INVENTUM ENGINEERING, PC

October 13, 2021

To: Ben McPherson, NYSDEC, Angela Martin, NYSDOH

From: John Yensan, John Black, Roxanne Birx

CC: Dan Flanagan, Kirsten Colligan, and Matt Reardon

RE: Coke Oven Gas Pipe and Coke Oven Gas Pipe Residuals Interim Remedial Measures Work Plan
Riverview Innovation & Technology Campus BCP Site #C915353
3875 River Road
Tonawanda, New York

Riverview Innovation & Technology Campus (Riverview) has been removing out of service Coke Oven Gas (COG) pipes at the Brownfield Cleanup Program Site (Site No. C915353) at 3875 River Road, Town of Tonawanda, New York since August 2020 (Photographs No. 1 and 2). The pipe removed to date has typically contained 0- to 70-percent (by pipe cross section, estimated) COG residuals (Photographs No. 3 and No. 4). Until August 10, 2021, the residuals within the pipe were removed and the pipe was sufficiently cleaned to be considered empty. Then the pipes were processed and successfully recycled with no indication of showing any characteristic of ignitability. On August 10, 2021, some of the COG residuals combusted after exposure to the atmosphere.

This IRM Work Plan is for the removal, processing and proper management of the remaining COG Pipe and residuals on the property including laterals from the main pipes to process equipment, exhausters, and the former flare location. The objective of the IRM is to safely remove all above ground pipe with the potential to contain materials that produce an exothermic reaction when exposed to the atmosphere.

The COG pipe that is known to remain on the property is in the boiler house (Table 1 and Appendix A) and above ground from the east crossover pipe to the former west flare location (Tables 2 and 3, Figure 1, and Appendix B). There may be some above ground COG under the battery, but that cannot be inspected until the upper portion of the battery is removed by controlled demolition. Below Grade COG lines are not being removed as a part of this IRM, the underground utilities will be addressed in a future IRM or the Alternatives Analysis.

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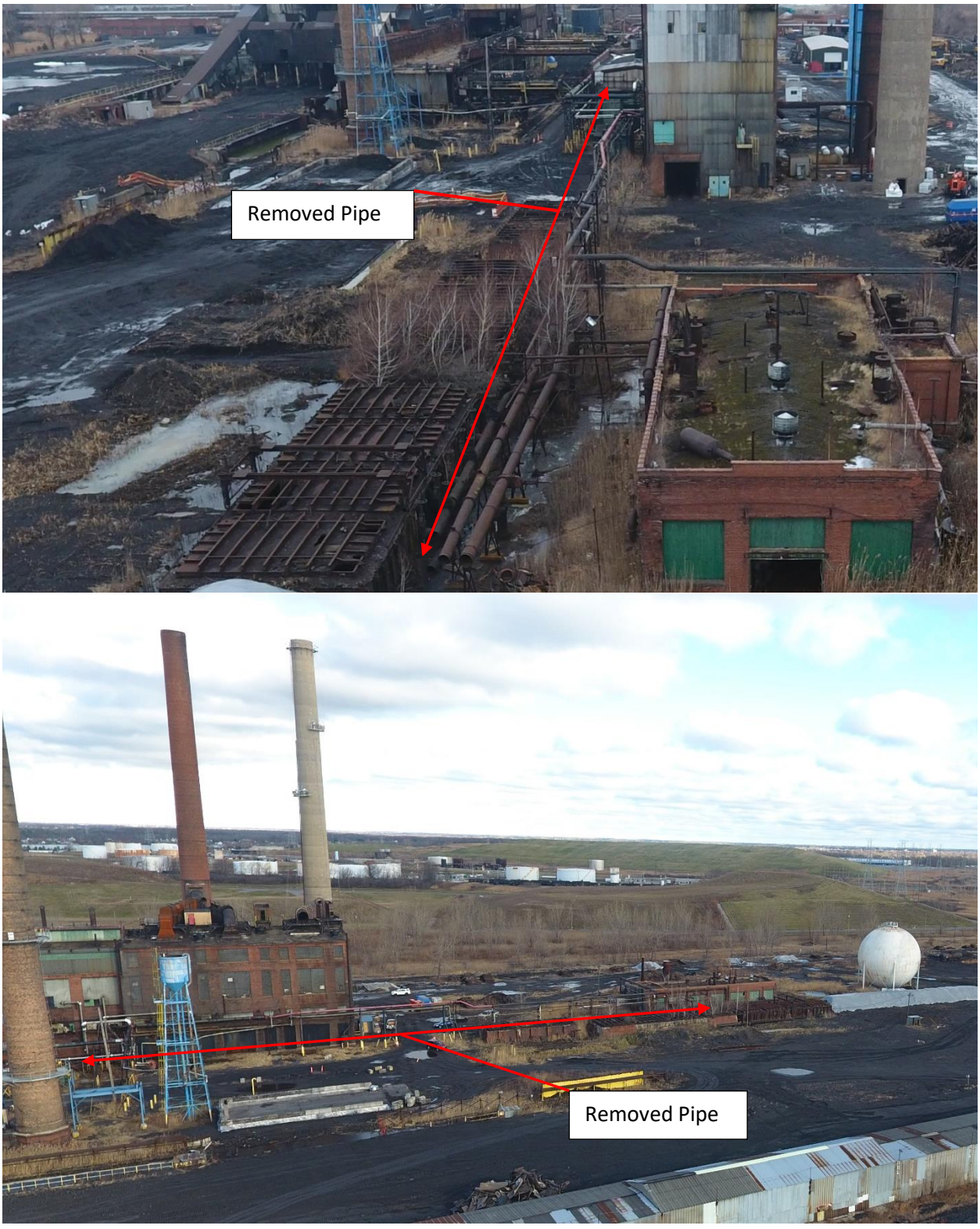


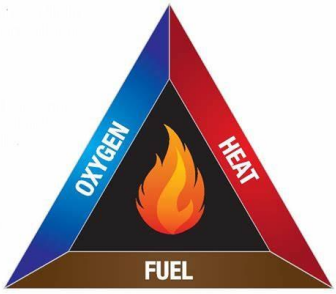
Photographs No. 1
Coke Oven Gas Lines Removed Before Fire

Photograph No. 2
COG pipes Removed Before August 2021 Without Incident

Photograph No. 3
COG Pipe Removed March 2021

Photograph No. 4
COG Pipe and Residual from Compressor Building, March 2021

The pipe being processed on August 10, 2021, contained an estimated 70- to 90-percent COG residuals. The August 10th fire and subsequent bench-scale testing at Riverview revealed that some residuals in sections of the COG piping west of the compressor building pipe may contain iron compounds that are capable of exothermic reactions that can lead to spontaneous combustion of the combustible materials from the pipes. The most probable cause is ferric iron oxide or ferric iron sulfide which generate heat as they oxidize. The increase in temperature, the hydrocarbon (fuel) in the residual, and the oxygen available outside the pipe combine to complete the fire triangle and can result in a fire:



Bench-scale Testing

A series of bench-scale tests were conducted on August 24-25, 2021 to determine full-scale treatment protocols that will be followed for the removal of the remaining COG pipes. Observations of the material characteristics (Photograph No. 5) from those bench-scale tests and from prior to, and after, the fire are noted below.:

- While contained in the piping, the pipe and residual materials can be moved safely on the property. The materials in the pipe lack oxygen and heat. During the bench-scale testing, materials were moved from the sample points to the testing area over periods of 10- to 30-minutes, without incident;
- The subject materials leading to the fire event were staged in cut piping for no less than 13 days;
- The material suspected[1] to produce the reaction had the grain-size and consistency of granular to fine silt, had a gray to black (some "shiny") appearance (similar to the pre-fire materials). Similar materials were recovered from the COG line during the bench-scale testing and produced no reactions;
- The material from all of the sampled pipes had the grain-size and consistency of granular to fine silt solids, not liquid, or a viscous tar like fluid;
- The material in the managed pipe sections could be physically removed from the COG pipe without the use of liquids or solvents;
- The exothermic properties are not uniformly distributed through the material, but require a critical volume and contact with other combustable material to produce sufficient heat and combustion. Photograph No. 4 shows relatively small amounts of material exposed to the atmosphere that did not ignite. Photograph No. 5 shows material that did not combust, Photograph No. 6 was typical of the progression of material that did combust, very localized amounts of material heated and then affected surrounding fuel;
- The material reaction, while likely initiated at first exposure to the atmosphere, does not raise the material temperature immediately to a degree that causes ignition. The pile of material that produced the fire event was observed for more than 15-minutes and exhibited no signs of combustion. Duirng the bench scale testing only 2 of 7 samples reaacted. Neither sample reacted instantaneously, one sample reacted after it was outside the pipe for 10 minutes, the second after it had been out of the pipe for 50 minutes;
- The five samples that did not react were left on the slab for several hours and produced no change in internal temperature;
- The fuel material continued to burn when not saturated to cool and extingush the combustion; and
- After buring and submersive quenching in water, and when quenched prior to combution, the material did not exhibit additonal exothermic properties. The post-quench sample materials were allowed to dry for no less than 3 days and clearly demonstrated the potential for combustion had been eliminated. The material notably changed in appearance as it was monitored through the oxidation process, first turning black then turning to a reddish brown "rust" color.

[1] While there are several observations of the materials suspected of producing the reaction, based on the August 10th fire and the observations during the bench-scale testing for purposes of all future removal of COG pipe it will be assumed that all residual materials in the COG pipe are capable of producing an exothermic reaction until the materials have been quenched and monitored.

Photograph No. 5
Coke Oven Gas Pipe and Residual on the Containment Slab

The two materials that were tested with the three quench fluids were those capable of producing sufficient heat to spontaneously combust. All three components of the fire triangle must be present for this to occur. Five of the seven samples did not produce an exothermic reaction on exposure to air. Samples that had clearly oxidized, reddish brown color, did not react, as anticipated. It is still not considered possible to safely assume any reddish brown COG residual has completely oxidized in the pipe, and therefore the recommendation that all COG residuals be quenched remains in effect and is the basis for this Work Plan.

In order to safely manage the COG pipes, there must be an ongoing evaluation of the residual. Where present, the COG pipe residual materials must be treated to eliminate the possibility that they could exhibit the characteristic of ignitability prior to ultimate management as a product[2] or waste. Three potential treatment protocols were evaluated:

1. Water quenching and water controlled oxidation;

[2] The FQE treatment results in a product that is typically used in fuel blending.

2. Potassium permanganate treatment ($KMnO_4$ a/k/a Permanganate), and
3. FQE Chemical Pyrophoric treatments (solvent and iron reduction).

Bench-scale testing of the above to eliminate the characteristic of ignitability[3] from the COG residual were performed at the site.

Treatment Alternatives

Three methods to eliminate the characteristics of ignitability were evaluated in the bench-scale tests:

1. Water Quenching
   The material appeared to change state in a saturated/submerged environment. The resulting material recovered from the pipe in the quench sump was stable and was not exothermic. The elimination of the characteristic in materials directly from the COG piping was confirmed by the bench-scale testing.
2. Carus CAIROX® Sodium Permanganate or generic Potassium Permanganate
   Sodium or Potassium Permanganate oxidizes without burning. The permanganate compound oxidizes pyrophoric iron sulfide to iron sulfate, which eliminates the potential for exothermic reactions in the material. The bench-scale testing demonstrated that the process is effective but is dependent on the ability to create effective contact between the permanganate and the iron. At the recommended concentrations, the solution was similar to water.
3. FQE Chemical Treatment
   FQE chemical solvent and pyrophoric treatments are two approaches that either use a solvent to separate the iron and coke oven gas residuals, or by treatment of the iron to eliminate the oxidation reaction that produces the heat. The bench-scale testing demonstrated the ability of the solvent to eliminate the characteristic of ignitability. The pyrophoric reagent container was damaged in transit and that solution could not be tested.

Prior to the bench-scale test, the pipe that contained the materials involved in the August 10, 2021, fire was removed from the east quench pit. The pipes that had been involved in the fire were sorted between those that were empty and those that contained residuals. The empty pipe was placed south of the east quench pit in the coke yard. The pipes with residual were emptied and the pipe was returned to the quench pit for further quenching. The materials recovered from the pipes were placed on concrete and monitored for temperature change over a 5 hour period. No temperature change was measured. The residuals were returned to the quench pit.

The sample collection[4] for the bench scale testing included sampling of seven locations on the coke oven gas lines at the facility. The seven locations (Appendix B) included:

1. 8-inch COG line on the southwest side of the boiler house;
2. 8-inch horizontal line near the center boiler,
3. 8-inch vertical line between the outside line and the horizontal line;
4. 10-inch COG line from a blind flange on the east end of the ground floor of the boiler house;
5. 10-inch COG line from a 2-inch capped lateral at the west end of the ground floor of the boiler house;

[3] 261.21 "It is not a liquid and is capable, under standard temperature and pressure, of causing fire through friction, absorption of moisture or spontaneous chemical changes and, when ignited, burns so vigorously and persistently that it creates a hazard."
[4] Note: This numbering is based on the locations, not the order of collection.

6. 12-inch former COG line that used to supply the west flare; and
7. The 20-inch line along Broadway near the pump house.

The seven sample locations (Table 4) are identified by the numbers listed above on Sheets T-BP-0250 and T-BP-0251 in Appendix B. The 10-inch COG Line in the boiler house, the 12-inch COG line at the former west flare location, and the 20-inch COG Line along Broadway contained the most residual. The residuals from these lines did not exhibit an exothermic reaction when exposed to the atmosphere.

Only a fraction of the material from the vertical 8-inch COG line on the exterior southwest wall of the boiler house (Sample Location No. 1) exhibited an exothermic reaction when exposed to the atmosphere. A temperature gauge was used to screen the residual from the 8-inch COG line. Approximately 8 cups of material from this line were segregated after exhibiting a measurable exothermic reaction on the temperature gauge. The materials exhibiting the potential for ignitibility rose from 90-degrees Fahrenheit (^{0}F) to 172 ^{0}F in less than 10 minutes.

Less than 1 cubic foot (less than a 5-gallon bucket full) of material from the 8-inch vertical line from within the boiler house (Sample Location No. 3) exhibited an exothermic reaction after 50-minutes. The material was divided into three subsamples; water quench, potassium permanganate treatment, and FQE Solvent treatment. All the samples exhibited a similar progression, allowed to begin heating, quenched with the liquids, cooled, and during/after drying (the drying process took several days) turned first black then reddish brown “rust” color.

The residual solids from the water quench were tested to provide an understanding of the potential requirements for disposal. The disposal profile will be based on samples of the full scale management of residual solids. The laboratory data (Table 5) provide the following indicators for disposal:

- The pH is acidic, close to the characteristic of corrosivity, 2.54 v 2;
- The quenched residuals were not reactive, but reactive sulfide was detected at 44 ug/g;
- The TCLP Data indicate the material was not characteristically toxic, but Pyridine, Mercury, Cadmium, and Benzene were detected;
- Total metals data detected Mercury (470 mg/Kg) among other metals. The metals concentrations were dominated by Iron (473,000mg/Kg) and Sulfur (190,000 mg/Kg);
- A number of PAHs were detected, with Naphthalene being the most predominant at 65,500 ug/Kg; and
- Cyanide was detected at 192 ug/g.

Prior to the fire, the water in the quench pit had been sampled in accordance with the Remedial Investigation Work Plan (RIWP), Sample W-BCP-04, Table 6. Following the fire event a sample was collected from the quench pit (Sample No. AQ-Fire Quench-08112021, POTW Parameters) and again after the pipes and residual from the fire had been quenched for 14 days (Sample No. AQ-COGAQ-08252021, Table 6). The data clearly show the water resulting from the fire and quenching has leached compounds from the COG residuals, increasing concentrations from pre-fire, post-fire and again post-quench. The resulting final quench pit water quality indicated:

- The water is characteristically toxic for Benzene, 1910 ug/L;
- Ethylbenzene, Toluene, m,p-xylene and o-xylene were all detected above class GA standards in the post quench sample;

- 1,4-Dioxane, below Class GA standards but detected at 0.583 ug/L;
- Multiple PAHs were detected, most significantly Naphthalene at 54,400 ug/L well over the Class GA standard;
- Iron, Magnesium, Manganese, and Mercury were detected above the Class GA Standards;
- Cyanide was detected at 7.39 ug/L v 0.2 ug/L GA Standard; and
- PFAS Compounds detected, but all but one compound was below their guidance values. PFOS has been detected at 18.4 nanograms per liter (ng/L) above the 10 ng/L guidance value in the quench water.

Recommendation

The bench scale testing demonstrated that all treatment methodologies tested were equally effective in the elimination of the potential to combust. Samples that produced a reaction were quenched with all three reagents and were monitored for one week and produced no further exothermic properties. Because water quenching was effective without the addition of chemicals and without producing a separate new waste stream, water quenching is the recommended alternative. To avoid adding additional chemicals to the property, only water quenching is proposed in this work plan. The testing did, however, demonstrate that both the liquid and potentially the solid (Table 5) residual require additional treatment for disposal. The liquid from the quench extracted significant quantities of Benzene, Mercury and other COG compounds (Table 6) from the pipe residuals. These waters will require treatment and testing throughout the IRM to either reduce the concentrations to allow approval and discharge to the Town of Tonawanda POTW or to develop waste profiles for offsite disposal.

At bench-scale volumes the treated solid residuals dried over a period of 3- to 5 days (Photographs No. 7 and 8). The samples were dry and passed the paint filter test. At full-scale it is assumed the solid materials will require additional stabilization for disposal. Following oxidation through water quenching, it is recommended the materials be moved to the containment pad (Figure 2) or the former mixing pad to allow free liquids to drain from the solids. All collected liquids will be treated and discharged either to the Town of Tonawanda POTW under Permit No. 331, or transported offsite for permitted treatment.

Following drainage, the materials can be stabilized with lime kiln dust or other suitable inert drying materials for disposal. After oxidation, the addition of a drying agent will not reverse the oxidation process. The use of lime kiln dust will also help neutralize the acidic character of the residuals. These will be confirmed as the materials, after stabilization, will remain on the containment pads until the laboratory data are received which has typically been more than 5 days and after the required five day notice to the DEC (minimum 10 days after stabilization).

Photograph No. 6
Residual from Vertical COG Pipe in Boiler House (Sample Location No. 3)
Note: Other Piles in Photograph are previous COG Pipe residual samples that did not react.

Photograph No. 7
Intermediate Stage of Bench-scale Testing – Black Oxidation Stage

Photograph No. 8
Final/Dried Bench-scale Sample – Water Quench
Note: Sample transitioned from Gray-Black to Black, to this Reddish Brown color over a period of one day

Preparation

The preparation for the full-scale removal and management of COG piping includes pre-removal inspection, planning and staging of the materials and equipment for pipe removal, materials handling, quenching and fire prevention and control.

