TECHNICAL MEMORANDUM
EVALUATION OF SOIL CLEANUP OBJECTIVES
FOR
THE NIACET SITE
47TH STREET
NIAGARA FALLS, NEW YORK

Prepared for:

UNION CARBIDE CORPORATION

Prepared by:

AECOM
257 W. GENESEE STREET, SUITE 400
BUFFALO, NEW YORK 14202

MAY 2017

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1.0 INTRODUCTION

1.1 General

AECOM Technical Services, Inc. (AECOM), on behalf of Union Carbide Corporation (UCC), has prepared this technical memorandum evaluating the selection of an appropriate Soil Cleanup Objective (SCO) for the soil remediation project at the Niacet Site in Niagara Falls, NY. The purpose of this memorandum is to present results of an evaluation conducted by AECOM to identify an appropriate SCO for the non-elemental mercury impacted areas located outside of the areas with visible mercury being addressed by the Interim Remedial Measure (IRM). This evaluation included review of relevant regulations and guidance documents, review of historical site data, as well as additional soil sampling and analyses completed in 2016 and 2017 to better characterize the nature of mercury impacts in the non-IRM areas.

2.0 SITE HISTORY AND DESCRIPTION

UCC previously owned and operated a chemical manufacturing facility at 400 47th Street in Niagara Falls, New York. The property was sold to Niacet Corporation in 1978. The Site is located on 19.42 acres at the intersection of 47th Street and Niagara Falls Boulevard (Figure 1). The parcel consists of a roughly L-shaped area with brick and cinder block buildings occupying the western portion of the property. The remainder of the property consists of asphalt and concrete roadways, parking lots, foundations from former buildings, a concrete lined cooling pond, and open areas containing industrial fill. Adjacent properties are primarily industrial.

Historical documentation indicates that the facility was initially constructed in 1925-26 and operated as the Niacet Chemical Company. The plant originally produced acetaldehyde, paraldehyde, aldol, and crotonaldehyde. Production of acetic acid by the oxidation of acetaldehyde began in 1928. The manufacture of sodium acetate and other acetates began in 1935. Vinyl acetate production was added in 1937 and increased steadily up through the late 1950's. Production of acetaldehyde and acetic acid was discontinued in 1952.

2.1 Historical Mercury Use at the Site

Mercury salts have historically been used as a catalyst in the production of aldehyde, where acetylene was passed through an acidic solution containing a divalent mercury [Hg(II)] salt (e.g., $HgSO_4$). The production of aldehyde by this method results in the reduction of Hg(II) to produce elemental mercury [Hg(0)], which typically deposited in a sludge at the bottom of the reaction vessel. The sludge was recovered from the reactor vessels, retorted to recover elemental mercury and then re-oxidized for the catalyst. While the precise chemical methodology employed at the Niacet site is not known, mercury wastes were treated on-site in the Mercury Recovery facility (Building 13) and re-used (Figure 2).

Niacet discovered visible mercury impacts to onsite soils during construction activities related to plant improvement projects. In 1998, during excavation for an above-ground storage tank (AST) containment area south of Building 4a, visible mercury was observed in excavated spoils. Then, in 2001, visible mercury was again observed in soils beneath the floor during installation of a trench drain in Building 17. UCC subsequently entered into a Voluntary Cleanup Agreement (VCA) with the New York State Department of Environmental Conservation (NYSDEC) on May 30, 2001 to address the mercury impacts.

3.0 SUMMARY OF SITE INVESTIGATION ACTIVITIES

From 2001 to 2015, AECOM (formerly URS Corporation) performed site investigation and interim remedial measures (IRM) activities at the site. Through these activities two types of mercury impacted soils have been identified on site: 1) soil impacted with elemental mercury where visible beads of mercury are observed, mainly concentrated in historical production areas such as specific former Building footprints; and 2) areas impacted by lower concentrations of mercury where elemental mercury was not visually observed in soils.

3.1 Elemental Mercury Impacts

In February 2013, AECOM implemented an IRM to excavate near-surface soils impacted by elemental mercury from the former mercury recovery building and near the AST containment area. The volume of soil impacted by elemental mercury estimated in the IRM Work Plan (URS, 2012) was approximately 3,400 cubic yards, or 6,500 tons. Over the course of two construction seasons in 2013 and 2014, AECOM excavated mercury-impacted soils based on visual observations of elemental mercury, and the extent of soil impacted by visible mercury expanded significantly beyond the previously delineated areas. A total of approximately 15,000 tons of soil was ultimately excavated and transported offsite for treatment and disposal at Stablex in Blainville, Quebec. The areas excavated are shown on Figure 2.

Following the completion of IRM in November 2014, AECOM undertook additional investigation activities to better define the extent of elemental mercury impacts.

As a result of these site activities, the understanding of the nature and extent of mercury-impacted soil has been refined. The occurrence of elemental mercury appears to mainly coincide with historical recovery operations as well as certain historical production operations associated with certain former buildings. During the IRM activities conducted in 2013/2014, elemental mercury was identified in and excavated from the area surrounding the former mercury recovery building (Building 13) as well as the foundations of former Buildings 1, 1A, 2, and 15 (Figure 2). In addition, additional investigation activities conducted during 2015 and 2016 have identified significant elemental mercury-impacted areas associated with former Buildings 16 and 19. These buildings are associated with former production activities.

Based on the additional investigation activities conducted since the IRM excavations were completed, AECOM estimates that an additional 17,000 tons of elemental mercury-impacted soil remains around the foundations of the former Buildings 16 and 19, and along various historical storm sewer pipes. The areas of additional visible elemental mercury-impacted soil are shown on Figure 3.

The observation of elemental mercury in these areas is consistent with what is known about mercury use at the site. The current Conceptual Site Model suggests it is impracticable to remove all soil with visible mercury from the site due to the presence of existing structures and ongoing industrial activity. A revised approach for addressing visible mercury areas will be addressed in the overall Remedial Action Work Plan currently being prepared.

3.2 Non-Visible Mercury Impacts

The remaining areas of impacted soil on site can be generally characterized as shallow, widespread, mostly open, areas impacted by lower concentrations of mercury where no visible elemental mercury is observed in soils. During the Remedial Investigation (RI) completed from 2002 through 2006, soil sampling was performed at 108 soil borings and 33 test trenches. Soil samples were collected from near-surface depths (i.e., 0-1 ft below ground surface [bgs]) as well as composite samples from the fill material extending as deep as 9 feet bgs. Concentrations of total mercury (THg) in near-surface soil samples from non-visible mercury areas ranged from non-detect to 1,600 mg/kg. Concentrations of total mercury in fill composite soil samples from non-visible mercury areas ranged from non-detect to 2,070 mg/kg. As stated above in the Introduction, it is these soils that are the subject of this SCO evaluation.

4.0 SCO EVALUATION APPROACH

The approach for evaluating the appropriate mercury SCO for the non-visible mercury-impacted areas involves performing mercury speciation analyses on soil samples from these areas to determine the relative amounts of the elemental and oxidized forms of mercury. The SCO for mercury in industrial site soil is based on the oxidation state of mercury. The NYSDEC Part 375 Restricted Use Industrial SCO for mercury is 5.7 mg/kg. This SCO had been considered as the presumptive SCO for the Niacet site since adoption by the NYSDEC of Part 375 SCOs in 2006. However, this generic SCO was calculated based on an adult worker's inhalation exposure for elemental mercury. The New York State Brownfield Cleanup Program, Development of Soil Cleanup Objectives Technical Support Document (TSD) (NYSDEC and NYSDOH, 2006) presents exposure pathway specific SCOs for various land uses. Table 5.3.6-1(e) of the TSD presents the exposure pathway specific Industrial SCOs for mercury (inorganic salts) of 260 mg/kg for an adult worker and 220 mg/kg for an adolescent trespasser. The final Human-Health Based SCOs in the TSD Table 5.6-1 show only the lower value of 220 mg/kg mercury salts based on the possibility that adolescents could trespass even at secure industrial facilities such as the Niacet site. These SCOs reflect the greater risk posed by elemental mercury to human health due to volatilization and inhalation, whereas the common Hg(II) species in soil are not volatile at standard temperature and pressure and are relatively unavailable via ingestion or dermal absorption (ATSDR, 1999).

