around the septic tank and drain field. Two 5-point composite samples were collected from the roll offs. The results of the TCLP analyses are provided in Appendix B.

The TCLP results indicate the soil is non-hazardous; the roll offs were manifested and shipped to Wastach Landfill for final disposition.

3.4 Decontamination of Tools/Equipment

Decontamination of sampling equipment and heavy equipment was completed within the decontamination area. All equipment was decontaminated prior to leaving the site.

All used personal protective equipment (PPE) and miscellaneous disposable sampling equipment including decontamination pad supplies was contained in plastic garbage bags in Department of Transportation (DOT) approved drums and disposed of in an appropriate manner.

4.0 Confirmation Sampling Results and Risk Assessment

4.1 Analytical Results

The detailed results of the Phase I samples are provided in Appendix A.2 while the detailed summary tables for the confirmation samples collected post removals are provided Appendix A.3.

4.2 Risk Assessment

A human health and ecological risk assessment was conducted using all confirmation data to demonstrate the closure performance standards and compliance with UAC R315-101 had been met and to support a final NFA determination. The Closure Verification Report (approved June 12, 2014) contained a risk assessment for all areas of Building 4541/4539 with the exception of the east septic area. As discussed with Division personnel (July 9, 2015), the rest of the site has been approved for NFA and this closure risk assessment may exclude the other areas within the Building 4541/4539 investigation area.

The risk assessments combined sample data from Phase I for areas that did not require removals (samples 541-SS-P01 through 541-SS-P06, 541-SS-TK-01 (f-8 ft bgs samples only), 541-SS-TK-03, 541-SS-DF-02, and 541-SS-DF-03) combined with post removal confirmation data (samples 541-S-1C through 541-S-5C).

4.2.1 Human Health

Similar to the site attribution analysis conducted for Phase I data, background levels used for the closure verification site attribution analysis for metals were taken from Table 5, Summary Statistics and Background Reference Values for Metals, of the TEAD-S RAD. The maximum detected concentration for each metal was compared to the background reference value (95% UTL). If the site maximum was greater than the background reference value, the metal was retained as a COPC and metal was included in the risk assessments. If a background value was not available for a metal, the metal was also retained as a COPC. All organics that had at least one detect were retained as COPCs. For samples with duplicates, the higher result was retained as the exposure point concentration. Table 5 summarizes all the confirmation data and highlights in blue those COPCs retained for the risk screen.

Table 5. Site attribution assessment for all confirmation data

Analyte	Sample	Result (mg/kg)	Background (mg/kg)	Result>Background?
Aluminum	541-S-1C	1.20E+04	1.76E+04	no
Aluminum	541-S-2C	7.30E+03	1.76E+04	no

Analyte	Sample	Result (mg/kg)	Background (mg/kg)	Result>Background?
Aluminum	541-S-3C	3.70E+03	1.76E+04	no
Aluminum	541-S-4C	4.60E+03	1.76E+04	no
Aluminum	541-S-5C	3.40E+03	1.76E+04	no
Aluminum	541-SS-DF-02-0	1.30E+04	1.76E+04	no
Aluminum	541-SS-DF-02-4	1.20E+04	1.76E+04	no
Aluminum	541-SS-DF-02-42	9.53E+03	1.76E+04	no
Aluminum	541-SS-DF-02-42	1.30E+04	1.76E+04	no
Aluminum	541-SS-DF-02-8	1.30E+04	1.76E+04	no
Aluminum	541-SS-DF-03-0	1.20E+04	1.76E+04	no
Aluminum	541-SS-DF-03-8	9.60E+03	1.76E+04	no
Aluminum	541-SS-P01-0	2.60E+03	1.76E+04	no
Aluminum	541-SS-P01-4	2.70E+03	1.76E+04	no
Aluminum	541-SS-P01-8	1.40E+03	1.76E+04	no
Aluminum	541-SS-P02-0	1.90E+03	1.76E+04	no
Aluminum	541-SS-P02-4	2.60E+03	1.76E+04	no
Aluminum	541-SS-P02-8	2.90E+03	1.76E+04	no
Aluminum	541-SS-P03-0	5.00E+03	1.76E+04	no
Aluminum	541-SS-P03-4	1.70E+03	1.76E+04	no
Aluminum	541-SS-P04-0	6.10E+03	1.76E+04	no
Aluminum	541-SS-P04-4	1.70E+03	1.76E+04	no
Aluminum	541-SS-P04-8	2.10E+03	1.76E+04	no
Aluminum	541-SS-P05-0	2.10E+03	1.76E+04	no
Aluminum	541-SS-P05-4	1.30E+03	1.76E+04	no
Aluminum	541-SS-P05-8	3.70E+03	1.76E+04	no
Aluminum	541-SS-P05-82	5.40E+03	1.76E+04	no
Aluminum	541-SS-P05-82	2.82E+03	1.76E+04	no
Aluminum	541-SS-P06-0	9.00E+03	1.76E+04	no
Aluminum	541-SS-P06-4	2.90E+03	1.76E+04	no
Aluminum	541-SS-P06-8	2.20E+03	1.76E+04	no
Aluminum	541-SS-TK-8	5.5E+03	1.76E+04	no
Aluminum	541-SS-TK-03-0	2.30E+03	1.76E+04	no
Aluminum	541-SS-TK-03-4	2.10E+03	1.76E+04	no
Aluminum	541-SS-TK-03-8	1.80E+03	1.76E+04	no
Antimony	541-SS-P01-0	3.30E-01	9.60E-01	no
Antimony	541-SS-P01-4	5.10E-01	9.60E-01	no
Antimony	541-SS-P01-8	3.90E-01	9.60E-01	no
Antimony	541-SS-P02-0	5.60E-01	9.60E-01	no
Antimony	541-SS-P02-4	4.40E-01	9.60E-01	no

Analyte	Sample	Result (mg/kg)	Background (mg/kg)	Result>Background?
Antimony	541-SS-P02-8	3.50E-01	9.60E-01	no
Antimony	541-SS-P03-0	4.50E-01	9.60E-01	no
Antimony	541-SS-P03-4	8.50E-01	9.60E-01	no
Antimony	541-SS-P04-0	3.10E-01	9.60E-01	no
Antimony	541-SS-P04-4	4.10E-01	9.60E-01	no
Antimony	541-SS-P04-8	5.60E-01	9.60E-01	no
Antimony	541-SS-P05-0	4.10E-01	9.60E-01	no
Antimony	541-SS-P05-4	3.90E-01	9.60E-01	no
Antimony	541-SS-P05-8	3.90E-01	9.60E-01	no
Antimony	541-SS-P05-82	3.90E-01	9.60E-01	no
Antimony	541-SS-P06-4	3.90E-01	9.60E-01	no
Antimony	541-SS-TK-01-8	4.80E-01	9.60E-01	no
Antimony	541-SS-TK-03-0	4.90E-01	9.60E-01	no
Antimony	541-SS-TK-03-4	4.10E-01	9.60E-01	no
Antimony	541-SS-TK-03-8	4.60E-01	9.60E-01	no
Arsenic	541-S-1C	4.70E+00	3.50E+01	no
Arsenic	541-S-1C2	4.70E+00	3.50E+01	no
Arsenic	541-S-2C	6.70E+00	3.50E+01	no
Arsenic	541-S-3C	5.90E+00	3.50E+01	no
Arsenic	541-S-4C	5.50E+00	3.50E+01	no
Arsenic	541-S-5C	4.20E+00	3.50E+01	no
Arsenic	541-SS-DF-02-0	7.50E+00	3.50E+01	no
Arsenic	541-SS-DF-02-4	6.50E+00	3.50E+01	no
Arsenic	541-SS-DF-02-42	5.65E+00	3.50E+01	no
Arsenic	541-SS-DF-02-42	7.20E+00	3.50E+01	no
Arsenic	541-SS-DF-02-8	7.50E+00	3.50E+01	no
Arsenic	541-SS-DF-03-0	7.50E+00	3.50E+01	no
Arsenic	541-SS-DF-03-4	6.40E+00	3.50E+01	no
Arsenic	541-SS-DF-03-8	6.20E+00	3.50E+01	no
Arsenic	541-SS-P01-0	6.10E+00	3.50E+01	no
Arsenic	541-SS-P01-4	6.30E+00	3.50E+01	no
Arsenic	541-SS-P01-8	4.00E+00	3.50E+01	no
Arsenic	541-SS-P02-0	6.50E+00	3.50E+01	no
Arsenic	541-SS-P02-4	8.60E+00	3.50E+01	no
Arsenic	541-SS-P02-8	6.60E+00	3.50E+01	no
Arsenic	541-SS-P03-0	1.10E+01	3.50E+01	no
Arsenic	541-SS-P03-4	7.00E+00	3.50E+01	no
Arsenic	541-SS-P04-0	5.70E+00	3.50E+01	no

Analyte	Sample	Result (mg/kg)	Background (mg/kg)	Result>Background?
Arsenic	541-SS-P04-4	6.90E+00	3.50E+01	no
Arsenic	541-SS-P04-8	7.80E+00	3.50E+01	no
Arsenic	541-SS-P05-0	5.00E+00	3.50E+01	no
Arsenic	541-SS-P05-4	5.60E+00	3.50E+01	no
Arsenic	541-SS-P05-8	7.30E+00	3.50E+01	no
Arsenic	541-SS-P05-82	1.00E+01	3.50E+01	no
Arsenic	541-SS-P05-82	5.49E+00	3.50E+01	no
Arsenic	541-SS-P06-0	5.80E+00	3.50E+01	no
Arsenic	541-SS-P06-4	6.00E+00	3.50E+01	no
Arsenic	541-SS-P06-8	5.60E+00	3.50E+01	no
Arsenic	541-SS-TK-01-8	1.10E+01	3.50E+01	no
Arsenic	541-SS-TK-03-0	6.70E+00	3.50E+01	no
Arsenic	541-SS-TK-03-4	5.00E+00	3.50E+01	no
Arsenic	541-SS-TK-03-8	5.00E+00	3.50E+01	no
Barium	541-S-1C2	2.00E+02	2.40E+02	no
Barium	541-S-2C	7.10E+01	2.40E+02	no
Barium	541-S-3C	3.70E+01	2.40E+02	no
Barium	541-S-4C	4.50E+01	2.40E+02	no
Barium	541-S-5C	3.70E+01	2.40E+02	no
Barium	541-SS-DF-02-0	1.80E+02	2.40E+02	no
Barium	541-SS-DF-02-4	1.60E+02	2.40E+02	no
Barium	541-SS-DF-02-42	1.51E+02	2.40E+02	no
Barium	541-SS-DF-02-42	1.80E+02	2.40E+02	no
Barium	541-SS-DF-02-8	1.70E+02	2.40E+02	no
Barium	541-SS-DF-03-0	1.90E+02	2.40E+02	no
Barium	541-SS-DF-03-4	1.40E+02	2.40E+02	no
Barium	541-SS-DF-03-8	1.50E+02	2.40E+02	no
Barium	541-SS-P01-0	6.50E+01	2.40E+02	no
Barium	541-SS-P01-4	2.60E+01	2.40E+02	no
Barium	541-SS-P01-8	1.60E+01	2.40E+02	no
Barium	541-SS-P02-0	4.20E+01	2.40E+02	no
Barium	541-SS-P02-4	2.80E+01	2.40E+02	no
Barium	541-SS-P02-8	2.40E+01	2.40E+02	no
Barium	541-SS-P03-0	1.00E+02	2.40E+02	no
Barium	541-SS-P03-4	2.50E+01	2.40E+02	no
Barium	541-SS-P04-0	1.10E+02	2.40E+02	no
Barium	541-SS-P04-4	2.50E+01	2.40E+02	no
Barium	541-SS-P04-8	2.00E+01	2.40E+02	no

