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Date:
February 4, 2015

ARCADIS Project No.:
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Subject:
Area 16 Soil Risk Evaluation, RACER Plant 3, Lansing, Michigan

Following the submittal of the Resource Conservation and Recovery Act Facility Investigation (RFI) Phase 2 Supplemental Activities Summary Report dated February 26, 2014 (ARCADIS 2014a) for the Revitalizing Auto Communities Environmental Response (RACER) Trust Plants 2, 3 and 6, located in Lansing, Michigan (Site), additional work has been completed to further characterize and evaluate metals in soil in Area 16, located adjacent to the southeast Plant 3 property boundary (Figure 1). Area 16 is bordered to the north and west by the remainder of Plant 3, to the south by Saginaw Street, and to the east by a 200-foot-wide railroad property owned by the Jackson & Lansing Railroad Company (railroad property). West Side Park is located east of the railroad property, and has two baseball fields, several horseshoe pits, and a small building. To date, soil sampling in and around Area 16 has been completed on the RACER property, as Jackson & Lansing Railroad Company has not responded to requests for access. Due to the issues with railroad property access, soil impacts in Area 16 have not been fully delineated beyond the RACER property boundary. Therefore, an evaluation was completed for soil in Area 16 to determine if impacts observed in Area 16 would be a concern if similar concentrations were detected in soil at West Side Park.

Figure 2 shows the surface soil sampling locations at Area 16. Constituents in soil in the general vicinity of Area 16 have been detected at concentrations higher than Michigan Department of Environmental Quality (MDEQ) criteria at several locations, including adjacent to the Plant 3 property boundary. The results of Area 16 sampling activities were provided to the MDEQ as the Area 16 Metals Summary memo dated

June 24, 2014 (ARCADIS 2014b). Criteria exceedances in soil primarily occur within the 2- to 10-foot below grade zone of shallow fill material that has been placed at the Site above native clay.

Historical aerial photographs and topographic maps were reviewed in an attempt to determine the timing of fill placement for Area 16 and the railroad property, and also if fill was ever placed in the West Side Park area. Historical aerial photographs and topographic maps are included as Attachment 1.

Observations noted from these sources are summarized as follows:

- 1910 – The first rail line was constructed, and associated fill placed, prior to 1910.
- 1938 - There appears to be some limited activity on the southern portion of Area 16 with potential filling. A building is visible on the railroad property. Baseball fields are present in West Side Park.
- 1950 – Additional development and filling is visible in Area 16, and several structures are now present on the property. Additional buildings have been constructed on the railroad property, and the baseball facility at West Side Park has been improved and expanded.
- 1955 – Additional buildings are present in Area 16, and the Plant 3 building and parking were constructed to the west. The baseball field at West Side Park has been re-oriented to its present-day configuration.
- 1963 - Buildings in Area 16 were removed, and Area 16 is vacant. Stands were added to the West Side Park baseball field.
- 1970 - A rail spur was installed through Area 16. The buildings on the railroad property appear to have been razed (photo resolution is poor).
- 1976 to 2013 - Area 16 was used for scrap metal storage after 1976, as observable on the 1998 photo. The surface configuration of the railroad property does not change appreciably beyond 1976. The baseball field at West Side Park was remodeled between 1998 and 2005.

Most of the fill material brought to Area 16 appears to have been in place by 1955, although additional material or debris may have been added during various construction and demolition activities. Filling at the railroad property likely occurred during various phases of construction and demolition, beginning with the first rail line constructed prior to 1910 and ending with demolition of the railroad buildings in the 1970s. There is no visible evidence of filling at West Side Park related to activities at Area 16 or the railroad property.

Risk Evaluation

In order to evaluate potential risks to human health from exposure to concentrations of metals in soil at Area 16, an exposure area (or “decision unit”) was identified around Area 16. As shown on Figure 2, the decision unit encompasses the southern portion of the grassy area around Area 16 where soil samples have been collected. This area occupies approximately 2.9 acres. The soil data collected in the decision unit were evaluated to determine if potentially unacceptable conditions are present at the nearby West Side Park, located to the east of Area 16 beyond the railroad property. To identify appropriate MDEQ screening criteria (MDEQ 2015), potential receptors were identified and include maintenance workers, baseball players and observers, and other users of the park. Based on these potential receptors, soil data were conservatively compared to residential MDEQ soil criteria including Direct Contact Criteria (DCC), Volatilization Soil Inhalation Criteria (VSIC), and Particulate Soil Inhalation Criteria (PSIC).

It was assumed that concentrations of constituents in soil at West Side Park were consistent with those measured in soil samples analyzed from the decision unit around Area 16. This is a conservative assumption because migration from the Site to West Side Park would only occur through the deposition of impacted wind-blown dust migrating from the unpaved ground around Area 16 to the park. If any volatile constituents were released, they would migrate into the ambient air rather than be deposited onto the soils in the park.

Soil data in the decision unit around Area 16 were separated into two datasets: surface soil (0 to 2 feet below ground surface [ft bgs]) to evaluate current conditions, and combined surface and subsurface soil (0 to 15 ft bgs) to evaluate a hypothetical future condition where soil in the decision unit was disturbed to a depth of 15 ft bgs (i.e., excavated during construction activities) and redistributed across the decision unit. Soil samples were collected at 22 locations within the decision unit, and 18 surface soil samples (0 to 2 ft bgs) and 48 combined surface and subsurface soil samples (0 to 15 ft bgs) were analyzed for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), and/or metals. One VOC, 20 SVOCs, and 17 metals were detected in at least one soil sample. Table 1 provides surface soil data for detected constituents, and Table 2 provides combined surface and subsurface soil data for detected constituents.

Constituents of potential concern (COPCs) were identified in soil, based on a comparison of the maximum detected concentration in either surface or combined surface and subsurface soil, as follows:

- Surface soil (0 to 2 ft bgs) – two COPCs: arsenic and lead were identified in surface soil. The concentration of arsenic exceeded the residential DCC at two locations (SB-A16-HU178 at 0-1 ft bgs and SB-A16-HU-181 at 0-1 ft bgs), and the concentration of lead was just above the residential DCC at one location (SB-A16-HU-181 at 0-1 ft bgs).

- Combined surface and subsurface soil (0 to 15 feet bgs) – five constituents were identified as combined surface and subsurface soil COPCs: arsenic, lead, benzo(a)anthracene, benzo(a)pyrene, and benzo(b)fluoranthene. The concentrations of arsenic in six samples; the concentrations of lead in three samples; and the concentrations of benzo(a)anthracene, benzo(a)pyrene, and benzo(b)fluoranthene in one sample (SB-A16-HU165 at 4-5 ft bgs) exceeded the residential DCC. In addition, methyl cyclohexane (which does not have criteria) was detected in one combined surface and subsurface soil sample at a concentration of 70 micrograms per kilogram (µg/kg).

The remaining detected constituents in surface and combined surface and subsurface soil did not exceed the relevant criteria.

The United States Environmental Protection Agency’s (USEPA’s) ProUCL statistical software (version 4.1.00) was used to calculate 95 percent upper confidence limits (UCLs) for the surface soil and combined surface and subsurface soil COPCs identified above. The ProUCL output sheet for the surface soil and combined surface soil and subsurface soil COPCs are provided in Attachment 2. For duplicate samples, the maximum detected concentration or the minimum reporting limit (for non-detects) was used as the representative concentration for each constituent. The 95 percent UCLs were then compared to the relevant criteria to determine if assumed COPC concentrations in soil at West Side Park (i.e., assuming concentrations were consistent with or lower than those measured in Area 16) were lower than applicable residential criteria. The following table summarizes this comparison.

COPC	Frequency of Detection	Maximum Detected (mg/kg)	Residential DDC (mg/kg)	Number of Exceedances	95 Percent UCL (mg/kg)	Does 95 Percent UCL Exceed Residential DCC?
Surface Soil (0-2 ft bgs)						
Arsenic	18/18	15.1	7.6	2	6.7	No
Lead	15/15	427	400	1	162	No
Surface and Subsurface Soil (0-15 feet bgs)						
Arsenic	48/48	16.7	7.6	6	4.2	No
Lead	40/40	7,230	400	3	1,037	YES
Benzo(a)anthracene	16/31	36	20	1	6.5	No
Benzo(a)pyrene	15/31	33	2	1	6.0	YES
Benzo(b)fluoranthene	17/31	62	20	1	11.1	No

The 95 percent UCLs for arsenic and lead in surface soil do not exceed the residential DCC, indicating that (based on current conditions) if surface soil concentrations at West Side Park are similar to or lower than those in the decision unit around Area 16, the surface soil is not a concern at West Side Park.

For combined surface and subsurface soil, the 95 percent UCLs for arsenic, benzo(a)anthracene, and benzo(b)fluoranthene do not exceed the residential DCC; however, the 95 percent UCLs for lead and benzo(a)pyrene do exceed the residential DCC. This indicates that a soil management plan (in the form of a deed restriction) prohibiting the excavation and re-grading of subsurface soils in the decision unit around Area 16 should be placed on the property consistent with the Draft Corrective Measures Study (CMS, ARCADIS 2014c). It should also be noted that USEPA policy on lead evaluations recommends that the arithmetic average of detected concentrations be used as the exposure point concentration (USEPA 2015) instead of the 95 percent UCL. The arithmetic average for lead in combined surface and subsurface soil was calculated to be 243 milligrams per kilogram (mg/kg), which is well below the residential DCC.

Conclusions

Current surface soil conditions in the 2.9-acre decision unit around Area 16 are not expected to have impacted the adjacent properties at concentrations that would be a concern for residential receptors. However, consistent with the draft CMS, ARCADIS recommends that, in addition to site-wide soil management, the deed restriction for Plant 3 include the maintenance of a clean soil cap over the Area 16 decision unit. Based on review of the Area 16 soil analytical data, the top 2 feet of the existing soil is suitable to act as a soil cap for the area. Future development of the area will require health and safety considerations to limit exposure to deeper impacted soils. The proposed corrective measures for Area 16 are illustrated on Figure 3.

Based on the results of the screening-level risk assessment, the concentrations of constituents on the RACER property do not pose an unacceptable risk to recreational users at West Side Park. Therefore, no additional off-site delineation for soil is warranted near Area 16.

