

Revised November 19, 2020

Ms. Abigail Mazza
Environmental Engineer III
City of Chicago
Department of Assets, Information and Services
Bureau of Environmental, Health & Safety Management
30 N. LaSalle Street, Suite 300
Chicago, Illinois 60602

**Subject: Environmental Soil Evaluation
Joint Public Safety Training Campus**

Dear Ms. Mazza,

AECOM compiled and reviewed soil analytical results for the approximately 30 acre site located at 4443 W. Chicago Avenue, Chicago, Illinois (the Site). The evaluation was conducted in order to determine soil management requirements during construction activities at the Site. Summaries of the soil analytical results are provided in the attached **Tables 1 through 4**.

The soil data was compiled from the following investigations conducted at the Site:

The **1991 Warzyn Phase II Report** included:

- 10 soil borings were advanced in a pattern that equally covered the 30-acre property, soils were screened for volatile organic compound (VOC) impact using a photoionization detector (PID), and two soil samples were collected from each boring for lab analysis.
- Soil samples were analyzed for VOCs, polycyclic aromatic hydrocarbons (PAHs), and total metals (the 7 RCRA metals plus cyanide).
- Water samples were collected from temporary wells in three of the boring locations, and were analyzed for the same contaminants of concern (COCs) as the soil samples.

The **2007 Carlson Phase II** included:

- Advanced 19 soil borings (GP-1 through -19) at the site, field screened soils, and collected 24 samples for lab analysis. Borings were distributed throughout the site, with the exception of the far eastern portion, where no borings were completed.

The **2018 AMEC Foster Wheeler Phase II** included:

- 24 soil borings advanced with 26 soil samples collected and analyzed for PAHs and Priority Pollutant metals; select samples analyzed for the full target compound list (TCL).
- Two temporary monitoring wells installed and sampled; two existing monitoring wells sampled; groundwater samples were analyzed for VOCs, PAHs, metals, and TCL depending on location.
- Level survey of existing and newly installed wells
- Limited ground penetrating radar survey

The **2019 Geo Services, Inc. Test Pit Investigation** included:

- A total of 25 test pit locations
- Ten of the 25 locations were selected for environmental sampling. Two soil samples were collected from each of the selected test pits and analyzed for PAHs, RCRA metals, antimony and pH.
- Sample locations and analytes were selected in order to resolve soil data location gaps and to attempt to delineate areas with COC concentrations above the MACs for soil reuse/disposal evaluation purposes. Field personnel selected samples from the vertical intervals deemed most likely to be impacted from both shallow soil and deeper soil within the vadose zone.

Sample locations collected from 1991 to 2007 are shown on the attached excerpt, Figure 3 prepared by Amec Foster and Wheeler and included in the report: *Phase II Environmental Site Assessment, 4301 W. Chicago Avenue, Chicago, Illinois*, January 12, 2018. The test pit locations are shown on the attached excerpts, Test Pit Location Map and Environmental Test Pit Location Map prepared by Geo Services and included in: *Summary of the Test Pit Exploration and Environmental Testing, Joint Public Training Campus, 4301 W. Chicago Avenue, Chicago, Illinois*, July 15, 2019.

The soil analytical results were compared to Tier 1 soil remediation objectives (SROs) for industrial/commercial and construction worker ingestion and inhalation exposure routes.

In addition, carcinogenic PAHs (cPAHs) were compared to Tier 2 values calculated based on updated benzo(a)pyrene toxicity criteria published by USEPA in 2017. Calculation of Tier 2 SROs for cPAHs with concentrations detected above the Tier 1 SROs for the industrial/commercial ingestion route include benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, and dibenzo(a,h)anthracene. Additional details regarding the Tier 2 calculations are provided in **Attachment 1**.

The following SRO exceedances were identified:

- Benzo(a)pyrene – industrial/commercial ingestion
- Arsenic – industrial/commercial ingestion
- Mercury – Construction worker inhalation

The 95% UCL was then calculated using ProUCL 5.1 for benzo(a)pyrene and arsenic. The soil data was separated into two datasets for each analyte: shallow (0-3 feet) and deep (> 3 feet). Several shallow soil sample intervals extend beyond 3 feet. Soil samples collected in the 2-4 feet interval were included in the shallow soil sample dataset and soil samples collected in the 2-5 feet interval were included in the deep soil sample dataset for this evaluation. Due to the planned construction at the site, the combined dataset (shallow and deep) was also evaluated. The 95% UCL is below SROs for both arsenic and benzo(a)pyrene as summarized in the attached **Table 5**. The ProUCL input and output are provided in **Attachment 2**.

The calculated benzo(a)pyrene 95% UCL for the combined and deep soil datasets excluded soil sample GP-7D 6-8' (13 mg/kg). This exceedance will be addressed in the soil management plan associated with the site development. Excavated material associated with sample location GP-7D should be segregated from all other material and then placed underneath the end user parking area which will provide a solid cap.

As a part of the Soil Management Plan this material should be segregated, with photographic documentation recording the steps, and then placed underneath the end user parking. The contractor will be required to record where this material is being placed, coordinate points and elevations. This will allow any future construction workers at a later date to be aware of the conditions and take appropriate action if working in this area.

The construction worker inhalation exceedances for Mercury can be addressed with a construction worker caution statement.

Yours sincerely,



Hilary Taghap
Geologist



Matthew Hildreth, P.G.
Project Manager

Attachments:

Table 1 Analytical Results for Soil Samples – VOCs
Table 2 Analytical Results for Soil Samples – SVOCs
Table 3 Analytical Results for Soil Samples – Metals
Table 4 Analytical Results for Soil Samples – Additional Metals
Table 5 95% UCL Summary
Attachment 1 Tier 2 cPAH Calculation
Attachment 2 95% UCL Documentation

Tables

Table 1
Analytical Results for Soil Samples -VOCs
Joint Public Safety Training Campus

Analyte	Tier 1 Soil Remediation Objectives				Sample ID	SB1-1	SB1-4	SB2-1	SB2-3	SB3-1	SB3-3	SB4-1	SB4-4	SB5-1	SB5-4
	Industrial/ Commercial		Construction Worker		Depth (feet)	1-3	8.5-10.5	1-3	6-8	1-3	6-8	1-3	8.5-10.5	1-3	8.5-10.5
	Ingestion	Inhalation	Ingestion	Inhalation	Sample Date	6/19/91	6/19/91	6/19/91	6/19/91	6/19/91	6/19/91	6/19/91	6/19/91	6/19/91	6/19/91
	mg/Kg	mg/Kg	mg/Kg	mg/Kg											
Acetone	NRO	100000	NRO	100000		--	--	--	--	--	--	--	--	--	--
Benzene	100	1.6	2300	2.2		--	--	--	--	--	--	--	--	--	--
Carbon Disulfide	200000	720	20000	9		--	--	--	--	--	--	--	--	--	--
Carbon Tetrachloride	44	0.64	410	0.9		--	--	--	--	--	--	--	--	--	--
Chloroform	940	0.54	2000	0.76		--	--	--	--	--	--	--	--	--	--
Tetrachloroethene	110	20	2400	28		--	--	--	--	--	--	--	--	--	--
Toluene	410000	650	410000	42		--	--	--	--	--	--	--	--	--	--
Trichlorofluoromethane	NRO	NRO	NRO	NRO		<0.005	<0.005	0.00775	<0.005	0.0089	<0.005	<0.005	<0.005	<0.005	<0.005
Xylenes, m & p	410000	420	41000	5.9		<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Xylenes, o	410000	410	41000	6.5		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Total Xylenes	410000	320	41000	5.6		--	--	--	--	--	--	--	--	--	--

Tier 1 Soil Remediation Objectives (SROs) are based on Title 35 Part 742

Tier 1 Appendix B Table B, C and D.

Results that are Bolded and Shaded indicate that the measured concentration exceeds any one of the SROs.

NRO = (No Remediation Objective) was provided in tables.

-- not analyzed

Table 1
Analytical Results for Soil Samples -VOCs
Joint Public Safety Training Campus

Analyte	Tier 1 Soil Remediation Objectives				Sample ID	SB6-1	SB6-4	SB7-4	SB7-5	SB8-1	SB8-3	SB9-2	SB9-3	SB10-1	SB10-4
	Industrial/ Commercial		Construction Worker		Depth (feet)	1-3	8.5-10.5	8.5-10.5	11-13	1-3	8.5-10.5	3.5-5.5	6-8	1-3	8.5-10.5
	Ingestion	Inhalation	Ingestion	Inhalation	Sample Date	6/19/91	6/19/91	6/19/91	6/19/91	6/19/91	6/19/91	6/19/91	6/19/91	6/19/91	6/19/91
	mg/Kg	mg/Kg	mg/Kg	mg/Kg											
Acetone	NRO	100000	NRO	100000		--	--	--	--	--	--	--	--	--	--
Benzene	100	1.6	2300	2.2		--	--	--	--	--	--	--	--	--	--
Carbon Disulfide	200000	720	20000	9		--	--	--	--	--	--	--	--	--	--
Carbon Tetrachloride	44	0.64	410	0.9		--	--	--	--	--	--	--	--	--	--
Chloroform	940	0.54	2000	0.76		--	--	--	--	--	--	--	--	--	--
Tetrachloroethene	110	20	2400	28		--	--	--	--	--	--	--	--	--	--
Toluene	410000	650	410000	42		--	--	--	--	--	--	--	--	--	--
Trichlorofluoromethane	NRO	NRO	NRO	NRO		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Xylenes, m & p	410000	420	41000	5.9		<0.010	<0.010	<0.010	<0.010	0.023	0.015	<0.010	<0.010	<0.010	<0.010
Xylenes, o	410000	410	41000	6.5		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Total Xylenes	410000	320	41000	5.6		--	--	--	--	--	--	--	--	--	--

Tier 1 Soil Remediation Objectives (SROs) are based on Title 35 Part 742

Tier 1 Appendix B Table B, C and D.

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Analytical Results for Soil Samples -VOCs
Joint Public Safety Training Campus

Analyte	Tier 1 Soil Remediation Objectives				Sample ID	GP-1A	GP-2B	GP-3A	GP-4B	GP-4E	GP-5A	GP-6A	GP-6C	GP-7D	GP-7F	GP-8A	GP-9B	GP-10B	GP-11B
	Industrial/Commercial		Construction Worker																
	Ingestion	Inhalation	Ingestion	Inhalation															
	mg/Kg	mg/Kg	mg/Kg	mg/Kg															
	Depth (feet)	0-2	2-4	0-2															
Sample Date	9/5/07	9/5/07	9/5/07	9/5/07	9/5/07	9/5/07	9/5/07	9/5/07	9/5/07	9/5/07	9/5/07	9/5/07	9/5/07	9/5/07	9/5/07	9/5/07	9/5/07	9/5/07	
Acetone	NRO	100000	NRO	100000		<0.40	<0.053	0.17	0.071	0.067	0.14	0.055	0.074	0.075	<0.26	--	--	--	<0.22
Benzene	100	1.6	2300	2.2		<0.0080	<0.0053	<0.0071	0.0064	<0.0050	<0.0076	<0.0052	<0.0050	<0.0066	<0.0051	--	--	--	<0.0044
Carbon Disulfide	200000	720	20000	9		<0.021	<0.011	<0.014	<0.012	<0.010	0.016	0.023	<0.010	<0.013	<0.013	--	--	--	<0.012
Carbon Tetrachloride	44	0.64	410	0.9		--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chloroform	940	0.54	2000	0.76		--	--	--	--	--	--	--	--	--	--	--	--	--	--
Tetrachloroethene	110	20	2400	28		<0.0080	<0.0053	<0.0071	<0.0061	0.0051	<0.0076	<0.0052	<0.0050	<0.0066	<0.0051	--	--	--	<0.0044
Toluene	410000	650	410000	42		<0.016	0.0084	<0.0071	0.0072	0.0075	0.017	0.0075	0.0094	0.008	<0.010	--	--	--	<0.0089
Trichlorofluoromethane	NRO	NRO	NRO	NRO		--	--	--	--	--	--	--	--	--	--	--	--	--	--
Xylenes, m & p	410000	420	41000	5.9		<0.0080	<0.0053	<0.0071	<0.0061	<0.0050	0.01	<0.0052	<0.0050	<0.0066	<0.0051	--	--	--	<0.0044
Xylenes, o	410000	410	41000	6.5		--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Xylenes	410000	320	41000	5.6		--	--	--	--	--	--	--	--	--	--	--	--	--	--

Tier 1 Soil Remediation Objectives (SROs) are based on Title 35 Part 742
Tier 1 Appendix B Table B, C and D.
Results that are Bolded and Shaded indicate that the measured concentration exceeds any one of the SROs.
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-- not analyzed

Table 1
Analytical Results for Soil Samples -VOCs
Joint Public Safety Training Campus

Analyte	Tier 1 Soil Remediation Objectives				Sample ID	GP-11D	GP-13A	GP-13D	GP-14B	GP-15A	GP-16B	GP-16E 8-10	GP-17A 0-2	GP-18B 2-4	GP-19A 0-2	ESB-1A	ESB-1C	ESB-2A
	Industrial/ Commercial		Construction Worker		Depth (feet)	6-8	0-2	6-8	2-4	0-2	2-4	9/5/07	9/5/07	9/5/07	9/5/07	0-2	13-14	1.5-2.5
	Ingestion	Inhalation	Ingestion	Inhalation	Sample Date	9/5/07	9/5/07	9/5/07	9/5/07	9/5/07	9/5/07	9/5/07	9/5/07	9/5/07	9/5/07	8/9/17	8/9/17	8/2/17
	mg/Kg	mg/Kg	mg/Kg	mg/Kg														
Acetone	NRO	100000	NRO	100000		<0.23	<0.36	<0.21	--	--	<0.24	<0.24	--	--	--	--	--	< 0.10
Benzene	100	1.6	2300	2.2		<0.0049	<0.0073	<0.0042	--	--	<0.0048	<0.0049	--	--	--	--	--	< 0.0067
Carbon Disulfide	200000	720	20000	9		<0.012	<0.019	<0.011	--	--	<0.012	<0.013	--	--	--	--	--	< 0.067
Carbon Tetrachloride	44	0.64	410	0.9		--	--	--	--	--	--	--	--	--	--	--	--	< 0.0067
Chloroform	940	0.54	2000	0.76		--	--	--	--	--	--	--	--	--	--	--	--	< 0.0067
Tetrachloroethene	110	20	2400	28		<0.0049	<0.0073	<0.0042	--	--	<0.0048	<0.0049	--	--	--	--	--	< 0.0067
Toluene	410000	650	410000	42		<0.0092	<0.015	<0.0085	--	--	<0.0096	<0.0098	--	--	--	--	--	< 0.0067
Trichlorofluoromethane	NRO	NRO	NRO	NRO		--	--	--	--	--	--	--	--	--	--	--	--	--
Xylenes, m & p	410000	420	41000	5.9		<0.0049	<0.0073	<0.0042	--	--	<0.0048	<0.0049	--	--	--	--	--	--
Xylenes, o	410000	410	41000	6.5		--	--	--	--	--	--	--	--	--	--	--	--	--
Total Xylenes	410000	320	41000	5.6		--	--	--	--	--	--	--	--	--	--	--	--	< 0.020

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-- not analyzed

Table 1
Analytical Results for Soil Samples -VOCs
Joint Public Safety Training Campus

Analyte	Tier 1 Soil Remediation Objectives				Sample ID	ESB-3A	ESB-3B	ESB-4A	ESB-5A	ESB-6A	B-1A	B-2A	B-3A	B-3B	B-4A	B-6A	B-6B	B-7A	B-9A
	Industrial/Commercial		Construction Worker		Depth (feet)	1-4	5.5-6.5	0.5-1.5	0-1	2-4	2-4	0-2	0-2	6-8	0-2	1-3	8-10	0-2	1-3
	Ingestion	Inhalation	Ingestion	Inhalation	Sample Date	8/2/17	8/2/17	8/7/17	8/3/17	8/4/17	8/9/17	8/9/17	8/8/17	8/8/17	8/2/17	8/8/17	8/8/17	8/2/17	8/8/17
	mg/Kg	mg/Kg	mg/Kg	mg/Kg															
Acetone	NRO	100000	NRO	100000		< 0.096	--	0.15	< 0.12	< 0.13	--	--	--	< 0.081	--	--	--	--	--
Benzene	100	1.6	2300	2.2		< 0.0064	--	< 0.0075	< 0.0083	< 0.0084	--	--	--	< 0.0054	--	--	--	--	--
Carbon Disulfide	200000	720	20000	9		< 0.064	--	< 0.075	< 0.083	< 0.084	--	--	--	< 0.054	--	--	--	--	--
Carbon Tetrachloride	44	0.64	410	0.9		< 0.0064	--	< 0.0075	< 0.0083	0.15	--	--	--	< 0.0054	--	--	--	--	--
Chloroform	940	0.54	2000	0.76		< 0.0064	--	< 0.0075	< 0.0083	0.034	--	--	--	< 0.0054	--	--	--	--	--
Tetrachloroethene	110	20	2400	28		< 0.0064	--	< 0.0075	0.027	< 0.0084	--	--	--	< 0.0054	--	--	--	--	--
Toluene	410000	650	410000	42		< 0.0064	--	< 0.0075	< 0.0083	< 0.0084	--	--	--	< 0.0054	--	--	--	--	--
Trichlorofluoromethane	NRO	NRO	NRO	NRO		--	--	--	--	--	--	--	--	--	--	--	--	--	--
Xylenes, m & p	410000	420	41000	5.9		--	--	--	--	--	--	--	--	--	--	--	--	--	--
Xylenes, o	410000	410	41000	6.5		--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Xylenes	410000	320	41000	5.6		< 0.019	--	< 0.022	< 0.025	< 0.025	--	--	--	<0.016	--	--	--	--	--

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Tier 1 Appendix B Table B, C and D.