Analyte	Sample	Result (mg/kg)	Background (mg/kg)	Result>Background?
Barium	541-SS-P05-0	3.20E+01	2.40E+02	no
Barium	541-SS-P05-4	2.60E+01	2.40E+02	no
Barium	541-SS-P05-8	2.70E+01	2.40E+02	no
Barium	541-SS-P05-82	4.20E+01	2.40E+02	no
Barium	541-SS-P05-82	2.23E+01	2.40E+02	no
Barium	541-SS-P06-0	1.30E+02	2.40E+02	no
Barium	541-SS-P06-4	2.80E+01	2.40E+02	no
Barium	541-SS-P06-8	1.80E+01	2.40E+02	no
Barium	541-SS-TK-01-8	5.20E+01	2.40E+02	no
Barium	541-SS-TK-03-0	2.50E+01	2.40E+02	no
Barium	541-SS-TK-03-4	2.60E+01	2.40E+02	no
Barium	541-SS-TK-03-8	2.10E+01	2.40E+02	no
Benzo(a)anthracene	541-S-1C2	7.80E-02		yes
Benzo(a)pyrene	541-S-1C2	6.50E-02		yes
Benzo(b)fluoranthene	541-S-1C2	9.60E-02		yes
Benzoic acid	541-S-1C	2.20E-01		yes
Benzoic acid	541-S-2C	2.30E-01		yes
Beryllium	541-S-1C	6.90E-01	9.70E-01	no
Beryllium	541-S-2C	5.00E-01	9.70E-01	no
Beryllium	541-S-3C	2.90E-01	9.70E-01	no
Beryllium	541-S-4C	3.30E-01	9.70E-01	no
Beryllium	541-S-5C	2.70E-01	9.70E-01	no
Beryllium	541-SS-DF-02-0	7.60E-01	9.70E-01	no
Beryllium	541-SS-DF-02-4	6.90E-01	9.70E-01	no
Beryllium	541-SS-DF-02-42	6.60E-01	9.70E-01	no
Beryllium	541-SS-DF-02-8	7.60E-01	9.70E-01	no
Beryllium	541-SS-DF-03-0	7.70E-01	9.70E-01	no
Beryllium	541-SS-DF-03-4	6.50E-01	9.70E-01	no
Beryllium	541-SS-DF-03-8	6.30E-01	9.70E-01	no
Beryllium	541-SS-P01-0	2.40E-01	9.70E-01	no
Beryllium	541-SS-P01-4	2.40E-01	9.70E-01	no
Beryllium	541-SS-P02-0	1.80E-01	9.70E-01	no
Beryllium	541-SS-P02-4	2.30E-01	9.70E-01	no
Beryllium	541-SS-P02-8	2.30E-01	9.70E-01	no
Beryllium	541-SS-P03-0	3.20E-01	9.70E-01	no
Beryllium	541-SS-P03-4	1.70E-01	9.70E-01	no
Beryllium	541-SS-P04-0	3.80E-01	9.70E-01	no
Beryllium	541-SS-P04-4	1.70E-01	9.70E-01	no

Analyte	Sample	Result (mg/kg)	Background (mg/kg)	Result>Background?
Beryllium	541-SS-P04-8	2.20E-01	9.70E-01	no
Beryllium	541-SS-P05-0	1.80E-01	9.70E-01	no
Beryllium	541-SS-P05-4	1.60E-01	9.70E-01	no
Beryllium	541-SS-P05-8	3.00E-01	9.70E-01	no
Beryllium	541-SS-P05-82	3.90E-01	9.70E-01	no
Beryllium	541-SS-P05-82	4.71E-01	9.70E-01	no
Beryllium	541-SS-P06-0	5.40E-01	9.70E-01	no
Beryllium	541-SS-P06-4	2.40E-01	9.70E-01	no
Beryllium	541-SS-P06-8	2.00E-01	9.70E-01	no
Beryllium	541-SS-TK-01-8	4.5E0-01	9.70E-01	no
Beryllium	541-SS-TK-03-0	1.70E-01	9.70E-01	no
Beryllium	541-SS-TK-03-4	2.00E-01	9.70E-01	no
Bis(2-ethylhexyl)phthalate	541-S-1C	6.10E-02		yes
Bis(2-ethylhexyl)phthalate	541-S-1C2	7.30E-02		yes
Cadmium	541-S-1C	6.90E-01	1.20E+00	no
Cadmium	541-S-2C	6.50E-01	1.20E+00	no
Cadmium	541-S-3C	5.20E-01	1.20E+00	no
Cadmium	541-S-4C	5.60E-01	1.20E+00	no
Cadmium	541-S-5C	9.00E-01	1.20E+00	no
Cadmium	541-SS-DF-02-0	5.50E-01	1.20E+00	no
Cadmium	541-SS-DF-02-4	8.30E-01	1.20E+00	no
Cadmium	541-SS-DF-02-42	5.51E-01	1.20E+00	no
Cadmium	541-SS-DF-02-42	6.00E-01	1.20E+00	no
Cadmium	541-SS-DF-02-8	8.90E-01	1.20E+00	no
Cadmium	541-SS-DF-03-0	5.20E-01	1.20E+00	no
Cadmium	541-SS-DF-03-4	4.70E-01	1.20E+00	no
Cadmium	541-SS-DF-03-8	6.30E-01	1.20E+00	no
Cadmium	541-SS-P01-0	7.00E-01	1.20E+00	no
Cadmium	541-SS-P01-4	6.40E-01	1.20E+00	no
Cadmium	541-SS-P01-8	3.50E-01	1.20E+00	no
Cadmium	541-SS-P02-0	4.80E-01	1.20E+00	no
Cadmium	541-SS-P02-4	5.20E-01	1.20E+00	no
Cadmium	541-SS-P02-8	5.10E-01	1.20E+00	no
Cadmium	541-SS-P03-0	5.40E-01	1.20E+00	no
Cadmium	541-SS-P03-4	6.10E-01	1.20E+00	no
Cadmium	541-SS-P04-0	5.10E-01	1.20E+00	no
Cadmium	541-SS-P04-4	6.90E-01	1.20E+00	no
Cadmium	541-SS-P04-8	4.80E-01	1.20E+00	no

Analyte	Sample	Result (mg/kg)	Background (mg/kg)	Result>Background?
Cadmium	541-SS-P05-0	7.90E-01	1.20E+00	no
Cadmium	541-SS-P05-4	4.40E-01	1.20E+00	no
Cadmium	541-SS-P05-8	4.30E-01	1.20E+00	no
Cadmium	541-SS-P05-82	1.40E+00	1.20E+00	yes
Cadmium	541-SS-P05-82	5.23E-01	1.20E+00	no
Cadmium	541-SS-P06-0	8.00E-01	1.20E+00	no
Cadmium	541-SS-P06-4	4.50E-01	1.20E+00	no
Cadmium	541-SS-P06-8	4.20E-01	1.20E+00	no
Cadmium	541-SS-TK-01-8	5.20E-01	1.20E+00	no
Cadmium	541-SS-TK-03-0	5.20E-01	1.20E+00	no
Cadmium	541-SS-TK-03-4	6.40E-01	1.20E+00	no
Cadmium	541-SS-TK-03-8	5.10E-01	1.20E+00	no
Calcium	541-S-1C	6.30E+04	1.21E+05	no
Calcium	541-S-2C	8.50E+04	1.21E+05	no
Calcium	541-S-3C	1.40E+05	1.21E+05	yes
Calcium	541-S-4C	9.90E+04	1.21E+05	no
Calcium	541-S-5C	1.50E+05	1.21E+05	yes
Calcium	541-SS-DF-02-0	4.50E+04	1.21E+05	no
Calcium	541-SS-DF-02-4	6.20E+04	1.21E+05	no
Calcium	541-SS-DF-02-42	4.63E+04	1.21E+05	no
Calcium	541-SS-DF-02-42	3.90E+04	1.21E+05	no
Calcium	541-SS-DF-02-8	4.70E+04	1.21E+05	no
Calcium	541-SS-DF-03-0	7.80E+04	1.21E+05	no
Calcium	541-SS-DF-03-4	5.10E+04	1.21E+05	no
Calcium	541-SS-DF-03-8	7.40E+04	1.21E+05	no
Calcium	541-SS-P01-0	2.30E+05	1.21E+05	yes
Calcium	541-SS-P01-4	1.70E+05	1.21E+05	yes
Calcium	541-SS-P01-8	1.30E+05	1.21E+05	yes
Calcium	541-SS-P02-0	2.40E+05	1.21E+05	yes
Calcium	541-SS-P02-4	1.70E+05	1.21E+05	yes
Calcium	541-SS-P02-8	1.70E+05	1.21E+05	yes
Calcium	541-SS-P03-0	1.70E+05	1.21E+05	yes
Calcium	541-SS-P03-4	2.20E+05	1.21E+05	yes
Calcium	541-SS-P04-0	1.30E+05	1.21E+05	yes
Calcium	541-SS-P04-4	1.90E+05	1.21E+05	yes
Calcium	541-SS-P04-8	1.90E+05	1.21E+05	yes
Calcium	541-SS-P05-0	2.20E+05	1.21E+05	yes
Calcium	541-SS-P05-4	1.90E+05	1.21E+05	yes

