REMOVAL ASSESSMENT REPORT
ELECTRO PLATING SERVICES SITE - RS
MADISON HEIGHTS, OAKLAND COUNTY, MICHIGAN

FINAL Report

Prepared for:

U.S. Environmental Protection Agency,
Emergency Response Branch Region 5
77 West Jackson Boulevard Chicago, IL 60604

TDD No.:	S05-0001-16-12-002
Date Prepared:	January 17, 2017
Contract No.:	EP-S5-16-01
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APPENDICES

1. INTRODUCTION

Sustainment and Restoration Services LLC (SRS) performed the Removal Assessment (RS) of the Electro Plating Services Site (Site) located at 945 East 10 Mile Road in Madison Heights, Oakland County, Michigan. SRS, the Superfund Technical Assessment and Response Team (START) contractor, was tasked by the United States Environmental Protection Agency (U.S. EPA), under contract number EP-S5-16-01 and Technical Direction Document (TDD) No. S05-0001-16-12-002, to perform this RS (U.S. EPA, 2016). SRS START was tasked to prepare a site-specific Health and Safety Plan (HASP) (SRS LLC 2016a) and a Field Sampling and Analysis Plan (SAP) (SRS LLC, 2016b); procure the services of an analytical laboratory; collect container, drum, and floor pit samples; document on-site conditions with written logbook notes and still photographs; evaluate analytical data; and prepare this RS report. SRS START members Raghu Nagam, Katherine Cooper, Cheryl Kondreck, Teresa Muldoon, and Lisa Matson conducted the field investigation and sampling on December 30th, 2016.

This RS report summarizes the Site background; discusses the assessment; provides a summary of the analytical data; and discusses potential site-related threats. The appendices for this report include figures (Appendix A), a sample summary table and a sample results table (Appendix B), photographic log (Appendix C), and the validated sample analytical results (Appendix D).

2 SITE BACKGROUND

This section provides a description of the Site and the Site history.

2.1 Site Description

The Site is located at 945 East 10 Mile Road, Madison Heights, Michigan (Figure 1 - Site Location Map). The geographical coordinates for the Site are 42°28'36.36" North latitude and -83°5'46.9" West longitude. The Site includes a large four level building with an approximate footprint of 10,000 square feet (ft^2). The Site is physically bounded to the north side by Heights Drive followed by Interstate 696, to the south by East 10 Mile Road, to the east by Dura Thread Gage business, and to the west by a vacant lot followed by a small storage building owned by Electro Plating Services, Inc. (EPS), then Advanced Assembly Products, Inc. is located next to the storage building on its west side. The area around the Site is a mix of densely populated residential, industrial, and commercial properties. The residential area is approximately 500 feet south of the Site with commercial businesses adjacent to the Site (Figures 2 and 3 – Site Feature Maps).

2.2 Site History

EPS was an electroplating business that began its operations in 1967. Various types of electroplating operations were conducted at EPS including copper, tin, bronze, cadmium, nickel, chrome, gold, silver, zinc, and lead plating. The operations at the EPS facility resulted in generating and storing large quantities of hazardous waste, including cyanide, chromium (including, chromium(VI)), nickel chloride, trichloroethene (TCE), and various acids and bases (Michigan Department of Environmental Quality[MDEQ], 2016a). From 1996 to 2009 MDEQ documented 15 compliance actions, including criminal enforcement of hazardous waste violations at the Site. In April 2010, a Consent Order (Order #111-03-10) was executed by the MDEQ to resolve “significant hazardous waste violations” which included not properly characterizing and storing hazardous waste, not properly storing or labeling process material, not proving proper emergency planning and employee training, as well as not complying with hazardous waste reporting requirements. EPS has not resolved the 2010 Consent Order (MDEQ, 2016a).

On May 13, 2016, MDEQ conducted an abbreviated inspection based on a complaint filed by the Madison Heights Fire Department (MHFD). During the inspection, the MDEQ verified MHFD's concerns regarding mismanagement of hazardous materials, hazardous wastes, other liquid and solid wastes, and unidentified chemicals to which MDEQ issued a Violation Notice on June 6, 2016. In addition to this violation, MHFD revoked EPS's occupancy from May 11 to May 27, 2016 due to fire and building code violations (MDEQ, 2016a).

On November 15, 2016, a follow-up inspection was conducted by MDEQ and the MHFD because EPS did not provide a formal response to the June 6, 2016 violation. MDEQ and MHFD documented the Site conditions were consistent with the May 13, 2016 inspection and formally documented that the Site posed "an imminent and substantial threat to human health and the environment" (MDEQ, 2016a). The following detailed observations were documented by MDEQ:

- Dilapidated building with missing doors, windows and roof areas resulting in unrestricted access
- Unstable and makeshift flooring on the plating bath level of the facility
- Numerous containers (estimated over 5,000) of liquid and solid waste and process chemicals
- Leaking, unlabeled, open, improperly stored, and/or corroded containers
- Waste and chemicals on-site including but not limited to acids, bases, metal oxides, cyanide, and chlorinated solvents
- Unorganized waste and chemical storage without consideration to chemical compatibility.
- A "pit" excavated in the basement by the owner of EPS which was said to have been excavated in 1993 for the intention of storing waste.
- Liquids leaking from the plating bath floor accumulating in the basement "pit"
- Sludge excavated from the "pit" to an elevated portion of the basement to dry contained by a makeshift berm from sludge listed as hazardous waste (chrome).

Based on the above observations the MDEQ issued a second Violation Notice on December 2, 2016 (MDEQ, 2016a). MDEQ then recommended the Site be referred to the

U.S. EPA, Superfund Division, Emergency Response Branch to perform an emergency removal action to secure the facility and properly manage all uncontrolled hazardous waste and materials (MDEQ, 2016a).

In a letter dated December 19, 2016, the MHFD deemed the EPS facility at 945 East 10 Mile road unfit for occupancy. MHFD ordered all operations inside the facility to cease and a 24-hour Fire Watch instituted. The letter also cited numerous violations under the 2015 International Fire Code. Additionally, MHFD again stated a significant and imminent threat to the community due to the unsecured state of the facility with access to various types of hazardous wastes and chemicals (MHFD, 2016a).

On December 21, 2016, an "Order to Cease and Desist Operations" was issued to EPS by the MDEQ. This Order was issued in response to the information summarized above regarding the unlawful generation, storage and/or disposal of hazardous waste (MDEQ, 2016b). In a letter date December 22, 2016, MDEQ submitted an official letter to the U.S. EPA Emergency Response Branch, Superfund Division, for assistance to perform a time-critical removal action at the EPS Site (MDEQ, 2016c). Subsequently, the U.S. EPA provided SRS with TDD # 0001/S05-0001-16-12-002 to conduct a Removal Assessment for the Site (U.S. EPA, 2016).

3 REMOVAL ASSESSMENT ACTIVTIES

U.S. EPA and START members performed RS activities on December 30th, 2016. Assessment activities included Site reconnaissance, field screening, and collection of container, drum, and floor pit samples. These RS assessment activities are discussed below.

A site-specific SAP was developed prior to mobilizing for the assessment and to perform the fieldwork. The SAP described the data quality objectives (DQO), sampling strategy, sampling locations, sampling methodology, and analytical procedures for analyzing the samples (SRS LLC, 2016b).

This section summarizes Site reconnaissance (subsection 3.1) and sampling (subsection 3.2). Table 1 (Appendix B) presents a summary of collected samples. Photographic documentation is provided in Appendix C.

3.1 Site Reconnaissance and Field Screening

U.S. EPA On-Scene Coordinator (OSC) Jeffrey Lippert and START members Raghu Nagam, Katherine Cooper, Cheryl Kondreck, Teresa Muldoon, and Lisa Matson mobilized to the Site on December 30th, 2016. Site reconnaissance was performed in level "D" personal protective equipment (PPE) in accordance with the approved site-specific HASP with continuous monitoring using field instruments. START members calibrated the MultiRAE® Six-Gas Monitor and checked the standard on the Ludlum model 192 gamma radiation monitor prior to conducting the Site reconnaissance. START also had two B.W. Gas Alert Extreme HCN, single-gas hydrogen cyanide detectors during the field investigation activities. The MultiRAE® gas monitor measures hydrogen cyanide (HCN), volatile organic compounds (VOCs), hydrogen sulfide (H_2S), lower explosive limit (LEL), and oxygen (O_2). The Ludlum model is a high-sensitivity gamma radiation MicroR survey meter. In addition to calibrating the instruments, a bump test was performed on the MultiRAE using isobutylene and cyanide calibrations gases and the HCN detectors with cyanide calibration gas to ensure that the instruments were accurately detecting the gases.

The Site is comprised of a four-level brick building with an approximate building footprint of 10,000 ft^2. The building is not entirely secure and has holes in the roof and windows (Photograph 1, Appendix C). Several of the doors, including the bay door on the northern

portion of the building, has been boarded; however, SRS could not verify the security of the boarded areas of the facility. The facility office is located immediately after entering the front entrance. Beyond the office area lies all the various components to the plating operations at the facility located in multiple levels. There is a total of four levels at the facility; main floor, basement, second level and third level. When entering the facility from the office, there are several large 10 to 15-foot tall tanks which is presumed to hold sludge. The top of the tank reached the third level of the facility which START did not sample due to time constraints. The contents of these tanks are currently an unknown. Further into the facility in the basement and second levels, many of the thousands of containers present on-site were open, unlabeled, unsecured, corroded, and leaking. SRS documented site conditions and collected liquid and solid samples from the basement and second level of the facility. Among the labeled containers, SRS documented containers marked as corrosive, poisonous, oxidizers and environmentally hazardous various in deteriorating conditions (Photographs 2 and 3, Appendix C).

On the second level of the facility, there were at least 15 open small plating baths with liquids and numerous containers labeled as nitric acid (HNO_3) and hydrochloric acid (HCl). Many of the acid containers were rusted and corroded. In some locations, acid and base drums were stored next to each other. At least four (4) 50-kilogram (kg) metal containers labeled as sodium cyanide were observed on the second level of the facility (Photograph 4, Appendix C). The four sodium cyanide containers looked fairly new and visually appeared to be sealed at the time of the site reconnaissance. The floor in some areas of the second level were unstable, appeared to be corroded, and had holes in them. Loose wooden boards and metal plates were put in place by EPS to compensate for the holes in the floor.

In the basement area, the floor was a combination of concrete and exposed soil. Near the center of the basement, the “pit” as described by MDEQ, was observed containing a pool of greenish hue sludge/liquid (Photographs 5, Appendix C). In one area, a berm allegedly made from hazardous sludge, held plating operations waste/sludge that was once at the bottom of the “pit.” Along the walls of the basement were numerous containers (opened and unopened) of liquids, sludges, and solid material. SRS documented one 55-gallon metal drum labeled “Tricholoroethene.” Many of the containers assumed to hold waste from the

plating operations were in unmarked buckets, plastic jugs (1-5 gallon capacities) or 55-gallon plastic drums that were sawed in half (Photograph 6, Appendix C). There were visible areas where leaks from the floor above the basement had corroded the cement in the basement and parts of the ceiling of the basement were extremely corroded (Photograph 7 and 8, Appendix C). Staining of the floor and soil in the basement were visible.

During the Site reconnaissance START personnel and the U.S. EPA OSC performed initial field screening using pH field tests and the MultiRAE® to determine which containers and materials to sample. Field screening with the pH paper from unlabeled open containers and plating baths yielded results as low as 0 standard units (SU) and as high as 12 SU throughout the facility. The VOC readings ranged from 0 to 0.5 parts per million (ppm) throughout the Site reconnaissance. Based on these field screening results as well as uncertainty of unlabeled closed drum contents, START members and the OSC selected drums, containers, and floor pit areas for sample collection and laboratory analysis.

3.2 Sampling

On December 30, 2016, with guidance from the U.S. EPA OSC Jeff Lippert, SRS collected 17 soil, liquid, and sludge samples for hazardous waste characterization. The samples were analyzed for various combinations of Toxicity Characteristic Leaching Procedure (TCLP) metals, TCLP VOCs, TCLP Semivolatile Organic Compounds (SVOCs), Corrosivity, Flashpoint, and Cyanide (total and amendable). Appendix B, Table 1 lists sample identification (ID), sample location, sample description and analyses performed on each sample.

Per the site-specific HASP, START members first collected drum samples in Level B personal protective equipment (PPE) while monitoring with the MultiRAE® and HCN detectors to ensure personnel safety. Elevated VOC or HCN readings were not encountered during the drum sampling activities. SRS did not sample some of the labelled containers which were extremely poisonous materials such as cyanide or dangerous materials such as oxidizers because of questionable drum and container integrity, poor building conditions, as well as possible reactivity of sodium cyanide with acids present throughout the facility. Samples were collected using dedicated new disposable glass drum thieves for each sample location to ensure sample integrity. Once the drum sampling was completed, START

downgraded to Level C PPE to collect the remaining samples from open containers and floor pits. Liquid samples from open containers were also collected with dedicated new disposable glass drum thieves and transferred directly into lab supplied glass sample jars. The solid samples were collected with dedicated new metal trowels for each sample location to maintain sample integrity. Sample containers were labeled and placed on ice and delivered to the laboratory by SRS.

3.3 Drum and Container Inventory

The presence of over 5,000 containers has been documented in previous Site inspections by MDEQ and the MHFD. An actual count of the containers was not performed by START during this assessment due to time constraints. START documented containers consisting of 55-gallon plastic and metal drums, plastic 5-gallon buckets, 1-4-gallon plastic jugs, open vats used for the plating baths (2 feet by 5-6 feet), and large plastic totes used to hold liquids. Many of the containers were opened, unlabeled, and corroded with associated visible staining on the floor.

4 SAMPLE ANALYTICAL RESULTS

START members reviewed the sample analytical data and supporting quality assurance/quality control (QA/QC) data provided by TestAmerica Laboratories, Inc (TestAmerica) and performed data validation of the results. The validated analytical data package is included in Appendix D. Based on START's data validation, the data is acceptable for use as qualified.

The following section summarizes laboratory analytical results for samples collected during the RS field activities. For purposes of evaluating hazardous characteristics, samples were compared to the Code of Federal Regulations (CFR) Title 40 sections (§) 261.21 and 261.22, which identify the characteristics of a hazardous waste for ignitability and corrosivity, respectively. Concentrations of TCLP Metals, TCLP VOCs, and TCLP SVOCs were compared against TCLP regulations under 40 CFR § 261.24 for determining toxicity characteristics of the samples. Total and Amenable Cyanide concentrations were used to determine if conditions for reactivity are met under 40 CFR § 261.23(a)(5). Table 2 in Appendix B summarizes all sample analytical results.

Analytical results for samples submitted for pH determination documented six out of seven samples with the characteristic of corrosivity. Samples EPS-3, EPS-7, EPS-10, EPS-13, EPS-14 and EPS-17 documented liquid having a pH level less than 2.0 SU, which according to 40 CFR § 261.22, exhibits the characteristic of a hazardous waste for corrosivity. A solid waste that exhibits the characteristic of corrosivity has the EPA Hazardous Waste Number of D002. The pH results ranged from less than 1 SU to 1.9 SU. The lowest pH was documented in sample EPS-17 collected from an unlabeled, small diameter, yellow plastic container located next to the plating baths on the second level of the facility (see Photograph 25, Appendix C).

Analytical results for samples submitted for TCLP Metals documented 9 of the 11 samples with toxicity characteristics for at least one of the 8 Resource Conservation and Recovery Act (RCRA) metals. The following metals were present at the Site exceeding the TCLP values in Table 1 of 40 CFR § 261.24, Maximum Concentration of Contaminants for Toxicity Characteristic:

- Chromium: 7 of 11 samples
    - Maximum concentration was documented in solid sample EPS-4 (60,000 ppm) collected from an unlabeled container partially buried in the basement floor (see Photograph 12, Appendix C).
- Lead: 6 of 11 samples
    - Maximum concentration was documented in liquid sample EPS-3 (1,100 ppm) collected from an unlabeled 55-gallon open plastic drum in the basement (see Photograph 11, Appendix C).
- Cadmium: 5 of 11 samples
    - Maximum concentration was documented in liquid sample EPS-2 (210 ppm) collected from an unlabeled 5-gallon bucket open waste container in the basement (see Photograph 10, Appendix C).
- Silver (3 of 11 samples)
    - Maximum concentration was documented in liquid sample EPS-3 (94 ppm) collected from an unlabeled 55-gallon open plastic drum in the basement (see Photograph 11, Appendix C)

Analytical results for samples submitted for TCLP VOCs documented one of the 11 samples with toxicity characteristics TCE presented in Table 1 of 40 CFR § 261.24, Maximum Concentration of Contaminants for the Toxicity Characteristic. TCE was detected at 89 ppm in liquid sample EPS-9 collected from an open 55-gallon unlabeled plastic drum sawed in half in the basement level (see Photograph 17, Appendix C).

Of the 11 samples analyzed for TCLP SVOCs, none of the compounds were detected in any of the samples.

One sample (EPS-1) was analyzed for total and amenable cyanide collected from a rusted metal drum with a label, “Sodium Cyanide” affixed to the drum. The sample collected from the drum was a black sludge material (see Photograph 9, Appendix C). Total cyanide was detected at a concentration of 0.95 ppm of cyanide. The presence of cyanide in the sample as well as the four documented drums labeled as containing sodium cyanide at the Site potentially meets the Characteristic of Reactivity as outlined in 40 CFR 261,23(a)(5).

Of the 17 samples collected, 2 samples were submitted for flashpoint analysis and both samples exhibited a flashpoint of greater than 176 degrees Fahrenheit (°F). According to 40 CFR § 261.21, flashpoint temperatures less than 140 °F exhibits the characteristic of a

hazardous waste for ignitability. Analytical results of samples submitted for flashpoint determination did not exhibit the characteristic of ignitability.

5 POTENTIAL SITE RELATED THREATS

Threats posed by on-site contamination and Site conditions were evaluated in accordance with The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) criteria for initiating removal action listed under Title 40 of the CFR, Section 300.415(b) (2). Paragraph (b) (2) of 40 CFR Section 300.415 lists factors to be considered when determining the appropriateness of a potential removal action at a Site. Potential Site-related threats to human health and the environment were evaluated based on the criteria listed in 40 CFR, Sections 261.21 through 261.24. Factors that may be applicable to the Site are discussed below.

Actual or potential exposure of nearby human populations, animals, or the food chain to hazardous substances or pollutants or contaminants (40 CFR300.415(b)(2)(i))

During the December 30th, 2016, Site investigation, START documented drums and containers containing corrosive characteristic material. Additionally, START documented drums of sodium cyanide which has the potential to react with acids documented to produce toxic gases. The building is dilapidated with the roof having several holes, windows and doors boarded up with plywood, and plastic sheeting used to separate some of the work areas within the building instead of solid walls.

