



United States Environmental Protection Agency
Region 6
1445 Ross Avenue, Suite 1200
Dallas, Texas 75202-2733

October 25, 2017

via Email

Pawhuska Public Schools
ATTN: Dr. Janet Neufeld, Superintendent
1801 McKenzie
Pawhuska, OK 74056

Dear Dr. Neufeld,

Following the Pawhuska High School Emergency Response assessment of the vapor intrusion that was reported on August 14, 2017, the Osage Mineral Council completed a plug and abandonment (P&A) of the well in the softball field on September 13, 2017. On September 22, 2017, officials with the Pawhuska High School reported to the workgroup that it continued to observe vapor seepage in the softball field and that there were concerns regarding the risk for the students playing softball in the field around the area where the flow-back pit was located during the P&A. On the September 22, 2017 stakeholders call, it was agreed that a 60-day air monitoring assessment would be conducted by the school with support from the Oklahoma Corporation Commission (OCC). Additionally, OCC requested EPA conduct surface soil sampling on the softball field to assure the P&A activities did not contaminate the soil.

EPA mobilized resources and collected samples of the softball field surface soil on October 2, 2017. The field was gridded into 40 foot by 40 foot sections, and seven samples were collected; each a 5-point composite (5 grab samples were collected and composited into one sample). Three samples and a duplicate were collected from the former flow-back pit location (grid C3 on the attached figure). Three samples were collected from background locations to include near home plate (grid A1), left field (grid B5), and southeast of the centerfield fence line (grid E6). All samples were collected from 0 to 3 inches below ground surface.

Samples were shipped to TestAmerica located in Phoenix, AZ and analyzed for total metals (Method 6010B/6020A), mercury (Method 7471B), volatile organic compounds (VOC's / method 8260B), semi-volatile organic compounds (SVOC's / Method 8270C and 8270D), and total petroleum hydrocarbons (TPH / Method TX 1005). Preliminary results were received on October 6, 2017 and compared to EPA Regional Screening Levels¹ (RSL's). TPH results were compared to the Oklahoma Department of Environmental Quality (ODEQ) Guidance for Risk-based Levels of TPH (October 2012). Arsenic was the only analyte exceeding its RSL. TPH results were not detected.

¹ U.S. EPA Regional Screening Levels are available at the following website:
<https://www.epa.gov/risk/regional-screening-levels-rsls>.

Arsenic was detected in all six samples at a concentration range from 1.9 milligrams per kilograms (mg/kg) to 10 mg/kg. EPA Toxicology reports that the arsenic concentration range is consistent with the arsenic background levels in Oklahoma soil², which has a median concentration of 3.96 mg/kg and a range of 0.75 mg/kg to 33.6 mg/kg. In addition, the arsenic soil concentrations are within the target lifetime excess cancer risk range (0.68 mg/kg to 68 mg/kg) and are below the noncancer level (35 mg/kg). Therefore, the soils at the Pawhuska High School softball field are unlikely to pose a health risk.

Attached please find a Summary table of the soil sample analytical results and a figure showing the gridded softball field. If you have any questions, please don't hesitate.