Analyte	Sample	Result (mg/kg)	Background (mg/kg)	Result>Background?
Calcium	541-SS-P05-8	2.00E+05	1.21E+05	yes
Calcium	541-SS-P05-82	1.30E+05	1.21E+05	yes
Calcium	541-SS-P05-82	1.27E+05	1.21E+05	yes
Calcium	541-SS-P06-0	1.20E+05	1.21E+05	no
Calcium	541-SS-P06-4	1.40E+05	1.21E+05	yes
Calcium	541-SS-P06-8	1.40E+05	1.21E+05	yes
Calcium	541-SS-TK-01-8	9.30E+05	1.21E+05	yes
Calcium	541-SS-TK-03-0	1.60E+05	1.21E+05	yes
Calcium	541-SS-TK-03-4	2.00E+05	1.21E+05	yes
Calcium	541-SS-TK-03-8	2.20E+05	1.21E+05	yes
Chromium	541-S-1C	1.60E+01	1.98E+01	no
Chromium	541-S-2C	1.20E+01	1.98E+01	no
Chromium	541-S-3C	8.30E+00	1.98E+01	no
Chromium	541-S-4C	9.50E+00	1.98E+01	no
Chromium	541-S-5C	8.10E+00	1.98E+01	no
Chromium	541-SS-DF-02-0	1.40E+01	1.98E+01	no
Chromium	541-SS-DF-02-4	1.40E+01	1.98E+01	no
Chromium	541-SS-DF-02-42	1.08E+01	1.98E+01	no
Chromium	541-SS-DF-02-42	1.40E+01	1.98E+01	no
Chromium	541-SS-DF-02-8	2.00E+01	1.98E+01	yes
Chromium	541-SS-DF-03-0	1.40E+01	1.98E+01	no
Chromium	541-SS-DF-03-4	1.20E+01	1.98E+01	no
Chromium	541-SS-DF-03-8	1.10E+01	1.98E+01	no
Chromium	541-SS-P01-0	8.00E+00	1.98E+01	no
Chromium	541-SS-P01-4	8.00E+00	1.98E+01	no
Chromium	541-SS-P01-8	6.20E+00	1.98E+01	no
Chromium	541-SS-P02-0	6.60E+00	1.98E+01	no
Chromium	541-SS-P02-4	9.30E+00	1.98E+01	no
Chromium	541-SS-P02-8	8.40E+00	1.98E+01	no
Chromium	541-SS-P03-0	9.30E+00	1.98E+01	no
Chromium	541-SS-P03-4	1.00E+01	1.98E+01	no
Chromium	541-SS-P04-0	9.50E+00	1.98E+01	no
Chromium	541-SS-P04-4	6.60E+00	1.98E+01	no
Chromium	541-SS-P04-8	7.90E+00	1.98E+01	no
Chromium	541-SS-P05-0	1.20E+01	1.98E+01	no
Chromium	541-SS-P05-4	7.90E+00	1.98E+01	no
Chromium	541-SS-P05-8	9.40E+00	1.98E+01	no
Chromium	541-SS-P05-82	1.20E+01	1.98E+01	no

Analyte	Sample	Result (mg/kg)	Background (mg/kg)	Result>Background?
Chromium	541-SS-P05-82	7.46E+00	1.98E+01	no
Chromium	541-SS-P06-0	1.40E+01	1.98E+01	no
Chromium	541-SS-P06-4	7.20E+00	1.98E+01	no
Chromium	541-SS-P06-8	6.70E+00	1.98E+01	no
Chromium	541-SS-TK-01-8	1.10E+02	1.98E+01	no
Chromium	541-SS-TK-03-0	9.50E+00	1.98E+01	no
Chromium	541-SS-TK-03-4	8.10E+00	1.98E+01	no
Chromium	541-SS-TK-03-8	6.90E+00	1.98E+01	no
Chrysene	541-S-1C2	9.90E-02		yes
Cobalt	541-S-1C	5.30E+00	5.70E+00	no
Cobalt	541-S-2C	4.30E+00	5.70E+00	no
Cobalt	541-S-3C	2.60E+00	5.70E+00	no
Cobalt	541-S-4C	2.90E+00	5.70E+00	no
Cobalt	541-S-5C	2.30E+00	5.70E+00	no
Cobalt	541-SS-DF-02-0	6.20E+00	5.70E+00	yes
Cobalt	541-SS-DF-02-4	5.50E+00	5.70E+00	no
Cobalt	541-SS-DF-02-42	5.13E+00	5.70E+00	no
Cobalt	541-SS-DF-02-42	6.80E+00	5.70E+00	yes
Cobalt	541-SS-DF-02-8	5.80E+00	5.70E+00	yes
Cobalt	541-SS-DF-03-0	5.90E+00	5.70E+00	yes
Cobalt	541-SS-DF-03-4	4.70E+00	5.70E+00	no
Cobalt	541-SS-DF-03-8	4.90E+00	5.70E+00	no
Cobalt	541-SS-P01-0	1.90E+00	5.70E+00	no
Cobalt	541-SS-P01-4	2.10E+00	5.70E+00	no
Cobalt	541-SS-P01-8	1.20E+00	5.70E+00	no
Cobalt	541-SS-P02-0	1.80E+00	5.70E+00	no
Cobalt	541-SS-P02-4	2.00E+00	5.70E+00	no
Cobalt	541-SS-P02-8	2.30E+00	5.70E+00	no
Cobalt	541-SS-P03-0	3.30E+00	5.70E+00	no
Cobalt	541-SS-P03-4	1.80E+00	5.70E+00	no
Cobalt	541-SS-P04-0	3.30E+00	5.70E+00	no
Cobalt	541-SS-P04-4	1.60E+00	5.70E+00	no
Cobalt	541-SS-P04-8	1.80E+00	5.70E+00	no
Cobalt	541-SS-P05-0	1.70E+00	5.70E+00	no
Cobalt	541-SS-P05-4	1.50E+00	5.70E+00	no
Cobalt	541-SS-P05-8	2.60E+00	5.70E+00	no
Cobalt	541-SS-P05-82	3.70E+00	5.70E+00	no
Cobalt	541-SS-P05-82	1.89E+00	5.70E+00	no

Analyte	Sample	Result (mg/kg)	Background (mg/kg)	Result>Background?
Cobalt	541-SS-P06-0	4.50E+00	5.70E+00	no
Cobalt	541-SS-P06-4	2.20E+00	5.70E+00	no
Cobalt	541-SS-P06-8	1.70E+00	5.70E+00	no
Cobalt	541-SS-TK-01-8	3.80E+00	5.70E+00	no
Cobalt	541-SS-TK-03-0	2.60E+00	5.70E+00	no
Cobalt	541-SS-TK-03-4	2.30E+00	5.70E+00	no
Cobalt	541-SS-TK-03-8	1.70E+00	5.70E+00	no
Copper	541-S-1C	2.60E+01	3.24E+01	no
Copper	541-S-2C	8.00E+00	3.24E+01	no
Copper	541-S-3C	5.20E+00	3.24E+01	no
Copper	541-S-4C	5.70E+00	3.24E+01	no
Copper	541-S-5C	4.30E+00	3.24E+01	no
Copper	541-SS-DF-02-0	1.20E+01	3.24E+01	no
Copper	541-SS-DF-02-4	1.10E+01	3.24E+01	no
Copper	541-SS-DF-02-42	9.90E+00	3.24E+01	no
Copper	541-SS-DF-02-42	1.20E+01	3.24E+01	no
Copper	541-SS-DF-02-8	2.30E+01	3.24E+01	no
Copper	541-SS-DF-03-0	1.90E+01	3.24E+01	no
Copper	541-SS-DF-03-4	1.10E+01	3.24E+01	no
Copper	541-SS-DF-03-8	1.20E+01	3.24E+01	no
Copper	541-SS-P01-0	6.90E+00	3.24E+01	no
Copper	541-SS-P01-4	3.80E+00	3.24E+01	no
Copper	541-SS-P01-8	2.50E+00	3.24E+01	no
Copper	541-SS-P02-0	3.50E+00	3.24E+01	no
Copper	541-SS-P02-4	3.30E+00	3.24E+01	no
Copper	541-SS-P02-8	3.60E+00	3.24E+01	no
Copper	541-SS-P03-0	6.90E+00	3.24E+01	no
Copper	541-SS-P03-4	3.40E+00	3.24E+01	no
Copper	541-SS-P04-0	6.80E+00	3.24E+01	no
Copper	541-SS-P04-4	3.40E+00	3.24E+01	no
Copper	541-SS-P04-8	3.40E+00	3.24E+01	no
Copper	541-SS-P05-0	3.20E+00	3.24E+01	no
Copper	541-SS-P05-4	2.80E+00	3.24E+01	no
Copper	541-SS-P05-8	3.90E+00	3.24E+01	no
Copper	541-SS-P05-82	5.90E+00	3.24E+01	no
Copper	541-SS-P05-82	3.34E+00	3.24E+01	no
Copper	541-SS-P06-0	1.10E+01	3.24E+01	no
Copper	541-SS-P06-4	3.80E+00	3.24E+01	no

Analyte	Sample	Result (mg/kg)	Background (mg/kg)	Result>Background?
Copper	541-SS-P06-8	3.20E+00	3.24E+01	no
Copper	541-SS-TK-01-8	7.70E+00	3.24E+01	no
Copper	541-SS-TK-03-0	5.30E+00	3.24E+01	no
Copper	541-SS-TK-03-4	6.20E+00	3.24E+01	no
Copper	541-SS-TK-03-8	2.90E+00	3.24E+01	no
Fluoranthene	541-S-1C2	1.20E-01		yes
Iron	541-S-1C	1.10E+04	1.55E+04	no
Iron	541-S-2C	9.30E+03	1.55E+04	no
Iron	541-S-3C	6.50E+03	1.55E+04	no
Iron	541-S-4C	6.90E+03	1.55E+04	no
Iron	541-S-5C	6.20E+03	1.55E+04	no
Iron	541-SS-DF-02-0	1.50E+04	1.55E+04	no
Iron	541-SS-DF-02-4	1.30E+04	1.55E+04	no
Iron	541-SS-DF-02-42	1.13E+04	1.55E+04	no
Iron	541-SS-DF-02-42	1.70E+04	1.55E+04	yes
Iron	541-SS-DF-02-8	1.50E+04	1.55E+04	no
Iron	541-SS-DF-03-0	1.40E+04	1.55E+04	no
Iron	541-SS-DF-03-4	1.20E+04	1.55E+04	no
Iron	541-SS-DF-03-8	1.10E+04	1.55E+04	no
Iron	541-SS-P01-0	5.60E+03	1.55E+04	no
Iron	541-SS-P01-4	6.90E+03	1.55E+04	no
Iron	541-SS-P01-8	4.20E+03	1.55E+04	no
Iron	541-SS-P02-0	5.90E+03	1.55E+04	no
Iron	541-SS-P02-4	6.70E+03	1.55E+04	no
Iron	541-SS-P02-8	6.80E+03	1.55E+04	no
Iron	541-SS-P03-0	9.20E+03	1.55E+04	no
Iron	541-SS-P03-4	5.10E+03	1.55E+04	no
Iron	541-SS-P04-0	8.80E+03	1.55E+04	no
Iron	541-SS-P04-4	5.20E+03	1.55E+04	no
Iron	541-SS-P04-8	6.20E+03	1.55E+04	no
Iron	541-SS-P05-0	5.10E+03	1.55E+04	no
Iron	541-SS-P05-4	4.80E+03	1.55E+04	no
Iron	541-SS-P05-8	9.00E+03	1.55E+04	no
Iron	541-SS-P05-82	1.10E+04	1.55E+04	no
Iron	541-SS-P05-82	6.29E+03	1.55E+04	no
Iron	541-SS-P06-0	1.10E+04	1.55E+04	no
Iron	541-SS-P06-4	7.60E+03	1.55E+04	no
Iron	541-SS-P06-8	5.00E+03	1.55E+04	no