Inspection and Planning

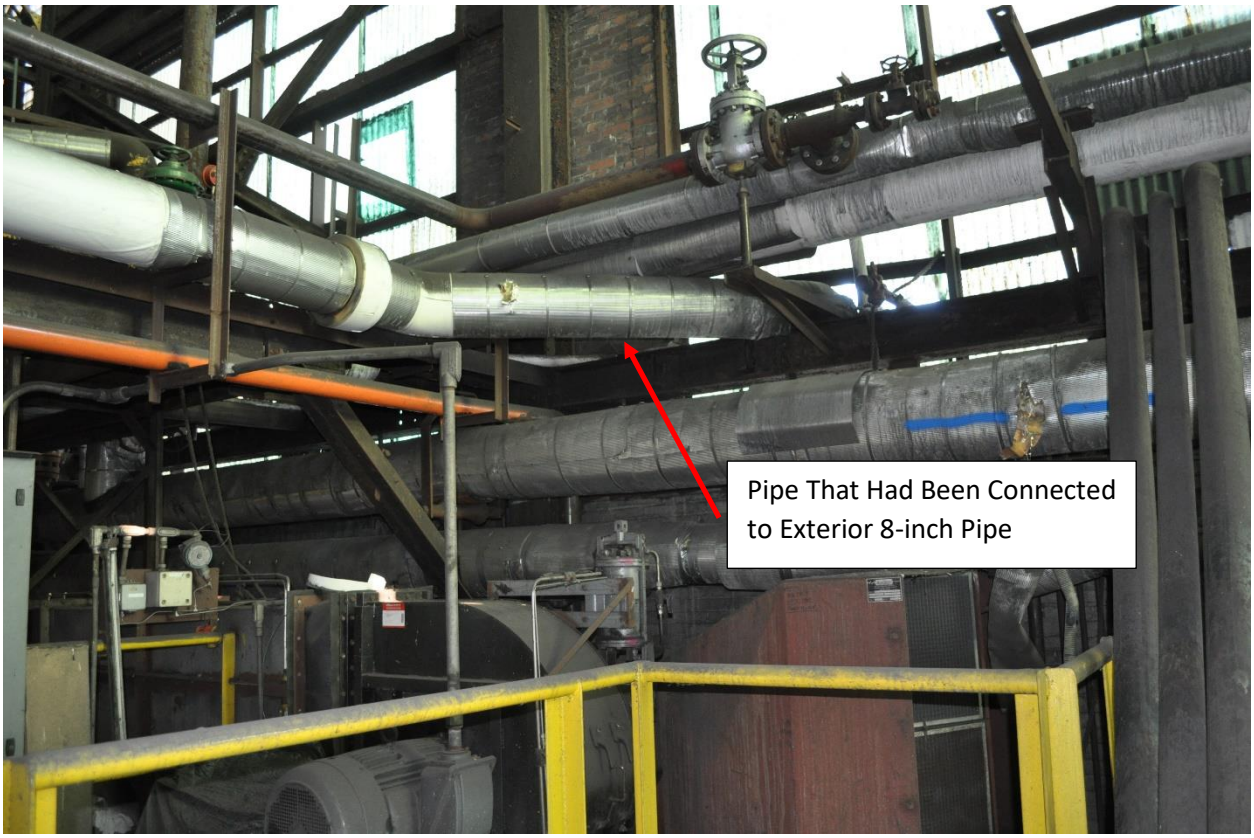
All work on the BCP Site, including the removal and management of COG piping, will be conducted in accordance with the Health and Safety Plan (HASP) and the Community Air Monitoring Plan (CAMP). No Hot Work or Hot Work Permits will be permitted for work under this Work Plan. Any hot work required on structures and steel can only be considered after the potentially combustible materials have been removed and quenched.

The inspections will consist of documentation of the estimated volume and mass of materials in the pipe. There is limited COG piping in the boiler house. It is clear from mapping the pipe in the boiler house that the COG feed at the facility changed at one point. At one time the COG was delivered from the north. This northern supply line had been cut at some time in the past and is free of COG residual at the north boiler house wall.

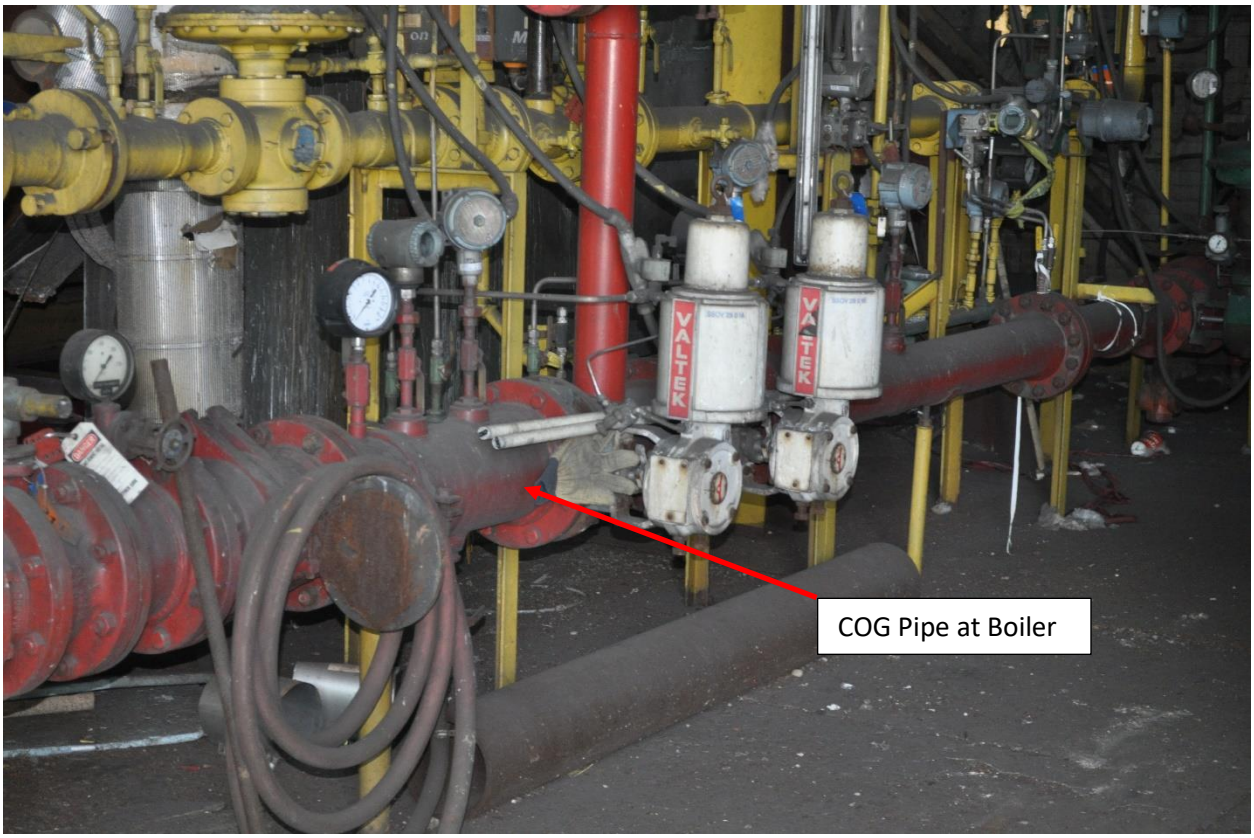
After the COG supply from the north was discontinued, COG feed was from the overhead piping on the south side of the boiler house. Within the boiler house there are two main COG systems, the system fed from the 8-inch COG line (Photograph No. 6) was the only system to produce exothermic reaction:

Photograph No. 9
8-inch COG Line on South Wall of the Boiler House

Once inside the wall this 8-inch COG Pipe fed Boiler No. 7 as shown in Photographs No. 10 and 11, and Sheet T-BP-0252 of Appendix B. The pipe was completely removed from the exterior of the building during sample collection.



Photograph No. 10
Pipe Inside the Boiler House from the 8-inch COG Line Tested and Shown in Photograph No. 9



Photograph No. 11
Horizontal COG Line at Boiler No. 7. Sample collected from the south (far right of Photograph) end of the pipe.

The Boiler House inspection identified the quantity of COG pipe in the Boiler House (Table 1). The remaining above ground COG pipe in the process area is identified in Tables 2 and 3, and shown in Appendix B.

It is important to note that the residual volume estimate assumes, for purposes of removal preparation, that the pipes are 100-percent full of residual. No pipe on the property has been found to be 100-percent full. The Boiler House Pipes were largely free of residual (Photograph No. 12). And the majority of the residual from the vertical pipe that produced a reaction was removed for testing. There are 6 access points/openings that were inspected in the interior COG piping, and all are currently free of potentially exothermic materials.

Photograph No. 12
COG Pipe on Second Floor of Boiler House (August 16, 2021)

Note: Pipes in the condition shown in Photograph No. 12 lack the fuel component to cause a fire. The rust indicates there had been sufficient oxygen to allow slow oxidation.

The residuals in the COG Pipe at the East Crossover Pipe occupied less than 50 percent of the pipe cross section and did not exhibit exothermic reaction.

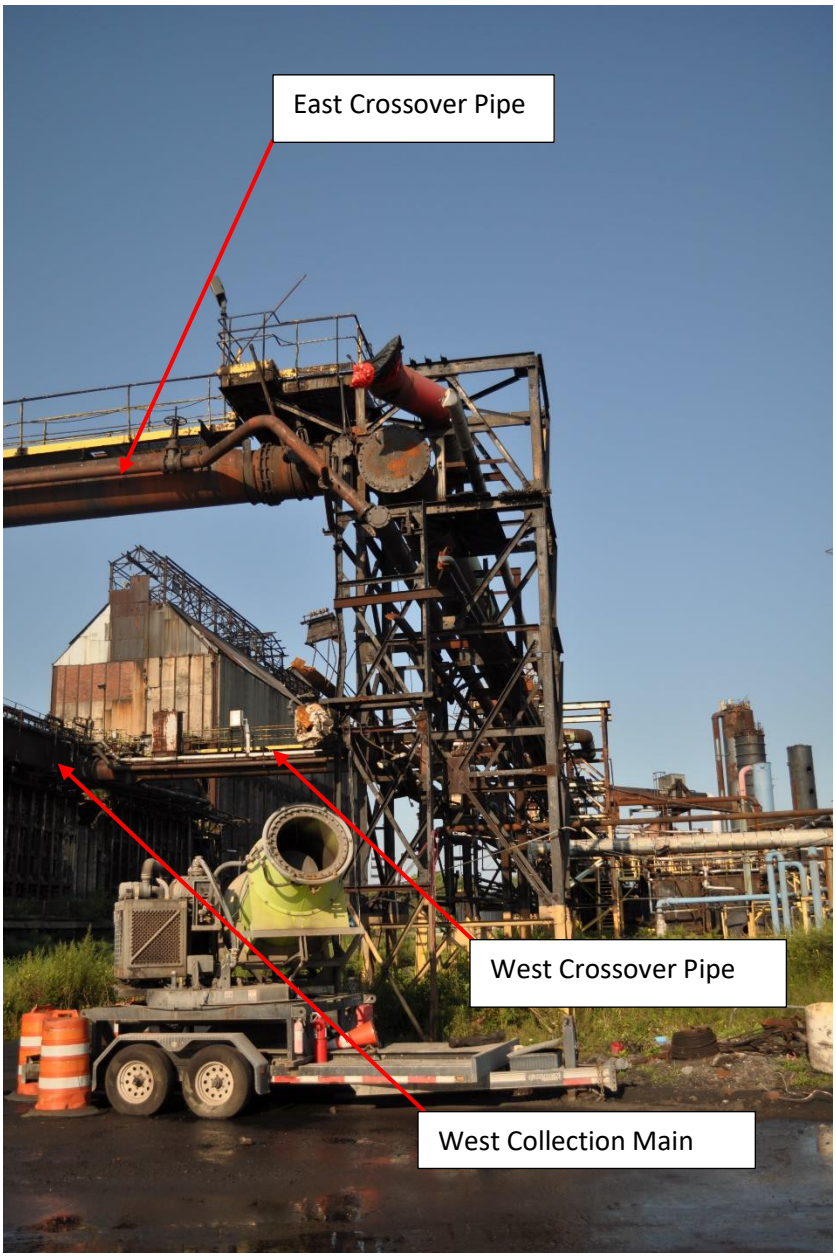
An inspection and summary for each section of COG pipe to be removed will be conducted on a daily basis in advance of pipe removal (Table 7) . The summary will be based on the information in Tables, 1,

2 and 3 and Appendices A and B and will provide a guide to the volume of quench water that will be required to be available for the residual and pipe each day.

Combustion Management

The starting location for the next section of COG to be removed, outside the Boiler House, is on a pipe structure with multiple other pipes (Photograph No. 13, 14 and 15, Appendix B). This is the location of the eastern most crossover pipe (Photograph No. 14) that will also be managed in accordance with this Work Plan.

Photograph No. 13
COG Pipe at Pump House Looking South

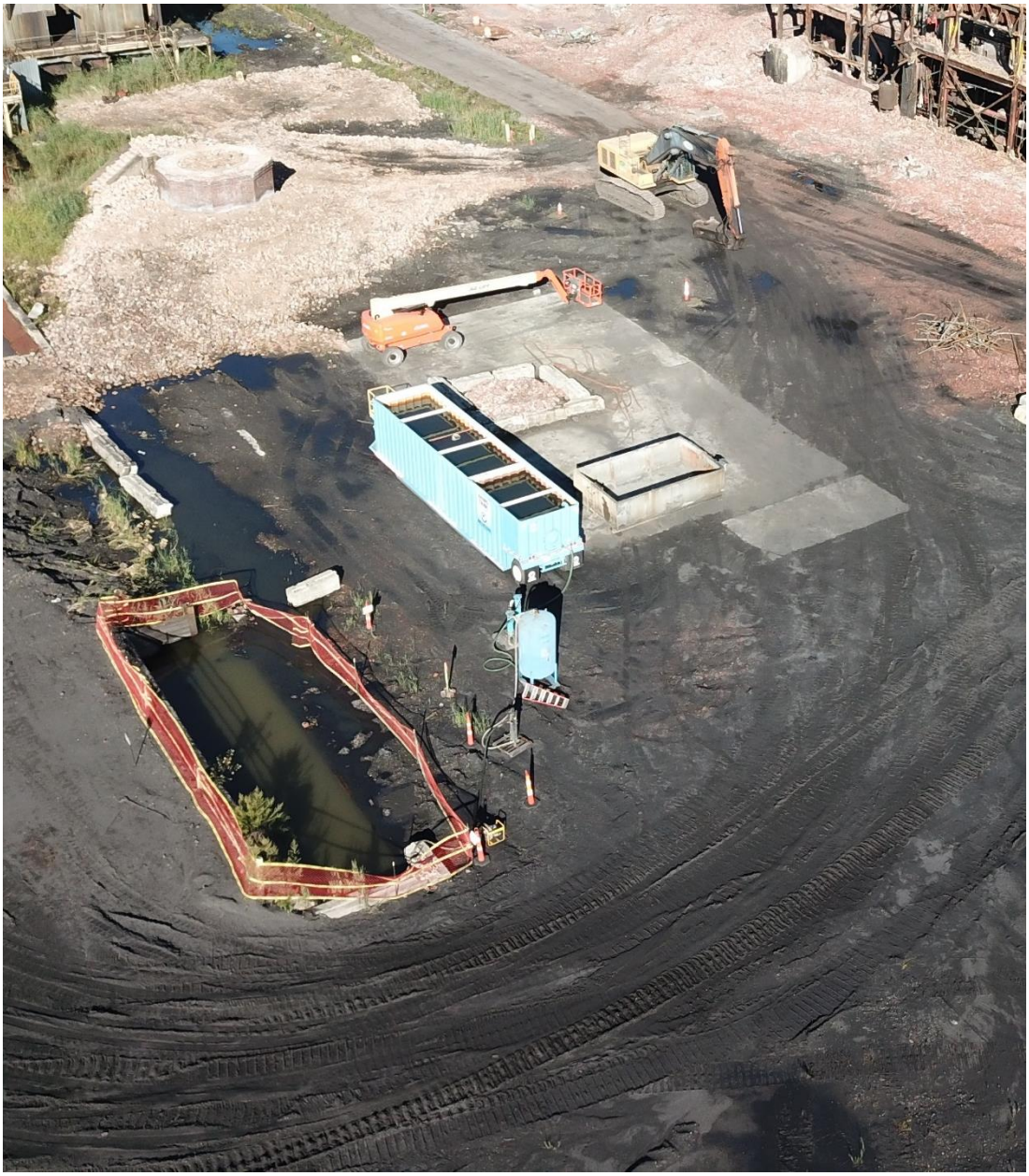


Photograph No. 14
Pipe Support Structure at Pump House Looking West
Collection Main and Crossover Pipe Locations

Photograph No. 15
Sample Collection, Location No. 7 (Looking North)
Note: Pipe was resealed after sample was collected, the residual sample from this location produced no exothermic reaction.

The sampled material at this location did not react, but as shown in Photographs No. 4 and No. 5, the materials that contain exothermic properties cannot be visually differentiated from the inert materials. The bench-scale test verified the materials can be differentiated with a temperature monitor. As a precaution, all COG piping on and in the Boiler House that formerly fed the Boilers and all remaining COG Pipe in the production area shall be assumed to potentially contain pyrophoric materials and residual and will be managed in accordance with this work plan.

The preparation, materials and equipment staged for combustion management at the materials management/ containment area (Photograph No. 16, Figure 2) will include:



Photograph No. 16
Management/Containment Slab, Quench Sump and Fractionation Tank (See Figure 2)

1. The materials management /containment areas will be on the former bag house slab (Photograph No. 16, Figure 2). Prior to use, the former bag house slab will
    a. be cleared of all combustible materials,
    b. will have concrete barriers to prevent inadvertent traffic, and
    c. silt sock around the perimeters.
2. A pump and hose capable of quenching the COG pipe after sampling, will be set in the closest coke wharf. The coke wharf is full of rainwater that had been tested during the RI and following

the fire. The data from the water samples from the Quench Pit and Coke Wharf (Figure 2) collected during the RI are presented in Table 4;

3. Fire extinguisher will be staged at the pipe cutting and materials management area;
4. Open-top fractionation tanks, lined roll off boxes, or the East Quench Pit (Figure 2) will be prepared to receive the residual and pipe. Each will be ¾ filled with potable water prior to cutting;
    a. The Quench Pit is a concrete lined sump that has collected quench water and coke fines for decades;
    b. The Quench Pit discharged to the box culvert until the DEC required, reportedly approximately 10 years ago, the overflow to be terminated;
    c. At this time there is no discharge from the Quench Sump, all accumulated water (Table 5) will have to be pumped, treated and discharged to the Town of Tonawanda or transported offsite for disposal. There is no current approval for discharge of the water in the Quench Pit;
    d. The preparation of the quench sump will include:
        i. pumping and treating the water to a weir tank;
        ii. Testing the treated water and submitting the data for discharge approval;
        iii. Removal of the residual coke fines. The fines will be staged on polyethylene sheeting adjacent to the quench sump. All free water released from the fines will be pumped, treated and pumped to the weir tank; and
        iv. The Quench Pit will be inspected to confirm all pipe seals are intact.
5. An excavator with a grapple and a front-end loader (or skip steer) capable of collecting and placing all residuals in the fractionation tank will be available;
6. Shears capable of cutting the pipe and moving it to the materials management/containment will be used to remove the pipe and empty the contents on the slab within 10 minutes of removal from the Boiler House or pipe rack;
7. A front-end loader or skid steer will be available to quickly load residuals from the pipe in the water quench;
8. The shear will place the pipe in a water quench after it has been emptied; and
9. A downwind air monitoring station will be operating within 50 feet of the downwind side of the active materials management/containment area.