The oxidation state of mercury in solid phase samples can be determined using selective sequential extraction (SSE) techniques. A commonly employed technique is described by Bloom et al. (2003), in which a solid phase sample (i.e., sediment or soil) is extracted sequentially with solution of increasing strength. The chemical species of mercury can then be inferred by an understanding of the chemical behavior of mercury and the extraction pattern.

The SSE technique described by Bloom et al. (2003) was designed specifically to detect the presence of elemental mercury in solid phase samples based on a weight-of-evidence approach. The presence of elemental mercury in a sample is indicated by the total mercury (THg) concentration in deionized (DI) water (F1 fraction) equal to or exceeding 50 micrograms per liter (µg/L), the aqueous solubility of elemental mercury. The concentration of elemental mercury can then be estimated by the concentration of THg in the fraction solubilized by concentrated nitric acid (F4 fraction). There are some uncertainties with elemental mercury quantification through this approach, as some Hg(I) compounds, and Hg(II) bound in mineral matrices (organo-sulfur, crystalline Fe/Mn oxide phases) or amalgams can also contribute to the F4 fraction quantified.

4.1 Visible Mercury Areas Speciation

In January, 2012 two soil samples were collected with visible amounts of elemental mercury and submitted to Frontier Global Services for SSE following Bloom et al. (2003). The range of THg found in the F1 fraction was 0.8 to 3.2%, a range of 57 to 72% in the F4 fraction, and 23 to 35% in the F5 fraction (Table 1). This is consistent with the extraction pattern that Bloom et al. (2003) observed for samples prepared by mixing elemental mercury droplets in kaolin, which had 0.1 to 2.7% of the THg in the F1 fraction, 96 to 97% in the F4 fraction, and 0.2 to 2.8% in the F5 fraction. The higher THg percentage detected in the F5 fraction for the site soils is likely related to the oxidation of elemental mercury to Hg(II) in soil and subsequent formation of mineral phases like metacinnabar (m-HgS) and cinnabar (HgS).

Further evidence of the presence of elemental mercury in these areas is provided by evaluation of the aqueous phase concentrations in the F1 extraction. The aqueous phase concentrations in the F1 fraction were 893 and 1,184 µg/L, well in excess of the 50 µg/L solubility of elemental mercury (Table 3). The concentrations were higher than 50 µg/L likely due to the presence of pure mercury oxides on the surface of the elemental mercury droplets, which commonly occur in soil (Miller et al., 2015) and have much higher solubility; Bloom et al, (2003) noted that formation of these oxide layers significantly limited further volatilization of elemental mercury. Evaluation of these data provide site-specific validation that the SSE technique can be used to accurately estimate the concentration of elemental mercury in site soils.

These two samples were part of a larger set of 19 site soil samples that were analyzed for total and elemental mercury. The results of these analyses are shown in Table 2. It was noted that the five samples with visible elemental mercury were in the top six samples in terms of THg concentration. All of these samples had THg concentrations of 3,450 mg/kg or higher; visible elemental mercury was not observed in one sample with a THg concentration of 6,840 mg/kg. The concentration of THg was predictive of the presence of visible elemental mercury (logistic regression; $p = 0.03$), indicating that samples with visible elemental mercury are likely to have relatively high THg concentrations. These results indicate that the presence of elemental mercury is likely associated with areas of the highest THg detections on site.

4.2 Non-Visible Mercury Areas Speciation

On December 21, 2016, AECOM collected eight near-surface (i.e. 0 – 1 ft bgs) soil samples at previous sampling locations covering a representative area of the overall site

where no visible mercury had been observed. Four samples were collected from the southern half of the property (south of Pike Creek), and four samples were collected from the northern half. The locations of soil samples collected as part of this evaluation are shown on Figure 4.

Samples were collected using a hand auger to bore to a depth of 1 foot bgs. Soil from the 0 to 1 ft interval was composited and collected into three laboratory provided 4-ounce glass sample jars equipped with Teflon-lined lids. Samples were further sealed with custody tape and placed into a cooler on ice for transportation to the laboratory. All sampling equipment was decontaminated prior to commencing sampling and between each sample.

Samples were shipped via Fedex under chain-of-custody protocol to Brooks Applied Labs (BAL) in Bothell, Washington. Samples were analyzed for the following parameters:

- Total Mercury by USEPA Method 1631
- Volatile Mercury by Thermal Desorption/ USEPA Method 1631E
- Extractable Mercury Hg(II) by IP-CV-ICP-MS

Samples were evaluated visually by the field staff for presence of elemental mercury but none was observed. THg concentrations in the samples ranged from 9 to 531 mg/kg (Table 3). The BAL laboratory report is attached as Appendix A. Samples were analyzed for elemental mercury according to a modification of Bloom et al. (2003), where soil sample aliquots are extracted with DI water. The concentrations of THg in these samples were lower than the samples in which elemental mercury was observed in previous investigations (Table 2). Evaluation of the data indicates that the concentrations in the DI water ranged between 0.006 and 3.1 µg/L, well below the 50 µg/L level that would indicate presence of elemental mercury (Table 3). Based on the site history and typical distribution of mercury species in soil, the majority of mercury in these locations is present as an inorganic mercury species complexed by organic matter or mineral phases in soil. The low concentrations of extractable mercury Hg(II), for example, which are determined via extraction by a weak acid and would theoretically liberate soluble Hg(II) species were low, ranging from 0.05 to 85.4 mg/kg or 0.14 to 17.7% of the THg. The remainder of the THg would then likely be

distributed in the organo-complexed and minerally-complexed Hg(II) (e.g., m-HgS and HgS). The potential presence of Hg(I) species can be ruled out by site history and presence of elemental mercury ruled out by analytical evidence.

Based on the mercury speciation analytical data collected from the site to date, the following can be inferred/concluded:

- Soil samples with visible elemental mercury in the IRM areas have concentrations in the aqueous phase of the F1 (deionized water-extracted) fraction in excess of 50 µg/L and extraction patterns that match elemental mercury containing standards.
- Sequential extraction data suggests that elemental mercury droplets in site soil are oxidizing, increasing solubility in the F1 fraction but potentially limiting volatility of soil elemental mercury.
- The presence of elemental mercury is significantly correlated with the THg concentration in soil.
- In areas where no visible elemental mercury has been observed on site, the concentrations in the deionized water extractions are below the level that would suggest the presence of elemental mercury.
- In areas outside of the visible mercury areas, the speciation data indicate that mercury in soil is present as inorganic Hg(II) species, such as Hg(II) complexed by organic matter or mineral phases such as m-HgS and HgS.

5.0 CONCLUSIONS AND RECOMMENDATIONS

The Niacet facility had historically used mercury salts as a catalyst in the production of aldehyde. As the result of transportation, use and recycling of the Hg catalyst at the site, mercury has been released to soils at the site. Elemental mercury is visible in locations that are associated with the the former mercury recovery area (Building 13) and former production buildings (Buildings 1/1A, 2, 15, 16, and 17). Mercury speciation data in samples from these areas historically associated with mercury use at the site support the presence of elemental mercury. In samples collected from the IRM (excavated) areas with visible elemental mercury, aqueous concentrations in extractant and extraction patterns clearly indicate the presence of elemental mercury which is strongly correlated with the THg concentration.

Samples collected from non-IRM areas adjacent to locations impacted with visible elemental mercury have lower THg concentrations and the speciation data conclusively indicate that there is no elemental mercury present in these samples.

As a result of the preceding evaluation, the Industrial Use SCO for inorganic mercury salts (220 mg/kg) for an adolescent trespasser is the appropriate SCO for guiding remedial decision-making in areas where elemental mercury has not been observed or in areas not associated with historic mercury use at the site. Therefore, the inorganic mercury salts SCO will be used for evaluating remedial alternatives in the non-IRM areas.

6.0 REFERENCES

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Bloom, N.S., Preus, E., Katon, J., and Hiltner, M. 2003. Selective extractions to assess the biogeochemically relevant fractionation of inorganic mercury in sediments and soils. Analytica Chimica Acta 479, 233–248.

Miller, C.L., Watson, D.B., Lester, B.P., Howe, J.Y., Phillips, D.H., He, F., Liang, L., and Pierce, E.M. 2015. Formation of soluble mercury oxide coatings: Transformation of elemental mercury in soils. Environmental Science & Technology 49, 12105–12111.