Analyte	Sample	Result (mg/kg)	Background (mg/kg)	Result>Background?
Iron	541-SS-TK-03-0	6.60E+03	1.55E+04	no
Iron	541-SS-TK-03-4	6.40E+03	1.55E+04	no
Iron	541-SS-TK-03-8	5.70E+03	1.55E+04	no
Lead	541-S-1C	2.40E+01	3.93E+01	no
Lead	541-S-2C	1.80E+01	3.93E+01	no
Lead	541-S-3C	1.10E+01	3.93E+01	no
Lead	541-S-4C	1.20E+01	3.93E+01	no
Lead	541-S-5C	9.50E+00	3.93E+01	no
Lead	541-SS-DF-02-0	2.30E+01	3.93E+01	no
Lead	541-SS-DF-02-4	1.80E+01	3.93E+01	no
Lead	541-SS-DF-02-42	1.94E+01	3.93E+01	no
Lead	541-SS-DF-02-42	2.10E+01	3.93E+01	no
Lead	541-SS-DF-02-8	2.60E+01	3.93E+01	no
Lead	541-SS-DF-03-0	1.70E+01	3.93E+01	no
Lead	541-SS-DF-03-4	1.70E+01	3.93E+01	no
Lead	541-SS-DF-03-8	1.90E+01	3.93E+01	no
Lead	541-SS-P01-0	8.00E+00	3.93E+01	no
Lead	541-SS-P01-4	7.60E+00	3.93E+01	no
Lead	541-SS-P01-8	4.10E+00	3.93E+01	no
Lead	541-SS-P02-0	1.10E+01	3.93E+01	no
Lead	541-SS-P02-4	7.20E+00	3.93E+01	no
Lead	541-SS-P02-8	9.60E+00	3.93E+01	no
Lead	541-SS-P03-0	1.20E+01	3.93E+01	no
Lead	541-SS-P03-4	2.60E+01	3.93E+01	no
Lead	541-SS-P04-0	1.20E+01	3.93E+01	no
Lead	541-SS-P04-4	9.40E+00	3.93E+01	no
Lead	541-SS-P04-8	8.30E+00	3.93E+01	no
Lead	541-SS-P05-0	9.70E+00	3.93E+01	no
Lead	541-SS-P05-4	1.00E+01	3.93E+01	no
Lead	541-SS-P05-8	1.10E+01	3.93E+01	no
Lead	541-SS-P05-82	1.70E+01	3.93E+01	no
Lead	541-SS-P05-82	7.40E+00	3.93E+01	no
Lead	541-SS-P06-0	2.00E+01	3.93E+01	no
Lead	541-SS-P06-4	1.50E+01	3.93E+01	no
Lead	541-SS-P06-8	7.10E+00	3.93E+01	no
Lead	541-SS-TK-03-0	8.80E+00	3.93E+01	no
Lead	541-SS-TK-03-4	6.40E+00	3.93E+01	no
Lead	541-SS-TK-03-8	8.60E+00	3.93E+01	no

Analyte	Sample	Result (mg/kg)	Background (mg/kg)	Result>Background?
Magnesium	541-S-1C	1.10E+04	1.72E+04	no
Magnesium	541-S-2C	1.50E+04	1.72E+04	no
Magnesium	541-S-3C	9.20E+03	1.72E+04	no
Magnesium	541-S-4C	1.10E+04	1.72E+04	no
Magnesium	541-S-5C	1.20E+04	1.72E+04	no
Magnesium	541-SS-DF-02-0	1.10E+04	1.72E+04	no
Magnesium	541-SS-DF-02-4	1.00E+04	1.72E+04	no
Magnesium	541-SS-DF-02-42	8.69E+03	1.72E+04	no
Magnesium	541-SS-DF-02-42	1.10E+04	1.72E+04	no
Magnesium	541-SS-DF-02-8	1.10E+04	1.72E+04	no
Magnesium	541-SS-DF-03-0	8.90E+03	1.72E+04	no
Magnesium	541-SS-DF-03-4	9.00E+03	1.72E+04	no
Magnesium	541-SS-DF-03-8	1.40E+04	1.72E+04	no
Magnesium	541-SS-P01-0	1.20E+04	1.72E+04	no
Magnesium	541-SS-P01-4	1.10E+04	1.72E+04	no
Magnesium	541-SS-P01-8	7.50E+03	1.72E+04	no
Magnesium	541-SS-P02-0	2.70E+04	1.72E+04	yes
Magnesium	541-SS-P02-4	8.70E+03	1.72E+04	no
Magnesium	541-SS-P02-8	9.50E+03	1.72E+04	no
Magnesium	541-SS-P03-0	9.60E+03	1.72E+04	no
Magnesium	541-SS-P03-4	8.70E+03	1.72E+04	no
Magnesium	541-SS-P04-0	8.30E+03	1.72E+04	no
Magnesium	541-SS-P04-4	1.30E+04	1.72E+04	no
Magnesium	541-SS-P04-8	1.30E+04	1.72E+04	no
Magnesium	541-SS-P05-0	9.50E+03	1.72E+04	no
Magnesium	541-SS-P05-4	1.20E+04	1.72E+04	no
Magnesium	541-SS-P05-8	9.60E+03	1.72E+04	no
Magnesium	541-SS-P05-82	1.20E+04	1.72E+04	no
Magnesium	541-SS-P05-82	7.46E+03	1.72E+04	no
Magnesium	541-SS-P06-0	1.40E+04	1.72E+04	no
Magnesium	541-SS-P06-4	2.10E+04	1.72E+04	yes
Magnesium	541-SS-P06-8	1.20E+04	1.72E+04	no
Magnesium	541-SS-TK-03-0	9.20E+03	1.72E+04	no
Magnesium	541-SS-TK-03-4	9.20E+03	1.72E+04	no
Magnesium	541-SS-TK-03-8	1.30E+04	1.72E+04	no
Manganese	541-S-1C	4.30E+02	6.99E+02	no
Manganese	541-S-2C	3.60E+02	6.99E+02	no
Manganese	541-S-3C	2.40E+02	6.99E+02	no

Analyte	Sample	Result (mg/kg)	Background (mg/kg)	Result>Background?
Manganese	541-S-4C	2.50E+02	6.99E+02	no
Manganese	541-S-5C	2.30E+02	6.99E+02	no
Manganese	541-SS-DF-02-0	6.00E+02	6.99E+02	no
Manganese	541-SS-DF-02-4	5.60E+02	6.99E+02	no
Manganese	541-SS-DF-02-42	5.49E+02	6.99E+02	no
Manganese	541-SS-DF-02-42	6.80E+02	6.99E+02	no
Manganese	541-SS-DF-02-8	4.40E+02	6.99E+02	no
Manganese	541-SS-DF-03-0	4.10E+02	6.99E+02	no
Manganese	541-SS-DF-03-4	4.60E+02	6.99E+02	no
Manganese	541-SS-DF-03-8	4.40E+02	6.99E+02	no
Manganese	541-SS-P01-0	2.10E+02	6.99E+02	no
Manganese	541-SS-P01-4	1.70E+02	6.99E+02	no
Manganese	541-SS-P01-8	9.20E+01	6.99E+02	no
Manganese	541-SS-P02-0	2.00E+02	6.99E+02	no
Manganese	541-SS-P02-4	1.70E+02	6.99E+02	no
Manganese	541-SS-P02-8	2.10E+02	6.99E+02	no
Manganese	541-SS-P03-0	2.70E+02	6.99E+02	no
Manganese	541-SS-P03-4	1.50E+02	6.99E+02	no
Manganese	541-SS-P04-0	2.60E+02	6.99E+02	no
Manganese	541-SS-P04-4	2.00E+02	6.99E+02	no
Manganese	541-SS-P04-8	2.10E+02	6.99E+02	no
Manganese	541-SS-P05-0	1.20E+02	6.99E+02	no
Manganese	541-SS-P05-4	1.20E+02	6.99E+02	no
Manganese	541-SS-P05-8	2.30E+02	6.99E+02	no
Manganese	541-SS-P05-82	2.80E+02	6.99E+02	no
Manganese	541-SS-P05-82	1.51E+02	6.99E+02	no
Manganese	541-SS-P06-0	4.20E+02	6.99E+02	no
Manganese	541-SS-P06-4	1.70E+02	6.99E+02	no
Manganese	541-SS-P06-8	1.80E+02	6.99E+02	no
Manganese	541-SS-TK-03-0	4.00E+02	6.99E+02	no
Manganese	541-SS-TK-03-4	3.90E+02	6.99E+02	no
Manganese	541-SS-TK-03-8	2.30E+02	6.99E+02	no
Mercury	541-S-1C	1.10E+01	5.00E-02	yes
Mercury	541-S-2C	6.30E-01	5.00E-02	yes
Mercury	541-S-3C	1.10E-01	5.00E-02	yes
Mercury	541-S-4C	1.20E-01	5.00E-02	yes
Mercury	541-S-5C	1.90E-02	5.00E-02	no
Mercury	541-SS-DF-02-0	3.10E-02	5.00E-02	no