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-- not analyzed

Table 1
Analytical Results for Soil Samples -VOCs
Joint Public Safety Training Campus

Analyte	Tier 1 Soil Remediation Objectives				Sample ID	B-10A	B-11A	B-12A	B-14A	B-15A	B-16A	B-17A	B-18A	B-18B
	Industrial/ Commercial		Construction Worker		Depth (feet)	0-1	1-2	0-2	1-2	1.5-3	1-2	0-2	0-2	4.5-5.5
	Ingestion	Inhalation	Ingestion	Inhalation	Sample Date	8/7/17	8/8/17	8/7/17	8/4/17	8/8/17	8/7/17	8/4/17	8/9/17	8/9/17
	mg/Kg	mg/Kg	mg/Kg	mg/Kg										
Acetone	NRO	100000	NRO	100000		--	< 0.074	--	--	--	--	--	< 0.11	--
Benzene	100	1.6	2300	2.2		--	< 0.0050	--	--	--	--	--	< 0.0071	--
Carbon Disulfide	200000	720	20000	9		--	< 0.050	--	--	--	--	--	< 0.071	--
Carbon Tetrachloride	44	0.64	410	0.9		--	< 0.0050	--	--	--	--	--	< 0.0071	--
Chloroform	940	0.54	2000	0.76		--	< 0.0050	--	--	--	--	--	< 0.0071	--
Tetrachloroethene	110	20	2400	28		--	< 0.0050	--	--	--	--	--	< 0.0071	--
Toluene	410000	650	410000	42		--	< 0.0050	--	--	--	--	--	< 0.0071	--
Trichlorofluoromethane	NRO	NRO	NRO	NRO		--	--	--	--	--	--	--	--	--
Xylenes, m & p	410000	420	41000	5.9		--	--	--	--	--	--	--	--	--
Xylenes, o	410000	410	41000	6.5		--	--	--	--	--	--	--	--	--
Total Xylenes	410000	320	41000	5.6		--	<0.015	--	--	--	--	--	0.021	--

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Table 2
Analytical Results for Soil Samples - SVOCs
Joint Public Safety Training Campus

Analyte	Tier 1 Soil Remediation Objectives				Tier 2* I/C	Background Chicago Metro Area	Sample ID	TP-01-S1 (2-5')	TP-01-S2 (5-10')	TP-02- S1 (3-5')	TP-02- S2 (5-10')	TP-05- S1 (3-5')	TP-05- S2 (5-10')	TP-06-S1 (2-5')
	Industrial/ Commercial		Construction Worker		Ingestion	mg/Kg	Depth (ft)	2-5	5-10	3-5	5-10	3-5	5-10	2-5
	Ingestion	Inhalation	Ingestion	Inhalation			Sample Date	6/27/2019	6/27/2019	6/28/2019	6/28/2019	6/28/2019	6/28/2019	6/27/2019
	mg/Kg	mg/Kg	mg/Kg	mg/Kg										
PAHs														
Acenaphthene	120000	NRO	120000	NRO		0.09		<0.034	<0.034	<0.034	<0.034	<0.18	<0.18	<0.034
Acenaphthylene	61000	NRO	61000	NRO		0.03		<0.034	<0.034	<0.034	<0.034	<0.18	<0.18	<0.034
Anthracene	610000	NRO	610000	NRO		0.25		<0.034	<0.034	<0.034	<0.034	0.62	0.36	<0.034
Benzo[a]anthracene	8	NRO	170	NRO	57	1.1		<0.034	<0.034	<0.034	<0.034	1.6	1.2	<0.034
Benzo[a]pyrene	0.8	NRO	17	NRO	5.7	1.3		<0.034	<0.034	<0.034	<0.034	2.1	1.3	<0.034
Benzo[b]fluoranthene	8	NRO	170	NRO	57	1.5		<0.034	<0.034	<0.034	<0.034	2.2	1.7	<0.034
Benzo[g,h,i]perylene	61000	NRO	61000	NRO		0.68		<0.034	<0.034	<0.034	<0.034	0.74	0.57	<0.034
Benzo[k]fluoranthene	78	NRO	1700	NRO		0.99		<0.034	<0.034	<0.034	<0.034	1.1	0.63	<0.034
Chrysene	780	NRO	17000	NRO		1.2		<0.034	<0.034	<0.034	<0.034	1.9	1.2	<0.034
Dibenz(a,h)anthracene	0.8	NRO	17	NRO	5.7	0.2		<0.034	<0.034	<0.034	<0.034	<0.18	0.19	<0.034
Fluoranthene	82000	NRO	82000	NRO		2.7		<0.034	<0.034	<0.034	<0.034	3.5	2.3	0.056
Fluorene	82000	NRO	82000	NRO		0.1		<0.034	<0.034	<0.034	<0.034	<0.18	<0.18	<0.034
Indeno[1,2,3-cd]pyrene	8	NRO	170	NRO		0.86		<0.034	<0.034	<0.034	<0.034	0.66	0.62	<0.034
Naphthalene	41000	270	4100	1.8		0.04		<0.034	<0.034	<0.034	<0.034	0.19	0.28	<0.034
Phenanthrene	61000	NRO	61000	NRO		1.3		<0.034	<0.034	<0.034	<0.034	2.3	1.9	0.038
Pyrene	61000	NRO	61000	NRO		1.9		<0.034	<0.034	<0.034	<0.034	4.2	2.4	0.054
SVOCs														
Carbazole	290	NRO	6200	NRO				--	--	--	--	--	--	--
Dibenzofuran	NRO	NRO	NRO	NRO				--	--	--	--	--	--	--
2-Methylnaphthalene	NRO	NRO	NRO	NRO				--	--	--	--	--	--	--

Tier 1 Soil Remediation Objectives (SROs) are based on Title 35 Part 742 Tier 1 Appendix B Table B, C and D.
*Tier 2 SROs were calculated based on the updated cancer slope factor for benzo(a)pyrene
Results that are Bolded and Shaded indicate that the measured concentration exceeds any one of the SROs.
NRO = (No Remediation Objective) was provided in tables.
Non TACO analytes are italicized and limits are based on the Illinois EPA Toxicity Assessment Unit Oct 30, 2012.
-- not analyzed

Table 2
Analytical Results for Soil Samples - SVOCs
Joint Public Safety Training Campus

Analyte	Tier 1 Soil Remediation Objectives				Tier 2*	Background Chicago Metro Area								
	Industrial/ Commercial		Construction Worker		I/C		Sample ID	TP-06-S2 (5-10')	TP-07-S1 (2-5')	TP-07-S2 (5-10')	TP10-S1 (3-5')	TP10-S2 (5-10')	TP-19-S1 (3-5')	TP-19-S2 (5-8')
	Ingestion	Inhalation	Ingestion	Inhalation	Ingestion		Depth (ft)	5-10	2-5	5-10	3-5	5-10	3-5	5-8
	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg		Sample Date	6/27/2019	6/27/2019	6/27/2019	6/27/2019	6/27/2019	6/26/2019	6/26/2019
	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg		mg/Kg							
PAHs														
Acenaphthene	120000	NRO	120000	NRO		0.09		<0.035	<0.034	<0.034	<0.035	<0.034	<0.036	<0.045
Acenaphthylene	61000	NRO	61000	NRO		0.03		<0.035	<0.034	<0.034	<0.035	<0.034	<0.036	<0.045
Anthracene	610000	NRO	610000	NRO		0.25		<0.035	<0.034	<0.034	<0.035	<0.034	<0.036	<0.045
Benzo[a]anthracene	8	NRO	170	NRO	57	1.1		<0.035	<0.034	<0.034	<0.035	<0.034	<0.036	<0.045
Benzo[a]pyrene	0.8	NRO	17	NRO	5.7	1.3		<0.035	<0.034	<0.034	<0.035	<0.034	<0.036	<0.045
Benzo[b]fluoranthene	8	NRO	170	NRO	57	1.5		<0.035	<0.034	<0.034	<0.035	<0.034	<0.036	<0.045
Benzo[g,h,i]perylene	61000	NRO	61000	NRO		0.68		<0.035	<0.034	<0.034	<0.035	<0.034	<0.036	<0.045
Benzo[k]fluoranthene	78	NRO	1700	NRO		0.99		<0.035	<0.034	<0.034	<0.035	<0.034	<0.036	<0.045
Chrysene	780	NRO	17000	NRO		1.2		<0.035	<0.034	<0.034	<0.035	<0.034	<0.036	<0.045
Dibenz[a,h]anthracene	0.8	NRO	17	NRO	5.7	0.2		<0.035	<0.034	<0.034	<0.035	<0.034	<0.036	<0.045
Fluoranthene	82000	NRO	82000	NRO		2.7		<0.035	<0.034	<0.034	<0.035	<0.034	<0.036	<0.045
Fluorene	82000	NRO	82000	NRO		0.1		<0.035	<0.034	<0.034	<0.035	<0.034	<0.036	<0.045
Indeno[1,2,3-cd]pyrene	8	NRO	170	NRO		0.86		<0.035	<0.034	<0.034	<0.035	<0.034	<0.036	<0.045
Naphthalene	41000	270	4100	1.8		0.04		<0.035	<0.034	<0.034	<0.035	<0.034	<0.036	<0.045
Phenanthrene	61000	NRO	61000	NRO		1.3		<0.035	<0.034	<0.034	<0.035	<0.034	<0.036	<0.045
Pyrene	61000	NRO	61000	NRO		1.9		<0.035	<0.034	<0.034	<0.035	<0.034	<0.036	<0.045
SVOCs														
Carbazole	290	NRO	6200	NRO				--	--	--	--	--	--	--
Dibenzofuran	NRO	NRO	NRO	NRO				--	--	--	--	--	--	--
2-Methylnaphthalene	NRO	NRO	NRO	NRO				--	--	--	--	--	--	--

Tier 1 Soil Remediation Objectives (SROs) are based on Title 35 Part 742 Tier 1 Appendix B Table B, C and D.
*Tier 2 SROs were calculated based on the updated cancer slope factor for benzo(a)pyrene
Results that are Bolded and Shaded indicate that the measured concentration exceeds any one of the SROs.
NRO = (No Remediation Objective) was provided in tables.
Non TACO analytes are italicized and limits are based on the Illinois EPA Toxicity Assessment Unit Oct 30, 2012.
-- not analyzed

Table 2
Analytical Results for Soil Samples - SVOCs
Joint Public Safety Training Campus

Analyte	Tier 1 Soil Remediation Objectives				Tier 2*	Background								
	Industrial/ Commercial		Construction Worker		I/C	Chicago Metro Area	Sample ID	TP-23-S1 (3-5')	TP-23-S2 (5-10')	TP-24-S1 (3-5')	TP-24-S2 (8-10')	TP-25-S1 (3-5')	TP-25-S2 (5-10')	SB1-1
	Ingestion	Inhalation	Ingestion	Inhalation	Ingestion		Depth (ft)	3-5	5-10	3-5	8-10	3-5	5-10	1-3
	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	Sample Date	6/26/2019	6/26/2019	6/26/2019	6/26/2019	6/26/2019	6/26/2019	6/19/91
PAHs														
Acenaphthene	120000	NRO	120000	NRO		0.09		<0.040	<0.035	<0.037	<0.048	<0.035	<0.038	<0.0063
Acenaphthylene	61000	NRO	61000	NRO		0.03		<0.040	<0.035	<0.037	<0.048	<0.035	<0.038	<0.007
Anthracene	610000	NRO	610000	NRO		0.25		<0.040	<0.035	<0.037	<0.048	0.064	<0.038	<0.038
Benzo[a]anthracene	8	NRO	170	NRO	57	1.1		<0.040	<0.035	<0.037	<0.048	0.21	0.048	0.14
Benzo[a]pyrene	0.8	NRO	17	NRO	5.7	1.3		<0.040	<0.035	<0.037	<0.048	0.20	0.043	0.25
Benzo[b]fluoranthene	8	NRO	170	NRO	57	1.5		<0.040	<0.035	<0.037	<0.048	0.31	0.061	0.26
Benzo[g,h,i]perylene	61000	NRO	61000	NRO		0.68		<0.040	<0.035	<0.037	<0.048	0.078	<0.038	0.26
Benzo[k]fluoranthene	78	NRO	1700	NRO		0.99		<0.040	<0.035	<0.037	<0.048	0.12	<0.038	0.14
Chrysene	780	NRO	17000	NRO		1.2		<0.040	<0.035	<0.037	<0.048	0.26	0.054	0.14
Dibenz[a,h]anthracene	0.8	NRO	17	NRO	5.7	0.2		<0.040	<0.035	<0.037	<0.048	<0.035	<0.038	0.044
Fluoranthene	82000	NRO	82000	NRO		2.7		<0.040	<0.035	<0.037	<0.048	0.35	0.090	0.21
Fluorene	82000	NRO	82000	NRO		0.1		<0.040	<0.035	<0.037	<0.048	<0.035	<0.038	<0.012
Indeno[1,2,3-cd]pyrene	8	NRO	170	NRO		0.86		<0.040	<0.035	<0.037	<0.048	0.064	<0.038	<0.020
Naphthalene	41000	270	4100	1.8		0.04		<0.040	<0.035	<0.037	<0.048	0.082	<0.038	0.096
Phenanthrene	61000	NRO	61000	NRO		1.3		<0.040	0.094	<0.037	<0.048	0.47	0.092	0.23
Pyrene	61000	NRO	61000	NRO		1.9		<0.040	0.038	<0.037	<0.048	0.31	0.075	0.2
SVOCs														
Carbazole	290	NRO	6200	NRO				--	--	--	--	--	--	--
Dibenzofuran	NRO	NRO	NRO	NRO				--	--	--	--	--	--	--
2-Methylnaphthalene	NRO	NRO	NRO	NRO				--	--	--	--	--	--	--

Tier 1 Soil Remediation Objectives (SROs) are based on Title 35 Part 742 Tier 1 Appendix B Table B, C and D.
*Tier 2 SROs were calculated based on the updated cancer slope factor for benzo(a)pyrene
Results that are Bolded and Shaded indicate that the measured concentration exceeds any one of the SROs.
NRO = (No Remediation Objective) was provided in tables.
Non TACO analytes are italicized and limits are based on the Illinois EPA Toxicity Assessment Unit Oct 30, 2012.
-- not analyzed

Table 2
Analytical Results for Soil Samples - SVOCs
Joint Public Safety Training Campus

Analyte	Tier 1 Soil Remediation Objectives				Tier 2*	Background										
	Industrial/ Commercial		Construction Worker		I/C	Chicago Metro Area	Sample ID	SB1-4	SB2-1	SB2-3	SB3-1	SB3-3	SB4-1	SB4-4	SB5-1	SB5-4
	Ingestion	Inhalation	Ingestion	Inhalation	Ingestion		Depth (ft)	8.5-10.5	1-3	6-8	1-3	6-8	1-3	8.5-10.5	1-3	8.5-10.5
	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	Sample Date	6/19/91	6/19/91	6/19/91	6/19/91	6/19/91	6/19/91	6/19/91	6/19/91	6/19/91
PAHs																
Acenaphthene	120000	NRO	120000	NRO		0.09		0.0033	<0.0062	<0.0012	<0.120	<0.0063	<0.0012	<0.0012	<0.0062	<0.0012
Acenaphthylene	61000	NRO	61000	NRO		0.03		<0.0014	<0.007	<0.0014	<0.140	<0.007	<0.0014	<0.0014	<0.0069	<0.0014
Anthracene	610000	NRO	610000	NRO		0.25		0.0019	<0.037	<0.00074	<0.075	0.0094	<0.00075	<0.00074	<0.037	<0.00074
Benzo[a]anthracene	8	NRO	170	NRO	57	1.1		0.002	0.093	0.002	0.47	0.026	0.004	0.00056	0.14	0.0056
Benzo[a]pyrene	0.8	NRO	17	NRO	5.7	1.3		0.0025	0.094	0.0019	0.48	0.029	0.0051	0.00071	0.14	0.0052
Benzo[b]fluoranthene	8	NRO	170	NRO	57	1.5		0.0049	0.13	0.0035	0.13	0.08	0.0077	0.0011	0.22	0.014
Benzo[g,h,i]perylene	61000	NRO	61000	NRO		0.68		<0.00040	0.094	<0.00039	0.33	0.032	0.0054	<0.00039	0.23	<0.00039
Benzo[k]fluoranthene	78	NRO	1700	NRO		0.99		0.0018	0.053	0.0012	0.25	0.017	0.0035	0.00045	0.1	0.01
Chrysene	780	NRO	17000	NRO		1.2		<0.00045	0.12	0.0019	0.12	<0.0023	0.0068	0.00078	0.18	<0.00044
Dibenz(a,h)anthracene	0.8	NRO	17	NRO	5.7	0.2		<0.00035	0.017	<0.00034	0.071	<0.0018	0.00092	<0.00035	0.023	<0.00034
Fluoranthene	82000	NRO	82000	NRO		2.7		0.006	<0.017	0.0046	0.73	0.089	0.0081	0.0015	0.31	0.013
Fluorene	82000	NRO	82000	NRO		0.1		<0.0023	<0.012	<0.0023	<0.230	<0.012	<0.0023	<0.0023	<0.012	<0.0023
Indeno[1,2,3-cd]pyrene	8	NRO	170	NRO		0.86		<0.00040	<0.020	<0.00039	0.27	<0.002	<0.00040	<0.00039	<0.020	<0.00039
Naphthalene	41000	270	4100	1.8		0.04		0.0024	0.07	0.0053	0.25	0.025	<0.0014	0.0014	0.13	0.028
Phenanthrene	61000	NRO	61000	NRO		1.3		0.0052	0.24	0.006	0.24	0.15	0.0085	0.0019	0.41	0.032
Pyrene	61000	NRO	61000	NRO		1.9		0.0049	0.16	0.0042	0.16	0.073	0.0072	0.0012	0.26	0.011
SVOCs																
Carbazole	290	NRO	6200	NRO				--	--	--	--	--	--	--	--	--
Dibenzofuran	NRO	NRO	NRO	NRO				--	--	--	--	--	--	--	--	--
2-Methylnaphthalene	NRO	NRO	NRO	NRO				--	--	--	--	--	--	--	--	--

Tier 1 Soil Remediation Objectives (SROs) are based on Title 35 Part 742 Tier 1 Appendix B Table B, C and D.
*Tier 2 SROs were calculated based on the updated cancer slope factor for benzo(a)pyrene
Results that are Bolded and Shaded indicate that the measured concentration exceeds any one of the SROs.
NRO = (No Remediation Objective) was provided in tables.
Non TACO analytes are italicized and limits are based on the Illinois EPA Toxicity Assessment Unit Oct 30, 2012.
-- not analyzed

Table 2
Analytical Results for Soil Samples - SVOCs
Joint Public Safety Training Campus

Analyte	Tier 1 Soil Remediation Objectives				Tier 2*	Background Chicago Metro Area										
	Industrial/ Commercial		Construction Worker		I/C		Sample ID	SB6-1	SB6-4	SB7-4	SB7-5	SB8-1	SB8-3	SB9-2	SB9-3	
	Ingestion mg/Kg	Inhalation mg/Kg	Ingestion mg/Kg	Inhalation mg/Kg	Ingestion mg/Kg		Depth (ft)	1-3	8.5-10.5	8.5-10.5	11-13	1-3	8.5-10.5	3.5-5.5	6-8	
							Sample Date	6/19/91	6/19/91	6/19/91	6/19/91	6/19/91	6/19/91	6/19/91	6/19/91	
PAHs																
Acenaphthene	120000	NRO	120000	NRO		0.09		<0.0062	<0.0013	<0.0025	<0.0025	0.0026	<0.0025	<0.0025	<0.0025	<0.0025
Acenaphthylene	61000	NRO	61000	NRO		0.03		<0.0069	<0.0014	<0.0028	<0.0028	<0.0028	<0.0028	<0.0028	<0.0028	<0.0028
Anthracene	610000	NRO	610000	NRO		0.25		<0.0037	<0.00075	<0.0015	<0.0015	<0.0015	0.032	<0.0015	<0.0015	<0.0015
Benzo[a]anthracene	8	NRO	170	NRO	57	1.1		0.014	0.0025	<0.00060	<0.00060	0.027	0.03	0.0042	<0.00060	<0.00060
Benzo[a]pyrene	0.8	NRO	17	NRO	5.7	1.3		0.016	0.0018	<0.00070	<0.00070	0.033	0.031	0.0042	<0.00070	<0.00070
Benzo[b]fluoranthene	8	NRO	170	NRO	57	1.5		0.034	0.0036	<0.00070	0.001	0.051	0.072	0.0089	0.00095	0.00095
Benzo[g,h,i]perylene	61000	NRO	61000	NRO		0.68		0.017	<0.00040	<0.00080	<0.00080	0.04	0.041	0.0062	0.00083	0.00083
Benzo[k]fluoranthene	78	NRO	1700	NRO		0.99		0.0093	0.0014	<0.00070	<0.00070	0.018	0.021	0.0028	<0.00070	<0.00070
Chrysene	780	NRO	17000	NRO		1.2		<0.0022	<0.00045	<0.00090	<0.00090	<0.00090	0.067	<0.00090	<0.00090	<0.00090
Dibenz(a,h)anthracene	0.8	NRO	17	NRO	5.7	0.2		<0.0017	<0.00035	<0.00070	<0.00070	0.0054	0.0074	<0.00070	<0.00070	<0.00070
Fluoranthene	82000	NRO	82000	NRO		2.7		0.037	0.0069	0.00089	0.0012	0.055	0.05	0.0084	0.0011	0.0011
Fluorene	82000	NRO	82000	NRO		0.1		<0.012	<0.0024	<0.0047	<0.0047	<0.0047	0.018	<0.0047	<0.0047	<0.0047
Indeno[1,2,3-cd]pyrene	8	NRO	170	NRO		0.86		<0.002	<0.00040	<0.00080	<0.00080	<0.00080	0.016	<0.00080	<0.00080	<0.00080
Naphthalene	41000	270	4100	1.8		0.04		0.012	0.0042	<0.0029	<0.0029	0.022	0.0078	0.0063	<0.0029	<0.0029
Phenanthrene	61000	NRO	61000	NRO		1.3		0.07	0.018	0.0021	0.0021	0.08	0.049	0.015	0.0021	0.0021
Pyrene	61000	NRO	61000	NRO		1.9		0.036	0.0047	0.001	0.00081	0.059	0.055	0.0082	<0.00080	<0.00080
SVOCs																
Carbazole	290	NRO	6200	NRO				--	--	--	--	--	--	--	--	--
Dibenzofuran	NRO	NRO	NRO	NRO				--	--	--	--	--	--	--	--	--
2-Methylnaphthalene	NRO	NRO	NRO	NRO				--	--	--	--	--	--	--	--	--