Analytical results of six out of seven samples submitted for pH determination exhibited the characteristic of corrosivity. Samples EPS-3, EPS-7, EPS-10, EPS-13, EPS-14 and EPS-17 documented liquid having a pH level less than 2.0 SU, exhibiting the characteristic of corrosivity. The pH results ranged from less than 1 SU to 1.9 SU. The lowest pH was documented in sample EPS-17 collected from an unlabeled, small diameter, yellow plastic container located next to the plating baths on the second level of the facility (see Photograph 25, Appendix C).

Analytical results for samples submitted for TCLP and Total Metals documented 9 of the 11 samples that exhibit toxicity characteristics for at least one of the 8 RCRA metals. Chromium, lead, cadmium, and silver were present at the Site exceeding their respective values in Table 1 of 40 CFR § 261.24, Maximum Concentration of Contaminants for the Toxicity Characteristic. Chromium was detected at 60,000 ppm in sample EPS-4 which was

collected from an open container; lead was detected at 1,100 ppm in EPS-3 from an open 55-gallon drum; cadmium was detected at 210 ppm in sample EPS-2 from an open 5-gallon bucket; and, silver was detected at 94 ppm also from sample EPS-3. The Toxicity Characteristic limits for chromium, lead, cadmium, and silver are 5 ppm, 5 ppm,1 ppm, and 5 ppm, respectively.

The presence of sodium cyanide drums at the Site as well as total cyanide from sample EPS-1 meets the criteria Characteristic of reactivity under 40 CFR 261.23(a)(5). The sodium cyanide drums are located on the same level as the plating bathes full of acids as well as exposure to precipitation from the holes in the roof of the facility. The plating baths are uncovered and have begun to corrode and few had observed leaks through the floor and into the basement. Additionally, drums of oxidizers and nitric acid were stored next to each other near the cyanide drums. According the Material Safety Data Sheet (MSDS) for sodium cyanide, if the sodium cyanide comes into contact with moisture/water and/or acids, it will react to form hydrogen cyanide gas, a toxic and flammable gas. Fusion of mixture of metal cyanides with metal chlorates, perchlorates or nitrates could cause violent explosions (MSDS, 2013). Releases of toxic gases may easily escape the facility because the building is not secured.

The confirmed hazardous waste inside the building that has boarded windows and large gaps in the roof pose a threat to vandals and trespassers through direct exposure. The close proximity of residential, industrial, and commercial areas to the Site greatly increases the likelihood of human health and environmental impacts should such an occurrence or release take place. Human contact with these materials can result in exposure to corrosive and toxic materials.

Hazardous substances or pollutants or contaminants in drums, barrels, tanks, or other bulk storage containers that may pose a threat of release (40 CFR 300.415(b)(2)(iii))

During the Site investigation, U.S. EPA and START documented drums and containers observed as rusted and deteriorated with contents spilled on the floor that could have possibly infiltrated into the soils beneath. Open containers and plating baths filled with acids were documented throughout the facility with leaks observed from the second level (plating bath area) to the basement, corroding the basement floor. Additionally, a part of the

basement floor was excavated into a pit where soil is exposed and plating waste is allowed to pool.

Analytical results of the samples confirmed the presence of corrosive waste and toxic characteristic at the Site. These containers are deteriorating, with visible spilled material on the ground and floor. At least four drums of sodium cyanide were documented surrounded by acids and exposed to the areas where the roof's integrity has been compromised. A leaking roof and may accelerate deterioration of the containers leading to the release of hazardous substances and migration of the hazardous material to off-site locations.

Weather conditions that may cause hazardous substances or pollutants or contaminants to migrate or be released (40 CFR 300.415(b)(2)(v))

The Detroit, Michigan area receives a substantial amount of precipitation during spring and summer and winter temperatures are normally below freezing. Weather conditions will contribute to further deterioration of the already severely corroded drums and containers that have been documented to contain corrosive and reactive material in open tanks. The dilapidated condition of the building, including holes in the roof can act as a conduit for infiltration of rain and snow and aid in contamination migration and release. Additionally, drums of sodium cyanide have been documented which could also react with water and the acids present at the Site, creating high flammability conditions as well as release of highly toxic hydrogen cyanide gas.

Threat of fire or explosion (40 CFR 300.415(b)(2)(vi))

Analytical results from this Site investigation did not document that material in sampled drums and containers were flammable wastes. However, due to the reactive nature of sodium cyanide, there is a potential to form a flammable and explosive environment, if the sodium cyanide comes into contact with water or acids present at the Site. Both acids from open containers and water from precipitation infiltrating through the open portions of the roof could cause above mentioned potential threat.

The availability of other appropriate federal or state response mechanisms to respond to the release (40 CFR 300.415(b)(2)(iv))

The U.S. EPA received a letter from MDEQ requesting assistance to perform a time-critical removal action due to Michigan Department of Health and Human Services' (MDHSS) documentation of an imminent danger to human health and the environment (MDEQ, 2016c). MDEQ has ordered a "Cease and Desist" and the Site may be left unattended for an indefinite amount of time which could lead to release of hazardous materials from the Site. MDEQ has requested U.S. EPA's assistance to abate threats posed by Site contamination as it did not have appropriate financial and response mechanism to respond and abate threats posed by Site conditions.

6 SUMMARY

On December 30th, 2016, U.S. EPA and START conducted a removal assessment at the Electro Plating Services Site located in Madison Heights, Michigan. Field screening with a MultiRAE for VOCs and pH field tests were performed on drum and container contents prior to sampling. During sampling, 2 sludge samples, 3 solid samples and 12 liquid samples were collected and submitted for various combinations of TCLP Metals, TCLP VOCs, TCLP SVOCs, pH and flashpoint determination analysis.

The analytical results for samples collected and analyzed for corrosivity determination by pH indicated six out of seven samples as meeting the characteristic of corrosivity. The result documented liquid having a pH level less than 2.0 standard units which, according to 40 CFR § 261.22, meets the characteristic of a hazardous waste for corrosivity.

The analytical results for samples collected and analyzed for TCLP Metals indicated that nine out of 11 samples as meeting the toxicity characteristic for at least one metal. The highest concentration of chromium documented at the Site is 60,000 ppm. According to 40 CFR § 261.24, the materials at the Site meets the toxicity characteristic for hazardous waste.

The analytical results for the sample collected and analyzed for total and amenable cyanide contained a detectable level of total cyanide. The presence of cyanide in the sample as well as potential cyanide in drums labeled as sodium cyanide all of which are surrounded and stored next to and among acids meets the characteristic of a hazardous waste for reactivity.

The analytical result of the sample collected and analyzed for TCLP VOCs indicated an 89 ppm TCE concentration, well above the TCLP concentration of 5 ppm for defining it as hazardous characteristic substance.

Because EPS is served with a Cease and Desist notice, containers holding hazardous and toxic material present throughout the building could remain unattended for an extended period of time resulting in conditions conducive to further deterioration of containers. Based on the proximity of residential, commercial, and industrial properties from the Site, the corrosive, reactive, and toxicity characteristic wastes pose a potential direct contact threat to the public. Additionally, weather conditions and the deteriorated condition of the building and containers poses a threat of release. The building is unsecured with boarded up windows and doors which

could potentially be removed by trespassers. The presence of hazardous materials such as TCE, chromium, and lead in open containers throughout the facility, as well as the presence of cyanide in drums pose a direct threat to trespassers who can easily be exposed to these chemicals if they gain access to the building through roof or by breaking through the boarded-up windows.

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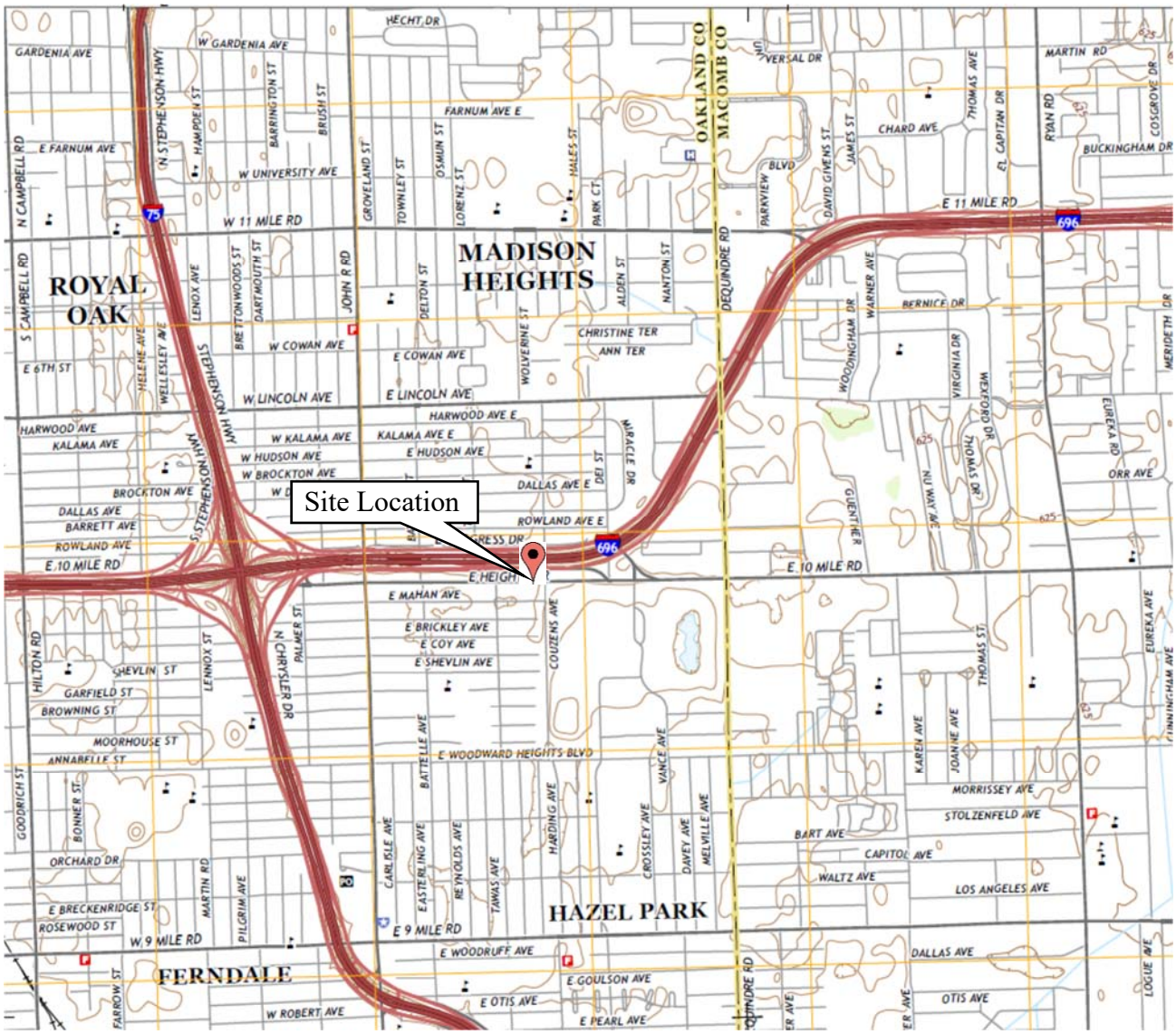
APPENDIX A
FIGURES



Source: USGS Topographic map

Disclaimer: This map is intended for visual orientation use only and should not be used for precise locational use.

Highland Park Quadrangle, Michigan

QUADRANGLE LOCATION

Legend

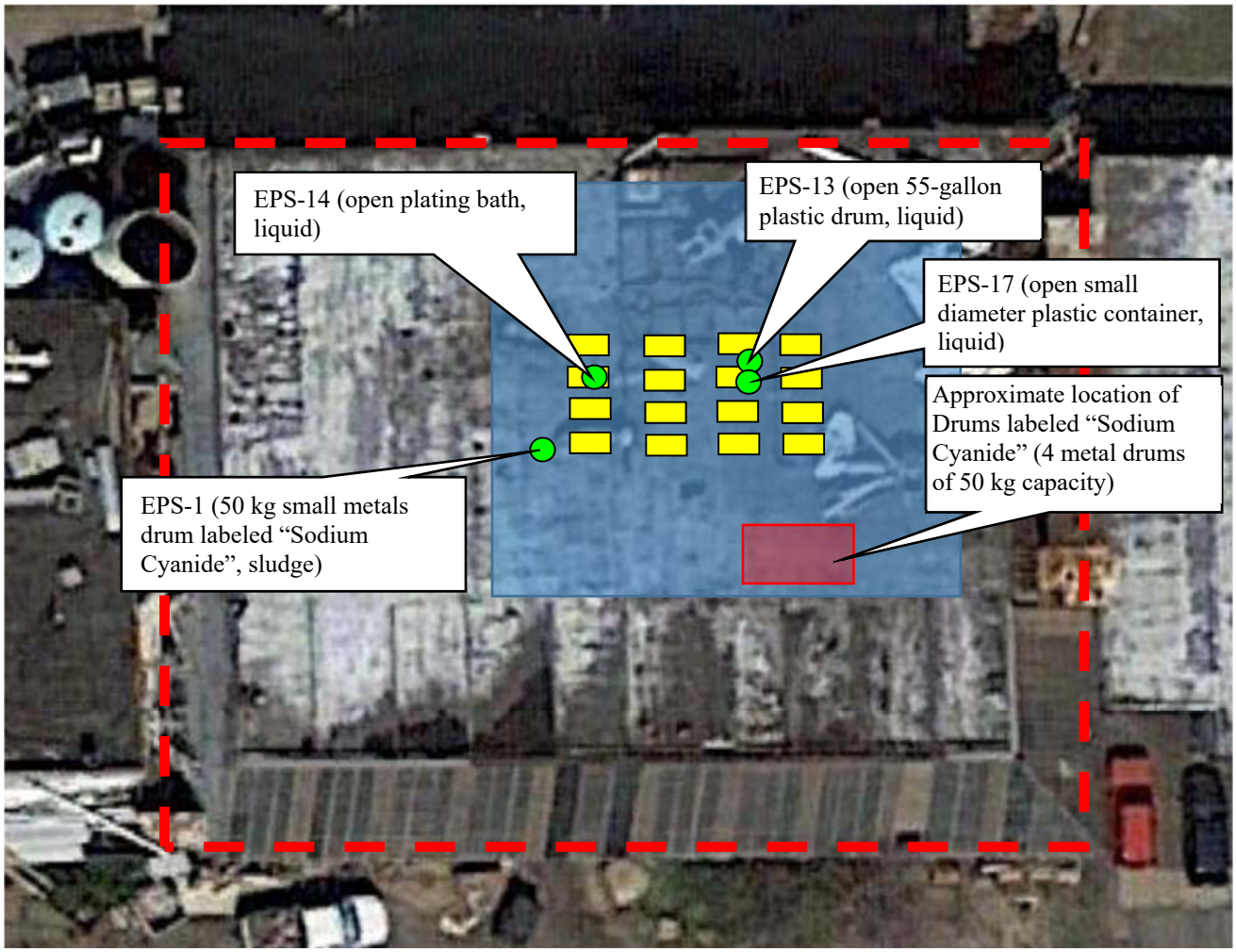
Site Location

United States Environmental Protection Agency

ELECTRO PLATING SERVICES SITE - RS
MADISON HEIGHTS, MI
TDD No. S05-0001-16-12-002

FIGURE 1
SITE LOCATION MAP

SRS
An Oneida ESC Group Company



Aerial Source: Google Earth 2016

Disclaimer: This map is intended for visual orientation use only and should not be used for precise locational use.

Legend

- Site Boundary
- Second Level Approximate Sampling Area
- Representation of Plating Bath Area
- Sample Location
- EPS-1 Sample Designation

0 25 50 Feet

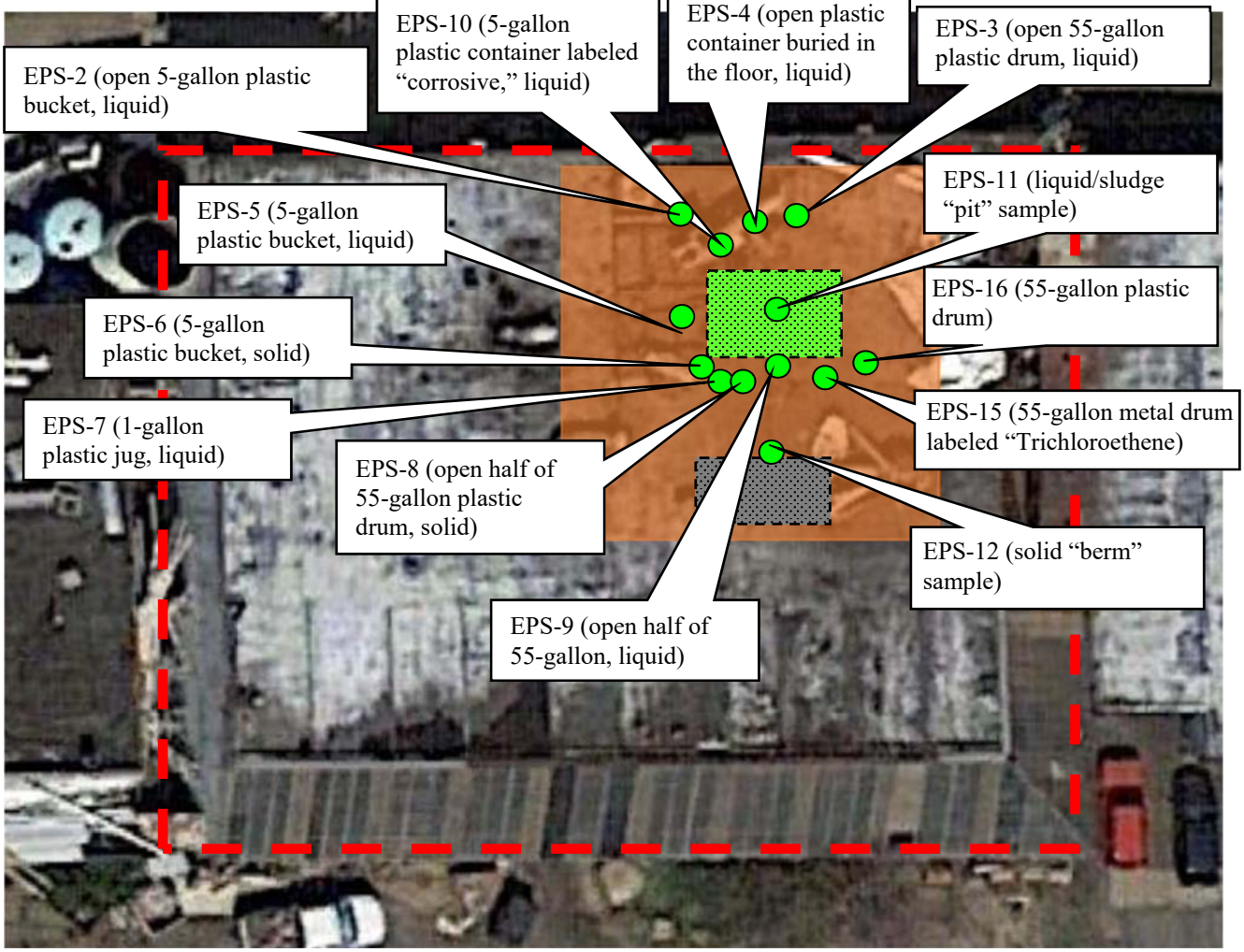
N

United States Environmental Protection Agency

ELECTRO PLATING SERVICES SITE - RS
MADISON HEIGHTS, MI
TDD No. S05-0001-16-12-002

FIGURE 2
SITE FEATURES AND SAMPLE LOCATION (SECOND LEVEL) MAP

SRS
An Oneida ESC Group Company



Aerial Source: Google Earth 2016

Disclaimer: This map is intended for visual orientation use only and should not be used for precise locational use.