Best Regards,



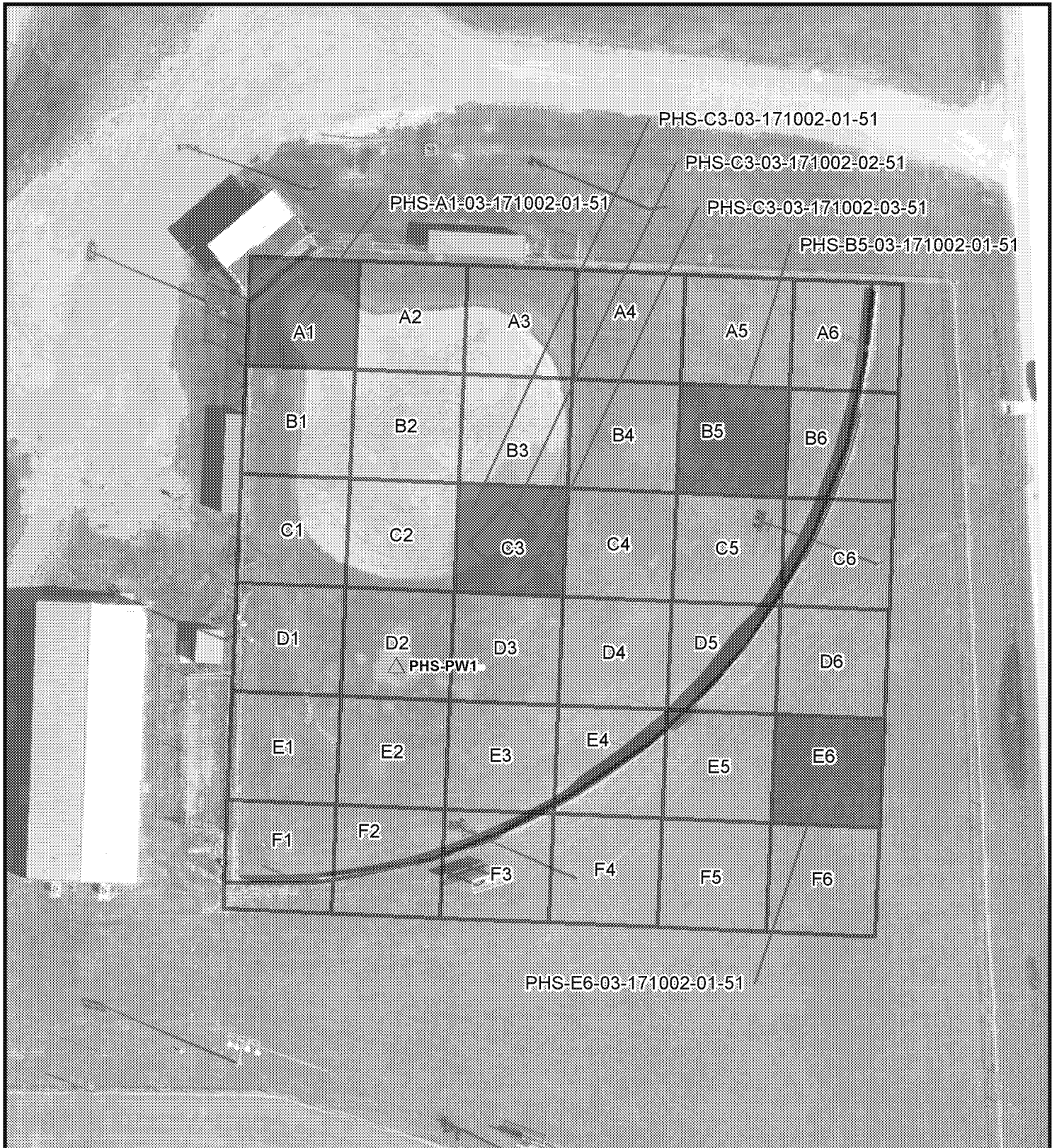
Adam Adams, OSC
US EPA, Region 6

cc:

Oklahoma Energy and Environment, Secretary Mike Teague
Oklahoma Water Resources Board (OWRB), Kent Wilkins
Oklahoma Corporation Commission (OCC), Tim Baker
Oklahoma State Fire Marshall, David Vanbuskirk
Bureau of Indian Affairs (BIA), Eddie Streater
Osage Nation, Chief Bobby Tallchief
Osage Mineral Council, William Lynn
CDC / ATSDR
Oklahoma Department of Health, Kristy B.

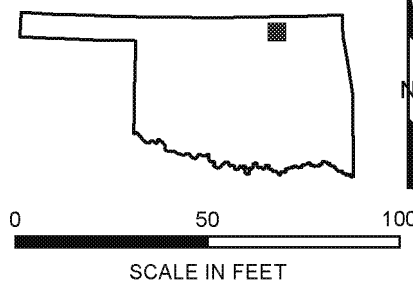
attachments

2. Oklahoma soil data reported in the Oklahoma State University Division of Agriculture Sciences and Natural Resources Oklahoma Cooperative Extension Service publication "Background Metal Concentrations in Oklahoma Soils" (2014), shows naturally occurring elevated levels of arsenic in Osage County and throughout Oklahoma, consistent with the EPA Team's findings.



LEGEND

- ▲ EXTERIOR MONITORING LOCATION
- ◻ RECIRCULATION PIT
- ◻ SAMPLE GRID
- SAMPLE COLLECTED



SAMPLE GRID MAP

PAWHUSKA HS ER
 621 E 15TH ST,
 PAWHUSKA, OSAGE COUNTY, OKLAHOMA

DATE OCTOBER 2017	PROJECT NO N/A	SCALE AS SHOWN
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**Table 1
Soil Analytical Results
Pawhuska High School ER
EPA Region 6**