Tier 1 Soil Remediation Objectives (SROs) are based on Title 35 Part 742 Tier 1 Appendix B Table B, C and D.
*Tier 2 SROs were calculated based on the updated cancer slope factor for benzo(a)pyrene
Results that are Bolded and Shaded indicate that the measured concentration exceeds any one of the SROs.
NRO = (No Remediation Objective) was provided in tables.
Non TACO analytes are italicized and limits are based on the Illinois EPA Toxicity Assessment Unit Oct 30, 2012.
-- not analyzed

Table 2
Analytical Results for Soil Samples - SVOCs
Joint Public Safety Training Campus

Analyte	Tier 1 Soil Remediation Objectives				Tier 2*	Background Chicago Metro Area	Sample ID	SB10-1	SB10-4	GP-1A	GP-2B	GP-3A	GP-4B	GP-4E	GP-5A	GP-6A
	Industrial/ Commercial		Construction Worker		I/C											
	Ingestion	Inhalation	Ingestion	Inhalation	Ingestion											
	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg											
PAHs																
Acenaphthene	120000	NRO	120000	NRO		0.09		<0.0025	<0.049	<0.055	<0.055	0.66	0.06	<0.055	<0.057	<0.056
Acenaphthylene	61000	NRO	61000	NRO		0.03		<0.0028	<0.055	0.089	<0.055	<0.056	<0.056	<0.055	<0.057	<0.056
Anthracene	610000	NRO	610000	NRO		0.25		<0.0015	0.091	0.11	0.15	2.5 E	0.25	<0.055	<0.057	<0.056
Benzo[a]anthracene	8	NRO	170	NRO	57	1.1		0.025	0.19	0.78	0.59	7.0 E	1.2	0.2	0.092	0.099
Benzo[a]pyrene	0.8	NRO	17	NRO	5.7	1.3		0.026	<0.014	0.9	0.55	6.3 E	1.1	0.16	0.072	0.086
Benzo[b]fluoranthene	8	NRO	170	NRO	57	1.5		0.064	0.021	1.9 E	1	8.7 E	1.5	0.28	0.16	0.18
Benzo[g,h,i]perylene	61000	NRO	61000	NRO		0.68		0.041	0.31	1.1	0.46	3.5 E	0.5	0.16	0.12	0.1
Benzo[k]fluoranthene	78	NRO	1700	NRO		0.99		0.016	<0.014	0.47	0.26	3.0 E	0.34	0.1	<0.057	<0.056
Chrysene	780	NRO	17000	NRO		1.2		<0.00090	<0.018	0.51	0.47	4.1 E	0.86	0.16	0.063	0.077
Dibenz(a,h)anthracene	0.8	NRO	17	NRO	5.7	0.2		<0.00070	<0.014	0.31	0.13	1.7	0.18	<0.055	<0.057	<0.056
Fluoranthene	82000	NRO	82000	NRO		2.7		0.057	0.59	1.1	0.99	8.9 E	1.9 E	0.33	0.085	0.11
Fluorene	82000	NRO	82000	NRO		0.1		<0.0047	0.35	<0.055	<0.055	1	0.07	<0.055	<0.057	<0.056
Indeno[1,2,3-cd]pyrene	8	NRO	170	NRO		0.86		<0.00080	<0.016	0.88	0.37	3.1 E	0.44	0.11	0.076	0.074
Naphthalene	41000	270	4100	1.8		0.04		0.018	0.11	0.087	<0.055	0.17	0.057	<0.055	ND	<0.056
Phenanthrene	61000	NRO	61000	NRO		1.3		0.11	0.62	0.6	0.68	8.2 E	1.1	0.35	0.11	<0.056
Pyrene	61000	NRO	61000	NRO		1.9		0.058	0.65	0.92	0.75	9.2 E	2.6 E	0.49	0.12	0.11
SVOCs																
Carbazole	290	NRO	6200	NRO				--	--	< 0.36	<0.37	0.58	<0.37	<0.36	<0.37	<0.37
Dibenzofuran	NRO	NRO	NRO	NRO				--	--	< 0.36	<0.37	0.68	<0.37	<0.36	<0.37	<0.37
2-Methylnaphthalene	NRO	NRO	NRO	NRO				--	--	< 0.36	<0.37	<0.37	<0.37	<0.36	<0.37	<0.37

Tier 1 Soil Remediation Objectives (SROs) are based on Title 35 Part 742 Tier 1 Appendix B Table B, C and D.
*Tier 2 SROs were calculated based on the updated cancer slope factor for benzo(a)pyrene
Results that are Bolded and Shaded indicate that the measured concentration exceeds any one of the SROs.
NRO = (No Remediation Objective) was provided in tables.
Non TACO analytes are italicized and limits are based on the Illinois EPA Toxicity Assessment Unit Oct 30, 2012.
-- not analyzed

Table 2
Analytical Results for Soil Samples - SVOCs
Joint Public Safety Training Campus

Analyte	Tier 1 Soil Remediation Objectives				Tier 2*	Background Chicago Metro Area	Sample ID	GP-6C	GP-7D	GP-7F	GP-8A	GP-9B	GP-10B	GP-11B	GP-11D	GP-13A	GP-13D
	Industrial/ Commercial		Construction Worker		I/C												
	Ingestion	Inhalation	Ingestion	Inhalation	Ingestion												
	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg												
PAHs																	
Acenaphthene	120000	NRO	120000	NRO		0.09		1.2	1.6	0.26	--	--	--	<0.056	0.18	<0.050	<0.050
Acenaphthylene	61000	NRO	61000	NRO		0.03		<0.055	0.068	<0.061	--	--	--	<0.056	<0.11	<0.050	<0.050
Anthracene	610000	NRO	610000	NRO		0.25		3.2	5.7	0.76	--	--	--	<0.056	0.72	0.07	<0.050
Benzo[a]anthracene	8	NRO	170	NRO	57	1.1		6.1	12	3.1 E	--	--	--	0.067	2	0.2	<0.050
Benzo[a]pyrene	0.8	NRO	17	NRO	5.7	1.3		3.8	13	2.3 E	--	--	--	<0.056	3.1	0.16	<0.050
Benzo[b]fluoranthene	8	NRO	170	NRO	57	1.5		6.4	12	4.8 E	--	--	--	0.07	2.1	0.29	<0.050
Benzo[g,h,i]perylene	61000	NRO	61000	NRO		0.68		1.5	2.3	1	--	--	--	<0.056	0.52	0.17	<0.050
Benzo[k]fluoranthene	78	NRO	1700	NRO		0.99		2.2	4.6	1.6	--	--	--	<0.056	0.67	0.1	<0.050
Chrysene	780	NRO	17000	NRO		1.2		2.8	5.6	1.9	--	--	--	<0.056	1.5	0.19	<0.050
Dibenz[a,h]anthracene	0.8	NRO	17	NRO	5.7	0.2		0.82	1.0	0.46	--	--	--	<0.056	0.19	0.075	<0.050
Fluoranthene	82000	NRO	82000	NRO		2.7		8.6	14	6.7 E	--	--	--	0.11	3.4	0.21	<0.050
Fluorene	82000	NRO	82000	NRO		0.1		1.8	4.4	0.25	--	--	--	<0.056	0.17	<0.050	<0.050
Indeno[1,2,3-cd]pyrene	8	NRO	170	NRO		0.86		1.6	3.4	1.2	--	--	--	<0.056	0.85	0.12	<0.050
Naphthalene	41000	270	4100	1.8		0.04		1.4	1.2	0.081	--	--	--	<0.056	<0.11	0.06	<0.050
Phenanthrene	61000	NRO	61000	NRO		1.3		9.6	16	5.2 E	--	--	--	0.07	3.2	0.33	<0.050
Pyrene	61000	NRO	61000	NRO		1.9		8.4	15	6.5 E	--	--	--	0.12	5.1 E	0.31	<0.050
SVOCs																	
Carbazole	290	NRO	6200	NRO				1.5	1.9	0.57	--	--	--	<0.37	<0.72	<0.33	<0.33
Dibenzofuran	NRO	NRO	NRO	NRO				1.5	2.8	<0.40	--	--	--	<0.37	<0.72	<0.33	<0.33
2-Methylnaphthalene	NRO	NRO	NRO	NRO				0.66	0.74	<0.40	--	--	--	<0.37	<0.72	<0.33	<0.33

Tier 1 Soil Remediation Objectives (SROs) are based on Title 35 Part 742 Tier 1 Appendix B Table B, C and D.
*Tier 2 SROs were calculated based on the updated cancer slope factor for benzo(a)pyrene
Results that are Bolded and Shaded indicate that the measured concentration exceeds any one of the SROs.
NRO = (No Remediation Objective) was provided in tables.
Non TACO analytes are italicized and limits are based on the Illinois EPA Toxicity Assessment Unit Oct 30, 2012.
-- not analyzed

Table 2
Analytical Results for Soil Samples - SVOCs
Joint Public Safety Training Campus

Analyte	Tier 1 Soil Remediation Objectives				Tier 2*	Background Chicago Metro Area												
	Industrial/ Commercial		Construction Worker		I/C		Sample ID	GP-14B	GP-15A	GP-16B	GP-16E	GP-17A	GP-18B	GP-19A	ESB-1A	ESB-1C	ESB-2A	ESB-3A
	Ingestion	Inhalation	Ingestion	Inhalation	Ingestion		Depth (ft)	2-4	0-2	2-4	8-10	0-2	2-4	0-2	0-2	13-14	1.5-2.5	1-4
	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg		Sample Date	9/5/07	9/5/07	9/5/07	9/5/07	9/5/07	9/5/07	9/5/07	8/9/17	8/9/17	8/2/17	8/2/17
PAHs																		
Acenaphthene	120000	NRO	120000	NRO		0.09		--	--	<0.052	<0.054	--	--	--	< 0.034	< 0.034	< 0.038	0.41
Acenaphthylene	61000	NRO	61000	NRO		0.03		--	--	<0.052	<0.054	--	--	--	< 0.034	< 0.034	< 0.038	< 0.35
Anthracene	610000	NRO	610000	NRO		0.25		--	--	<0.052	<0.054	--	--	--	< 0.034	< 0.034	< 0.038	0.82
Benzo[a]anthracene	8	NRO	170	NRO	57	1.1		--	--	<0.052	<0.054	--	--	--	0.084	< 0.034	0.045	2.4
Benzo[a]pyrene	0.8	NRO	17	NRO	5.7	1.3		--	--	<0.052	<0.054	--	--	--	0.074	< 0.034	< 0.038	0.84
Benzo[b]fluoranthene	8	NRO	170	NRO	57	1.5		--	--	<0.052	<0.054	--	--	--	0.07	< 0.034	< 0.038	< 0.35
Benzo[g,h,i]perylene	61000	NRO	61000	NRO		0.68		--	--	<0.052	<0.054	--	--	--	0.071	< 0.034	< 0.038	1.6
Benzo[k]fluoranthene	78	NRO	1700	NRO		0.99		--	--	<0.052	<0.054	--	--	--	0.066	< 0.034	< 0.038	< 0.35
Chrysene	780	NRO	17000	NRO		1.2		--	--	<0.052	<0.054	--	--	--	0.11	< 0.034	0.052	4.1
Dibenz(a,h)anthracene	0.8	NRO	17	NRO	5.7	0.2		--	--	<0.052	<0.054	--	--	--	0.035	< 0.034	< 0.038	< 0.35
Fluoranthene	82000	NRO	82000	NRO		2.7		--	--	<0.052	<0.054	--	--	--	0.13	< 0.034	0.071	3.1
Fluorene	82000	NRO	82000	NRO		0.1		--	--	<0.052	<0.054	--	--	--	< 0.034	< 0.034	< 0.038	< 0.35
Indeno[1,2,3-cd]pyrene	8	NRO	170	NRO		0.86		--	--	<0.052	<0.054	--	--	--	0.057	< 0.034	< 0.038	0.94
Naphthalene	41000	270	4100	1.8		0.04		--	--	<0.052	<0.054	--	--	--	< 0.034	< 0.034	< 0.038	< 0.35
Phenanthrene	61000	NRO	61000	NRO		1.3		--	--	<0.052	<0.054	--	--	--	0.13	< 0.034	< 0.038	2.6
Pyrene	61000	NRO	61000	NRO		1.9		--	--	<0.052	<0.054	--	--	--	0.13	< 0.034	0.065	6.4
SVOCs																		
Carbazole	290	NRO	6200	NRO				--	--	<0.34	<0.35	--	--	--	--	--	< 0.20	< 1.8
Dibenzofuran	NRO	NRO	NRO	NRO				--	--	<0.34	<0.35	--	--	--	--	--	< 0.20	< 1.8
2-Methylnaphthalene	NRO	NRO	NRO	NRO				--	--	<0.34	<0.35	--	--	--	--	--	< 0.20	< 1.8

Tier 1 Soil Remediation Objectives (SROs) are based on Title 35 Part 742 Tier 1 Appendix B Table B, C and D.
*Tier 2 SROs were calculated based on the updated cancer slope factor for benzo(a)pyrene
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NRO = (No Remediation Objective) was provided in tables.
Non TACO analytes are italicized and limits are based on the Illinois EPA Toxicity Assessment Unit Oct 30, 2012.
-- not analyzed

Table 2
Analytical Results for Soil Samples - SVOCs
Joint Public Safety Training Campus

Analyte	Tier 1 Soil Remediation Objectives				Tier 2*	Background													
	Industrial/ Commercial		Construction Worker		I/C	Chicago Metro Area	Sample ID	ESB-3B	ESB-4A	ESB-5A	ESB-6A	B-1A	B-2A	B-3A	B-3B	B-4A	B-6A	B-6B	B-7A
	Ingestion	Inhalation	Ingestion	Inhalation	Ingestion		Depth (ft)	5.5-6.5	0.5-1.5	0-1	2-4	2-4	0-2	0-2	6-8	0-2	1-3	8-10	0-2
	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	Sample Date	8/2/17	8/7/17	8/3/17	8/4/17	8/9/17	8/9/17	8/8/17	8/8/17	8/2/17	8/8/17	8/8/17	8/2/17
PAHs																			
Acenaphthene	120000	NRO	120000	NRO		0.09		0.19	0.41	< 0.034	< 0.036	< 0.034	< 0.035	< 0.035	< 0.036	< 0.035	0.32	< 0.040	< 0.039
Acenaphthylene	61000	NRO	61000	NRO		0.03		0.16	0.11	0.05	0.12	< 0.034	< 0.035	< 0.035	< 0.036	0.05	0.085	0.1	< 0.039
Anthracene	610000	NRO	610000	NRO		0.25		0.82	1.3	0.092	0.089	0.085	0.045	< 0.035	< 0.036	0.17	2	0.25	0.04
Benzo[a]anthracene	8	NRO	170	NRO	57	1.1		2.6	3.1	0.16	0.25	0.21	0.16	0.11	< 0.036	0.75	4.9	0.64	0.17
Benzo[a]pyrene	0.8	NRO	17	NRO	5.7	1.3		3	3.2	0.13	0.26	0.2	0.16	0.13	< 0.036	0.71	3.9	0.68	< 0.039
Benzo[b]fluoranthene	8	NRO	170	NRO	57	1.5		2.9	3.3	0.18	0.35	0.18	0.15	0.11	< 0.036	0.56	3.5	0.53	0.042
Benzo[g,h,i]perylene	61000	NRO	61000	NRO		0.68		1.9	1.9	0.22	0.22	0.19	0.13	0.097	< 0.036	0.61	3.3	0.65	0.13
Benzo[k]fluoranthene	78	NRO	1700	NRO		0.99		2.2	2.5	0.13	0.25	0.16	0.14	0.096	< 0.036	0.64	3.2	0.67	< 0.039
Chrysene	780	NRO	17000	NRO		1.2		2.8	3.5	0.25	0.34	0.27	0.19	0.13	< 0.036	1.1	5.1	0.89	0.21
Dibenz[a,h]anthracene	0.8	NRO	17	NRO	5.7	0.2		0.87	0.81	0.062	0.094	0.076	0.064	< 0.035	< 0.036	0.27	1.1	0.25	0.14
Fluoranthene	82000	NRO	82000	NRO		2.7		4.3	7.7	0.31	0.52	0.34	0.26	0.16	0.04	0.95	9.8	0.97	0.32
Fluorene	82000	NRO	82000	NRO		0.1		0.25	0.46	< 0.034	< 0.036	< 0.034	< 0.035	< 0.035	< 0.036	0.049	0.46	0.067	< 0.039
Indeno[1,2,3-cd]pyrene	8	NRO	170	NRO		0.86		1.7	1.7	0.12	0.17	0.14	0.11	0.075	< 0.036	0.44	2.5	0.51	0.11
Naphthalene	41000	270	4100	1.8		0.04		0.12	0.088	0.059	0.07	0.051	< 0.035	< 0.035	< 0.036	0.06	0.061	0.2	< 0.039
Phenanthrene	61000	NRO	61000	NRO		1.3		2.3	5.7	0.29	0.45	0.37	0.16	0.088	< 0.036	0.92	6.5	0.91	0.17
Pyrene	61000	NRO	61000	NRO		1.9		3.9	6.3	0.29	0.52	0.34	0.22	0.18	0.043	1.1	13	1.2	0.29
SVOCs																			
Carbazole	290	NRO	6200	NRO				--	0.75	< 0.18	< 0.18	--	--	--	< 0.18	--	--	--	--
Dibenzofuran	NRO	NRO	NRO	NRO				--	0.26	< 0.18	< 0.18	--	--	--	< 0.18	--	--	--	--
2-Methylnaphthalene	NRO	NRO	NRO	NRO				--	< 0.18	< 0.18	< 0.18	--	--	--	< 0.18	--	--	--	--