NYSDEC and NYSDOH. 2006. New York State Brownfield Cleanup Program Development of Soil Cleanup Objectives Technical Support Document. September.

R Core Team. 2015. R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. URL https://www.R-project.org/.

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TABLES

TABLE 1

SUMMARY OF 2012 MERCURY SPECIATION ANALYTICAL RESULTS

(Samples Collected January 2012)

Extractant[1]	Fraction[1]	Vis-1		SB-072R		Kaolin/Hg(0) Standard[1]
		Total Mercury (mg/kg)	%	Total Mercury (mg/kg)	%	
DI Water	F-1	288	0.77	367	3.24	0.1-2.7
pH 2 HCl/CH_3COOH	F-2	149	0.4	100	0.88	0.2-1.3
1 N KOH	F-3	1,240	3.3	385	3.39	0-0.3
12N HNO_3	F-4	27,400	72.82	6,510	57.4	95.7-96.7
Aqua regia	F-5	8,550	22.72	3,980	35.09	0.2-2.8

[1]Bloom et al 2003

Table 2

TOTAL MERCURY RESULTS AND PRESENCE/ ABSENCE OF ELEMENTAL MERCURY

(Samples Collected January 2012)

Sample ID	Total Mercury (mg/kg)	Visible Mercury?
VIS-1	44,200	Yes
VIS-3	12,700	Yes
SB-075R	10,600	Yes
SB-072R	7,780	Yes
VIS-4	6,840	No
SB-070R	3,450	Yes
SB-074R	2,500	No
VIS-2	1,170	No
SB-063R	1,160	No
SB-061R	1,110	No
SB-049R	835	No
SB-053R	754	No
SB-064R	512	No
SB-033R	405	No
SB-071R	351	No
SB-062R	336	No
SB-059R	313	No
MW-01R	213	No
SB-039R	94.2	No

TABLE 3

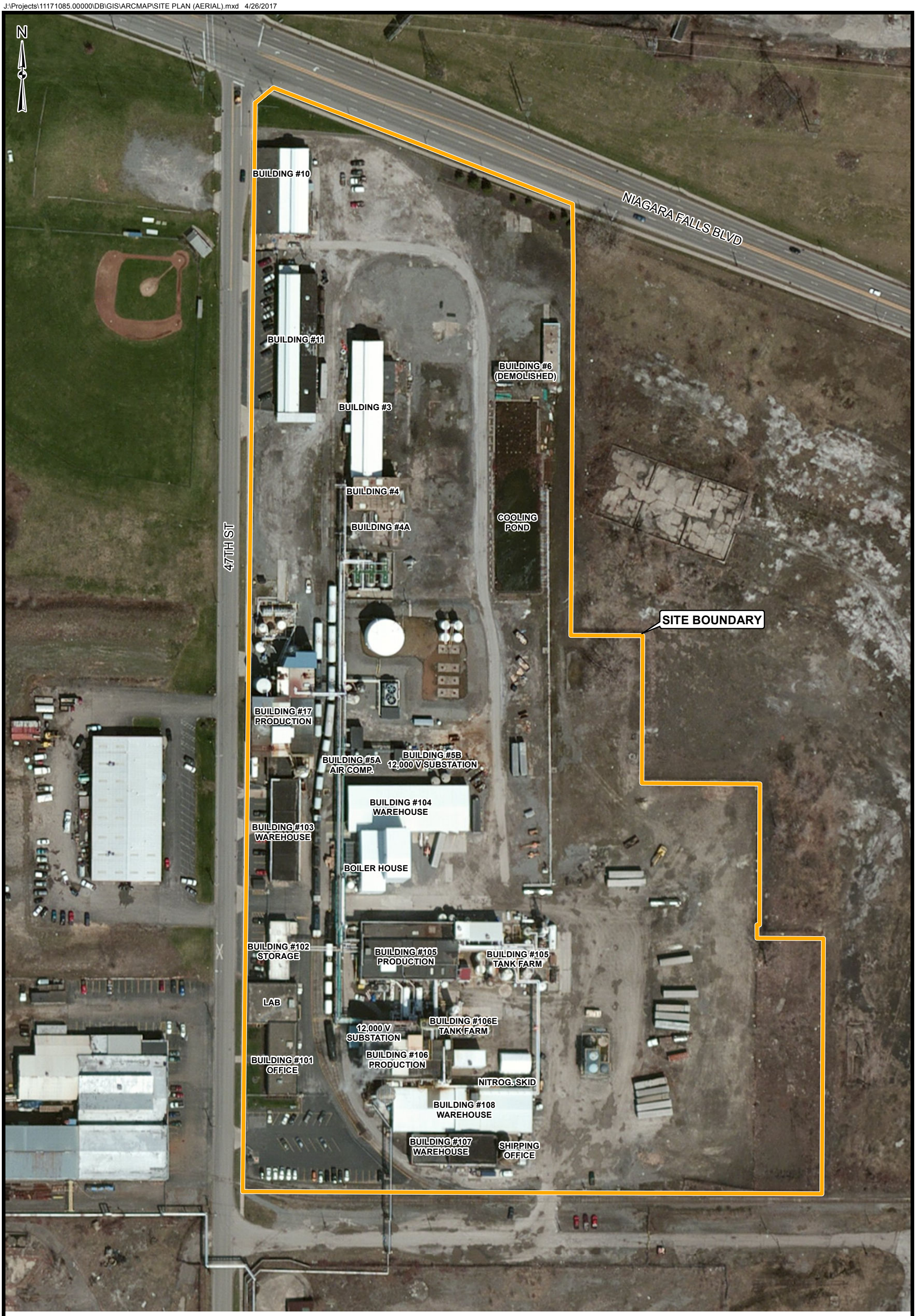
TOTAL MERCURY CONCENTRATIONS IN SOIL AND EXTRACTANT (DI WATER)

(2012 and 2016)

Sample ID	Bulk Total Mercury (mg/kg)	Total Mercury in Extractant (ug/L)	Sample Date	Visible Mercury?
Vis-1	44,200	893	January 2012	Yes
SB-072R	7,780	1,184		
SB-066	529	0.3	December 2016	No
SB-059	389	0.02		
SB-056	531	3.1		
MW-01	153	0.01		
SB-033	187	0.3		
SB-028	9.17	0.02		
SB-015	483	2.6		
SB-082	265	0.01		