Analyte	CAS.NO	Units	Summary Resident Soil (RSL) THQ=1.0	PHS-A1	PHS-B5	PHS-C3	PHS-C3	PHS-C3	PHS-C3	PHS-E6
				PHS-A1-03-171002-01-51	PHS-B5-03-171002-01-51	PHS-C3-03-171002-01-51	PHS-C3-03-171002-02-51	PHS-C3-03-171002-03-51	PHS-C3-03-171002-03-52	PHS-E6-03-171002-01-51
				0-3 inches	0-3 inches	0-3 inches	0-3 inches	0-3 inches	0-3 inches	0-3 inches
				10/2/2017	10/2/2017	10/2/2017	10/2/2017	10/2/2017	10/2/2017	10/2/2017
				Field Sample	Field Sample	Field Sample	Field Sample	Field Sample	Field Duplicate	Field Sample
6020A Metals (ICP/MS)										
Aluminum	7429-90-5	mg/Kg	77000	3800 JK	8500 JK	11000	10000	8100	8400	6800 JK
Antimony	7440-36-0	mg/Kg	31	0.22 UJL	0.57 UBJL	0.34 UB	0.37 UB	0.37 UB	0.37 UB	0.42 UBJL
Arsenic	7440-38-2	mg/Kg	0.68	1.9 JL	10 JL	3.6	5.2	5.5	4.7	4 JL
Barium	7440-39-3	mg/Kg	15000	59	150	270	200	210	190	160
Beryllium	7440-41-7	mg/Kg	160	0.26 JQ	0.63	0.75	0.78	1	0.79	0.64
Cadmium	7440-43-9	mg/Kg	71	0.22 U	0.24 U	0.22 U	0.21 U	0.22 U	0.22 U	0.26 U
Calcium	7440-70-2	mg/Kg	N/P	9000 JK	2700 JK	2800	4900	2400	2700	2800 JK
Chromium	7440-47-3	mg/Kg	N/P	3.6	11	14	15	11	14	11
Cobalt	7440-48-4	mg/Kg	23	1.6 JL	2.9 JL	5.7	5.1	4.8	6.2	3.6 JL
Copper	7440-50-8	mg/Kg	3100	2.3 JL	7 JL	6.1	5.7	7.3	6.1	5.9 JL
Iron	7439-89-6	mg/Kg	55000	5000 JK	12000 JK	16000	16000	19000	18000	12000 JK
Lead	7439-92-1	mg/Kg	400	3.9	14	16	16	16	17	19
Magnesium	7439-95-4	mg/Kg	N/P	830	1300	1600	1500	1300	1300	1200
Manganese	7439-96-5	mg/Kg	1800	110 JK	170 JK	320	340	270 JK	790 JK	200 JK
Nickel	7440-02-0	mg/Kg	1500	4.3	8.6	13	12	16	14	9.4
Potassium	7440-09-7	mg/Kg	N/P	490	1300	1000	1100	720	730	1200
Selenium	7782-49-2	mg/Kg	390	0.26 JQL	0.62 JL	0.6	0.6	0.54	0.52 JQ	0.61 JQL
Silver	7440-22-4	mg/Kg	390	0.11 U	0.12 U	0.11 U	0.11 U	0.11 U	0.11 U	0.13 U
Sodium	7440-23-5	mg/Kg	N/P	65	46 JQ	270	240	250	230	79
Thallium	7440-28-0	mg/Kg	0.78	0.22 U	0.24 U	0.22 U	0.21 U	0.22 U	0.22 U	0.26 U
Vanadium	7440-62-2	mg/Kg	390	8.4 JK	22 JK	24	28	28	27	23 JK
Zinc	7440-66-6	mg/Kg	23000	7.1 JL	27 JL	15	18	15	13	25 JL
7471B Mercury (CVAA)										
Mercury	7439-97-6	mg/Kg	11	0.033 U	0.052 JQ	0.055 JQL	0.091 JQL	0.054 JQL	0.056 JQL	0.056 JQ
8260B Volatile Organic Compounds (GC/MS)										
1,1,1-Trichloroethane	71-55-6	mg/Kg	8100	0.001 U	0.0018 U	0.00086 U	0.0011 U	0.00083 U	0.0013 U	0.0017 U
1,1,2,2-Tetrachloroethane	79-34-5	mg/Kg	0.6	0.0011 U	0.002 U	0.00094 U	0.0012 U	0.00091 U	0.0014 U	0.074 U
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	mg/Kg	6700	0.00049 U	0.0009 U	0.00042 U	0.00053 U	0.00041 U	0.00063 U	0.00083 U
1,1,2-Trichloroethane	79-00-5	mg/Kg	1.1	0.0015 U	0.0028 U	0.0013 U	0.0016 U	0.0013 U	0.002 U	0.0026 U
1,1-Dichloroethane	75-34-3	mg/Kg	3.6	0.00073 U	0.0013 U	0.00063 U	0.00079 U	0.00061 U	0.00094 U	0.0012 U
1,1-Dichloroethene	75-35-4	mg/Kg	230	0.00062 U	0.0011 U	0.00054 U	0.00067 U	0.00052 U	0.0008 U	0.0011 U
1,2,3-Trichlorobenzene	87-61-6	mg/Kg	63	0.00042 U	0.00076 U	0.00036 U	0.00045 U	0.00034 U	0.00054 U	0.028 U
1,2,4-Trichlorobenzene	120-82-1	mg/Kg	24	0.00073 U	0.0013 U	0.00063 U	0.00079 U	0.00061 U	0.00094 U	0.051 U
1,2-Dibromo-3-chloropropane	96-12-8	mg/Kg	0.0053	0.00077 U	0.0014 U	0.00066 U	0.00082 U	0.00063 U	0.00099 U	0.052 U
1,2-Dibromoethane	106-93-4	mg/Kg	0.036	0.0011 U	0.002 U	0.00094 U	0.0012 U	0.00091 U	0.0014 U	0.0018 U
1,2-Dichlorobenzene	95-50-1	mg/Kg	1800	0.00037 U	0.00068 U	0.00032 U	0.0004 U	0.00031 U	0.00048 U	0.025 U
1,2-Dichloroethane	107-06-2	mg/Kg	0.46	0.00073 U	0.0013 U	0.00063 U	0.00079 U	0.00061 U	0.00094 U	0.0012 U
1,2-Dichloropropane	78-87-5	mg/Kg	0.28	0.001 U	0.0019 U	0.00088 U	0.0011 U	0.00085 U	0.0013 U	0.0017 U
1,3-Dichlorobenzene	541-73-1	mg/Kg	N/P	0.00073 U	0.0013 U	0.00063 U	0.00079 U	0.00061 U	0.00094 U	0.051 U