Legend

- Site Boundary
- Approximate Sampling Area in Basement
- Approximate area of dried sludge and "berm"
- Area of excavated "pit" with liquid/sludge
- Sample Location
- EPS-2 Sample Designation

0 25 50 Feet

N

United States Environmental Protection Agency

ELECTRO PLATING SERVICES SITE - RS
MADISON HEIGHTS, MI
TDD No. S05-0001-16-12-002

FIGURE 3
SITE FEATURES AND SAMPLE LOCATION (BASEMENT LEVEL) MAP

SRS
An Oneida ESC Group Company

APPENDIX B

TABLE 1 – SAMPLE SUMMARY

TABLE 2 – SAMPLE ANALYTICAL RESULTS

Table 1
Removal Assessment Sample Summary
Electro Plating Services Site
Madison Heights, Oakland County, Michigan

Sample ID	Collection Date	Sample Location	Sample Description	Laboratory Analysis
EPS-1	12/30/2016	Drum labeled Sodium Cyanide	Sludge	Total and Amenable Cyanide
EPS-2	12/30/2016	Open unlabeled 5-gallon plastic bucket	Liquid	TCLP Metals, TCLP VOC, TCLP SVOC
EPS-3	12/30/2016	Open unlabeled plastic drum	Liquid	TCLP Metals and Corrosivity
EPS-4	12/30/2016	Open unlabeled plastic container buried in the floor	Liquid	TCLP Metals, TCLP VOC, TCLP SVOC
EPS-5	12/30/2016	Open unlabeled 5-gallon plastic bucket	Liquid	TCLP Metals
EPS-6	12/30/2016	Open unlabeled 5-gallon plastic bucket	Solids	TCLP Metals, TCLP VOC, TCLP SVOC
EPS-7	12/30/2016	1-gallon plastic jug	Liquid	TCLP Metals Corrosivity
EPS-8	12/30/2016	Open unlabeled plastic drum	Solids	TCLP Metals, TCLP VOC, TCLP SVOC
EPS-9	12/30/2016	Open unlabeled plastic drum	Liquid	TCLP Metals, TCLP VOC, TCLP SVOC
EPS-10	12/30/2016	5-gallon plastic container labeled "corrosive"	Liquid	Corrosivity
EPS-11	12/30/2016	Floor pit	Sludge	TCLP Metals, TCLP VOC, TCLP SVOC, Flammability, Corrosivity
EPS-12	12/30/2016	Floor sample from makeshift "berm"	Solid	Total Metals, TCLP VOC, TCLP SVOC
EPS-13	12/30/2016	Open unlabeled plastic drum	Liquid	Corrosivity
EPS-14	12/30/2016	Open plating bath	Liquid	Corrosivity
EPS-15	12/30/2016	Metal drum labeled Trichloroethene	Liquid	TCLP VOC and Flammability
EPS-16	12/30/2016	drum	Liquid	TCLP Metals, TCLP VOC, TCLP SVOC
EPS-17	12/30/2016	Open plastic container	Liquid	Corrosivity

Notes:

EPS	Electro Plating Services Site
SVOC	Semivolatile organic compounds
TCLP	Toxicity Characteristic Leaching Procedure
VOC	Volatile organic compounds

Samples were submitted to TestAmerica laboratory for analysis under TDD No. S05-0001-16-12-002

Table 2
Sample Analytical Results
Electro Plating Services Site
Madison Heights, Oakland County, Michigan

		Sample ID	EPS-1	EPS-2	EPS-3	EPS-4	EPS-5	EPS-6	EPS-7	EPS-8	EPS-9	EPS-10	EPS-11	EPS-12	EPS-13	EPS-14	EPS-15	EPS-16	EPS-17
		Collection Date	12/30/2016	12/30/2016	12/30/2016	12/30/2016	12/30/2016	12/30/2016	12/30/2016	12/30/2016	12/30/2016	12/30/2016	12/30/2016	12/30/2016	12/30/2016	12/30/2016	12/30/2016	12/30/2016	12/30/2016
		Sample Matrix	SL	L	L	L	L	S	L	S	L	L	SL	S	L	L	L	L	L
Analyte Type	**Analysis Method**	**Analyte**	**Hazardous waste criteria**	**Sample Results**															
Metals[1 & 2]	6010C	Arsenic	5 (ppm)	--	4.5 U	0.89 U	88 U	**0.82 J**	1.3 U	0.89 U	0.050 U	8.6 U	--	0.05 U	0.05 U	--	--	--	0.88 U	--
	6010C	Barium	100 (ppm)	--	4.5 U	**1.2**	18 U	**0.33 J**	13 U	0.89 U	**0.33 J**	**22**	--	**0.41 J**	**0.17 J**	--	--	--	**0.74 J**	--
	6010C	Cadmium	1 (ppm)	--	**210**	**0.55**	**3.3 J**	**0.36**	0.13 U	**0.17 J**	**0.28**	**40**	--	**0.59**	**2.0**	--	--	--	**7.5**	--
	6010C	Chromium	5 (ppm)	--	**4700**	**720**	**60000**	**200**	**1.2**	**2.0**	**0.031**	**2800**	--	**13**	**9.5**	--	--	--	**59**	--
	6010C	Lead	5 (ppm)	--	**140**	**1100**	8.8 U	**17**	**8.8**	0.45 U	**0.45**	**91**	--	**0.39**	**0.058**	--	--	--	**6.8**	--
	6010C	Selenium	1 (ppm)	--	4.5 U	**0.67 J**	18 U	**0.51 J**	1.3 U	**0.59 J**	0.05 U	**0.5 J**	--	0.05 U	0.05 U	--	--	--	0.88 U	--
	6010C	Silver	5 (ppm)	--	**6.2**	**94**	8.8 U	**1.5**	**1.1**	0.45 U	0.025 U	**6.3**	--	**0.11**	**2.0**	--	--	--	**2.7**	--
	7470A/7471B	Mercury	0.2 (ppm)	--	**0.029**	0.016 U	0.016 U	0.015 U	0.00020 U	0.017 U	**0.00021**	0.016 U	--	0.0002 U	**0.0038**	--	--	--	0.015 U	--
General Chemistry	9014	Total cyanide[3]	*	**0.95**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	9014	Amenable cyanide[3]	*	0.47 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	9045D	pH[4]	≤2 or ≥12.5 (SU)	--	--	**0.6**	--	--	--	**1.2**	--	--	**1.9**	**8.3**	--	**1.4**	**0.4**	--	--	**0.3**
	1010A	Flashpoint[5]	< 140°F	--	--	--	--	--	--	--	--	--	--	>176°F	--	--	--	>176°F	--	--
VOC[1]	8260B	Benzene	0.5 (ppm)	--	0.025 U	--	0.025 U	--	0.02 U	--	0.02 U	0.025 U	--	0.02 U	0.02 U	--	--	0.025 U	0.013 U	--
	8260B	Carbon tetrachloride	0.5 (ppm)	--	0.1 U	--	0.1 U	--	0.02 U	--	0.02 U	0.1 U	--	0.02 U	0.02 U	--	--	0.1 U	0.05 U	--
	8260B	Chlorobenzene	100 (ppm)	--	0.1 U	--	0.1 U	--	0.02 U	--	0.02 U	0.1 U	--	0.02 U	0.02 U	--	--	0.1 U	0.05 U	--
	8260B	Chloroform	6.0 (ppm)	--	0.1 U	--	0.1 U	--	0.02 U	--	0.02 U	0.1 U	--	0.04 U	0.02 U	--	--	0.1 U	0.05 U	--
	8260B	1,2-Dichloroethane	0.5 (ppm)	--	0.1 U	--	0.1 U	--	0.02 U	--	0.02 U	0.1 U	--	0.02 U	0.02 U	--	--	0.1 U	0.05 U	--
	8260B	1,1-Dichloroethene	0.7 (ppm)	--	0.1 U	--	0.1 U	--	0.02 U	--	0.02 U	0.1 U	--	0.02 U	0.02 U	--	--	0.1 U	0.05 U	--
	8260B	Methyl Ethyl Ketone	200 (ppm)	--	0.5 U	--	0.5 U	--	0.1 U	--	0.1 U	0.5 U	--	0.1 U	0.1 U	--	--	0.5 U	0.25 U	--
	8260B	Tetrachloroethene	0.7 (ppm)	--	0.1 U	--	0.1 U	--	0.02 U	--	0.02 U	0.1 U	--	0.02 U	0.02 U	--	--	0.1 U	0.05 U	--
	8260B	Trichloroethene	0.5 (ppm)	--	0.05 U	--	0.05 U	--	0.02 U	--	0.02 U	**89**	--	**0.010 J**	**0.015 J**	--	--	**0.077**	0.025 U	--
	8260B	Vinyl chloride	0.2 (ppm)	--	0.05 U	--	0.05 U	--	0.02 U	--	0.02 U	0.05 U	--	0.02 U	0.02 U	--	--	0.05 U	0.025 U	--
SVOC[1]	8270D	2-Methylphenol (o-cres	200 (ppm)	--	49 UJ	--	50 U	--	0.02 U	--	0.02 U	48 U	--	0.02 U	0.02 U	--	--	--	47 UJ	--
	8270D	3 & 4 Methylphenol (n	200 (ppm)	--	49 UJ	--	50 U	--	0.02 U	--	0.02 U	48 U	--	0.02 U	0.02 U	--	--	--	47 UJ	--
	8270D	1,4-Dichlorobenzene	7.5 (ppm)	--	49 U	--	50 U	--	0.02 U	--	0.02 U	48 U	--	0.02 U	0.02 U	--	--	--	47 U	--
	8270D	2,4-Dinitrotoluene	0.13 (ppm)	--	49 U	--	50 U	--	0.01 U	--	0.01 U	48 U	--	0.01 U	0.01 U	--	--	--	47 U	--
	8270D	Hexachlorobenzene	0.13 (ppm)	--	20 U	--	20 U	--	0.005 U	--	0.005 U	19 U	--	0.005 U	0.005 U	--	--	--	19 U	--
	8270D	Hexachlorobutadiene	0.5 (ppm)	--	49 U	--	50 U	--	0.05 U	--	0.05 U	48 U	--	0.05 U	0.05 U	--	--	--	47 U	--
	8270D	Hexachloroethane	3.0 (ppm)	--	49 U	--	50 U	--	0.05 U	--	0.05 U	48 U	--	0.05 U	0.05 U	--	--	--	47 U	--
	8270D	Nitrobenzene	2.0 (ppm)	--	9.7 U	--	9.9 U	--	0.01 U	--	0.01 U	9.5 U	--	0.01 U	0.01 U	--	--	--	9.3 U	--
	8270D	Pentachlorophenol	100 (ppm)	--	200 UJ	--	200 U	--	0.2 U	--	0.2 U	190 U	--	0.2 U	0.2 U	--	--	--	190 UJ	--
	8270D	Pyridine	5.0 (ppm)	--	200 UJ	--	200 UJ	--	0.2 UJ	--	0.2 UJ	190 UJ	--	0.2 UJ	0.2 UJ	--	--	--	190 UJ	--
	8270D	2,4,5-Trichlorophenol	400 (ppm)	--	97 U	--	99 U	--	0.1 U	--	0.1 U	95 U	--	0.1 U	0.1 U	--	--	--	93 U	--
	8270D	2,4,6-Trichlorophenol	2.0 (ppm)	--	97 U	--	99 U	--	0.05 U	--	0.05 U	95 U	--	0.05 U	0.05 U	--	--	--	93 U	--

Notes:

EPS-1	Electro Plating Services Site Sample No 1 Identification
J	The analyte was detected. The reported concentration was considered an estimated value
L	Liquid sample
ppm	Parts per million
S	Solid sample
SL	Sludge sample
SU	Standard units
SVOC	Semivolatile organic compound
U	Not detected above the stated reporting limit
UJ	Not detected and the reporting limit was estimated
VOC	Volatile Organic Compound
--	Analysis not requested
≤	Less than or equal to
≥	Greater than or equal to
<	Greater than
>	Less than
°F	Degrees Farenheit
*	Numerical toxicity characteristics criteria are not listed in Table 1, 40 CFR 261.24; sample collected to detect presence of analyte
bold	=Detected results
	=Exceedance of criteria

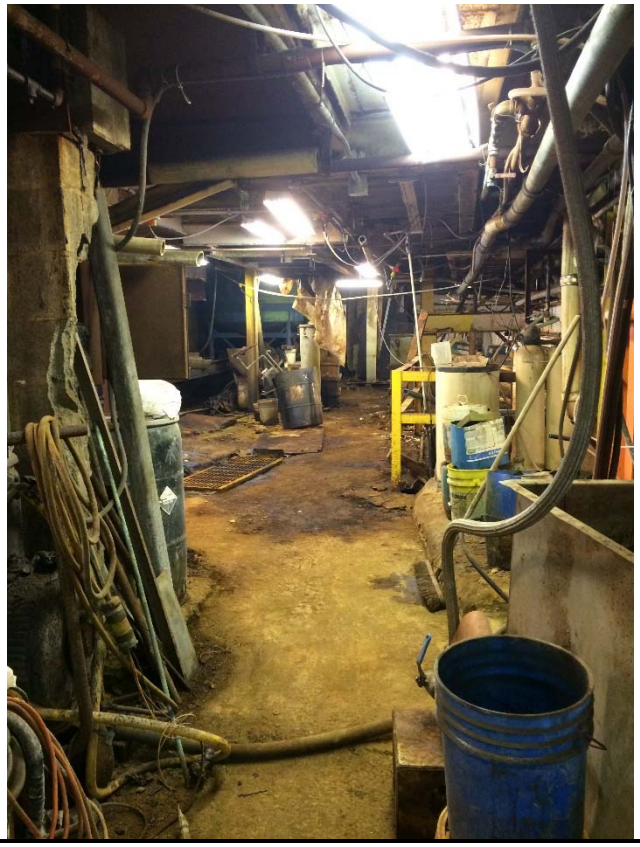
1. Samples were compared to the Toxicity Characteristic Leaching Procedure (TCLP) hazardous waste criteria as stated in 40 CFR § 261.24
2. As stated in 40 CFR § 261.24, if there was less than 0.5% solids, the waste itself was considered the extract and analyzed for total metals and compared to the TCLP hazardous waste criteria.
3. Sample EPS-1 was analyzed for total and amenable cyanide to determine if site conditions for reactivity outlined in 40 CFR 261.23(a)(5) are met.
4. Samples were compared to the characteristics of a hazardous waste for corrosivity as stated in 40 CFR §261.22(a)(1)
5. Samples were compared to the characteristics of a hazardous waste for flammability as stated in 40 CFR §261.21(a)(1)

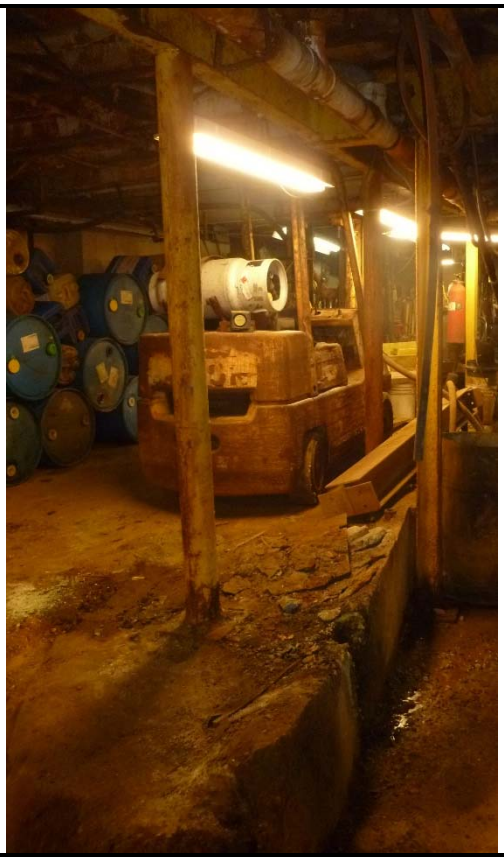
Samples were collected on December 30, 2016 and submitted to TestAmerica for analysis under TDD No. S05-0001-16-12-002

APPENDIX C
PHOTOGRAPHIC LOG

Site: Electro Plating Services - RS **Contract:** EP-S5-16-01 **TDD:** 0001/S05-0001-16-12-002 **OSC:** Jeffrey Lippert **Date:** December 30, 2016 **Photographer:** Cheryl Kondreck, Katherine Cooper, and Lisa Matson **Official Photograph No.1:**Second level general layout of facility. Ceiling caving is depicted in this photograph	
Site: Electro Plating Services - RS **Contract:** EP-S5-16-01 **TDD:** 0001/S05-0001-16-12-002 **OSC:** Jeffrey Lippert **Date:** December 30, 2016 **Photographer:** Cheryl Kondreck, Katherine Cooper, and Lisa Matson **Official Photograph No.2:** Rusted metal drum with sodium cyanide label.	

