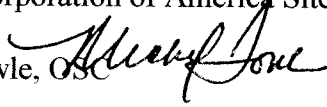


SUBJECT: Summary of Removal Site Evaluation Analytical Data
Tank Car Corporation of America Site

FROM: Michael Towle, OSC 

TO: FILE

DATE : August 19, 2009

The Tank Car Corporation of America (TCCA) Site included, among other things, operations involving the cleaning, sand blasting, painting, and repair of railroad tank cars. Tank cars taken into the facility contained, among other things, oils, creosote, solvents, ammonia, and pesticides.

Based upon a review of aerial photographs and on-Site observation, the Site historically included up to 5 rail sidings. One siding entered a small shed building where painting operations occurred. The remaining 4 sidings entered 2 large shed buildings where repair or rehabilitation operations occurred. One of these sidings also passed through a sandblasting shed.

A small impoundment was located between the sidings. A larger impoundment was located southeast of the sidings. The impoundments were likely used for the placement of various fluids removed from tankcars. Surface water from the Site was likely directed into the larger impoundment based upon observation of underground pipes at the Site. EPA installed soil borings into the impoundment areas and found them to contain remnants of black tarry materials along with sandblasting grit.

At least 4 tankcars used for the containment of hazardous materials were buried alongside the westernmost siding. Three of these tankcars ("UST 1, 2, and 3") were reportedly used as a replacement for the impoundments which were filled in the 1970s. These tankcars were removed by TCCA in 2007. A fourth buried tankcar ("Tank 4") contained a black tarry material removed by EPA in 2009. Other tankcars located upon the sidings ("AST 1 and 2") were used for the storage of hazardous materials. They were removed by TCCA. Additional tanks included storage for ammonia, diesel fuel, gasoline, and fuel for an on-Site boiler. The contents of these tanks have also been removed from the Site.

A removal site evaluation was conducted by EPA and included various field work activities between November 2008 and June 2009. The EPA evaluation included evaluation of work and information conducted or collected by others as well as the analysis of samples collected by EPA contractors. This document includes a summary of the information.

Only a limited number of potential contaminants are summarized herein. Most media contained dozens of contaminants and presenting them all in this document would be cumbersome. EPA tried to summarize the results of contaminants which are likely Site related (e.g., naphthalene or lead), may pose risk (e.g., benzene), are found in multiple media (e.g., soil and shallow water), or represent a category of contaminants (e.g., benzo(a)pyrene representing PAHs). The chlorinated solvents (e.g., TCE) are also summarized even though were found in only minor concentrations in the soil since they were also found in the ground water and the tank wastes.

1. TANK WASTES

In 2007, the oil, water, and sludge layers were analyzed by TCCA pursuant to an EPA Order in the 3 buried tankcars and one of the tankcars located on the sidings. The analysis identified the following contaminants, among others:

	UST 1 oil (mg/kg)	UST 1 sludge (mg/kg)	UST 2 sludge (mg/kg)	UST 3 oil (mg/kg)	UST 3 sludge (mg/kg)	AST 2 oil (mg/kg)
Benzene	137	4150	7.16	5.02	23.8	30.6
Ethylbenzene	14.1	476	-	8.78	-	265
Toluene	60.1	1240	21.9	17.3	20	57.3
Xylenes	87.6	1680	22.4	66.2	30.1	1450
Trichloroethene	-	-	-	4.8		11.8
1,1-dichloroethene	-	-	23.2	7.37	38.4	29.7
Vinyl chloride	-	-	-	5.12	57.1	-
Lead		22,000	626		2160	-

The following additional chemicals, among others, were also found in the same samples subjected to leaching tests (TCLP):

	UST 1 oil (mg/L)	UST 1 sludge (mg/L)	UST 2 sludge (mg/L)	UST 3 oil (mg/L)	UST 3 sludge (mg/L)	AST 2 oil (mg/L)
2,4 -D	0.0051	-	12.9	-	47	
Cresol (highest)	0.787	1.27	2.43	0.676	2.910	0.816

The EPA identified a fourth buried tankcar and collected a sample of the contents. The following chemicals, among others, were identified (mg/kg):

Benzene	-240	1'1'-biphenyl	-13000	heptachlor	-0.430
Ethylbenzene	-110	Acenaphthylene	-32000	dieldrin	-0.150
Toluene	-420	Acenaphthene	-26000	endrin	-0.660
Xylenes	-560	Dibenzofuran	-38000	DDD	-0.290
Styrene	-250	Fluorene	-56000	DDT	-1.7
Isopropylbenzene	-24	Phenanthrene	-140000	chlordane	-3.2
Phenol	-9300	Anthracene	-59000	endrin ketone	-1.1
2-methylphenol	-5000	Carbazole	-23000	endrin aldehyde	-1.5
4-methylphenol	-12000	Fluoranthene	-77000		
2,4-dimethylphenol	-8600	Pyrene	-55000		
Naphthalene	-240000	Chrysene	-28000		
2-methylnaphthalene	-68000	Benzo(a)anthracene	-27000		
		Benzo(a)pyrene	-17000		
		Dibenzothiophene	-13000		