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Soil Analytical Results
Pawhuska High School ER
EPA Region 6**

Analyte	CAS.NO	Units	Summary Resident Soil (RSL) THQ=1.0	PHS-A1	PHS-B5	PHS-C3	PHS-C3	PHS-C3	PHS-C3	PHS-E6
				PHS-A1-03-171002-01-51	PHS-B5-03-171002-01-51	PHS-C3-03-171002-01-51	PHS-C3-03-171002-02-51	PHS-C3-03-171002-03-51	PHS-C3-03-171002-03-52	PHS-E6-03-171002-01-51
				0-3 inches	0-3 inches	0-3 inches	0-3 inches	0-3 inches	0-3 inches	0-3 inches
				10/2/2017	10/2/2017	10/2/2017	10/2/2017	10/2/2017	10/2/2017	10/2/2017
				Field Sample	Field Sample	Field Sample	Field Sample	Field Sample	Field Duplicate	Field Sample
1,4-Dichlorobenzene	106-46-7	mg/Kg	2.6	0.00073 U	0.0013 U	0.00063 U	0.00079 U	0.00061 U	0.00094 U	0.07 U
2-Butanone	78-93-3	mg/Kg	27000	0.0056 U	0.01 U	0.0048 U	0.006 U	0.0046 U	0.0072 U	0.021 JQ
2-Hexanone	591-78-6	mg/Kg	200	0.018 U	0.034 U	0.016 U	0.02 U	0.015 U	0.024 U	0.031 U
4-Methyl-2-pentanone	108-10-1	mg/Kg	33000	0.0021 U	0.0038 U	0.0018 U	0.0022 U	0.0017 U	0.0027 U	0.0035 U
Acetone	67-64-1	mg/Kg	61000	0.028 JQ	0.08 UB	0.06	0.069	0.048 UB	0.11	0.29
Benzene	71-43-2	mg/Kg	1.2	0.00073 U	0.0013 U	0.00073 JQ	0.0015 JQ	0.00061 U	0.0013 JQ	0.0041
Bromochloromethane	74-97-5	mg/Kg	150	0.0006 U	0.0011 U	0.00052 U	0.00065 U	0.0005 U	0.00078 U	0.001 U
Bromodichloromethane	75-27-4	mg/Kg	0.29	0.0006 U	0.0011 U	0.00052 U	0.00065 U	0.0005 U	0.00078 U	0.001 U
Bromoform	75-25-2	mg/Kg	19	0.0006 U	0.0011 U	0.00052 U	0.00065 U	0.0005 U	0.00078 U	0.001 U
Bromomethane	74-83-9	mg/Kg	6.8	0.0013 U	0.0024 U	0.0011 U	0.0014 U	0.0011 U	0.0017 U	0.0022 U
Carbon disulfide	75-15-0	mg/Kg	770	0.0039 U	0.0072 U	0.0034 U	0.0042 U	0.0033 U	0.0051 U	0.0066 U
Carbon tetrachloride	56-23-5	mg/Kg	0.65	0.00073 U	0.0013 U	0.00063 U	0.00079 U	0.00061 U	0.00094 U	0.0012 U
Chlorobenzene	108-90-7	mg/Kg	280	0.00073 U	0.0013 U	0.00063 U	0.00079 U	0.00061 U	0.00094 U	0.0012 U
Chloroethane	75-00-3	mg/Kg	14000	0.0021 U	0.0038 U	0.0018 U	0.0022 U	0.0017 U	0.0027 U	0.0035 U
Chloroform	67-66-3	mg/Kg	0.32	0.00073 U	0.0013 U	0.00063 U	0.00079 U	0.00061 U	0.00094 U	0.0012 U
Chloromethane	74-87-3	mg/Kg	110	0.00073 U	0.0013 U	0.00063 U	0.00079 U	0.00061 U	0.00094 U	0.0012 U
cis-1,2-Dichloroethene	156-59-2	mg/Kg	160	0.00073 U	0.0013 U	0.00063 U	0.00079 U	0.00061 U	0.00094 U	0.0012 U