Tier 1 Soil Remediation Objectives (SROs) are based on Title 35 Part 742 Tier 1 Appendix B Table B, C and D.
*Tier 2 SROs were calculated based on the updated cancer slope factor for benzo(a)pyrene
Results that are Bolded and Shaded indicate that the measured concentration exceeds any one of the SROs.
NRO = (No Remediation Objective) was provided in tables.
Non TACO analytes are italicized and limits are based on the Illinois EPA Toxicity Assessment Unit Oct 30, 2012.
-- not analyzed

Table 2
Analytical Results for Soil Samples - SVOCs
Joint Public Safety Training Campus

Analyte	Tier 1 Soil Remediation Objectives				Tier 2*	Background	Sample ID	B-9A	B-10A	B-11A	B-12A	B-14A	B-15A	B-16A	B-17A	B-18A	B-18B
	Industrial/Commercial		Construction Worker		I/C	Chicago Metro Area											
	Ingestion	Inhalation	Ingestion	Inhalation	Ingestion												
	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg											
PAHs																	
Acenaphthene	120000	NRO	120000	NRO		0.09		< 0.37	< 0.035	< 0.039	< 0.034	< 0.035	0.11	< 0.034	< 0.034	< 0.035	< 0.034
Acenaphthylene	61000	NRO	61000	NRO		0.03		< 0.37	0.12	< 0.039	0.11	< 0.035	< 0.035	< 0.034	0.18	< 0.035	< 0.034
Anthracene	610000	NRO	610000	NRO		0.25		0.57	0.28	0.066	0.16	0.037	< 0.035	< 0.034	0.089	0.061	< 0.034
Benzo[a]anthracene	8	NRO	170	NRO	57	1.1		1.3	0.25	0.19	0.73	0.15	0.24	0.058	0.18	0.16	< 0.034
Benzo[a]pyrene	0.8	NRO	17	NRO	5.7	1.3		1.2	0.31	0.18	0.91	0.17	0.22	0.089	0.17	0.11	< 0.034
Benzo[b]fluoranthene	8	NRO	170	NRO	57	1.5		1.0	0.41	0.18	0.63	0.18	0.23	0.11	0.23	0.14	< 0.034
Benzo[g,h,i]perylene	61000	NRO	61000	NRO		0.68		2.0	0.51	0.12	0.66	0.14	0.2	0.071	0.15	0.13	< 0.034
Benzo[k]fluoranthene	78	NRO	1700	NRO		0.99		0.38	0.29	0.16	0.65	0.12	0.16	0.081	0.15	0.095	< 0.034
Chrysene	780	NRO	17000	NRO		1.2		2.8	0.41	0.21	0.79	0.25	0.3	0.086	0.31	0.25	< 0.034
Dibenz(a,h)anthracene	0.8	NRO	17	NRO	5.7	0.2		0.52	0.11	0.066	0.25	0.063	0.05	< 0.034	0.066	0.064	< 0.034
Fluoranthene	82000	NRO	82000	NRO		2.7		1.2	0.39	0.34	1.1	0.22	0.33	0.055	0.34	0.26	< 0.034
Fluorene	82000	NRO	82000	NRO		0.1		< 0.37	< 0.035	< 0.039	< 0.034	< 0.035	< 0.035	< 0.034	< 0.034	< 0.035	< 0.034
Indeno[1,2,3-cd]pyrene	8	NRO	170	NRO		0.86		0.73	0.3	0.098	0.49	0.1	0.13	0.054	0.11	0.092	< 0.034
Naphthalene	41000	270	4100	1.8		0.04		1.2	0.064	0.046	< 0.034	0.082	0.079	< 0.034	< 0.034	0.1	< 0.034
Phenanthrene	61000	NRO	61000	NRO		1.3		5.7	0.34	0.19	0.48	0.38	0.9	0.063	0.34	0.48	< 0.034
Pyrene	61000	NRO	61000	NRO		1.9		2.8	0.4	0.29	1.5	0.29	0.35	0.096	0.45	0.25	< 0.034
SVOCs																	
Carbazole	290	NRO	6200	NRO				--	--	--	--	--	--	--	--	--	<0.18
Dibenzofuran	NRO	NRO	NRO	NRO				--	--	--	--	--	--	--	--	--	<0.18
2-Methylnaphthalene	NRO	NRO	NRO	NRO				--	--	--	--	--	--	--	--	0.18	--

Tier 1 Soil Remediation Objectives (SROs) are based on Title 35 Part 742 Tier 1 Appendix B Table B, C and D.
*Tier 2 SROs were calculated based on the updated cancer slope factor for benzo(a)pyrene
Results that are Bolded and Shaded indicate that the measured concentration exceeds any one of the SROs.
NRO = (No Remediation Objective) was provided in tables.
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-- not analyzed

Table 3
Analytical Results for Soil Samples - Metals
Joint Public Safety Training Campus

Analyte	Tier 1 Soil Remediation Objectives												
	Industrial/ Commercial		Construction Worker		Sample ID	TP-01-S1 (2-5')	TP-01-S2 (5-10')	TP-02- S1 (3-5')	TP-02- S2 (5-10')	TP-05- S1 (3-5')	TP-05- S2 (5-10')	TP-06-S1 (2-5')	TP-06-S2 (5-10')
					Depth	2-5	5-10	3-5	5-10	3-5	5-10	2-5	5-10
	Ingestion mg/Kg	Inhalation mg/Kg	Ingestion mg/Kg	Inhalation mg/Kg	Sample Date	6/27/2019	6/27/2019	6/28/2019	6/28/2019	6/28/2019	6/28/2019	6/27/2019	6/27/2019
					pH	8.50	8.53	8.29	8.38	8.03	8.04	8.60	8.45
Antimony	820	NRO	82	NRO		<1.9	<1.8	<2.0	<2.0	<2.1	2.1	<1.8	<1.9
Arsenic	13	1200	61	25000		2.2	4.5	3.0	2.8	5.6	9.8	2.3	2.1
Barium	140000	910000	14000	870000		8.5	7.5	6.1	7.1	31	39	7.1	9.2
Beryllium	4100	2100	410	44000		--	--	--	--	--	--	--	--
Cadmium	2000	2800	200	59000		0.33	0.28	0.28	0.28	0.85	1.3	0.28	0.36
Chromium	6100	420	4100	690		4.1	3.4	3.1	3.5	15	17	3.0	4.7
Copper	82000	NRO	8200	NRO		--	--	--	--	--	--	--	--
Lead	800	NRO	700	NRO		3.8	6.7	4.1	4.5	76	120	8.4	9.5
Nickel	41000	21000	4100	440000		--	--	--	--	--	--	--	--
Selenium	10000	NRO	1000	NRO		<0.95	<0.92	<1.0	<1.0	<1.1	1.3	<0.92	<0.95
Silver	10000	NRO	1000	NRO		0.82	1.0	0.81	1.1	1.7	1.5	0.95	0.85
Thallium	160	NRO	160	NRO		--	--	--	--	--	--	--	--
Zinc	610000	NRO	61000	NRO		--	--	--	--	--	--	--	--
Mercury	610	16	61	0.1		<0.017	<0.017	<0.017	<0.017	0.090	0.086	<0.017	<0.016
Cyanide	41000	NRO	4100	NRO		--	--	--	--	--	--	--	--
TCLP Analysis	Class I	Class II											
	mg/L	mg/L											
Chromium (TCLP)	0.1	1				--	--	--	--	--	--	--	--
Lead (TCLP)	0.0075	0.1				--	--	--	--	--	<0.050	--	--
Selenium (TCLP)	0.05	0.05				--	--	--	--	--	<0.050	--	--
Chromium (SPLP)	0.1	1				--	--	--	--	--	--	--	--
Cobalt (SPLP)	1.0	1.0				--	--	--	--	--	--	--	--

Tier 1 Soil Remediation Objectives (SROs) are based on Title 35 Part 742 Tier 1
Appendix B Table B, C and D.
Results that are Bolded and Shaded indicate that the measured concentration exceeds
any one of the SROs.
NRO = (No Remediation Objective) was provided in tables.
-- not analyzed

Table 3
Analytical Results for Soil Samples - Metals
Joint Public Safety Training Campus

Analyte	Tier 1 Soil Remediation Objectives				Sample ID	TP-07-S1 (2-5')	TP-07-S2 (5-10')	TP10-S1 (3-5')	TP10-S2 (5-10')	TP-19-S1 (3-5')	TP-19-S2 (5-8')	TP-23-S1 (3-5')	TP-23-S2 (5-10')									
	Industrial/ Commercial		Construction Worker																			
														Depth	2-5	5-10	3-5	5-10	3-5	5-8	3-5	5-10
	Ingestion	Inhalation	Ingestion	Inhalation										Sample Date	6/27/2019	6/27/2019	6/27/2019	6/27/2019	6/26/2019	6/26/2019	6/26/2019	6/26/2019
	mg/Kg	mg/Kg	mg/Kg	mg/Kg										pH	8.61	8.33	8.08	8.39	8.19	7.44	8.24	8.45
Antimony	820	NRO	82	NRO		<2.0	<1.7	<2.0	<1.8	<2.0	<2.6	<2.3	<2.1									
Arsenic	13	1200	61	25000		1.9	2.2	2.2	2.4	3.1	3.8	1.1	2.6									
Barium	140000	910000	14000	870000		6.1	8.2	7.9	7.5	26	91	9.3	9.0									
Beryllium	4100	2100	410	44000		--	--	--	--	--	--	--	--									
Cadmium	2000	2800	200	59000		0.28	0.28	0.31	0.28	0.38	0.36	0.34	0.31									
Chromium	6100	420	4100	690		3.0	3.5	4.8	3.3	6.6	26	3.8	4.3									
Copper	82000	NRO	8200	NRO		--	--	--	--	--	--	--	--									
Lead	800	NRO	700	NRO		3.4	4.1	4.4	4.0	13	16	2.5	36									
Nickel	41000	21000	4100	440000		--	--	--	--	--	--	--	--									
Selenium	10000	NRO	1000	NRO		<1.0	<0.87	<1.0	<0.91	<1.0	<1.3	1.2	<1.0									
Silver	10000	NRO	1000	NRO		0.75	0.94	0.95	0.74	1.4	4.0	0.83	0.89									
Thallium	160	NRO	160	NRO		--	--	--	--	--	--	--	--									
Zinc	610000	NRO	61000	NRO		--	--	--	--	--	--	--	--									
Mercury	610	16	61	0.1		<0.016	0.017	<0.017	<0.016	<0.017	<0.022	<0.020	<0.016									
Cyanide	41000	NRO	4100	NRO		--	--	--	--	--	--	--	--									
TCLP Analysis	Class I	Class II																				
	mg/L	mg/L																				
Chromium (TCLP)	0.1	1				--	--	--	--	<0.025	<0.025	--	--									
Lead (TCLP)	0.0075	0.1				--	--	--	--	--	--	--	--									
Selenium (TCLP)	0.05	0.05				--	--	--	--	--	--	--	--									
Chromium (SPLP)	0.1	1				--	--	--	--	--	--	--	--									
Cobalt (SPLP)	1.0	1.0				--	--	--	--	--	--	--	--									

Tier 1 Soil Remediation Objectives (SROs) are based on Title 35 Part 742 Tier 1
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-- not analyzed

Table 3
Analytical Results for Soil Samples - Metals
Joint Public Safety Training Campus

Analyte	Tier 1 Soil Remediation Objectives				Sample ID	TP-24-S1 (3-5')	TP-24-S2 (8-10')	TP-25-S1 (3-5')	TP-25-S2 (5-10')	SB1-1	SB1-4	SB2-1	SB2-3	SB3-1	SB3-3	SB4-1	
	Industrial/ Commercial		Construction Worker														
					Depth	3-5	8-10	3-5	5-10	1-3	8.5-10.5	1-3	6-8	1-3	6-8	1-3	
	Ingestion	Inhalation	Ingestion	Inhalation	Sample Date	6/26/2019	6/26/2019	6/26/2019	6/26/2019	6/19/91	6/19/91	6/19/91	6/19/91	6/19/91	6/19/91	6/19/91	6/19/91
	mg/Kg	mg/Kg	mg/Kg	mg/Kg	pH	8.35	7.16	8.10	8.25								
Antimony	820	NRO	82	NRO		<2.1	<2.6	<2.2	<2.2	--	--	--	--	--	--	--	
Arsenic	13	1200	61	25000		2.3	4.7	5.2	3.0	8.84	3.44	13	3.36	12.2	2.77	3.38	
Barium	140000	910000	14000	870000		17	91	38	15	21.8	53	47.2	25.3	52.2	12.7	10.8	
Beryllium	4100	2100	410	44000		--	--	--	--	--	--	--	--	--	--	--	
Cadmium	2000	2800	200	59000		0.26	0.44	0.45	0.33	<1.00	<1.00	1.6	<1.00	2.79	<1.00	<1.00	
Chromium	6100	420	4100	690		5.8	28	7.4	4.8	10	22.1	13.2	4.39	9.98	6.76	4	
Copper	82000	NRO	8200	NRO		--	--	--	--	--	--	--	--	--	--	--	
Lead	800	NRO	700	NRO		4.1	20	33	11	91.9	25.9	166	<20.0	261	<20.0	<20.0	
Nickel	41000	21000	4100	440000		--	--	--	--	--	--	--	--	--	--	--	
Selenium	10000	NRO	1000	NRO		<1.0	1.4	<1.1	<1.1	0.45	<0.40	0.9	<0.40	0.85	<0.40	<0.40	
Silver	10000	NRO	1000	NRO		1.7	4.0	1.3	1.1	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	
Thallium	160	NRO	160	NRO		--	--	--	--	--	--	--	--	--	--	--	
Zinc	610000	NRO	61000	NRO		--	--	--	--	--	--	--	--	--	--	--	
Mercury	610	16	61	0.1		<0.018	0.024	0.029	<0.019	0.1	<0.04	0.31	<0.04	0.17	<0.04	<0.04	
Cyanide	41000	NRO	4100	NRO		--	--	--	--	<1.25	<1.25	<1.25	<1.25	<1.25	<1.25	<1.25	
TCLP Analysis	Class I	Class II															
	mg/L	mg/L															
Chromium (TCLP)	0.1	1				--	<0.025	--	--	--	--	--	--	--	--	--	
Lead (TCLP)	0.0075	0.1				--	--	--	--	--	--	--	--	--	--	--	
Selenium (TCLP)	0.05	0.05				--	<0.050	--	--	--	--	--	--	--	--	--	
Chromium (SPLP)	0.1	1				--	--	--	--	--	--	--	--	--	--	--	
Cobalt (SPLP)	1.0	1.0				--	--	--	--	--	--	--	--	--	--	--	

Tier 1 Soil Remediation Objectives (SROs) are based on Title 35 Part 742 Tier 1
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-- not analyzed

Table 3
Analytical Results for Soil Samples - Metals
Joint Public Safety Training Campus

Analyte	Tier 1 Soil Remediation Objectives																		
	Industrial/ Commercial		Construction Worker		Sample ID	SB4-4	SB5-1	SB5-4	SB6-1	SB6-4	SB7-4	SB7-5	SB8-1	SB8-3	SB9-2	SB9-3	SB10-1	SB10-4	GP-1A
					Depth	8.5-10.5	1-3	8.5-10.5	1-3	8.5-10.5	8.5-10.5	11-13	1-3	8.5-10.5	3.5-5.5	6-8	1-3	8.5-10.5	0-2
	Ingestion	Inhalation	Ingestion	Inhalation	Sample Date	6/19/91	6/19/91	6/19/91	6/19/91	6/19/91	6/19/91	6/19/91	6/19/91	6/19/91	6/19/91	6/19/91	6/19/91	6/19/91	9/5/07
	mg/Kg	mg/Kg	mg/Kg	mg/Kg	pH														8.1
Antimony	820	NRO	82	NRO		--	--	--	--	--	--	--	--	--	--	--	--	--	4.6
Arsenic	13	1200	61	25000		3.47	4.51	5.42	3.53	2.38	2.65	2.72	2.09	3.15	3.26	2.94	5.45	13.8	7.9
Barium	140000	910000	14000	870000		55.4	10.8	42.6	9.95	6.71	6.57	8.81	5.81	39	26.1	19.2	13.9	38.5	--
Beryllium	4100	2100	410	44000		--	--	--	--	--	--	--	--	--	--	--	--	--	0.29
Cadmium	2000	2800	200	59000		<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	0.8
Chromium	6100	420	4100	690		19.4	3.79	19.2	5.81	3.2	2.38	4.96	2.17	2.37	7.22	3.95	3.98	8.03	20
Copper	82000	NRO	8200	NRO		--	--	--	--	--	--	--	--	--	--	--	--	--	45
Lead	800	NRO	700	NRO		<20.0	32.5	22.3	22.9	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	346	130
Nickel	41000	21000	4100	440000		--	--	--	--	--	--	--	--	--	--	--	--	--	15
Selenium	10000	NRO	1000	NRO		<0.40	<0.40	0.65	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	0.66	0.66
Silver	10000	NRO	1000	NRO		<2.00	2	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<0.49
Thallium	160	NRO	160	NRO		--	--	--	--	--	--	--	--	--	--	--	--	--	<0.25
Zinc	610000	NRO	61000	NRO		--	--	--	--	--	--	--	--	--	--	--	--	--	110
Mercury	610	16	61	0.1		<0.04	<0.04	<0.04	0.06	<0.04	<0.04	<0.04	<0.04	0.06	<0.04	<0.04	<0.04	0.14	0.087
Cyanide	41000	NRO	4100	NRO		<1.25	<1.25	<1.25	<1.25	<1.25	<1.25	<1.25	<1.25	<1.25	<1.25	<1.25	<1.25	<1.25	--
TCLP Analysis	Class I	Class II																	
	mg/L	mg/L																	
Chromium (TCLP)	0.1	1				--	--	--	--	--	--	--	--	--	--	--	--	--	--
Lead (TCLP)	0.0075	0.1				--	--	--	--	--	--	--	--	--	--	--	--	--	--
Selenium (TCLP)	0.05	0.05				--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chromium (SPLP)	0.1	1				--	--	--	--	--	--	--	--	--	--	--	--	--	--
Cobalt (SPLP)	1.0	1.0				--	--	--	--	--	--	--	--	--	--	--	--	--	--

Tier 1 Soil Remediation Objectives (SROs) are based on Title 35 Part 742 Tier 1
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any one of the SROs.
NRO = (No Remediation Objective) was provided in tables.
-- not analyzed

Table 3
Analytical Results for Soil Samples - Metals
Joint Public Safety Training Campus