References

- ARCADIS. 2014a. RFI Supplemental Phase 2 Activities Summary Report. RACER Trust, Lansing, Michigan Plants 2, 3 & 6 Industrial Land. February 26.
- ARCADIS. 2014b. Memorandum, Re: Area 16 Soil and Groundwater Metals Summary RACER Trust Plant 3, Lansing, Michigan. June 13.
- ARCADIS. 2014c. RCRA Corrective Action, Draft Corrective Measures Study. Plants 2, 3 and 6 Industrial Land. June.
- Michigan Department of Environmental Quality (MDEQ). 2015. Cleanup Criteria Requirements for Response Activity (Formerly the Part 201 Generic Cleanup Criteria and Screening Levels). Available at: http://www.michigan.gov/deq/0,4561,7-135-3311_4109_9846-251790--,00.html

United States Environmental Protection Agency (USEPA). 2015. Frequent Questions from Risk Assessors on the Adult Lead Methodology (ALM). Available at:
<http://www.epa.gov/superfund/health/contaminants/lead/almfaq.htm>

Enclosures:

Table 1	Summary of Area 16 Surface Soil (0 to 2 ft bgs) Sampling Analytical Results
Table 2	Summary of Area 16 Soil (0 to 15 ft bgs) Sampling Analytical Results
Figure 1	Plant 3 Work Plan Areas
Figure 2	Area 16 Surface Soil Sampling Locations
Figure 3	Proposed Corrective Measures Area 16
Attachment 1	Historical Aerial Photographs
Attachment 2	ProUCL Output Sheets



Tables

Table 1
Summary of Area 16 Surface Soil (0 to 2 ft bgs) Sampling Analytical Results
RACER Trust
Plant 3 - Lansing, Michigan

Constituent	Units	Residential Infinite Source Volatile Soil Inhalation Criteria (VSIC)	Residential Particulate Soil Inhalation Criteria (PSIC)	Residential Direct Contact Criteria (DCC)	Statewide Default Background Levels	Detection Frequency	Maximum Detect	Exceeds Residential VSIC/PSIC/DC?	Location ID:	SB-A16-GX162	SB-A16-HA159	SB-A16-HA165	SB-A16-HD162	SB-A16-HQ168	SB-A16-HR162
									Sample Depth (feet): Date Collected:	1 - 2 06/05/12	0 - 1 06/05/12	1 - 2 06/06/12	1 - 2 06/06/12	1 - 2 11/09/12	1 - 2 06/06/12
Semivolatile Organics															
2-Methylnaphthalene	µg/kg	1.50E+06	6.70E+08	8.10E+06	--	1/12	80	No		<300	<80	80	<40	<200 [<100]	<100
Anthracene	µg/kg	1.40E+09	6.70E+10	2.30E+08	--	4/12	200	No		<300	150	<70	50	200 [<100]	<100
Benzo(a)anthracene	µg/kg	NLV	ID	2.00E+04	--	8/12	900	No		300	500	<70	210 J	900 J [<100 J]	400
Benzo(a)pyrene	µg/kg	NLV	1.50E+06	2.00E+03	--	7/12	700	No		<300	470	<70	210	700 J [<100 J]	400
Benzo(b)fluoranthene	µg/kg	ID	ID	2.00E+04	--	9/12	1,100	No		500 J	820 J	<70	400 J	800 J [<100 J]	800 J
Benzo(g,h,i)perylene	µg/kg	NLV	8.00E+08	2.50E+06	--	7/12	400	No		<300	380 J	<70	210 J	400 J [<100 J]	300
Benzo(k)fluoranthene	µg/kg	NLV	ID	2.00E+05	--	9/12	1,100	No		500 J	840 J	<70	410 J	600 J [<100 J]	800 J
bis(2-Ethylhexyl)phthalate (DEHP)	µg/kg	NLV	7.00E+08	2.80E+06	--	2/12	74,000	No		74,000 EJ	7,800	<100	<80	<300 [<200]	<300
Carbazole	µg/kg	NLV	6.20E+07	5.30E+05	--	2/12	100	No		<300	100	<70	40	<200 [<100]	<100
Chrysene	µg/kg	ID	ID	2.00E+06	--	8/12	1,200	No		300	510	<70	230	1,200 J [<100 J]	500
Dibenz(a,h)anthracene	µg/kg	NLV	ID	2.00E+03	--	2/12	200	No		<500	200 J	<100	100 J	<300 [<200]	<300
Fluoranthene	µg/kg	7.40E+08	9.30E+09	4.60E+07	--	10/12	1,600	No		600	1,150	90	470	1,600 J [100 J]	900
Fluorene	µg/kg	1.30E+08	9.30E+09	2.70E+07	--	1/12	90	No		<300	90	<70	<40	<200 [<100]	<100
Indeno(1,2,3-cd)pyrene	µg/kg	NLV	ID	2.00E+04	--	7/12	400	No		<300	360 J	<70	180 J	300 [<100]	300
Phenanthrene	µg/kg	1.60E+05	6.70E+06	1.60E+06	--	9/12	900	No		300	690	<70	250	900 J [<100 J]	600
Pyrene	µg/kg	6.50E+08	6.70E+09	2.90E+07	--	10/12	1,300	No		500	950	90	410	1,300 J [100 J]	700
Inorganics															
Antimony	mg/kg	NLV	1.30E+04	1.80E+02	NA	1/15	0.3	No		<0.20	<0.20	<0.20	<0.21	<0.24 [<0.22]	<0.20
Arsenic	mg/kg	NVL	7.20E+02	7.60E+00	5.8	18/18	15.1	YES		1.34	1.69	3.32	1.67	1.13 [1.41]	1.12
Barium	mg/kg	NLV	3.30E+05	3.70E+04	75	15/15	178	No		53.4	41.4	18.8	55.9	23.0 [26.6]	30.7
Beryllium	mg/kg	NLV	1.30E+03	4.10E+02	NA	5/8	0.37	No		0.31	0.26	<0.20	0.37	NA	<0.20
Boron	mg/kg	NLV	ID	4.80E+04	NA	2/14	4.19	No		<4.0	<4.1	<4.0	<4.3	<4.8 [<4.5]	<4.0
Cadmium	mg/kg	NLV	1.70E+03	5.50E+02	1.2	15/15	1.39	No		0.27	0.41	0.16	0.18	<0.12 [0.13]	0.14
Chromium (a)	mg/kg	NLV	2.60E+02	2.50E+03	18	15/15	11.4	No		9.68	11.4	4.41	9.33	4.93 [6.42]	8
Cobalt	mg/kg	NLV	1.30E+04	2.60E+03	6.8	18/18	4.8	No		4.54	4.27	2.92	4.8	3.15 [3.71]	3.58
Copper	mg/kg	NLV	1.30E+05	2.00E+04	32	15/15	293	No		8.65	10.3	5.95	9.37	5.60 [7.97]	11.4
Lead	mg/kg	NLV	1.00E+05	4.00E+02	21	15/15	427	YES		17	20.4	8.21	13.3	3.48 [4.8]	11.4
Manganese	mg/kg	NLV	3.30E+03	2.50E+04	440	18/18	450	No		328	293	215	308	189 [248]	246
Mercury	mg/kg	5.20E+01	2.00E+04	1.60E+02	0.13	15/15	1.067	No		0.0436	0.0362	0.0106	0.0365	0.0184 [0.0316]	0.0151
Nickel	mg/kg	NLV	1.30E+04	4.00E+04	20	15/15	16.6	No		7.1	9.54	9.62	7.98	7.25 [9.37]	11.1
Selenium	mg/kg	NLV	1.30E+05	2.60E+03	0.41	4/18	0.39	No		<0.20	<0.20	<0.20	<0.21	<0.12 [<0.11]	<0.20
Silver	mg/kg	NLV	6.70E+03	2.50E+03	1	4/15	0.26	No		<0.10	<0.10	<0.10	<0.10	<0.02 [0.02]	0.1
Vanadium	mg/kg	NLV	ID	7.50E+02	NA	15/15	11.7	No		10.2	8.77	4.76	11.2	6.88 [8.86]	6.42
Zinc	mg/kg	NLV	ID	1.70E+05	47	18/18	453	No		22.5	32.3	13.8	18.2	15.2 [19.7]	16
Miscellaneous															
Total solids	%	--	--	--	--	18/18	96	NA		91	87	94	84	89 [90]	95

Table 1
Summary of Area 16 Surface Soil (0 to 2 ft bgs) Sampling Analytical Results
RACER Trust
Plant 3 - Lansing, Michigan

Constituent	Units	Location ID:	SB-A16-HU159	SB-A16-HU165	SB-A16-HU171	SB-A16-HU178	SB-A16-HX162	SB-A16-HX165	SB-A16-HX176	SB-A16-HY168	SB-A16-IE168	SB-A16-HU181	SB-A16-IL168	SB-A16-HU181E-E
		Sample Depth (feet): Date Collected:	1 - 2 06/06/12	1 - 2 06/06/12	1 - 2 11/09/12	0 - 1 11/28/12	1 - 2 06/06/12	1 - 2 09/20/12	0 - 1 11/28/12	1 - 2 11/09/12	0 - 1 11/28/12	0 - 1 07/10/13	1 - 2 07/10/13	0 - 1 04/09/14
Semivolatile Organics														
2-Methylnaphthalene	µg/kg		<70	<100 J	<100	NA	<70	<100	NA	<100	NA	NA	NA	NA
Anthracene	µg/kg		<70	200 J	<100	NA	<70	<100	NA	<100	NA	NA	NA	NA
Benzo(a)anthracene	µg/kg		200 J	600 J	<100	NA	300	<100	NA	<100	NA	NA	NA	NA
Benzo(a)pyrene	µg/kg		200	600 J	<100	NA	320	<100	NA	<100	NA	NA	NA	NA
Benzo(b)fluoranthene	µg/kg		380 J	1,100 J	<100	NA	630 J	100 J	NA	<100	NA	NA	NA	NA
Benzo(g,h,i)perylene	µg/kg		140 J	400 J	<100	NA	180	<100	NA	<100	NA	NA	NA	NA
Benzo(k)fluoranthene	µg/kg		390 J	1,100 J	<100	NA	620 J	200 J	NA	<100	NA	NA	NA	NA
bis(2-Ethylhexyl)phthalate (DEHP)	µg/kg		<100	<300 J	<200	NA	<100	<200 J	NA	<200	NA	NA	NA	NA
Carbazole	µg/kg		<70	<100 J	<100	NA	<70	<100	NA	<100	NA	NA	NA	NA
Chrysene	µg/kg		210	700 J	<100	NA	330	<100	NA	<100	NA	NA	NA	NA
Dibenz(a,h)anthracene	µg/kg		<100	<300 J	<200	NA	<100	<200	NA	<200	NA	NA	NA	NA
Fluoranthene	µg/kg		410	1,200 J	<100	NA	650	200	NA	<100	NA	NA	NA	NA
Fluorene	µg/kg		<70	<100 J	<100	NA	<70	<100	NA	<100	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	µg/kg		130 J	400 J	<100	NA	170	<100	NA	<100	NA	NA	NA	NA
Phenanthrene	µg/kg		220	800 J	<100	NA	380	100	NA	<100	NA	NA	NA	NA
Pyrene	µg/kg		370	1,000 J	<100	NA	550	200	NA	<100	NA	NA	NA	NA
Inorganics														
Antimony	mg/kg		<0.20	<0.20	<0.22	NA	<0.20	<0.20	NA	<0.23	NA	0.30 J	<0.50	<0.50
Arsenic	mg/kg		1.29	2.45	1.66	15.1	1.4	1.98	3.28	1.65	1.46	9.08	3.33	3.1
Barium	mg/kg		32.2	35.5	31.7	NA	31.7	30.1	NA	31.8	NA	178	31.5	39.3
Beryllium	mg/kg		0.27	0.21	NA	NA	<0.20	NA	NA	NA	NA	NA	NA	NA
Boron	mg/kg		<4.0	4.19	<4.4	NA	<4.0	<4.0	NA	<4.5	NA	1.82 J	<2.0	NA
Cadmium	mg/kg		0.22	0.12	0.18	NA	0.21	0.19	NA	0.15	NA	1.39	0.07 J	0.17 J
Chromium (a)	mg/kg		7.22	8.76	7.19	NA	5.66	4.75	NA	8.03	NA	8.48	1.75	8.39
Cobalt	mg/kg		3.44	3.81	4.51	2.96	2.83	2.75	3.06	4.14	2.8	4.54	1.04	4.22
Copper	mg/kg		9.16	37.9 ^f	7.17	NA	13	9.67	NA	8.97	NA	293	11.4	19.5
Lead	mg/kg		17.2	18.3	5.39	NA	27	18.9	NA	11.2	NA	427	25.9	9.47
Manganese	mg/kg		254	278	235	258	249	294	234	226	200	450	82.3	311
Mercury	mg/kg		0.0335	0.0159	0.0191	NA	0.023	0.0259	NA	0.0201	NA	1.067	0.0131	0.0281
Nickel	mg/kg		8.39	16.6	10.4	NA	7.36	8.67	NA	11.5	NA	12.9	3.15	10.9
Selenium	mg/kg		<0.20	<0.20	<0.11	0.39	<0.20	<0.20	0.23	<0.11	<0.20	0.29 J	<0.40	0.34 J
Silver	mg/kg		<0.10	<0.10	0.03	NA	<0.10	<0.10	NA	<0.20	NA	0.26	<0.20	<0.20
Vanadium	mg/kg		6.97	8.78	9.11	NA	5.62	5.29	NA	9.09	NA	11.7	4.83	9.43
Zinc	mg/kg		32.3	32.6	20.5	453	25.1	20.4	47.2	24.3	17.4	446	12.9	33.2
Miscellaneous														
Total solids	%		92	96	93	87	95	94	88	92	91	86	88	87

Table 1
Summary of Area 16 Surface Soil (0 to 2 ft bgs) Sampling Analytical Results
RACER Trust
Plant 3 - Lansing, Michigan

Table Notes:

(a) Chromium VI criteria presented. The total chromium statewide background level is presented

Data shown in [] represent duplicate sample analytical results.