cis-1,3-Dichloropropene	10061-01-5	mg/Kg	N/P	0.00073 U	0.0013 U	0.00063 U	0.00079 U	0.00061 U	0.00094 U	0.0012 U
Cyclohexane	110-82-7	mg/Kg	6500	0.00036 U	0.00066 U	0.00083 JQ	0.00039 U	0.0003 U	0.00047 U	0.00061 U
Dibromochloromethane	124-48-1	mg/Kg	8.3	0.00037 U	0.00068 U	0.00032 U	0.0004 U	0.00031 U	0.00048 U	0.00063 U
Dichlorodifluoromethane	75-71-8	mg/Kg	87	0.0011 U	0.002 U	0.00094 U	0.0012 U	0.00091 U	0.0014 U	0.0018 U
Ethylbenzene	100-41-4	mg/Kg	5.8	0.00073 U	0.0013 U	0.00063 U	0.00079 U	0.00061 U	0.00094 U	0.0012 U
Isopropylbenzene	98-82-8	mg/Kg	1900	0.00045 U	0.00082 U	0.00039 U	0.00048 U	0.00037 U	0.00058 U	0.00076 U
Methyl Acetate	79-20-9	mg/Kg	78000	0.0058 UJK	0.011 UJK	0.005 UJK	0.0062 UJK	0.0048 UJK	0.0075 UJK	0.0098 UJK
Methyl tert-butyl ether	1634-04-4	mg/Kg	47	0.0011 U	0.0019 U	0.0009 U	0.0011 U	0.00087 U	0.0014 U	0.0018 U
Methylcyclohexane	108-87-2	mg/Kg	N/P	0.00048 U	0.00088 U	0.00041 U	0.00053 JQ	0.0004 U	0.00062 U	0.00081 U
Methylene chloride	75-09-2	mg/Kg	57	0.0014 UB	0.0017 U	0.002 UB	0.0026 UB	0.00078 U	0.0045 UB	0.0043 UB
Styrene	100-42-5	mg/Kg	6000	0.0012 U	0.0022 U	0.001 U	0.0013 U	0.001 U	0.0016 U	0.002 U
Tetrachloroethene	127-18-4	mg/Kg	24	0.0008 U	0.0015 U	0.00069 U	0.00086 U	0.00066 U	0.001 U	0.0013 U
Toluene	108-88-3	mg/Kg	4900	0.00081 U	0.0015 U	0.0007 U	0.0011 JQ	0.00067 U	0.001 U	0.0025 JQ
trans-1,2-Dichloroethene	156-60-5	mg/Kg	1600	0.00073 U	0.0013 U	0.00063 U	0.00079 U	0.00061 U	0.00094 U	0.0012 U
trans-1,3-Dichloropropene	10061-02-6	mg/Kg	N/P	0.00073 U	0.0013 U	0.00063 U	0.00079 U	0.00061 U	0.00094 U	0.0012 U
Trichloroethene	79-01-6	mg/Kg	0.94	0.0011 U	0.0019 U	0.0009 U	0.0011 U	0.00087 U	0.0014 U	0.0018 U
Trichlorofluoromethane	75-69-4	mg/Kg	23000	0.0011 U	0.002 U	0.00094 U	0.0012 U	0.00091 U	0.0014 U	0.0018 U
Vinyl chloride	75-01-4	mg/Kg	0.059	0.0012 U	0.0022 U	0.001 U	0.0013 U	0.001 U	0.0016 U	0.002 U
Xylene (total)	1330-20-7	mg/Kg	580	0.0013 U	0.0025 U	0.0012 JQ	0.0014 U	0.0011 U	0.0017 U	0.0023 U
8270C_SIM Semivolatile Organic Compounds (GC/MS) SI										
1-Methylnaphthalene	90-12-0	mg/Kg	18	0.002 U	0.012 U	0.002 U	0.002 U	0.002 U	0.002 U	0.011 U
2-Methylnaphthalene	91-57-6	mg/Kg	240	0.0023 U	0.014 U	0.0023 U	0.0024 U	0.0023 U	0.0023 U	0.013 U
Acenaphthene	83-32-9	mg/Kg	3600	0.0024 U	0.014 U	0.0024 U	0.0025 U	0.0024 U	0.0024 U	0.014 U