Analyte	Tier 1 Soil Remediation Objectives				Sample ID	GP-3A	GP-4B	GP-4E	GP-5A	GP-6A	GP-6C	GP-7D	GP-7F	GP-8A	GP-9B	GP-10B	GP-11B	GP-11D	GP-13A	GP-13D
	Industrial/ Commercial		Construction Worker																	
	Ingestion	Inhalation	Ingestion	Inhalation																
	mg/Kg	mg/Kg	mg/Kg	mg/Kg																
				Sample Date	9/5/07	9/5/07	9/5/07	9/5/07	9/5/07	9/5/07	9/5/07	9/5/07	9/5/07	9/5/07	9/5/07	9/5/07	9/5/07	9/5/07	9/5/07	9/5/07
				pH	7.8	8.1	7.4	7.3	7.4	7.9	7.7	7.6	8.2	8.1	8.1	8.3	8	7.8	8.4	
Antimony	820	NRO	82	NRO		1.2	1.5	23	5.4	<1.1	3.6	2.6	3	2.5	7.3	<0.97	<1.1	<0.98	5.6	<0.97
Arsenic	13	1200	61	25000		4	5.2	6.2	6.8	7.7	5.2	11	7.6	5.8	5.5	3.4	9.2	4.6	8.1	2.5
Barium	140000	910000	14000	870000		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Beryllium	4100	2100	410	44000		0.46	0.33	0.38	0.5	0.47	0.4	0.72	0.42	0.34	0.48	0.19	0.75	0.56	0.58	0.08
Cadmium	2000	2800	200	59000		0.89	0.75	1.3	0.89	0.63	0.84	3.4	1.8	4.5	0.74	0.23	0.55	0.49	1.5	0.13
Chromium	6100	420	4100	690		13	15	23	11	15	13	21	23	10	5.8	6.1	20	15	12	3.5
Copper	82000	NRO	8200	NRO		24	36	150	61	26	41	62	67	41	31	14	22	19	48	6.6
Lead	800	NRO	700	NRO		88	72	310	130	21	110	270	130	83	140	11	15	22	170	4.4
Nickel	41000	21000	4100	440000		14	13	14	15	26	21	21	20	12	8.8	6.8	30	22	14	5.4
Selenium	10000	NRO	1000	NRO		0.63	0.48	0.69	0.89	0.46	0.46	0.87	0.67	0.56	0.67	0.28	0.57	0.45	1.1	<0.24
Silver	10000	NRO	1000	NRO		<0.53	<0.56	<0.51	<0.55	<0.55	<0.52	<0.55	<0.57	<0.50	<0.53	<0.49	<0.55	<0.49	<0.50	<0.49
Thallium	160	NRO	160	NRO		0.27	<0.28	<0.26	0.41	0.55	<0.26	0.3	<0.28	<0.25	0.32	<0.24	0.29	0.29	0.42	<0.24
Zinc	610000	NRO	61000	NRO		130	90	180	120	50	140	330	250	190	66	37	40	45	250	20
Mercury	610	16	61	0.1		--	0.044	0.16	0.087	<0.045	0.16	0.76	0.16	0.1	<0.041	<0.044	<0.041	0.045	0.12	<0.040
Cyanide	41000	NRO	4100	NRO		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TCLP Analysis	Class I	Class II																		
	mg/L	mg/L																		
Chromium (TCLP)	0.1	1				--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Lead (TCLP)	0.0075	0.1				--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Selenium (TCLP)	0.05	0.05				--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chromium (SPLP)	0.1	1				--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Cobalt (SPLP)	1.0	1.0				--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

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Table 3
Analytical Results for Soil Samples - Metals
Joint Public Safety Training Campus

Analyte	Tier 1 Soil Remediation Objectives																		
	Industrial/ Commercial		Construction Worker		Sample ID	GP-14B	GP-15A	GP-16B	GP-16E	GP-17A	GP-18B	GP-19A	ESB-1A	ESB-1C	ESB-2A	ESB-3A	ESB-3B	ESB-4A	ESB-5A
					Depth	2-4	0-2	2-4	8-10	0-2	2-4	0-2	0-2	13-14	1.5-2.5	1-4	5.5-6.5	0.5-1.5	0-1
	Ingestion	Inhalation	Ingestion	Inhalation	Sample Date	9/5/07	9/5/07	9/5/07	9/5/07	9/5/07	9/5/07	9/5/07	8/9/17	8/9/17	8/2/17	8/2/17	8/2/17	8/7/17	8/3/17
	mg/Kg	mg/Kg	mg/Kg	mg/Kg	pH	8.3	7.8	8.7	8.2	8.2	8.6	8.2	8.05	--	8.21	8.15	--	7.86	7.89
Antimony	820	NRO	82	NRO		<1.0	7.6	<1.0	<0.98	3.6	<1.0	1.9	< 1.8	--	< 2.1	< 1.9	--	2	2.2
Arsenic	13	1200	61	25000		3.9	12	2.6	3.1	18	2.4	5.4	8.6	--	8.6	6.4	--	13	12
Barium	140000	910000	14000	870000		--	--	--	--	--	--	--	--	--	42	45	--	79	40
Beryllium	4100	2100	410	44000		0.12	0.87	0.09	0.14	0.68	0.1	0.33	0.53	--	0.54	< 0.48	--	0.69	0.62
Cadmium	2000	2800	200	59000		0.22	3.2	0.16	0.19	2.3	0.12	1.5	0.48	--	0.59	0.56	--	2.1	2.1
Chromium	6100	420	4100	690		5	20	3.1	6.8	15	3.6	35	16	--	17	13	--	18	21
Copper	82000	NRO	8200	NRO		10	78	6.3	11	130	5.7	41	39	--	47	77	--	78	93
Lead	800	NRO	700	NRO		34	320	3.6	7.5	230	2.8	96	51	--	94	160	--	180	210
Nickel	41000	21000	4100	440000		6.8	22	4.6	7.1	23	4.5	20	24	--	27	15	--	19	21
Selenium	10000	NRO	1000	NRO		<0.26	1.1	<0.26	0.41	0.74	<0.26	0.61	< 0.92	--	< 1.0	< 0.95	--	< 0.97	1.1
Silver	10000	NRO	1000	NRO		<0.51	<0.51	<0.51	<0.49	<0.53	<0.51	<0.53	< 0.92	--	< 1.0	< 0.95	--	< 0.97	< 0.92
Thallium	160	NRO	160	NRO		<0.26	0.35	<0.26	<0.24	0.31	<0.26	<0.26	< 0.92	--	< 1.0	< 0.95	--	a	< 0.92
Zinc	610000	NRO	61000	NRO		26	340	18	23	390	16	450	110	--	130	180	--	690	750
Mercury	610	16	61	0.1		<0.043	0.28	<0.040	<0.038	7.5	<0.042	0.066	0.043	--	0.038	0.065	--	0.14	0.15
Cyanide	41000	NRO	4100	NRO		--	--	--	--	--	--	--	--	--	< 0.29	< 0.27	--	< 0.27	<0.26
TCLP Analysis	Class I	Class II																	
	mg/L	mg/L																	
Chromium (TCLP)	0.1	1				--	--	--	--	--	--	--	--	--	--	--	--	--	--
Lead (TCLP)	0.0075	0.1				--	--	--	--	--	--	--	--	--	--	--	--	--	--
Selenium (TCLP)	0.05	0.05				--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chromium (SPLP)	0.1	1				--	--	--	--	--	--	--	--	--	--	--	--	--	--
Cobalt (SPLP)	1.0	1.0				--	--	--	--	--	--	--	--	--	< 0.0040	--	--	--	--

Tier 1 Soil Remediation Objectives (SROs) are based on Title 35 Part 742 Tier 1
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any one of the SROs.
NRO = (No Remediation Objective) was provided in tables.
-- not analyzed

Table 3
Analytical Results for Soil Samples - Metals
Joint Public Safety Training Campus

Analyte	Tier 1 Soil Remediation Objectives				Sample ID	B-1A	B-2A	B-3A	B-3B	B-4A	B-6A	B-6B	B-7A	B-9A	B-10A	B-11A	B-12A	B-14A	B-15A	B-16A
	Industrial/ Commercial		Construction Worker			Depth	2-4	0-2	0-2	6-8	0-2	1-3	8-10	0-2	1-3	0-1	1-2	0-2	1-2	1.5-3
	Ingestion	Inhalation	Ingestion	Inhalation	Sample Date	8/9/17	8/9/17	8/8/17	8/8/17	8/2/17	8/8/17	8/8/17	8/2/17	8/8/17	8/7/17	8/8/17	8/7/17	8/4/17	8/8/17	8/7/17
	mg/Kg	mg/Kg	mg/Kg	mg/Kg	pH	8.07	7.92	7.77	8.04	7.61	9.92	8.22	7.42	7.74	7.82	7.97	7.81	7.21	7.49	8.36
Antimony	820	NRO	82	NRO		< 1.8	< 1.9	< 1.9	< 2.0	2.5	< 2.0	3.4	4.6	8	4.1	< 2.0	< 1.8	< 1.9	3.3	< 1.9
Arsenic	13	1200	61	25000		6.2	12	4.2	2.7	12	6.8	13	12	14	7.5	8.6	7.2	11	11	8.8
Barium	140000	910000	14000	870000		--	--	--	13	--	--	--	--	--	--	--	--	--	--	--
Beryllium	4100	2100	410	44000		< 0.45	0.6	< 0.48	< 0.49	1.1	0.56	0.57	1.6	0.56	< 0.46	0.78	0.5	< 0.48	0.77	< 0.47
Cadmium	2000	2800	200	59000		0.47	0.76	< 0.48	< 0.49	1.5	< 0.49	2.7	1.4	1.3	0.96	< 0.50	0.6	< 0.48	0.8	0.96
Chromium	6100	420	4100	690		16	18	9.5	6.7	16	20	29	13	17	12	20	12	7.2	11	13
Copper	82000	NRO	8200	NRO		27	58	18	7.7	83	41	170	79	90	67	35	46	24	66	46
Lead	800	NRO	700	NRO		75	85	29	6.4	190	66	240	160	320	130	38	86	53	170	110
Nickel	41000	21000	4100	440000		10	29	12	7.4	17	29	31	18	19	16	31	15	11	15	13
Selenium	10000	NRO	1000	NRO		< 0.91	< 0.96	< 0.96	< 0.98	1.6	< 0.98	1.2	2	1.2	< 0.93	< 0.99	< 0.90	< 0.96	1.3	< 0.94
Silver	10000	NRO	1000	NRO		< 0.91	< 0.96	< 0.96	< 0.98	< 0.95	< 0.98	< 1.1	< 1.0	< 0.97	< 0.93	< 0.99	< 0.90	< 0.96	< 0.96	< 0.94
Thallium	160	NRO	160	NRO		< 0.91	< 0.96	< 0.96	< 0.98	< 0.95	< 0.98	< 1.1	< 1.0	< 0.97	< 0.93	< 0.99	< 0.90	< 0.96	< 0.96	< 0.94
Zinc	610000	NRO	61000	NRO		93	180	59	25	280	100	650	180	370	200	67	160	80	210	260
Mercury	610	16	61	0.1		0.073	0.061	0.075	0.047	0.086	0.077	0.24	0.23	0.22	0.2	0.033	0.32	0.091	0.09	0.075
Cyanide	41000	NRO	4100	NRO		--	--	--	<0.27	--	--	--	--	--	--	--	--	--	--	--
TCLP Analysis	Class I	Class II																		
	mg/L	mg/L																		
Chromium (TCLP)	0.1	1				--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Lead (TCLP)	0.0075	0.1				--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Selenium (TCLP)	0.05	0.05				--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chromium (SPLP)	0.1	1				--	--	--	--	--	--	<0.0040	--	--	--	--	--	--	--	--
Cobalt (SPLP)	1.0	1.0				--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Tier 1 Soil Remediation Objectives (SROs) are based on Title 35 Part 742 Tier 1
Appendix B Table B, C and D.
Results that are Bolded and Shaded indicate that the measured concentration exceeds
any one of the SROs.
NRO = (No Remediation Objective) was provided in tables.
-- not analyzed

Table 3
Analytical Results for Soil Samples - Metals
Joint Public Safety Training Campus

Analyte	Tier 1 Soil Remediation Objectives				Sample ID	B-17A	B-18A	B-18B
	Industrial/ Commercial		Construction Worker					
	Ingestion	Inhalation	Ingestion	Inhalation	Sample Date	8/4/17	8/9/17	8/9/17
	mg/Kg	mg/Kg	mg/Kg	mg/Kg	pH	7.95	7.65	--
Antimony	820	NRO	82	NRO		4.3	3	--
Arsenic	13	1200	61	25000		34	20	--
Barium	140000	910000	14000	870000		--	99	--
Beryllium	4100	2100	410	44000		0.89	0.7	--
Cadmium	2000	2800	200	59000		1.9	3.1	--
Chromium	6100	420	4100	690		18	61	--
Copper	82000	NRO	8200	NRO		120	210	--
Lead	800	NRO	700	NRO		300	280	--
Nickel	41000	21000	4100	440000		24	41	--
Selenium	10000	NRO	1000	NRO		2	0.97	--
Silver	10000	NRO	1000	NRO		< 0.95	< 0.94	--
Thallium	160	NRO	160	NRO		< 0.95	< 0.94	--
Zinc	610000	NRO	61000	NRO		910	500	--
Mercury	610	16	61	0.1		0.097	0.25	--
Cyanide	41000	NRO	4100	NRO		--	0.27	--
TCLP Analysis	Class I	Class II						
	mg/L	mg/L						
Chromium (TCLP)	0.1	1				--	--	--
Lead (TCLP)	0.0075	0.1				--	--	--
Selenium (TCLP)	0.05	0.05				--	--	--
Chromium (SPLP)	0.1	1				--	0.006	--
Cobalt (SPLP)	1.0	1.0				--	--	--

Tier 1 Soil Remediation Objectives (SROs) are based on Title 35 Part 742 Tier 1 Appendix B Table B, C and D.
 Results that are Bolded and Shaded indicate that the measured concentration exceeds any one of the SROs.
 NRO = (No Remediation Objective) was provided in tables.
 -- not analyzed

Table 4
Analytical Results for Soil Samples - Metals
Joint Public Safety Training Campus

Analyte	Tier 1 Soil Remediation Objectives				Sample ID	ESB-1A	ESB-1C	ESB-2A	ESB-3A	ESB-3B	ESB-4A	ESB-5A	ESB-6A	B-1A	B-2A	B-3A	B-3B	B-4A	B-6A															
	Industrial/ Commercial		Construction Worker																															
	Depth	0-2	13-14	1.5-2.5																1-4	5.5-6.5	0.5-1.5	0-1	2-4	2-4	0-2	0-2	6-8	0-2	1-3				
	Ingestion	Inhalation	Ingestion	Inhalation																Sample Date	8/9/17	8/9/17	8/2/17	8/2/17	8/2/17	8/7/17	8/3/17	8/4/17	8/9/17	8/9/17	8/8/17	8/8/17	8/2/17	8/8/17
	mg/Kg	mg/Kg	mg/Kg	mg/Kg																pH	8.05	--	8.21	8.15	--	7.86	7.89	7.56	8.07	7.92	7.77	8.04	7.61	9.92
Aluminum	NRO	NRO	NRO	NRO	--	--	6600	4400	--	3900	3600	4500	--	--	--	2600	--	--																
Calcium	NRO	NRO	NRO	NRO	--	--	40000	80000	--	42000	68000	49000	--	--	--	50000	--	--																
Cobalt	120000	NRO	12000	NRO	--	--	9.3	4.7	--	6.3	5.8	7.1	--	--	--	3.1	--	--																
Iron	NRO	NRO	NRO	NRO	--	--	24000	19000	--	28000	35000	39000	--	--	--	7600	--	--																
Magnesium	NRO	NRO	730000	NRO	--	--	23000	43000	--	23000	31000	26000	--	--	--	26000	--	--																
Manganese	41000	91000	4100	8700	--	--	410	340	--	360	470	1400	--	--	--	200	--	--																
Potassium	NRO	NRO	NRO	NRO	--	--	1400	800	--	630	440	730	--	--	--	440	--	--																
Sodium	NRO	NRO	NRO	NRO	--	--	100	180	--	150	180	250	--	--	--	95	--	--																
Vanadium	14000	NRO	1400	NRO	--	--	17	18	--	18	17	20	--	--	--	12	--	--																
TCLP Analysis	Class I	Class II																																
	mg/L	mg/L																																
Iron (TCLP)	5.0	5.0			--	--	--	<0.25	--	3.1	2.4	--	--	--	--	--	--	--																
Iron (SPLP)	5.0	5.0			--	--	0.65	--	--	--	--	0.86	--	--	--	--	--	--																
Manganese (SPLP)	0.15	10			--	--	--	--	--	--	--	0.012	--	--	--	--	--	--																

Tier 1 Soil Remediation Objectives (SROs) are based on Title 35 Part 742 Tier 1 Appendix B Table B, C and D.
 Results that are Bolded and Shaded indicate that the measured concentration exceeds any one of the SROs.
 NRO = (No Remediation Objective) was provided in tables.
 -- not analyzed

Table 4
Analytical Results for Soil Samples - Metals
Joint Public Safety Training Campus

Analyte	Tier 1 Soil Remediation Objectives				Sample ID	B-6B	B-7A	B-9A	B-10A	B-11A	B-12A	B-14A	B-15A	B-16A	B-17A	B-18A	B-18B													
	Industrial/ Commercial		Construction Worker																											
																		Depth	8-10	0-2	1-3	0-1	1-2	0-2	1-2	1.5-3	1-2	0-2	0-2	4.5-5.5
	Ingestion	Inhalation	Ingestion	Inhalation														Sample Date	8/8/17	8/2/17	8/8/17	8/7/17	8/8/17	8/7/17	8/4/17	8/8/17	8/7/17	8/4/17	8/9/17	8/9/17
	mg/Kg	mg/Kg	mg/Kg	mg/Kg														pH	8.22	7.42	7.74	7.82	7.97	7.81	7.21	7.49	8.36	7.95	7.65	--
Aluminum	NRO	NRO	NRO	NRO		--	--	--	--	--	--	--	--	--	--	3500	--													
Calcium	NRO	NRO	NRO	NRO		--	--	--	--	--	--	--	--	--	--	19000	--													
Cobalt	120000	NRO	12000	NRO		--	--	--	--	--	--	--	--	--	--	7.7	--													
Iron	NRO	NRO	NRO	NRO		--	--	--	--	--	--	--	--	--	--	64000	--													
Magnesium	NRO	NRO	730000	NRO		--	--	--	--	--	--	--	--	--	--	9000	--													
Manganese	41000	91000	4100	8700		--	--	--	--	--	--	--	--	--	--	750	--													
Potassium	NRO	NRO	NRO	NRO		--	--	--	--	--	--	--	--	--	--	360	--													
Sodium	NRO	NRO	NRO	NRO		--	--	--	--	--	--	--	--	--	--	180	--													
Vanadium	14000	NRO	1400	NRO		--	--	--	--	--	--	--	--	--	--	19	--													
TCLP Analysis	Class I	Class II																												
	mg/L	mg/L																												
Iron (TCLP)	5.0	5.0				--	--	--	--	--	--	--	--	--	--	2.8	--													
Iron (SPLP)	5.0	5.0				--	--	--	--	--	--	--	--	--	--	--	--													
Manganese (SPLP)	0.15	10				--	--	--	--	--	--	--	--	--	--	0.038	--													

Tier 1 Soil Remediation Objectives (SROs) are based on Title 35 Part 742 Tier 1 Appendix B Table B, C and D.
Results that are Bolded and Shaded indicate that the measured concentration exceeds any one of the SROs.
NRO = (No Remediation Objective) was provided in tables.
-- not analyzed