Bolded results indicate the constituent was detected.

Shaded results indicate the constituent exceeded the residential criteria

% - percent

ft bgs - feet below ground surface

mg/kg - milligram per kilogram

NA - not available/not analyzed

µg/kg - microgram per kilogram

Michigan Department of Environmental Quality (MDEQ) Criteria Footnotes: (as revised December 30, 2013)

-- - Not listed in MDEQ Criteria Tables.

ID - Insufficient data to develop a criterion.

NLV - Not likely to volatilize.

Lab Data Qualifiers:

E - analyte exceeds calibration range

J - The constituent was positively identified; however, the associated numerical value is an estimated concentration

Table 2
Summary of Area 16 Soil (0 to 15 ft bgs) Sampling Analytical Results
RACER Trust
Plant 3 - Lansing, Michigan

Constituent	Units	Residential Infinite Source Volatile Soil Inhalation Criteria (VSIC)	Residential Particulate Soil Inhalation Criteria (PSIC)	Residential Direct Contact Criteria (DCC)	Statewide Default Background Levels	Detection Frequency	Maximum Detect	Exceeds Residential VSIC/PSIC/DC?	Location ID:		P3-SB-24 3 - 4 08/18/11	P3-SB-24 9 - 10 08/18/11	P3-SB-31 2 - 3 08/18/11	P3-SB-31 9 - 10 08/18/11	SB-A16-GX162 1 - 2 06/05/12	SB-A16-GX162 7 - 8 06/05/12	SB-A16-HA159 0 - 1 06/05/12	SB-A16-HA159 9 - 10 06/05/12
									Sample Depth (feet):	Date Collected:								
Volatile Organics																		
Methyl cyclohexane	µg/kg	--	--	--	--	1/5	70	NSL			NA	NA	NA	NA	NA	NA	NA	NA
Semivolatile Organics																		
2-Methylnaphthalene	µg/kg	1.50E+06	6.70E+08	8.10E+06	--	2/31	2,000	No			<40	<40	<40	<40 [<40]	<300	<40	<80	<40
Naphthalene	µg/kg	3.00E+05	2.00E+08	1.60E+07	--	1/31	2,000	No			<40	<40	<40	<40 [<40]	<300	<40	<80	<40
Anthracene	µg/kg	1.40E+09	6.70E+10	2.30E+08	--	7/31	19,000	No			<40	<40	<40	<40 [<40]	<300	<40	150	<40
Acenaphthene	µg/kg	8.10E+07	1.40E+10	4.10E+07	--	2/31	8,000	No			<40	<40	<40	<40 [<40]	<300	<40	<80	<40
Benzo(a)anthracene	µg/kg	NLV	ID	2.00E+04	--	16/31	36,000	YES			70	<40	40	<40 [<40]	300	<40	500	<40
Benzo(a)pyrene	µg/kg	NLV	1.50E+06	2.00E+03	--	15/31	33,000	YES			70	<40	50	<40 [<40]	<300	<40	470	<40
Benzo(b)fluoranthene	µg/kg	ID	ID	2.00E+04	--	17/31	62,000	YES			50	<40	40	<40 [<40]	500 J	<40	820 J	<40
Benzo(g,h,i)perylene	µg/kg	NLV	8.00E+08	2.50E+06	--	11/30	12,000	No			<40	<40	<40	<40 [<40]	<300	<40	380 J	<40
Benzo(k)fluoranthene	µg/kg	NLV	ID	2.00E+05	--	17/31	60,000	No			50	<40	40	<40 [<40]	500 J	<40	840 J	<40
bis(2-Ethylhexyl)phthalate (DEHP)	µg/kg	NLV	7.00E+08	2.80E+06	--	3/31	74,000	No			<40	<40	<40	<40 [<40]	74,000 EJ	<80	7,800	<80
Carbazole	µg/kg	NLV	6.20E+07	5.30E+05	--	4/31	6,000	No			<40	<40	<40	<40 [<40]	<300	<40	100	<40
Chrysene	µg/kg	ID	ID	2.00E+06	--	15/31	38,000	No			90	<80	<80	<80 [<80]	300	<40	510	<40
Dibenz(a,h)anthracene	µg/kg	NLV	ID	2.00E+03	--	2/30	200	No			<70	<80	<80	<80 [<80]	<500	<80	200 J	<80
Dibenzofuran	µg/kg	1.30E+05	6.70E+06	ID	--	1/31	7,000	No			<40	<40	<40	<40 [<40]	<300	<40	<80	<40
Di-n-butylphthalate (DBP)	µg/kg	NLV	3.30E+09	2.70E+07	--	1/31	300	No			<70	<80	<80	<80 [<80]	<500	<80	<200	<80
Fluoranthene	µg/kg	7.40E+08	9.30E+09	4.60E+07	--	18/31	88,000	No			170	<40	100	<40 [<40]	600	<40	1,150	<40
Fluorene	µg/kg	1.30E+08	9.30E+09	2.70E+07	--	2/31	13,000	No			<40	<40	<40	<40 [<40]	<300	<40	90	<40
Indeno(1,2,3-cd)pyrene	µg/kg	NLV	ID	2.00E+04	--	11/30	13,000	No			<40	<40	<40	<40 [<40]	<300	<40	360 J	<40
Phenanthrene	µg/kg	1.60E+05	6.70E+06	1.60E+06	--	17/31	74,000	No			140	<40	50	<40 [<40]	300	<40	690	<40
Pyrene	µg/kg	6.50E+08	6.70E+09	2.90E+07	--	18/31	61,000	No			140	<40	80	<40 [<40]	500	<40	950	<40
Inorganics																		
Antimony	mg/kg	NLV	1.30E+04	1.80E+02	NA	2/40	0.54	No			<0.11	<0.13	<0.12	<0.11 [<0.1]	<0.20	<0.22	<0.20	<0.20
Arsenic	mg/kg	NVL	7.20E+02	7.60E+00	5.8	48/48	16.7	YES			1.34	1.03	0.6	0.66 [1.33]	1.34	0.19	1.69	0.27
Barium	mg/kg	NLV	3.30E+05	3.70E+04	75	40/40	456	No			34	58.3	60.2	11.3 [13.3]	53.4	41.2	41.4	14.1
Beryllium	mg/kg	NLV	1.30E+03	4.10E+02	NA	14/20	0.46	No			0.15	0.35	0.4	0.11 [0.16]	0.31	0.46	0.26	<0.20
Boron	mg/kg	NLV	ID	4.80E+04	NA	7/37	10.3	No			<4.48	<5.04	<4.84	<4.30 [<4.04]	<4.0	<4.4	<4.1	<4.1
Cadmium	mg/kg	NLV	1.70E+03	5.50E+02	1.2	36/40	4.09	No			0.13	0.38	0.15	<0.11 [<0.1]	0.27	<0.11	0.41	<0.10
Chromium (a)	mg/kg	NLV	2.60E+02	2.50E+03	18	40/40	16.4	No			3.16	4.12	4.43	2.06 [1.93]	9.68	5.33	11.4	3.64
Cobalt	mg/kg	NLV	1.30E+04	2.60E+03	6.8	48/48	8.34	No			3.88	3.35	3.56	1.89 [2.21]	4.54	2.57	4.27	2.09
Copper	mg/kg	NLV	1.30E+05	2.00E+04	32	40/40	293	No			7.25	23	5.6	5.01 [7.97]	8.65	9.87	10.3	7.33
Lead	mg/kg	NLV	1.00E+05	4.00E+02	21	40/40	7,230	YES			6.65	9.27	9.04	2.73 [2.54]	17	4.7	20.4	2.74
Manganese	mg/kg	NLV	3.30E+03	2.50E+04	440	48/48	734	No			279	204	251	105 [117]	328	43.2	293	47.8
Mercury	mg/kg	5.20E+01	2.00E+04	1.60E+02	0.13	38/40	2.378	No			0.0156	0.0183	0.032	0.0080 [<0.0058]	0.0436	0.0367	0.0362	<0.0058
Nickel	mg/kg	NLV	1.30E+04	4.00E+04	20	40/40	21.7	No			8.75	8.93	5.06	5.32 [5.81]	7.1	4.75	9.54	6.24
Selenium	mg/kg	NLV	1.30E+05	2.60E+03	0.41	24/48	1.37	No			0.25	0.2	0.14	<0.11 [0.13]	<0.20	<0.22	<0.20	<0.20
Silver	mg/kg	NLV	6.70E+03	2.50E+03	1	10/40	1.59	No			<0.11	<0.13	<0.12	<0.11 [<0.1]	<0.10	<0.11	<0.10	<0.10
Vanadium	mg/kg	NLV	ID	7.50E+02	NA	40/40	31.5	No			4.81	13.1	8.96	3.57 [5.03]	10.2	8.08	8.77	5.37
Zinc	mg/kg	NLV	ID	1.70E+05	47	48/48	990	No			16.1	38.1	11.9	9.00 [8.4]	22.5	11.9	32.3	9.41
Miscellaneous																		
Total solids	%	--	--	--	--	48/48	96	NA			92	82	87	85 [86]	91	84	87	87

Table 2
Summary of Area 16 Soil (0 to 15 ft bgs) Sampling Analytical Results
RACER Trust
Plant 3 - Lansing, Michigan