The removal of the crossover pipes and collection mains on the battery (Photograph no. 14) will require additional heavy equipment. The Removal of each section of this piping; east and west crossover pipe and east and west collection main will require three pieces of equipment, two with grapples and one with the shear. The equipment used will be:

1. One machine with grapple to hold the main section of pipe;
2. A second machine to hold the section to be cut;
3. The third machine with the shear to cut the pipe; and
4. The machine with the cut section to transfer the pipe and contents to the containment pad and empty the residual.

Each section of this piping; east and west crossover and east and west collection main will be removed in a single day.

The materials and equipment staged for combustion management at the pipe cutting area will include:

1. Fire extinguisher will be staged at the pipe cutting area;
2. Inert materials; hydraulic cement, sealant foam (see SDS in Appendix C), and tape wrap; will be available to seal the remaining section of COG pipe, as needed;
3. A nitrogen plant or tank will be available to purge the pipes if onsite measurements exceed the LEL. The Site LEL Meters are calibrated using a gas with50ppm carbon monoxide, 10 ppm hydrogen sulfide, 2.5% by volume methane (50% LEL), 18% Oxygen, and the balance made up of nitrogen; and
4. The water truck will be onsite and full.

Pipe Removal

The pipe removal is time-sensitive due to the fact it may result in materials being exposed to the atmosphere that have been in an oxygen free environment for decades. In addition to the OSC Staff removing the sample from the COG pipe, dedicated staff will be at the materials management/containment area. The following protocol will be followed each day of COG pipe removal:

1. Review the pipe section to be removed each day to differentiate the types of piping and conduit to be removed .
2. Calculate the potential volume of residual and pipe (Table 6);
3. Prepare the available capacity in the residual and pipe quench tank or sump;
4. Test the LEL/O2 at any openings to the pipe to be cut;
5. Purge with nitrogen if pipe atmosphere is above the LEL;
6. Remove each section of pipe, between 10- and 20-feet long (as required to fit within the quench pit);
7. A spotter shall be available to ensure the remaining pipe section contents do not ignite. The spotter shall remain on site at the materials management area(s) for no less than 1 hour after the pipe and contents have been quenched. The spotter shall be responsible for;
    a. Tracking the pipe sections removed based on the daily quantities identified in activity 1;
    b. Monitoring the movement of contents from the pipe;
    c. Monitoring the temperature of the contents exposed to the atmosphere;
    d. Monitoring the placement of the contents into the quench;
    e. Monitoring the placement of the pipe in the quench; and
    f. Documenting that all new pipe openings have been sealed at the end of the shift.
8. The pipe section shall be transferred to the materials management/containment area;
9. To the extent possible, the pipe contents will be emptied onto the containment slab. The residual contents will be scraped from the slab and placed in the water quench;
10. ;Each area that could have any pipe residual (building surfaces, pavement or slabs) shall be flushed with water. The flushing water will be collected, treated and properly managed;
11. The pipe and contents will be placed in the water quench for no less than 8 hours;

12. No less than 8-hours after the pipe residuals have been quenched, the solids will be removed from the quench tank and placed in the containment area or mixing pad (Figure 2) for inspection;
13. No less than 8 hours after the pipe has been quenched the pipe will be rinsed in the pipe Quench Pit or lined roll off container;
14. The sequence (9 to 13) shall be repeated until the days planned pipe has been removed;
15. After the residual has been inspected following quenching, the material will be stabilized with lime kiln dust (LKD). After the material has oxidized, it is no longer capable of spontaneous combustion so stabilization with LKD will be used solely to eliminate free liquids. Following stabilization, the materials shall remain onsite for no less than 24-hours, but likely 10 days;
16. After the pipe is to be removed from the quench, it shall be triple rinsed with potable water and stockpiled onsite for no less than two days;
17. After the pipe has been staged after quenching and rinsing for two days, the pipe shall be sheared, inspected, and if free of residual shipped offsite for recycling; and
18. For those sections of pipe not removed on a day's shift, each end of remaining pipe shall be sealed (poly and tape or Foam [Appendix C]) no more than 15 minutes after cutting to prevent introduction of air into the pipe.

All rinse water shall be collected and can be used as quench water. Rinsing will be considered complete when the final rinse is clear. The pipe shall be staged for transportation and recycling as scrap.

The residual shall be removed from the quench tank and staged in stockpiles of no more than 2 tons/1 cubic yard on the mixing pad. The residuals will be isolated from other solid materials staged on the mixing pad, if any. The piles will be surrounded with silt socks and allowed to freely drain. The leachate shall be collected in a tank or tote and labeled as non-hazardous pending analysis but shall be assumed to be characteristic for benzene. All totes shall be on two layers of polyethylene sheeting supported with absorbent booms or soil berms to form secondary containment. The residual shall be tested for the waste profile parameters and stabilized as necessary to meet the free liquid criteria for landfill. The waste profile testing suite required for solid material waste disposal approval from the site is:

- TCL VOCs (8260; bulk jar);
- TCL SVOCs (8270);
- Mercury (7471);
- TAL Metals (6010);
- Cyanide (9012);
- Ammonia (350.1);
- Full TCLP;
- PCBs (8082); and
- HazCat: Ignitability, Reactivity, Corrosivity, Paint Filter.

Any tote or container with material that exhibits the characteristics of hazardous waste shall be properly labeled upon receipt of the laboratory data and managed in accordance with the hazardous waste storage and inspection protocols. The approved waste profile and disposal facility will be provided to the DEC no less than 5 days prior to any shipment of residual from the Site.

The pipe rinse water, quench water and leachate will be tested for waste profile parameters and discharged under Permit No. 331to the Town of Tonawanda POTW. All water from the site (other than sanitary waste) is treated prior to discharge. Based on the data collected from the quench sump (Appendix D) it is anticipated that treatment of the pipe rinse water, quench water and leachate will require filtration, granulate active carbon (GAC) and potentially sulfur impregnated carbon (mercury polishing). Inventum/OSC will coordinate with the POTW to determine discharge permitting and treatment requirements. If the water cannot be treated to meet the POTW discharge criteria, the water will be transported for offsite disposal.

Reporting

The pipe removal under this work plan will be documented in a Construction Completion report (CCR) prepared in accordance with DER-10.

Table 1
COG Pipe in Boiler House
Riverview Innovation Technology Campus, Inc.
Town of Tonawanda, New York

Report Date: 8/17/2021
Estimate: R. Birx

Line Diameter (inch)	Length (ft)	Notes	
10	70	Red COG	
24	62	Red COG	
16	92	Red COG	
6	65	Insulated and likely contains residual material	
2	100	Smaller dia. gas lines branching around boilers, estimated, not measured	
Pipe Area (in^2)	Pipe Volume (ft^3)		
79	40		
452	200		
201	130		
28	20		
3	10		

Potential Volume of Residual (ft^3)		Potential Volume of Pipe (ft^3)	
	400		800
15% Contingency	460	15% Contingency	920
	Minium Qunch Volume (Gallons)		
	3500		6900
	Disposal Weight (Tons)		
	32		
	All Resdiiual should fit in a single roll off container.		Pipe will likely require two roll off containers unless removed over several days.

Report Date: 9/23/2021
Estimate: J. Black

Sheet T-BP-0250			
Line Diameter (inch)	**Length (ft), rounded to 10 feet**	**Notes**	
18	30	Red COG	
24	480	Red COG	
30	200	Red COG	
36	350	Red COG	
Drip Legs	30	#2, #3, and #4	
Pipe Area (in^2)	Pipe Volume (ft^3)		
254	60		
452	1510		
707	990		
1017	2480		
314	70		

Potential Volume of Residual (ft^3)		**Potential Volume of Pipe (ft^3)**	
	5110		10220
15% Contingency	5880	15% Contingency	11760
	Minium Qunch Volume (Gallons)		
	44100		88200
	Disposal Weight (Tons)		
	400		
	All Residual will require significant stockpile and management. The pipe will have to be managed over several weeks to allow quenching.		

Table 3
COG Pipe Sheet 0251
Riverview Innovation Technology Campus, Inc.
Town of Tonawanda, New York

Report Date: 9/23/2021
Estimate: J. Black

Sheet T-BP-0251			
Line Diameter (inch)	**Length (ft), rounded to 10 feet**	**Notes**	
24	190	Red COG	
30	60	Red COG	
36	200	Red COG	
36	150	Crossover	
36	250	Collection Mains	
Drip Legs	60	#5a, #5B, #6, #7A, #7B, Pod #8	
Pipe Area (in^2)	Pipe Volume (ft^3)		
452	600		
707	300		
1017	1420		
1017	1060		
1017	1770		
314	140		

Potential Volume of Residual (ft^3)		**Potential Volume of Pipe (ft^3)**	
	5290		10580
15% Contingency	6090	15% Contingency	12170
	Minium Qunch Volume (Gallons)		
	45700		91300
	Disposal Weight (Tons)		
	420		
	All Residual will require significant stockpile and management. The pipe will have to be managed over several weeks to allow quenching.		

Table 4
Bench-scale Test Results
Riverview Innovation Technology Campus, Inc.
Town of Tonawanda, New York

Sample Location	Pipe	Contents	Control, Response to Atmosphere	Quench		
				Water	Permanganate (0.1, 0.5, and 1 % Solutions)	FQE (3, 5, and 10% solutions)
1	8-inch COG line on the southwest side of the boiler house	Grayish Black silt consistency material. Some crystals like "Napthalene".	Smoulder after 10 Minutes, rose to 172^{0}F	Cooled to 97^{0}F within 10 minutes, 50% quench by volume	Cooled to 99^{0}F within 25 minutes, 50% quench by volume	Cooled to 100^{0}F within 23 minutes, 50% quench by volume
2	8-inch horizontal line near the center boiler	Grayish Black silt consistency material. Some crystals like "Napthalene".	No Reaction, no temperature rise.	N.A.	N.A.	N.A.
3	8-inch vertical line between the outside line and the horizontal line	Grayish Black silt consistency material. Some crystals like "Napthalene".	Smoulder after 50 Minutes, rose to 1340F, igited breifly but self extinguished (too little fuel)	Cooled to 97^{0}F within 10 minutes, 50% quench by volume	Cooled to 99^{0}F within 25 minutes, 50% quench by volume	Cooled to 100^{0}F within 23 minutes, 50% quench by volume
4	10-inch COG line from a blind flange on the east end of the ground floor of the boiler house	Reddish Brown silt and some scale.	No Reaction, no temperature rise.	N.A.	N.A.	N.A.
5	10-inch COG line from a 2-inch capped lateral at the west end of the ground floor of the boiler house	Grayish Black silt consistency material. Some crystals like "Napthalene".	No Reaction, no temperature rise.	N.A.	N.A.	N.A.
6	12-inch former COG line that used to supply the west flare	Grayish Black silt consistency material.	No Reaction, no temperature rise.	N.A.	N.A.	N.A.
7	20-inch Pipe along Broadway near the pump house	Grayish Black silt consistency material. Much lighter in unit weight.	No Reaction, no temperature rise.	N.A.	N.A.	N.A.

Table 5
Bench Scale Test Results
Post-Quench Sample
Riverview Innovation Technology Campus BCP Site
Tonawanda, NY

Analytes (a)	Comparative Standards (where applicable)	Description:	Sample ID: SD-COGAQ-08272021 Bench Scale Test Post-Quench Sample
		Units	8/27/2021
Waste Characterization General Chemistry			
Corrosivity as pH	<2	S.U.	2.54
Flash Point	<60	deg. C	>70.0
Ignitability		mm/sec	No Burn
Paint Filter		N/A	Pass
Reactive Cyanide		µg/g	<5.0 U
Reactive Sulfide		µg/g	44
Reactivity			Not Reactive
TCLP - Semi-Volatile Organics	(b)		
1,4-Dichlorobenzene	7500	µg/L	<40 U
2,4,5-Trichlorophenol	400000	µg/L	<40 U
2,4,6-Trichlorophenol	2000	µg/L	<40 U
2,4-Dinitrotoluene	130	µg/L	<40 U
Cresols (as m,p,o-Cresol)	200000	µg/L	<80 U
Hexachlorobenzene	130	µg/L	<40 U
Hexachlorobutadiene	500	µg/L	<40 U
Hexachloroethane	3000	µg/L	<40 U
Nitrobenzene	2000	µg/L	<40 U
Pentachlorophenol	100000	µg/L	<80 U
Pyridine	5000	µg/L	**207**
TCLP - Mercury	(b)		
Mercury	0.2	mg/L	**0.0011** J
TCLP - Pesticides	(b)		
Chlordane	30	µg/L	<1.00 U
Endrin	20	µg/L	<1.00 U
gamma-BHC (Lindane)	400	µg/L	<1.00 U
Heptachlor	8	µg/L	<1.00 U
Heptachlor Epoxide	8	µg/L	<1.00 U
Methoxychlor	10000	µg/L	<1.00 U
Toxaphene	500	µg/L	<20.0 U
TCLP - Herbicides	(b)		
2,4,5-TP (Silvex)	1	mg/L	<0.050 U
2,4-D	10	mg/L	<0.050 U
TCLP - Metals	(b)		
Arsenic	5	mg/L	<0.500 U
Barium	100	mg/L	<0.500 U
Boron	-	mg/L	<0.500 U
Cadmium	1	mg/L	**0.136**
Chromium	5	mg/L	<0.500 U
Lead	5	mg/L	<0.500 U
Selenium	1	mg/L	<0.200 U
Silver	5	mg/L	<0.500 U
TCLP - Volatile Organics	(b)		
1,1-Dichloroethene	700	µg/L	<20.0 U
1,2-Dichloroethane	500	µg/L	<20.0 U
2-Butanone	200000	µg/L	<100 U
Benzene	500	µg/L	**23.9**
Carbon Tetrachloride	500	µg/L	<20.0 U
Chlorobenzene	100000	µg/L	<20.0 U
Chloroform	6000	µg/L	<20.0 U
Tetrachloroethene	700	µg/L	<20.0 U
Trichloroethene	500	µg/L	<20.0 U
Vinyl chloride	200	µg/L	<20.0 U

Table 5
Bench Scale Test Results
Post-Quench Sample
Riverview Innovation Technology Campus BCP Site
Tonawanda, NY

Analytes (a)	Sample ID:		SD-COGAQ-08272021	
	Comparative Standards (where applicable)	Description:	Bench Scale Test Post-Quench Sample	
		Units	8/27/2021	
Mercury				
Mercury		mg/kg	470	
TAL Metals				
Aluminum		mg/kg	167	
Antimony		mg/kg	9.48	
Arsenic		mg/kg	7.22	
Barium		mg/kg	8.25	
Beryllium		mg/kg	<0.242	U
Cadmium		mg/kg	54.7	
Calcium		mg/kg	160	
Chromium		mg/kg	**120**	
Cobalt		mg/kg	**11.3**	
Copper		mg/kg	**176**	
Iron		mg/kg	**423000**	
Lead		mg/kg	**10.7**	
Magnesium		mg/kg	<121	U
Manganese		mg/kg	**3980**	
Nickel		mg/kg	**54.6**	
Potassium		mg/kg	<121	U
Selenium		mg/kg	<19.4	U
Silver		mg/kg	<24.2	U
Sodium		mg/kg	<121	U
Sulfur		mg/kg	**190000**	
Thallium		mg/kg	<24.2	U
Vanadium		mg/kg	**13.1**	
Zinc		mg/kg	**84.8**	
Polychlorinated Biphenyls				
PCB-1016		mg/kg	<0.0301	U
PCB-1221		mg/kg	<0.0301	U
PCB-1232		mg/kg	<0.0301	U
PCB-1242		mg/kg	<0.0301	U
PCB-1248		mg/kg	<0.0301	U
PCB-1245		mg/kg	<0.0301	U
PCB-1260		mg/kg	<0.0301	U
PCB-1262		mg/kg	<0.0301	U
PCB-1268		mg/kg	<0.0301	U
Pesticides				
4,4-DDD		µg/kg	<150	U
4,4-DDE		µg/kg	<150	U
4,4-DDT		µg/kg	<150	U
Aldrin		µg/kg	<150	U
alpha-BHC		µg/kg	<150	U
beta-BHC		µg/kg	<150	U
Dieldrin		µg/kg	<150	U
Endosulfan I		µg/kg	<150	U
Endosulfan II		µg/kg	<150	U
Endosulfan Sulfate		µg/kg	<150	U
Endrin		µg/kg	<150	U
Endrin Aldehyde		µg/kg	<150	U
Endrin Ketone		µg/kg	<150	U
gamme-BHC (Lindane)		µg/kg	<150	U
Heptachlor		µg/kg	<150	U
Heptachlor Epoxide		µg/kg	<150	U
Methoxychlor		µg/kg	**171**	P
Toxaphene		µg/kg	<1500	U
trans-Chlordane		µg/kg	<150	U
Herbicides				
2,4-D		µg/kg	<1280	U
2,4,5-T		µg/kg	<320	U
2,4,5-TP (Silvex)		µg/kg	<320	U

Table 5
Bench Scale Test Results
Post-Quench Sample
Riverview Innovation Technology Campus BCP Site
Tonawanda, NY