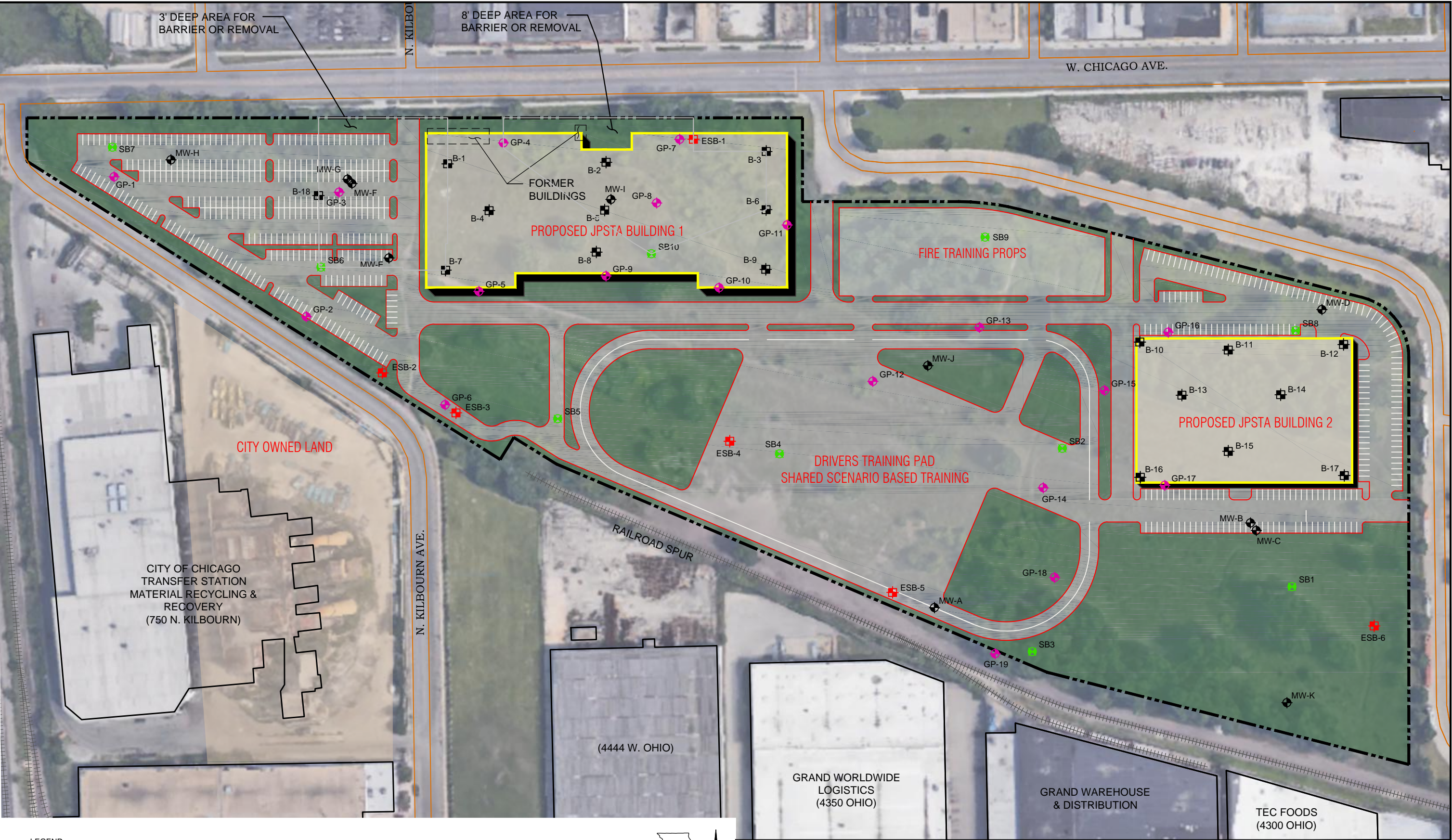
Table 5
95% UCL Summary
Joint Public Safety Training Campus

Analyte	Depth	95% UCL		Remediation Objective		Samples excluded from dataset
		Result (mg/kg)	Method	mg/kg		
Benzo(a)pyrene	All Intervals	5.378	KM H-UCL	5.7	Tier 2 IC Ingestion	GP-7D 6-8', 13 mg/kg
	Shallow (0-3)	1.495	95% KM (Chebyshev) UCL	5.7	Tier 2 IC Ingestion	none
	Deep (>3 ft)	1.789	95% Gamma Adjusted KM-UCL	5.7	Tier 2 IC Ingestion	none
	Deep (>3 ft)	0.829	95% Gamma Adjusted KM-UCL	5.7	Tier 2 IC Ingestion	GP-7D 6-8', 13 mg/kg
Arsenic	All Intervals	7.72	95% H-UCL	13	Tier 1 IC Ingestion	none
	Shallow (0-3)	10.4	95% adjusted Gamma UCL	13	Tier 1 IC Ingestion	none
	Deep (>3 ft)	6.184	95% Chebyshev (Mean, Sd) UCL	13	Tier 1 IC Ingestion	none

Notes

1. Shallow sample intervals extending 2-4 ft were considered "shallow" for this evaluation.
2. Sample intervals 2-5 ft were considered "deep" for this evaluation.
3. The Deep (>3 ft) dataset for benzo(a)pyrene was also evaluated without GP-7D 6-8, 13 mg/kg

Figures



1/8/2018 12:04 PM P:\Env\3205171606\4.0 Project Deliverables\4.3 Drawings\3205171606 SB-GW Data.dwg fig-3

LEGEND:

- APPROXIMATE SITE BOUNDARY
- SB (green circle) APPROXIMATE ENVIRONMENTAL SOIL BORING LOCATION (WARZYN 1991)
- GP (pink diamond) APPROXIMATE ENVIRONMENTAL SOIL BORING LOCATION (CARLSON 2007)
- GP (pink diamond) GEOTECHNICAL / ENVIRONMENTAL SOIL BORING LOCATION (2017)
- ESB (red square) ENVIRONMENTAL SOIL BORING LOCATION (2017)
- MW (black circle) MONITORING WELL, UNKNOWN DATE, UNKNOWN INSTALLER

0 150
SCALE: 1" = 150'





Amec Foster Wheeler
Environment & Infrastructure, Inc.


Map Showing Planned Land Development & Boring Locations
Vacant Parcel
4303 W. Chicago Avenue
Chicago, IL

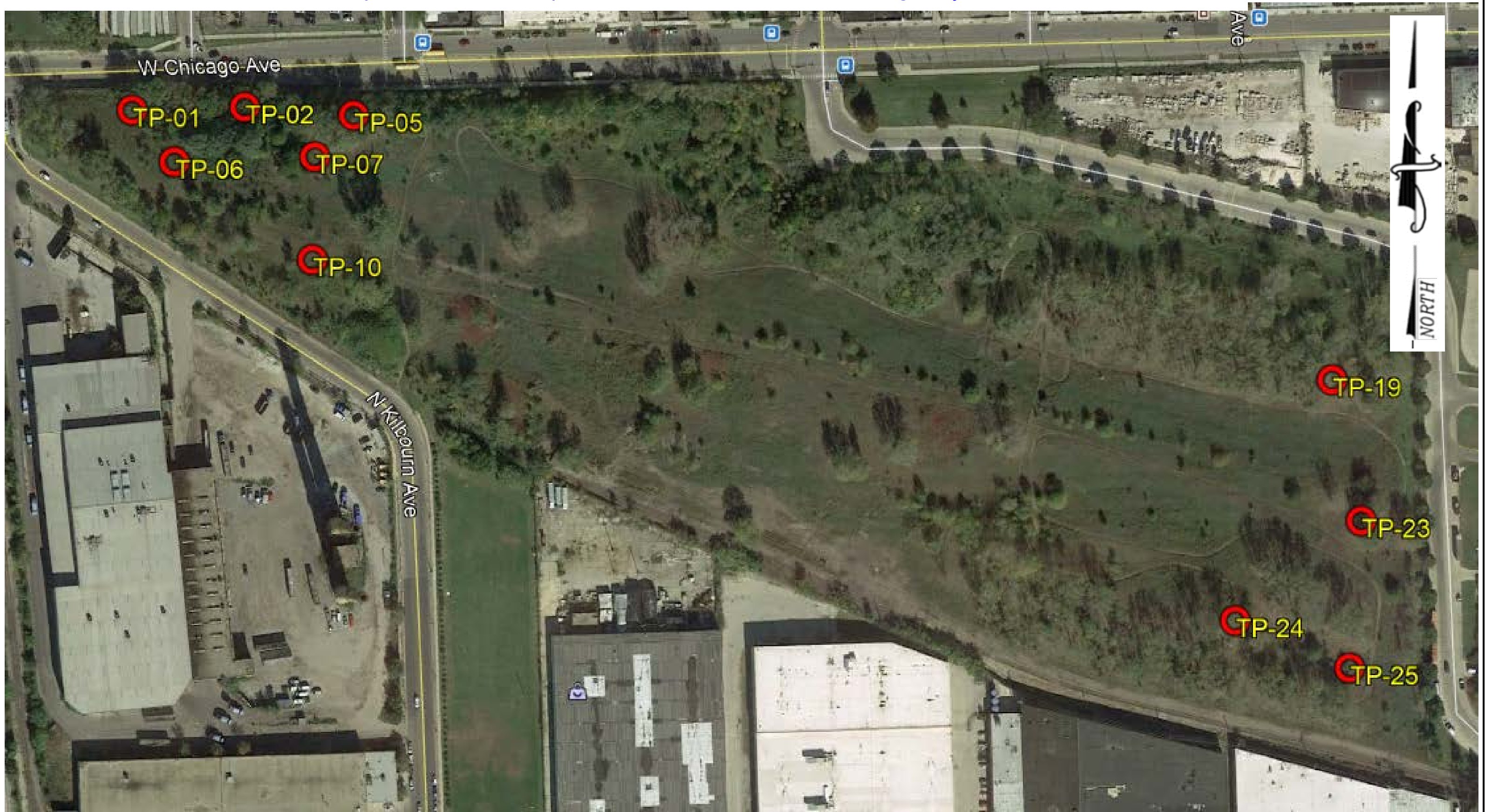
DRAWN GAP	PROJECT NUMBER 3205171606	APPROVED	DATE 11/9/17	REVISED DATE	REV. No.
--------------	------------------------------	----------	-----------------	--------------	----------

FIGURE
3

Source: Geo Services, Inc., *Summary of the Test Pit Exploration and Environmental Testing*, July 15, 2019.



TEST PIT LOCATION MAP	<div><p>Geo Services, Inc. Geotechnical, Environmental & Civil Engineering 805 Amherst Court, Suite 204 Naperville, Illinois 60565 (630) 355-2838</p></div>	DRAWN BY	DT
Joint Public Safety Training Campus		APPROVED BY	AJP
4301 W. Chicago Avenue		DATE	July 11, 2019
Chicago, Illinois		GSI JOB No.	19059
		SCALE	NTS



ENVIRONMENTAL TEST PIT LOCATION MAP	<div><p>Geo Services, Inc. Geotechnical, Environmental & Civil Engineering 805 Amherst Court, Suite 204 Naperville, Illinois 60565 (630) 355-2838</p></div>	DRAWN BY	DT
Joint Public Safety Training Campus		APPROVED BY	AJP
4301 W. Chicago Avenue		DATE	July 11, 2019
Chicago, Illinois		GSI JOB No.	19059
		SCALE	NTS

Attachment 1

Attachment 1
Tier 2 Soil Ingestion Remediation Objectives
Industrial Commercial Ingestion Exposure Route

Parameter		Unit	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Dibenz(a,h)anthracene	Rationale
Target Cancer Risk	TR	Unitless	1.00E-06	1.00E-06	1.00E-06	1.00E-06	TACO default value 35 IAC 742 Appendix C, Table B.
Averaging Time for Carcinogens	ATc	yr	70	70	70	70	TACO default value 35 IAC 742 Appendix C, Table B.
Target Hazard Quotient	THQ	Unitless	1	1	1	1	TACO default value 35 IAC 742 Appendix C, Table B.
Averaging Time for Non-Carcinogens	ATnc	yr	NA	25	NA	NA	TACO default value 35 IAC 742 Appendix C, Table B. Industrial Commercial.
Exposure Frequency	EF	day/yr	250	250	250	250	TACO default value 35 IAC 742 Appendix C, Table B. Industrial Commercial.
Exposure Duration	ED	yr	25	25	25	25	TACO default value 35 IAC 742 Appendix C, Table B. Industrial Commercial.
Body Weight	BW	kg	70	70	70	70	TACO default value 35 IAC 742 Appendix C, Table B.
Soil Ingestion Rate	IR _{soil}	mg/day	50	50	50	50	TACO default value 35 IAC 742 Appendix C, Table B. Industrial Commercial.
Oral reference dose	RfD _o	mg/kg-day	NA	3.00E-04	NA	NA	Toxicity data used from USEPA RSL website, last updated June 2017.
Oral cancer slope factor	SF _o	mg/kg-day ⁻¹	0.1	1	0.1	1	Toxicity data used from USEPA RSL website, last updated June 2017.
Tier 2 Soil Ingestion Remediation Objective - Carcinogenic	SRO	mg/kg	57	5.7	57	5.7	Calculated value. 35 IAC 742 Appendix C, Table A SSL Equation: S3.
Tier 2 Soil Ingestion Remediation Objective - Non-carcinogenic	SRO	mg/kg	NA	613	NA	NA	Calculated value. 35 IAC 742 Appendix C, Table A SSL Equation: S1.

Attachment 2

95% UCL Input Benzo(a)pyrene - All Intervals
Joint Public Safety Training Campus

Sample ID	BaP	D_BaP	Sample Depth
SB1-1	0.25	1	1-3
SB2-1	0.094	1	1-3
SB3-1	0.48	1	1-3
SB4-1	0.0051	1	1-3
SB5-1	0.14	1	1-3
SB6-1	0.016	1	1-3
SB8-1	0.033	1	1-3
SB10-1	0.026	1	1-3
GP-1A	0.9	1	0-2
GP-2B	0.55	1	2-4
GP-3A	6.3	1	0-2
GP-4B	1.1	1	2-4
GP-5A	0.072	1	0-2
GP-6A	0.086	1	0-2
GP-11B	0.056	0	2-4
GP-13A	0.16	1	0-2
GP-16B	0.052	0	2-4
ESB-1A	0.074	1	0-2
ESB-2A	0.038	0	1.5-2.5
ESB-3A	0.84	1	1-4
ESB-4A	3.2	1	0.5-1.5
ESB-5A	0.13	1	0-1
ESB-6A	0.26	1	2-4
B-1A	0.2	1	2-4
B-2A	0.16	1	0-2
B-3A	0.13	1	0-2
B-4A	0.71	1	0-2
B-6A	3.9	1	1-3
B-7A	0.039	0	0-2
B-9A	1.2	1	1-3
B-10A	0.31	1	0-1
B-11A	0.18	1	1-2
B-12A	0.91	1	0-2
B-14A	0.17	1	1-2
B-15A	0.22	1	1.5-3
B-16A	0.089	1	1-2
B-17A	0.17	1	0-2
B-18A	0.11	1	0-2
TP-01-S2 (5-10')	0.034	0	5-10
TP-02- S1 (3-5')	0.034	0	3-5
TP-02- S2 (5-10')	0.034	0	5-10
TP-05- S1 (3-5')	2.1	1	3-5
TP-05- S2 (5-10')	1.3	1	5-10
TP-06-S2 (5-10')	0.035	0	5-10
TP-07-S2 (5-10')	0.034	0	5-10
TP10-S1 (3-5')	0.035	0	3-5
TP10-S2 (5-10')	0.034	0	5-10
TP-19-S1 (3-5')	0.036	0	3-5
TP-19-S2 (5-8')	0.045	0	5-8
TP-23-S1 (3-5')	0.04	0	3-5
TP-23-S2 (5-10')	0.035	0	5-10

95% UCL Input Benzo(a)pyrene - All Intervals

Joint Public Safety Training Campus

TP-24-S1 (3-5')	0.037	0	3-5
TP-24-S2 (8-10')	0.048	0	8-10
TP-25-S1 (3-5')	0.2	1	3-5
TP-25-S2 (5-10')	0.043	1	5-10
SB1-4	0.0025	1	8.5-10.5
SB2-3	0.0019	1	6-8
SB3-3	0.029	1	6-8
SB4-4	0.00071	1	8.5-10.5
SB5-4	0.0052	1	8.5-10.5
SB6-4	0.0018	1	8.5-10.5
SB7-4	0.0007	0	8.5-10.5
SB7-5	0.0007	0	11-13
SB8-3	0.031	1	8.5-10.5
SB9-2	0.0042	1	3.5-5.5
SB9-3	0.0007	0	6-8
SB10-4	0.014	0	8.5-10.5
GP-4E	0.16	1	8-10
GP-6C	3.8	1	4-6
GP-7F	2.3	1	10-12
GP-11D	3.1	1	6-8
GP-13D	0.05	0	6-8
GP-16E	0.054	0	8-10
ESB-1C	0.034	0	13-14
ESB-3B	3	1	5.5-6.5
B-3B	0.036	0	6-8
B-6B	0.68	1	8-10
B-18B	0.034	0	4.5-5.5
TP-01-S1 (2-5')	0.034	0	2-5
TP-06-S1 (2-5')	0.034	0	2-5
TP-07-S1 (2-5')	0.034	0	2-5

User Selected Options

Date/Time of Computation ProUCL 5.110/19/2020 10:26:35 AM
 From File JPSTC_BaP_Input_20201019_a.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

BaP_All_2

General Statistics

Total Number of Observations	81	Number of Distinct Observations	62
Number of Detects	52	Number of Non-Detects	29
Number of Distinct Detects	47	Number of Distinct Non-Detects	15
Minimum Detect	7.1000E-4	Minimum Non-Detect	7.0000E-4
Maximum Detect	6.3	Maximum Non-Detect	0.056
Variance Detects	1.687	Percent Non-Detects	35.8%
Mean Detects	0.768	SD Detects	1.299
Median Detects	0.17	CV Detects	1.691
Skewness Detects	2.437	Kurtosis Detects	6.292
Mean of Logged Detects	-1.84	SD of Logged Detects	2.201

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.637	Normal GOF Test on Detected Observations Only
5% Shapiro Wilk P Value	1.776E-15	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.292	Lilliefors GOF Test
5% Lilliefors Critical Value	0.122	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.496	KM Standard Error of Mean	0.123
KM SD	1.093	95% KM (BCA) UCL	0.705
95% KM (t) UCL	0.7	95% KM (Percentile Bootstrap) UCL	0.703
95% KM (z) UCL	0.698	95% KM Bootstrap t UCL	0.769
90% KM Chebyshev UCL	0.864	95% KM Chebyshev UCL	1.031
97.5% KM Chebyshev UCL	1.262	99% KM Chebyshev UCL	1.716

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.883	Anderson-Darling GOF Test
5% A-D Critical Value	0.835	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.155	Kolmogorov-Smirnov GOF
5% K-S Critical Value	0.132	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.415	k star (bias corrected MLE)	0.404
Theta hat (MLE)	1.851	Theta star (bias corrected MLE)	1.902
nu hat (MLE)	43.16	nu star (bias corrected)	42
Mean (detects)	0.768		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	7.1000E-4	Mean	0.497
Maximum	6.3	Median	0.033
SD	1.1	CV	2.214
k hat (MLE)	0.32	k star (bias corrected MLE)	0.317
Theta hat (MLE)	1.551	Theta star (bias corrected MLE)	1.568
nu hat (MLE)	51.88	nu star (bias corrected)	51.29
Adjusted Level of Significance (β)	0.047		
Approximate Chi Square Value (51.29, α)	35.85	Adjusted Chi Square Value (51.29, β)	35.61
95% Gamma Approximate UCL (use when $n \geq 50$)	0.711	95% Gamma Adjusted UCL (use when $n < 50$)	0.715