Site: Electro Plating Services - RS **Contract:** EP-S5-16-01 **TDD:** 0001/S05-0001-16-12-002 **OSC:** Jeffrey Lippert **Date:** December 30, 2016 **Photographer:** Cheryl Kondreck, Katherine Cooper, and Lisa Matson **Official Photograph No.3:** Oxidizer and Corrosive containers stored next to each other. Containers were not sampled due to safety concerns.	
Site: Electro Plating Services - RS **Contract:** EP-S5-16-01 **TDD:** 0001/S05-0001-16-12-002 **OSC:** Jeffrey Lippert **Date:** December 30, 2016 **Photographer:** Cheryl Kondreck, Katherine Cooper, and Lisa Matson **Official Photograph No.4:**Suspected sodium cyanide containers. Containers were not sampled due to safety concerns.	

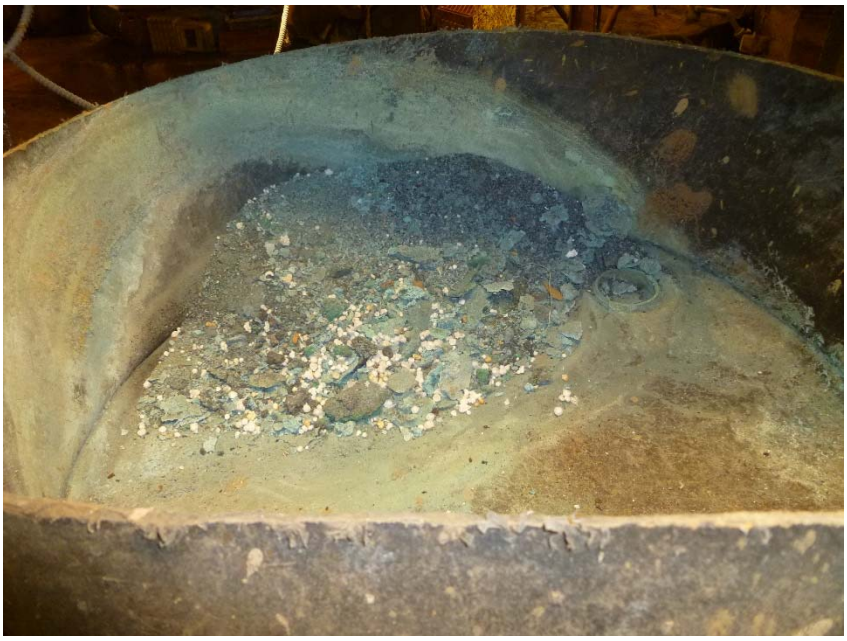
Site: Electro Plating Services - RS **Contract:** EP-S5-16-01 **TDD:** 0001/S05-0001-16-12-002 **OSC:** Jeffrey Lippert **Date:** December 30, 2016 **Photographer:** Cheryl Kondreck, Katherine Cooper, and Lisa Matson **Official Photograph No.5:**Pit in the middle of the basement with liquid/sludge	
Site: Electro Plating Services - RS **Contract:** EP-S5-16-01 **TDD:** 0001/S05-0001-16-12-002 **OSC:** Jeffrey Lippert **Date:** December 30, 2016 **Photographer:** Cheryl Kondreck, Katherine Cooper, and Lisa Matson **Official Photograph No.6:** Open containers of various types in the basement of the facility. Also in view is the stained and corroded floor	

Site: Electro Plating Services - RS **Contract:** EP-S5-16-01 **TDD:** 0001/S05-0001-16-12-002 **OSC:** Jeffrey Lippert **Date:** December 30, 2016 **Photographer:** Cheryl Kondreck, Katherine Cooper, and Lisa Matson **Official Photograph No.7:** Corroded basement floor from waste dripping from the ceiling	
Site: Electro Plating Services - RS **Contract:** EP-S5-16-01 **TDD:** 0001/S05-0001-16-12-002 **OSC:** Jeffrey Lippert **Date:** December 30, 2016 **Photographer:** Cheryl Kondreck, Katherine Cooper, and Lisa Matson **Official Photograph No.8:** Corroded ceiling of the basement	

Site: Electro Plating Services - RS **Contract:** EP-S5-16-01 **TDD:** 0001/S05-0001-16-12-002 **OSC:** Jeffrey Lippert **Date:** December 30, 2016 **Photographer:** Cheryl Kondreck, Katherine Cooper, and Lisa Matson **Official Photograph No.9:** Rusted metal drum with sodium cyanide label. Sample ID: EPS-1 Sample description: Black sludge material	
Site: Electro Plating Services - RS **Contract:** EP-S5-16-01 **TDD:** 0001/S05-0001-16-12-002 **OSC:** Jeffrey Lippert **Date:** December 30, 2016 **Photographer:** Cheryl Kondreck, Katherine Cooper, and Lisa Matson **Official Photograph No.10:** 5-gallon unlabeled container located in basement of facility Sample ID: EPS-2 Sample description: Dark Green liquid	

Site: Electro Plating Services - RS **Contract:** EP-S5-16-01 **TDD:** 0001/S05-0001-16-12-002 **OSC:** Jeffrey Lippert **Date:** December 30, 2016 **Photographer:** Cheryl Kondreck, Katherine Cooper, and Lisa Matson **Official Photograph No.11:** 55-gallon plastic drum that appears to have been used to store waste located in basement of the facility. Sample ID: EPS-3 Sample description: Black liquid	
Site: Electro Plating Services - RS **Contract:** EP-S5-16-01 **TDD:** 0001/S05-0001-16-12-002 **OSC:** Jeffrey Lippert **Date:** December 30, 2016 **Photographer:** Cheryl Kondreck, Katherine Cooper, and Lisa Matson **Official Photograph No.12:** Makeshift container buried in the floor of the basement holding liquid waste. Sample ID: EPS-4 Sample description: Brownish/orange liquid.	

Site: Electro Plating Services - RS **Contract:** EP-S5-16-01 **TDD:** 0001/S05-0001-16-12-002 **OSC:** Jeffrey Lippert **Date:** December 30, 2016 **Photographer:** Cheryl Kondreck, Katherine Cooper, and Lisa Matson **Official Photograph No.13:** 5-gallon unlabeled plastic bucket with liquid waste located in the basement of the facility. Sample ID: EPS-5 Sample description: Dark green liquid	
Site: Electro Plating Services - RS **Contract:** EP-S5-16-01 **TDD:** 0001/S05-0001-16-12-002 **OSC:** Jeffrey Lippert **Date:** December 30, 2016 **Photographer:** Cheryl Kondreck, Katherine Cooper, and Lisa Matson **Official Photograph No.14:** 5-gallon unlabeled plastic bucket with solid waste located in the basement of the facility. Sample ID: EPS-6 Sample description: White powdery solid	

Site: Electro Plating Services - RS **Contract:** EP-S5-16-01 **TDD:** 0001/S05-0001-16-12-002 **OSC:** Jeffrey Lippert **Date:** December 30, 2016 **Photographer:** Cheryl Kondreck, Katherine Cooper, and Lisa Matson **Official Photograph No.15:** 1-gallon plastic jug with illegible label containing liquid material Sample ID: EPS-7 Sample description: Red liquid	
Site: Electro Plating Services - RS **Contract:** EP-S5-16-01 **TDD:** 0001/S05-0001-16-12-002 **OSC:** Jeffrey Lippert **Date:** December 30, 2016 **Photographer:** Cheryl Kondreck, Katherine Cooper, and Lisa Matson **Official Photograph No.16:** 55-gallon plastic drum sawed in half containing solid waste in the basement of facility. Sample ID: EPS-8 Sample description: Green to grey sandy/gravelly solid	

Site: Electro Plating Services - RS **Contract:** EP-S5-16-01 **TDD:** 0001/S05-0001-16-12-002 **OSC:** Jeffrey Lippert **Date:** December 30, 2016 **Photographer:** Cheryl Kondreck, Katherine Cooper, and Lisa Matson **Official Photograph No.17:** 55-gallon unlabeled plastic drum sawed in half containing liquid waste located in the basement of the facility. Sample ID: EPS-9 Sample description: Black/brown liquid	
Site: Electro Plating Services - RS **Contract:** EP-S5-16-01 **TDD:** 0001/S05-0001-16-12-002 **OSC:** Jeffrey Lippert **Date:** December 30, 2016 **Photographer:** Cheryl Kondreck, Katherine Cooper, and Lisa Matson **Official Photograph No.18:** 5-gallon plastic container located labeled "corrosive" in basement of facility Sample ID: EPS-10 Sample description: Black liquid with greenish tint	

Site: Electro Plating Services - RS **Contract:** EP-S5-16-01 **TDD:** 0001/S05-0001-16-12-002 **OSC:** Jeffrey Lippert **Date:** December 30, 2016 **Photographer:** Cheryl Kondreck, Katherine Cooper, and Lisa Matson **Official Photograph No.19:** Sample collected from earthen pit in the middle of the basement of the facility (see also Photograph No. 5) Sample ID: EPS-11 Sample description: Light green to grey liquid/sludge	
Site: Electro Plating Services - RS **Contract:** EP-S5-16-01 **TDD:** 0001/S05-0001-16-12-002 **OSC:** Jeffrey Lippert **Date:** December 30, 2016 **Photographer:** Cheryl Kondreck, Katherine Cooper, and Lisa Matson **Official Photograph No.20:** Berm reportedly made from hazardous waste surrounding an area used to dry sludge. Sample ID: EPS-12 Sample description: Green/black/brown granular solid material	

Site: Electro Plating Services - RS **Contract:** EP-S5-16-01 **TDD:** 0001/S05-0001-16-12-002 **OSC:** Jeffrey Lippert **Date:** December 30, 2016 **Photographer:** Cheryl Kondreck, Katherine Cooper, and Lisa Matson **Official Photograph No.21:** 55-gallon open plastic container with clear/light green liquid located on the second level of the facility Sample ID: EPS-13 Sample description: Transparent light green liquid **Sample Results**:	
Site: Electro Plating Services - RS **Contract:** EP-S5-16-01 **TDD:** 0001/S05-0001-16-12-002 **OSC:** Jeffrey Lippert **Date:** December 30, 2016 **Photographer:** Cheryl Kondreck, Katherine Cooper, and Lisa Matson **Official Photograph No.22:** Plating bath marked as "HCL ACID" Sample ID: EPS-14 Sample description: Transparent amber liquid	

Site: Electro Plating Services - RS **Contract:** EP-S5-16-01 **TDD:** 0001/S05-0001-16-12-002 **OSC:** Jeffrey Lippert **Date:** December 30, 2016 **Photographer:** Cheryl Kondreck, Katherine Cooper, and Lisa Matson **Official Photograph No.23:** Rusted 55-gallon metal drum labeled "Trichloroethene". Sample ID: EPS-15 Sample description: Transparent liquid	
Site: Electro Plating Services - RS **Contract:** EP-S5-16-01 **TDD:** 0001/S05-0001-16-12-002 **OSC:** Jeffrey Lippert **Date:** December 30, 2016 **Photographer:** Cheryl Kondreck, Katherine Cooper, and Lisa Matson **Official Photograph No.24:** 55-gallon plastic drum unlabeled. Sample ID: EPS-16 Sample description: Transparent liquid with light grey sludge	

Site: Electro Plating Services - RS **Contract:** EP-S5-16-01 **TDD:** 0001/S05-0001-16-12-002 **OSC:** Jeffrey Lippert **Date:** December 30, 2016 **Photographer:** Cheryl Kondreck, Katherine Cooper, and Lisa Matson **Official Photograph No.25:** Small diameter yellow plastic open container with liquid Sample ID: EPS-17 Sample description: Dark greenish/black liquid	

APPENDIX D
VALIDATED ANALYTICAL DATA PACKAGE

QUALITY ASSURANCE REVIEW
DATA VALIDATION CHECKLIST
Inorganic (Metals and Cyanide) Data

Project Name	Electro Plating Service
Analytical Laboratory	Test America – Chicago
Sample Delivery Group Numbers	500-122083-1
Date(s) of Sample Collection	12/30/2016
Date(s) of Sample Receipt (Laboratory)	12/31/2016

Matrix ☒ Water ☒ Solid ☐ Air

Sample Identification numbers:

EPS-2 (N)	EPS-8 (N)
EPS-3 (N)	EPS-9 (N)
EPS-4 (N)	EPS-11 (N)
EPS-5 (N)	EPS-12 (N)
EPS-6 (N)	EPS-16 (N)
EPS-7 (N)	

N = Normal; FB = Field Blank; EB = Rinsate Blank; FD = Field Duplicate; TB = Trip Blank

The general criteria used to determine the data performance and quality assurance were based on:

☐ Hazardous Waste Remedial Actions Program (HAZWRAP) Requirements for Quality Control of Analytical Data (HAZWRAP DOE/HWP-65/R2)

☒ USEPA Contract Laboratory Program (CLP) National Laboratory Functional Guidelines for Inorganic Data Review (EPA-540-R-2016-001, September 2016)

☒ USEPA SW846 (SW-846) Methods (6010, 6020, 7000 series, 9010, 9012, 9013)

☐ USEPA Drinking Water (DW) Methods (200.7, 200.8, 200.9, 200.15, 202.1, 202.2, 1620)

☒ Uniform Federal Policy for Quality Assurance Project Plans (UFP-QAPP)
Contract Quality Assurance Project Plan for START IV Contract, U.S. EPA Region 5

☒ Other: Laboratory-specific QC limits.

The following QA/QC criteria were examined:

- Holding time
- MS/MSD recoveries
- Field/Rinsate blank results
- Serial Dilutions
- Sample preservation
- LCS recoveries
- Field/Lab duplicates
- Detection limits
- Calibration
- Method blank results
- Interference Check Sample
- Analytical performance

Reviewed by: _____ Date: 1/16/2017

QA Concurrence by: _____ Date: _____

Validation Summary

Chromium was detected in the laboratory method blank at 0.466 mg/kg. Sample detects were well above the MRL. No action was taken to qualify analytical data.

Lead was detected in the TCLP laboratory method blank at 0. 0262 mg/L. Sample detects were well above the MRL. No action was taken to qualify analytical data.

The matrix spike recovery for cadmium in sample EPS-12 was high at 198%. The upper control limit was 150%. The native sample concentration was two orders of magnitude higher than the spike concentration added. No action was taken to qualify analytical data.

The matrix spike recovery for silver in sample EPS-12 was high at 178%. The upper control limit was 150%. The native sample concentration was two orders of magnitude higher than the spike concentration added. No action was taken to qualify analytical data.

Qualifiers:

U - Not detected.
R - Unusable.
J - Approximate data due to other quality control criteria.
UJ - Not detected, limit of detection approximate.

I. SAMPLE PRESERVATION AND HOLDING TIME

Yes	No	
☒	☐	All samples were handled and preserved according to requirements.
☒	☐	All samples were analyzed within holding time criteria.

The following deficiencies were found:

Sample ID	Matrix	Preservation	Analyte	Collection Date	Extraction Date	Analysis Date	Qualifier Flag

Remarks:
Metals samples were extracted within 6 days of sample collection and analyzed within 6 days of sample collection.

II. INITIAL AND CONTINUING CALIBRATION

A. Inductively Coupled Plasma (ICP or ICP-MS) Analysis: ☒ **Yes** ☐ **No**

Yes	No	
☒	☐	The instrument was standardized with at least a blank and one traceable standard.
☒	☐	The initial calibration verification (ICV) solutions were immediately analyzed after each instrument was calibrated.

B. Cold Vapor (CV) Mercury Analysis: ☐ **Yes** ☒ **No**

Yes	No	
☐	☐	The instrument was standardized with at least a blank and **5** traceable standards.
☐	☐	The concentration for one of the calibration standards was at the CRDL.
☐	☐	The ICV solutions were immediately analyzed after each instrument was calibrated.
☐	☐	The calibration curves have a correlation coefficient of **≥ 0.995**.

C. Cyanide Analysis: ☐ **Yes** ☒ **No**

Yes	No	
☐	☐	The instrument was standardized with at least a blank and **5** traceable standards.
☐	☐	The concentration for one of the calibration standards was at the CRDL.
☐	☐	The ICV solutions were immediately analyzed after each instrument was calibrated.
☐	☐	The calibration curves have a correlation coefficient of **≥ 0.995**.

D. Continuing Verifications

The continuing calibration verification (CCV) standard was traceable and analyzed at the beginning of the run and after the last analytical sample.

Yes	No		Yes	No		Yes	No	
☒	☐	**ICP Analysis**	☐	☐	**CV Mercury Analysis**	☐	☐	**Cyanide Analysis**

The CCV standard was analyzed at a frequency of **10%** or every _____ hours during the analytical run, whichever is more frequent.

Yes	No		Yes	No		Yes	No	
☒	☐	**ICP Analysis**	☐	☐	**CV Mercury Analysis**	☐	☐	**Cyanide Analysis**

Recoveries for initial and/or continuing calibrations were within the control limits.
Control Limits: Mercury: **80 – 120 %** Other Metals: **90 – 110 %** Cyanide: **85 – 115 %**

Yes	No		Yes	No		Yes	No	
☒	☐	**ICP Analysis**	☐	☐	**CV Mercury Analysis**	☐	☐	**Cyanide Analysis**

The following calibration deficiencies were found:

Calibration Date	Instr ID	ICV/ CCV	Analyte	%R	Affected Samples	Action

Remarks:
No discrepancies were noted.

III. LOW-LEVEL CHECK STANDARD ANALYSIS

Yes	No	N/A	
☒	☐	☐	The low-level standard was analyzed at the beginning and end of each sample analysis run, or at a minimum of once per 8 hour working shift, but not before the ICV.
☒	☐	☐	The low-level standard was analyzed at a concentration less than 2 times RL.
☒	☐	☐	Recoveries for the low-level standard were within acceptance limits. (ICP: **60 – 140 %**; Mercury **60 – 140 %**).

The following deficiencies were found for the CRI/CRA analysis:

Calibration Date	Instr ID	CRI/ CRA	Analyte	%R	Affected Samples

Remarks:
Check standard recoveries were within limits. No discrepancies were noted.

☒ **No Action was taken to qualify data based on CRI/CRA recoveries.**

IV. BLANKS

Yes	No	
☒	☐	Calibration and/or preparation blanks were analyzed for each matrix.
☒	☐	Blanks were reported at the MDL/IDL for all non-detects.
☒	☐	The initial calibration blank (ICB) was analyzed after the analytical standards, but not before the ICV analysis.
☒	☐	A continuing calibration blank (CCB) was analyzed for every 10 samples or every 12 hours, whichever occurred more frequently.
☒	☐	The CCB was analyzed at the beginning of the analytical run, and after the last CCV that was analyzed after the last analytical sample of the run.
☐	☒	Field QC samples were associated with this SDG.