Analytes (a)	Sample ID:		SD-COGAQ-08272021
	Comparative Standards (where applicable)	Description:	Bench Scale Test Post-Quench Sample
		Units	8/27/2021
Semi-Volatile Organics			
1,1-Biphenyl		µg/kg	**2080** J
1,2,4,5-Tetrachlorobenzene		µg/kg	<2820 U
1,2,4-Trichlorobenzene		µg/kg	<2820 U
1,2-Dichlorobenzene		µg/kg	<2820 U
1,3-Dichlorobenzene		µg/kg	<2820 U
1,4-Dichlorobenzene		µg/kg	<2820 U
2,2-Oxybis (1-chloropropane)		µg/kg	<2820 U
2,3,4,6-Tetrachlorophenol		µg/kg	<2820 U
2,4,5-Trichlorophenol		µg/kg	<2820 U
2,4,6-Trichlorophenol		µg/kg	<2820 U
2,4-Dichlorophenol		µg/kg	<2820 U
2,4-Dimethylphenol		µg/kg	<2820 U
2,4-Dinitrophenol		µg/kg	<11300 U
2,4-Dinitrotoluene		µg/kg	<2820 U
2-Chloronaphthalene		µg/kg	<2820 U
2-Chlorophenol		µg/kg	<2820 U
2-Methylnaphthalene		µg/kg	**15800**
2-Methylphenol		µg/kg	<2820 U
2-Nitroaniline		µg/kg	<2820 U
2-Nitrophenol		µg/kg	<2820 U
3&4-Methylphenol		µg/kg	<2820 U
3,3'-Dichlorobenzidine		µg/kg	<2820 U
3-Nitroaniline		µg/kg	<2820 U
4,6-Dinitro-2-methylphenol		µg/kg	<5640 U
4-Bromophenyl phenyl ether		µg/kg	<2820 U
4-Chloro-3-methylphenol		µg/kg	<2820 U
4-Chloroaniline		µg/kg	<2820 U
4-Chlorophenyl phenyl ether		µg/kg	<2820 U
4-Nitroaniline		µg/kg	<2820 U
4-Nitrophenol		µg/kg	<2820 U
Acenaphthene		µg/kg	**1680** J
Acenaphthylene		µg/kg	**4020**
Acetophenone		µg/kg	**1450** J
Anthracene		µg/kg	**2280** J
Atrazine		µg/kg	<2820 U
Benzaldehyde		µg/kg	<2820 U
Benzo (a) anthracene		µg/kg	**4300**
Benzo (a) pyrene		µg/kg	**8640**
Benzo (b) fluoranthene		µg/kg	**1950** J
Benzo (g,h,i) perylene		µg/kg	**4930**
Benzo (k) fluoranthene		µg/kg	<2820 U
Bis (2-chloroethoxy) methane		µg/kg	<2820 U
Bis (2-chloroethyl) ether		µg/kg	<2820 U
Bis (2-ethylhexyl) phthalate		µg/kg	<2820 U
Caprolactam		µg/kg	<2820 U
Carbozole		µg/kg	**1690** J
Chrysene		µg/kg	**13200**
Dibenz (a,h) anthracene		µg/kg	<2820 U
Dibenzofuran		µg/kg	**3970**
Diethyl phthalate		µg/kg	<2820 U
Dimethyl phthalate		µg/kg	<2820 U
Di-n-butyl phthalate		µg/kg	<2820 U
Di-n-oxtylphthalate		µg/kg	<2820 U
Fluoranthene		µg/kg	**16400**
Fluorene		µg/kg	**3740**
Hexachlorobenzene		µg/kg	<2820 U
Hexachlorobutadiene		µg/kg	<2820 U
Hexachlorocyclopentadiene		µg/kg	<11300 U
Hexachloroethane		µg/kg	<2820 U
Indeno (1,2,3-cd) pyrene		µg/kg	**2770** J
Isophorone		µg/kg	<2820 U
Naphthalene		µg/kg	**65500**
Nitrobenzene		µg/kg	<2820 U

Table 5
Bench Scale Test Results
Post-Quench Sample
Riverview Innovation Technology Campus BCP Site
Tonawanda, NY

Analytes (a)	Comparative Standards (where applicable)	Sample ID: / Description:	SD-COGAQ-08272021 / Bench Scale Test Post-Quench Sample
		Units	8/27/2021
N-Nitroso-di-n-propylamine		µg/kg	<2820 U
N-Nitrosodiphenylamine		µg/kg	<2820 U
Pentachlorophenol		µg/kg	<5640 U
Phanenthrene		µg/kg	**10500**
Phenol		µg/kg	<2820 U
Pyrene		µg/kg	**9290**

Table 5
Bench Scale Test Results
Post-Quench Sample
Riverview Innovation Technology Campus BCP Site
Tonawanda, NY

Analytes (a)	Sample ID:		SD-COGAQ-08272021
	Comparative Standards (where applicable)	Description:	Bench Scale Test Post-Quench Sample
		Units	8/27/2021
Volatile Organics			
1,1,1-Trichloroethane		µg/kg	<28.8 U
1,1,2,2-Tetrachloroethane		µg/kg	<28.8 U
1,1,2-Trichloroethane		µg/kg	<28.8 U
1,1-Dichloroethane		µg/kg	<28.8 U
1,1,-Dichloroethene		µg/kg	<28.8 U
1,2,3-Trichlorobenzene		µg/kg	<72 U
1,2,4-Trichlorobenzene		µg/kg	<72 U
1,2-Dibromo-3-Chloropropane		µg/kg	<144 U
1,2-Dibromoethane		µg/kg	<28.8 U
1,2Dichlorobenzene		µg/kg	<28.8 U
1,2-Dichloroethane		µg/kg	<28.8 U
1,2-Dichloropropane		µg/kg	<28.8 U
1,3-Dichlorobenzene		µg/kg	<28.8 U
1,4-Dichlorobenzene		µg/kg	<28.8 U
1,4-Dioxne		µg/kg	<144 U
2-Butanone		µg/kg	<144 U
2-Hexanone		µg/kg	<72 U
4-Methyl-2-pentanone		µg/kg	<72 U
Acetone		µg/kg	**73.3** J
Benzene		µg/kg	**27.4** J
Bromochloromethane		µg/kg	<72 U
Bromodichloromethane		µg/kg	<28.8 U
Bromoform		µg/kg	<72 U
Bromomethane		µg/kg	<28.8 U
Carbon Disulfide		µg/kg	**127**
Carbon Tetrachloride		µg/kg	<28.8 U
Chlorobenzene		µg/kg	<28.8 U
Chloroethane		µg/kg	<28.8 U
Chloroform		µg/kg	<28.8 U
Chloromethane		µg/kg	<28.8 U
cis-1,2-Dichloroethene		µg/kg	<28.8 U
cis-1,3-Dichloropropene		µg/kg	<28.8 U
Cyclohexane		µg/kg	<144 U
Dibromochloromethane		µg/kg	<28.8 U
Dichlorodifluoromethane		µg/kg	<28.8 U
Ethylbenzene		µg/kg	<28.8 U
Freon 113		µg/kg	<28.8 U
Isopropylbenzene		µg/kg	<28.8 U
m,p-Xylene		µg/kg	**31.3**
Methyl acetate		µg/kg	<28.8 U
Methyl ter-butyl Ether		µg/kg	<28.8 U
Methylcyclohexane		µg/kg	<28.8 U
Methylene chloride		µg/kg	**50.7** J
o-Xylene		µg/kg	<28.8 U
Sytrene		µg/kg	<72 U
Tetrachloroethene		µg/kg	<28.8 U
Toluene		µg/kg	**19.8** J
trans-1,2-Dichloroethene		µg/kg	<28.8 U
trans-1,3-Dichloropropene		µg/kg	<28.8 U
Trichloroethene		µg/kg	<28.8 U
Trichlorofluoromethane		µg/kg	<28.8 U
Vinyl Chloride		µg/kg	<28.8 U
Dioxane (8270 SIM)			
1,4-Dioxane		µg/kg	<103 U

Table 5
Bench Scale Test Results
Post-Quench Sample
Riverview Innovation Technology Campus BCP Site
Tonawanda, NY

Analytes (a)		Sample ID:	SD-COGAQ-08272021
	Comparative Standards (where applicable)	Description:	Bench Scale Test Post-Quench Sample
		Units	8/27/2021
General Chemistry			
Cyanide, Total		µg/g	192
Heat Value		btu/lb	1520

a/ Detections or estimated detections are noted in bold font.
b/Toxicity Characteristic Leaching Procedure SW-846 Hazardous Waste Standards
U = not detected above reporting limit shown; J= estimated value. Results above MDL but below RL
mg/L = milligrams per liter; ug/L = micrograms per liter; mg/kg = milligrams per kilogram; ug/kg = micrograms per kilograms; ug/g = micrograms per gram; btu/lb = british thermal units per pound

Table 6
Water Quality Data
Coke Quench Pit and Wharf
Riverview Innovation Technology Campus, Inc.
Town of Tonawanda, New York

Analytes	Class GA Ambient Water Quality Standards and Guidance Values	Units	W-BCP-04	W-BCP-07	AQ-Fire Quench-08112021		AQ-COGAQ-08252021	
	Sample Date		11/19/2020	11/19/2020	8/11/2021		8/25/2021	
	Location:		East Quench Sump	East Coke Wharf	East Quench Sump		East Quench Sump	
	Sample Type:		Grab - Accumulated Storm Water	Grab - Accumulated Storm Water	Grab - Post Fire		Grab - Post Fire and Quench	
Characteristics								
pH			NS	NS			6.82	
Flash Point			NS	NS			>70	
			NS	NS				
TOC VOCs (SW8260C)								
1,1,1-Trichloroethane (TCA)	5	ug/l	NS	NS	<20	U	<200	U
1,1,2,2-Tetrachloroethane	5	ug/l	NS	NS	<20	U	<200	U
1,1,2-Trichloroethane	1	ug/l	NS	NS	<20	U	<200	U
1,1,2-Trichloro-1,2,2-Trifluoroethane	5	ug/l	NS	NS			<200	U
1,1-Dichloroethane	5	ug/l	NS	NS	<20	U	<200	U
1,1-Dichloroethene	5	ug/l	NS	NS	<20	U	<200	U
1,2,3-Trichlorobenzene	5	ug/l	NS	NS	<50	U	<500	U
1,2,4-Trichlorobenzene	5	ug/l	NS	NS	<50	U	<200	U
1,2-Dibromo-3-Chloropropane	0.04	ug/l	NS	NS	<100	U	<1000	U
1,2-Dibromoethane (Ethylene Dibromide)	0.0006	ug/l	NS	NS	<20	U	<200	U
1,2-Dichlorobenzene	3	ug/l	NS	NS	<20	U	<200	U
1,2-Dichloroethane	0.6	ug/l	NS	NS	<20	U	<200	U
1,2-Dichloropropane	1	ug/l	NS	NS	<20	U	<200	U
1,3-Dichlorobenzene	3	ug/l	NS	NS	<20	U	<200	U
1,4-Dichlorobenzene	3	ug/l	NS	NS	<20	U	<200	U
1,4-Dioxane (P-Dioxane)		ug/l	NS	NS	<100	U	<1000	U
Methyl Ethyl Ketone (2-Butanone)	50	ug/l	NS	NS	<100	U	<1000	U
2-Hexanone	50	ug/l	NS	NS	<50	U	<500	U
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)		ug/l	NS	NS	<50	U	<500	U
Acetone	50	ug/l	NS	NS	<100	U	<1000	U
Benzene	1	ug/l	NS	NS	**340**		**1910**	
Bromochloromethane	5	ug/l	NS	NS	<50	U	<500	U
Bromodichloromethane	50	ug/l	NS	NS	<20	U	<200	U
Bromoform	50	ug/l	NS	NS	<50	U	<500	U
Bromomethane	5	ug/l	NS	NS	<20	U	<200	U
Carbon Disulfide		ug/l	NS	NS	**23.6**		<200	U
Carbon Tetrachloride	5	ug/l	NS	NS	<20	U	<200	U
Chlorobenzene	5	ug/l	NS	NS	<20	U	<200	U
Chloroethane	5	ug/l	NS	NS	<20	U	<200	U
Chloroform	7	ug/l	NS	NS	<20	U	<200	U
Chloromethane	5	ug/l	NS	NS	<20	U	<200	U
Cyclohexane		ug/l	NS	NS	<100	U	<1000	U
Dibromochloromethane	50	ug/l	NS	NS	<20	U	<200	U
Dichlorodifluoromethane	5	ug/l	NS	NS	<20	U	<200	U
Methylene Chloride	5	ug/l	NS	NS	<50	U	<500	U
Ethylbenzene	5	ug/l	NS	NS	**31.1**		**129**	

Table 6
Water Quality Data
Coke Quench Pit and Wharf
Riverview Innovation Technology Campus, Inc.
Town of Tonawanda, New York

Analytes	Class GA Ambient Water Quality Standards and Guidance Values	Units	W-BCP-04	W-BCP-07	AQ-Fire Quench-08112021		AQ-COGAQ-08252021	
	Sample Date		11/19/2020	11/19/2020	8/11/2021		8/25/2021	
	Location:		East Quench Sump	East Coke Wharf	East Quench Sump		East Quench Sump	
	Sample Type:		Grab - Accumulated Storm Water	Grab - Accumulated Storm Water	Grab - Post Fire		Grab - Post Fire and Quench	
Isopropylbenzene (Cumene)	5	ug/l	NS	NS	<20	U	<200	U
Methyl Acetate		ug/l	NS	NS	<20	U	<200	U
Tert-Butyl Methyl Ether		ug/l	NS	NS	<20	U	<200	U
Methylcyclohexane		ug/l	NS	NS	<20	U	<200	U
Styrene	5	ug/l	NS	NS	<50	U	<500	U
Tetrachloroethylene (PCE)	5	ug/l	NS	NS	<20	U	<200	U
Toluene	5	ug/l	NS	NS	**485**		**2440**	
Trichloroethylene (TCE)	5	ug/l	NS	NS	<20	U	<200	U
Trichlorofluoromethane	5	ug/l	NS	NS	<20	U	<200	U
Vinyl Chloride	2	ug/l	NS	NS	<20	U	<200	U
Cis-1,2-Dichloroethylene	5	ug/l	NS	NS			<200	U
Cis-1,3-Dichloropropene	0.4	ug/l	NS	NS	<20	U	<200	U
m,p-Xylene	5	ug/l	NS	NS	**530**		**2180**	
O-Xylene (1,2-Dimethylbenzene)	5	ug/l	NS	NS	**184**		**731**	
Trans-1,2-Dichloroethene	5	ug/l	NS	NS	<20	U	<200	U
Trans-1,3-Dichloropropene	0.4	ug/l	NS	NS	<20	U	<200	U

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Coke Quench Pit and Wharf
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Analytes	Class GA Ambient Water Quality Standards and Guidance Values	Units	W-BCP-04		W-BCP-07		AQ-Fire Quench-08112021		AQ-COGAQ-08252021	
	Sample Date		11/19/2020		11/19/2020		8/11/2021		8/25/2021	
	Location:		East Quench Sump		East Coke Wharf		East Quench Sump		East Quench Sump	
	Sample Type:		Grab - Accumulated Storm Water		Grab - Accumulated Storm Water		Grab - Post Fire		Grab - Post Fire and Quench	
1,4-Dioxane (SW8270D)										
1,4-Dioxane (P-Dioxane)	1	ug/l	NS		NS		<100		**0.583**	
TCL SVOCs (SW8270D)										
1,2,4,5-Tetrachlorobenzene	5	ug/l	<1.1	U	<1.1	U	<5000	U	<4840	U
2,3,4,6-Tetrachlorophenol		ug/l	<1.1	U	<1.1	U	<5000	U	<4840	U
2,4,5-Trichlorophenol		ug/l	<0.99	U	<0.99	U	<5000	U	<4840	U
2,4,6-Trichlorophenol		ug/l	<1.3	U	<1.3	U	<5000	U	<4840	U
2,4-Dichlorophenol	5	ug/l	<1.2	U	<1.2	U	<5000	U	<4840	U
2,4-Dimethylphenol	50	ug/l	<1.3	U	<1.3	U	<5000	U	<4840	U
2,4-Dinitrophenol	10	ug/l	<19	U	<19	U	<5000	U	<4840	U
2,4-Dinitrotoluene	5	ug/l	<2.2	U	<2.2	U	<5000	U	<9690	U
2,6-Dinitrotoluene	5	ug/l	<1.2	U	<1.2	U	<5000	U	<4840	U
2-Chloronaphthalene	10	ug/l	<1.3	U	<1.3	U	<5000	U	<4840	U
2-Chlorophenol		ug/l	<0.97	U	<0.97	U	<5000	U	<4840	U
2-Methylnaphthalene	NC	ug/l	<1.2	U	<1.2	U	<5000	U	**3560**	
2-Methylphenol (O-Cresol)		ug/l	<0.91	U	<0.91	U	<5000	U	<4840	U
2-Nitroaniline	5	ug/l	<1.3	U	<1.3	U	<10000	U	<9690	U
2-Nitrophenol		ug/l	<1.4	U	<1.4	U	<5000	U	<4840	U
3,3'-Dichlorobenzidine	5	ug/l	<1.1	U	<1.1	U	<5000	U	<4840	U
Cresols, M & P		ug/l	<1.1	U	<1.1	U				
3-Nitroaniline	5	ug/l	<2.3	U	<2.3	U	<10000	U	<9690	U
4,6-Dinitro-2-Methylphenol		ug/l	<18	U	<18	U	<10000	U	<9690	U
4-Bromophenyl Phenyl Ether		ug/l	<1.5	U	<1.5	U	<5000	U	<4840	U
4-Chloro-3-Methylphenol		ug/l	<0.98	U	<0.98	U	<5000	U	<4840	U
4-Chloroaniline	5	ug/l	<0.91	U	<0.91	U	<5000	U	<4840	U
4-Chlorophenyl Phenyl Ether		ug/l	<1.4	U	<1.4	U	<5000	U	<4840	U
4-Nitroaniline	5	ug/l	<2.5	U	<2.5	U	<5000	U	<9690	U
4-Nitrophenol		ug/l	<5.8	U	<5.8	U	<5000	U	<9690	U
Acenaphthene	20	ug/l	<1.3	U	<1.3	U	<5000	U	<4840	U
Acenaphthylene		ug/l	<1.3	U	<1.3	U	<5000	U	<4840	U
Acetophenone		ug/l	<1.2	U	<1.2	U	<5000	U	**2500**	
Anthracene	50	ug/l	<1.2	U	<1.2	U	<5000	U	<4840	U
Atrazine	7.5	ug/l	<1.9	U	<1.9	U	<12500	U	<12100	U
Benzo(A)Anthracene	0.002	ug/l	<1.5	U	<1.5	U	<5000	U	<4840	U
Benzaldehyde		ug/l	<3.4	U	<3.4	U	<5000	U	<4840	U
Benzo(A)Pyrene	NC	ug/l	<1.1	U	<1.1	U	<5000	U	<4840	U
Benzo(B)Fluoranthene	0.002	ug/l	<1.1	U	<1.1	U	<5000	U	<4840	U
Benzo(G,H,I)Perylene		ug/l	<0.91	U	<0.91	U	<5000	U	<4840	U
Benzo(K)Fluoranthene	0.002	ug/l	<1.1	U	<1.1	U	<5000	U	<4840	U
Biphenyl (Diphenyl)	5	ug/l	<1.3	U	<1.3	U			<4840	U
Bis(2-Chloroisopropyl) Ether	5	ug/l	<1.3	U	<1.3	U			<4840	U