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.496	SD (KM)	1.093
Variance (KM)	1.195	SE of Mean (KM)	0.123
k hat (KM)	0.206	k star (KM)	0.207
nu hat (KM)	33.4	nu star (KM)	33.49
theta hat (KM)	2.407	theta star (KM)	2.4
80% gamma percentile (KM)	0.665	90% gamma percentile (KM)	1.501
95% gamma percentile (KM)	2.535	99% gamma percentile (KM)	5.366

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (33.49, α)	21.26	Adjusted Chi Square Value (33.49, β)	21.08
95% Gamma Approximate KM-UCL (use when $n \geq 50$)	0.782	95% Gamma Adjusted KM-UCL (use when $n < 50$)	0.788

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Approximate Test Statistic	0.949	Shapiro Wilk GOF Test
5% Shapiro Wilk P Value	0.045	Detected Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.11	Lilliefors GOF Test
5% Lilliefors Critical Value	0.122	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Approximate Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.495	Mean in Log Scale	-3.157
SD in Original Scale	1.1	SD in Log Scale	2.605
95% t UCL (assumes normality of ROS data)	0.699	95% Percentile Bootstrap UCL	0.704
95% BCA Bootstrap UCL	0.747	95% Bootstrap t UCL	0.774
95% H-UCL (Log ROS)	4.235		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-3.226	KM Geo Mean	0.0397
KM SD (logged)	2.693	95% Critical H Value (KM-Log)	4.258
KM Standard Error of Mean (logged)	0.335	95% H-UCL (KM -Log)	5.378
KM SD (logged)	2.693	95% Critical H Value (KM-Log)	4.258
KM Standard Error of Mean (logged)	0.335		

DL/2 Statistics

DL/2 Normal

Mean in Original Scale	0.499
SD in Original Scale	1.098
95% t UCL (Assumes normality)	0.702

DL/2 Log-Transformed

Mean in Log Scale	-2.757
SD in Log Scale	2.272
95% H-Stat UCL	2.151

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Approximate Lognormal Distributed at 5% Significance Level

Suggested UCL to Use

KM H-UCL 5.378

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

95% UCL Input Benzo(a)pyrene - Shallow
Joint Public Safety Training Campus

Sample ID	BaP	D_BaP	Sample Depth
SB1-1	0.25	1	1-3
SB2-1	0.094	1	1-3
SB3-1	0.48	1	1-3
SB4-1	0.0051	1	1-3
SB5-1	0.14	1	1-3
SB6-1	0.016	1	1-3
SB8-1	0.033	1	1-3
SB10-1	0.026	1	1-3
GP-1A	0.9	1	0-2
GP-2B	0.55	1	2-4
GP-3A	6.3	1	0-2
GP-4B	1.1	1	2-4
GP-5A	0.072	1	0-2
GP-6A	0.086	1	0-2
GP-11B	0.056	0	2-4
GP-13A	0.16	1	0-2
GP-16B	0.052	0	2-4
ESB-1A	0.074	1	0-2
ESB-2A	0.038	0	1.5-2.5
ESB-3A	0.84	1	1-4
ESB-4A	3.2	1	0.5-1.5
ESB-5A	0.13	1	0-1
ESB-6A	0.26	1	2-4
B-1A	0.2	1	2-4
B-2A	0.16	1	0-2
B-3A	0.13	1	0-2
B-4A	0.71	1	0-2
B-6A	3.9	1	1-3
B-7A	0.039	0	0-2
B-9A	1.2	1	1-3
B-10A	0.31	1	0-1
B-11A	0.18	1	1-2
B-12A	0.91	1	0-2
B-14A	0.17	1	1-2
B-15A	0.22	1	1.5-3
B-16A	0.089	1	1-2
B-17A	0.17	1	0-2
B-18A	0.11	1	0-2

User Selected Options

Date/Time of Computation ProUCL 5.110/6/2020 7:21:22 AM
 From File JPSTC_BaP_Input_20201006_a.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

BaP_Shallow

General Statistics

Total Number of Observations	38	Number of Distinct Observations	35
Number of Detects	34	Number of Non-Detects	4
Number of Distinct Detects	31	Number of Distinct Non-Detects	4
Minimum Detect	0.0051	Minimum Non-Detect	0.038
Maximum Detect	6.3	Maximum Non-Detect	0.056
Variance Detects	1.695	Percent Non-Detects	10.53%
Mean Detects	0.682	SD Detects	1.302
Median Detects	0.175	CV Detects	1.91
Skewness Detects	3.252	Kurtosis Detects	11.21
Mean of Logged Detects	-1.487	SD of Logged Detects	1.523

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.531	Shapiro Wilk GOF Test
5% Shapiro Wilk Critical Value	0.933	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.302	Lilliefors GOF Test
5% Lilliefors Critical Value	0.15	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.612	KM Standard Error of Mean	0.203
KM SD	1.23	95% KM (BCA) UCL	0.988
95% KM (t) UCL	0.954	95% KM (Percentile Bootstrap) UCL	0.96
95% KM (z) UCL	0.945	95% KM Bootstrap t UCL	1.307
90% KM Chebyshev UCL	1.22	95% KM Chebyshev UCL	1.495
97.5% KM Chebyshev UCL	1.877	99% KM Chebyshev UCL	2.627

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	1.597	Anderson-Darling GOF Test
5% A-D Critical Value	0.805	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.209	Kolmogorov-Smirnov GOF
5% K-S Critical Value	0.159	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.565	k star (bias corrected MLE)	0.535
Theta hat (MLE)	1.207	Theta star (bias corrected MLE)	1.275
nu hat (MLE)	38.41	nu star (bias corrected)	36.35
Mean (detects)	0.682		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.0051	Mean	0.611
Maximum	6.3	Median	0.165
SD	1.247	CV	2.041
k hat (MLE)	0.483	k star (bias corrected MLE)	0.462
Theta hat (MLE)	1.265	Theta star (bias corrected MLE)	1.321
nu hat (MLE)	36.7	nu star (bias corrected)	35.14
Adjusted Level of Significance (β)	0.0434		
Approximate Chi Square Value (35.14, α)	22.58	Adjusted Chi Square Value (35.14, β)	22.16
95% Gamma Approximate UCL (use when $n \geq 50$)	0.951	95% Gamma Adjusted UCL (use when $n < 50$)	0.969

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.612	SD (KM)	1.23
Variance (KM)	1.513	SE of Mean (KM)	0.203
k hat (KM)	0.248	k star (KM)	0.246
nu hat (KM)	18.81	nu star (KM)	18.66
theta hat (KM)	2.473	theta star (KM)	2.493
80% gamma percentile (KM)	0.883	90% gamma percentile (KM)	1.839
95% gamma percentile (KM)	2.978	99% gamma percentile (KM)	6.018

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (18.66, α)	9.869	Adjusted Chi Square Value (18.66, β)	9.603
95% Gamma Approximate KM-UCL (use when $n \geq 50$)	1.157	95% Gamma Adjusted KM-UCL (use when $n < 50$)	1.189

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.976	Shapiro Wilk GOF Test
5% Shapiro Wilk Critical Value	0.933	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.11	Lilliefors GOF Test
5% Lilliefors Critical Value	0.15	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.612	Mean in Log Scale	-1.746
SD in Original Scale	1.247	SD in Log Scale	1.63
95% t UCL (assumes normality of ROS data)	0.953	95% Percentile Bootstrap UCL	0.987
95% BCA Bootstrap UCL	1.076	95% Bootstrap t UCL	1.411
95% H-UCL (Log ROS)	1.556		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-1.764	KM Geo Mean	0.171
KM SD (logged)	1.65	95% Critical H Value (KM-Log)	3.237
KM Standard Error of Mean (logged)	0.277	95% H-UCL (KM -Log)	1.608
KM SD (logged)	1.65	95% Critical H Value (KM-Log)	3.237
KM Standard Error of Mean (logged)	0.277		

DL/2 Statistics

DL/2 Normal

Mean in Original Scale	0.612
SD in Original Scale	1.246
95% t UCL (Assumes normality)	0.953

DL/2 Log-Transformed

Mean in Log Scale	-1.729
SD in Log Scale	1.607
95% H-Stat UCL	1.495

Nonparametric Distribution Free UCL Statistics

Detected Data appear Lognormal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (Chebyshev) UCL 1.495

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

95% UCL Input Benzo(a)pyrene - Deep
Joint Public Safety Training Campus

Sample ID	BaP	D_BaP	Sample Depth
TP-01-S1 (2-5')	0.034	0	2-5
TP-06-S1 (2-5')	0.034	0	2-5
TP-07-S1 (2-5')	0.034	0	2-5
TP-01-S2 (5-10')	0.034	0	5-10
TP-02- S1 (3-5')	0.034	0	3-5
TP-02- S2 (5-10')	0.034	0	5-10
TP-05- S1 (3-5')	2.1	1	3-5
TP-05- S2 (5-10')	1.3	1	5-10
TP-06-S2 (5-10')	0.035	0	5-10
TP-07-S2 (5-10')	0.034	0	5-10
TP10-S1 (3-5')	0.035	0	3-5
TP10-S2 (5-10')	0.034	0	5-10
TP-19-S1 (3-5')	0.036	0	3-5
TP-19-S2 (5-8')	0.045	0	5-8
TP-23-S1 (3-5')	0.04	0	3-5
TP-23-S2 (5-10')	0.035	0	5-10
TP-24-S1 (3-5')	0.037	0	3-5
TP-24-S2 (8-10')	0.048	0	8-10
TP-25-S1 (3-5')	0.2	1	3-5
TP-25-S2 (5-10')	0.043	1	5-10
SB1-4	0.0025	1	8.5-10.5
SB2-3	0.0019	1	6-8
SB3-3	0.029	1	6-8
SB4-4	0.00071	1	8.5-10.5
SB5-4	0.0052	1	8.5-10.5
SB6-4	0.0018	1	8.5-10.5
SB7-4	0.0007	0	8.5-10.5
SB7-5	0.0007	0	11-13
SB8-3	0.031	1	8.5-10.5
SB9-2	0.0042	1	3.5-5.5
SB9-3	0.0007	0	6-8
SB10-4	0.014	0	8.5-10.5
GP-4E	0.16	1	8-10
GP-6C	3.8	1	4-6
GP-7D	13	1	6-8
GP-7F	2.3	1	10-12
GP-11D	3.1	1	6-8
GP-13D	0.05	0	6-8
GP-16E	0.054	0	8-10
ESB-1C	0.034	0	13-14
ESB-3B	3	1	5.5-6.5
B-3B	0.036	0	6-8
B-6B	0.68	1	8-10
B-18B	0.034	0	4.5-5.5

User Selected Options

Date/Time of Computation ProUCL 5.110/7/2020 7:49:16 AM
 From File JPSTC_BaP_Input_20201006_b.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

BaP_Deep

General Statistics

Total Number of Observations	44	Number of Distinct Observations	30
Number of Detects	19	Number of Non-Detects	25
Number of Distinct Detects	19	Number of Distinct Non-Detects	11
Minimum Detect	7.1000E-4	Minimum Non-Detect	7.0000E-4
Maximum Detect	13	Maximum Non-Detect	0.054
Variance Detects	9.298	Percent Non-Detects	56.82%
Mean Detects	1.566	SD Detects	3.049
Median Detects	0.16	CV Detects	1.947
Skewness Detects	3.226	Kurtosis Detects	11.86
Mean of Logged Detects	-2.241	SD of Logged Detects	3.185

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.562	Shapiro Wilk GOF Test
5% Shapiro Wilk Critical Value	0.901	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.304	Lilliefors GOF Test
5% Lilliefors Critical Value	0.197	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.68	KM Standard Error of Mean	0.325
KM SD	2.098	95% KM (BCA) UCL	1.215
95% KM (t) UCL	1.226	95% KM (Percentile Bootstrap) UCL	1.246
95% KM (z) UCL	1.214	95% KM Bootstrap t UCL	1.97
90% KM Chebyshev UCL	1.655	95% KM Chebyshev UCL	2.096
97.5% KM Chebyshev UCL	2.709	99% KM Chebyshev UCL	3.913

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.622	Anderson-Darling GOF Test
5% A-D Critical Value	0.861	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.171	Kolmogorov-Smirnov GOF
5% K-S Critical Value	0.217	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.262	k star (bias corrected MLE)	0.256
Theta hat (MLE)	5.977	Theta star (bias corrected MLE)	6.124
nu hat (MLE)	9.958	nu star (bias corrected)	9.719
Mean (detects)	1.566		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	7.1000E-4	Mean	0.682
Maximum	13	Median	0.01
SD	2.121	CV	3.11
k hat (MLE)	0.226	k star (bias corrected MLE)	0.225
Theta hat (MLE)	3.024	Theta star (bias corrected MLE)	3.027
nu hat (MLE)	19.85	nu star (bias corrected)	19.83
Adjusted Level of Significance (β)	0.0445		
Approximate Chi Square Value (19.83, α)	10.72	Adjusted Chi Square Value (19.83, β)	10.5
95% Gamma Approximate UCL (use when $n \geq 50$)	1.261	95% Gamma Adjusted UCL (use when $n < 50$)	1.288

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.68	SD (KM)	2.098
Variance (KM)	4.401	SE of Mean (KM)	0.325
k hat (KM)	0.105	k star (KM)	0.113
nu hat (KM)	9.239	nu star (KM)	9.943
theta hat (KM)	6.474	theta star (KM)	6.016
80% gamma percentile (KM)	0.555	90% gamma percentile (KM)	1.892
95% gamma percentile (KM)	3.906	99% gamma percentile (KM)	10.15

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (9.94, α)	3.906	Adjusted Chi Square Value (9.94, β)	3.778
95% Gamma Approximate KM-UCL (use when $n \geq 50$)	1.73	95% Gamma Adjusted KM-UCL (use when $n < 50$)	1.789

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.916	Shapiro Wilk GOF Test
5% Shapiro Wilk Critical Value	0.901	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.152	Lilliefors GOF Test
5% Lilliefors Critical Value	0.197	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.679	Mean in Log Scale	-4.957
SD in Original Scale	2.122	SD in Log Scale	3.558
95% t UCL (assumes normality of ROS data)	1.217	95% Percentile Bootstrap UCL	1.229
95% BCA Bootstrap UCL	1.548	95% Bootstrap t UCL	2.054
95% H-UCL (Log ROS)	104.3		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-4.459	KM Geo Mean	0.0116
KM SD (logged)	2.974	95% Critical H Value (KM-Log)	5.133
KM Standard Error of Mean (logged)	0.519	95% H-UCL (KM -Log)	9.888
KM SD (logged)	2.974	95% Critical H Value (KM-Log)	5.133
KM Standard Error of Mean (logged)	0.519		

DL/2 Statistics

DL/2 Normal

Mean in Original Scale	0.686
SD in Original Scale	2.12
95% t UCL (Assumes normality)	1.223

DL/2 Log-Transformed

Mean in Log Scale	-3.524
SD in Log Scale	2.551
95% H-Stat UCL	4.373

Nonparametric Distribution Free UCL Statistics

Detected Data appear Gamma Distributed at 5% Significance Level

Suggested UCL to Use

Adjusted KM-UCL (use when $k \leq 1$ and $15 < n < 50$ but $k \leq 1$) 1.789

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

95% UCL Input Benzo(a)pyrene - Deep (GP-7D removed)

Joint Public Safety Training Campus

Sample ID	BaP	D_BaP	Sample Depth
TP-01-S1 (2-5')	0.034	0	2-5
TP-06-S1 (2-5')	0.034	0	2-5
TP-07-S1 (2-5')	0.034	0	2-5
TP-01-S2 (5-10')	0.034	0	5-10
TP-02- S1 (3-5')	0.034	0	3-5
TP-02- S2 (5-10')	0.034	0	5-10
TP-05- S1 (3-5')	2.1	1	3-5
TP-05- S2 (5-10')	1.3	1	5-10
TP-06-S2 (5-10')	0.035	0	5-10
TP-07-S2 (5-10')	0.034	0	5-10
TP10-S1 (3-5')	0.035	0	3-5
TP10-S2 (5-10')	0.034	0	5-10
TP-19-S1 (3-5')	0.036	0	3-5
TP-19-S2 (5-8')	0.045	0	5-8
TP-23-S1 (3-5')	0.04	0	3-5
TP-23-S2 (5-10')	0.035	0	5-10
TP-24-S1 (3-5')	0.037	0	3-5
TP-24-S2 (8-10')	0.048	0	8-10
TP-25-S1 (3-5')	0.2	1	3-5
TP-25-S2 (5-10')	0.043	1	5-10
SB1-4	0.0025	1	8.5-10.5
SB2-3	0.0019	1	6-8
SB3-3	0.029	1	6-8
SB4-4	0.00071	1	8.5-10.5
SB5-4	0.0052	1	8.5-10.5
SB6-4	0.0018	1	8.5-10.5
SB7-4	0.0007	0	8.5-10.5
SB7-5	0.0007	0	11-13
SB8-3	0.031	1	8.5-10.5
SB9-2	0.0042	1	3.5-5.5
SB9-3	0.0007	0	6-8
SB10-4	0.014	0	8.5-10.5
GP-4E	0.16	1	8-10
GP-6C	3.8	1	4-6
GP-7F	2.3	1	10-12
GP-11D	3.1	1	6-8
GP-13D	0.05	0	6-8
GP-16E	0.054	0	8-10
ESB-1C	0.034	0	13-14
ESB-3B	3	1	5.5-6.5
B-3B	0.036	0	6-8
B-6B	0.68	1	8-10
B-18B	0.034	0	4.5-5.5

User Selected Options

Date/Time of Computation ProUCL 5.111/19/2020 11:44:14 AM
 From File JPSTC_BaP_Input_20201119_d.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

BaP_Deep_2

General Statistics

Total Number of Observations	43	Number of Distinct Observations	29
Number of Detects	18	Number of Non-Detects	25
Number of Distinct Detects	18	Number of Distinct Non-Detects	11
Minimum Detect	7.1000E-4	Minimum Non-Detect	7.0000E-4
Maximum Detect	3.8	Maximum Non-Detect	0.054
Variance Detects	1.728	Percent Non-Detects	58.14%
Mean Detects	0.931	SD Detects	1.314
Median Detects	0.102	CV Detects	1.412
Skewness Detects	1.138	Kurtosis Detects	-0.224
Mean of Logged Detects	-2.508	SD of Logged Detects	3.051

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.736	Shapiro Wilk GOF Test
5% Shapiro Wilk Critical Value	0.897	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.322	Lilliefors GOF Test
5% Lilliefors Critical Value	0.202	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.393	KM Standard Error of Mean	0.148
KM SD	0.944	95% KM (BCA) UCL	0.653
95% KM (t) UCL	0.642	95% KM (Percentile Bootstrap) UCL	0.65
95% KM (z) UCL	0.637	95% KM Bootstrap t UCL	0.759
90% KM Chebyshev UCL	0.838	95% KM Chebyshev UCL	1.039
97.5% KM Chebyshev UCL	1.318	99% KM Chebyshev UCL	1.867