Note: Negative blanks whose absolute values are > IDL must be carefully evaluated to determine their effect on the sample data. When the observed blank exceeds a negative CRDL, all non-detects should be considered unusable.

Field QC associated with this SDG were:

Field Blanks	Associated Samples	Field Blanks	Associated Samples
	All		

Equipment Blanks	Associated Samples	Equipment Blanks	Associated Samples

Remarks:
No discrepancies were noted.

Action Level Summary (in parts-per-million)

Analyte	Field Blank	Equipt Blank	Prep Blank	ICB	Highest CCB	Blank Action Level			Action Taken
						Water	Soil	Air	
Al						**0.01**			
Cd						**0.0002**			
Ca						**1**			
Cr			0.466			**0.002**			
Cu						**0.001**			
Fe						**0.1**			
Pb			0.0262			**0.001**			
Mg						**1**			
Mn						**0.001**			
Ni						**0.0005**			
K						**1**			
Na						**1**			
Sn						**0.001**			
Zn						**0.015**			

Remarks:
Sample detects all above the blank action level. No action taken.

V. ICP INTERFERENCE CHECK SAMPLE

Yes	No	
☒	☐	The ICS was between the QC limits of 80 – 120%.
☒	☐	For ICP analysis, the interference QC samples were run at the beginning and end of each sample analysis run or at a minimum of once per 8 hour working shift, whichever occurred more frequently.

The following deficiencies were found:

Date/Time	Analyte	True Conc	Found Conc	%R	Affected Samples	Action

Report the concentration of any elements detected in the ICS A solution >2 x MRL/CRQL.

Element	Concentration detected in the ICS	Interferent concentration in the ICS			
		Al	Ca	Fe	Mg

Estimate the concentration produced by the interfering element in all affected samples. List the samples affected by the interferences below:

Affected Sample	Affected Element	Sample Conc.	Interferent Concentration in the ICS				Estimated Interference
			Al	Ca	Fe	Mg	

Remarks:
ICS recoveries ranged from 93% to 109%. No discrepancies were noted.

VI. LABORATORY CONTROL SAMPLE ANALYSIS

Yes	No	N/A	
☒	☐	☐	An LCS was analyzed for each matrix.
☒	☐	☐	The percent recoveries were within the control limits of 80 - 120% (except for Sb and Ag) for aqueous LCS results. (Note: An aqueous LCS is not required for Hg. For cyanide, a distilled ICV is used as the LCS.)
☐	☐	☒	All non-aqueous LCS recovery results fell within the control limits of 70 - 130%.

The following deficiencies were found:

LCS ID	Element	% R	Action	Samples Affected

LCS Summary: Recoveries per the total number of matrix spike recoveries in the fraction.

Sample ID	SDG	Matrix	Recovery
LCS 500-367517/2-A	500-122083-1	Water	0 of 7 outside limits
LCS 500-367574/3-A	500-122083-1	Water	0 of 7 outside limits
LCS 500-367589/13-A	500-122083-1	Water	0 of 1 outside limits
LCS 500-367597/13-A	500-122083-1	Water	0 of 1 outside limits

Remarks:
LCS recoveries ranged from 89% to 108%. No discrepancies were noted.

VII. DUPLICATE SAMPLE ANALYSIS

Yes **No**

☒ ☐ A laboratory sample/duplicate analysis was performed for every matrix in a batch, at a frequency of one matrix duplicate for every **20** samples.

Field Sample ID	Lab Duplicate Sample ID	Matrix
EPS-8	EPS-8 DUP	Water
EPS-12	EPS-12 DUP	Water

☒ ☐ Reported relative percent differences (RPDs) for laboratory sample/duplicate analysis were <20% (<35% for soils) when the original and duplicate values were > 5 x RL (or CRQL)

☒ ☐ The control limit of ± the RL was used for water (±2 x the RL for soil) when either the sample or duplicate value was < 5 x RL. In the case where only one result was above the 5 x RL level and the other was below, the ± the RL criteria was applied.

☒ ☐ If both sample and duplicate values were < 5 x RL, the RPD was not calculated.

☐ ☒ Field duplicate data were included in this data package.

Field Sample ID	Duplicate Sample ID	Matrix

☐ ☒ Qualification of field duplicate data was attempted.

The relative percent difference (RPD) is calculated for each positive result identified in either the sample or field duplicate. RPD is calculated using the following equation:

$$RPD = \frac{|A - B|}{(A + B)/2} \times 100$$

Where: A = Sample Result
B = Duplicate Sample Result

Field/Laboratory Precision Evaluation Deficiency Worksheet:

Element	RL	5 x RL	Sample	Duplicate	RPD	Action

Remarks:
Laboratory duplicate RPDs were 6% or less.

VIII. MATRIX SPIKE ANALYSIS

A. Matrix Spike/Matrix Spike Duplicate Analysis

Yes	No	
☒	☐	Field QC samples were not used for MS analyses.
☐	☒	% Recoveries were within QC limits.

The following deficiencies were found:

Element	Sample Result (SR)	Spike Added (SA)	Spiked Sample Result (SSR)	%R	Action	Comments
Cd	2	0.05	2.07	**198**		
Ag	2	0.05	2.08	**178**		

MS/MSD Summary: Recoveries per the total number of matrix spike recoveries in the fraction.

Sample ID	SDG	Matrix	Recovery
EPS-12	500-122083-1	Water	2 of 7 outside limits
EPS-8	500-122083-1	Water	0 of 14 outside limits

B. Post-digestion Spike Recovery

Listed below are those samples with post-digestion spike recoveries not within **75-125%**.

Sample ID	Element	%R	Action

Remarks:
Sample results greater than 4x the spike amount. No action taken.

IX. ICP SERIAL DILUTION ANALYSIS

Yes **No**

☒ ☐ At least one ICP serial dilution was performed on a sample of each matrix type, or for each SDG, whichever is more frequent, unless no samples had sufficiently high concentrations (concentration in the original sample was minimally a factor of 10 above the PQL) of any analytes for serial dilution analysis.

Field Sample ID	SDG	Matrix
EPS-12	500-122083-1	Water

☒ ☐ When the concentration of an analyte in the original sample was sufficiently high, the serial dilution analysis (a 5-fold dilution) agreed within a **10%** Difference of the original determination after the correction for dilution.

Serial Dilution Deficiency Worksheet:

Element	IDL	50 x IDL	Sample	Serial Dilution	%D	Action

Remarks

Serial Dilution percent differences were 2.7% or less. No discrepancies were noted.

QUALITY ASSURANCE REVIEW
DATA VALIDATION CHECKLIST
Volatile Organic Analytes by GC/MS

Project Name	Electro Plating Service
Analytical Laboratory	Test America – Chicago
Sample Delivery Group Numbers	500-122083-1
Date(s) of Sample Collection	12/30/2016
Date(s) of Sample Receipt (Laboratory)	12/31/2016

Matrix ☒ Water ☒ Solid ☐ Air

Sample Identification numbers:

EPS-2 (N)
EPS-4 (N)
EPS-6 (N)
EPS-8 (N)
EPS-9 (N)
EPS-11 (N)
EPS-12 (N)
EPS-15 (N)
EPS-16 (N)

N = Normal; FB = Field Blank; EB = Rinsate Blank; FD = Field Duplicate; TB = Trip Blank

The general criteria used to determine the data performance and quality assurance were based on:

☐ Hazardous Waste Remedial Actions Program (HAZWRAP) Requirements for Quality Control of Analytical Data (HAZWRAP DOE/HWP-65/R2)
☒ USEPA Contract Laboratory Program (CLP) National Laboratory Functional Guidelines for Organic Data Review (EPA-540/R-99/008, October 1999)
☐ USEPA Contract Laboratory Program (CLP) National Laboratory Functional Guidelines for Low Concentration Organic Data Review (EPA-540/R-00/006, June 2001)
☒ USEPA SW846 (SW-846) Methods (8260)
☐ USEPA Drinking Water (DW) Methods (524.2, 624, 1624)
☒ Uniform Federal Policy for Quality Assurance Project Plans (UFP-QAPP)
Contract Quality Assurance Project Plan for START IV Contract, U.S. EPA Region 5
☒ Other: Laboratory-specific QC limits.

The following QA/QC criteria were examined:

- Holding time
- MS/MSD recoveries
- Field/Rinsate blank results
- Initial calibration
- Compound quantification
- Sample preservation
- LCS recoveries
- Field duplicate results
- Continuing calibration
- Detection limits
- Surrogate spike recoveries
- Method blank results
- Instrument performance
- Compound identification
- Analytical performance

Reviewed by: _____ Date: 1/16/2017

QA Concurrence by: _____ Date: _____

Validation Summary:

No discrepancies were noted.

Qualifiers:

U - Not detected.
R - Unusable.
J - Approximate data due to other quality control criteria.
UJ - Not detected, limit of detection approximate.

I. HOLDING TIME AND SAMPLE PRESERVATION

Yes	No	
☒	☐	All samples were handled and preserved according to requirements.
☒	☐	All samples were extracted and analyzed within holding time criteria.

The following deficiencies were found:

Sample ID	Matrix	Preservation	Collection Date	Extraction Date	Analysis Date	Qualifier Flag

Remarks:
VOC samples were analyzed up to 6 days after sample collection.

II. SURROGATE SPIKE RECOVERIES

Yes	No	
☒	☐	No deficiencies were found.
☒	☐	No deficient surrogate recoveries were outside control limits due to dilutions.

Sample ID	DMC 1	DMC 2	DMC 3	DMC 4	DMC 5	DMC 6	DMC 7
Sample ID	**DMC 8**	**DMC 9**	**DMC 10**	**DMC 11**	**DMC 12**	**DMC 13**	**DMC 14**

		QC Limits Water	Soil
DMC 1	Dibromofluoromethane	70-120	
DMC 2	1,2-Dichloroethane-d4	71-127	
DMC 3	Toluene-d8	75-120	
DMC 4	4-Bromofluorobenzene	71-120	

Remarks:
Surrogate recoveries ranged from 89% to 104%.

III. MATRIX SPIKE/MATRIX SPIKE DUPLICATE ANALYSIS

Yes **No**

☐ ☒ Matrix Spike/Matrix Spike Duplicate (MS/MSD) analysis was requested for this SDG.

☐ ☒ All recoveries and relative percent differences (RPDs) were within control limits.

The following deficiencies were found:

SDG	Sample ID	Analyte	MS Recovery	MSD Recovery	MS/MSD QC Limits	RPD	RPD Limit

MS/MSD Summary: Recoveries per the total number of matrix spike recoveries in the fraction.

Sample ID	SDG	Matrix	RPD	Recovery
			_ of __ outside limits	_ of __ outside limits

Remarks:
MS/MSD audits were not performed for this SDG.

Note: No action will be taken based on MS/MSD data alone. Sample results may be affected by either a positive or negative bias due to deficient recoveries.

IV. LABORATORY CONTROL SAMPLE

Yes	No	
☒	☐	At least one LCS analysis was performed per batch of samples.
☒	☐	LCS recoveries were within criteria.

The following compounds fell outside the specified QC limits:

LCS ID	Matrix	Compound	%R	Control Limits	Qualifier Flags

LCS Summary: Recoveries per the total number of spike recoveries in the fraction.

Sample ID	SDG	Matrix	Recovery
LCS 500-367411/5	500-122083-1	Waste	0 of 14 outside limits
LCS 500-367555/5	500-122083-1	Waste	0 of 14 outside limits
LCS 500-367556/5	500-122083-1	Waste	0 of 14 outside limits

Remarks:
LCS percent recoveries ranged from 87% to 103%.

V. BLANK ANALYSIS RESULTS

A. Laboratory Blanks (Deficiencies for method blanks, instrument blanks, etc.):

Blank ID	Matrix	Compound	Conc	Action Level	Associated Samples
LB 500-367467/1-A	Waste	No detects were noted			
MB 500-367411/7	Waste	No detects were noted			
MB 500-367555/7	Waste	No detects were noted			
MB 500-367556/7	Waste	No detects were noted			

Remarks:
No blank detects were noted.

B. Field QC (Blanks):

Yes **No**

☐ ☒ Field QC samples were associated with this SDG.

Field QC associated with this SDG were:

Field Blanks	Equipment Rinsate Blanks

The following contaminants were detected in the field QC:

Matrix	Blank ID	Compound	Conc	Action Level	Associated Samples

Remarks:
No field blank samples were included with this SDG.

VI. FIELD PRECISION RESULTS

Yes **No**

☐ ☒ Field duplicate data were included in this data package.

Field Sample ID	Duplicate Sample ID	Matrix

☐ ☐ Qualification of field duplicate data was attempted.

☐ ☐ Relative percent differences (RPDs) between duplicate sample results was less than **25%** for liquid (**30%** for solid samples) when both sample values were ≥5 x MDL or the RL.

☐ ☐ When one or both results were <5 x MDL or the RL, RPDs between duplicate sample results were less than _____ for water samples (_____ for soil samples).

Note: In the absence of project specified criteria the following guidelines are recommended:

☐ ☐ For sample results >5 x MDL or the RL, the RPD between field duplicate samples was **<40%** for water samples (**70%** for soil samples).

☐ ☐ For sample results <5 x MDL or the RL, the RPD between field duplicate samples was less than the MDL or the RL for water samples (less than 2x the MDA or the RL for soil samples).

The relative percent difference (RPD) is calculated for each positive result identified in either the sample or field duplicate. RPD is calculated using the following equation:

$$RPD = \frac{|A - B|}{(A + B)/2} \times 100$$

Where: A = Sample Result
B = Duplicate Sample Result

Field Precision Evaluation Deficiency Worksheet:

Analyte	MDA/ RL	5 x MDA/ 5 x RL	Sample Result	Duplicate Result	RPD	Action

Remarks:
No field duplicate samples were collected.

VII. GC/MS TUNING - INSTRUMENT PERFORMANCE

Yes	No	
☒	☐	All tunes were compliant.

The bromofluorobenzene (BFB) standard performance results were reviewed and the following abundances were found to fall outside the specified criteria:

m/z	Required Abundance	Actual Abundance

Remarks:
GC/MS tuning data were not included with this data package.

VIII. INITIAL AND CONTINUING CALIBRATIONS

Yes	No	
☒	☐	The average relative response factors (RRF_{avg}) met validation criteria for all initial calibrations.
☒	☐	The percent relative standard deviation (%RSD) of the calibration or response factors (or correlation coefficients for regression analysis of calibration curves) met validation criteria for all initial calibrations.
☒	☐	Continuing calibrations were performed at the frequency specified by the analytical method.
☒	☐	The RRFs met validation criteria for all continuing calibrations.
☒	☐	The percentage difference (%D) from the initial calibration met validation criteria for all continuing calibrations.

The following deficiencies were found:

Instrument ID	Date/ Time	Analyte	I/C	Calibration Deficiency	Affected Samples	Action
				☐RRF 0.005 ☐%RSD ≥25% ☐Frequency ☐r_____		
				☐RRF 0.005 ☐%D ≥30% ☐Frequency ☐r_____		
				☐RRF 0.005 ☐%D ≥30% ☐Frequency ☐r_____		
				☐RRF 0.005 ☐%D ≥30% ☐Frequency ☐r_____		

Remarks:
No discrepancies were noted.

IX. INTERNAL STANDARDS

Yes	No	
☒	☐	All internal standard areas were within control limits.
☒	☐	All retention times for the internal standards were within control limits.

The following deficiencies were found:

	IS 1 Area	IS 1 RT	IS 2 Area	IS 2 RT	IS 3 Area	IS 3 RT	IS 4 Area	IS 4 RT
12 Hour STD								
Upper Limit								
Lower Limit								
Sample ID								

Internal Standard 1
Internal Standard 2
Internal Standard 3
Internal Standard 4

Remarks:
No discrepancies were noted.

X. QUANTITATION LIMIT RESULTS

Yes	No	
☒	☐	No deficiencies were found.
☒	☐	Reported quantitation limits (RQLs) were provided, but contract required quantitation limits (CRQLs) were not met.

The following deficiencies were found:

Sample ID	Compound(s)	RQL	CRQL	Action

Remarks:
No discrepancies were noted.

XI. SAMPLE RESULT VERIFICATION (CONFIRMATORY LEVEL VALIDATION ONLY)

Yes	No	
☐	☐	Calculations for all positive hits were verified ☐ or spot-checked ☐.

The following discrepancies were found:

Analyte	Reported Value	Recalculated Value	Samples

Remarks:
No discrepancies were noted.

QUALITY ASSURANCE REVIEW
DATA VALIDATION CHECKLIST
Semivolatile Organic Analytes by GC/MS

Project Name	Electro Plating Service
Analytical Laboratory	Test America – Chicago
Sample Delivery Group Numbers	500-122083-1
Date(s) of Sample Collection	12/30/2016
Date(s) of Sample Receipt (Laboratory)	12/31/2016

Matrix ☒ Water ☒ Solid ☐ Air

Sample Identification numbers:

EPS-2 (N)
EPS-4 (N)
EPS-6 (N)
EPS-8 (N)
EPS-9 (N)
EPS-11 (N)
EPS-12 (N)
EPS-16 (N)

N = Normal; FB = Field Blank; EB = Rinsate Blank; FD = Field Duplicate; TB = Trip Blank

The general criteria used to determine the data performance and quality assurance were based on:

☐ Hazardous Waste Remedial Actions Program (HAZWRAP) Requirements for Quality Control of Analytical Data (HAZWRAP DOE/HWP-65/R2)
☐ USEPA Contract Laboratory Program (CLP) National Laboratory Functional Guidelines for Organic Data Review (EPA-540/R-99/008, October 1999)
☒ USEPA Contract Laboratory Program (CLP) National Laboratory Functional Guidelines for Low Concentration Organic Data Review (EPA-540-R-08-01, June 2008)
☒ USEPA SW846 (SW-846) Methods (8270, 8275)
☐ USEPA Drinking Water (DW) Methods (525.1, 525.2, 625, 1653)
☒ Uniform Federal Policy for Quality Assurance Project Plans (UFP-QAPP)
Contract Quality Assurance Project Plan for START IV Contract, U.S. EPA Region 5
☒ Other: Laboratory-specific QC limits.

The following parameters were examined:

- Holding time
- MS/MSD recoveries
- Field/Rinsate blank results
- Initial calibration
- Compound quantification
- Sample preservation
- LCS recoveries
- Field duplicate results
- Continuing calibration
- Detection limits
- Surrogate spike recoveries
- Method blank results
- Instrument performance
- Compound identification
- Analytical performance

Reviewed by: _____ Date: 1/16/2017

QA Concurrence by: _____ Date: _____

Validation Summary

The acid extractable surrogate recoveries in sample EPS-2 were low at 0%. This sample was re-extracted with similar results. Sample results for the acid extractable analytes were non-detect. Analytical results in this waste sample were considered estimated and flagged "UJ" for non-detects due to probable matrix interference.