2. SOIL

The surface material at the Site is comprised predominantly of the residues (i.e., sand and minor bits of paint and metal) from former sand blasting operations. The Site includes piles of sand blasting residues along its eastern boundary and along the railroad tracks. Most of the eastern half of the Site is also covered by the sand blasting residue. The depth of the sand blasting residue is variable across the Site. Piles along the eastern boundary of the Site are about 8 feet high. An approximate depth of 4 feet of sand was found in many of the boreholes advanced into the area of the former impoundments. According to the historical photographs and on-Site observations from geoprobe borings, it appears that the former impoundments were filled with sandblasting residues. EPA estimates approximately 19,500 cubic yards (24,000 tons) of sand blasting grit.

The sandblasting residues could be considered to be residual wastes pursuant to Pennsylvania Code. The EPA removal site evaluation included analysis of surface material samples for metal and semi-volatile organic compounds. Analytical results of the soil (sand) material at the Site (comprised mainly of sandblasting residues) identified metal and semi-volatile organic contaminants.

The Site evaluation also included the collection of soil samples from an area of the Site in which tankcars were buried and the wastes within those tankcars were stockpiled. This area (SS-05 and SS-06) is not characterized by sand and the results are excluded from the general evaluation of the surface soil characterized by sand.

ELEMENT CONCENTRATIONS IN SOIL

Certain element concentrations in the Site soil (comprised mainly of sand) are as follows:

	Arsenic (mg/kg)	Beryllium (mg/kg)	Lead (mg/kg)	Manganese (mg/kg)	Zinc (mg/kg)	Nickel (mg/kg)	Copper (mg/kg)
Surface Soil	1.5 – 33.7	8.5 – 149	681-1980	715-3420	4150-42,300	115-1070	1010-5440
Deep Soil	1.8 – 57.3	0.91 – 162	13.4-1260	124-2660	75-23,800	15.9-391	14.2-5160

EPA believes that this data reasonably depicts the contaminants found within the sandblasting grit. The sand was also subjected to TCLP tests and the tests suggest that the sand is likely not classified as a hazardous waste. The data summary suggests that the concentrations of elements in the soil comprised mainly of sand are similar whether at the surface or depth.

Certain element concentrations in the soil in areas in which sand is not readily identified are as follows:

	Arsenic (mg/kg)	Beryllium (mg/kg)	Lead (mg/kg)	Manganese (mg/kg)	Zinc (mg/kg)	Nickel (mg/kg)	Copper (mg/kg)
Residential Soil	2.5 – 30.6	0.77 – 10	29.5-697	340-2630	85.3-2950	10.5-75.7	23.9-600
Site Tank Area	17.5 – 30.6	16.6-46.4	487-914	744-1170	4240-13,700	90-261	820-2010
Site (non sand area) (SS-07)	3.5	14.2	366	702	3450	28.9	396

The data summary suggests that the concentrations of the elements in the soil not characterized by obvious amounts of sand are lower than soil comprised mainly or mostly of sand. As such, the sand is likely a source of element contamination.

A sample from the area in which surface water drains from the Site includes the following element concentrations:

	Arsenic (mg/kg)	Beryllium (mg/kg)	Lead (mg/kg)	Manganese (mg/kg)	Zinc (mg/kg)	Nickel (mg/kg)	Copper (mg/kg)
Drainage (SS-04)	15.4	8.5	681	715	4450	115	1010

The drainage sample inorganic analytical results suggest that the drainage pathway contains inorganic elements which may be elevated with respect to possible background concentrations of elements as suggested by literature sources.

RESIDENTIAL SOIL EVALUATION

The evaluation of soil on residential properties included collection of surface samples biased towards bare soil areas (where they existed). In general, the soil samples collected from the area of the property closest to the TCCA Site contained the highest element concentrations. The element concentrations on residential properties are lower than concentrations on the Site.