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.783	Anderson-Darling GOF Test
5% A-D Critical Value	0.849	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.178	Kolmogorov-Smirnov GOF
5% K-S Critical Value	0.222	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.285	k star (bias corrected MLE)	0.275
Theta hat (MLE)	3.263	Theta star (bias corrected MLE)	3.388
nu hat (MLE)	10.27	nu star (bias corrected)	9.893
Mean (detects)	0.931		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	7.1000E-4	Mean	0.401
Maximum	3.8	Median	0.01
SD	0.952	CV	2.374
k hat (MLE)	0.26	k star (bias corrected MLE)	0.258
Theta hat (MLE)	1.54	Theta star (bias corrected MLE)	1.556
nu hat (MLE)	22.4	nu star (bias corrected)	22.17
Adjusted Level of Significance (β)	0.0444		
Approximate Chi Square Value (22.17, α)	12.47	Adjusted Chi Square Value (22.17, β)	12.21
95% Gamma Approximate UCL (use when $n \geq 50$)	0.714	95% Gamma Adjusted UCL (use when $n < 50$)	0.728

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.393	SD (KM)	0.944
Variance (KM)	0.891	SE of Mean (KM)	0.148
k hat (KM)	0.173	k star (KM)	0.177
nu hat (KM)	14.92	nu star (KM)	15.21
theta hat (KM)	2.267	theta star (KM)	2.223
80% gamma percentile (KM)	0.483	90% gamma percentile (KM)	1.185
95% gamma percentile (KM)	2.089	99% gamma percentile (KM)	4.631

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (15.21, α)	7.41	Adjusted Chi Square Value (15.21, β)	7.22
95% Gamma Approximate KM-UCL (use when $n \geq 50$)	0.807	95% Gamma Adjusted KM-UCL (use when $n < 50$)	0.829

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.896	Shapiro Wilk GOF Test
5% Shapiro Wilk Critical Value	0.897	Detected Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.151	Lilliefors GOF Test
5% Lilliefors Critical Value	0.202	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Approximate Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.392	Mean in Log Scale	-5.094
SD in Original Scale	0.956	SD in Log Scale	3.347
95% t UCL (assumes normality of ROS data)	0.637	95% Percentile Bootstrap UCL	0.644
95% BCA Bootstrap UCL	0.714	95% Bootstrap t UCL	0.731
95% H-UCL (Log ROS)	31.41		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-4.623	KM Geo Mean	0.00982
KM SD (logged)	2.807	95% Critical H Value (KM-Log)	4.859
KM Standard Error of Mean (logged)	0.504	95% H-UCL (KM -Log)	4.136
KM SD (logged)	2.807	95% Critical H Value (KM-Log)	4.859
KM Standard Error of Mean (logged)	0.504		

DL/2 Statistics

DL/2 Normal

Mean in Original Scale	0.399
SD in Original Scale	0.953
95% t UCL (Assumes normality)	0.644

DL/2 Log-Transformed

Mean in Log Scale	-3.666
SD in Log Scale	2.4
95% H-Stat UCL	2.194

Nonparametric Distribution Free UCL Statistics

Detected Data appear Gamma Distributed at 5% Significance Level

Suggested UCL to Use

Adjusted KM-UCL (use when $k \leq 1$ and $15 < n < 50$ but $k \leq 1$), 0.829

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

95% UCL Input Arsenic - All Intervals
Joint Public Safety Training Campus

Sample ID	Arsenic	Sample Depth
TP-01-S1 (2-5')	2.2	2-5
TP-01-S2 (5-10')	4.5	5-10
TP-02- S1 (3-5')	3	3-5
TP-02- S2 (5-10')	2.8	5-10
TP-05- S1 (3-5')	5.6	3-5
TP-05- S2 (5-10')	9.8	5-10
TP-06-S1 (2-5')	2.3	2-5
TP-06-S2 (5-10')	2.1	5-10
TP-07-S1 (2-5')	1.9	2-5
TP-07-S2 (5-10')	2.2	5-10
TP10-S1 (3-5')	2.2	3-5
TP10-S2 (5-10')	2.4	5-10
TP-19-S1 (3-5')	3.1	3-5
TP-19-S2 (5-8')	3.8	5-8
TP-23-S1 (3-5')	1.1	3-5
TP-23-S2 (5-10')	2.6	5-10
TP-24-S1 (3-5')	2.3	3-5
TP-24-S2 (8-10')	4.7	8-10
TP-25-S1 (3-5')	5.2	3-5
TP-25-S2 (5-10')	3	5-10
SB1-1	8.84	1-3
SB1-4	3.44	8.5-10.5
SB2-1	13	1-3
SB2-3	3.36	6-8
SB3-1	12.2	1-3
SB3-3	2.77	6-8
SB4-1	3.38	1-3
SB4-4	3.47	8.5-10.5
SB5-1	4.51	1-3
SB5-4	5.42	8.5-10.5
SB6-1	3.53	1-3
SB6-4	2.38	8.5-10.5
SB7-4	2.65	8.5-10.5
SB7-5	2.72	11-13
SB8-1	2.09	1-3
SB8-3	3.15	8.5-10.5
SB9-2	3.26	3.5-5.5
SB9-3	2.94	6-8
SB10-1	5.45	1-3
SB10-4	13.8	8.5-10.5
GP-1A	7.9	0-2
GP-2B	8.5	2-4
GP-3A	4	0-2
GP-4B	5.2	2-4
GP-4E	6.2	8-10
GP-5A	6.8	0-2
GP-6A	7.7	0-2
GP-6C	5.2	4-6
GP-7D	11	6-8
GP-7F	7.6	10-12
GP-8A	5.8	0-2

95% UCL Input Arsenic - All Intervals
Joint Public Safety Training Campus

GP-9B	5.5	2-4
GP-10B	3.4	2-4
GP-11B	9.2	2-4
GP-11D	4.6	6-8
GP-13A	8.1	0-2
GP-13D	2.5	6-8
GP-14B	3.9	2-4
GP-15A	12	0-2
GP-16B	2.6	2-4
GP-16E	3.1	8-10
GP-17A	18	0-2
GP-18B	2.4	2-4
GP-19A	5.4	0-2
ESB-1A	8.6	0-2
ESB-2A	8.6	1.5-2.5
ESB-3A	6.4	1-4
ESB-4A	13	0.5-1.5
ESB-5A	12	0-1
ESB-6A	18	2-4
B-1A	6.2	2-4
B-2A	12	0-2
B-3A	4.2	0-2
B-3B	2.7	6-8
B-4A	12	0-2
B-6A	6.8	1-3
B-6B	13	8-10
B-7A	12	0-2
B-9A	14	1-3
B-10A	7.5	0-1
B-11A	8.6	1-2
B-12A	7.2	0-2
B-14A	11	1-2
B-15A	11	1.5-3
B-16A	8.8	1-2
B-17A	34	0-2
B-18A	20	0-2

User Selected Options

Date/Time of Computation ProUCL 5.110/6/2020 6:34:07 AM
 From File JPSTC_As_Input_20201006.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Arsenic_All

General Statistics

Total Number of Observations	87	Number of Distinct Observations	65
		Number of Missing Observations	0
Minimum	1.1	Mean	6.705
Maximum	34	Median	5.2
SD	5.141	Std. Error of Mean	0.551
Coefficient of Variation	0.767	Skewness	2.27

Normal GOF Test

Shapiro Wilk Test Statistic 0.807
 5% Shapiro Wilk P Value 1.110E-16
 Lilliefors Test Statistic 0.163
 5% Lilliefors Critical Value 0.0951

Shapiro Wilk GOF Test

Data Not Normal at 5% Significance Level

Lilliefors GOF Test

Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL

95% Student's-t UCL 7.622

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995) 7.755

95% Modified-t UCL (Johnson-1978) 7.644

Gamma GOF Test

A-D Test Statistic 1.422
 5% A-D Critical Value 0.763
 K-S Test Statistic 0.12
 5% K-S Critical Value 0.097

Anderson-Darling Gamma GOF Test

Data Not Gamma Distributed at 5% Significance Level

Kolmogorov-Smirnov Gamma GOF Test

Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	2.286	k star (bias corrected MLE)	2.215
Theta hat (MLE)	2.933	Theta star (bias corrected MLE)	3.027
nu hat (MLE)	397.9	nu star (bias corrected)	385.5
MLE Mean (bias corrected)	6.705	MLE Sd (bias corrected)	4.505
		Approximate Chi Square Value (0.05)	341
Adjusted Level of Significance	0.0472	Adjusted Chi Square Value	340.3

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when $n \geq 50$) 7.58195% Adjusted Gamma UCL (use when $n < 50$) 7.596

Lognormal GOF Test

Shapiro Wilk Test Statistic 0.966
 5% Shapiro Wilk P Value 0.0982

Shapiro Wilk Lognormal GOF Test

Data appear Lognormal at 5% Significance Level

Lilliefors Test Statistic 0.105

Lilliefors Lognormal GOF Test

5% Lilliefors Critical Value 0.0951

Data Not Lognormal at 5% Significance Level

Data appear Approximate Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data 0.0953

Mean of logged Data 1.669

Maximum of Logged Data 3.526

SD of logged Data 0.678

Assuming Lognormal Distribution

95% H-UCL 7.72

90% Chebyshev (MVUE) UCL 8.249

95% Chebyshev (MVUE) UCL 8.97

97.5% Chebyshev (MVUE) UCL 9.972

99% Chebyshev (MVUE) UCL 11.94

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL 7.612

95% Jackknife UCL 7.622

95% Standard Bootstrap UCL 7.614

95% Bootstrap-t UCL 7.852

95% Hall's Bootstrap UCL 7.912

95% Percentile Bootstrap UCL 7.608

95% BCA Bootstrap UCL 7.771

90% Chebyshev(Mean, Sd) UCL 8.359

95% Chebyshev(Mean, Sd) UCL 9.108

97.5% Chebyshev(Mean, Sd) UCL 10.15

99% Chebyshev(Mean, Sd) UCL 12.19

Suggested UCL to Use

95% H-UCL 7.72

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

ProUCL computes and outputs H-statistic based UCLs for historical reasons only.

H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.

It is therefore recommended to avoid the use of H-statistic based 95% UCLs.

Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.

95% UCL Input Arsenic - Shallow
Joint Public Safety Training Campus

Sample ID	Arsenic	Sample Depth
SB1-1	8.84	1-3
SB2-1	13	1-3
SB3-1	12.2	1-3
SB4-1	3.38	1-3
SB5-1	4.51	1-3
SB6-1	3.53	1-3
SB8-1	2.09	1-3
SB10-1	5.45	1-3
GP-1A	7.9	0-2
GP-2B	8.5	2-4
GP-3A	4	0-2
GP-4B	5.2	2-4
GP-5A	6.8	0-2
GP-6A	7.7	0-2
GP-8A	5.8	0-2
GP-9B	5.5	2-4
GP-10B	3.4	2-4
GP-11B	9.2	2-4
GP-13A	8.1	0-2
GP-14B	3.9	2-4
GP-15A	12	0-2
GP-16B	2.6	2-4
GP-17A	18	0-2
GP-18B	2.4	2-4
GP-19A	5.4	0-2
ESB-1A	8.6	0-2
ESB-2A	8.6	1.5-2.5
ESB-3A	6.4	1-4
ESB-4A	13	0.5-1.5
ESB-5A	12	0-1
ESB-6A	18	2-4
B-1A	6.2	2-4
B-2A	12	0-2
B-3A	4.2	0-2
B-4A	12	0-2
B-6A	6.8	1-3
B-7A	12	0-2
B-9A	14	1-3
B-10A	7.5	0-1
B-11A	8.6	1-2
B-12A	7.2	0-2
B-14A	11	1-2
B-15A	11	1.5-3
B-16A	8.8	1-2
B-17A	34	0-2
B-18A	20	0-2

User Selected Options

Date/Time of Computation ProUCL 5.110/6/2020 6:40:26 AM
 From File JPSTC_As_Input_20201006_a.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Arsenic_Shallow

General Statistics

Total Number of Observations	46	Number of Distinct Observations	36
		Number of Missing Observations	0
Minimum	2.09	Mean	8.941
Maximum	34	Median	8
SD	5.665	Std. Error of Mean	0.835
Coefficient of Variation	0.634	Skewness	2.166

Normal GOF Test

Shapiro Wilk Test Statistic	0.835	Shapiro Wilk GOF Test
5% Shapiro Wilk Critical Value	0.945	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.159	Lilliefors GOF Test
5% Lilliefors Critical Value	0.129	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL

95% Student's-t UCL 10.34

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995) 10.6
 95% Modified-t UCL (Johnson-1978) 10.39

Gamma GOF Test

A-D Test Statistic	0.306	Anderson-Darling Gamma GOF Test
5% A-D Critical Value	0.755	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.0852	Kolmogorov-Smirnov Gamma GOF Test
5% K-S Critical Value	0.131	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	3.162	k star (bias corrected MLE)	2.971
Theta hat (MLE)	2.827	Theta star (bias corrected MLE)	3.01
nu hat (MLE)	290.9	nu star (bias corrected)	273.3
MLE Mean (bias corrected)	8.941	MLE Sd (bias corrected)	5.188
		Approximate Chi Square Value (0.05)	236
Adjusted Level of Significance	0.0448	Adjusted Chi Square Value	234.9

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when $n \geq 50$) 10.35 **95% Adjusted Gamma UCL (use when $n < 50$) 10.4**

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.984	Shapiro Wilk Lognormal GOF Test
5% Shapiro Wilk Critical Value	0.945	Data appear Lognormal at 5% Significance Level

Lilliefors Test Statistic 0.0695

Lilliefors Lognormal GOF Test

5% Lilliefors Critical Value 0.129

Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data 0.737

Mean of logged Data 2.024

Maximum of Logged Data 3.526

SD of logged Data 0.586

Assuming Lognormal Distribution

95% H-UCL 10.66

90% Chebyshev (MVUE) UCL 11.43

95% Chebyshev (MVUE) UCL 12.55

97.5% Chebyshev (MVUE) UCL 14.11

99% Chebyshev (MVUE) UCL 17.17

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL 10.32

95% Jackknife UCL 10.34

95% Standard Bootstrap UCL 10.28

95% Bootstrap-t UCL 10.73

95% Hall's Bootstrap UCL 11.08

95% Percentile Bootstrap UCL 10.38

95% BCA Bootstrap UCL 10.57

90% Chebyshev(Mean, Sd) UCL 11.45

95% Chebyshev(Mean, Sd) UCL 12.58

97.5% Chebyshev(Mean, Sd) UCL 14.16

99% Chebyshev(Mean, Sd) UCL 17.25

Suggested UCL to Use

95% Adjusted Gamma UCL 10.4

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

95% UCL Input Arsenic - Deep
Joint Public Safety Training Campus

Sample ID	Arsenic	Sample Depth
TP-01-S1 (2-5')	2.2	2-5
TP-06-S1 (2-5')	2.3	2-5
TP-07-S1 (2-5')	1.9	2-5
TP-01-S2 (5-10')	4.5	5-10
TP-02- S1 (3-5')	3	3-5
TP-02- S2 (5-10')	2.8	5-10
TP-05- S1 (3-5')	5.6	3-5
TP-05- S2 (5-10')	9.8	5-10
TP-06-S2 (5-10')	2.1	5-10
TP-07-S2 (5-10')	2.2	5-10
TP10-S1 (3-5')	2.2	3-5
TP10-S2 (5-10')	2.4	5-10
TP-19-S1 (3-5')	3.1	3-5
TP-19-S2 (5-8')	3.8	5-8
TP-23-S1 (3-5')	1.1	3-5
TP-23-S2 (5-10')	2.6	5-10
TP-24-S1 (3-5')	2.3	3-5
TP-24-S2 (8-10')	4.7	8-10
TP-25-S1 (3-5')	5.2	3-5
TP-25-S2 (5-10')	3	5-10
SB1-4	3.44	8.5-10.5
SB2-3	3.36	6-8
SB3-3	2.77	6-8
SB4-4	3.47	8.5-10.5
SB5-4	5.42	8.5-10.5
SB6-4	2.38	8.5-10.5
SB7-4	2.65	8.5-10.5
SB7-5	2.72	11-13
SB8-3	3.15	8.5-10.5
SB9-2	3.26	3.5-5.5
SB9-3	2.94	6-8
SB10-4	13.8	8.5-10.5
GP-4E	6.2	8-10
GP-6C	5.2	4-6
GP-7D	11	6-8
GP-7F	7.6	10-12
GP-11D	4.6	6-8
GP-13D	2.5	6-8
GP-16E	3.1	8-10
B-3B	2.7	6-8
B-6B	13	8-10

User Selected Options

Date/Time of Computation ProUCL 5.110/7/2020 7:44:11 AM
 From File JPSTC_As_Input_20201006_b.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Arsenic_Deep

General Statistics

Total Number of Observations	41	Number of Distinct Observations	35
		Number of Missing Observations	0
Minimum	1.1	Mean	4.197
Maximum	13.8	Median	3.1
SD	2.919	Std. Error of Mean	0.456
Coefficient of Variation	0.696	Skewness	2.087

Normal GOF Test

Shapiro Wilk Test Statistic	0.726
5% Shapiro Wilk Critical Value	0.941
Lilliefors Test Statistic	0.257
5% Lilliefors Critical Value	0.137

Shapiro Wilk GOF Test

Data Not Normal at 5% Significance Level

Lilliefors GOF Test

Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL

95% Student's-t UCL	4.964
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95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995)	5.105
95% Modified-t UCL (Johnson-1978)	4.989

Gamma GOF Test

A-D Test Statistic	2.166
5% A-D Critical Value	0.754
K-S Test Statistic	0.214
5% K-S Critical Value	0.139

Anderson-Darling Gamma GOF Test

Data Not Gamma Distributed at 5% Significance Level

Kolmogorov-Smirnov Gamma GOF Test

Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	3.19	k star (bias corrected MLE)	2.973
Theta hat (MLE)	1.316	Theta star (bias corrected MLE)	1.412
nu hat (MLE)	261.6	nu star (bias corrected)	243.8
MLE Mean (bias corrected)	4.197	MLE Sd (bias corrected)	2.434
		Approximate Chi Square Value (0.05)	208.6
Adjusted Level of Significance	0.0441	Adjusted Chi Square Value	207.4

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when $n \geq 50$)	4.904	95% Adjusted Gamma UCL (use when $n < 50$)	4.932
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Lognormal GOF Test

Shapiro Wilk Test Statistic	0.917
5% Shapiro Wilk Critical Value	0.941

Shapiro Wilk Lognormal GOF Test

Data Not Lognormal at 5% Significance Level

Lilliefors Test Statistic 0.177

Lilliefors Lognormal GOF Test

5% Lilliefors Critical Value 0.137

Data Not Lognormal at 5% Significance Level

Data Not Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data 0.0953

Mean of logged Data 1.269

Maximum of Logged Data 2.625

SD of logged Data 0.542

Assuming Lognormal Distribution

95% H-UCL 4.862

90% Chebyshev (MVUE) UCL 5.206

95% Chebyshev (MVUE) UCL 5.705

97.5% Chebyshev (MVUE) UCL 6.397

99% Chebyshev (MVUE) UCL 7.757

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution (0.05)

Nonparametric Distribution Free UCLs

95% CLT UCL 4.947

95% Jackknife UCL 4.964

95% Standard Bootstrap UCL 4.923

95% Bootstrap-t UCL 5.236

95% Hall's Bootstrap UCL 5.105

95% Percentile Bootstrap UCL 4.939

95% BCA Bootstrap UCL 5.068

90% Chebyshev(Mean, Sd) UCL 5.564

95% Chebyshev(Mean, Sd) UCL 6.184

97.5% Chebyshev(Mean, Sd) UCL 7.044

99% Chebyshev(Mean, Sd) UCL 8.733

Suggested UCL to Use

95% Chebyshev (Mean, Sd) UCL 6.184

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.