FIGURES

J:\Projects\11171085.00000\DB\GIS\ARCMAP\SITE PLAN (AERIAL).mxd 4/26/2017



Source: ESRI World Imagery

120 0 120 Feet

URS

UNION CARBIDE CORPORATION NIACET SITE
SITE PLAN

FIGURE 1

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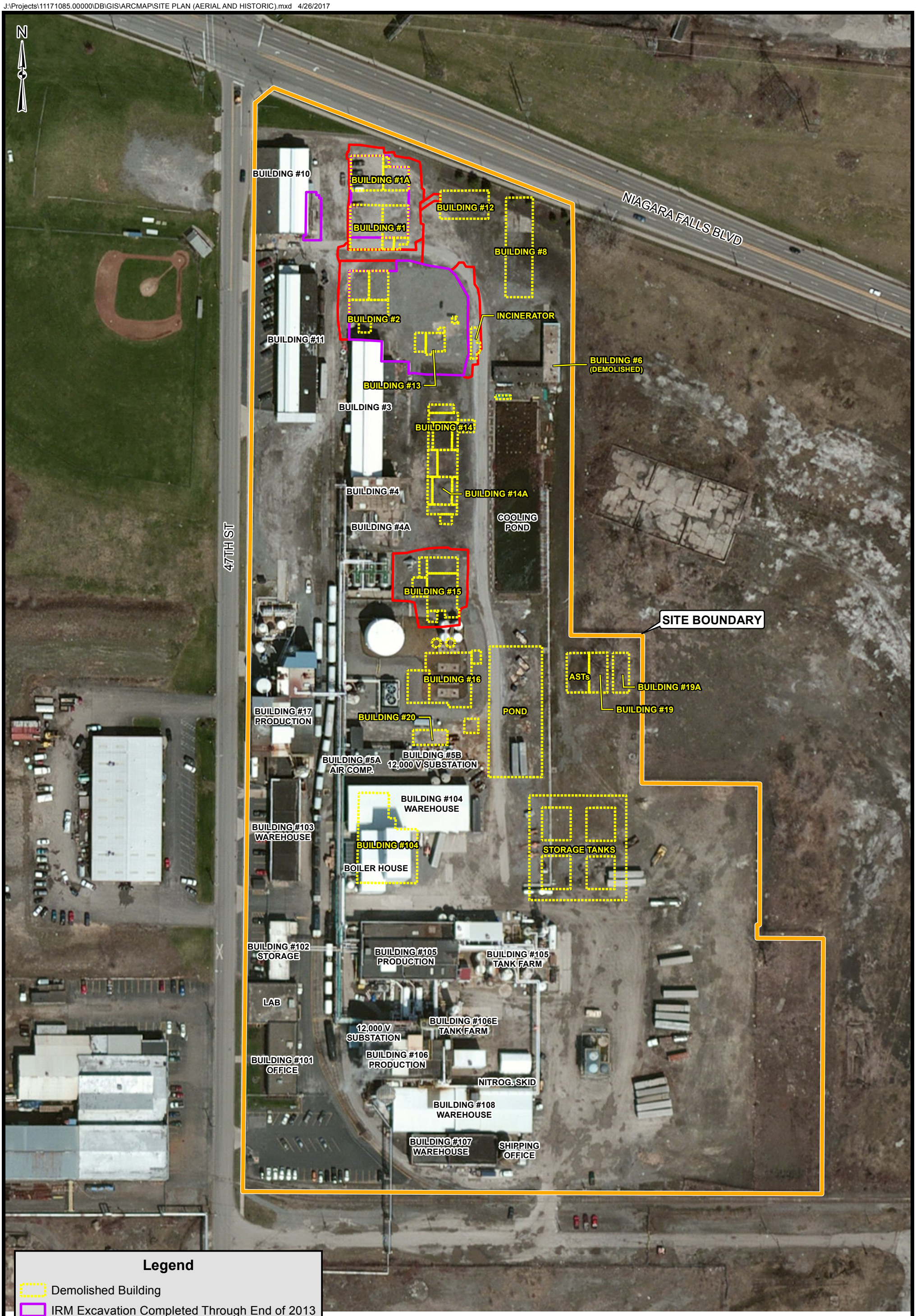

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UNION CARBIDE CORPORATION NIACET SITE
HISTORIC BUILDING LOCATIONS
AND 2013/2014 IRM EXCAVATION LIMITS

FIGURE 2

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N

NIAGARA FALLS BLVD

47TH ST

SB-077, 95.5
SB-073, 103
SB-072, 270
BUILDING #10
BUILDING #1A
BUILDING #12
BUILDING #1
SB-075, 711
SB-074, 400
SB-071, 292
SB-076, 48.7
SB-069, 180
BUILDING #8
SB-106, 1.7
SB-066, 65.9
SB-070, 1070
BS-02, 13.4
BUILDING #2
INCINERATOR
BUILDING #11
BUILDING #6
(DEMOLISHED)
SB-064, 1240
BUILDING #13
SB-062, 634
SB-061/PZ-07, 433
SB-063/PZ-08, 426
BUILDING #3
BUILDING #14
SB-060, 12
SB-058, 119
SB-057, 41.3
BS-03, 1.7
SB-059, 631
COOLING
POND
BS-01, 5
BUILDING #4
BUILDING #14A
SB-056/MW-03, 23.5
SB-055, 3.2
BUILDING #4A
SB-054/PZ-09, 51.7
SB-053, 1600
SB-079, 23.7
BS-04, 1.9
BUILDING #15
SB-049, 337
SB-052, 7.6
SITE BOUNDARY
MW-01, 738
SB-046/PZ-10, 38.4
SB-047, 8.8
BUILDING #16
ASTs
BUILDING #19A
BUILDING #19
POND
BUILDING #17
PRODUCTION
BUILDING #20
SB-042, 29.7
SB-041, 26.7
SB-040, 109
SB-039, 276
SB-044/MW-06, 0.055
SB-043, 17.7
BUILDING #5A
AIR COMP.
BUILDING #5B
12,000 V SUBSTATION
BUILDING #104
WAREHOUSE
SB-036, 20.8
SB-035, 13
SB-034, 97.2
SB-033/PZ-03, 387
SB-032, 104
SB-037, 8.6
BUILDING #103
WAREHOUSE
BUILDING #104
STORAGE TANKS
BOILER HOUSE
SB-028, 26
SB-026, 53.2
SB-025, 0.301
SB-030, 26
SB-029/PZ-06, 9.4
SB-027/PZ-05, 52.4
BUILDING #102
STORAGE
BUILDING #105
PRODUCTION
BUILDING #105
TANK FARM
SB-021, 2
SB-020, 13.4
SB-019, 55.6
LAB
BUILDING #106E
TANK FARM
SB-017/PZ-04, 7.1
SB-016, 25.1
SB-015, 118
SB-014, 7.9
SB-081/PZ-12, 30.8
12,000 V
SUBSTATION
BUILDING #101
OFFICE
BUILDING #106
PRODUCTION
NITROG. SKID
SB-011, 1.5
SB-010, 1.1
SB-009/PZ-02, 66.2
SB-013, 2.3
SB-008, 21.7
BUILDING #108
WAREHOUSE
BUILDING #107
WAREHOUSE
SHIPPING
OFFICE
SB-082/PZ-13, 166
SB-005, 13.1
SB-003, 1.9
SB-001, 0.113
SB-007/PZ-11, 1.4
SB-006, 2.2
SB-004, 0
SB-002/PZ-01, 73.3

Legend

Mercury Concentrations:
- < 5.7 MG/KG
- 5.7 - 23 MG/KG
- 23 - 260 MG/KG
- > 260 MG/KG
- Demolished Building
- Visible Mercury Impacts

Source: ESRI World Imagery

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UNION CARBIDE CORPORATION NIACET SITE
EXTENT OF REMAINING VISIBLE MERCURY AREAS

FIGURE 3

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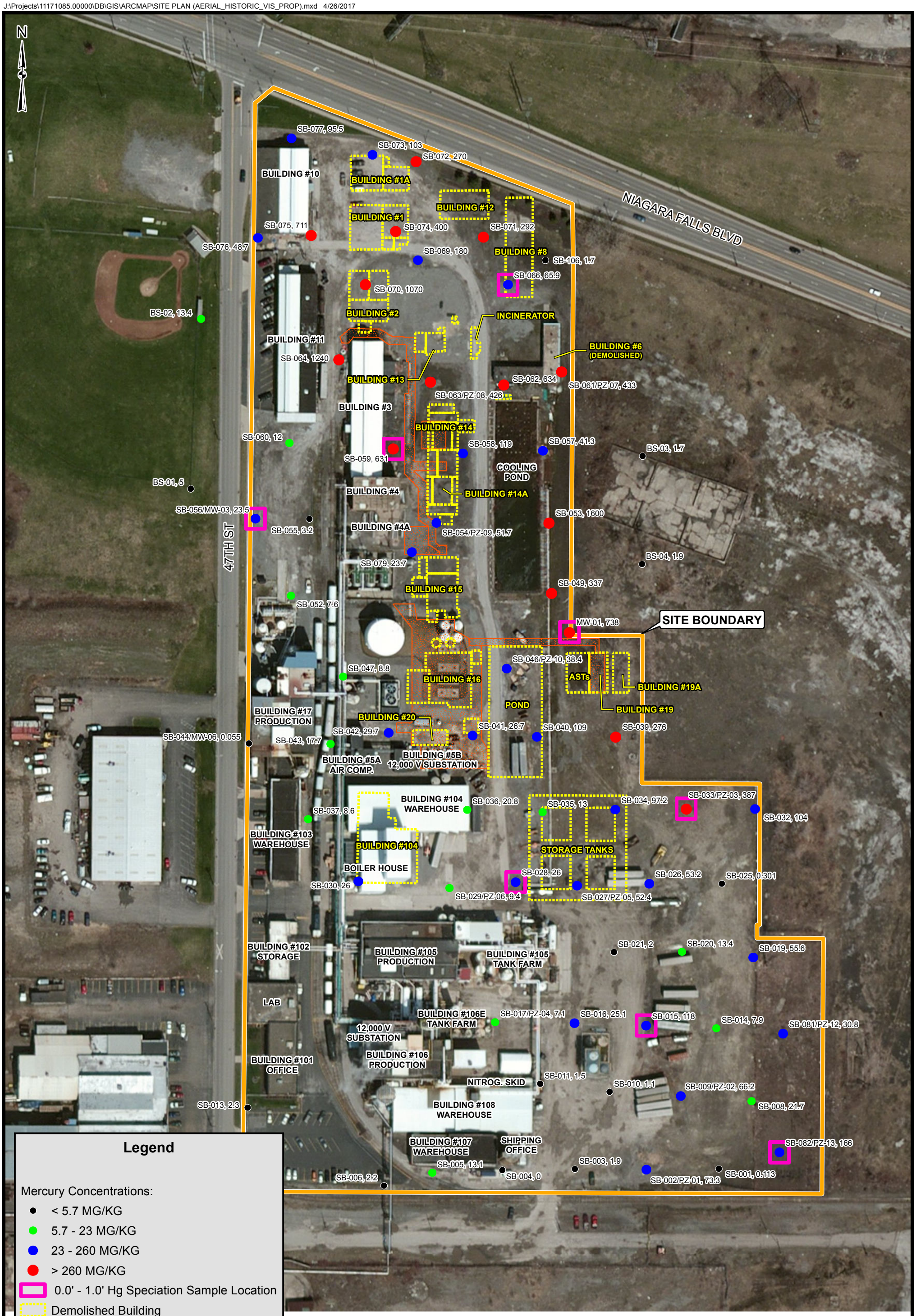