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Town of Tonawanda, New York

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	Sample Date		11/19/2020		11/19/2020		8/11/2021		8/25/2021	
	Location:		East Quench Sump		East Coke Wharf		East Quench Sump		East Quench Sump	
	Sample Type:		Grab - Accumulated Storm Water		Grab - Accumulated Storm Water		Grab - Post Fire		Grab - Post Fire and Quench	
Bis(2-Chloroethoxy) Methane	5	ug/l	<1.8	U	<1.8	U	<5000	U	<4840	U
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	1	ug/l	<1.2	U	<1.2	U	<5000	U	<4840	U
Bis(2-Ethylhexyl) Phthalate	5	ug/l	<0.91	U	<0.91	U	<5000	U	<4840	U
Benzyl Butyl Phthalate	50	ug/l	<1.3	U	<1.3	U	<5000	U	<4840	U
Caprolactam		ug/l	<0.91	U	<0.91	U	<5000	U	<4840	U
Carbazole		ug/l	<1.4	U	<1.4	U	<5000	U	<4840	U
Chrysene	0.002	ug/l	<1.1	U	<1.1	U	<5000	U	<4840	U
Di-N-Butyl Phthalate	50	ug/l	<1.9	U	<1.9	U	<5000	U	<4840	U
Di-N-Octylphthalate	50	ug/l	<3.0	U	<3.0	U	<5000	U	<4840	U
Dibenz(A,H)Anthracene		ug/l	<0.93	U	<0.93	U	<5000	U	<4840	U
Dibenzofuran		ug/l	<1.3	U	<1.3	U			<4840	U
Diethyl Phthalate	50	ug/l	<0.98	U	<0.98	U			<4840	U
Dimethyl Phthalate	50	ug/l	<1.2	U	<1.2	U	<10000	U	<9690	U
Fluoranthene	50	ug/l	<1.4	U	<1.4	U	<5000	U	<4840	U
Fluorene	50	ug/l	<1.2	U	<1.2	U	<5000	U	<4840	U
Hexachlorobenzene	0.04	ug/l	<1.4	U	<1.4	U	<5000	U	<4840	U
Hexachlorobutadiene	0.5	ug/l	<0.91	U	<0.91	U	<5000	U	<4840	U
Hexachlorocyclopentadiene	5	ug/l	<2.0	U	<2.0	U	<5000	U	<4840	U
Hexachloroethane	5	ug/l	<0.96	U	<0.96	U	<5000	U	<4840	U
Indeno(1,2,3-C,D)Pyrene	0.002	ug/l	<1.6	U	<1.6	U	<5000	U	<4840	U
Isophorone	50	ug/l	<1.3	U	<1.3	U	<5000	U	<4840	U
N-Nitrosodi-N-Propylamine		ug/l	<1.1	U	<1.1	U			<4840	U
N-Nitrosodiphenylamine	50	ug/l	<2.4	U	<2.4	U			<4840	U
Naphthalene	10	ug/l	<1.1	U	<1.1	U	**31200**		**54400**	
Nitrobenzene	0.4	ug/l	<1.4	U	<1.4	U	<5000	U	<4840	U
Pentachlorophenol	1	ug/l	<8.9	U	<8.9	U	<5000	U	<4840	U
Phenanthrene	50	ug/l	<1.3	U	<1.3	U	<5000	U	<4840	U
Phenol	1	ug/l	<0.91	U	<0.91	U	<5000	U	<4840	U
Pyrene	50	ug/l	<1.3	U	<1.3	U	<5000	U	<4840	U

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Analytes	Class GA Ambient Water Quality Standards and Guidance Values	Units	W-BCP-04		W-BCP-07		AQ-Fire Quench-08112021	AQ-COGAQ-08252021
	Sample Date		11/19/2020		11/19/2020		8/11/2021	8/25/2021
	Location:		East Quench Sump		East Coke Wharf		East Quench Sump	East Quench Sump
	Sample Type:		Grab - Accumulated Storm Water		Grab - Accumulated Storm Water		Grab - Post Fire	Grab - Post Fire and Quench
TAL Metals (SW6010)								
Aluminum	NC	ug/l	**23.1**	J	<23	U	**19600**	**251**
Antimony	3	ug/l	<4.7	U	<4.7	U	<60	<60
Arsenic	25	ug/l	<5.5	U	<5.5	U	**54.3**	**8.1**
Barium	1,000	ug/l	**33.3**		**17**	J		**75.5**
Beryllium	3	ug/l	<0.13	U	<0.13	U	<5	<5
Cadmium	5	ug/l	<0.35	U	<0.35	U	<5	<5
Calcium		ug/l	**108000**		**79200**			**235000**
Chromium, Total	50	ug/l	<0.59	U	<0.59	U		<10
Cobalt	NC	ug/l	<0.89	U	<0.89	U		<50
Copper	200	ug/l	<3.9	U	<3.9	U	**192**	<20
Iron	300	ug/l	**181**		**1830**		**146000**	**33600**
Lead	25	ug/l	<2.1	U	<2.1	U	**264**	<10
Magnesium	35,000	ug/l	**17100**		**22800**			**42100**
Manganese	300	ug/l	**14.5**		**50.8**		**6660**	**7440**
Nickel	100	ug/l	<2.6	U	<2.6	U	**50.3**	<40
Potassium		ug/l	**5780**		**11200**			**50500**
Selenium	10	ug/l	<6.4	U	<6.4	U	**13.3**	<20
Silver	50	ug/l	<0.57	U	<0.57	U	<10	<10
Sodium	20,000	ug/l	**31900**		**60800**			**46800**
Thallium	0.5	ug/l	<6.6	U	<6.6	U		<25
Vanadium	NC	ug/l	<0.67	U	<0.67	U		<25
Zinc	2,000	ug/l	<9.4	U	**21.9**		**1280**	<60
Mercury (SW7470)								
Mercury	0.7	ug/l	<0.077	U	<0.077	U	**0.105**	**2.66**
Cyanide (SW9012B)								
Cyanide	0.20	mg/l	**0.0108**	J	NS		**10.9**	**7.39**
PCBs (8082A)								
PCB-1016 (Aroclor 1016)	0.09	ug/l	NS		NS			<1
PCB-1221 (Aroclor 1221)	0.09	ug/l	NS		NS			<1
PCB-1232 (Aroclor 1232)	0.09	ug/l	NS		NS			<1
PCB-1242 (Aroclor 1242)	0.09	ug/l	NS		NS			<1
PCB-1248 (Aroclor 1248)	0.09	ug/l	NS		NS			<1
PCB-1254 (Aroclor 1254)	0.09	ug/l	NS		NS			<1
PCB-1260 (Aroclor 1260)	0.09	ug/l	NS		NS			<1

Table 6
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			Sample Date	11/19/2020	11/19/2020	8/11/2021	8/25/2021
			Location:	East Quench Sump	East Coke Wharf	East Quench Sump	East Quench Sump
			Sample Type:	Grab - Accumulated Storm Water	Grab - Accumulated Storm Water	Grab - Post Fire	Grab - Post Fire and Quench
Pesticides (8081B)							
P,P'-DDD		0.3	ug/l	NS	NS		NS
P,P'-DDE		0.2	ug/l	NS	NS		NS
P,P'-DDT		0.2	ug/l	NS	NS		NS
Aldrin	NC		ug/l	NS	NS		NS
Dieldrin		0.004	ug/l	NS	NS		NS
Alpha Endosulfan			ug/l	NS	NS		NS
Beta Endosulfan			ug/l	NS	NS		NS
Endosulfan Sulfate			ug/l	NS	NS		NS
Endrin	NC		ug/l	NS	NS		NS
Endrin Aldehyde		5	ug/l	NS	NS		NS
Endrin Ketone		5	ug/l	NS	NS		NS
Heptachlor		0.04	ug/l	NS	NS		NS
Heptachlor Epoxide		0.03	ug/l	NS	NS		NS
Methoxychlor		35	ug/l	NS	NS		NS
Toxaphene		0.06	ug/l	NS	NS		NS
Alpha Bhc (Alpha Hexachlorocyclohexane)		0.01	ug/l	NS	NS		NS
cis-Chlordane			ug/l	NS	NS		NS
Beta Bhc (Beta Hexachlorocyclohexane)		0.04	ug/l	NS	NS		NS
Delta BHC (Delta Hexachlorocyclohexane)		0.04	ug/l	NS	NS		NS
Gamma Bhc (Lindane)		0.05	ug/l	NS	NS		NS
Chlordane (Technical)		0.05	ug/l	NS	NS		NS
Herbicides (SW8151A)							
Acetic acid, (2,4,5-trichlorophenoxy)-		35	ug/l	NS	NS		NS
Silvex (2,4,5-TP)		0.26	ug/l	NS	NS		NS
2,4-D (Dichlorophenoxyacetic Acid)		50	ug/l	NS	NS		NS
Dicamba		0.44	ug/l	NS	NS		NS

Table 6
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Town of Tonawanda, New York

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	Sample Date		11/19/2020	11/19/2020	8/11/2021	8/25/2021	
	Location:		East Quench Sump	East Coke Wharf	East Quench Sump	East Quench Sump	
	Sample Type:		Grab - Accumulated Storm Water	Grab - Accumulated Storm Water	Grab - Post Fire	Grab - Post Fire and Quench	
PFAS (E537)							
Perfluorobutanesulfonic acid (PFBS)	100	ng/l	NS	NS	<0.211	U	
Perfluorohexanesulfonic acid (PFHxS)	100	ng/l	NS	NS			
Perfluoroheptanesulfonic acid (PFHpS)	100	ng/l	NS	NS	<0.610	U	
Perfluorooctanesulfonic acid (PFOS)	10	ng/l	NS	NS	**7.68**	F	
Perfluorodecanesulfonic acid (PFDS)	100	ng/l	NS	NS	<0.870	U	
Perfluorobutanoic Acid	100	ng/l	NS	NS	**50.3**		
Perfluoropentanoic Acid (PFPeA)	100	ng/l	NS	NS	**48.2**		
Perfluorohexanoic acid (PFHxA)	100	ng/l	NS	NS	**23**		
Perfluoroheptanoic acid (PFHpA)	100	ng/l	NS	NS	**6.05**		
Perfluorooctanoic acid (PFOA)	10	ng/l	NS	NS	**6.19**		
Perfluorononanoic acid (PFNA)	100	ng/l	NS	NS	**0.745**	J	
Perfluorodecanoic acid (PFDA)	100	ng/l	NS	NS	**0.497**	J	
Perfluoroundecanoic Acid (PFUnA)	100	ng/l	NS	NS	<0.231	U	
Perfluorododecanoic acid (PFDoA)	100	ng/l	NS	NS	<0.330		
Perfluorotridecanoic Acid (PFTriA/PFTrDA)	100	ng/l	NS	NS	<0.290		
Perfluorotetradecanoic acid (PFTA)	100	ng/l	NS	NS	<0.220		
Perfluorooctane Sulfonamide (FOSA)	100	ng/l	NS	NS	<0.515		
N-methyl perfluorooctanesulfonamidoacetic ac	100	ng/l	NS	NS	<0.575		
N-ethyl perfluorooctanesulfonamidoacetic acid	100	ng/l	NS	NS	<0.713		
1H,1H, 2H, 2H-Perfluorooctane sulfonic acid	100	ng/l	NS	NS			
1H,1H, 2H, 2H-Perfluorodecane sulfonic acid	100	ng/l	NS	NS	<1.08	U	
SOLIDS							
Total Solids		%	NS	NS	NS		

Daily Planning Inventory
COG Pipe Removal
Riverview Innovation Technology Campus Inc.
Town of Tonawanda, New York

Report Date: _____
Spotter: _____

Complete All Blue Cells Daily

Line Diameter (inch)	Length (ft)	Notes/Location	
0	0		
0	0		
0	0		
0	0		
0	0		
Pipe Area (in^2)	Pipe Volume (ft^3)		
0	0		
0	0		
0	0		
0	0		
0	0		

Potential Volume of Residual (ft^3)		Potential Volume of Pipe (ft^3)	
	0		0
15% Contingency	0	15% Contingency	0
	Minium Qunch Volume (Gallons)		
	0		0
	Disposal Weight (Tons)		
	0		

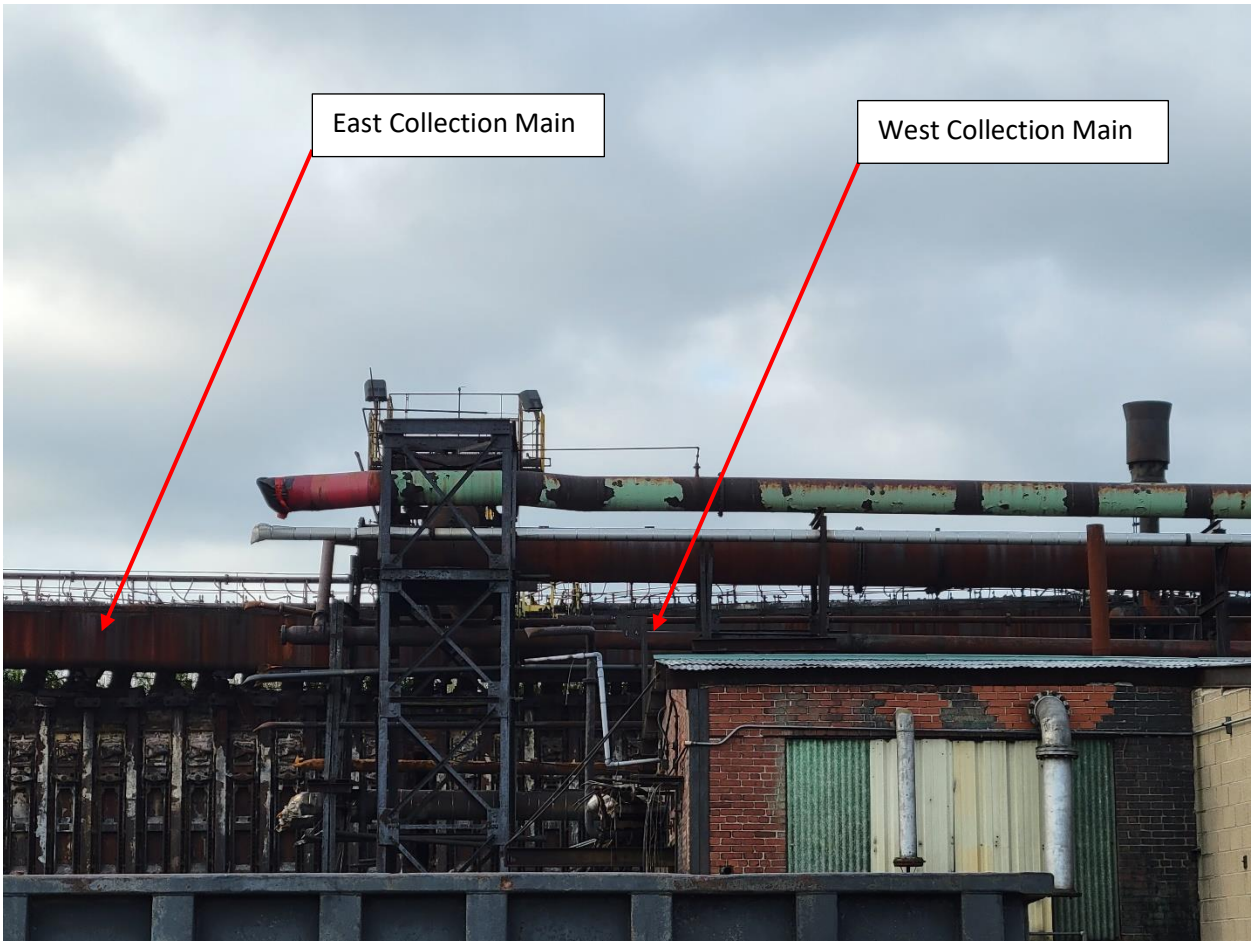
Appendix A
Boiler House Pipe Inspection Notes

By-Products/Production Area

As of 8/13/2021 the Broadway pipe rack has been removed up to the east crossover pipe to the Battery. A field assessment was done to gauge distances and number of pipes in the next area of outside pipe to be removed, the pipe structure adjacent to the south side of the Pump House.

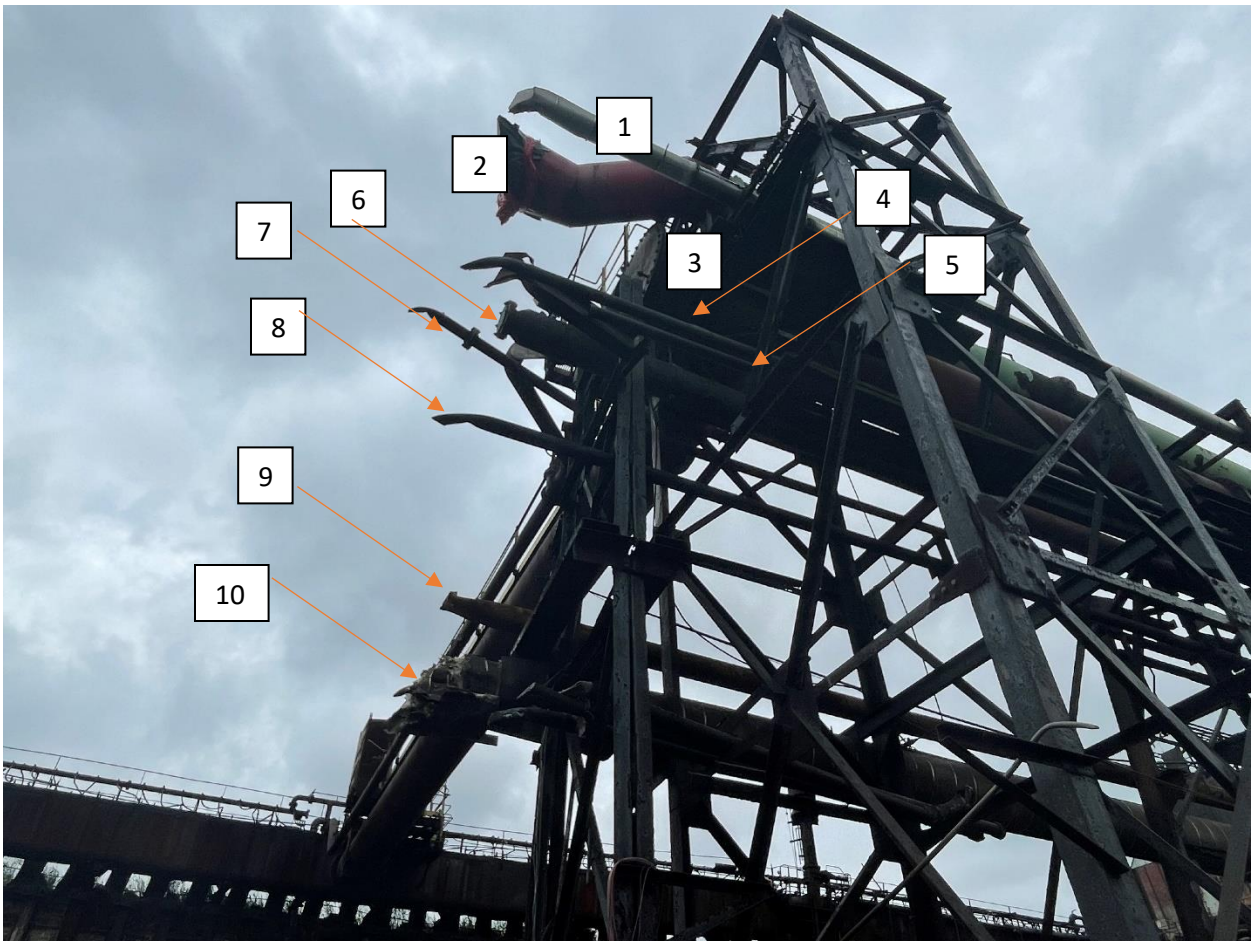
The total distance between the east and west crossover pipes is approximately 120-feet.