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EPA Region 6**

Analyte	CAS.NO	Units	Summary Resident Soil (RSL) THQ=1.0	PHS-A1	PHS-B5	PHS-C3	PHS-C3	PHS-C3	PHS-C3	PHS-E6
				PHS-A1-03-171002-01-51	PHS-B5-03-171002-01-51	PHS-C3-03-171002-01-51	PHS-C3-03-171002-02-51	PHS-C3-03-171002-03-51	PHS-C3-03-171002-03-52	PHS-E6-03-171002-01-51
				0-3 inches	0-3 inches	0-3 inches	0-3 inches	0-3 inches	0-3 inches	0-3 inches
				10/2/2017	10/2/2017	10/2/2017	10/2/2017	10/2/2017	10/2/2017	10/2/2017
				Field Sample	Field Sample	Field Sample	Field Sample	Field Sample	Field Duplicate	Field Sample
Acenaphthylene	208-96-8	mg/Kg	N/P	0.002 U	0.012 U	0.002 U	0.002 U	0.002 U	0.002 U	0.011 U
Anthracene	120-12-7	mg/Kg	18000	0.0014 U	0.0085 U	0.0014 U	0.0015 U	0.0014 U	0.0014 U	0.0082 U
Benzo(a)anthracene	56-55-3	mg/Kg	1.1	0.0013 U	0.018 JQ	0.0032 JQ	0.0013 U	0.0013 JQ	0.0016 JQ	0.0075 U
Benzo(a)pyrene	50-32-8	mg/Kg	0.11	0.0014 U	0.014 JQ	0.0041	0.0015 U	0.0016 JQ	0.002 JQ	0.0082 U
Benzo(b)fluoranthene	205-99-2	mg/Kg	1.1	0.003 JQ	0.051	0.0065	0.0025 U	0.0029 JQ	0.0037	0.018 JQ
Benzo(g,h,i)perylene	191-24-2	mg/Kg	N/P	0.0015 U	0.0092 U	0.0018 JQ	0.0016 U	0.0015 U	0.0015 U	0.0088 U
Benzo(k)fluoranthene	207-08-9	mg/Kg	11	0.002 U	0.015 JQ	0.0025 JQ	0.002 U	0.002 U	0.002 U	0.011 U
Chrysene	218-01-9	mg/Kg	110	0.0013 U	0.034	0.0046	0.0013 U	0.0015 JQ	0.0028 JQ	0.0093 JQ
Dibenzo(a,h)anthracene	53-70-3	mg/Kg	0.11	0.0016 U	0.0099 U	0.0017 U	0.0017 U	0.0017 U	0.0016 U	0.0094 U
Fluoranthene	206-44-0	mg/Kg	2400	0.0015 U	0.054	0.0061	0.0016 U	0.0021 JQ	0.0024 JQ	0.01 JQ
Fluorene	86-73-7	mg/Kg	2400	0.0038 U	0.023 U	0.0039 U	0.0039 U	0.0039 U	0.0038 U	0.022 U
Indeno(1,2,3-cd)pyrene	193-39-5	mg/Kg	1.1	0.0017 U	0.011 U	0.0018 U	0.0018 U	0.0018 U	0.0017 U	0.01 U
Naphthalene	91-20-3	mg/Kg	3.8	0.0024 U	0.014 U	0.0024 U	0.0025 U	0.0024 U	0.0024 U	0.014 U
Phenanthrene	85-01-8	mg/Kg	N/P	0.0019 U	0.016 JQ	0.0048	0.0019 U	0.0019 U	0.0019 U	0.011 U
Pyrene	129-00-0	mg/Kg	1800	0.0016 U	0.041	0.008	0.0017 U	0.0027 JQ	0.0031 JQ	0.0098 JQ
8270D Semivolatile Organic Compounds (GC/MS)										
1,1'-Biphenyl	92-52-4	mg/Kg	47	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U
1,2,4,5-Tetrachlorobenzene	95-94-3	mg/Kg	23	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U
1,2,4-Trichlorobenzene	120-82-1	mg/Kg	24	0.18 U	0.18 U	0.18 U	0.18 U	0.18 U	0.18 U	0.18 U
1,2-Dichlorobenzene	95-50-1	mg/Kg	1800	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U
1,3-Dichlorobenzene	541-73-1	mg/Kg	N/P	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U
1,4-Dichlorobenzene	106-46-7	mg/Kg	2.6	0.19 U	0.2 U	0.2 U	0.2 U	0.19 U	0.2 U	0.19 U
2,2'-Oxybis(1-chloropropane)	108-60-1	mg/Kg	3100	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
2,3,4,6-Tetrachlorophenol	58-90-2	mg/Kg	1900	0.18 U	0.18 U	0.18 U	0.18 U	0.18 U	0.18 U	0.18 U
2,4,5-Trichlorophenol	95-95-4	mg/Kg	6300	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U
2,4,6-Trichlorophenol	88-06-2	mg/Kg	49	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U
2,4-Dichlorophenol	120-83-2	mg/Kg	190	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U
2,4-Dimethylphenol	105-67-9	mg/Kg	1300	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
2,4-Dinitrophenol	51-28-5	mg/Kg	130	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
2,4-Dinitrotoluene	121-14-2	mg/Kg	1.7	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U
2,6-Dinitrotoluene	606-20-2	mg/Kg	0.36	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U
2-Chloronaphthalene	91-58-7	mg/Kg	4800	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U
2-Chlorophenol	95-57-8	mg/Kg	390	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U
2-Methylnaphthalene	91-57-6	mg/Kg	240	0.026 U	0.026 U	0.026 U	0.026 U	0.026 U	0.026 U	0.026 U
2-Methylphenol	95-48-7	mg/Kg	3200	0.21 U	0.22 U	0.22 U	0.22 U	0.21 U	0.22 U	0.21 U
2-Nitroaniline	88-74-4	mg/Kg	630	0.2 U	0.21 U	0.21 U	0.21 U	0.2 U	0.21 U	0.21 U
2-Nitrophenol	88-75-5	mg/Kg	N/P	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U
3 & 4 Methylphenol	15831-10-4	mg/Kg	N/P	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
3,3'-Dichlorobenzidine	91-94-1	mg/Kg	1.2	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
3-Nitroaniline	99-09-2	mg/Kg	N/P	0.23 U	0.23 U	0.23 U	0.23 U	0.23 U	0.23 U	0.23 U