Constituent	Units	Location ID:	SB-A16-HA165	SB-A16-HA165	SB-A16-HA165	SB-A16-HD162	SB-A16-HD162	SB-A16-HP165	SB-A16-HP165	SB-A16-HP178	SB-A16-HP178	SB-A16-HQ168	SB-A16-HQ168	SB-A16-HR162	SB-A16-HR162	SB-A16-HU159	SB-A16-HU165
		Sample Depth (feet):	1 - 2	7 - 8	14 - 15	1 - 2	8 - 9	3 - 4	9 - 10	2 - 3	10 - 11	1 - 2	10 - 11	1 - 2	9 - 10	1 - 2	1 - 2
		Date Collected:	06/06/12	06/06/12	06/06/12	06/06/12	06/06/12	09/20/12	09/20/12	11/28/12	11/28/12	11/09/12	11/09/12	06/06/12	06/06/12	06/06/12	06/06/12
Volatile Organics																	
Methyl cyclohexane	µg/kg		NA	NA	NA	NA	NA	<60	<80	NA	NA	NA	NA	NA	NA	NA	NA
Semivolatile Organics																	
2-Methylnaphthalene	µg/kg		80	<40 [<40]	<40	<40	<40 [<100]	<100	<100	NA	NA	<200 [<100]	<100	<100	<80	<70	<100 J
Naphthalene	µg/kg		<70	<40 [<40]	<40	<40	<40 [<100]	<100	<100	NA	NA	<200 [<100]	<100	<100	<80	<70	<100 J
Anthracene	µg/kg		<70	<40 [<40]	<40	50	<40 [<100]	200	<100	NA	NA	200 [<100]	<100	<100	<80	<70	200 J
Acenaphthene	µg/kg		<70	<40 [<40]	<40	<40	<40 [<100]	<100	<100	NA	NA	<200 [<100]	<100	<100	<80	<70	<100 J
Benzo(a)anthracene	µg/kg		<70	60 J [<40]	<40	210 J	<40 J [600 J]	700	<100	NA	NA	900 J [<100 J]	<100	400	<80	200 J	600 J
Benzo(a)pyrene	µg/kg		<70	50 [<40]	<40	210	<40 J [600 J]	600	<100	NA	NA	700 J [<100 J]	<100	400	<80	200	600 J
Benzo(b)fluoranthene	µg/kg		<70	90 J [<40]	<40	400 J	<40 J [1,300 J]	1,100 J	<100	NA	NA	800 J [<100 J]	<100	800 J	<80	380 J	1,100 J
Benzo(g,h,i)perylene	µg/kg		<70	<40 [<40]	<40	210 J	<40 [200 J]	600 J	<100	NA	NA	400 J [<100 J]	<100	300	<80	140 J	400 J
Benzo(k)fluoranthene	µg/kg		<70	100 J [<40]	<40	410 J	<40 J [1,300 J]	1,200 J	<100	NA	NA	600 J [<100 J]	<100	800 J	<80	390 J	1,100 J
bis(2-Ethylhexyl)phthalate (DEHP)	µg/kg		<100	<80 [<80]	<80	<80	<80 [<300]	<200 J	<300 J	NA	NA	<300 [<200]	<300	<300	<200	<100	<300 J
Carbazole	µg/kg		<70	<40 [<40]	<40	40	<40 [<100]	<100	<100	NA	NA	<200 [<100]	<100	<100	<80	<70	<100 J
Chrysene	µg/kg		<70	60 [<40]	<40	230	<40 J [600 J]	700	<100	NA	NA	1,200 J [<100 J]	<100	500	<80	210	700 J
Dibenz(a,h)anthracene	µg/kg		<100	<80 [<80]	<80	100 J	<80 [<300 J]	<200	<300	NA	NA	<300 [<200]	<300	<300	<200	<100	<300 J
Dibenzofuran	µg/kg		<70	<40 [<40]	<40	<40	<40 [<100]	<100	<100	NA	NA	<200 [<100]	<100	<100	<80	<70	<100 J
Di-n-butylphthalate (DBP)	µg/kg		<100	<80 [<80]	<80	<80	<80 [300]	<200 J	<300 J	NA	NA	<300 [<200]	<300	<300	<200	<100	<300 J
Fluoranthene	µg/kg		90	110 [60]	<40	470	<40 J [1,200 J]	1,400	<100	NA	NA	1,600 J [100 J]	<100	900	<90 B	410	1,200 J
Fluorene	µg/kg		<70	<40 [<40]	<40	<40	<40 [<100]	<100	<100	NA	NA	<200 [<100]	<100	<100	<80	<70	<100 J
Indeno(1,2,3-cd)pyrene	µg/kg		<70	<40 [<40]	<40	180 J	<40 [200 J]	400 J	<100	NA	NA	300 [<100]	<100	300	<80	130 J	400 J
Phenanthrene	µg/kg		<70	50 [<40]	<40	250	<40 J [700 J]	900	<100	NA	NA	900 J [<100 J]	<100	600	<80	220	800 J
Pyrene	µg/kg		90	90 [50]	<40	410	<40 [1,000 J]	1,200	<100	NA	NA	1,300 J [100 J]	<100	700	<80	370	1,000 J
Inorganics																	
Antimony	mg/kg		<0.20	<0.21 [<0.2]	<0.22	<0.21	<0.21	<0.20	<0.20	NA	NA	<0.24 [<0.22]	<0.25	<0.20	<0.22	<0.20	<0.20
Arsenic	mg/kg		3.32	0.62 [1.32]	1.74	1.67	0.49 J	2.31	1.56	2.47	3.50 [2.3]	1.13 [1.41]	2.35	1.12	0.85	1.29	2.45
Barium	mg/kg		18.8	50.1 [47.7]	4.2	55.9	69.1	35	138	NA	NA	23.0 [26.6]	59.8	30.7	59.2	32.2	35.5
Beryllium	mg/kg		<0.20	0.28 [0.28]	<0.22	0.37	0.42	NA	NA	NA	NA	NA	NA	<0.20	0.34	0.27	0.21
Boron	mg/kg		<4.0	<4.3 [<4.1]	<4.4	<4.3	<4.3	<4.0	<4.0	NA	NA	<4.8 [<4.5]	<5.0	<4.0	<4.4	<4.0	4.19
Cadmium	mg/kg		0.16	0.43 [0.23]	<0.11	0.18	0.24	0.12	2.12	NA	NA	<0.12 [0.13]	0.19	0.14	0.19	0.22	0.12
Chromium (a)	mg/kg		4.41	3.15 [6.13]	3.73	9.33	3.8	5.01	8.46	NA	NA	4.93 [6.42]	12.9	8	3.88	7.22	8.76
Cobalt	mg/kg		2.92	1.22 [3.36]	1.34	4.8	1.45	2.14	2.91	2.76	4.29 [4.77]	3.15 [3.71]	8.34	3.58	3.28	3.44	3.81
Copper	mg/kg		5.95	7.96 [9.14]	30.3	9.37	14.3	7.34	124	NA	NA	5.60 [7.97]	16.3	11.4	12.4	9.16	37.9
Lead	mg/kg		8.21	8.38 [9.59]	2	13.3	7.1	12.8	29.8	NA	NA	3.48 [4.8]	8.05	11.4	7.9	17.2	18.3
Manganese	mg/kg		215	62.5 J [290 J]	86.6	308	48.7 J	180	103	193	336 [447]	189 [248]	508	246	236	254	278
Mercury	mg/kg		0.0106	0.0286 [0.0271]	<0.0061	0.0365	0.0282	0.0166	0.2373	NA	NA	0.0184 [0.0316]	0.013	0.0151	0.0195	0.0335	0.0159
Nickel	mg/kg		9.62	2.57 [8.59]	6.62	7.98	3.22 J	9.33	16.1	NA	NA	7.25 [9.37]	18.7	11.1	7.06	8.39	16.6
Selenium	mg/kg		<0.20	<0.21 [<0.2]	0.42	<0.21	<0.21	<0.20	<0.20	<0.20	0.22 [0.27]	<0.12 [<0.11]	0.13	<0.20	<0.22	<0.20	<0.20
Silver	mg/kg		<0.10	<0.10 [<0.1]	0.11	<0.10	<0.10	<0.10	<0.10	NA	NA	<0.02 [0.02]	0.05	0.1	<0.11	<0.10	<0.10
Vanadium	mg/kg		4.76	6.12 [8.81]	8.13	11.2	9.24	6.74	21	NA	NA	6.88 [8.86]	16.1	6.42	12	6.97	8.78
Zinc	mg/kg		13.8	9.82 [17.9]	4.69	18.2	10.0 J	14.4	167	40.9	29.9 [29.3]	15.2 [19.7]	35	16	29	32.3	32.6
Miscellaneous																	
Total solids	%		94	84 [85]	80	84	85 [90]	95	77	92	76 [77]	89 [90]	79	95	83	92	96

Table 2
Summary of Area 16 Soil (0 to 15 ft bgs) Sampling Analytical Results
RACER Trust
Plant 3 - Lansing, Michigan

Constituent	Units	Location ID:	SB-A16-HU165	SB-A16-HU168	SB-A16-HU168	SB-A16-HU171	SB-A16-HU171	SB-A16-HU178	SB-A16-HU178	SB-A16-HX162	SB-A16-HX162	SB-A16-HX165	SB-A16-HX176	SB-A16-HX176	SB-A16-HY168	SB-A16-HY168	SB-A16-IE168
		Sample Depth (feet):	4 - 5	4.5 - 5.5	9 - 10	1 - 2	12 - 13	0 - 1	5 - 6	1 - 2	8 - 9	1 - 2	0 - 1	5 - 6	1 - 2	11 - 12	0 - 1
		Date Collected:	06/06/12	09/20/12	09/20/12	11/09/12	11/09/12	11/28/12	11/28/12	06/06/12	06/06/12	09/20/12	11/28/12	11/28/12	11/09/12	11/09/12	11/28/12
Volatile Organics																	
Methyl cyclohexane	µg/kg		NA	70	<100 [<90]	NA	NA	NA	NA	NA	NA	<60	NA	NA	NA	NA	NA
Semivolatile Organics																	
2-Methylnaphthalene	µg/kg		2,000 J	<100	<100 [<100]	<100	<100 [<100]	NA	NA	<70	<200	<100	NA	NA	<100	<100 [<200]	NA
Naphthalene	µg/kg		2,000 J	<100	<100 [<100]	<100	<100 [<100]	NA	NA	<70	<200	<100	NA	NA	<100	<100 [<200]	NA
Anthracene	µg/kg		19,000 J	300	<100 [<100]	<100	<100 [<100]	NA	NA	<70	<200	<100	NA	NA	<100	<100 [<200]	NA
Acenaphthene	µg/kg		8,000 J	100	<100 [<100]	<100	<100 [<100]	NA	NA	<70	<200	<100	NA	NA	<100	<100 [<200]	NA
Benzo(a)anthracene	µg/kg		36,000 J	700	<100 [<100]	<100	<100 [<100]	NA	NA	300	300	<100	NA	NA	<100	<100 [<200]	NA
Benzo(a)pyrene	µg/kg		33,000 J	600	<100 [<100]	<100	<100 [<100]	NA	NA	320	500 J	<100	NA	NA	<100	<100 [<200]	NA
Benzo(b)fluoranthene	µg/kg		62,000 J	1,000 J	<100 [<100]	<100	<100 [<100]	NA	NA	630 J	1,000 J	100 J	NA	NA	<100	<100 [<200]	NA
Benzo(g,h,i)perylene	µg/kg		12,000 J	500 J	<100 [<100]	<100	<100 [<100]	NA	NA	180	R	<100	NA	NA	<100	<100 [<200]	NA
Benzo(k)fluoranthene	µg/kg		60,000 J	1,100 J	<100 [<100]	<100	<100 [<100]	NA	NA	620 J	1,000 J	200 J	NA	NA	<100	<100 [<200]	NA
bis(2-Ethylhexyl)phthalate (DEHP)	µg/kg		<2,000	<200 J	<300 [<300 J]	<200	<300 [<300]	NA	NA	<100	<400	<200 J	NA	NA	<200	300 [<300]	NA
Carbazole	µg/kg		6,000 J	100	<100 [<100]	<100	<100 [<100]	NA	NA	<70	<200	<100	NA	NA	<100	<100 [<200]	NA
Chrysene	µg/kg		38,000 J	700	<100 [<100]	<100	<100 [<100]	NA	NA	330	400	<100	NA	NA	<100	<100 [<200]	NA
Dibenz(a,h)anthracene	µg/kg		<2,000	<200	<300 [<300]	<200	<300 [<300]	NA	NA	<100	R	<200	NA	NA	<200	<300 [<300]	NA
Dibenzofuran	µg/kg		7,000 J	<100	<100 [<100]	<100	<100 [<100]	NA	NA	<70	<200	<100	NA	NA	<100	<100 [<200]	NA
Di-n-butylphthalate (DBP)	µg/kg		<2,000	<200 J	<300 J [<300 J]	<200	<300 [<300]	NA	NA	<100	<400	<200 J	NA	NA	<200	<300 [<300]	NA
Fluoranthene	µg/kg		88,000 J	1,500	<100 [<100]	<100	<100 [<100]	NA	NA	650	600	200	NA	NA	<100	<100 [<200]	NA
Fluorene	µg/kg		13,000 J	<100	<100 [<100]	<100	<100 [<100]	NA	NA	<70	<200	<100	NA	NA	<100	<100 [<200]	NA
Indeno(1,2,3-cd)pyrene	µg/kg		13,000 J	400 J	<100 [<100]	<100	<100 [<100]	NA	NA	170	R	<100	NA	NA	<100	<100 [<200]	NA
Phenanthrene	µg/kg		74,000 J	1,100	<100 [<100]	<100	<100 [<100]	NA	NA	380	400	100	NA	NA	<100	<100 [<200]	NA
Pyrene	µg/kg		61,000 J	1,400	<100 [<100]	<100	<100 [<100]	NA	NA	550	800	200	NA	NA	<100	<100 [<200]	NA
Inorganics																	
Antimony	mg/kg		<0.21	<0.20	<0.20 [<0.2]	<0.22	<0.27 [<0.27]	NA	NA	<0.20	<0.20 [<0.21]	<0.20	NA	NA	<0.23	<0.29 [<0.32]	NA
Arsenic	mg/kg		2.23	1.26	9.97 [9.05]	1.66	4.73 [6.84]	15.1	7.94	1.4	1.41 [2.2 J]	1.98	3.28	0.73 [0.34]	1.65	6.45 [4.72]	1.46
Barium	mg/kg		32.8	24.8	456 [413]	31.7	60.2 [70.3]	NA	NA	31.7	58.2 [51.2 J]	30.1	NA	NA	31.8	70.9 [66.9]	NA
Beryllium	mg/kg		<0.21	NA	NA	NA	NA	NA	NA	<0.20	0.33 [0.36]	NA	NA	NA	NA	NA	NA
Boron	mg/kg		<4.2	<4.0	10.3 [6.45]	<4.4	<5.5 [6.1]	NA	NA	<4.0	<4.1 [<4.2]	<4.0	NA	NA	<4.5	7.4 [7.3]	NA
Cadmium	mg/kg		0.14	0.134	1.08 [0.62]	0.18	0.25 [0.34]	NA	NA	0.21	0.43 [0.46]	0.19	NA	NA	0.15	0.43 [0.21]	NA
Chromium (a)	mg/kg		5.39	2.86	6.81 [11.1]	7.19	11.2 [12.9]	NA	NA	5.66	4.44 [5.85]	4.75	NA	NA	8.03	14.7 [16.4]	NA
Cobalt	mg/kg		3.31	2.63	3.08 [1.67]	4.51	6.13 [6.28]	2.96	2.67	2.83	3.33 [5.09 J]	2.75	3.06	2.81 [2.37]	4.14	7.76 [8.14]	2.8
Copper	mg/kg		16.7	7.76	292 J [35.6 J]	7.17	19.3 [21.4]	NA	NA	13	15.7 [16.1]	9.67	NA	NA	8.97	25.6 [21.5]	NA
Lead	mg/kg		10.6	5.29	4,100 [7,230]	5.39	7.94 [8.09]	NA	NA	27	35.7 [20.3]	18.9	NA	NA	11.2	9.90 [10.3]	NA
Manganese	mg/kg		253	200	386 [285]	235	388 [370]	258	244	249	257 [734 J]	294	234	69.5 [36.1]	226	294 [351]	200
Mercury	mg/kg		0.0136	0.0328	2.378 [1.341]	0.0191	0.0138 [0.0164]	NA	NA	0.023	0.063 [0.0394]	0.0259	NA	NA	0.0201	0.0196 [0.0258]	NA
Nickel	mg/kg		13	10	13.7 [12.3]	10.4	15.3 [16.8]	NA	NA	7.36	7.8 [12.3 J]	8.67	NA	NA	11.5	21.5 [21.7]	NA
Selenium	mg/kg		<0.21	<0.20	0.65 [0.47]	<0.11	0.30 [0.45]	0.39	0.31	<0.20	0.28 [<0.21]	<0.20	0.23	0.37 [0.24]	<0.11	0.98 [0.38]	<0.20
Silver	mg/kg		<0.10	<0.10	1.31 [1.59]	0.03	0.08 [0.07]	NA	NA	<0.10	<0.10 [<0.10]	<0.10	NA	NA	<0.20	0.10 [0.1]	NA
Vanadium	mg/kg		7.72	4.25	14.2 [11]	9.11	17.2 [19.2]	NA	NA	5.62	10 [9.39]	5.29	NA	NA	9.09	22.6 [23.2]	NA
Zinc	mg/kg		21.2	10.2	538 [262]	20.5	36.7 [38.4]	453	616	25.1	84.3 [49.4 J]	20.4	47.2	37.2 [22.2]	24.3	49.1 [51.2]	17.4
Miscellaneous																	
Total solids	%		89	91	68 [73]	93	77 [76]	87	80	95	89	94	88	80 [82]	92	68 [66]	91