Analyte	Sample	Result (mg/kg)	Background (mg/kg)	Result>Background?
Mercury	541-SS-DF-02-4	2.30E+00	5.00E-02	yes
Mercury	541-SS-DF-02-42	4.50E-02	5.00E-02	no
Mercury	541-SS-DF-02-8	6.60E+00	5.00E-02	yes
Mercury	541-SS-DF-03-0	2.60E-01	5.00E-02	yes
Mercury	541-SS-DF-03-4	2.50E+00	5.00E-02	yes
Mercury	541-SS-DF-03-8	2.60E+00	5.00E-02	yes
Mercury	541-SS-P01-0	2.50E-01	5.00E-02	yes
Mercury	541-SS-P01-4	1.10E+00	5.00E-02	yes
Mercury	541-SS-P01-8	2.00E-01	5.00E-02	yes
Mercury	541-SS-P02-0	3.10E-02	5.00E-02	no
Mercury	541-SS-P02-8	1.30E-02	5.00E-02	no
Mercury	541-SS-P03-0	4.10E-02	5.00E-02	no
Mercury	541-SS-P03-4	2.80E-02	5.00E-02	no
Mercury	541-SS-P04-0	6.40E-02	5.00E-02	yes
Mercury	541-SS-P04-4	2.10E-02	5.00E-02	no
Mercury	541-SS-P04-8	1.30E-02	5.00E-02	no
Mercury	541-SS-P05-0	3.10E-02	5.00E-02	no
Mercury	541-SS-P05-4	1.90E-01	5.00E-02	yes
Mercury	541-SS-P05-8	1.90E-02	5.00E-02	no
Mercury	541-SS-P05-82	2.00E-02	5.00E-02	no
Mercury	541-SS-P06-0	2.10E-01	5.00E-02	yes
Mercury	541-SS-P06-8	1.40E-02	5.00E-02	no
Mercury	541-SS-TK-03-0	1.30E-01	5.00E-02	yes
Mercury	541-SS-TK-03-4	2.40E-01	5.00E-02	yes
Mercury	541-SS-TK-03-8	4.90E-02	5.00E-02	no
Nickel	541-S-1C	1.50E+01	1.45E+01	yes
Nickel	541-S-2C	1.60E+01	1.45E+01	yes
Nickel	541-S-3C	1.30E+01	1.45E+01	no
Nickel	541-S-4C	1.30E+01	1.45E+01	no
Nickel	541-S-5C	1.30E+01	1.45E+01	no
Nickel	541-SS-DF-02-0	1.50E+01	1.45E+01	yes
Nickel	541-SS-DF-02-4	1.50E+01	1.45E+01	yes
Nickel	541-SS-DF-02-42	1.24E+01	1.45E+01	no
Nickel	541-SS-DF-02-42	1.70E+01	1.45E+01	yes
Nickel	541-SS-DF-02-8	1.60E+01	1.45E+01	yes
Nickel	541-SS-DF-03-0	1.60E+01	1.45E+01	yes
Nickel	541-SS-DF-03-4	1.30E+01	1.45E+01	no
Nickel	541-SS-DF-03-8	1.40E+01	1.45E+01	no

Analyte	Sample	Result (mg/kg)	Background (mg/kg)	Result>Background?
Nickel	541-SS-P01-0	1.00E+01	1.45E+01	no
Nickel	541-SS-P01-4	1.20E+01	1.45E+01	no
Nickel	541-SS-P01-8	7.50E+00	1.45E+01	no
Nickel	541-SS-P02-0	1.00E+01	1.45E+01	no
Nickel	541-SS-P02-4	1.10E+01	1.45E+01	no
Nickel	541-SS-P02-8	1.10E+01	1.45E+01	no
Nickel	541-SS-P03-0	1.10E+01	1.45E+01	no
Nickel	541-SS-P03-4	9.90E+00	1.45E+01	no
Nickel	541-SS-P04-0	1.10E+01	1.45E+01	no
Nickel	541-SS-P04-4	9.30E+00	1.45E+01	no
Nickel	541-SS-P04-8	1.10E+01	1.45E+01	no
Nickel	541-SS-P05-0	1.10E+01	1.45E+01	no
Nickel	541-SS-P05-4	8.10E+00	1.45E+01	no
Nickel	541-SS-P05-8	1.20E+01	1.45E+01	no
Nickel	541-SS-P05-82	1.70E+01	1.45E+01	yes
Nickel	541-SS-P05-82	1.01E+01	1.45E+01	no
Nickel	541-SS-P06-0	1.30E+01	1.45E+01	no
Nickel	541-SS-P06-4	1.10E+01	1.45E+01	no
Nickel	541-SS-P06-8	8.00E+00	1.45E+01	no
Nickel	541-SS-TK-03-0	1.30E+01	1.45E+01	no
Nickel	541-SS-TK-03-4	1.40E+01	1.45E+01	no
Nickel	541-SS-TK-03-8	1.00E+01	1.45E+01	no
Potassium	541-S-2C	1.20E+03	9.13E+03	no
Potassium	541-S-3C	5.50E+02	9.13E+03	no
Potassium	541-S-4C	7.40E+02	9.13E+03	no
Potassium	541-S-5C	4.50E+02	9.13E+03	no
Potassium	541-SS-DF-02-0	5.00E+03	9.13E+03	no
Potassium	541-SS-DF-02-4	4.20E+03	9.13E+03	no
Potassium	541-SS-DF-02-42	3.74E+03	9.13E+03	no
Potassium	541-SS-DF-02-42	4.50E+03	9.13E+03	no
Potassium	541-SS-DF-02-8	4.50E+03	9.13E+03	no
Potassium	541-SS-DF-03-0	3.50E+03	9.13E+03	no
Potassium	541-SS-DF-03-4	3.20E+03	9.13E+03	no
Potassium	541-SS-DF-03-8	3.10E+03	9.13E+03	no
Potassium	541-SS-P01-0	5.20E+02	9.13E+03	no
Potassium	541-SS-P01-4	4.60E+02	9.13E+03	no
Potassium	541-SS-P01-8	2.80E+02	9.13E+03	no
Potassium	541-SS-P02-0	3.10E+02	9.13E+03	no

Analyte	Sample	Result (mg/kg)	Background (mg/kg)	Result>Background?
Potassium	541-SS-P02-4	4.50E+02	9.13E+03	no
Potassium	541-SS-P02-8	3.90E+02	9.13E+03	no
Potassium	541-SS-P03-0	1.50E+03	9.13E+03	no
Potassium	541-SS-P03-4	3.50E+02	9.13E+03	no
Potassium	541-SS-P04-0	1.70E+03	9.13E+03	no
Potassium	541-SS-P04-4	3.10E+02	9.13E+03	no
Potassium	541-SS-P04-8	3.40E+02	9.13E+03	no
Potassium	541-SS-P05-0	4.50E+02	9.13E+03	no
Potassium	541-SS-P05-4	2.60E+02	9.13E+03	no
Potassium	541-SS-P05-8	4.90E+02	9.13E+03	no
Potassium	541-SS-P05-82	8.00E+02	9.13E+03	no
Potassium	541-SS-P05-82	4.35E+02	9.13E+03	no
Potassium	541-SS-P06-0	3.50E+03	9.13E+03	no
Potassium	541-SS-P06-4	4.90E+02	9.13E+03	no
Potassium	541-SS-P06-8	3.70E+02	9.13E+03	no
Potassium	541-SS-TK-01-8	8.80E+02	9.13E+03	no
Potassium	541-SS-TK-03-0	3.90E+02	9.13E+03	no
Potassium	541-SS-TK-03-4	3.40E+02	9.13E+03	no
Potassium	541-SS-TK-03-8	3.40E+02	9.13E+03	no
Pyrene	541-S-1C2	1.00E-01		yes
Silver	541-S-1C	1.10E+01		yes
Silver	541-S-2C	9.20E-01		yes
Silver	541-S-4C	6.30E-01		yes
Silver	541-SS-DF-02-0	1.90E-01		yes
Silver	541-SS-DF-02-4	1.90E-01		yes
Silver	541-SS-DF-02-42	4.91E-01		yes
Silver	541-SS-DF-02-8	2.20E+01		yes
Silver	541-SS-DF-03-0	3.20E-01		yes
Silver	541-SS-DF-03-4	2.40E-01		yes
Silver	541-SS-DF-03-8	2.20E-01		yes
Silver	541-SS-P01-0	1.60E+00		yes
Silver	541-SS-P01-4	2.40E+00		yes
Silver	541-SS-P01-8	1.50E+00		yes
Silver	541-SS-P02-0	3.60E-01		yes
Silver	541-SS-P03-0	1.60E-01		yes
Silver	541-SS-P03-4	1.50E-01		yes
Silver	541-SS-P04-0	2.50E-01		yes
Silver	541-SS-P05-0	1.70E-01		yes

Analyte	Sample	Result (mg/kg)	Background (mg/kg)	Result>Background?
Silver	541-SS-P06-0	2.70E-01		yes
Silver	541-SS-TK-01-8	6.60E-01		yes
Silver	541-SS-TK-03-0	1.30E+00		yes
Silver	541-SS-TK-03-4	3.30E-01		yes
Silver	541-SS-TK-03-8	2.00E-01		yes
Sodium	541-S-1C	2.70E+02	9.13E+03	no
Sodium	541-S-2C	2.10E+02	9.13E+03	no
Sodium	541-S-3C	7.40E+01	9.13E+03	no
Sodium	541-S-4C	8.20E+01	9.13E+03	no
Sodium	541-S-5C	8.20E+01	9.13E+03	no
Sodium	541-SS-DF-02-0	2.70E+02	9.13E+03	no
Sodium	541-SS-DF-02-4	2.70E+02	9.13E+03	no
Sodium	541-SS-DF-02-42	2.33E+02	9.13E+03	no
Sodium	541-SS-DF-02-42	2.70E+02	9.13E+03	no
Sodium	541-SS-DF-02-8	2.40E+02	9.13E+03	no
Sodium	541-SS-DF-03-0	2.30E+02	9.13E+03	no
Sodium	541-SS-DF-03-4	2.80E+02	9.13E+03	no
Sodium	541-SS-DF-03-8	2.90E+02	9.13E+03	no
Sodium	541-SS-P01-0	2.50E+02	9.13E+03	no
Sodium	541-SS-P01-4	9.00E+01	9.13E+03	no
Sodium	541-SS-P01-8	5.70E+01	9.13E+03	no
Sodium	541-SS-P02-0	1.10E+02	9.13E+03	no
Sodium	541-SS-P02-4	1.10E+02	9.13E+03	no
Sodium	541-SS-P02-8	7.70E+01	9.13E+03	no
Sodium	541-SS-P03-0	2.90E+02	9.13E+03	no
Sodium	541-SS-P03-4	6.60E+01	9.13E+03	no
Sodium	541-SS-P04-0	3.90E+02	9.13E+03	no
Sodium	541-SS-P04-4	6.30E+01	9.13E+03	no
Sodium	541-SS-P04-8	7.70E+01	9.13E+03	no
Sodium	541-SS-P05-0	1.10E+02	9.13E+03	no
Sodium	541-SS-P05-4	6.70E+01	9.13E+03	no
Sodium	541-SS-P05-8	7.00E+01	9.13E+03	no
Sodium	541-SS-P05-82	8.60E+01	9.13E+03	no
Sodium	541-SS-P05-82	5.70E+01	9.13E+03	no
Sodium	541-SS-P06-0	2.10E+02	9.13E+03	no
Sodium	541-SS-P06-4	6.80E+01	9.13E+03	no
Sodium	541-SS-P06-8	6.00E+01	9.13E+03	no
Sodium	541-SS-TK-01-8	8.80E+01	9.13E+03	no