**Table 1
Soil Analytical Results
Pawhuska High School ER
EPA Region 6**

Analyte	CAS.NO	Units	Summary Resident Soil (RSL) THQ=1.0	PHS-A1	PHS-B5	PHS-C3	PHS-C3	PHS-C3	PHS-C3	PHS-E6
				PHS-A1-03-171002-01-51	PHS-B5-03-171002-01-51	PHS-C3-03-171002-01-51	PHS-C3-03-171002-02-51	PHS-C3-03-171002-03-51	PHS-C3-03-171002-03-52	PHS-E6-03-171002-01-51
				0-3 inches	0-3 inches	0-3 inches	0-3 inches	0-3 inches	0-3 inches	0-3 inches
				10/2/2017	10/2/2017	10/2/2017	10/2/2017	10/2/2017	10/2/2017	10/2/2017
				Field Sample	Field Sample	Field Sample	Field Sample	Field Sample	Field Duplicate	Field Sample
4,6-Dinitro-2-methylphenol	534-52-1	mg/Kg	5.1	0.23 U	0.23 U	0.23 U	0.23 U	0.23 U	0.23 U	0.23 U
4-Bromophenyl-phenylether	101-55-3	mg/Kg	N/P	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
4-Chloro-3-methylphenol	59-50-7	mg/Kg	6300	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U
4-Chloroaniline	106-47-8	mg/Kg	2.7	0.22 U	0.23 U	0.23 U	0.23 U	0.22 U	0.23 U	0.23 U
4-Chlorophenyl-phenylether	7005-72-3	mg/Kg	N/P	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
4-Nitroaniline	100-01-6	mg/Kg	27	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U
4-Nitrophenol	100-02-7	mg/Kg	N/P	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U
Acenaphthene	83-32-9	mg/Kg	3600	0.032 U	0.032 U	0.032 U	0.032 U	0.032 U	0.032 U	0.032 U
Acenaphthylene	208-96-8	mg/Kg	N/P	0.029 U	0.029 U	0.029 U	0.029 U	0.029 U	0.029 U	0.029 U
Acetophenone	98-86-2	mg/Kg	7800	0.18 U	0.19 U	0.19 U	0.19 U	0.18 U	0.19 U	0.18 U
Anthracene	120-12-7	mg/Kg	18000	0.029 U	0.029 U	0.029 U	0.029 U	0.029 U	0.029 U	0.029 U
Atrazine	1912-24-9	mg/Kg	2.4	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U
Benzaldehyde	100-52-7	mg/Kg	170	0.25 UJK	0.25 UJK	0.25 UJK	0.25 UJK	0.25 UJK	0.25 UJK	0.25 UJK
Benzidine	92-87-5	mg/Kg	0.00053	0.2 UJK	0.2 UJK	0.2 UJK	0.2 U	0.2 UJK	0.2 UJK	0.2 R
Benzo(a)anthracene	56-55-3	mg/Kg	1.1	0.03 U	0.03 U	0.063 JQ	0.03 U	0.03 U	0.03 U	0.037 JQ
Benzo(a)pyrene	50-32-8	mg/Kg	0.11	0.027 U	0.027 U	0.049 JQ	0.027 U	0.027 U	0.027 U	0.036 JQ
Benzo(b)fluoranthene	205-99-2	mg/Kg	1.1	0.028 U	0.028 U	0.064 JQ	0.028 U	0.028 U	0.028 U	0.056 JQ
Benzo(g,h,i)perylene	191-24-2	mg/Kg	N/P	0.033 U	0.033 U	0.033 U	0.033 U	0.033 U	0.033 U	0.033 U
Benzo(k)fluoranthene	207-08-9	mg/Kg	11	0.027 U	0.027 U	0.031 JQ	0.027 U	0.027 U	0.027 U	0.027 U
Benzyl alcohol	100-51-6	mg/Kg	6300	0.19 U	0.19 U	0.19 U	0.19 UJK	0.19 U	0.19 U	0.19 U
Bis(2-chloroethoxy)methane	111-91-1	mg/Kg	190	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Bis(2-chloroethyl)ether	111-44-4	mg/Kg	0.23	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U
Bis(2-ethylhexyl)phthalate	117-81-7	mg/Kg	39	0.2 U	0.21 U	0.21 U	0.21 U	0.2 U	0.21 U	0.21 U
Butylbenzylphthalate	85-68-7	mg/Kg	290	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U
Caprolactam	105-60-2	mg/Kg	31000	0.15 U	0.15 U	0.15 U	0.15 U	0.15 U	0.15 U	0.15 U
Carbazole	86-74-8	mg/Kg	N/P	0.2 U	0.21 U	0.21 U	0.21 U	0.2 U	0.21 U	0.21 U
Chrysene	218-01-9	mg/Kg	110	0.037 U	0.037 U	0.06 JQ	0.037 U	0.037 U	0.037 U	0.047 JQ
Dibenzo(a,h)anthracene	53-70-3	mg/Kg	0.11	0.032 U	0.032 U	0.032 U	0.032 U	0.032 U	0.032 U	0.032 U
Dibenzofuran	132-64-9	mg/Kg	73	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U
Diethylphthalate	84-66-2	mg/Kg	51000	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U
Dimethylphthalate	131-11-3	mg/Kg	N/P	0.2 U	0.21 U	0.21 U	0.21 U	0.2 U	0.21 U	0.21 U
Di-n-butylphthalate	84-74-2	mg/Kg	6300	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U
Di-n-octylphthalate	117-84-0	mg/Kg	630	0.18 U	0.18 U	0.18 U	0.18 U	0.18 U	0.18 U	0.18 U
Fluoranthene	206-44-0	mg/Kg	2400	0.034 U	0.034 U	0.11	0.034 U	0.034 U	0.034 U	0.1
Fluorene	86-73-7	mg/Kg	2400	0.029 U	0.029 U	0.029 U	0.029 U	0.029 U	0.029 U	0.029 U
Hexachlorobenzene	118-74-1	mg/Kg	0.21	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
Hexachlorobutadiene	87-68-3	mg/Kg	1.2	0.17 U	0.17 U	0.17 U	0.17 U	0.16 U	0.17 U	0.17 U
Hexachlorocyclopentadiene	77-47-4	mg/Kg	1.8	0.15 UJK	0.15 UJK	0.15 UJK	0.15 UJK	0.15 UJK	0.15 UJK	0.15 UJK
Hexachloroethane	67-72-1	mg/Kg	1.8	0.18 U	0.18 U	0.18 U	0.18 U	0.18 U	0.18 U	0.18 U
Indeno(1,2,3-cd)pyrene	193-39-5	mg/Kg	1.1	0.029 U	0.029 U	0.029 U	0.029 U	0.029 U	0.029 U	0.029 U