The surrogate recovery for Phenol-d5 in sample EPS-4 was low at 20%. The lower control limit was 36%. The other two acid extractable surrogate recoveries were acceptable. No action was taken to qualify analytical data.

The acid extractable surrogate recoveries in sample EPS-16 were low at 0% to 3%. This sample was re-extracted with similar results. Sample results for the acid extractable analytes were non-detect. Analytical results in this waste sample were considered estimated and flagged "UJ" for non-detects due to probable matrix interference.

The MS percent recovery for pyridine in sample EPS-12 was low at 0%. The lower control limit was 10%. Analytical results for pyridine in this SDG are considered estimated and flagged "UJ" for non-detected results due to possible negative bias.

Qualifiers:

U - Not detected.
R - Unusable.
J - Approximate data due to other quality control criteria.
UJ - Not detected, limit of detection approximate.

I. HOLDING TIME AND SAMPLE PRESERVATION

Yes	No	
☒	☐	All samples were handled and preserved according to requirements.
☒	☐	All samples were extracted and analyzed within holding time criteria.

The following deficiencies were found:

Sample ID	Matrix	Preservation	Collection Date	Extraction Date	Analysis Date	Qualifier Flag

Remarks:
Samples were extracted up to 7 days after collection and were analyzed up to 11 days after collection.

II. SURROGATE SPIKE RECOVERIES

Yes	No	
☐	☒	No deficiencies were found.
☐	☒	At least one of the deficient recoveries was outside control limits due to dilutions.

Sample ID	DMC-1	DMC-2	DMC-3	DMC-4	DMC-5	DMC-6	DMC-7	DMC-8	DMC-9
EPS-2	**0**	**0**			**0**				
EPS-4		**20**							
EPS-16	**0**	**3**			**0**				
Sample ID	**DMC-10**	**DMC-11**	**DMC-12**	**DMC-13**	**DMC-14**	**DMC-15**	**DMC-16**	**DMC-17**	

		QC Limits Water	Soil
DMC 1	2-Fluorophenol	40-130	
DMC 2	Phenol-d5	36-123	
DMC 3	Nitrobenzene-d5	33-124	
DMC 4	2-Fluorobiphenyl	42-115	
DMC 5	2,4,6-Tribromophenol	25-130	
DMC 6	Terphenyl-d14	25-150	
DMC 7			
DMC 8			
DMC 9			
DMC 10			
DMC 11			
DMC 12			
DMC 13			
DMC 14			
DMC 15			
DMC 16			
DMC 17			

Remarks:
No surrogate recovery deficiencies were noted.

III. MATRIX SPIKE/MATRIX SPIKE DUPLICATE ANALYSIS

Yes	No	
☒	☐	Matrix Spike/Matrix Spike Duplicate (MS/MSD) analysis was requested for this SDG.
☐	☒	All recoveries and relative percent differences (RPDs) were within control limits.

The following deficiencies were found:

Matrix	Analyte	MS Recovery	MSD Recovery	MS/MSD QC Limits	RPD	RPD Limit
Waste	Pyridine	0		10-110		

MS/MSD Summary: Recoveries per the total number of matrix spike recoveries in the fraction.

Sample ID	SDG	Matrix	RPD	Recovery
EPS-12	500-122083-1	Waste	0 of 0 outside limits	1 of 18 outside limits

Remarks:
Qualify results for pyridine as estimated.

Note: No action will be taken based on MS/MSD data alone. Sample results may be affected by either a positive or negative bias due to deficient recoveries.

IV. LABORATORY CONTROL SAMPLE

Yes	No	
☒	☐	At least one LCS analysis was performed per batch of samples.
☒	☐	LCS recoveries were within criteria.

The following compounds fell outside the specified QC limits:

LCS ID	Matrix	Compound	LCS% R	LCSD %R	Control Limits	Qualifier Flags

LCS Summary: Recoveries per the total number of spike recoveries in the fraction.

Sample ID	SDG	Matrix	Recovery
LCS 500-367313/2-A	500-122083-1	Waste	0 of 18 outside limits
LCS 500-367581/2-A	500-122083-1	Waste	0 of 18 outside limits
LCS 500-367747/2-A	500-122083-1	Waste	0 of 18 outside limits
LCSD 500-367313/3-A	500-122083-1	Waste	0 of 18 outside limits
LCSD 500-367747/3-A	500-122083-1	Waste	0 of 18 outside limits

Remarks:
No deficiencies were noted.

V. BLANK ANALYSIS RESULTS

A. Laboratory Blanks (Deficiencies for method blanks, instrument blanks, etc.):

Blank ID	Matrix	Compound	Conc	Action Level	Associated Samples
LB 500-367459/1-C	Waste	No detects were noted			
LB2 500-367460/1-C	Waste	No detects were noted			
MB 500-367313/1-A	Waste	No detects were noted			
MB 500-367581/1-A	Waste	No detects were noted			
MB 500-367747/1-A	Waste	No detects were noted			

Remarks:
No blank detects were noted.

B. Field QC (Blanks):

Yes	No	
☐	☒	Field QC samples were associated with this SDG.

Field QC associated with this SDG were:

Field Blanks	Equipment Rinsate Blanks

The following contaminants were detected in the field QC:

Blank ID	Matrix	Compound	Conc	Action Level	Associated Samples

Remarks:
No field blank samples were included with this SDG.

VI. FIELD PRECISION RESULTS

Yes **No**

☐ ☒ Field duplicate data were included in this data package.

Field Sample ID	Duplicate Sample ID	Matrix

☐ ☐ Qualification of field duplicate data was attempted.

☐ ☐ Relative percent differences (RPDs) between duplicate sample results was less than 25% for liquid (30% for solid samples) when both sample values were ≥5 x MDL or the RL.

☐ ☐ When one or both results were <5 x MDL or the RL, RPDs between duplicate sample results were less than _____ for water samples (_____ for soil samples).

Note: In the absence of project specified criteria the following guidelines are recommended:

☐ ☐ For sample results >5 x MDL or the RL, the RPD between field duplicate samples was <40% for water samples (70% for soil samples).

☐ ☐ For sample results <5 x MDL or the RL, the RPD between field duplicate samples was less than the MDL or the RL for water samples (less than 2x the MDA or the RL for soil samples).

The relative percent difference (RPD) is calculated for each positive result identified in either the sample or field duplicate. RPD is calculated using the following equation:

$$RPD = \frac{|A - B|}{(A + B)/2} \times 100$$

Where: A = Sample Result
B = Duplicate Sample Result

Field Precision Evaluation Deficiency Worksheet:

Analyte	MDA/ RL	5 x MDA/ 5 x RL	Sample Result	Duplicate Result	RPD	Action

Remarks:
No field duplicate samples were included with this SDG.

VII. GC/MS TUNING - INSTRUMENT PERFORMANCE

Yes	No	
☒	☐	All tunes were compliant.

The decafluorotriphenylphosphine (DFTPP) standard performance results were reviewed and the following abundances were found to fall outside the specified criteria:

m/z	Required Abundance	Actual Abundance

Remarks:
No deficiencies were noted.

VIII. INITIAL AND CONTINUING CALIBRATIONS

Yes	No	
☒	☐	The average relative response factors (RRF_{avg}) met validation criteria for all initial calibrations. **RF > 0.05**
☒	☐	The percent relative standard deviation (%RSD) of the calibration or response factors (or correlation coefficients for regression analysis of calibration curves) met validation criteria for all initial calibrations. **%RPD ≤ 30, if fit to curve then r > 0.995 (r^2 > 0.990)**
☒	☐	Continuing calibrations were performed at the specified frequency. **Each 12hr sequence**
☒	☐	The RRFs met validation criteria for all continuing calibrations. **RRF > 0.05**
☒	☐	The percentage difference (%D) from the initial calibration met validation criteria for all continuing calibrations. **±25%**

The following deficiencies were found:

Instrument ID	Date/ Time	Analyte	I/C	Calibration Deficiency	Affected Samples	Action
				☐RRF_____ ☐%RSD **<30%** ☐Frequency ☐r_____		
				☐RRF_____ ☐%D ≤25% ☐Frequency ☐r_____		

Remarks:
No deficiencies were noted.

IX. INTERNAL STANDARDS

Yes **No**

☒ ☐ All internal standard areas were within control limits.

☒ ☐ All retention times for the internal standards were within control limits.

The following deficiencies were found:

	IS 1 Area	IS 1 RT	IS 2 Area	IS 2 RT	IS 3 Area	IS 3 RT
12 Hour STD						
Upper Limit						
Lower Limit						
Sample ID						

	IS 4 Area	IS 4 RT	IS 5 Area	IS 5 RT	IS 6 Area	IS 6 RT
12 Hour STD						
Upper Limit						
Lower Limit						
Sample ID						

Internal Standard 1 1,4-Dichlorobenzene-d4
Internal Standard 2 Naphthalene-d8
Internal Standard 3 Acenaphthene-d10
Internal Standard 4 Phenanthrene-d10
Internal Standard 5 Chrysene-d12
Internal Standard 6 Perylene-d12

Remarks:
No deficiencies were noted.

X. QUANTITATION LIMIT RESULTS

Yes **No**

☒ ☐ No deficiencies were found.

☒ ☐ Reported quantitation limits (RQLs) were provided, but contract required quantitation limits (CRQLs) were not met.

The following deficiencies were found:

Sample ID	Compound(s)	RQL	CRQL	Action

Remarks:
No deficiencies were noted.

XI. SAMPLE RESULT VERIFICATION (CONFIRMATORY LEVEL VALIDATION ONLY)

Yes **No**

☒ ☐ Calculations for all positive hits were verified ☒ or spot-checked ☐.

The following discrepancies were found:

Analyte	Reported Value	Recalculated Value	Samples

Remarks:
No deficiencies were noted.

QUALITY ASSURANCE REVIEW
DATA VALIDATION CHECKLIST
Inorganic (Metals and Cyanide) Data

Project Name	Electro Plating Service
Analytical Laboratory	Test America – Chicago
Sample Delivery Group Numbers	500-122083-1
Date(s) of Sample Collection	12/30/2016
Date(s) of Sample Receipt (Laboratory)	12/31/2016

Matrix ☒ Water ☒ Solid ☐ Air

Sample Identification numbers:

EPS-2 (N)	EPS-8 (N)
EPS-3 (N)	EPS-9 (N)
EPS-4 (N)	EPS-11 (N)
EPS-5 (N)	EPS-12 (N)
EPS-6 (N)	EPS-16 (N)
EPS-7 (N)	

N = Normal; FB = Field Blank; EB = Rinsate Blank; FD = Field Duplicate; TB = Trip Blank

The general criteria used to determine the data performance and quality assurance were based on:

☐ Hazardous Waste Remedial Actions Program (HAZWRAP) Requirements for Quality Control of Analytical Data (HAZWRAP DOE/HWP-65/R2)

☒ USEPA Contract Laboratory Program (CLP) National Laboratory Functional Guidelines for Inorganic Data Review (EPA-540-R-2016-001, September 2016)

☒ USEPA SW846 (SW-846) Methods (6010, 6020, 7000 series, 9010, 9012, 9013)

☐ USEPA Drinking Water (DW) Methods (200.7, 200.8, 200.9, 200.15, 202.1, 202.2, 1620)

☒ Uniform Federal Policy for Quality Assurance Project Plans (UFP-QAPP)
Contract Quality Assurance Project Plan for START IV Contract, U.S. EPA Region 5

☒ Other: Laboratory-specific QC limits.

The following QA/QC criteria were examined:

- Holding time
- MS/MSD recoveries
- Field/Rinsate blank results
- Serial Dilutions
- Sample preservation
- LCS recoveries
- Field/Lab duplicates
- Detection limits
- Calibration
- Method blank results
- Interference Check Sample
- Analytical performance

Reviewed by: _____ Date: 1/16/2017

QA Concurrence by: _____ Date: _____

Validation Summary

Chromium was detected in the laboratory method blank at 0.466 mg/kg. Sample detects were well above the MRL. No action was taken to qualify analytical data.

Lead was detected in the TCLP laboratory method blank at 0. 0262 mg/L. Sample detects were well above the MRL. No action was taken to qualify analytical data.

The matrix spike recovery for cadmium in sample EPS-12 was high at 198%. The upper control limit was 150%. The native sample concentration was two orders of magnitude higher than the spike concentration added. No action was taken to qualify analytical data.

The matrix spike recovery for silver in sample EPS-12 was high at 178%. The upper control limit was 150%. The native sample concentration was two orders of magnitude higher than the spike concentration added. No action was taken to qualify analytical data.

Qualifiers:

U - Not detected.
R - Unusable.
J - Approximate data due to other quality control criteria.
UJ - Not detected, limit of detection approximate.

I. SAMPLE PRESERVATION AND HOLDING TIME

Yes	No	
☒	☐	All samples were handled and preserved according to requirements.
☒	☐	All samples were analyzed within holding time criteria.

The following deficiencies were found:

Sample ID	Matrix	Preservation	Analyte	Collection Date	Extraction Date	Analysis Date	Qualifier Flag

Remarks:
Metals samples were extracted within 6 days of sample collection and analyzed within 6 days of sample collection.

II. INITIAL AND CONTINUING CALIBRATION

A. Inductively Coupled Plasma (ICP or ICP-MS) Analysis: ☒ **Yes** ☐ **No**

Yes	No	
☒	☐	The instrument was standardized with at least a blank and one traceable standard.
☒	☐	The initial calibration verification (ICV) solutions were immediately analyzed after each instrument was calibrated.

B. Cold Vapor (CV) Mercury Analysis: ☐ **Yes** ☒ **No**

Yes	No	
☐	☐	The instrument was standardized with at least a blank and **5** traceable standards.
☐	☐	The concentration for one of the calibration standards was at the CRDL.
☐	☐	The ICV solutions were immediately analyzed after each instrument was calibrated.
☐	☐	The calibration curves have a correlation coefficient of **≥ 0.995**.

C. Cyanide Analysis: ☐ **Yes** ☒ **No**

Yes	No	
☐	☐	The instrument was standardized with at least a blank and **5** traceable standards.
☐	☐	The concentration for one of the calibration standards was at the CRDL.
☐	☐	The ICV solutions were immediately analyzed after each instrument was calibrated.
☐	☐	The calibration curves have a correlation coefficient of **≥ 0.995**.

D. Continuing Verifications

The continuing calibration verification (CCV) standard was traceable and analyzed at the beginning of the run and after the last analytical sample.

Yes	No		Yes	No		Yes	No	
☒	☐	**ICP Analysis**	☐	☐	**CV Mercury Analysis**	☐	☐	**Cyanide Analysis**

The CCV standard was analyzed at a frequency of **10%** or every _____ hours during the analytical run, whichever is more frequent.

Yes	No		Yes	No		Yes	No	
☒	☐	**ICP Analysis**	☐	☐	**CV Mercury Analysis**	☐	☐	**Cyanide Analysis**

Recoveries for initial and/or continuing calibrations were within the control limits.
Control Limits: Mercury: **80 – 120 %** Other Metals: **90 – 110 %** Cyanide: **85 – 115 %**

Yes	No		Yes	No		Yes	No	
☒	☐	**ICP Analysis**	☐	☐	**CV Mercury Analysis**	☐	☐	**Cyanide Analysis**

The following calibration deficiencies were found:

Calibration Date	Instr ID	ICV/ CCV	Analyte	%R	Affected Samples	Action

Remarks:
No discrepancies were noted.

III. LOW-LEVEL CHECK STANDARD ANALYSIS

Yes	No	N/A	
☒	☐	☐	The low-level standard was analyzed at the beginning and end of each sample analysis run, or at a minimum of once per 8 hour working shift, but not before the ICV.
☒	☐	☐	The low-level standard was analyzed at a concentration less than 2 times RL.
☒	☐	☐	Recoveries for the low-level standard were within acceptance limits. (ICP: **60 – 140 %**; Mercury **60 – 140 %**).

The following deficiencies were found for the CRI/CRA analysis:

Calibration Date	Instr ID	CRI/ CRA	Analyte	%R	Affected Samples

Remarks:
Check standard recoveries were within limits. No discrepancies were noted.

☒ **No Action was taken to qualify data based on CRI/CRA recoveries.**

IV. BLANKS

Yes	No	
☒	☐	Calibration and/or preparation blanks were analyzed for each matrix.
☒	☐	Blanks were reported at the MDL/IDL for all non-detects.
☒	☐	The initial calibration blank (ICB) was analyzed after the analytical standards, but not before the ICV analysis.
☒	☐	A continuing calibration blank (CCB) was analyzed for every 10 samples or every 12 hours, whichever occurred more frequently.
☒	☐	The CCB was analyzed at the beginning of the analytical run, and after the last CCV that was analyzed after the last analytical sample of the run.
☐	☒	Field QC samples were associated with this SDG.

Note: Negative blanks whose absolute values are > IDL must be carefully evaluated to determine their effect on the sample data. When the observed blank exceeds a negative CRDL, all non-detects should be considered unusable.

Field QC associated with this SDG were:

Field Blanks	Associated Samples	Field Blanks	Associated Samples
	All		

Equipment Blanks	Associated Samples	Equipment Blanks	Associated Samples

Remarks:
No discrepancies were noted.

Action Level Summary (in parts-per-million)

Analyte	Field Blank	Equipt Blank	Prep Blank	ICB	Highest CCB	Blank Action Level			Action Taken
						Water	Soil	Air	
Al						**0.01**			
Cd						**0.0002**			
Ca						**1**			
Cr			0.466			**0.002**			
Cu						**0.001**			
Fe						**0.1**			
Pb			0.0262			**0.001**			
Mg						**1**			
Mn						**0.001**			
Ni						**0.0005**			
K						**1**			
Na						**1**			
Sn						**0.001**			
Zn						**0.015**			

Remarks:
Sample detects all above the blank action level. No action taken.

V. ICP INTERFERENCE CHECK SAMPLE

Yes	No	
☒	☐	The ICS was between the QC limits of 80 – 120%.
☒	☐	For ICP analysis, the interference QC samples were run at the beginning and end of each sample analysis run or at a minimum of once per 8 hour working shift, whichever occurred more frequently.

The following deficiencies were found:

Date/Time	Analyte	True Conc	Found Conc	%R	Affected Samples	Action

Report the concentration of any elements detected in the ICS A solution >2 x MRL/CRQL.