Analyte	Sample	Result (mg/kg)	Background (mg/kg)	Result>Background?
Sodium	541-SS-TK-03-0	6.10E+01	9.13E+03	no
Sodium	541-SS-TK-03-4	6.20E+01	9.13E+03	no
Sodium	541-SS-TK-03-8	6.40E+01	9.13E+03	no
Thallium	541-SS-DF-02-0	2.40E-01		yes
Thallium	541-SS-DF-02-4	2.20E-01		yes
Thallium	541-SS-DF-02-42	4.91E-01		yes
Thallium	541-SS-DF-02-42	2.30E-01		yes
Thallium	541-SS-DF-02-8	2.40E-01		yes
Thallium	541-SS-DF-03-0	2.10E-01		yes
Thallium	541-SS-DF-03-4	2.00E-01		yes
Thallium	541-SS-P04-8	2.30E-01		yes
Thallium	541-SS-P06-0	2.00E-01		yes
Thallium	541-SS-TK-01-8	1.60E-01		yes
Vanadium	541-S-1C	1.40E+01	2.79E+01	no
Vanadium	541-S-1C2	1.50E+01	2.79E+01	no
Vanadium	541-S-2C	1.50E+01	2.79E+01	no
Vanadium	541-S-3C	9.60E+00	2.79E+01	no
Vanadium	541-S-4C	1.10E+01	2.79E+01	no
Vanadium	541-S-5C	8.00E+00	2.79E+01	no
Vanadium	541-SS-DF-02-0	1.90E+01	2.79E+01	no
Vanadium	541-SS-DF-02-4	1.80E+01	2.79E+01	no
Vanadium	541-SS-DF-02-42	1.43E+01	2.79E+01	no
Vanadium	541-SS-DF-02-42	1.90E+01	2.79E+01	no
Vanadium	541-SS-DF-02-8	1.90E+01	2.79E+01	no
Vanadium	541-SS-DF-03-0	2.10E+01	2.79E+01	no
Vanadium	541-SS-DF-03-4	1.60E+01	2.79E+01	no
Vanadium	541-SS-DF-03-8	1.70E+01	2.79E+01	no
Vanadium	541-SS-P01-0	7.70E+00	2.79E+01	no
Vanadium	541-SS-P01-4	9.90E+00	2.79E+01	no
Vanadium	541-SS-P01-8	5.70E+00	2.79E+01	no
Vanadium	541-SS-P02-0	8.60E+00	2.79E+01	no
Vanadium	541-SS-P02-4	1.10E+01	2.79E+01	no
Vanadium	541-SS-P02-8	1.00E+01	2.79E+01	no
Vanadium	541-SS-P03-0	1.20E+01	2.79E+01	no
Vanadium	541-SS-P03-4	7.80E+00	2.79E+01	no
Vanadium	541-SS-P04-0	1.20E+01	2.79E+01	no
Vanadium	541-SS-P04-4	8.30E+00	2.79E+01	no
Vanadium	541-SS-P04-8	8.50E+00	2.79E+01	no

Analyte	Sample	Result (mg/kg)	Background (mg/kg)	Result>Background?
Vanadium	541-SS-P05-0	9.10E+00	2.79E+01	no
Vanadium	541-SS-P05-4	6.70E+00	2.79E+01	no
Vanadium	541-SS-P05-8	1.00E+01	2.79E+01	no
Vanadium	541-SS-P05-82	1.50E+01	2.79E+01	no
Vanadium	541-SS-P05-82	8.53E+00	2.79E+01	no
Vanadium	541-SS-P06-0	1.50E+01	2.79E+01	no
Vanadium	541-SS-P06-4	9.10E+00	2.79E+01	no
Vanadium	541-SS-P06-8	6.00E+00	2.79E+01	no
Vanadium	541-SS-TK-01-8	1.40E+01	2.79E+01	no
Vanadium	541-SS-TK-03-0	8.90E+00	2.79E+01	no
Vanadium	541-SS-TK-03-4	7.90E+00	2.79E+01	no
Vanadium	541-SS-TK-03-8	6.80E+00	2.79E+01	no
Zinc	541-S-1C	1.90E+02	7.71E+01	yes
Zinc	541-S-1C2	1.80E+02	7.71E+01	yes
Zinc	541-S-2C	4.80E+01	7.71E+01	no
Zinc	541-S-3C	3.40E+01	7.71E+01	no
Zinc	541-S-4C	3.90E+01	7.71E+01	no
Zinc	541-S-5C	2.80E+01	7.71E+01	no
Zinc	541-S-5C	2.80E+01	7.71E+01	no
Zinc	541-SS-DF-02-0	6.20E+01	7.71E+01	no
Zinc	541-SS-DF-02-4	5.30E+01	7.71E+01	no
Zinc	541-SS-DF-02-42	4.61E+01	7.71E+01	no
Zinc	541-SS-DF-02-42	5.70E+01	7.71E+01	no
Zinc	541-SS-DF-02-8	2.00E+02	7.71E+01	yes
Zinc	541-SS-DF-03-0	5.40E+01	7.71E+01	no
Zinc	541-SS-DF-03-4	5.00E+01	7.71E+01	no
Zinc	541-SS-DF-03-8	4.90E+01	7.71E+01	no
Zinc	541-SS-P01-0	1.90E+01	7.71E+01	no
Zinc	541-SS-P01-4	3.30E+01	7.71E+01	no
Zinc	541-SS-P01-8	1.80E+01	7.71E+01	no
Zinc	541-SS-P02-0	2.40E+01	7.71E+01	no
Zinc	541-SS-P02-4	2.50E+01	7.71E+01	no
Zinc	541-SS-P02-8	2.70E+01	7.71E+01	no
Zinc	541-SS-P03-0	3.00E+01	7.71E+01	no
Zinc	541-SS-P03-4	2.30E+01	7.71E+01	no
Zinc	541-SS-P04-0	3.30E+01	7.71E+01	no
Zinc	541-SS-P04-4	2.60E+01	7.71E+01	no
Zinc	541-SS-P04-8	2.70E+01	7.71E+01	no

Analyte	Sample	Result (mg/kg)	Background (mg/kg)	Result>Background?
Zinc	541-SS-P05-0	2.30E+01	7.71E+01	no
Zinc	541-SS-P05-4	2.20E+01	7.71E+01	no
Zinc	541-SS-P05-8	3.20E+01	7.71E+01	no
Zinc	541-SS-P05-82	4.40E+01	7.71E+01	no
Zinc	541-SS-P05-82	2.62E+01	7.71E+01	no
Zinc	541-SS-P06-0	7.90E+01	7.71E+01	yes
Zinc	541-SS-P06-4	3.40E+01	7.71E+01	no
Zinc	541-SS-P06-8	2.20E+01	7.71E+01	no
Zinc	541-SS-TK-01-8	5.10E+01	7.71E+01	no
Zinc	541-SS-TK-03-0	3.80E+01	7.71E+01	no
Zinc	541-SS-TK-03-4	3.30E+01	7.71E+01	no
Zinc	541-SS-TK-03-8	2.60E+01	7.71E+01	no

A residential assessment was conducted based on the risk-based closure performance standards from Table 5-1 of Attachment 5 of the TEAD-S RCRA part B permit, which referenced the screening levels from the November 2013 RSLs tables. However, the June 2015 RSLs were applied to represent the most current evaluation of risk. Because noncarcinogenic risks are conservatively considered as additive (meaning combined hazard is evaluated and not just impact from a single chemical) in the screening level assessment, the noncarcinogenic RSLs based on the target hazard quotient (THQ) of 1.0 were applied. It was also assumed that all risks for individual constituents are additive. Calculated carcinogenic risks were compared to the State of Utah target cancer level of 1E-06 while noncarcinogenic hazards were compared to the State of Utah target level of 1.0. Residential risk/hazard estimates are considered protective of all other potential receptors, to include industrial and construction workers, and trespassers. Due to the size of the investigation area (less than 0.5 acres), the beef ingestion pathway is considered incomplete.

The vapor intrusion pathway is only considered complete if VOCs were detected that have a Henry's Law constant of greater than 1E-05 atmospheres-cubic meters per mole (atm-m^3/mole) and a molecular weight less than 200 grams per mole (g/mole). VOCs were not COPCs at Building 4541 and thus the vapor intrusion pathway is considered incomplete.

Table 6 presents the residential risk screening comparing the maximum detected concentration from combined post removal samples.

Table 6. Residential risk based on maximum detections

Analyte	Result (mg/kg) MAX	Residential RSL (mg/kg)	C/NC	Risk	Hazard (HQ)
Benzoic acid	2.30E-01	2.50E+05	NC		9.20E-07

Cadmium	1.40E+00	7.10E+01	NC		1.97E-02
Calcium	2.40E+05	1.30E+07	NC		1.85E-02
Chromium	1.98E+01	1.20E+05	NC		1.65E-04
Cobalt	6.80E+00	2.30E+01	NC		2.96E-01
Iron	1.70E+04	5.50E+04	NC		3.09E-01
Magnesium	2.70E+04	3.39E+05	NC		7.96E-02
Mercury	6.60E+00	2.30E+01	NC		2.87E-01
Nickel	1.70E+01	1.50E+03	NC		1.13E-02
Silver	2.20E+01	3.90E+02	NC		5.64E-02
Thallium	4.90E-01	7.80E-01	NC		6.28E-01
Zinc	2.00E+02	2.30E+04	NC		8.70E-03
Pyrene	1.00E-01	1.80E+03	NC		5.56E-05
Benzo(a)anthracene	7.80E-02	1.60E-01	C	4.88E-07	
Bis(2-ethylhexyl)phthalate	7.30E-02	3.90E+01	C	1.87E-09	
Fluoranthene	1.20E-01	2.40E+03	NC		5.00E-05
Chrysene	9.90E-02	1.60E+01	C	6.19E-09	
Benzo(b)fluoranthene	9.60E-02	1.60E-01	C	6.00E-07	
Benzo(a)pyrene	6.50E-02	1.60E-02	C	4.06E-06	
	Total Risk or Hazard (HI) =			**5.16E-06**	**1.71E+00**

The carcinogenic risk slightly exceeds the target risk level of 1E-06. Risk is driven by a single estimated result from duplicate sample 541-S-1C for benzo(a)pyrene. The HI also slightly exceeds the target level of 1.0. Hazard is driven by low level metal detections.