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UNION CARBIDE CORPORATION NIACET SITE
2016 MERCURY SPECIATION SAMPLING LOCATIONS

FIGURE 4

APPENDIX A

2016 LABORATORY ANALYTICAL REPORT

BROOKS APPLIED LABS
18804 North Creek Parkway, Ste 100, Bothell, WA 98011 • USA • T: 206 632 6206 F: 206 632 6017 • info@brooksapplied.com

February 2, 2017

AECOM - Conshohocken
ATTN: Colin Wasteneys
257 West Genesee St
Buffalo, NY 14202
colin.wasteneys@aecom.com

RE: Project AEC-CS1602

Dear Mr. Wasteneys,

On December 23, 2016, Brooks Applied Labs (BAL) received eight (8) soil samples. The samples were logged-in for the analyses of total mercury (Hg), volatile mercury [Hg(TotVol)], and extractable mercury [Hg(II)] according to the chain-of-custody form. All samples were received and stored according to BAL SOPs and EPA methodology.

All soil samples for Hg analysis were digested via modified EPA Method 1631, Appendix with a mix of concentrated nitric acid and concentrated hydrochloric acid. Prior to analysis, digestions are preserved with bromine monochloride.

Soil samples for Hg(TotVol) are extracted with deionized water into a solution of bromine monochloride (BrCl).

The digests and extractions for Hg and Hg(TotVol) were analyzed via cold vapor atomic fluorescence spectroscopy (CVAFS).

Hg(II) was extracted with deionized water. The extracts are analyzed with ion-pairing chromatography cold vapor inductively coupled plasma mass spectrometry (IP-CV-ICP-MS). Retention times for each eluting species are compared to known standards for species identification.

Sample results reported for Hg were method blank corrected, while all other results were not method blank corrected, as described in the calculations section of the relevant BAL SOP(s). All results were evaluated using reporting limits adjusted to account for sample aliquot size. Please refer to the *Sample Results* page for sample-specific MDLs, MRLs, and other details. All results were reported in ng/g (ppb). Results for Hg and Hg(II) were reported on a dry-weight basis. Results for Hg(TotVol) were reported on a wet-weight (as-received) basis.

In instances where a matrix spike/matrix spike duplicate (MS/MSD) set was spiked at a level less than the native sample, the recoveries are not considered valid indicators of data quality. However, these results are reported as a demonstration of precision. When the spiking levels were ≤ 25% of the native sample concentrations, the recoveries were not reported (**NR**). No sample results were qualified on the basis of the MS or MSD recoveries.

The Hg(TotVol) native result for sample *SB-066 (0-1')* (1652047-02) and the associated DUP result yielded a 50% RPD, not meeting BRL's acceptance criteria for duplicate precision. As such, the Hg(TotVol) sample result was qualified **M** for duplicate imprecision.

Aside from concentration qualifiers, all data was reported without further qualifications and all other associated quality control sample results met the acceptance criteria.

BAL, an accredited laboratory, certifies that the reported results of all analyses for which BAL is NELAP accredited meet all NELAP requirements. For more information please see the *Report Information* page in your report. Please feel free to contact us if you have any questions regarding this report.

Sincerely,

Lydia Greaves
Project Manager
lydia@brooksapplied.com

Project ID: AEC-CS1602
PM: Lydia Greaves

Client PM: John Boyd

Report Information

Laboratory Accreditation

BAL is accredited by the *National Environmental Laboratory Accreditation Program* (NELAP) through the State of Florida Department of Health, Bureau of Laboratories (E87982) and is certified to perform many environmental analyses. BAL is also certified by many other states to perform environmental analyses. For a current list of our accreditations/certifications, please visit our website at <http://www.brooksapplied.com/resources/certificates-permits/>. Results reported relate only to the samples listed in the report.

Field Quality Control Samples

Please be notified that certain EPA methods require the collection of field quality control samples of an appropriate type and frequency; failure to do so is considered a deviation from some methods and for compliance purposes should only be done with the approval of regulatory authorities. Please see the specific EPA methods for details regarding required field quality control samples.

Common Abbreviations

BAL	Brooks Applied Labs	**MS**	matrix spike
BLK	method blank	**MSD**	matrix spike duplicate
BS	laboratory fortified blank	**ND**	non-detect
CAL	calibration standard	**NR**	non-reportable
CCB	continuing calibration blank	**N/C**	not calculated
CCV	continuing calibration verification	**PS**	post preparation spike
COC	chain of custody record	**REC**	percent recovery
D	dissolved fraction	**RPD**	relative percent difference
DUP	duplicate	**SCV**	secondary calibration verification
IBL	instrument blank	**SOP**	standard operating procedure
ICV	initial calibration verification	**SRM**	standard reference material
MDL	method detection limit	**T**	total fraction
MRL	method reporting limit	**TR**	total recoverable fraction

Definition of Data Qualifiers

(Effective 9/23/09)

B Detected by the instrument, the result is > the MDL but ≤ the MRL. Result is reported and considered an estimate.
E An estimated value due to the presence of interferences. A full explanation is presented in the narrative.
H Holding time and/or preservation requirements not met. Result is estimated.
J Estimated value. A full explanation is presented in the narrative.
J-M Duplicate precision (RPD) for associated QC sample was not within acceptance criteria. Result is estimated.
J-N Spike recovery for associated QC sample was not within acceptance criteria. Result is estimated.
M Duplicate precision (RPD) was not within acceptance criteria. Result is estimated.
N Spike recovery was not within acceptance criteria. Result is estimated.
R Rejected, unusable value. A full explanation is presented in the narrative.
U Result is ≤ the MDL or client requested reporting limit (CRRL). Result reported as the MDL or CRRL.
X Result is not BLK-corrected and is within 10x the absolute value of the highest detectable BLK in the batch. Result is estimated.

These qualifiers are based on those previously utilized by Brooks Applied Labs, those found in the EPA SOW ILM03.0, Exhibit B, Section III, pg. B-18, and the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review; USEPA; January 2010. These supersede all previous qualifiers ever employed by BAL.