Element	Concentration detected in the ICS	Interferent concentration in the ICS			
		Al	Ca	Fe	Mg

Estimate the concentration produced by the interfering element in all affected samples. List the samples affected by the interferences below:

Affected Sample	Affected Element	Sample Conc.	Interferent Concentration in the ICS				Estimated Interference
			Al	Ca	Fe	Mg	

Remarks:
ICS recoveries ranged from 93% to 109%. No discrepancies were noted.

VI. LABORATORY CONTROL SAMPLE ANALYSIS

Yes	No	N/A	
☒	☐	☐	An LCS was analyzed for each matrix.
☒	☐	☐	The percent recoveries were within the control limits of 80 - 120% (except for Sb and Ag) for aqueous LCS results. (Note: An aqueous LCS is not required for Hg. For cyanide, a distilled ICV is used as the LCS.)
☐	☐	☒	All non-aqueous LCS recovery results fell within the control limits of 70 - 130%.

The following deficiencies were found:

LCS ID	Element	% R	Action	Samples Affected

LCS Summary: Recoveries per the total number of matrix spike recoveries in the fraction.

Sample ID	SDG	Matrix	Recovery
LCS 500-367517/2-A	500-122083-1	Water	0 of 7 outside limits
LCS 500-367574/3-A	500-122083-1	Water	0 of 7 outside limits
LCS 500-367589/13-A	500-122083-1	Water	0 of 1 outside limits
LCS 500-367597/13-A	500-122083-1	Water	0 of 1 outside limits

Remarks:
LCS recoveries ranged from 89% to 108%. No discrepancies were noted.

VII. DUPLICATE SAMPLE ANALYSIS

Yes **No**

☒ ☐ A laboratory sample/duplicate analysis was performed for every matrix in a batch, at a frequency of one matrix duplicate for every **20** samples.

Field Sample ID	Lab Duplicate Sample ID	Matrix
EPS-8	EPS-8 DUP	Water
EPS-12	EPS-12 DUP	Water

☒ ☐ Reported relative percent differences (RPDs) for laboratory sample/duplicate analysis were <20% (<35% for soils) when the original and duplicate values were > 5 x RL (or CRQL)

☒ ☐ The control limit of ± the RL was used for water (±2 x the RL for soil) when either the sample or duplicate value was < 5 x RL. In the case where only one result was above the 5 x RL level and the other was below, the ± the RL criteria was applied.

☒ ☐ If both sample and duplicate values were < 5 x RL, the RPD was not calculated.

☐ ☒ Field duplicate data were included in this data package.

Field Sample ID	Duplicate Sample ID	Matrix

☐ ☒ Qualification of field duplicate data was attempted.

The relative percent difference (RPD) is calculated for each positive result identified in either the sample or field duplicate. RPD is calculated using the following equation:

$$RPD = \frac{|A - B|}{(A + B)/2} \times 100$$

Where: A = Sample Result
B = Duplicate Sample Result

Field/Laboratory Precision Evaluation Deficiency Worksheet:

Element	RL	5 x RL	Sample	Duplicate	RPD	Action

Remarks:
Laboratory duplicate RPDs were 6% or less.

VIII. MATRIX SPIKE ANALYSIS

A. Matrix Spike/Matrix Spike Duplicate Analysis

Yes	No	
☒	☐	Field QC samples were not used for MS analyses.
☐	☒	% Recoveries were within QC limits.

The following deficiencies were found:

Element	Sample Result (SR)	Spike Added (SA)	Spiked Sample Result (SSR)	%R	Action	Comments
Cd	2	0.05	2.07	**198**		
Ag	2	0.05	2.08	**178**		

MS/MSD Summary: Recoveries per the total number of matrix spike recoveries in the fraction.

Sample ID	SDG	Matrix	Recovery
EPS-12	500-122083-1	Water	2 of 7 outside limits
EPS-8	500-122083-1	Water	0 of 14 outside limits

B. Post-digestion Spike Recovery

Listed below are those samples with post-digestion spike recoveries not within **75-125%**.

Sample ID	Element	%R	Action

Remarks:
Sample results greater than 4x the spike amount. No action taken.

IX. ICP SERIAL DILUTION ANALYSIS

Yes **No**

☒ ☐ At least one ICP serial dilution was performed on a sample of each matrix type, or for each SDG, whichever is more frequent, unless no samples had sufficiently high concentrations (concentration in the original sample was minimally a factor of 10 above the PQL) of any analytes for serial dilution analysis.

Field Sample ID	SDG	Matrix
EPS-12	500-122083-1	Water

☒ ☐ When the concentration of an analyte in the original sample was sufficiently high, the serial dilution analysis (a 5-fold dilution) agreed within a **10%** Difference of the original determination after the correction for dilution.

Serial Dilution Deficiency Worksheet:

Element	IDL	50 x IDL	Sample	Serial Dilution	%D	Action

Remarks

Serial Dilution percent differences were 2.7% or less. No discrepancies were noted.

Table 1: Summary of Qualified Data

Batch ID	Sample ID	Sample Type	Analyte Code	Result	Laboratory Qualifier	Validation Qualifier	Qualifier Code
500-122083-1	EPS-11	SW8270D	PYRDN	0.2	U	UJ	M
500-122083-1	EPS-12	SW8270D	PYRDN	0.2	U F1	UJ	M
500-122083-1	EPS-16	SW8270D	MEPH1314	47	U	UJ	S
500-122083-1	EPS-16	SW8270D	MEPH2	47	U	UJ	S
500-122083-1	EPS-16	SW8270D	PCP	190	U	UJ	S
500-122083-1	EPS-16	SW8270D	PYRDN	190	U *	UJ	M
500-122083-1	EPS-2	SW8270D	MEPH1314	49	U	UJ	S
500-122083-1	EPS-2	SW8270D	MEPH2	49	U	UJ	S
500-122083-1	EPS-2	SW8270D	PCP	200	U	UJ	S
500-122083-1	EPS-2	SW8270D	PYRDN	200	U *	UJ	M
500-122083-1	EPS-4	SW8270D	PYRDN	200	U	UJ	M
500-122083-1	EPS-6	SW8270D	PYRDN	0.2	U	UJ	M
500-122083-1	EPS-8	SW8270D	PYRDN	0.2	U	UJ	M
500-122083-1	EPS-9	SW8270D	PYRDN	190	U	UJ	M

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

2417 Bond Street, University Park, IL 60484
Phone: 708.534.5200 Fax: 708.534.5211

Chain of Custody Record

Lab Job #: 500-122083

Chain of Custody Number:

Page ____ of ____

Temperature °C of Cooler: 3.4-7 3.0

Report To (optional)	Bill To (optional)
Contact:	Contact:
Company:	Company:
Address:	Address:
Address:	Address:
Phone:	Phone:
Fax:	Fax:
E-Mail:	PO#/Reference#

Client: SRS LLC

Client Project #:

Project Name: ELECTRO-PLATING SERVICE

Project Location/State: Detroit MI

Lab Project #:

Sampler: Teresa Muldoon, Liz M., Katherine Cooper, Cheryl Holbrook

Lab PM: Theresa Hargraves

Preservative Key: 1. HCL, Cool to 4° ... to 4° ... to 4° ... to 4° ... Cool to 4°

500-122083 COC

Lab ID	MS/MSD	Sample ID	Sampling Date	Sampling Time	# of Containers	Matrix	Total and amenable CN	RCRA 8 metals (TCLP)	VOCs (TCLP)	SVOCs (TCLP)	Corrosivity	Flashpoint KC 12-30				Comments
1		EPS-1	12/30/16	0950	1	SL	X									
2		EPS-2	↓	1030	1	O	~~X~~	X	X	X	~~X~~	X				No pH or CN
3		EPS-3	↓	1040	1	O		X			X					
4		EPS-4	↓	1050	1	O	~~X~~	X	X	X	~~X~~	X				No pH or CN
5		EPS-5	↓	1100	1	O		X								
6		EPS-6	↓	1048	1	SO	~~X~~	X	X	X	~~X~~	X				No pH or CN
7		EPS-7	↓	1152	1	O		X			X					
8		EPS-8	↓	1058	1	SO	~~X~~	X	X	X	~~X~~	X				No pH or CN
9		EPS-9	↓	1042	1	O	~~X~~	X	X	X	~~X~~	X				No pH or CN
10		EPS-10	12/30/16	1110	1	O					X					

Turnaround Time Required (Business Days)

___ 1 Day ___ 2 Days ___ 5 Days ___ 7 Days X 10 Days ___ 15 Days _____ Other

Requested Due Date ____________

Sample Disposal

☐ Return to Client ☐ Disposal by Lab ☐ Archive for ____ Months (A fee may be assessed if samples are retained longer than 1 month)

Relinquished By	Company	Date	Time	Received By	Company	Date	Time
Katherine Cooper	SRS	12/30/16	1702	[signature]	TA	12/30/16	17:02
Relinquished By	Company	Date	Time	Received By	Company	Date	Time
Relinquished By	Company	Date	Time	Received By	Company	Date	Time

Lab Courier ☐

Shipped ☐

Hand Delivered X

Matrix Key

WW – Wastewater	SE – Sediment
W – Water	SO – Soil
S – Soil	L – Leachate
SL – Sludge	WI – Wipe
MS – Miscellaneous	DW – Drinking Water
OL – Oil	O – Other
A – Air	

Client Comments:
SO = SOLID
O = OTHER

Lab Comments:

TAL-4124 (1007) 1/11/2017

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

2417 Bond Street, University Park, IL 60484
Phone: 708.534.5200 Fax: 708.534.5211

(optional)
Report To
Contact:
Company:
Address:
Address:
Phone:
Fax:
E-Mail:

(optional)
Bill To
Contact:
Company:
Address:
Address:
Phone:
Fax:
PO#/Reference#

Chain of Custody Record

Lab Job #: 500-122083

Chain of Custody Number:

Page _____ of _____

Temperature °C of Cooler: 3.4→3.0

Client: SES LLC
Client Project #:
Project Name: ELECTRO PLATING SERVICE
Project Location/State: DETROIT MI
Lab Project #:
Sampler: KATHERINE COOPER / TERESA MULDOON / LISA MATSON / CHERYL KONDRECK
Lab PM: Therese Hargraves

Preservative Key
1. HCL, Cool to 4°
2. H2SO4, Cool to 4°
3. HNO3, Cool to 4°
4. NaOH, Cool to 4°
5. NaOH/Zn, Cool to 4°
6. NaHSO4
7. Cool to 4°
8. None
9. Other

Lab ID	MS/MSD	Sample ID	Sampling Date	Sampling Time	# of Containers	Matrix	Preservative	Corrosivity	Flashpoint	VOCs (TCLP)	SVOCs (TCLP)	RCRA 8 (TCLP) metals	Total and amenable CN				Comments
11		EPS-11	12/30/16	1120	1	SL		X	X	X	X	X	X				
12		EPS-12		1110	1	SO		X	X	X	X	X	X				No pH, FLASH OR CN
13		EPS-13		1115	1	O		X									
14		EPS-14		1135	1	O		X									
15		EPS-15		1130	1	O			X	X							
16		EPS-16		1135	2	O		X	X	X	X	X	X				No pH, FLASH OR CN
17		EPS-17		1155	1	O		X									
			12/30/16														

Turnaround Time Required (Business Days)
___ 1 Day ___ 2 Days ___ 5 Days ___ 7 Days X 10 Days ___ 15 Days _____ Other
Requested Due Date _____

Sample Disposal
☐ Return to Client ☐ Disposal by Lab ☐ Archive for _____ Months (A fee may be assessed if samples are retained longer than 1 month)

Relinquished By	Company	Date	Time	Received By	Company	Date	Time
Katherine Cooper	SES	12/30/16	1702	[signature]	TA-PHX	12/30/16	17:05
Relinquished By	Company	Date	Time	Received By	Company	Date	Time
Relinquished By	Company	Date	Time	Received By	Company	Date	Time

Lab Courier
Shipped
Hand Delivered X

Matrix Key
WW – Wastewater
W – Water
S – Soil
SL – Sludge
MS – Miscellaneous
OL – Oil
A – Air
SE – Sediment
SO – Soil
L – Leachate
WI – Wipe
DW – Drinking Water
O – Other

Client Comments
O = OTHER - LIQUID WASTE
SO = SOLID

Lab Comments:

Client Sample ID: EPS-1
Date Collected: 12/30/16 09:50
Date Received: 12/31/16 07:30

Lab Sample ID: 500-122083-1
Matrix: Solid

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cyanide, Total	**0.95**		0.47	0.16	mg/Kg		01/04/17 12:05	01/04/17 16:36	1
Cyanide, Amenable	0.47	U	0.47	0.16	mg/Kg		01/09/17 12:40	01/09/17 16:49	1

Cle 1/17/17

Client Sample Results

Client: Sustainment & Restoration Services, LLC
Project/Site: Electroplating Service Inc. Site

TestAmerica Job ID: 500-122083-1

Client Sample ID: EPS-2
Date Collected: 12/30/16 10:30
Date Received: 12/31/16 07:30

Lab Sample ID: 500-122083-2
Matrix: Waste

Method: 7471B - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.029		0.016	0.0082	mg/Kg		01/05/17 10:15	01/05/17 14:06	1

CR 1/17/17

Client Sample ID: EPS-4

Date Collected: 12/30/16 10:50
Date Received: 12/31/16 07:30

Lab Sample ID: 500-122083-4

Matrix: Waste

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	0.025	U	0.025	0.015	mg/Kg		01/01/17 19:07	01/04/17 11:55	50
Carbon tetrachloride	0.10	U	0.10	0.038	mg/Kg		01/01/17 19:07	01/04/17 11:55	50
Chlorobenzene	0.10	U	0.10	0.039	mg/Kg		01/01/17 19:07	01/04/17 11:55	50
Chloroform	0.10	U	0.10	0.037	mg/Kg		01/01/17 19:07	01/04/17 11:55	50
1,2-Dichloroethane	0.10	U	0.10	0.039	mg/Kg		01/01/17 19:07	01/04/17 11:55	50
1,1-Dichloroethene	0.10	U	0.10	0.039	mg/Kg		01/01/17 19:07	01/04/17 11:55	50
Methyl Ethyl Ketone	0.50	U	0.50	0.21	mg/Kg		01/01/17 19:07	01/04/17 11:55	50
Tetrachloroethene	0.10	U	0.10	0.037	mg/Kg		01/01/17 19:07	01/04/17 11:55	50
Trichloroethene	0.050	U	0.050	0.016	mg/Kg		01/01/17 19:07	01/04/17 11:55	50
Vinyl chloride	0.050	U	0.050	0.026	mg/Kg		01/01/17 19:07	01/04/17 11:55	50

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*102*		*71 - 127*	*01/01/17 19:07*	*01/04/17 11:55*	*50*
Toluene-d8 (Surr)	*96*		*75 - 120*	*01/01/17 19:07*	*01/04/17 11:55*	*50*
4-Bromofluorobenzene (Surr)	*92*		*71 - 120*	*01/01/17 19:07*	*01/04/17 11:55*	*50*
Dibromofluoromethane	*103*		*70 - 120*	*01/01/17 19:07*	*01/04/17 11:55*	*50*

Method: 8270D - Semivolatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
2-Methylphenol	50	U	50	25	mg/Kg		01/06/17 12:22	01/06/17 16:28	1
3 & 4 Methylphenol	50	U	50	25	mg/Kg		01/06/17 12:22	01/06/17 16:28	1
1,4-Dichlorobenzene	50	U	50	25	mg/Kg		01/06/17 12:22	01/06/17 16:28	1
2,4-Dinitrotoluene	50	U	50	25	mg/Kg		01/06/17 12:22	01/06/17 16:28	1
Hexachlorobenzene	20	U	20	10	mg/Kg		01/06/17 12:22	01/06/17 16:28	1
Hexachlorobutadiene	50	U	50	25	mg/Kg		01/06/17 12:22	01/06/17 16:28	1
Hexachloroethane	50	U	50	25	mg/Kg		01/06/17 12:22	01/06/17 16:28	1
Nitrobenzene	9.9	U	9.9	4.9	mg/Kg		01/06/17 12:22	01/06/17 16:28	1
Pentachlorophenol	200	U	200	100	mg/Kg		01/06/17 12:22	01/06/17 16:28	1
Pyridine	200UJ ~~200 U~~		200	100	mg/Kg		01/06/17 12:22	01/06/17 16:28	1
2,4,5-Trichlorophenol	99	U	99	49	mg/Kg		01/06/17 12:22	01/06/17 16:28	1
2,4,6-Trichlorophenol	99	U	99	49	mg/Kg		01/06/17 12:22	01/06/17 16:28	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
2-Fluorophenol (Surr)	*75*		*40 - 130*	*01/06/17 12:22*	*01/06/17 16:28*	*1*
Phenol-d5 (Surr)	*20*	*X*	*36 - 123*	*01/06/17 12:22*	*01/06/17 16:28*	*1*
Nitrobenzene-d5 (Surr)	*85*		*33 - 124*	*01/06/17 12:22*	*01/06/17 16:28*	*1*
2-Fluorobiphenyl (Surr)	*104*		*42 - 115*	*01/06/17 12:22*	*01/06/17 16:28*	*1*
2,4,6-Tribromophenol (Surr)	*46*		*25 - 130*	*01/06/17 12:22*	*01/06/17 16:28*	*1*
Terphenyl-d14 (Surr)	*125*		*25 - 150*	*01/06/17 12:22*	*01/06/17 16:28*	*1*

Method: 6010C - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	88	U	88	41	mg/Kg		01/04/17 14:51	01/05/17 12:16	100
Barium	18	U	18	3.2	mg/Kg		01/04/17 14:51	01/05/17 12:12	20
Cadmium	**3.3**	**J**	3.5	0.77	mg/Kg		01/04/17 14:51	01/05/17 12:12	20
Chromium	**60000**	**B**	88	15	mg/Kg		01/04/17 14:51	01/05/17 12:16	100
Lead	8.8	U	8.8	4.4	mg/Kg		01/04/17 14:51	01/05/17 12:12	20
Selenium	18	U	18	8.8	mg/Kg		01/04/17 14:51	01/05/17 12:12	20
Silver	8.8	U	8.8	2.1	mg/Kg		01/04/17 14:51	01/05/17 12:12	20

CR 1/17/17

Client Sample Results

Client: Sustainment & Restoration Services, LLC
Project/Site: Electroplating Service Inc. Site

TestAmerica Job ID: 500-122083-1

Client Sample ID: EPS-5
Date Collected: 12/30/16 11:00
Date Received: 12/31/16 07:30