In accordance with the RAD, the exposure point concentrations were refined by calculation of the 95% UCL where sufficient data were available. A 95% UCL could be calculated for all inorganics, but minimum requirements for calculation of a 95% UCL for the organics was met. For the refined screening, the maximum concentration was still applied. ProUCL version 5.1 was used to derive the UCLs. The output files are provided in Appendix C.

Table 7. Refined residential risk screening using 95% UCL

Analyte	Result (mg/kg) 95% UCL	Residential RSL (mg/kg)	C/NC	Risk	Hazard (HQ)
Benzoic acid	2.30E-01	2.50E+05	NC		9.20E-07
Cadmium	6.60E-01	7.10E+01	NC		9.30E-03
Calcium	1.56E+05	1.30E+07	NC		1.20E-02
Chromium	1.09E+01	1.20E+05	NC		9.08E-05
Cobalt	3.60E+00	2.30E+01	NC		1.57E-01
Iron	9.47E+03	5.50E+04	NC		1.72E-01
Magnesium	1.25E+04	3.39E+05	NC		3.68E-02

Mercury	2.72E+00	2.30E+01	NC		1.18E-01
Nickel	1.30E+01	1.50E+03	NC		8.67E-03
Silver	6.44E+00	3.90E+02	NC		1.65E-02
Thallium	2.99E-01	7.80E-01	NC		3.83E-01
Zinc	8.03E+01	2.30E+04	NC		3.49E-03
Pyrene	1.00E-01	1.80E+03	NC		
Benzo(a)anthracene	7.80E-02	1.60E-01	C	4.88E-07	
Bis(2-ethylhexyl)phthalate	7.30E-02	3.90E+01	C	1.87E-09	
Fluoranthene	1.20E-01	2.40E+03	NC		
Chrysene	9.90E-02	1.60E+01	C	6.19E-09	
Benzo(b)fluoranthene	9.60E-02	1.60E-01	C	6.00E-07	
Benzo(a)pyrene	6.50E-02	1.60E-02	C	4.06E-06	
	Total Risk or Hazard (HI) =			5.16E-06	9.17E-01

As shown in Table 7, the site cancer risk remains unchanged, due to the lack of sufficient data to calculate an UCL for benzo(a)pyrene. The site HI is below the target level of 1.0.

While the cancer risk is slightly above the target risk level of 1E-06, the risk is driven by a single result (one estimated detection in 33 samples) in a duplicate sample; the overall cancer risk is minimal and likely significantly less. It is recommended that the site be approved for NFA. A discussion of uncertainty is provided in Section 5.

4.2.2 Ecological

In accordance with the TEAD-S RAD, risks to potential ecological receptors must be addressed. Ecological risk assessments are only conducted if it has been determined that exposure pathways are potentially complete for ecological receptors. A complete exposure pathway consists of: 1) a source; 2) a mechanism of contaminant release; 3) a receiving or contact medium; 4) a potential receptor population; and 5) an exposure route (USEPA, 1997). In order for a potential receptor population to exist, sites must contain open areas that would allow plant growth and suitable habitat for wildlife.

Following the methodology of the RAD, the size of the site will dictate which key receptors will be selected for quantitative evaluation for varying trophic levels. The size of the Building 4541 septic system and drain field is small, approximately 600 square feet (0.02 acres). As such the primary key receptors identified are the deer mouse, horned lark, and plant community.

For the Tier 1 screening assessment, it is assumed that the ecological receptors are exposed to COPCs in soil up to a depth of 10 ft bgs. The Tier 2 assessment allows for refining of the exposure intervals. For the deer mouse and horned lark, it is assumed that exposure only occurs to the top six inches of soil. Deeper rooted plants and burrowing animals would still be exposed to soil up to 10 ft bgs.

The depth to the pipe that extended from Building 4541 to the septic tank varied between three and 4.5 ft bgs. Given the thickness of the pipe, any residual contamination would occur at about

5 ft bgs. The septic tank was over 10 feet in depth with the drain field soils being removed up to 14 ft bgs. Thus, exposure to any residual contamination for the deer mouse and horned lark would be remote and under a Tier 2 refinement, the pathway would be considered incomplete.

No deep rooted plants have been observed in the area of Building 4541. All plants identified in the area of excavation are considered forage/shallow rooted plants; no root structures were noted below a foot or 2 ft bgs. Following the Tier 2 methodology, the exposure interval to shallow rooted plants is limited to the top six inches of soil. Due to the small size of the disturbed area, the area also does not represent a significant fraction of burrowing animal land use (less than 10%) and renders the burrowing animal scenario incomplete.

The most likely exposure to the representative ecological receptors would be to the overburden soil proposed to be used for backfill. The sampling of the overburden fill indicates metals above the background reference values, to include cobalt, mercury, nickel, silver, sodium, and thallium. Following the RAD, ecological risks to the deer mouse, horned lark and shallow-rooted plant were evaluated for potential exposure to the overburden/backfill soil. No organics were detected in the overburden soil (see Appendix A for all data). Those metals with maximum concentrations above the background reference values (Table 5 of the RAD) were retained for evaluation. Since insufficient data are available to statistically estimate an exposure point concentration, the maximum concentration was applied in both the Tier 1 and Tier 2 assessments. The ecological screening levels (ESLs) are from Appendix B of the RAD.

4.2.2.1 Deer Mouse

Table 8 presents the results of the Tier 1 screening assessment for the deer mouse.

Table 8. Tier 1 ecological screening assessment, deer mouse.

Analyte	Maximum Detection (mg/kg)	ESL	HQ
Cobalt	6	66.6	0.09
Mercury	0.7	12.8	0.05
Nickel	15	15.5	0.97
Silver	0.49	54.7	0.01
Sodium	990		
Thallium	0.49	0.06	**7.60**

The screening level HQ is below the target level of one for all analytes except thallium. While it is likely that the levels of thallium are representative of natural background conditions, a background reference value for thallium has not been determined for TEAD-S. In lieu of completing a complete Tier 2 assessment, an area use factor (AUF) adjustment was applied to the Tier 1 ESL; the resulting ESL is less conservative than a Tier 2-derived ESL as refined ingestion rates were not applied and a dose based on a lowest-observed-adverse effect level was not applied. The adjusted AUF was determined as a ratio of the site are to the foraging range

(0.02 acres to 0.3 acres). The results of the modified Tier 2 assessment for thallium is presented in Table 9.

Table 9. Modified Tier 2 assessment, deer mouse

Analyte	Maximum Detection (mg/kg)	ESL	HQ
Thallium	0.49	0.97	0.51

The resulting modified Tier 2 assessment shows that there is no adverse health impact to the deer mouse to thallium in overburden soils.

4.2.2.2 Horned Lark

Table 10 presents the results of the Tier 1 screening assessment for the horned lark.

Table 10. Tier 1 ecological screening assessment, horned lark

Analyte	Maximum Detection (mg/kg)	ESL	HQ
Cobalt	6	36	0.17
Mercury	0.7	0.09	**7.79**
Nickel	15	31.7	0.47
Silver	0.49	10.4	0.05
Sodium	990		
Thallium	0.49	1.66	0.30

The screening level HQ is below the target level of one for all analytes except mercury. In lieu of completing a complete Tier 2 assessment, an AUF adjustment was applied to the Tier 1 ESL; the resulting ESL is less conservative than a Tier 2-derived ESL as refined ingestion rates were not applied and a dose based on a lowest-observed-adverse effect level was not applied. The adjusted AUF was determined as a ratio of the site are to the foraging range (0.02 acres to 4 acres). The results of the modified Tier 2 assessment for mercury is presented in Table 11.

Table 11. Modified Tier 2 assessment, horned lark

Analyte	Maximum Detection (mg/kg)	ESL	HQ
Mercury	0.7	17.98	0.04

The resulting modified Tier 2 assessment shows that there is no adverse health impact to the horned lark to mercury in overburden soils.

4.2.2.3 Plants

Table 12 presents the results of the Tier 1 screening assessment for plants.

Table 12. Tier 1 ecological screening assessment, plants

Analyte	Maximum Detection (mg/kg)	ESL	HQ
Cobalt	6	13	0.46
Mercury	0.7	34.9	0.02
Nickel	15	38	0.39
Silver	0.49	560	0.00
Sodium	990		
Thallium	0.49	0.1	**4.90**

The screening level HQ is below the target level of one for all analytes except thallium. While it is likely that the levels of thallium are representative of natural background conditions, a background reference value for thallium has not been determined for TEAD-S. The Tier 2 ESL was applied for a refined evaluation of the thallium, as presented in Table 13.

Table 13. Modified Tier 2 assessment, plants

Analyte	Maximum Detection (mg/kg)	ESL	HQ
Thallium	0.49	0.50	0.98

The resulting Tier 2 assessment shows that there is no adverse health impact to plants from thallium in overburden soils.

4.2.3 Soil-to-Groundwater Migration

In accordance with the RAD, future impacts to groundwater were assessed by evaluating the potential for detected concentration sin soil to contaminate groundwater via the soil-to-groundwater migration pathway. For the Tier 1 assessment, the maximum detected concentration for all COPCs was compared to the soil screening level (SSL), the less conservative of either the risk- or maximum contaminant level- (MCL) based level, for a dilution attenuation coefficient (DAF) of 20 (USEPA, 2015). The results of the Tier 1 screening are provided in Table 14.

Table 14. Tier 1 SSL evaluation

Analyte	Result (mg/kg) MAX	RSL SSL (DAF 20)	Result>SSL?
Benzoic acid	2.30E-01	3.60E+02	no
Cadmium	1.40E+00	1.38E+01	no
Calcium	2.40E+05	NA	
Chromium	1.98E+01	3.60E+06	no
Cobalt	6.80E+00	5.40E+00	**yes**
Iron	1.70E+04	7.00E+03	**yes**
Magnesium	2.70E+04	NA	
Mercury	6.60E+00	NA	
Nickel	1.70E+01	5.20E+02	no
Silver	2.20E+01	1.60E+01	**yes**
Thallium	4.90E-01	2.80E+00	no
Zinc	2.00E+02	7.40E+03	no
Pyrene	1.00E-01	1.30E+01	no
Benzo(a)anthracene	7.80E-02	4.30E-03	**yes**
Bis(2-ethylhexyl)phthalate	7.30E-02	1.40E+00	no
Fluoranthene	1.20E-01	8.90E+01	no
Chrysene	9.90E-02	1.20E+00	no
Benzo(b)fluoranthene	9.60E-02	7.80E-02	**yes**
Benzo(a)pyrene	6.50E-02	2.40E-01	no

Applying the maximum detected concentrations and the default SSL, exceedances were noted for cobalt, iron, silver, and benzo(b)fluoranthene, and benzo(a)anthracene. Following the Tier 2 methodology, the 95% upper confidence level of the mean (UCL) along with a site-specific DAF were applied to refine the SSLs. ProUCL version 5.1 was used to derive the UCLs (see Appendix C). Note, since there was only a single estimate result for bezo(a)anthracene and benzo(b)fluoanthene, the maximum concentration was applied in the Tier 2 screen. Table 15 shows the derivation of the site-specific DAF. Values were derived from the solid waste management unit (SWMU) 19 facility investigation report, due to the close proximity of the SWMU to Building 4541 (Parsons, 2014).