Heading west along Broadway, the distances between pipe structural supports is as follows: 32-feet, 30-feet, 23-feet, 6-feet, 20feet, 16-feet. Measurements were taken at the east side of the supports where pipe would be cut. There are a total of 12 pipes and 3 electrical conduits supported by the structure.



Photograph A-1
Pipe rack supporting the east crossover pipe to Battery.
The Pump House is in the right foreground

Photograph A-2
Section of pipe rack evaluated.
Note west crossover pipe on left side of image.

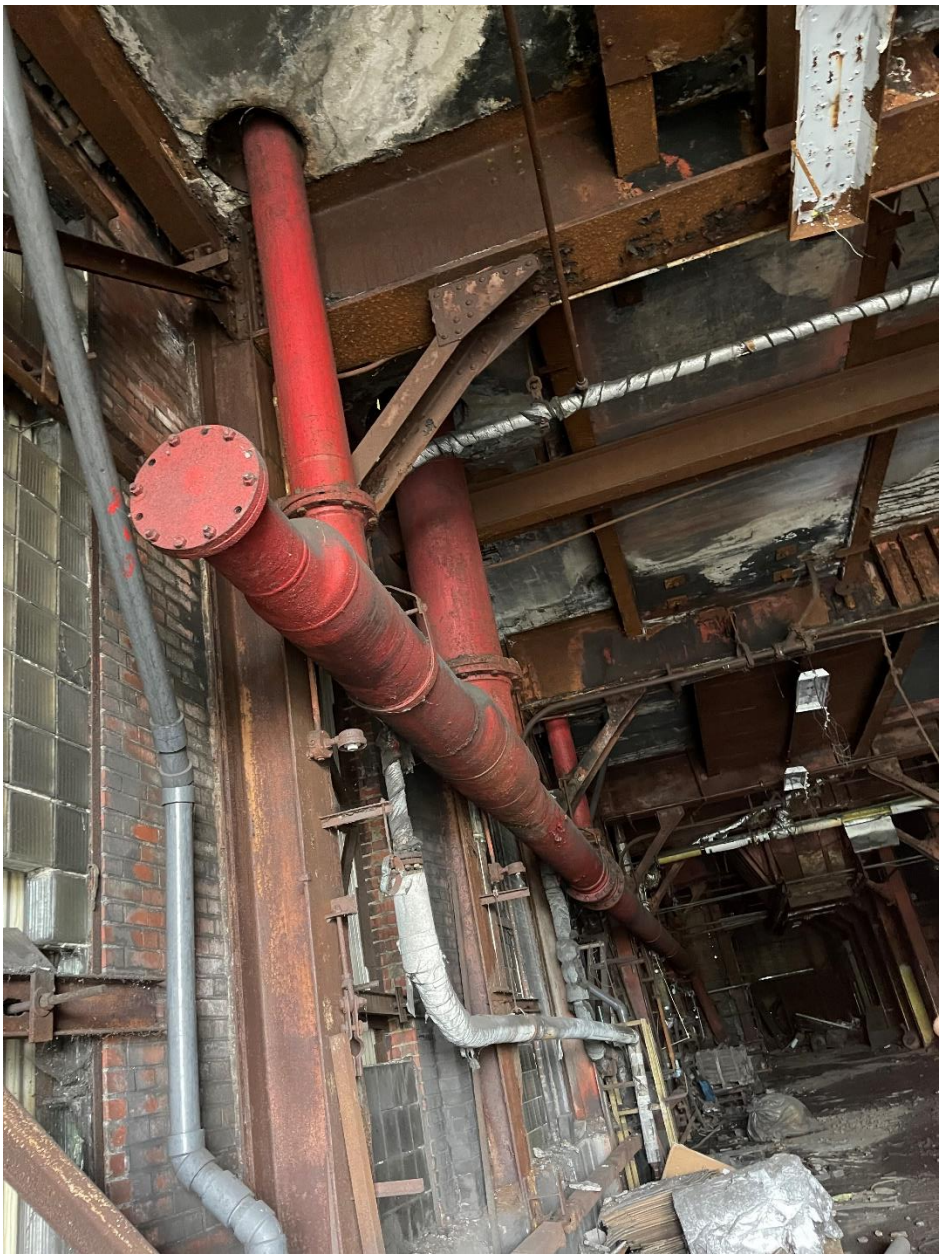


Photograph A-3
10 of the 12 pipes (See notes)

Photograph A-4
Pipe 11 of 12.
This pipe originates from the Pump House and continues west.

Photograph A-5
The 12th pipe starts approximately halfway down (heading west) the structure.

Boiler House



Photograph A-6
The COG pipe on the ground floor inside the Boiler House is approximately 92-feet in length.

Photograph A-7
Typical conditions surrounding piping on ground floor.

Photograph A-8

2nd floor of Boiler House. 10-inches diameter COG pipe about 5-feet 8-inches off the ground. Ties into main COG line on 1st above grade floor of Boiler House.

Photograph A-9

View inside 10-inch COG pipe conveying gas from first to second floor of Boiler house.

Notes:

1. Little to no scale observed.

2. Rust shows oxidation had occurred.

3. Odor similar to cut/burned COG pipelines.

Photograph A-10

24” diameter COG pipe, from 1st floor, up through 2nd floor, runs along ceiling, exits the Boiler House, is sheared/cut. No significant residual.

Notes:

1. Red pipe, second to left and above inspectors’ head.
2. Insulated pipe to the right and above are steam pipelines that do not pose a risk of combustion.

Photograph A-11

10-inch COG pipe coming from 1st floor. Pipe is capped. Used to supply Furnace/ Boiler #7.

Photograph A-12
10-inch COG pipe where it tied into Boiler/ furnace.
Note little scale build-up observed.

Photograph A-13
The bolted flange is the end of the COG pipe. It is capped at this penetration to the west boiler house wall.

Photograph A-14
Interior Section of 8-inch Pipeline inside the Boiler House

Photograph A-15
Horizontal Pipe on Third Level of Boiler House

Photograph No. A-16
Vertical Line inside Boiler House

Note:
This is the pipe that yielded the most reactive sample. All material was removed for testing.

Photograph No. A-17
Horizontal Line along Boiler No. 7

Note: The Boiler to the right of this pipe was fired only with Natural Gas, no COG.

Photograph A-18

COG Pipe at South End of Boiler

Appendix B
Process Lines Schematic Diagrams

TONAWANDA COKE CORPORATION
PROCESS LINES SCHEMATIC DIAGRAMS

Diagrams provided to U.S. EPA by the Tonawanda Coke Corporation.
Information provided here should be verified for accuracy.

0A T-BP-0250

W300.00 W200.00 W100.00 E0.00 E100.00 E200.00 E300.00

N100.00

S0.00

S100.00

S200.00

LOCO REPAIR SHOP

ELECTRICAL SHOP

OIL HOUSE

LABORATORY

MACHINE SHOP AND STORES

BLACKSMITH SHOP

TRUCK LOAD OUT ABANDONED

LIGHT OIL BUILDING

LO STORAGE TANK

WO STORAGE TANK

GASOLINE STG TANK

Previously Removed

Sample 6 Location

NEW FLARE STACK

16" COG

48'

28'

46'

MATCH LINE DWG T-BP-0251

WAREHOUSE

ABANDONED

NOT IN SERVICE

COND SUMP

SHED

LBA LO SCRUBBER

ACTIFIER ABANDONED

32 30" COG

19

27

25

24" COG

DRIP LEG #1

DRIP LEG #2

DRIP LEG #3

DRIP LEG #4

16" UFG

38

LABOUR SUMP

LABOUR SUMP PUMPS

L.G.A.'s 4, 5, 6

TAR PRECIPITATOR

TP ELECT.

TAR PRECIP. SUMPS

COND TANK

30" BY-PASS

35" COG

47'

43

41

3 SUMP

6 SUMP PUMP

6 SUMP

#1 #2

EXHAUST #3

EXHAUST #2

32

EXHAUSTER BUILDING

BP CONTROL BUILDING

80'

B8W B7W B6W T5W T4W T3W

338'

AMMONIA CONCENTRATING BUILDING

COND PUMP TANK

CW PUMP

LB TANK

DEPHLEGMATOR

LEVEL TANK

AMM STILL

FUTURE WAL EFF PUMP

WAL EFF PUMPS

PIT

WAL HOLD TANK

WAL FEED PUMP

TAR PUMP

PHENOL PUMP HOUSE

NEW AMM STILL

CURBED CONTAINMENT AREA

ABANDONED TANK WALL CUT

WAL STORAGE TANK NO. 1

WAL STORAGE TANK NO. 2

3" WAL TO EQUALIZATION TANK

CAUSTIC STORAGE TANK

WATER TOWER

QUENCHING STATION

0A	12/30/10		ISSUED FOR COMMENT
	FJL/BPE		30 DEC 2010
	KPS		
			1"=20'-0
GENERAL PLOT PLAN			
AMMONIA CONCENTRATING AND LIGHT OIL AREAS	T-BP-0250		0A
SHEET 1 OF 3			

0A T-BP-0251

MATCH LINE E300.00 DWG T-BP-0250

E400.00 E500.00 E600.00 E100.00 E700.00 E800.00

MATCH LINE T-BP-0252

N100.00

WAREHOUSE

STAND PIPE

Sample 7 Location

Sample 3 Location

Sample 2 Location

TAR TRUCK LOADING STATION

DRIP LEG #5B

DRIP LEG #5A

TAR DEHYDRATOR TAR PUMPS

TAR RECEIVER

BH LIQ CIRC TANK #2

BH LIQ CIRC TANK #1

TAR PRECIPITATOR

S0.00

COND TANK

6 SUMP PUMP

6 SUMP

SECONDARY COOLER

36" COG

1 SUMP

PRIMARY COOLER

CURBED CONTAINMENT AREA

30" COG

EXHAUST #3

EXHAUST #2

EXHAUST #1

24" COG

FDN

DRIP LEG #6

FL CIRC TANK ABANDONED

AC COLLECTOR TANK

FL DECANTER ABANDONED

ABANDONED TANK

EXHAUSTER BUILDING

BP CONTROL BUILDING

DRIP LEG #7B

DRIP LEG #7A

FL DECANTER ABANDONED

FDN

BH LIQ DECANTER

SECONDARY PLATE CLR #2

PRIMARY PLATE CLR #1

SECONDARY PLATE CLR #1

PRIMARY PLATE CLR #2

AIR COMP #2

SECONDARY CLR PUMPS

PRIMARY CLR PUMPS

AIR COMP #1

BH LIQ PUMPS

CW PUMPS

PUMP HOUSE

AC WAL PUMP

AIR REC #1 #2

ELECT ROOM

DIESEL TANK

DIESEL GENERATOR

BFW TREATMENT AREA

BOILER NO. 1

BOILER NO. 2

BOILER NO. 7

BOILER NO. 8 ABANDONED

NEW AMM STILL PROPOSED LOCATION

BOILER HOUSE

EXISTING BOILER NO. 9 TO BE DEMOLISHED FOR INSTALLATION OF NEW AMMONIA STILL

BOILER NO. 7 CHIMNEY

BOILER NO. 9 CHIMNEY ABANDONED

POWER HOUSE

COGEN GENERATOR

COG BOOSTER

COG COND TANK

SHED

DRIP POD #11

DRIP LEG #12

12" COG

24" COG

S100.00

T4W T3W T2W T1W B1 B2 T3 B4 T5 B6 T7 T7A B8 T9 T10 T11 B12 T13 T14 T15 T16 T17

DRIP POD #8

112

72

72

CROSSOVER NO 1

CROSSOVER NO 2

PROPOSED NEW DRIP LEG #9 AT LOW POINT

PROPOSED NEW DRIP LEG #10

221

COG Pipe East of the East Crossover Pipe Previously Removed

Sample 1 Location

Sample 5 Location

Sample 4 Location

PUSHER MACHINE TRACK

COAL BIN AND CHARGING BUILDING

BATTERY NO. 2

S200.00

	FJL/BPS	31 DEC 2010
	KPS	
		1"=20'-0
GENERAL PLOT PLAN		
EXHAUSTER BUILDING AND BOILER HOUSE AREA	T-BP-0251	0A
SHEET 2 OF 3		

0A T-BP-0252

E800.00 E900.00 E1000.00 E1100.00 E1200.00 E1300.00 E1400.00

MATCH LINE DWG T-BP-0251

N100.00

BOILER NO. 7 CHIMNEY

BOILER NO. 9 CHIMNEY ABANDONED

EXISTING BOILER NO. 9 TO BE DEMOLISHED FOR INSTALLATION OF NEW AMMONIA STILL

S0.00

BOILER NO. 7

BOILER NO. 8 ABANDONED

NEW AMM STILL PROPOSED LOCATION

24"x16" 16"x12"

12" COG

DRIP LEG #12

COG COND TANK

SHED

PROPOSED NEW DRIP LEG #13 AT LOW POINT

12"x16" 16" COG

126 260 132

ABANDONED FLARE STACK

COG COND. SUMP

FLARE STACK

DRIP LEG #15

DRIP LEG #16

23

8" COG

8" COG

DRIP LEG #14

COG COND SUMP 42

INSTRUMENT ENCLOSURE

283

91

8" COG

COMPRESSOR BUILDING ABANDONED

COG HOLDER

All COG Pipe on this Sheet Previously Re-moved

S100.00

S200.00

	FJL/BPC	30 DEC 2010
	KPS	
		1"=20'-0
GENERAL PLOT PLAN FLARE STACK AND GAS HOLDER AREA SHEET 3 OF 3	T-BP-0252	0A

0A T-BP-0254

Previously Removed

S0.00

FUTURE 16" COG TO RELOCATED FLARE STACK

ABANDONED

LBA LO SCRUBBER

TIE-IN POINT FOR FUTURE 16" COG NEW 24" FLARE VALVE

24"GV 24"GV

30"GV

ACTIFIER ABANDONED

30" DIA. RISER PIPE

24"GV (BELOW)

24"GV

COG DRIP LEG #2

30" COG

36" COG

30"GV

2" COG COND.

2" COG COND.

24" COG

24"GV

24"GV

24"GV

COG DRIP LEG #3

COG DRIP LEG #1

SHED

2" COG COND. TO COND SUMP AT GRADE ELEV.

16"GV

24"GV

16" UFG

16" COG TO BATTERY NO.2 UNDER FIRING

24" COG

4" BV

B8W

B7W

B6W

24" COG

24" COG TO BOILERS

B

DWG T-BP-0256

E200.00

S100.00

LABOUR SUMP

SUMP PUMP #1

SUMP PUMP #2

LGA 6 PUMP

LGA 4 PUMP

TAR PRECIP. ELECTRICAL SWITCH GEAR BUILDING

TAR PRECIPITATOR

36"GV

LGA NO. 6 LGA NO. 5 LGA NO. 4

30" COG

PUMP

24" COG

30"GV

36" COG

36"GV

COG DRIP LEG #3

36" COG

C

DWG T-BP-0257

30"GV

36"GV

36"GV

36" COG

30"GV

30"GV

2" COG COND.