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Project ID: AEC-CS1602
PM: Lydia Greaves

Client PM: John Boyd

Sample Information

Sample	Lab ID	Report Matrix	Type	Sampled	Received
SB-066 (0-1')	1652047-01	Soil/Sediment	Sample	12/21/2016	12/23/2016
SB-066 (0-1')	1652047-02	Soil/Sediment	Sample	12/21/2016	12/23/2016
SB-066 (0-1')	1652047-03	Soil/Sediment	Sample	12/21/2016	12/23/2016
SB-059 (0-1')	1652047-04	Soil/Sediment	Sample	12/21/2016	12/23/2016
SB-059 (0-1')	1652047-05	Soil/Sediment	Sample	12/21/2016	12/23/2016
SB-059 (0-1')	1652047-06	Soil/Sediment	Sample	12/21/2016	12/23/2016
SB-056 (0-1')	1652047-07	Soil/Sediment	Sample	12/21/2016	12/23/2016
SB-056 (0-1')	1652047-08	Soil/Sediment	Sample	12/21/2016	12/23/2016
SB-056 (0-1')	1652047-09	Soil/Sediment	Sample	12/21/2016	12/23/2016
MW-01 (0-1')	1652047-10	Soil/Sediment	Sample	12/21/2016	12/23/2016
MW-01 (0-1')	1652047-11	Soil/Sediment	Sample	12/21/2016	12/23/2016
MW-01 (0-1')	1652047-12	Soil/Sediment	Sample	12/21/2016	12/23/2016
SB-033 (0-1')	1652047-13	Soil/Sediment	Sample	12/21/2016	12/23/2016
SB-033 (0-1')	1652047-14	Soil/Sediment	Sample	12/21/2016	12/23/2016
SB-033 (0-1')	1652047-15	Soil/Sediment	Sample	12/21/2016	12/23/2016
SB-028 (0-1')	1652047-16	Soil/Sediment	Sample	12/21/2016	12/23/2016
SB-028 (0-1')	1652047-17	Soil/Sediment	Sample	12/21/2016	12/23/2016
SB-028 (0-1')	1652047-18	Soil/Sediment	Sample	12/21/2016	12/23/2016
SB-015 (0-1')	1652047-19	Soil/Sediment	Sample	12/21/2016	12/23/2016
SB-015 (0-1')	1652047-20	Soil/Sediment	Sample	12/21/2016	12/23/2016
SB-015 (0-1')	1652047-21	Soil/Sediment	Sample	12/21/2016	12/23/2016
SB-082 (0-1')	1652047-22	Soil/Sediment	Sample	12/21/2016	12/23/2016
SB-082 (0-1')	1652047-23	Soil/Sediment	Sample	12/21/2016	12/23/2016
SB-082 (0-1')	1652047-24	Soil/Sediment	Sample	12/21/2016	12/23/2016

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Project ID: AEC-CS1602
PM: Lydia Greaves

Client PM: John Boyd

Batch Summary

Analyte	Lab Matrix	Method	Prepared	Analyzed	Batch	Sequence
%TS	Soil/Sediment	SM 2540G	01/09/2017	01/13/2017	B170012	N/A
%TS	Soil/Sediment	SM 2540G	01/23/2017	01/30/2017	B170201	N/A
Hg	Soil/Sediment	EPA 1631 Appendix	01/09/2017	01/11/2017	B170011	1700042
Hg	Soil/Sediment	EPA 1631 Appendix	01/09/2017	01/12/2017	B170011	1700048
Hg(II)	Soil/Sediment	IP-ICP-MS	01/23/2017	01/23/2017	B170101	1700083
Hg(TotVol)	Soil/Sediment	In-House	12/23/2016	12/27/2016	B163303	1601493
Hg(TotVol)	Soil/Sediment	In-House	12/23/2016	01/04/2017	B163303	1700011

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Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
MW-01 (0-1')										
1652047-10	%TS	Soil/Sediment	NA	76.98		0.02	0.05	%	B170012	N/A
1652047-12	%TS	Soil/Sediment	NA	78.84		0.09	0.31	%	B170201	N/A
1652047-10	Hg	Soil/Sediment	dry	153000		193	645	ng/g	B170011	1700042
1652047-12	Hg(II)	Soil/Sediment	dry	5580		48	318	ng/g	B170101	1700083
1652047-11	Hg(TotVol)	Soil/Sediment		0.051		0.016	0.032	ng/g wet	B163303	1601493
SB-015 (0-1')										
1652047-19	%TS	Soil/Sediment	NA	89.42		0.02	0.05	%	B170012	N/A
1652047-21	%TS	Soil/Sediment	NA	89.41		0.09	0.31	%	B170201	N/A
1652047-19	Hg	Soil/Sediment	dry	483000		656	2190	ng/g	B170011	1700048
1652047-21	Hg(II)	Soil/Sediment	dry	85400		43	284	ng/g	B170101	1700083
1652047-20	Hg(TotVol)	Soil/Sediment		13.0		0.016	0.032	ng/g wet	B163303	1601493
SB-028 (0-1')										
1652047-16	%TS	Soil/Sediment	NA	94.72		0.02	0.05	%	B170012	N/A
1652047-18	%TS	Soil/Sediment	NA	92.85		0.09	0.31	%	B170201	N/A
1652047-16	Hg	Soil/Sediment	dry	9170		157	522	ng/g	B170011	1700042
1652047-18	Hg(II)	Soil/Sediment	dry	47		0.4	3	ng/g	B170101	1700083
1652047-17	Hg(TotVol)	Soil/Sediment		0.116		0.016	0.032	ng/g wet	B163303	1601493
SB-033 (0-1')										
1652047-13	%TS	Soil/Sediment	NA	82.48		0.02	0.05	%	B170012	N/A
1652047-15	%TS	Soil/Sediment	NA	86.87		0.09	0.31	%	B170201	N/A
1652047-13	Hg	Soil/Sediment	dry	187000		175	585	ng/g	B170011	1700042
1652047-15	Hg(II)	Soil/Sediment	dry	9910		43	289	ng/g	B170101	1700083
1652047-14	Hg(TotVol)	Soil/Sediment		1.31		0.016	0.032	ng/g wet	B163303	1601493
SB-056 (0-1')										
1652047-07	%TS	Soil/Sediment	NA	83.84		0.02	0.05	%	B170012	N/A
1652047-09	%TS	Soil/Sediment	NA	83.06		0.09	0.31	%	B170201	N/A
1652047-07	Hg	Soil/Sediment	dry	531000		689	2300	ng/g	B170011	1700048
1652047-09	Hg(II)	Soil/Sediment	dry	38800		46	305	ng/g	B170101	1700083
1652047-08	Hg(TotVol)	Soil/Sediment		14.8		0.015	0.030	ng/g wet	B163303	1601493

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Project ID: AEC-CS1602
PM: Lydia Greaves

Client PM: John Boyd

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
SB-059 (0-1')										
1652047-04	%TS	Soil/Sediment	NA	84.21		0.02	0.05	%	B170012	N/A
1652047-06	%TS	Soil/Sediment	NA	85.81		0.09	0.31	%	B170201	N/A
1652047-04	Hg	Soil/Sediment	dry	389000		176	588	ng/g	B170011	1700042
1652047-06	Hg(II)	Soil/Sediment	dry	540		45	299	ng/g	B170101	1700083
1652047-05	Hg(TotVol)	Soil/Sediment		0.115		0.016	0.032	ng/g wet	B163303	1601493
SB-066 (0-1')										
1652047-01	%TS	Soil/Sediment	NA	88.41		0.02	0.05	%	B170012	N/A
1652047-03	%TS	Soil/Sediment	NA	90.97		0.09	0.31	%	B170201	N/A
1652047-01	Hg	Soil/Sediment	dry	529000		682	2270	ng/g	B170011	1700048
1652047-03	Hg(II)	Soil/Sediment	dry	5650		43	285	ng/g	B170101	1700083
1652047-02	Hg(TotVol)	Soil/Sediment		1.58	M	0.016	0.032	ng/g wet	B163303	1700011
SB-082 (0-1')										
1652047-22	%TS	Soil/Sediment	NA	72.15		0.02	0.05	%	B170012	N/A
1652047-24	%TS	Soil/Sediment	NA	80.72		0.09	0.31	%	B170201	N/A
1652047-22	Hg	Soil/Sediment	dry	265000		199	664	ng/g	B170011	1700042
1652047-24	Hg(II)	Soil/Sediment	dry	4410		50	335	ng/g	B170101	1700083
1652047-23	Hg(TotVol)	Soil/Sediment		0.030		0.016	0.032	ng/g wet	B163303	1601493

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Project ID: AEC-CS1602
PM: Lydia Greaves