	Arsenic (mg/kg)	Beryllium (mg/kg)	Lead (mg/kg)	Manganese (mg/kg)	Zinc (mg/kg)	Nickel (mg/kg)	Copper (mg/kg)
Residential Range	2.5 – 30.6	0.77 – 10	29.5-697	340-2630	85.3-2950	10.5-75.7	23.9-600
Range at Rear	8 – 30.6	1.5 – 10	71 – 495	752 – 2630	164 – 2950	16.6 – 75.7	31 – 600

SOIL ELEMENT CONSIDERATIONS

An evaluation of the potential background concentrations of elements in soils follows (this may not accurately represent background concentrations at the TCCA Site):

	Arsenic (mg/kg)	Beryllium (mg/kg)	Lead (mg/kg)	Manganese (mg/kg)	Zinc (mg/kg)	Nickel (mg/kg)	Copper (mg/kg)
Eastern US (range)		<1-7	<10-300	<2-7000	<5-2900	<5-700	<1-700
Eastern US (mean)	7.4	0.85	17	640	52	18	22
EPA range	1-50	0.1-40	2-200	20-3000	10-300	5-500	2-100
EPA avg.	5	6	10	600	50	10	30

An evaluation of possible residential screening concentrations follows:

	Arsenic (mg/kg)	Beryllium (mg/kg)	Lead (mg/kg)	Manganese (mg/kg)	Zinc (mg/kg)	Nickel (mg/kg)	Copper (mg/kg)
PADEP Soil MSC	12	440	500	31,000	66,000	4400	8200
USEPA screening	4	160	400	1600	23,000	1600	

ORGANIC CONCENTRATIONS IN SOIL

Certain organic concentrations in the Site surface soil (comprised mainly of sand) and in the deeper soils are as follows:

	Napthalene (mg/kg)	Dibenzofuran (mg/kg)	Benzo(a) anthracene (mg/kg)	Benzo(a) Pyrene (mg/kg)	DEHP (mg/kg)	Phenol (mg/kg)	benzene (mg/kg)
Surface Soil	ND- 0.250	ND-0.110	0.067-2.9	0.064-2.9	0.069-9.7	ND	NA
Drainage (SS-04)	0.380	0.220	4.1	4.1	1.8	ND	NA
Waste residue (SS-05/06)	0.57 -1.500	0.3 – 0.94	4.3-4.9	5.1	1.2-1.6	ND-0.19	NA
Deep Soil	0.016-14,000	ND-1700	ND-1500	ND-970	ND-5.1	ND-19	ND-42

The data summary suggests that the concentration of organic contaminants in the soil is much greater at depth than at the surface. This is likely due to several issues: 1) material at the surface is “diluted” by other materials (e.g., materials brought to the Site), 2) material at depth is mixed with residual wastes associated with the former impoundments, 3) contaminants in the surface soils are exposed and may weather. Additionally, the concentrations of organic contaminants in the drainage sample are concentrated with respect to the remainder of the Site’s surface soil suggesting that organic contaminants may migrate from the Site. The deep soil at the Site contains a variety of chemicals that are also found in the waste materials in the tanks at the Site. The soil contamination in one of the impoundments (represented by borings SB-01 and SB-32 collected from depths of 2 and 4 feet) includes (mg/kg):

Benzene	-42	1'1'-biphenyl	-310	heptachlor	-0.069
Ethylbenzene	-32	Acenaphthylene	-590	DDD	-0.220
Toluene	-110	Acenaphthene	-710	DDT	-0.150
Xylenes	-243	Dibenzofuran	-220	chlordane	-0.420
Styrene	-78	Fluorene	-330	2,4-D	-1.09
Isopropylbenzene	-0.075	Phenanthrene	-930	1,2 -DCE	-33
Phenol	-19	Anthracene	-200	TCE	-0.061
2-methylphenol	-32	Carbazole	-120	PCE	-0.054
4-methylphenol	-72	Fluoranthene	-580		
2,4-dimethylphenol	-64	Pyrene	-3300		
Naphthalene	-14000	Chrysene	-1500		
2-methylnaphthalene	-2200	Benzo(a)anthracene	-1500		
		Benzo(a)pyrene	-970		

The similarities between the contamination found within the tanks and the contamination found within the subsurface soil indicates that similar wastes are found in each of these locations.

The surface soil on the residential properties was sampled and analyzed for organic parameters. The results are summarized as follows:

	Napthalene (mg/kg)	Dibenzofuran (mg/kg)	Benzo(a) anthracene (mg/kg)	Benzo(a) Pyrene (mg/kg)	DEHP (mg/kg)	Phenol (mg/kg)	benzene (mg/kg)
Residential Soil Range	ND – 0.130	ND – 0.280	0.058-1.6	0.067-1.6	0.077-1.6	ND	NA

The analytical results of soil samples collected from the residential properties suggests that the levels of contaminants are significantly less than they are on the Site. However, organic parameters in the residential soil are similar to those found on the Site.