3 SUMP

36"X24" ECC REDUCER

A

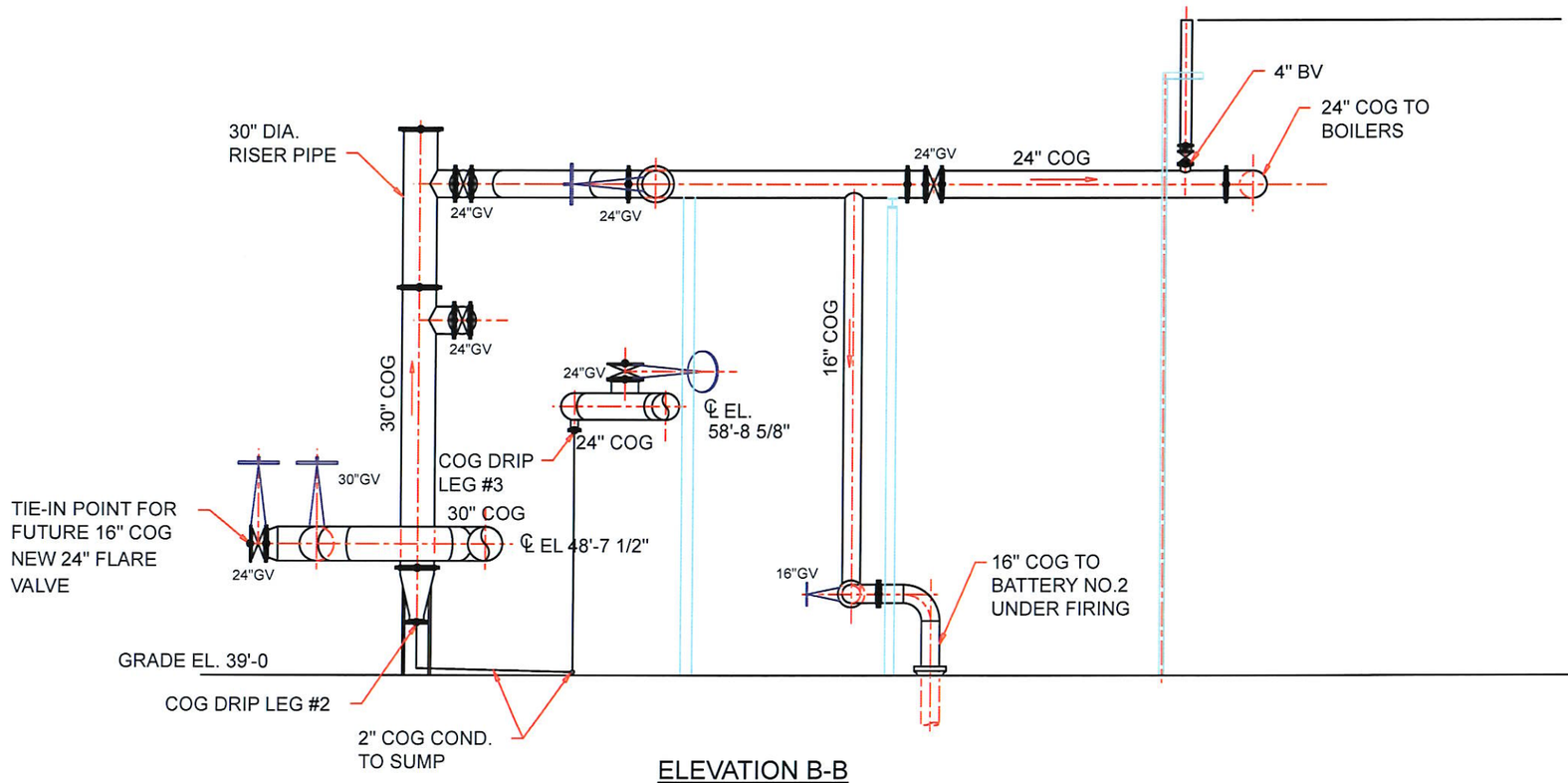
DWG T-BP-0255

24" COG BY-PASS

FROM EXHAUSTERS

FJL/BPC	30 DEC 2010	
KPS		
	3/16"=1'-0	
COG PIPING ARRANGEMENT		
LO SCRUBBER AND LGA AREA		
PLAN	T-BP-0254	0A

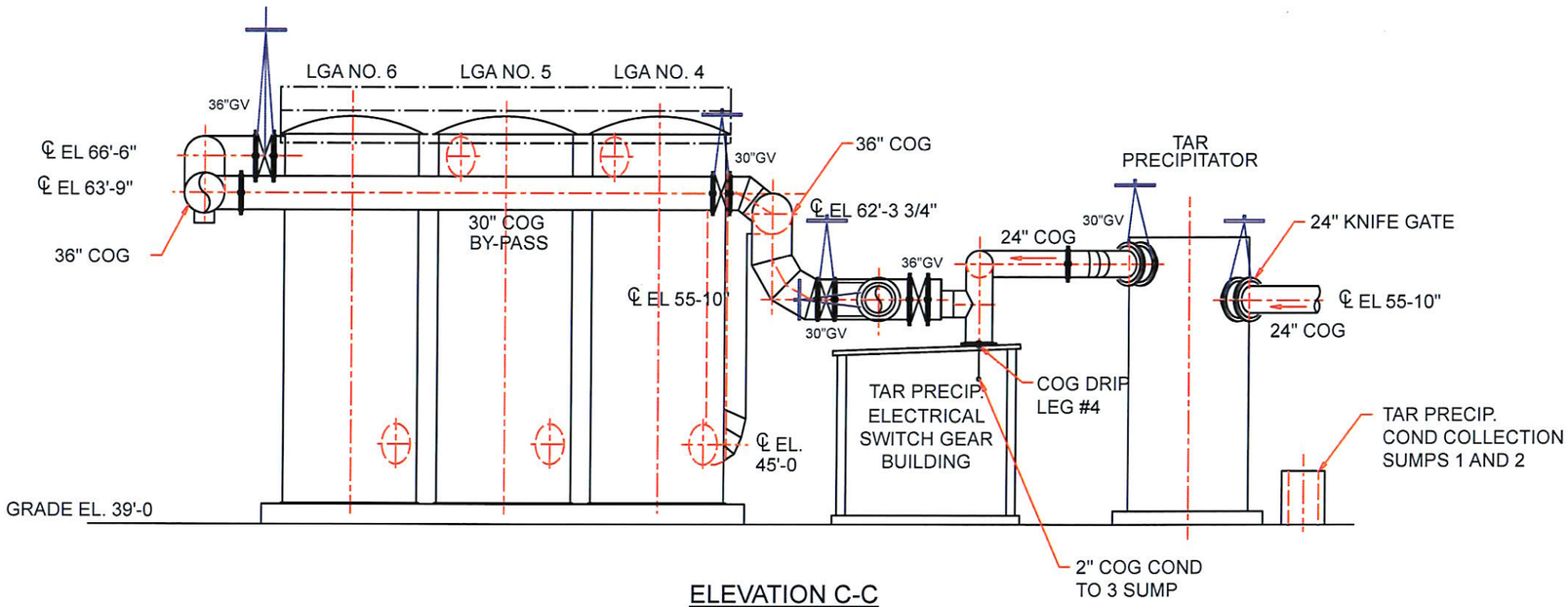
0A T-BP-0256



ELEVATION B-B

SCALE: 3/16"=1'-0
DWG T-BP-0254

	FJL/BPC	30 DEC 2010
	KPS	
		AS NOTED
COG PIPING ARRANGEMENT LO SCRUBBER AND LGA AREA ELEVATION B-B	T-BP-0256	0A



ELEVATION C-C

SCALE: 3/16"=1'-0
DWG T-BP-0254

	FJL/BPC	30 DEC 2010
	KPS	
		AS NOTED
COG PIPING ARRANGEMENT LO SCRUBBER AND LGA AREA ELEVATION C-C	T-BP-0257	0A

0A T-BP-0258

S0.00

CONTAINMENT CURB

TAR RECEIVER TANK

CONDENSATE COLLECTION TANK

2" COG COND.

SECONDARY COOLER

TAR PRECIPITATOR

24" KNIFE GATE

TAR PRECIP. COND COLLECT. SUMPS 1 & 2

6 SUMP PUMP

6 SUMP

1 SUMP

36"GV

36" COG

COG COND. DRIP POD #5A

COG COND. DRIP POD #5B

PRIMARY COOLER

30"GV

24"GV

COG DRIP LEG #6

24" COG TO LGA AREA

DWG T-BP-0260

EXHAUSTER BUILDING

30" COG BY-PASS

30"x24"

PIPE TRENCH

EXHAUST #3

EXHAUST #2

EXHAUST #1

24" COG

COG DRIP LEG #7A

FDN

8" CONTROL VALVE

DWG T-BP-0261

24" COG BY-PASS

24" COG BY-PASS TO LGA AREA

COG DRIP LEG #7B

CONDENSATE COLLECTION TANK

DWG T-BP-0263

DWG T-BP-0262

BP CONTROL BUILDING

FL DECANTER ABANDONED

FL DECANTER

2" COG COND.

24" COG FROM LO SCRUBBER AREA

24" DIA. COND. DRIP POD #8 (TO BE REPLACED)

4"GV

24" DIA. EXP. JOINT

42" SUCTION MAIN FROM BATTERY NO.2

24" COG TO BOILER

T1W

T2W

T3W

T4W

E300.00

E400.00

S100.00

DWG T-BP-0259

24" KNIFE GATE

FJL/BPC 30 DEC 2010

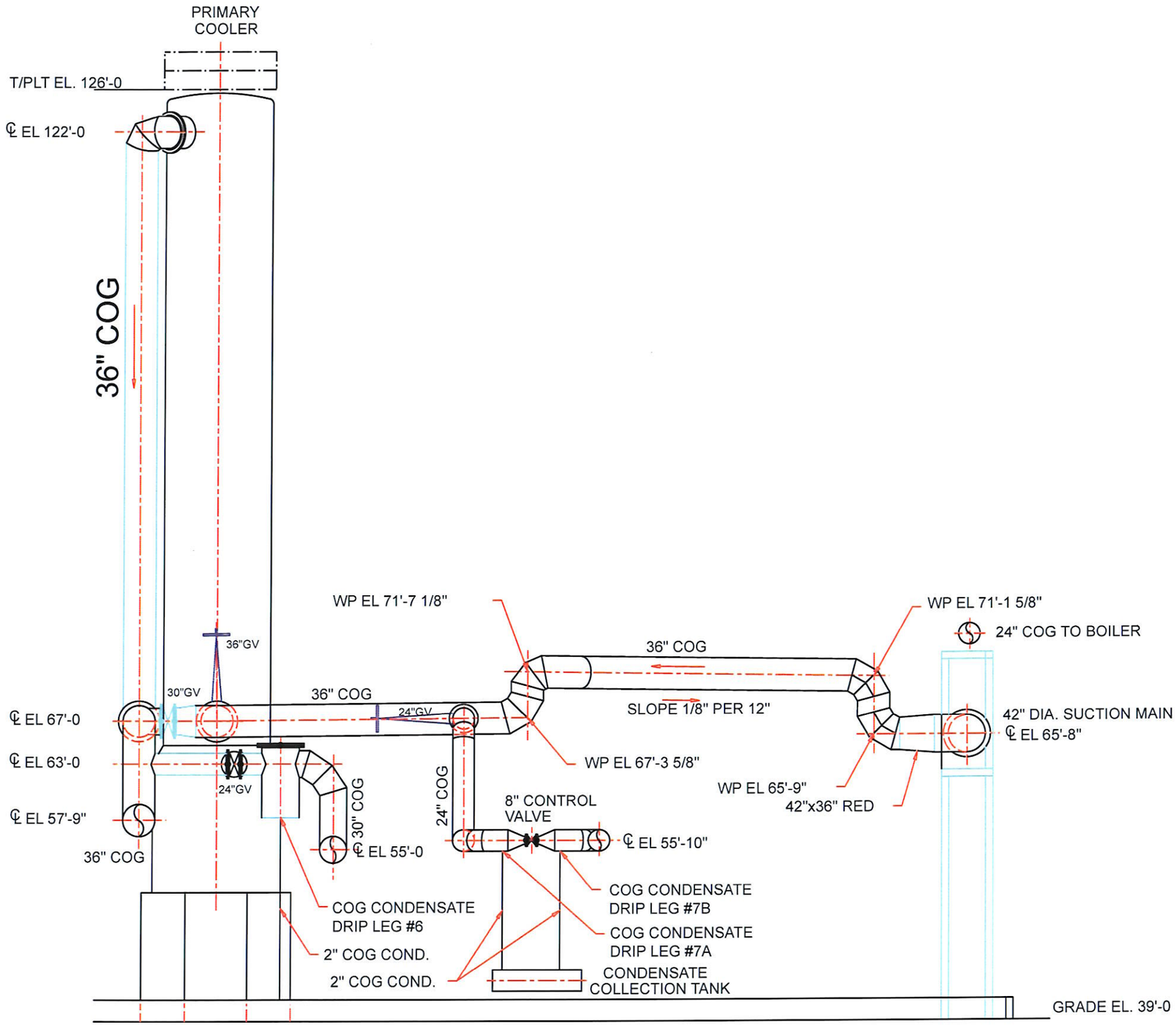
KPS

3/16"=1'-0

COG PIPING ARRANGEMENT
COOLERS AND EXHAUSTER AREA
PLAN

T-BP-0258 0A

0A T-BP-0259

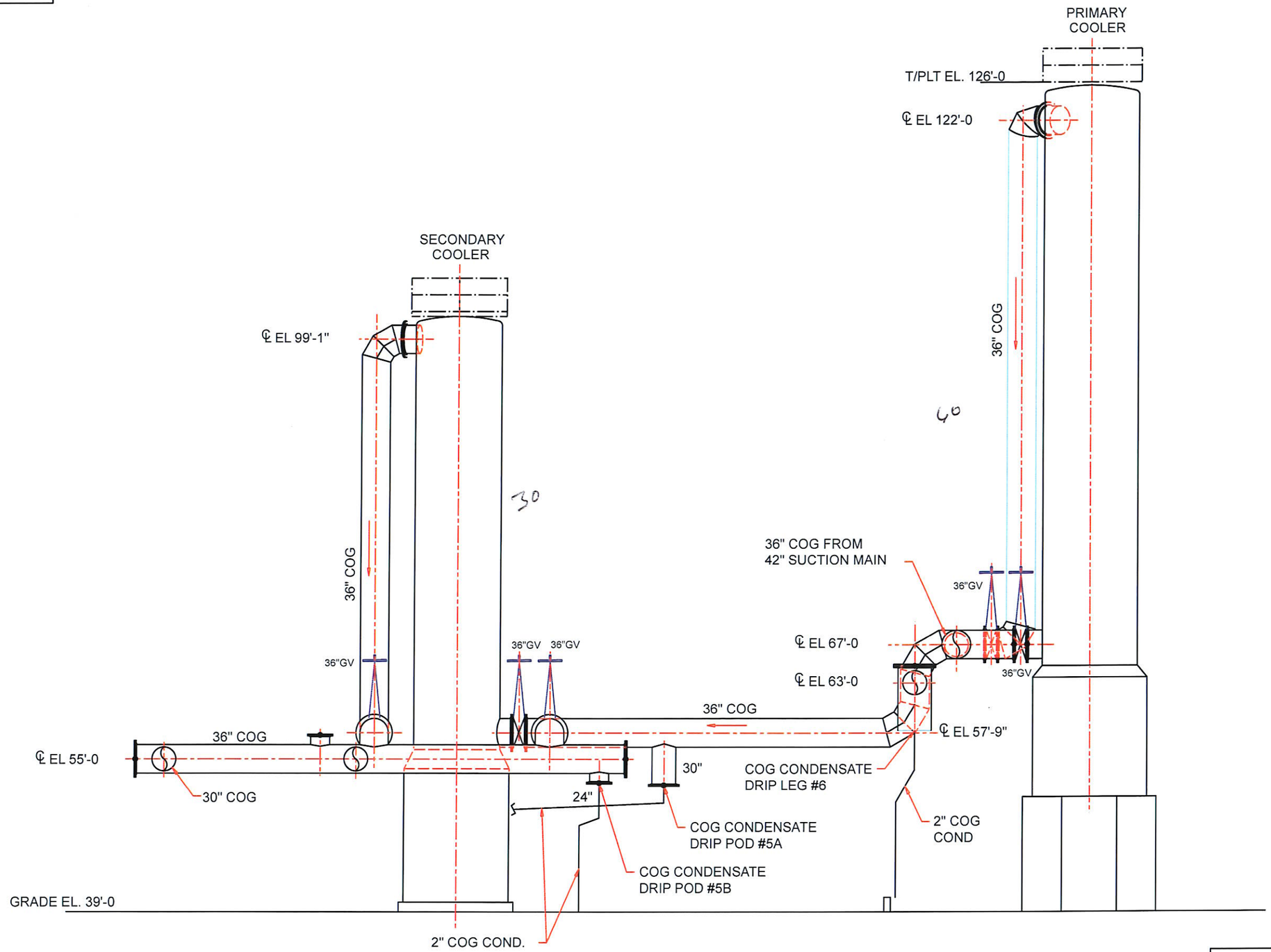


ELEVATION D-D

SCALE: 3/16"=1'-0
DWG T-BP-0258

	FJL/BPC	30 DEC 2010
	KPS	
		AS NOTED
COG PIPING ARRANGEMENT		
COOLERS AND EXHAUSTER AREA		
ELEVATION D-D	T-BP-0259	0A

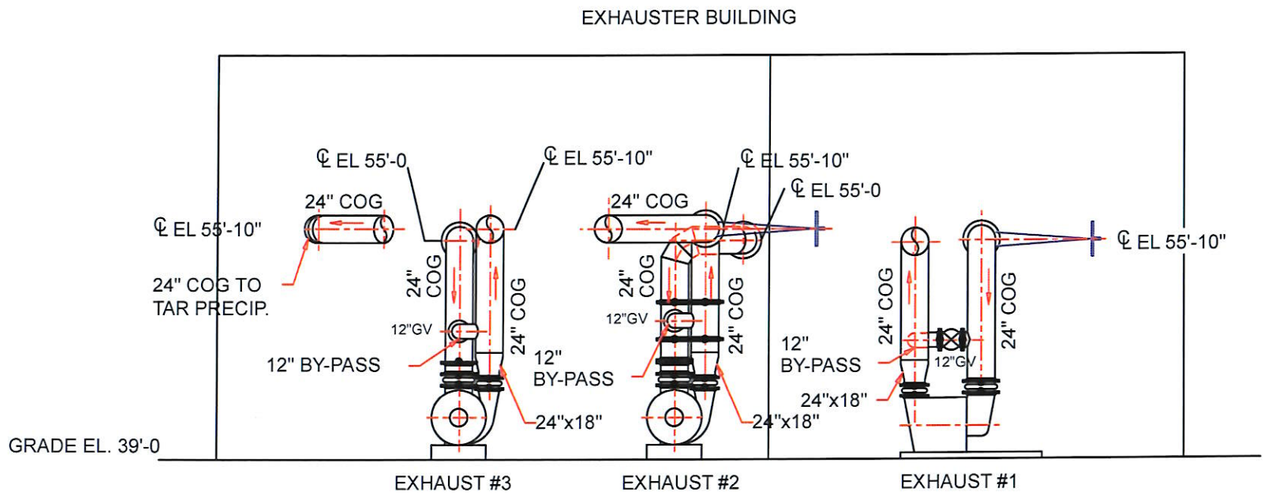
0A T-BP-0260



ELEVATION E-E

SCALE: 3/16"=1'-0
DWG T-BP-0258

	FJL/BPC	30 DEC 2010	
	KPS		
		AS NOTED	
COG PIPING ARRANGEMENT			
COOLERS AND EXHAUSTER AREA			
ELEVATION E-E	T-BP-0260		0A