Client PM: John Boyd

Accuracy & Precision Summary

Batch: B163303
Lab Matrix: Soil/Sediment
Method: In-House

Sample	Analyte	Native	Spike	Result	Units	REC & Limits	RPD & Limits
B163303-DUP2	**Duplicate, (1652047-02)**						
	Hg(TotVol)	1.582		2.634	ng/g		*50%* 25
B163303-MS2	**Matrix Spike, (1652047-02)**						
	Hg(TotVol)	1.582	2.967	4.618	ng/g	102% 75-125	
B163303-MSD2	**Matrix Spike Duplicate, (1652047-02)**						
	Hg(TotVol)	1.582	2.967	4.688	ng/g	105% 75-125	2% 25

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Project ID: AEC-CS1602
PM: Lydia Greaves

Client PM: John Boyd

Accuracy & Precision Summary

Batch: B170011
Lab Matrix: Soil/Sediment
Method: EPA 1631 Appendix

Sample	Analyte	Native	Spike	Result	Units	REC & Limits	RPD & Limits
B170011-SRM1	**Certified Reference Material, (1529016, MESS-4)**						
	Hg		80.00	71.79	ng/g	90% 75-125	
B170011-DUP1	**Duplicate, (1652047-16)**						
	Hg	9173		9111	ng/g		0.7% 30
B170011-MS1	**Matrix Spike, (1652047-16)**						
	Hg	9173	1039	9030	ng/g	NR 70-130	
B170011-MSD1	**Matrix Spike Duplicate, (1652047-16)**						
	Hg	9173	1015	10650	ng/g	NR 70-130	N/C 30
B170011-DUP2	**Duplicate, (1652050-03)**						
	Hg	14060		12800	ng/g		9% 30
B170011-MS2	**Matrix Spike, (1652050-03)**						
	Hg	14060	2326	16080	ng/g	NR 70-130	
B170011-MSD2	**Matrix Spike Duplicate, (1652050-03)**						
	Hg	14060	2396	15650	ng/g	NR 70-130	N/C 30

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Project ID: AEC-CS1602
PM: Lydia Greaves

Client PM: John Boyd

Accuracy & Precision Summary

Batch: B170012
Lab Matrix: Soil/Sediment
Method: SM 2540G

Sample	Analyte	Native	Spike	Result	Units	REC & Limits	RPD & Limits
B170012-DUP1	**Duplicate, (1652047-16)**						
	%TS	94.72		93.58	%		1% 15
B170012-DUP2	**Duplicate, (1652050-03)**						
	%TS	41.58		40.88	%		2% 15

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Project ID: AEC-CS1602
PM: Lydia Greaves

Client PM: John Boyd

Accuracy & Precision Summary

Batch: B170101
Lab Matrix: Soil/Sediment
Method: IP-ICP-MS

Sample	Analyte	Native	Spike	Result	Units	REC & Limits	RPD & Limits
B170101-DUP1	**Duplicate, (1652047-03)**						
	Hg(II)	5654		5287	ng/g		7% 25
B170101-DUP2	**Duplicate, (1652047-06)**						
	Hg(II)	540		558	ng/g		3% 25
B170101-PS1	**Post Spike, (1652047-06)**						
	Hg(II)	540	29850	30900	ng/g	102% 75-125	
B170101-PS2	**Post Spike, (1652047-06)**						
	Hg(II)	540	29850	31520	ng/g	104% 75-125	

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Project ID: AEC-CS1602
PM: Lydia Greaves

Client PM: John Boyd

Accuracy & Precision Summary

Batch: B170201
Lab Matrix: Soil/Sediment
Method: SM 2540G

Sample	Analyte	Native	Spike	Result	Units	REC & Limits	RPD & Limits
B170201-DUP1	**Duplicate, (1652047-03)**						
	%TS	90.97		91.44	%		0.5% 15

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Project ID: AEC-CS1602
PM: Lydia Greaves

Client PM: John Boyd

Method Blanks & Reporting Limits

Batch: B163303
Matrix: Soil/Sediment
Method: In-House
Analyte: Hg(TotVol)

Sample	Result	Units
B163303-BLK1	0.012	ng/g wet
B163303-BLK2	0.013	ng/g wet
B163303-BLK4	0.014	ng/g wet

Average: 0.013 **Standard Deviation:** 0.001 **MDL:** 0.016
Limit: 0.032 **Limit:** 0.011 **MRL:** 0.032

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Project ID: AEC-CS1602
PM: Lydia Greaves

Client PM: John Boyd

Method Blanks & Reporting Limits

Batch: B170011
Matrix: Soil/Sediment
Method: EPA 1631 Appendix
Analyte: Hg

Sample	Result	Units
B170011-BLK1	-0.014	ng/g wet
B170011-BLK2	-0.020	ng/g wet
B170011-BLK3	-0.015	ng/g wet
B170011-BLK4	-0.012	ng/g wet

Average: -0.015 **Standard Deviation:** 0.003 **MDL:** 0.150
Limit: 0.300 **Limit:** 0.100 **MRL:** 0.500

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Project ID: AEC-CS1602
PM: Lydia Greaves

Client PM: John Boyd

Method Blanks & Reporting Limits

Batch: B170012
Matrix: Soil/Sediment
Method: SM 2540G
Analyte: %TS

Sample	Result	Units
B170012-BLK1	0.00	%
B170012-BLK2	-0.01	%

Average: -0.01
Limit: 0.05

MDL: 0.02
MRL: 0.05

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Project ID: AEC-CS1602
PM: Lydia Greaves

Client PM: John Boyd

Method Blanks & Reporting Limits

Batch: B170101
Matrix: Soil/Sediment
Method: IP-ICP-MS
Analyte: Hg(II)

Sample	Result	Units
B170101-BLK1	0	ng/g wet
B170101-BLK2	0	ng/g wet
B170101-BLK3	0	ng/g wet
B170101-BLK4	0	ng/g wet

Average: 0.000 **Standard Deviation:** 0.000 **MDL:** 0.4
Limit: 0.800 **Limit:** 0.267 **MRL:** 3

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Project ID: AEC-CS1602
PM: Lydia Greaves

Client PM: John Boyd

Method Blanks & Reporting Limits

Batch: B170201
Matrix: Soil/Sediment
Method: SM 2540G
Analyte: %TS

Sample	Result	Units
B170201-BLK1	-0.01	%
B170201-BLK2	-0.02	%

Average: -0.02
Limit: 0.31

MDL: 0.09
MRL: 0.31

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Project ID: AEC-CS1602
PM: Lydia Greaves

Client PM: John Boyd

Sample Containers

Lab ID: 1652047-01 **Report Matrix:** Soil/Sediment **Collected:** 12/21/2016
Sample: SB-066 (0-1') **Sample Type:** Sample **Received:** 12/23/2016

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Jar Glass	4oz	16-0163	none	n/a		Cooler

Lab ID: 1652047-02 **Report Matrix:** Soil/Sediment **Collected:** 12/21/2016
Sample: SB-066 (0-1') **Sample Type:** Sample **Received:** 12/23/2016

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Jar Glass	4oz	16-0163	none	n/a		Cooler

Lab ID: 1652047-03 **Report Matrix:** Soil/Sediment **Collected:** 12/21/2016
Sample: SB-066 (0-1') **Sample Type:** Sample **Received:** 12/23/2016

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Jar Glass	4oz	16-0163	none	n/a		Cooler

Lab ID: 1652047-04 **Report Matrix:** Soil/Sediment **Collected:** 12/21/2016
Sample: SB-059 (0-1') **Sample Type:** Sample **Received:** 12/23/2016

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Jar Glass	4oz	16-0163	none	n/a		Cooler

Lab ID: 1652047-05 **Report Matrix:** Soil/Sediment **Collected:** 12/21/2016
Sample: SB-059 (0-1') **Sample Type:** Sample **Received:** 12/23/2016

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Jar Glass	4oz	16-0163	none	n/a		Cooler

Lab ID: 1652047-06 **Report Matrix:** Soil/Sediment **Collected:** 12/21/2016
Sample: SB-059 (0-1') **Sample Type:** Sample **Received:** 12/23/2016

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Jar Glass	4oz	16-0163	none	n/a		Cooler

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Project ID: AEC-CS1602
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Client PM: John Boyd