3. SHALLOW/PERCHED GROUNDWATER

The subsurface was found to be saturated in the areas of the former impoundments and immediately downgradient thereof. The clayey soils appeared to result in a perched water table less than 2 feet beneath ground surface. A deeper regional shallow aquifer is suggested by the deeper water levels in the monitoring wells located at the Site. The manner in which the shallow perched water migrates is not known; but is believed to migrate north and may discharge through a pipe and then onto nearby properties. Temporary monitoring wells were installed within the soil borings of both former impoundments and the area immediately downgradient thereof to evaluate the contaminants that may be in the shallow perched water. The water was purged slowly from the wells until certain parameters equilibrated and then samples were collected. The wells recharged quickly indicating that the perched water was able to move efficiently through the sandblasting residues.

METALS IN WATER WITHIN TEMPORARY WELLS

	Arsenic	Beryllium	Lead	Manganese	Zinc	Nickel	Copper
On-Site Deep Soil Range, mg/kg	1.8 – 57.3	0.91 – 162	13.4-1260	124-2660	75-23,800	15.9-391	14.2-5160
Shallow Water Range, ug/L	ND-5.3	ND	47.6-571	117-497	468-1000	50.1-251	67.7-139

ORGANICS IN WATER WITHIN TEMPORARY WELLS

	Napthalene	Dibenzofuran	Benzo(a) anthracene	Benzo(a) Pyrene	DEHP	Phenol	benzene
On-Site Deep Soil Range, mg/kg	0.016-14,000	ND-1700	ND-1500	ND-970	ND-5.1	ND-19	ND-42
Shallow Water Range, ug/L	ND-5900	ND-120	1-38	0.88-27	ND-1.3	ND-3500	ND-3100

Additionally, TCE (68 ug/L) was also found in the shallow water.

4. GROUNDWATER

Three monitoring wells located at the Site were purged and sampled. These wells appear to be constructed into the shallow regional aquifer approximately 40 feet below the ground surface. Only trichloroethene (TCE) was detected in only one of these wells (MW-3) located in the northwest portion of the Site at a level of 8.2 ug/L.

EPA installed three additional wells at the Site in order to be sure of the construction specifics of the wells and the monitored interval as well as to position wells downgradient to source areas. EPA positioned one of these wells in an area believed to represent a background or upgradient location (MW-04), one of the wells in an area suspected to be downgradient to the impoundments and in the direction of shallow perched water flow (MW-05), and one well near the location of former buried tankcars and downgradient to those tanks and the Site based upon June 2009 water level readings (MW-06). The analytical results follow:

	Napthalene	Dibenzofuran	Benzo(a) anthracene	Benzo(a) Pyrene	DEHP	Phenol	Benzene
MW-04, ug/l							
MW-05, ug/l	1.1	1.7					5.4
MW-06, ug/l	16	0.61			1.3		

Additionally, PCE (4.8 ug/l), TCE (28 ug/l), and DCE (1.7 ug/l) were detected in MW-06.

The following element concentrations were found in the ground water:

	Arsenic (ug/l)	Beryllium (ug/l)	Lead (ug/l)	Manganese (ug/l)	Zinc (ug/l)	Nickel (ug/l)	Copper (ug/l)
MW-04	2.9	1.3	-	1750	45.3	11.1	-
MW-05	3.5	-	-	7800	38.8	9.2	-
MW-06	4.6	-	-	135	10.9	-	-

The analytical results of the monitoring wells indicates that Site-related contaminants are present in the ground water in areas downgradient to known sources of contamination.

5. SURFACE WATER

The surface water migration pathway from the Site is not completely understood since EPA was not provided access to the railroad right of way to verify that Site surface waters and shallow underground waters enter a pipe believed to go under the tracks based upon available drawings. During rain events, water disappears into the ground in area where this pipe is believed to be located. On the opposite side of the tracks, a pipe with flowing water during rain events is identified. This water discharges and then flows into a water filled quarry. The quarry is then able to overflow into Sandy Run. By the end of June 2009, EPA was unable to sample the waters discharging from the Site. However, a sample of water was collected from the quarry. The analytical results indicate no organic contaminants and the following levels of elements (compared with on-Site shallow perched water values and ground water values):

	Arsenic (ug/l)	Beryllium (ug/l)	Lead (ug/l)	Manganese (ug/l)	Zinc (ug/l)	Nickel (ug/l)	Copper (ug/l)
Surface Water (SW-01)	4.1	-	4.7	107	17.3	-	19
Shallow Water Range	ND-5.3	ND	47.6-571	117-497	468-1000	50.1-251	67.7-139
MW-04	2.9	1.3	-	1750	45.3	11.1	-
MW-05	3.5	-	-	7800	38.8	9.2	-
MW-06	4.6	-	-	135	10.9	-	-