Table 2
Summary of Area 16 Soil (0 to 15 ft bgs) Sampling Analytical Results
RACER Trust
Plant 3 - Lansing, Michigan

Constituent	Units	Location ID:	SB-A16-IE168	SB-A16-HU181	SB-A16-HU181	SB-A16-HU181	SB-A16-IL168	SB-A16-IL168	SB-A16-IL168	SB-A16-HU181E-E	SB-A16-HU181E-E	SB-A16-HU181E-E
		Sample Depth (feet):	6 - 7	0 - 1	4 - 5	10 - 11	1 - 2	6 - 7	11 - 12	0 - 1	4 - 4.5	7.5 - 8.5
		Date Collected:	11/28/12	07/10/13	07/10/13	07/10/13	07/10/13	07/10/13	07/10/13	04/09/14	04/09/14	04/09/14
Volatile Organics												
Methyl cyclohexane	µg/kg		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Semivolatile Organics												
2-Methylnaphthalene	µg/kg		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Naphthalene	µg/kg		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Anthracene	µg/kg		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthene	µg/kg		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	µg/kg		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	µg/kg		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	µg/kg		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(g,h,i)perylene	µg/kg		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	µg/kg		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
bis(2-Ethylhexyl)phthalate (DEHP)	µg/kg		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbazole	µg/kg		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chrysene	µg/kg		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibenz(a,h)anthracene	µg/kg		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibenzofuran	µg/kg		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Di-n-butylphthalate (DBP)	µg/kg		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	µg/kg		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluorene	µg/kg		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	µg/kg		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	µg/kg		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pyrene	µg/kg		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Inorganics												
Antimony	mg/kg		NA	0.30 J	0.54	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Arsenic	mg/kg		5.46	9.08	16.7	1.77	3.33	1.25	0.9	3.1	8.17	0.74
Barium	mg/kg		NA	178	230	45	31.5	44.2	14.6	39.3	178	80.1
Beryllium	mg/kg		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Boron	mg/kg		NA	1.82 J	6.84	<2.0	<2.0	1.39 J	<2.0	NA	NA	NA
Cadmium	mg/kg		NA	1.39	1.13	0.19 J	0.07 J	0.35	0.17 J	0.17 J	4.09	0.81
Chromium (a)	mg/kg		NA	8.48	11.8	5.13	1.75	3.45	2.86	8.39	6.53	9.28
Cobalt	mg/kg		4.8	4.54	4.18	3.59	1.04	2.38	3.57	4.22	3.22	4.36
Copper	mg/kg		NA	293	154	15.5	11.4	36.7	10	19.5	77.1	35.6
Lead	mg/kg		NA	427	1,250	10.1	25.9	108	5.05	9.47	298	11.9
Manganese	mg/kg		75.8	450	395	457	82.3	171	288	311	232	67.3
Mercury	mg/kg		NA	1.067	0.8965	0.029	0.0131	0.0194	0.016	0.0281	0.2094	0.068
Nickel	mg/kg		NA	12.9	14.5	12.3	3.15	8.68	10.4	10.9	9.23	11.4
Selenium	mg/kg		1.37	0.29 J	0.49	<0.40	<0.40	0.44	1.31	0.34 J	0.44	0.46
Silver	mg/kg		NA	0.26	0.32	<0.20	<0.20	<0.20	<0.20	<0.20	0.19 J	<0.20
Vanadium	mg/kg		NA	11.7	31.5	8.8	4.83	5.66	6.45	9.43	12.1	19.3
Zinc	mg/kg		231	446	572	19.9	12.9	117	15.4	33.2	990	44.2
Miscellaneous												
Total solids	%		70	86	59	78	88	90	84	87	82	79

Table 2
Summary of Area 16 Soil (0 to 15 ft bgs) Sampling Analytical Results
RACER Trust
Plant 3 - Lansing, Michigan

Table Notes:

(a) Chromium VI criteria presented. The total chromium statewide background level is presented

Data shown in [] represent duplicate sample analytical results.

Bolded results indicate the constituent was detected.

Shaded results indicate the constituent exceeded the residential criteria

% - percent

ft bgs - feet below ground surface

mg/kg - milligram per kilogram

NA - not available/not analyzed

NSL - no screening level

µg/kg - microgram per kilogram

Michigan Department of Environmental Quality (MDEQ) Criteria Footnotes: (as revised December 30, 2013)

-- - Not listed in MDEQ Criteria Tables.

ID - Insufficient data to develop a criterion.

NLV - Not likely to volatilize.

Lab Data Qualifiers:

E - analyte exceeds calibration range

J - The constituent was positively identified; however, the associated numerical value is an estimated concentration

R - rejected

Figures



AREA 13

AREA 12

AREA 14

AREA 18

AREA 17

AREA 20

AREA 21

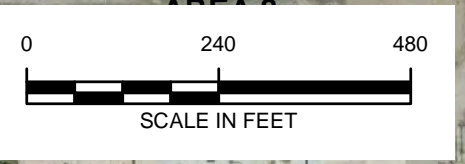
AREA 16

AREA 11

AREA 15

AREA 19

AREA 3



AREA 4





RACER TRUST
PLANTS 2, 3 & 6
LANSING, MICHIGAN

PLANT 3 WORK PLAN AREAS



FIGURE
1

LEGEND

-  WORK PLAN AREAS
-  PLANT 2
-  PLANT 3
-  PLANT 6

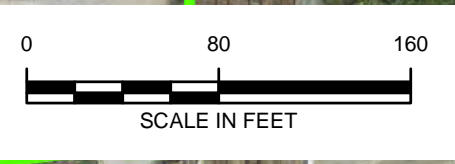
CITY: Novi DIV: ENV DB: TRY PIC: PM: TR: PROJECT NUMBER: COORDINATE SYSTEM: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl
G:\GIS\Project Files\MotorsLiquidation\Company\Lansing\Docs\working\Plant3 Historic Overlay.mxd PLOTTED: 10/30/2014 5:26:13 PM BY: dolaxa



CITY: Novi DIV: ENV DB: TRY PIC: PM: TR: PROJECT NUMBER: COORDINATE SYSTEM: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl G:\GIS\Project Files\MotorsLiqudation\Company\Lansing\Docs\working\Plant3 Historic Overlay.mxd PLOTTED: 10/30/2014 5:26:13 PM BY: dolaxa

LEGEND

- OTHER SOIL BORING
- DEEP VAP/HPT BORING
- WORK PLAN AREAS
- ▭ PROPOSED AREA 16 DECISION UNIT - APPROX. 2.9 ACRES
- ▭ PLANT 2
- ▭ PLANT 3
- ▭ PLANT 6