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Analyte	CAS.NO	Units	Summary Resident Soil (RSL) THQ=1.0	PHS-A1	PHS-B5	PHS-C3	PHS-C3	PHS-C3	PHS-C3	PHS-E6	
				PHS-A1-03-171002-01-51	PHS-B5-03-171002-01-51	PHS-C3-03-171002-01-51	PHS-C3-03-171002-02-51	PHS-C3-03-171002-03-51	PHS-C3-03-171002-03-52	PHS-E6-03-171002-01-51	
				0-3 inches	0-3 inches	0-3 inches	0-3 inches	0-3 inches	0-3 inches	0-3 inches	
				10/2/2017	10/2/2017	10/2/2017	10/2/2017	10/2/2017	10/2/2017	10/2/2017	
				Field Sample	Field Sample	Field Sample	Field Sample	Field Sample	Field Duplicate	Field Sample	
Isophorone	78-59-1	mg/Kg	570	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U
Naphthalene	91-20-3	mg/Kg	3.8	0.029 U	0.029 U	0.029 U	0.029 U	0.029 U	0.029 U	0.029 U	0.029 U
Nitrobenzene	98-95-3	mg/Kg	5.1	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
N-Nitrosodimethylamine	62-75-9	mg/Kg	0.002	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
N-Nitroso-di-n-propylamine	621-64-7	mg/Kg	0.078	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U
N-Nitrosodiphenylamine	86-30-6	mg/Kg	110	0.052 U	0.053 U	0.053 U	0.053 U	0.052 U	0.053 U	0.053 U	0.053 U
Pentachlorophenol	87-86-5	mg/Kg	1	0.26 U	0.27 U	0.27 U	0.27 U	0.26 U	0.27 U	0.26 U	0.26 U
Phenanthrene	85-01-8	mg/Kg	N/P	0.034 U	0.034 U	0.096	0.034 U	0.034 U	0.034 U	0.034 U	0.077
Phenol	108-95-2	mg/Kg	19000	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Pyrene	129-00-0	mg/Kg	1800	0.034 U	0.034 U	0.096	0.034 U	0.034 U	0.034 U	0.034 U	0.075
TX_1005 Texas - Total Petroleum Hydrocarbon (GC)											
C6-C12	STL00061	mg/Kg	50	6.3 U	11 U	7.2 U	8.2 U	7.1 U	7.7 U	10 U	10 U
C6-C35 Summary	STL00265	mg/Kg	50	6.3 U	11 U	7.2 U	8.2 U	7.1 U	7.7 U	10 U	10 U
Over C12-C28	STL00035	mg/Kg	50	6.3 U	11 U	7.2 U	8.2 U	7.1 U	7.7 U	10 U	10 U
Over C28-C35	STL00147	mg/Kg	50	6.3 U	11 U	7.2 U	8.2 U	7.1 U	7.7 U	10 U	10 U

BOLD = Detected above the detection limit

Yellow highlight = equal or exceeds RSL.

B = Compound was found in the blank and sample.

H = High bias.

J = Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

K = Unknown bias.

L = Low bias.

Q = The reported concentration is less than the sample quantitation limit for the specific analyte in the sample.

R = Quality Control indicates that data are unusable for all purposes.

U = Indicates the analyte was analyzed for but not detected.

N/P = Not Published

TPH was compared to the ODEQ guidance for Risk-Based Levels of Total Petroleum Hydrocarbons (TPH)(October 2012) of 50 mg/Kg for 0 to 2 ft bgs.