Lab Sample ID: 500-122083-5
Matrix: Waste

Method: 6010C - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.82	J	0.92	0.42	mg/Kg		01/04/17 14:51	01/05/17 12:20	1
Barium	0.33	J	0.92	0.17	mg/Kg		01/04/17 14:51	01/05/17 12:20	1
Cadmium	0.36		0.18	0.040	mg/Kg		01/04/17 14:51	01/05/17 12:20	1
Chromium	200	B	0.92	0.16	mg/Kg		01/04/17 14:51	01/05/17 12:20	1
Lead	17		2.3	1.1	mg/Kg		01/04/17 14:51	01/05/17 16:08	5
Selenium	0.51	J	0.92	0.45	mg/Kg		01/04/17 14:51	01/05/17 12:20	1
Silver	1.5		0.46	0.11	mg/Kg		01/04/17 14:51	01/05/17 12:20	1

Method: 7471B - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.015	U	0.015	0.0080	mg/Kg		01/05/17 10:15	01/05/17 14:10	1

CK 1/17/17

Client Sample Results

Client: Sustainment & Restoration Services, LLC
Project/Site: Electroplating Service Inc. Site

TestAmerica Job ID: 500-122083-1

Client Sample ID: EPS-6
Date Collected: 12/30/16 10:48
Date Received: 12/31/16 07:30

Lab Sample ID: 500-122083-6
Matrix: Solid

Method: 7470A - Mercury (CVAA) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.00020	U	0.00020	0.00020	mg/L		01/05/17 09:20	01/05/17 12:25	1

1/17/17

Client Sample Results

Client: Sustainment & Restoration Services, LLC
Project/Site: Electroplating Service Inc. Site

TestAmerica Job ID: 500-122083-1

Client Sample ID: EPS-8
Date Collected: 12/30/16 10:38
Date Received: 12/31/16 07:30

Lab Sample ID: 500-122083-8
Matrix: Solid

Method: 8260B - Volatile Organic Compounds (GC/MS) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	0.020	U	0.020	0.010	mg/L			01/05/17 14:31	20
Carbon tetrachloride	0.020	U	0.020	0.010	mg/L			01/05/17 14:31	20
Chlorobenzene	0.020	U	0.020	0.010	mg/L			01/05/17 14:31	20
Chloroform	0.020	U	0.020	0.010	mg/L			01/05/17 14:31	20
1,2-Dichloroethane	0.020	U	0.020	0.010	mg/L			01/05/17 14:31	20
1,1-Dichloroethene	0.020	U	0.020	0.010	mg/L			01/05/17 14:31	20
Methyl Ethyl Ketone	0.10	U	0.10	0.050	mg/L			01/05/17 14:31	20
Tetrachloroethene	0.020	U	0.020	0.010	mg/L			01/05/17 14:31	20
Trichloroethene	0.020	U	0.020	0.010	mg/L			01/05/17 14:31	20
Vinyl chloride	0.020	U	0.020	0.010	mg/L			01/05/17 14:31	20

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*98*		*71 - 127*		*01/05/17 14:31*	*20*
Toluene-d8 (Surr)	*97*		*75 - 120*		*01/05/17 14:31*	*20*
4-Bromofluorobenzene (Surr)	*93*		*71 - 120*		*01/05/17 14:31*	*20*
Dibromofluoromethane	*102*		*70 - 120*		*01/05/17 14:31*	*20*

Method: 8270D - Semivolatile Organic Compounds (GC/MS) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
2-Methylphenol	0.020	U	0.020	0.020	mg/L		01/05/17 08:53	01/05/17 18:28	1
3 & 4 Methylphenol	0.020	U	0.020	0.020	mg/L		01/05/17 08:53	01/05/17 18:28	1
1,4-Dichlorobenzene	0.020	U	0.020	0.020	mg/L		01/05/17 08:53	01/05/17 18:28	1
2,4-Dinitrotoluene	0.010	U	0.010	0.010	mg/L		01/05/17 08:53	01/05/17 18:28	1
Hexachlorobenzene	0.0050	U	0.0050	0.0050	mg/L		01/05/17 08:53	01/05/17 18:28	1
Hexachlorobutadiene	0.050	U	0.050	0.050	mg/L		01/05/17 08:53	01/05/17 18:28	1
Hexachloroethane	0.050	U	0.050	0.050	mg/L		01/05/17 08:53	01/05/17 18:28	1
Nitrobenzene	0.010	U	0.010	0.010	mg/L		01/05/17 08:53	01/05/17 18:28	1
Pentachlorophenol	0.20	U	0.20	0.20	mg/L		01/05/17 08:53	01/05/17 18:28	1
Pyridine	0.20 J ~~0.20 U~~		0.20	0.20	mg/L		01/05/17 08:53	01/05/17 18:28	1
2,4,5-Trichlorophenol	0.10	U	0.10	0.10	mg/L		01/05/17 08:53	01/05/17 18:28	1
2,4,6-Trichlorophenol	0.050	U	0.050	0.050	mg/L		01/05/17 08:53	01/05/17 18:28	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
2-Fluorophenol (Surr)	*52*		*30 - 110*	*01/05/17 08:53*	*01/05/17 18:28*	*1*
Phenol-d5 (Surr)	*32*		*20 - 100*	*01/05/17 08:53*	*01/05/17 18:28*	*1*
Nitrobenzene-d5 (Surr)	*71*		*33 - 139*	*01/05/17 08:53*	*01/05/17 18:28*	*1*
2-Fluorobiphenyl (Surr)	*72*		*30 - 123*	*01/05/17 08:53*	*01/05/17 18:28*	*1*
2,4,6-Tribromophenol (Surr)	*134*		*30 - 150*	*01/05/17 08:53*	*01/05/17 18:28*	*1*
Terphenyl-d14 (Surr)	*107*		*42 - 150*	*01/05/17 08:53*	*01/05/17 18:28*	*1*

Method: 6010C - Metals (ICP) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.050	U	0.050	0.010	mg/L		01/05/17 08:27	01/05/17 16:48	1
Barium	**0.33**	**J**	0.50	0.050	mg/L		01/05/17 08:27	01/05/17 16:48	1
Cadmium	**0.28**		0.0050	0.0020	mg/L		01/05/17 08:27	01/05/17 16:48	1
Chromium	**0.031**		0.025	0.010	mg/L		01/05/17 08:27	01/05/17 16:48	1
Lead	**0.45**		0.050	0.0075	mg/L		01/05/17 08:27	01/05/17 16:48	1
Selenium	0.050	U	0.050	0.020	mg/L		01/05/17 08:27	01/05/17 16:48	1
Silver	0.025	U	0.025	0.010	mg/L		01/05/17 08:27	01/05/17 16:48	1

AE 1/17/17

Client Sample ID: EPS-9
Date Collected: 12/30/16 10:42
Date Received: 12/31/16 07:30

Lab Sample ID: 500-122083-9
Matrix: Waste

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	0.025	U	0.025	0.015	mg/Kg		01/01/17 19:11	01/05/17 13:36	100
Carbon tetrachloride	0.10	U	0.10	0.038	mg/Kg		01/01/17 19:11	01/05/17 13:36	100
Chlorobenzene	0.10	U	0.10	0.039	mg/Kg		01/01/17 19:11	01/05/17 13:36	100
Chloroform	0.10	U	0.10	0.037	mg/Kg		01/01/17 19:11	01/05/17 13:36	100
1,2-Dichloroethane	0.10	U	0.10	0.039	mg/Kg		01/01/17 19:11	01/05/17 13:36	100
1,1-Dichloroethene	0.10	U	0.10	0.039	mg/Kg		01/01/17 19:11	01/05/17 13:36	100
Methyl Ethyl Ketone	0.50	U	0.50	0.21	mg/Kg		01/01/17 19:11	01/05/17 13:36	100
Tetrachloroethene	0.10	U	0.10	0.037	mg/Kg		01/01/17 19:11	01/05/17 13:36	100
Vinyl chloride	0.050	U	0.050	0.026	mg/Kg		01/01/17 19:11	01/05/17 13:36	100

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*99*		*71 - 127*	*01/01/17 19:11*	*01/05/17 13:36*	*100*
Toluene-d8 (Surr)	*96*		*75 - 120*	*01/01/17 19:11*	*01/05/17 13:36*	*100*
4-Bromofluorobenzene (Surr)	*91*		*71 - 120*	*01/01/17 19:11*	*01/05/17 13:36*	*100*
Dibromofluoromethane	*90*		*70 - 120*	*01/01/17 19:11*	*01/05/17 13:36*	*100*

Method: 8260B - Volatile Organic Compounds (GC/MS) - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Trichloroethene	**89**		10	3.3	mg/Kg		01/01/17 19:11	01/04/17 16:06	20000

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*100*		*71 - 127*	*01/01/17 19:11*	*01/04/17 16:06*	*20000*
Toluene-d8 (Surr)	*96*		*75 - 120*	*01/01/17 19:11*	*01/04/17 16:06*	*20000*
4-Bromofluorobenzene (Surr)	*91*		*71 - 120*	*01/01/17 19:11*	*01/04/17 16:06*	*20000*
Dibromofluoromethane	*101*		*70 - 120*	*01/01/17 19:11*	*01/04/17 16:06*	*20000*

Method: 8270D - Semivolatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
2-Methylphenol	48	U	48	24	mg/Kg		01/06/17 12:22	01/06/17 16:50	1
3 & 4 Methylphenol	48	U	48	24	mg/Kg		01/06/17 12:22	01/06/17 16:50	1
1,4-Dichlorobenzene	48	U	48	24	mg/Kg		01/06/17 12:22	01/06/17 16:50	1
2,4-Dinitrotoluene	48	U	48	24	mg/Kg		01/06/17 12:22	01/06/17 16:50	1
Hexachlorobenzene	19	U	19	9.6	mg/Kg		01/06/17 12:22	01/06/17 16:50	1
Hexachlorobutadiene	48	U	48	24	mg/Kg		01/06/17 12:22	01/06/17 16:50	1
Hexachloroethane	48	U	48	24	mg/Kg		01/06/17 12:22	01/06/17 16:50	1
Nitrobenzene	9.5	U	9.5	4.8	mg/Kg		01/06/17 12:22	01/06/17 16:50	1
Pentachlorophenol	190	U	190	96	mg/Kg		01/06/17 12:22	01/06/17 16:50	1
Pyridine	190 UJ ~~190 U~~		190	96	mg/Kg		01/06/17 12:22	01/06/17 16:50	1
2,4,5-Trichlorophenol	95	U	95	48	mg/Kg		01/06/17 12:22	01/06/17 16:50	1
2,4,6-Trichlorophenol	95	U	95	48	mg/Kg		01/06/17 12:22	01/06/17 16:50	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
2-Fluorophenol (Surr)	*56*		*40 - 130*	*01/06/17 12:22*	*01/06/17 16:50*	*1*
Phenol-d5 (Surr)	*63*		*36 - 123*	*01/06/17 12:22*	*01/06/17 16:50*	*1*
Nitrobenzene-d5 (Surr)	*88*		*33 - 124*	*01/06/17 12:22*	*01/06/17 16:50*	*1*
2-Fluorobiphenyl (Surr)	*110*		*42 - 115*	*01/06/17 12:22*	*01/06/17 16:50*	*1*
2,4,6-Tribromophenol (Surr)	*93*		*25 - 130*	*01/06/17 12:22*	*01/06/17 16:50*	*1*
Terphenyl-d14 (Surr)	*128*		*25 - 150*	*01/06/17 12:22*	*01/06/17 16:50*	*1*

1/17/17

Client Sample ID: EPS-10
Date Collected: 12/30/16 11:10
Date Received: 12/31/16 07:30

Lab Sample ID: 500-122083-10
Matrix: Waste

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
pH	**1.9**		0.2	0.2	SU			01/03/17 16:31	1

CW 1/17/17

Client Sample ID: EPS-11
Date Collected: 12/30/16 11:20
Date Received: 12/31/16 07:30

Lab Sample ID: 500-122083-11
Matrix: Waste

Method: 7470A - Mercury (CVAA) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.00020	U	0.00020	0.00020	mg/L		01/05/17 09:20	01/05/17 12:34	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Flashpoint	**>176**		40.0	40.0	Degrees F			01/04/17 20:20	1
pH	**8.3**		0.2	0.2	SU			01/03/17 16:35	1

CL 1/17/17

Client Sample ID: EPS-12
Date Collected: 12/30/16 11:10
Date Received: 12/31/16 07:30

Lab Sample ID: 500-122083-12
Matrix: Solid

Method: 7470A - Mercury (CVAA) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	**0.0038**		0.00020	0.00020	mg/L		01/05/17 09:20	01/05/17 12:36	1

CR 1/12/17

Client Sample ID: EPS-14
Date Collected: 12/30/16 11:35
Date Received: 12/31/16 07:30

Lab Sample ID: 500-122083-14
Matrix: Waste

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
pH	**0.4**		0.2	0.2	SU			01/03/17 16:42	1

4/17/17

Client Sample Results

Client: Sustainment & Restoration Services, LLC
Project/Site: Electroplating Service Inc. Site

TestAmerica Job ID: 500-122083-1

Client Sample ID: EPS-16

Date Collected: 12/30/16 11:35
Date Received: 12/31/16 07:30

Lab Sample ID: 500-122083-16

Matrix: Waste

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	0.013	U	0.013	0.0073	mg/Kg		01/01/17 19:17	01/04/17 13:47	50
Carbon tetrachloride	0.050	U	0.050	0.019	mg/Kg		01/01/17 19:17	01/04/17 13:47	50
Chlorobenzene	0.050	U	0.050	0.019	mg/Kg		01/01/17 19:17	01/04/17 13:47	50
Chloroform	0.050	U	0.050	0.019	mg/Kg		01/01/17 19:17	01/04/17 13:47	50
1,2-Dichloroethane	0.050	U	0.050	0.020	mg/Kg		01/01/17 19:17	01/04/17 13:47	50
1,1-Dichloroethene	0.050	U	0.050	0.020	mg/Kg		01/01/17 19:17	01/04/17 13:47	50
Methyl Ethyl Ketone	0.25	U	0.25	0.11	mg/Kg		01/01/17 19:17	01/04/17 13:47	50
Tetrachloroethene	0.050	U	0.050	0.019	mg/Kg		01/01/17 19:17	01/04/17 13:47	50
Trichloroethene	0.025	U	0.025	0.0082	mg/Kg		01/01/17 19:17	01/04/17 13:47	50
Vinyl chloride	0.025	U	0.025	0.013	mg/Kg		01/01/17 19:17	01/04/17 13:47	50

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*104*		*71 - 127*	*01/01/17 19:17*	*01/04/17 13:47*	*50*
Toluene-d8 (Surr)	*95*		*75 - 120*	*01/01/17 19:17*	*01/04/17 13:47*	*50*
4-Bromofluorobenzene (Surr)	*91*		*71 - 120*	*01/01/17 19:17*	*01/04/17 13:47*	*50*
Dibromofluoromethane	*97*		*70 - 120*	*01/01/17 19:17*	*01/04/17 13:47*	*50*

Method: 8270D - Semivolatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
2-Methylphenol	47UJ ~~47 U~~		47	23	mg/Kg		01/03/17 09:46	01/10/17 14:41	1
3 & 4 Methylphenol	47UJ ~~47 U~~		47	23	mg/Kg		01/03/17 09:46	01/10/17 14:41	1
1,4-Dichlorobenzene	47	U	47	23	mg/Kg		01/03/17 09:46	01/10/17 14:41	1
2,4-Dinitrotoluene	47	U	47	23	mg/Kg		01/03/17 09:46	01/10/17 14:41	1
Hexachlorobenzene	19	U	19	9.4	mg/Kg		01/03/17 09:46	01/10/17 14:41	1
Hexachlorobutadiene	47	U	47	23	mg/Kg		01/03/17 09:46	01/10/17 14:41	1
Hexachloroethane	47	U	47	23	mg/Kg		01/03/17 09:46	01/10/17 14:41	1
Nitrobenzene	9.3	U	9.3	4.7	mg/Kg		01/03/17 09:46	01/10/17 14:41	1
Pentachlorophenol	190UJ ~~190 U~~		190	94	mg/Kg		01/03/17 09:46	01/10/17 14:41	1
Pyridine	190UJ ~~190 U*~~		190	94	mg/Kg		01/03/17 09:46	01/10/17 14:41	1
2,4,5-Trichlorophenol	93	U	93	47	mg/Kg		01/03/17 09:46	01/10/17 14:41	1
2,4,6-Trichlorophenol	93	U	93	47	mg/Kg		01/03/17 09:46	01/10/17 14:41	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
2-Fluorophenol (Surr)	*0*	*X*	*40 - 130*	*01/03/17 09:46*	*01/10/17 14:41*	*1*
Phenol-d5 (Surr)	*3*	*X*	*36 - 123*	*01/03/17 09:46*	*01/10/17 14:41*	*1*
Nitrobenzene-d5 (Surr)	*82*		*33 - 124*	*01/03/17 09:46*	*01/10/17 14:41*	*1*
2-Fluorobiphenyl (Surr)	*99*		*42 - 115*	*01/03/17 09:46*	*01/10/17 14:41*	*1*
2,4,6-Tribromophenol (Surr)	*0*	*X*	*25 - 130*	*01/03/17 09:46*	*01/10/17 14:41*	*1*
Terphenyl-d14 (Surr)	*115*		*25 - 150*	*01/03/17 09:46*	*01/10/17 14:41*	*1*

Method: 6010C - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.88	U	0.88	0.41	mg/Kg		01/04/17 14:51	01/05/17 12:33	1
Barium	**0.74**	**J**	0.88	0.16	mg/Kg		01/04/17 14:51	01/05/17 12:33	1
Cadmium	**7.5**		0.18	0.038	mg/Kg		01/04/17 14:51	01/05/17 12:33	1
Chromium	**59**	**B**	0.88	0.15	mg/Kg		01/04/17 14:51	01/05/17 12:33	1
Lead	**6.8**		0.44	0.22	mg/Kg		01/04/17 14:51	01/05/17 12:33	1
Selenium	0.88	U	0.88	0.43	mg/Kg		01/04/17 14:51	01/05/17 12:33	1
Silver	**2.7**		0.44	0.10	mg/Kg		01/04/17 14:51	01/05/17 12:33	1

AL 1/17/17

Client Sample ID: EPS-17
Date Collected: 12/30/16 11:55
Date Received: 12/31/16 07:30

Lab Sample ID: 500-122083-17
Matrix: Waste

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
pH	0.3		0.2	0.2	SU			01/03/17 16:46	1

1/17/17