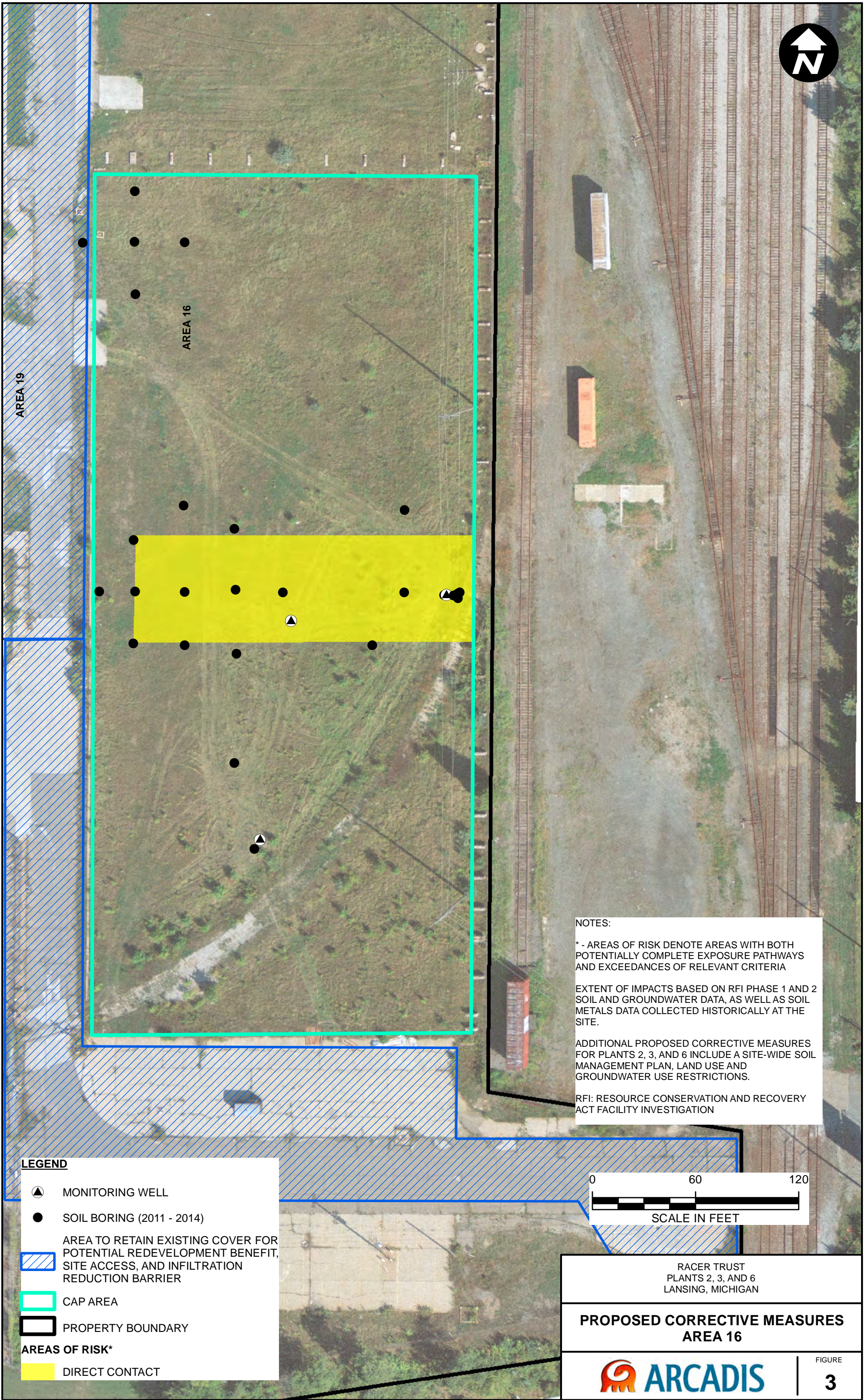


RACER TRUST
PLANTS 2, 3 & 6
LANSING, MICHIGAN

AREA 16 SURFACE SOIL SAMPLING LOCATIONS



FIGURE
2



LEGEND

- MONITORING WELL
- SOIL BORING (2011 - 2014)
- AREA TO RETAIN EXISTING COVER FOR POTENTIAL REDEVELOPMENT BENEFIT, SITE ACCESS, AND INFILTRATION REDUCTION BARRIER
- CAP AREA
- PROPERTY BOUNDARY
- AREAS OF RISK***
- DIRECT CONTACT

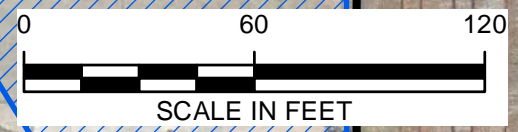
NOTES:

* - AREAS OF RISK DENOTE AREAS WITH BOTH POTENTIALLY COMPLETE EXPOSURE PATHWAYS AND EXCEEDANCES OF RELEVANT CRITERIA

EXTENT OF IMPACTS BASED ON RFI PHASE 1 AND 2 SOIL AND GROUNDWATER DATA, AS WELL AS SOIL METALS DATA COLLECTED HISTORICALLY AT THE SITE.

ADDITIONAL PROPOSED CORRECTIVE MEASURES FOR PLANTS 2, 3, AND 6 INCLUDE A SITE-WIDE SOIL MANAGEMENT PLAN, LAND USE AND GROUNDWATER USE RESTRICTIONS.