Sample Containers

Lab ID: 1652047-07 **Report Matrix:** Soil/Sediment **Collected:** 12/21/2016
Sample: SB-056 (0-1') **Sample Type:** Sample **Received:** 12/23/2016

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Jar Glass	4oz	16-0163	none	n/a		Cooler

Lab ID: 1652047-08 **Report Matrix:** Soil/Sediment **Collected:** 12/21/2016
Sample: SB-056 (0-1') **Sample Type:** Sample **Received:** 12/23/2016

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Jar Glass	4oz	16-0163	none	n/a		Cooler

Lab ID: 1652047-09 **Report Matrix:** Soil/Sediment **Collected:** 12/21/2016
Sample: SB-056 (0-1') **Sample Type:** Sample **Received:** 12/23/2016

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Jar Glass	4oz	16-0163	none	n/a		Cooler

Lab ID: 1652047-10 **Report Matrix:** Soil/Sediment **Collected:** 12/21/2016
Sample: MW-01 (0-1') **Sample Type:** Sample **Received:** 12/23/2016

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Jar Glass	4oz	16-0163	none	n/a		Cooler

Lab ID: 1652047-11 **Report Matrix:** Soil/Sediment **Collected:** 12/21/2016
Sample: MW-01 (0-1') **Sample Type:** Sample **Received:** 12/23/2016

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Jar Glass	4oz	16-0163	none	n/a		Cooler

Lab ID: 1652047-12 **Report Matrix:** Soil/Sediment **Collected:** 12/21/2016
Sample: MW-01 (0-1') **Sample Type:** Sample **Received:** 12/23/2016

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Jar Glass	4oz	16-0163	none	n/a		Cooler

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Project ID: AEC-CS1602
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Client PM: John Boyd

Sample Containers

Lab ID: 1652047-13 **Report Matrix:** Soil/Sediment **Collected:** 12/21/2016
Sample: SB-033 (0-1') **Sample Type:** Sample **Received:** 12/23/2016

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Jar Glass	4oz	16-0163	none	n/a		Cooler

Lab ID: 1652047-14 **Report Matrix:** Soil/Sediment **Collected:** 12/21/2016
Sample: SB-033 (0-1') **Sample Type:** Sample **Received:** 12/23/2016

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Jar Glass	4oz	16-0163	none	n/a		Cooler

Lab ID: 1652047-15 **Report Matrix:** Soil/Sediment **Collected:** 12/21/2016
Sample: SB-033 (0-1') **Sample Type:** Sample **Received:** 12/23/2016

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Jar Glass	4oz	16-0163	none	n/a		Cooler

Lab ID: 1652047-16 **Report Matrix:** Soil/Sediment **Collected:** 12/21/2016
Sample: SB-028 (0-1') **Sample Type:** Sample **Received:** 12/23/2016

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Jar Glass	4oz	16-0163	none	n/a		Cooler

Lab ID: 1652047-17 **Report Matrix:** Soil/Sediment **Collected:** 12/21/2016
Sample: SB-028 (0-1') **Sample Type:** Sample **Received:** 12/23/2016

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Jar Glass	4oz	16-0163	none	n/a		Cooler

Lab ID: 1652047-18 **Report Matrix:** Soil/Sediment **Collected:** 12/21/2016
Sample: SB-028 (0-1') **Sample Type:** Sample **Received:** 12/23/2016

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Jar Glass	4oz	16-0163	none	n/a		Cooler

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Project ID: AEC-CS1602
PM: Lydia Greaves

Client PM: John Boyd

Sample Containers

Lab ID: 1652047-19 **Report Matrix:** Soil/Sediment **Collected:** 12/21/2016
Sample: SB-015 (0-1') **Sample Type:** Sample **Received:** 12/23/2016

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Jar Glass	4oz	16-0163	none	n/a		Cooler

Lab ID: 1652047-20 **Report Matrix:** Soil/Sediment **Collected:** 12/21/2016
Sample: SB-015 (0-1') **Sample Type:** Sample **Received:** 12/23/2016

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Jar Glass	4oz	16-0163	none	n/a		Cooler

Lab ID: 1652047-21 **Report Matrix:** Soil/Sediment **Collected:** 12/21/2016
Sample: SB-015 (0-1') **Sample Type:** Sample **Received:** 12/23/2016

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Jar Glass	4oz	16-0163	none	n/a		Cooler

Lab ID: 1652047-22 **Report Matrix:** Soil/Sediment **Collected:** 12/21/2016
Sample: SB-082 (0-1') **Sample Type:** Sample **Received:** 12/23/2016

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Jar Glass	4oz	16-0163	none	n/a		Cooler

Lab ID: 1652047-23 **Report Matrix:** Soil/Sediment **Collected:** 12/21/2016
Sample: SB-082 (0-1') **Sample Type:** Sample **Received:** 12/23/2016

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Jar Glass	4oz	16-0163	none	n/a		Cooler

Lab ID: 1652047-24 **Report Matrix:** Soil/Sediment **Collected:** 12/21/2016
Sample: SB-082 (0-1') **Sample Type:** Sample **Received:** 12/23/2016

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Jar Glass	4oz	16-0163	none	n/a		Cooler

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Project ID: AEC-CS1602
PM: Lydia Greaves

Client PM: John Boyd

Shipping Containers

Cooler

Received: December 23, 2016 12:15
Tracking No: 809195708219 via FedEx
Coolant Type: Ice
Temperature: 0.6 °C

Description: Cooler
Damaged in transit? No
Returned to client? No
Comments: IR8

Custody seals present? Yes
Custody seals intact? Yes
COC present? Yes

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Chain-of-Custody Form

BROOKS APPLIED LABS

Ship samples to:
18804 North Creek Parkway, Suite 100
Bothell, WA 98011

BAL Report 1652047

For BAL use only
Received by: _____ Date: 12/23/16
Work Order ID: 1652047 Time: 12:15
Project ID: AEC-CS1602

Client: AECOM
Contact: COLIN WASTENEYS
Client Project ID: AEC-CS1602
Samples Collected By: R. MURPHY + T. URBAN

PO Number:
Phone: 716-856-5636
Email: colin.wasteneys@aecom.com

Mailing Address: 257 WEST GENESEE ST
BUFFALO NY 14202
Email Receipt Confirmation? (Yes/No)
BAL PM: LYDIA GREAVES

Requested TAT (business days)
- [x] 20 (standard)
- [ ] 15*
- [ ] 10*
- [ ] 5*
- [ ] Other ____

*Surcharges may apply to expedited TATs

	Sample ID	Collection: Date	Collection: Time	Client Sample Info: Matrix Type	Number of Containers	Field Filtered? (Yes/No)	Preservation Type HCl / HNO_3 / Other	BAL Analyses Required: Total Hg, EPA 1631	Methyl Hg, EPA 1630	ICP-MS Metals (specify)	As Species (specify) InOrg, III, V, MMA, DMA	Se Species (specify) Se(IV), Se(VI), SeCN, Uknown	Filtration	Other (specify) EPA 1631E Volatile Hg by Thermal Desorption	Other (specify) Extractable Mercury Speciation Analysis 1P-GV-ICPMS, Hg(I)	Comments: Specify Here
1	SB-066(0-1')	12/21/16	0940	SO	3	N	-	1						1	1	
2	SB-059(0-1')	12/21/16	1005	SO	3	N	-	1						1	1	
3	SB-056(0-1')	12/21/16	1040	SO	3	N	-	1						1	1	
4	MW-01 (0-1')	12/21/16	1120	SO	3	N	-	1						1	1	
5	SB-033(0-1')	12/21/16	1145	SO	3	N	-	1						1	1	
6	SB-028(0-1')	12/21/16	1210	SO	3	N	-	1						1	1	
7	SB-015(0-1')	12/21/16	1235	SO	3	N	-	1						1	1	
8	SB-082(0-1')	12/21/16	1250	SO	3	N	-	1						1	1	
9																
10																
	Trip Blank															

Relinquished By: Rob Murphy	Date: 12/21/16	Time: 1500	Relinquished By:	Date: 12/23/16 Time: 12:15
Received By:	Date: 12/23/16	Time: 12:15	Total Number of Packages:	

Page 1 of 1 List Hazardous Contaminants: —

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