Table 15. Derivation of the site-specific DAF.

$$DAF = 1 + \left(\frac{K \times i \times D}{I \times L} \right)$$

Where:

$$D = \left(0.0112 \times L^2 \right)^{0.5} + D_a \left(1 - \exp \left[\frac{-L \times I}{K \times i \times D_a} \right] \right)$$

Parameter	Definition (units)	Value
DAF	Dilution/attenuation factor (unitless)	119.3
K	Aquifer hydraulic conductivity (m/year)	31600
i	Hydraulic gradient (m/m)	0.002
D	Mixing zone depth (m)	7.04
I	Infiltration rate (m/year)	0.057
L	Source length parallel to groundwater flow (m)	66
D_a	Aquifer thickness (m)	12
m - meters		

Table 16 presents the refined Tier 2 SSL assessment using the 95%UCL as the exposure point concentration and the site-specific DAF.

Table 16. Tier 2 SSL evaluation, site-specific DAF.

Analyte	Result (mg/kg) 95UCL	RSL SSL (DAF 119.3)	Result>SSL?
Cobalt	3.60E+00	3.22E+01	no
Iron	9.47E+03	4.18E+04	no
Silver	6.44E+00	9.54E+01	no
Benzo(a)anthracene[a]	7.80E-02	5.13E-01	no
Benzo(b)fluoranthene[a]	9.60E-02	9.31E+00	no
[a] maximum concentration			

The refined analyses demonstrates that there is no residual contamination in soil at the former Building 4541 septic tank, drain field, or associated pipe line that would pose a threat for vertical migration and impact to groundwater.

5.0 Uncertainty Analyses

This section presents an evaluation of several potential sources of uncertainty in the human health and ecological risk estimates.

5.1 Human Health Risk Assessment

Uncertainty in the human health risk screening assessment may have been introduced into the risk calculations as a result of:

- Land use at the site,
- Residential exposure assumptions, and
- Chemical with detection limits above screening levels.

The most significant source of uncertainty in this risk assessment is the assumed land use at the former Building 4541 septic tank area. Currently, there are no plans to redevelop Building 4541. Thus, it is unlikely that residents would be present at the site. However, evaluation of the residential pathway is essential to demonstrating the condition of NFA under UAC R315-101 and in accordance with the closure performance standards.

The default exposure assumptions, such as soil ingestion rates, body weight, etc., may not be representative of a potential residential at TEAD-S. Use of default values may over- or under-estimate the risks from assumed exposures at this site.

Some chemicals, specifically PAHs in the samples along the pipe, had levels of detection (LODs) slightly above the residential RSL. While PAHs were not identified as a COPC for this investigation, sporadic low levels of PAHs were detected in three samples: 541-SS-DF-01 (0-2 ft bgs), 541-SS-DF-04 (6-8 ft bgs), and 541-SS-1C2 (duplicate). Soil associated with the two samples in the drainfield were removed and the confirmation samples were all non-detect for PAHs. Sample 541-SS-1C2, is a duplicate sample at the bottom of the excavation around the inlet pipe to the septic tank. Pre-removal samples did not indicate and PAHs and PAHs were not detected in sample 541-SS-1C. The only PAH that was slightly above risk was the single estimated result for benzo(a)pyrene (resulting risk 4.06E-06).

PAHs were not detected beneath the septic tank (541-S-2C) or below the tank on the southwest edge (541-SS-TK-03). PAHs were also not detected in the drain field confirmation samples. Since carcinogenic risk is driven by the single estimated result of benzo(a)pyrene, the assumption someone would be exposed to this concentration across the entire site results in an overestimation of risk. The likelihood that low levels of PAHs between the LOD and RSL in the samples associated with the pipe is minimal and does not impact site closure.

5.2 Ecological Risk Assessment

This section presents an evaluation of several potential sources of uncertainty in the ecological risk estimates.

The Tier 1 exposure estimates incorporate an assumption of 100-percent bioavailability of the COPC in the ingested medium. Actual absorbed doses are expected to be less than was estimated in this report, and risks to wildlife receptors are likely to have been overestimated.

The RAD indicates the terrestrial-plant community will be evaluated quantitatively if applicable toxicological benchmarks are available. There are available effect-concentrations for plants, but these have high uncertainty associated with their relevance to the plant community observed at

Building 4541. The majority of phytotoxicity studies used to derive the screening-benchmarks are based on root or shoot lengths, root or shoot weights, harvestable biomass, or other productivity-related indices relevant to agricultural crops (e.g., soybean, barley, radish, lettuce, wheat, rye, etc.). The productivity-related responses of agricultural crops grown in agricultural or greenhouse settings cannot be directly related to the high-desert conditions experienced by the plants growing on and near Building 4451. The abiotic conditions (e.g., moisture regime, temperature, irradiance, climate, and site-specific soil conditions), the ecological characteristics of the TEAD-S vegetative communities (i.e., how the communities respond to and interact with their high-desert environment), and the species-specific characteristics of the specific plants growing at Building 4451 (e.g., nutrient requirements, tolerance, and adaptability to soil conditions) are far too different from the collective conditions used in the studies for the benchmark derivation to give the benchmarks relevance to site-specific vegetation.

A toxicity datum was not available for sodium. Additionally, an appropriate surrogate was not available. Uncertainty associated with the lack of toxicity data is not expected to be significant considering compounds with known degrees of toxicity contribute significantly to hazard estimates.

6.0 Data Assessment and Usability

All data underwent a comprehensive quality assurance (QA)/QC review, including data verification, data validation, qualification, assessment relative to the data quality objectives (DQOs), and usability assessment. Data verification is the process which is used to review field documentation and analytical data package completeness; whereas, data validation evaluates compliance with project documents, analytical methods, and the EPA National Functional Guidelines. Data qualification is an assessment process used to evaluate the quality and therefore usability of data based on the sample result provided by the laboratory and verified by the data validation processes. Two levels of validation were performed – Level I and Level IV. Level I validation, which is a simple, high-level review to determine compliance with items such as sample receipt, holding time, method blank criteria, etc. was performed on 100% of the data. Level IV validation consisted of all the requirements of Level I, plus a review of all raw data associated with both the investigative and QC samples. Level IV validation was performed on a portion of the data. Data usability is the final step in determining which sample results are legitimate, applicable, and eligible to be included in the data set that moves forward for evaluation.

As part of this data evaluation process, the precision, accuracy, representativeness, completeness, comparability, and sensitivity parameters were reviewed as indicators of whether the DQOs were met. Observed DQO variances were evaluated and assessed to determine their impact to the overall quality of the data. DQO comparisons, along with the verification, validation, and qualification processes, contributed to the final determination of data usability.

Based on the results of the overall data evaluation, it was determined that 100% of the soil sampling data are usable for all metals and SVOCs, except 2,4-Dinitrophenol and 4,6-Dinitro-2-methylphenol, which achieved a minimum overall completeness of 94% and 96%, respectively. However, the samples that were rejected for 2,4-Dinitrophenol and 4,6-Dinitro-2-methylphenol

were non-detect duplicate samples. Therefore, it was determined that the overall data used for closure determinations was not impacted. In summary, the completeness goal of 90% for the soil samples used for closure determinations was achieved, without exception.

The data usability requirements for field precision, analytical precision, accuracy, comparability, and completeness were met without exception. Additionally, the sensitivity requirements were met for all analytes except the following, which exhibited RLs that were greater than the minimum screening level (PAL or Background Level): arsenic, chromium, mercury, selenium, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, bis(2-chloroethyl)ether, dibenzo(a,h)anthracene, ideno(1,2,3-cd)pyrene, n-nitrosodimethylamine, and n-nitrosodi-n-propyl amine. The following analytes eshibited MDLs that were greater than the minimum screening level (PAL or background level): chromium, mercury, benzo(a)pyrene, dibenzo(a,h)anthracene, and n-nitrosodimethylamine.

7.0 Site Restoration

Following confirmation that sufficient soil had been removed and the closure performance standards had been met, the excavations were backfilled and graded to mitigate ponding water. The stockpiled overburden soil was used as fill. The fill was placed in 1-2 foot lifts and compacted to ensure minimal subsidence.

8.0 Closure Verification

The nature and extent of potential contamination associated with the east septic tank and associated drain field and pipe line was determined through the Phase I investigation. The results indicated low levels of contamination in soil beneath the inlet pipe to the septic tank and in soil at the outlet pipe and in the immediate area of the drain field.

The sludge and residual rain water was pumped from the septic tank and disposed of in accordance with the waste characterization data. The concrete tank and pipe were also disposed of offsite.

During the Phase II operations soil was removed at the inlet and outlet areas as identified in Figure 6. Soil was managed off site in accordance with the waste characterization samples. Following removals, confirmation samples were collected. The confirmation data were combined with Phase I data for areas where removals were not required.

A human health and ecological risk assessment was conducted to demonstrate compliance with the closure performance standards and to determine if the site meets NFA under UAC R315-101. The results of the residential risk assessment indicated no adverse risk from noncarcinogens. The HI was 8.84E-01 compared to the target level of 1.0. Cancer risk was slightly above the target cancer level of 1E-06 (5.1E-06). However, the cancer risk is driven by a single estimated result for benzo(a)pyrene. Due to the low detected frequency (1 estimate result per 33 samples), the likelihood for excess risk in low. Further assessment or removals for the single estimated result is not deemed warranted.

A comparison to SSLs was conducted. The resulted showed that there are no residual concentrations in soil that could pose a threat to groundwater.

A Tier 1 and Tier 2 ecological risk assessment was conducted for the deer mouse, horned lark and plant. All HIs were below the target level of 1.0 indicating no adverse ecological risk exists at the site.

It is recommended that Building 4541 be closed with NFA and removed from the TEAD-S RCRA part B permit.

9.0 References

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APPENDICES (provided on attached CD)

Appendix A –Sample Results
- Appendix A.1 Chain of Custody
- Appendix A.2 – Phase I Sample Data
- Appendix A.3 Validated Confirmation Sample Results

Appendix B – Waste Characterization Data
- Appendix B.1 Chain of Custody
- Appendix B.2 Sample Results

Appendix C – ProUCL Output files