RFI: RESOURCE CONSERVATION AND RECOVERY ACT FACILITY INVESTIGATION



RACER TRUST
 PLANTS 2, 3, AND 6
 LANSING, MICHIGAN

**PROPOSED CORRECTIVE MEASURES
 AREA 16**

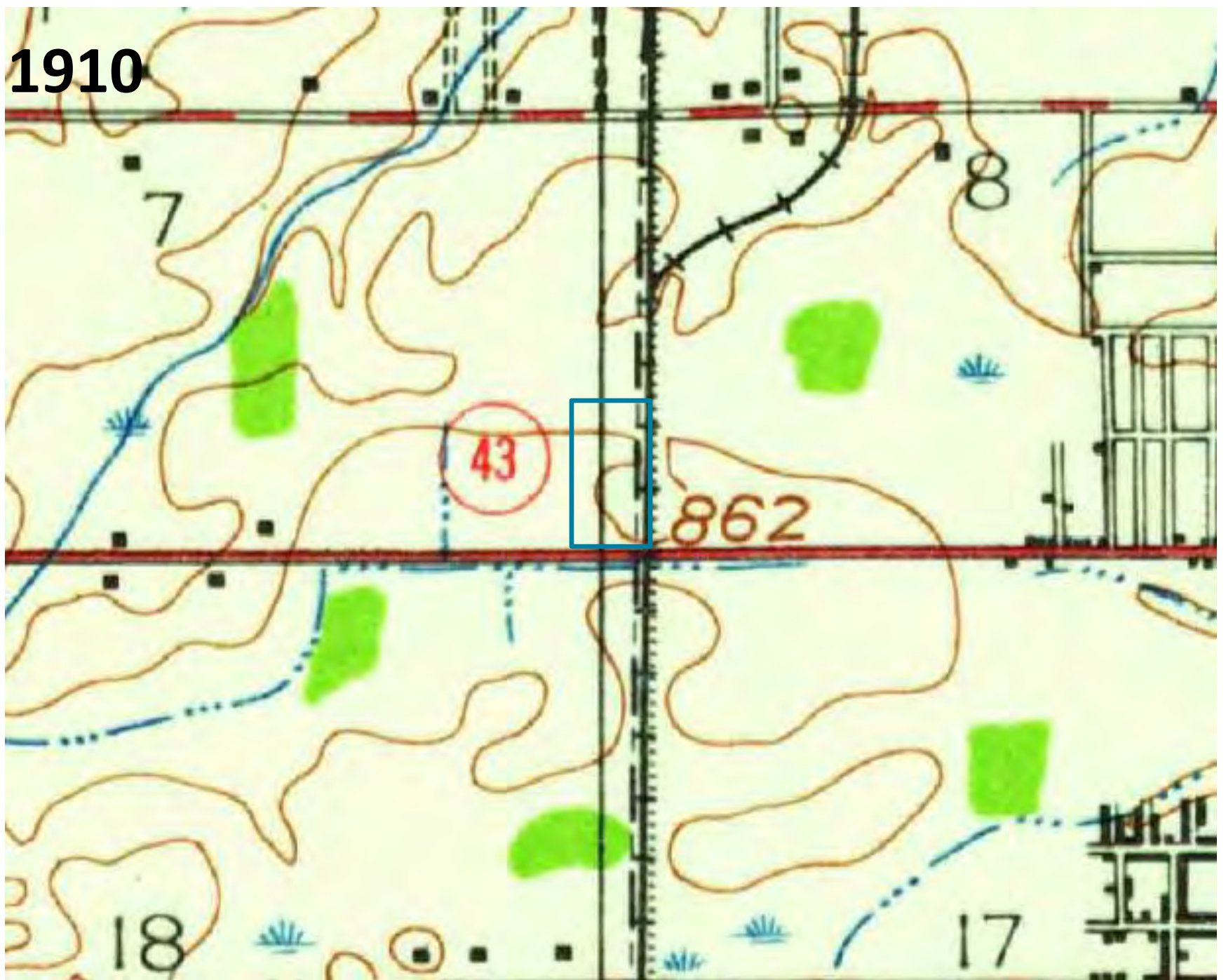




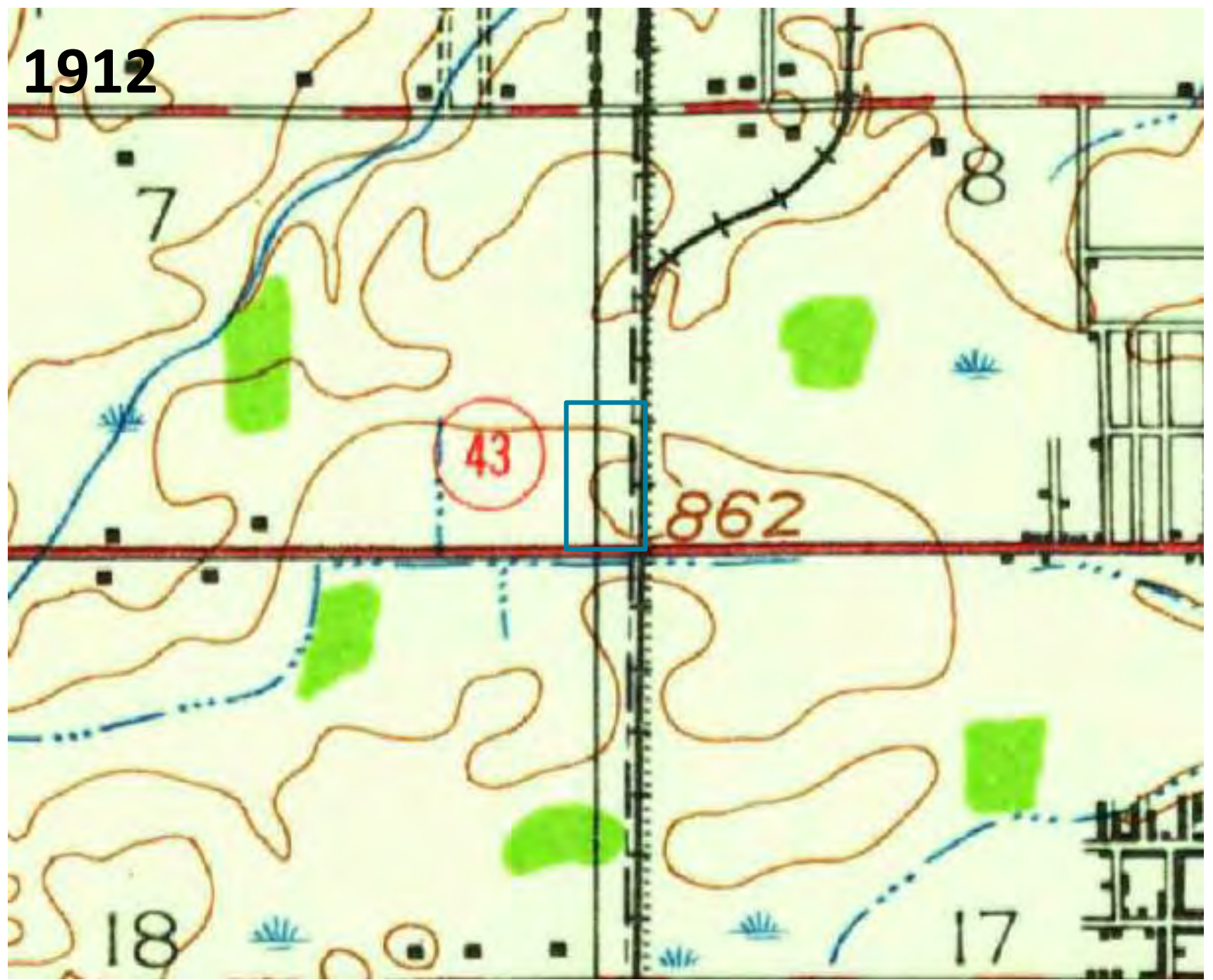
Attachment 1

Historical Aerial Photographs and
Topographic Maps

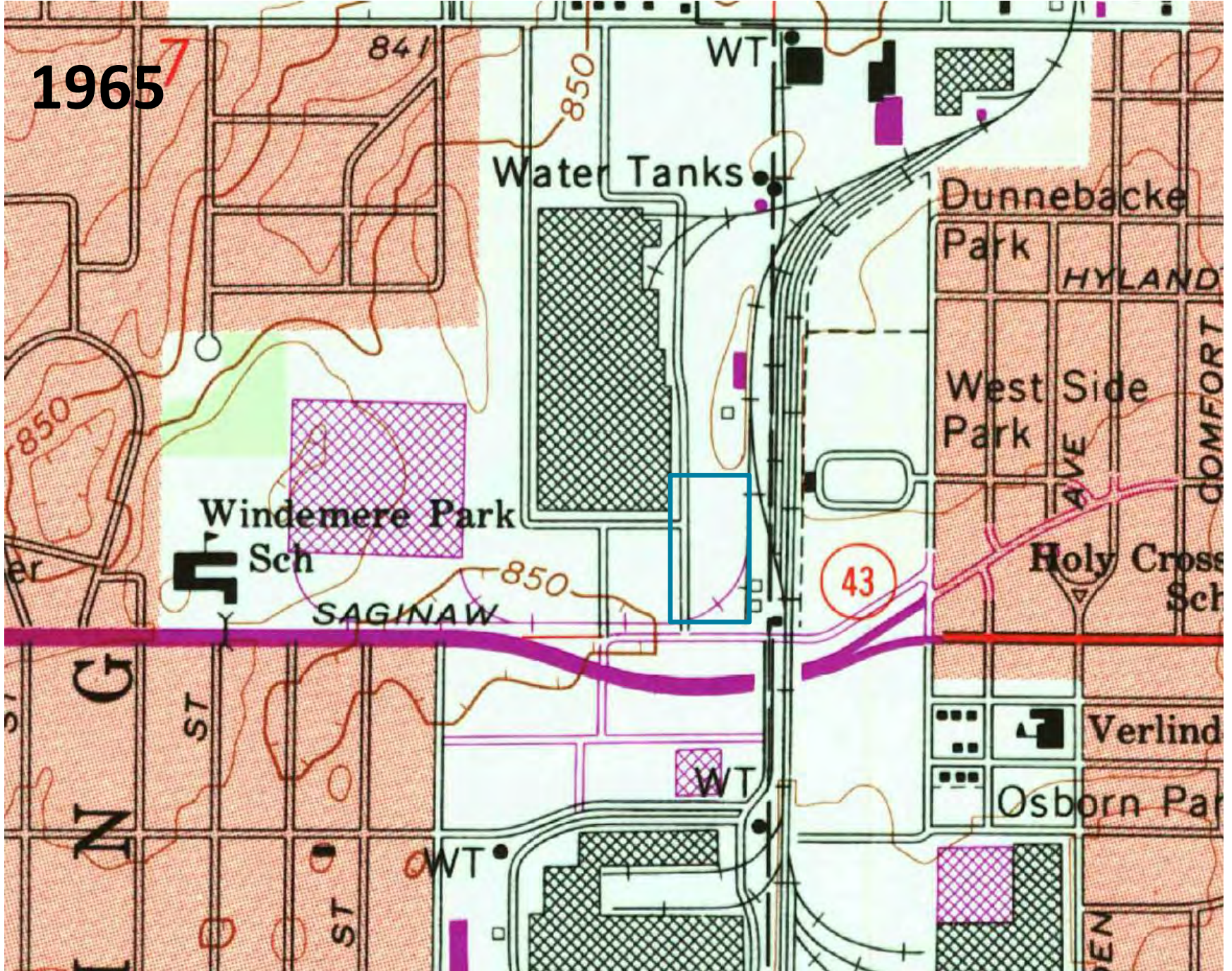
1910



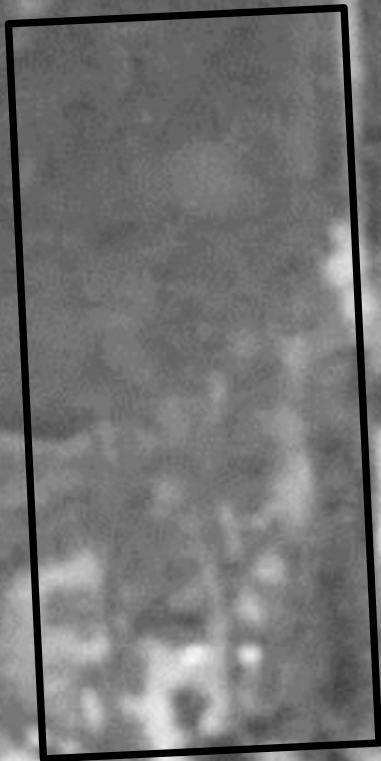
1912



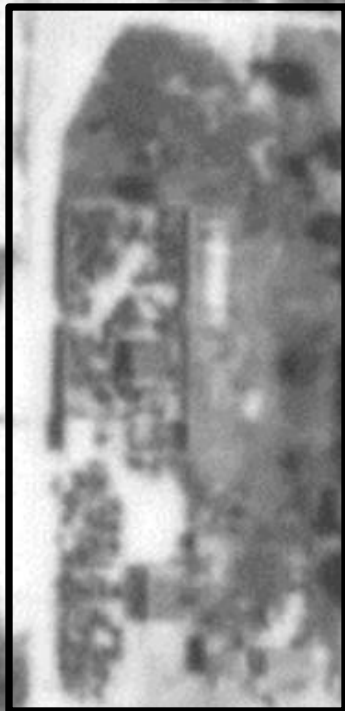
1965



1938



1950



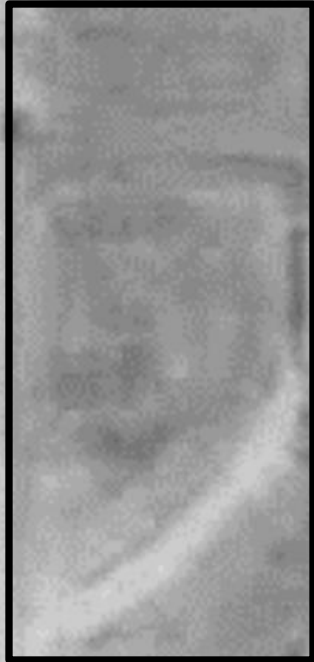
1955



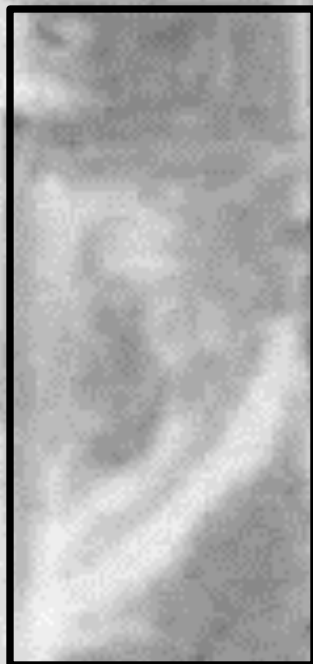
1963



1970



1976



1998



2005



2010



2013





Attachment 2

ProUCL Output Files

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File C:\Users\jmsmith\Desktop\RACER\Lansing\2014\Stats\Surface As Pb for ProUCL.xls.wst
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Result (arsenic)

General Statistics

Number of Valid Observations 18
 Number of Distinct Observations 18

Raw Statistics

Minimum 1.12
 Maximum 15.1
 Mean 3.129
 Median 1.68
 SD 3.502
 Std. Error of Mean 0.825
 Coefficient of Variation 1.119
 Skewness 2.892

Log-transformed Statistics

Minimum of Log Data 0.113
 Maximum of Log Data 2.715
 Mean of log Data 0.833
 SD of log Data 0.694

Relevant UCL Statistics

Normal Distribution Test

Shapiro Wilk Test Statistic 0.563
 Shapiro Wilk Critical Value 0.897

Data not Normal at 5% Significance Level

Lognormal Distribution Test

Shapiro Wilk Test Statistic 0.812
 Shapiro Wilk Critical Value 0.897

Data not Lognormal at 5% Significance Level

Assuming Normal Distribution

95% Student's-t UCL 4.565

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995) 5.088
 95% Modified-t UCL (Johnson-1978) 4.659

Assuming Lognormal Distribution

95% H-UCL 4.259

95% Chebyshev (MVUE) UCL 5.059
 97.5% Chebyshev (MVUE) UCL 6.002
 99% Chebyshev (MVUE) UCL 7.854

Gamma Distribution Test

k star (bias corrected) 1.512
 Theta Star 2.069
 MLE of Mean 3.129
 MLE of Standard Deviation 2.545
 nu star 54.44
 Approximate Chi Square Value (.05) 38.49
 Adjusted Level of Significance 0.0357
 Adjusted Chi Square Value 37.2
 Anderson-Darling Test Statistic 1.882
 Anderson-Darling 5% Critical Value 0.754
 Kolmogorov-Smirnov Test Statistic 0.258
 Kolmogorov-Smirnov 5% Critical Value 0.207

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

95% Approximate Gamma UCL 4.427
 95% Adjusted Gamma UCL 4.58

Data Distribution

Data do not follow a Discernable Distribution (0.05)

Nonparametric Statistics

95% CLT UCL 4.487
 95% Jackknife UCL 4.565
 95% Standard Bootstrap UCL 4.446
 95% Bootstrap-t UCL 8.459
 95% Hall's Bootstrap UCL 11.11
 95% Percentile Bootstrap UCL 4.56
 95% BCA Bootstrap UCL 5.082
 95% Chebyshev(Mean, Sd) UCL 6.727
 97.5% Chebyshev(Mean, Sd) UCL 8.284
 99% Chebyshev(Mean, Sd) UCL 11.34

Potential UCL to Use

Use 95% Chebyshev (Mean, Sd) UCL 6.727

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

Result (lead)

General Statistics

Number of Valid Observations 15

Number of Distinct Observations 15

Raw Statistics

Minimum 4.8
 Maximum 427
 Mean 42.36
 Median 17
 SD 106.6
 Std. Error of Mean 27.53
 Coefficient of Variation 2.517
 Skewness 3.847

Log-transformed Statistics

Minimum of Log Data 1.569
 Maximum of Log Data 6.057
 Mean of log Data 2.813
 SD of log Data 1.035

Relevant UCL Statistics

Normal Distribution Test

Shapiro Wilk Test Statistic 0.341
 Shapiro Wilk Critical Value 0.881

Data not Normal at 5% Significance Level

Lognormal Distribution Test

Shapiro Wilk Test Statistic 0.769
 Shapiro Wilk Critical Value 0.881

Data not Lognormal at 5% Significance Level

Assuming Normal Distribution

95% Student's-t UCL 90.85

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995) 116.9
 95% Modified-t UCL (Johnson-1978) 95.41

Assuming Lognormal Distribution

95% H-UCL 61.8

95% Chebyshev (MVUE) UCL 61.68
 97.5% Chebyshev (MVUE) UCL 76.66
 99% Chebyshev (MVUE) UCL 106.1

Gamma Distribution Test

k star (bias corrected) 0.567
 Theta Star 74.67
 MLE of Mean 42.36
 MLE of Standard Deviation 56.24
 nu star 17.02
 Approximate Chi Square Value (.05) 8.687
 Adjusted Level of Significance 0.0324
 Adjusted Chi Square Value 7.962
 Anderson-Darling Test Statistic 2.686
 Anderson-Darling 5% Critical Value 0.782
 Kolmogorov-Smirnov Test Statistic 0.398
 Kolmogorov-Smirnov 5% Critical Value 0.232

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

95% Approximate Gamma UCL 83.01
 95% Adjusted Gamma UCL 90.56

Potential UCL to Use

Data Distribution

Data do not follow a Discernable Distribution (0.05)

Nonparametric Statistics

95% CLT UCL 87.65
 95% Jackknife UCL 90.85
 95% Standard Bootstrap UCL 86.84
 95% Bootstrap-t UCL 583
 95% Hall's Bootstrap UCL 353.1
 95% Percentile Bootstrap UCL 96.71
 95% BCA Bootstrap UCL 125.5
 95% Chebyshev(Mean, Sd) UCL 162.4
 97.5% Chebyshev(Mean, Sd) UCL 214.3
 99% Chebyshev(Mean, Sd) UCL 316.3

Use 95% Chebyshev (Mean, Sd) UCL 162.4

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

These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

Attachment 2
ProUCL Output
Soil (0 to15 ft bgs)
RACER Trust
Plant 3 - Lansing, Michigan

Result (benzo(a)anthracene)

General Statistics			
Number of Valid Data	31	Number of Detected Data	16
Number of Distinct Detected Data	12	Number of Non-Detect Data	15
		Percent Non-Detects	48.39%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	40	Minimum Detected	3.689
Maximum Detected	36000	Maximum Detected	10.49
Mean of Detected	2618	Mean of Detected	5.949
SD of Detected	8906	SD of Detected	1.527
Minimum Non-Detect	40	Minimum Non-Detect	3.689
Maximum Non-Detect	100	Maximum Non-Detect	4.605
 		Number treated as Non-Detect	18
 		Number treated as Detected	13
 		Single DL Non-Detect Percentage	58.06%
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.298	Shapiro Wilk Test Statistic	0.837
5% Shapiro Wilk Critical Value	0.887	5% Shapiro Wilk Critical Value	0.887
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1370	Mean	4.797
SD	6432	SD	1.648
95% DL/2 (t) UCL	3330	95% H-Stat (DL/2) UCL	1266
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	4.28
		SD in Log Scale	2.192
		Mean in Original Scale	1361
		SD in Original Scale	6434
		95% t UCL	3322
		95% Percentile Bootstrap UCL	3654
		95% BCA Bootstrap UCL	4843
		95% H-UCL	4125
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.326	Data do not follow a Discernable Distribution (0.05)	
Theta Star	8027		
nu star	10.43		
A-D Test Statistic	2.955		
5% A-D Critical Value	0.827		
K-S Test Statistic	0.827		
5% K-S Critical Value	0.232		
Data not Gamma Distributed at 5% Significance Level			
Assuming Gamma Distribution		Nonparametric Statistics	
Gamma ROS Statistics using Extrapolated Data		Kaplan-Meier (KM) Method	
Minimum	0.000001	Mean	1372
Maximum	36000	SD	6327
Mean	1351	SE of Mean	1174
Median	40	95% KM (t) UCL	3364
SD	6436	95% KM (z) UCL	3303
k star	0.0914	95% KM (jackknife) UCL	3325
Theta star	14783	95% KM (bootstrap t) UCL	38397
Nu star	5.666	95% KM (BCA) UCL	3727
AppChi2	1.472	95% KM (Percentile Bootstrap) UCL	3680
95% Gamma Approximate UCL	5202	95% KM (Chebyshev) UCL	6488
95% Adjusted Gamma UCL	5640	97.5% KM (Chebyshev) UCL	8701
		99% KM (Chebyshev) UCL	13050
		Potential UCLs to Use	
		99% KM (Chebyshev) UCL	13050

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006). For additional insight, the user may want to consult a statistician.

Attachment 2
ProUCL Output
Soil (0 to 15 ft bgs)
RACER Trust
Plant 3 - Lansing, Michigan

Result (benzo(a)pyrene)

General Statistics			
Number of Valid Data	31	Number of Detected Data	15
Number of Distinct Detected Data	11	Number of Non-Detect Data	16
		Percent Non-Detects	51.61%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	50	Minimum Detected	3.912
Maximum Detected	33000	Maximum Detected	10.4
Mean of Detected	2558	Mean of Detected	5.959
SD of Detected	8424	SD of Detected	1.538
Minimum Non-Detect	40	Minimum Non-Detect	3.689
Maximum Non-Detect	300	Maximum Non-Detect	5.704
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.307	Shapiro Wilk Test Statistic	0.805
5% Shapiro Wilk Critical Value	0.881	5% Shapiro Wilk Critical Value	0.881
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1261	Mean	4.772
SD	5895	SD	1.619
95% DL/2 (t) UCL	3058	95% H-Stat (DL/2) UCL	1145
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	4.209
		SD in Log Scale	2.161
		Mean in Original Scale	1249
		SD in Original Scale	5898
		95% t UCL	3046
		95% Percentile Bootstrap UCL	3356
		95% BCA Bootstrap UCL	4425
		95% H-UCL	3443
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.329	Data do not follow a Discernable Distribution (0.05)	
Theta Star	7782		
nu star	9.861		
A-D Test Statistic	2.859	Nonparametric Statistics	
5% A-D Critical Value	0.824	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.824	Mean	1265
5% K-S Critical Value	0.238	SD	5798
Data not Gamma Distributed at 5% Significance Level		SE of Mean	1078
Assuming Gamma Distribution		95% KM (t) UCL	3094
Gamma ROS Statistics using Extrapolated Data		95% KM (z) UCL	3038
Minimum	0.000001	95% KM (jackknife) UCL	3062
Maximum	33000	95% KM (bootstrap t) UCL	34567
Mean	1238	95% KM (BCA) UCL	3424
Median	0.000001	95% KM (Percentile Bootstrap) UCL	3386
SD	5900	95% KM (Chebyshev) UCL	5963
k star	0.0884	97.5% KM (Chebyshev) UCL	7997
Theta star	14008	99% KM (Chebyshev) UCL	11990
Nu star	5.478	Potential UCLs to Use	
AppChi2	1.379	97.5% KM (Chebyshev) UCL	7997
95% Gamma Approximate UCL	4916		
95% Adjusted Gamma UCL	5341		

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006). For additional insight, the user may want to consult a statistician.

Attachment 2
ProUCL Output
Soil (0 to 15 ft bgs)
RACER Trust
Plant 3 - Lansing, Michigan

Result (benzo(b)fluoranthene)

General Statistics			
Number of Valid Data	31	Number of Detected Data	17
Number of Distinct Detected Data	14	Number of Non-Detect Data	14
		Percent Non-Detects	45.16%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	40	Minimum Detected	3.689
Maximum Detected	62000	Maximum Detected	11.03
Mean of Detected	4242	Mean of Detected	6.318
SD of Detected	14890	SD of Detected	1.663
Minimum Non-Detect	40	Minimum Non-Detect	3.689
Maximum Non-Detect	100	Maximum Non-Detect	4.605

Note: Data have multiple DLs - Use of KM Method is recommended
For all methods (except KM, DL/2, and ROS Methods),
Observations < Largest ND are treated as NDs

Number treated as Non-Detect	17
Number treated as Detected	14
Single DL Non-Detect Percentage	54.84%

UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.286	Shapiro Wilk Test Statistic	0.847
5% Shapiro Wilk Critical Value	0.892	5% Shapiro Wilk Critical Value	0.892
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	

Assuming Normal Distribution

DL/2 Substitution Method	
Mean	2343
SD	11080
95% DL/2 (t) UCL	5721

Maximum Likelihood Estimate(MLE) Method N/A
MLE yields a negative mean

Assuming Lognormal Distribution

DL/2 Substitution Method	
Mean	5.065
SD	1.878
95% H-Stat (DL/2) UCL	3204
Log ROS Method	
Mean in Log Scale	4.643
SD in Log Scale	2.352
Mean in Original Scale	2336
SD in Original Scale	11081
95% t UCL	5714
95% Percentile Bootstrap UCL	6311
95% BCA Bootstrap UCL	10287
95% H-UCL	10720

Gamma Distribution Test with Detected Values Only	
k star (bias corrected)	0.314
Theta Star	13528
nu star	10.66

Data Distribution Test with Detected Values Only
Data do not follow a Discernable Distribution (0.05)

A-D Test Statistic	2.936
5% A-D Critical Value	0.835
K-S Test Statistic	0.835
5% K-S Critical Value	0.226

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	62000
Mean	2326
Median	50
SD	11083
k star	0.0931
Theta star	24972
Nu star	5.775
AppChi2	1.526
95% Gamma Approximate UCL	8803
95% Adjusted Gamma UCL	9535

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	2346
SD	10899
SE of Mean	2018
95% KM (t) UCL	5770
95% KM (z) UCL	5665
95% KM (jackknife) UCL	5720
95% KM (bootstrap t) UCL	63901
95% KM (BCA) UCL	6417
95% KM (Percentile Bootstrap) UCL	6302
95% KM (Chebyshev) UCL	11141
97.5% KM (Chebyshev) UCL	14947
99% KM (Chebyshev) UCL	22422

Potential UCLs to Use

99% KM (Chebyshev) UCL	22422
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Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Result (lead)

General Statistics

Number of Valid Observations 40

Number of Distinct Observations 40

Raw Statistics

Minimum 2
 Maximum 7230
 Mean 243.3
 Median 10.45
 SD 1152
 Std. Error of Mean 182.1
 Coefficient of Variation 4.735
 Skewness 6.031

Log-transformed Statistics

Minimum of Log Data 0.693
 Maximum of Log Data 8.886
 Mean of log Data 2.798
 SD of log Data 1.631

Relevant UCL Statistics

Normal Distribution Test

Shapiro Wilk Test Statistic 0.224
 Shapiro Wilk Critical Value 0.94

Data not Normal at 5% Significance Level

Lognormal Distribution Test

Shapiro Wilk Test Statistic 0.779
 Shapiro Wilk Critical Value 0.94

Data not Lognormal at 5% Significance Level

Assuming Normal Distribution

95% Student's-t UCL 550.2

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995) 728.5
 95% Modified-t UCL (Johnson-1978) 579.1

Assuming Lognormal Distribution

95% H-UCL 144.2

95% Chebyshev (MVUE) UCL 144.3
 97.5% Chebyshev (MVUE) UCL 181.8
 99% Chebyshev (MVUE) UCL 255.3

Gamma Distribution Test

k star (bias corrected) 0.259
 Theta Star 940.8
 MLE of Mean 243.3
 MLE of Standard Deviation 478.4
 nu star 20.69
 Approximate Chi Square Value (.05) 11.36
 Adjusted Level of Significance 0.044
 Adjusted Chi Square Value 11.1

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

95% Approximate Gamma UCL 443.1
 95% Adjusted Gamma UCL 453.4

Potential UCL to Use

Data Distribution

Data do not follow a Discernable Distribution (0.05)

Nonparametric Statistics

95% CLT UCL 542.9
 95% Jackknife UCL 550.2
 95% Standard Bootstrap UCL 548.1
 95% Bootstrap-t UCL 3976
 95% Hall's Bootstrap UCL 3359
 95% Percentile Bootstrap UCL 599.8
 95% BCA Bootstrap UCL 841.6
 95% Chebyshev(Mean, Sd) UCL 1037
 97.5% Chebyshev(Mean, Sd) UCL 1381
 99% Chebyshev(Mean, Sd) UCL 2056

Use 95% Chebyshev (Mean, Sd) UCL 1037

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and IacI (2002) and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.