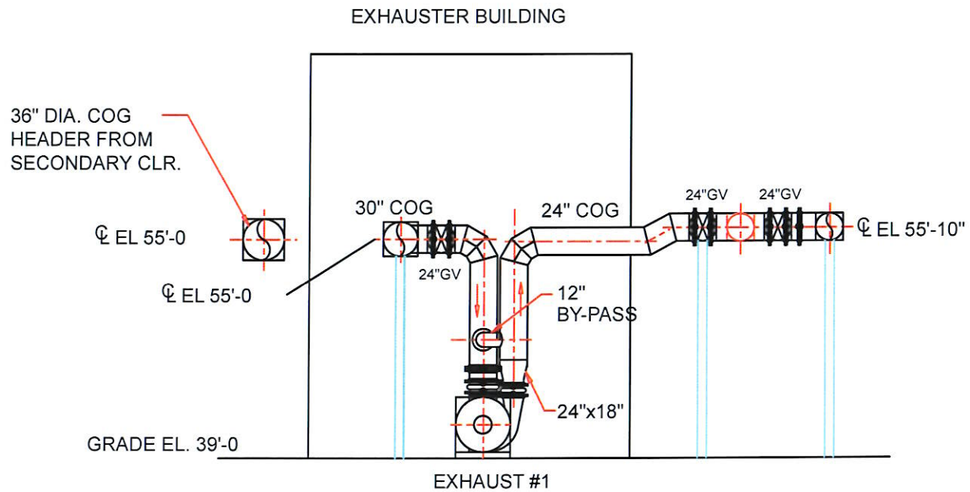


ELEVATION F-F

SCALE: 3/16"=1'-0
DWG T-BP-0258

	FJL/BPC	30 DEC 2010	
	KPS		
		AS NOTED	
COG PIPING ARRANGEMENT COOLERS AND EXHAUSTER AREA ELEVATION F-F	T-BP-0261		0A

0A T-BP-0262

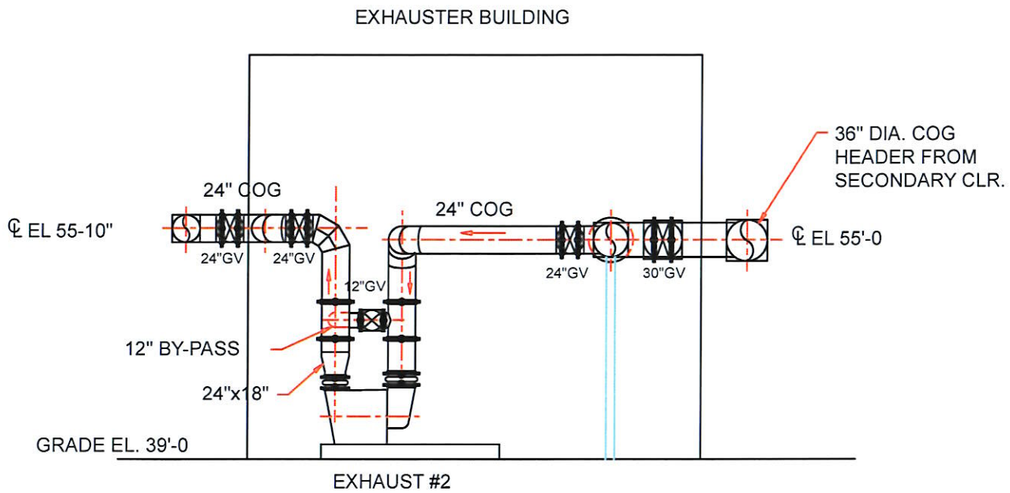


ELEVATION G-G

SCALE: 3/16"=1'-0
DWG T-BP-0258

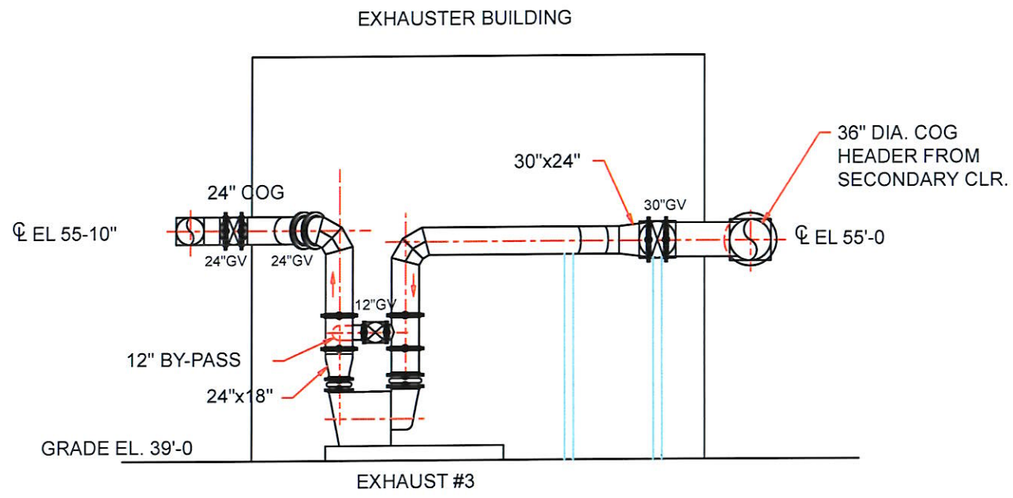
	FJL/BPC	30 DEC 2010
	KPS	
		AS NOTED
COG PIPING ARRANGEMENT		
COOLERS AND EXHAUSTER AREA		
ELEVATION G-G	T-BP-0262	0A

0A T-BP-0263



ELEVATION H-H

SCALE: 3/16"=1'-0
DWG T-BP-0258

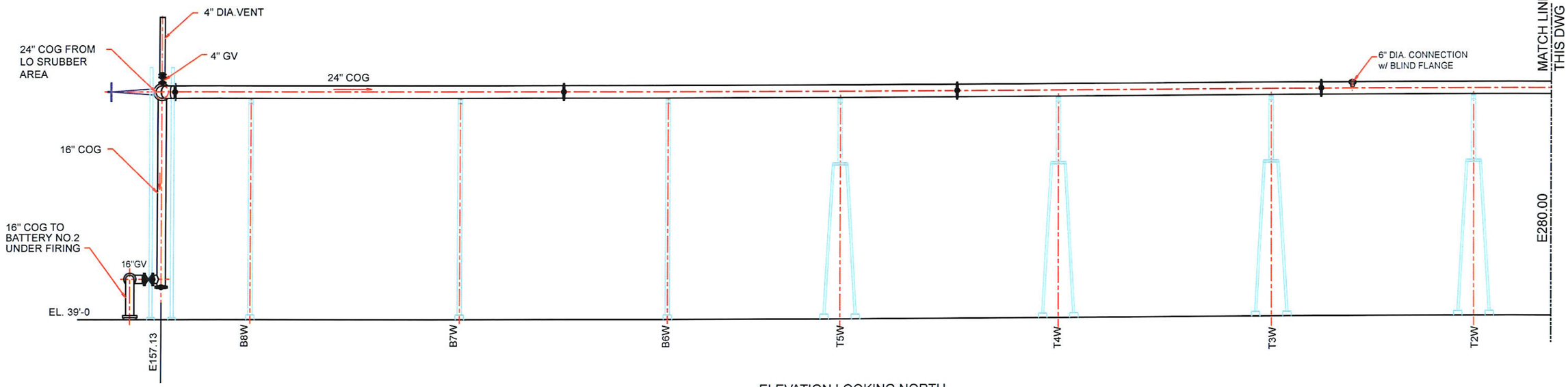


ELEVATION J-J

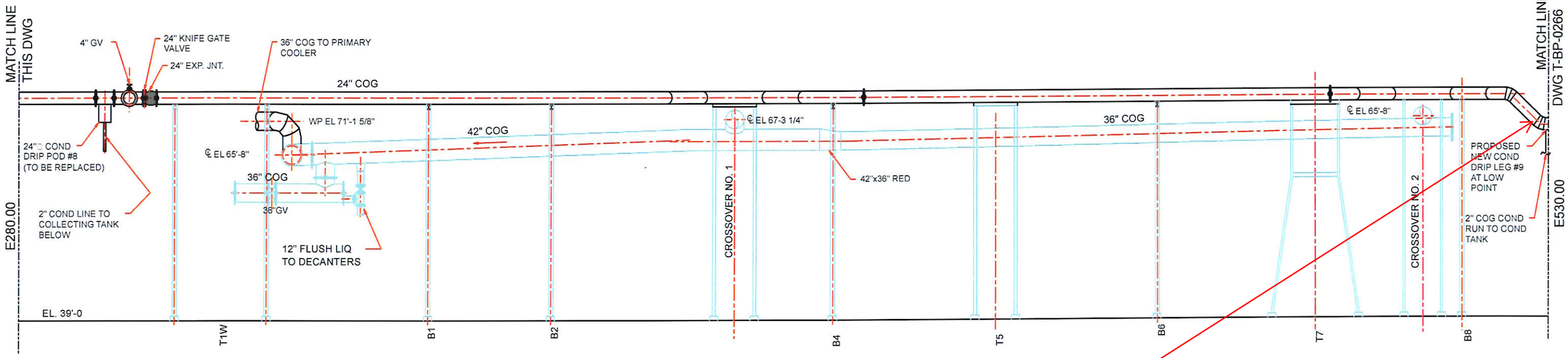
SCALE: 3/16"=1'-0
DWG T-BP-0258

	FJL/BPC	30 DEC 2010
	KPS	
		AS NOTED
COG PIPING ARRANGEMENT COOLERS AND EXHAUSTER AREA ELEVATIONS H-H, J-J	T-BP-0263	0A

0A T-BP-0265



ELEVATION LOOKING NORTH
STA. E157.13 TO E280.00

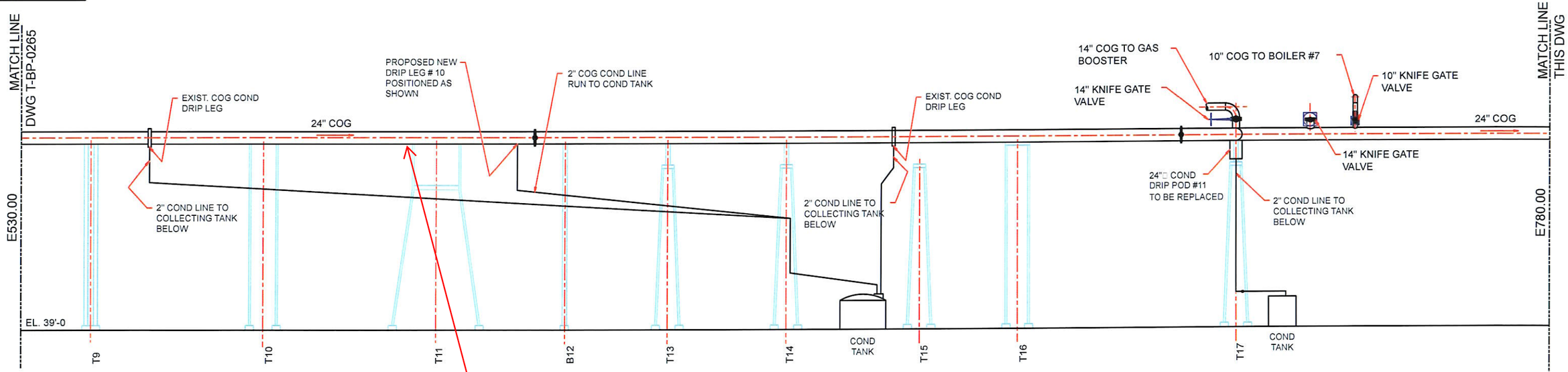


ELEVATION LOOKING NORTH
STA. E280.00 TO E530.00

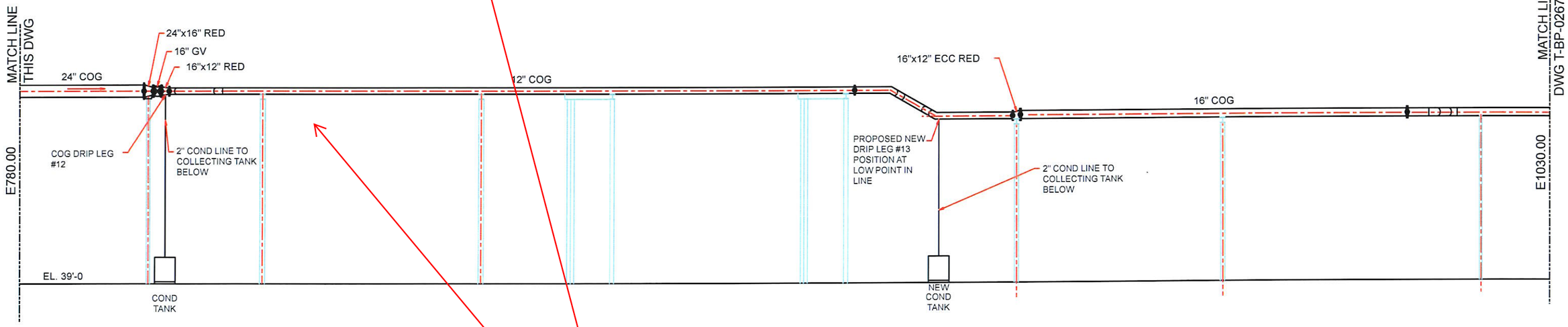
COG Pipe East of the Crossover No. 2 (East Crossover) was Previously Removed

	FJL/BPC	30 DEC 2010
	KPS	
		1/8"=1'-0
COG PIPING ARRANGEMENT 24" DIA. COG MAIN TO BOILER HOUSE ELEVATIONS STA. E157.13 TO E530.00	T-BP-0265	0A

0A T-BP-0266



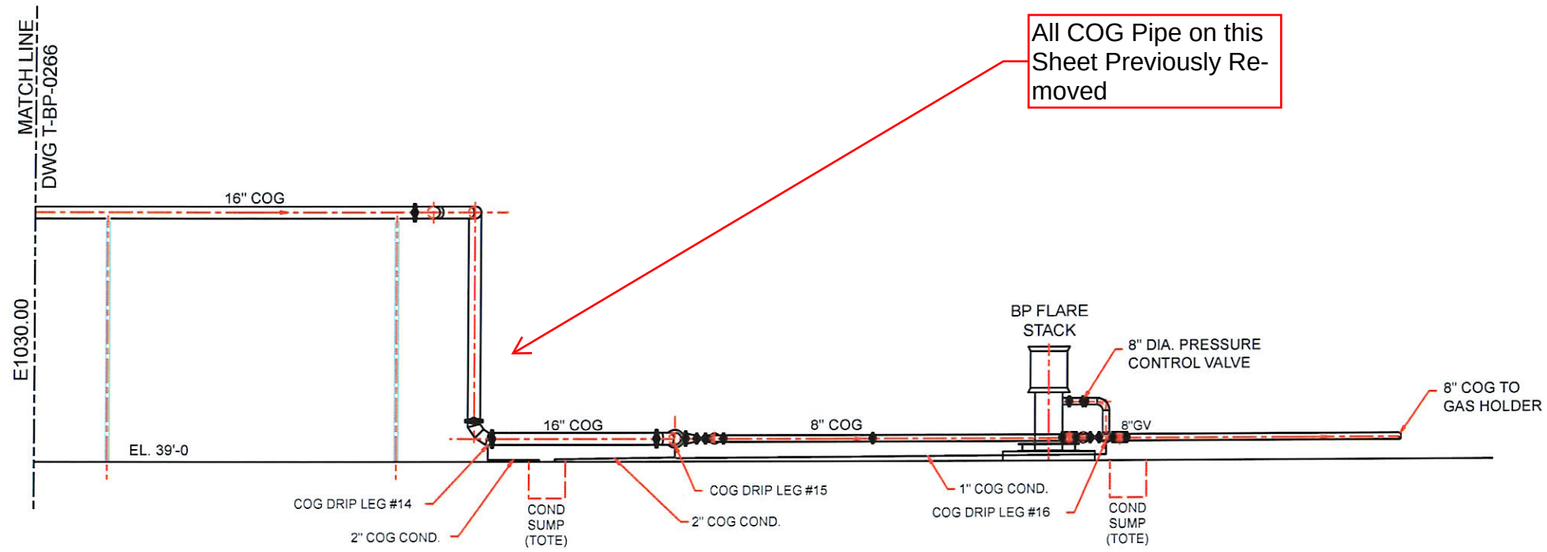
ELEVATION LOOKING NORTH
STA. E530.00 TO E780.00



ELEVATION LOOKING NORTH
STA. E780.00 TO E1030.00

All COG Pipe on this Sheet
Previously Removed

	FJL/BPC	30 DEC 2010
	KPS	
		1/8"=1'-0
COG PIPING ARRANGEMENT 24" DIA. MAIN TO BOILER HOUSE ELEVATIONS STA. E530.00 TO E1030.0	T-BP-0266	0A



ELEVATION LOOKING NORTH
STA. E1030.00 TO EXISTING FLARE STACK

	FJL/BPE 30 DEC 2010 KPS	
	1/8"=1'-0	
COG PIPING ARRANGEMENT 24" DIA. COG MAIN TO BOILER HOUSE ELEVATIONS STA. 1030.00 TO EXISTING FLARE STACK	T-BP-0267	0A

Appendix C
SDS Pipe Sealing Foam

SAFETY DATA SHEET

DDP SPECIALTY ELECTRONIC MATERIALS US, INC.

Product name: GREAT STUFF™ Big Gap Filler Insulating Foam Sealant 16oz HC ES STW QP 144ct **Issue Date:** 06/29/2020

Print Date: 07/03/2020

DDP SPECIALTY ELECTRONIC MATERIALS US, INC. encourages and expects you to read and understand the entire (M)SDS, as there is important information throughout the document. We expect you to follow the precautions identified in this document unless your use conditions would necessitate other appropriate methods or actions.

1. IDENTIFICATION

Product name: GREAT STUFF™ Big Gap Filler Insulating Foam Sealant 16oz HC ES STW QP 144ct

Recommended use of the chemical and restrictions on use
Identified uses: Polyurethane foam.

COMPANY IDENTIFICATION
DDP SPECIALTY ELECTRONIC MATERIALS US, INC.
400 ARCOLA ROAD
COLLEGEVILLE PA 19426-2914
UNITED STATES

Customer Information Number: 833-338-7668
SDSQuestion-NA@dupont.com

EMERGENCY TELEPHONE NUMBER
24-Hour Emergency Contact: 1-800-424-9300
Local Emergency Contact: 800-424-9300

2. HAZARDS IDENTIFICATION

Hazard classification
GHS classification in accordance with 29 CFR 1910.1200
Flammable aerosols - Category 2
Gases under pressure - Liquefied gas
Skin irritation - Category 2
Eye irritation - Category 2B
Respiratory sensitisation - Category 1
Skin sensitisation - Category 1
Effects on or via lactation
Specific target organ toxicity - single exposure - Category 3
Specific target organ toxicity - repeated exposure - Category 2 - Inhalation

Label elements
Hazard pictograms

Signal word: **DANGER!**

Hazards
Flammable aerosol.
Contains gas under pressure; may explode if heated.
Causes skin and eye irritation.
May cause an allergic skin reaction.
May cause allergy or asthma symptoms or breathing difficulties if inhaled.
May cause respiratory irritation.
May cause harm to breast-fed children.
May cause damage to organs (Respiratory Tract) through prolonged or repeated exposure if inhaled.

Precautionary statements

Prevention
Obtain special instructions before use.
Keep away from heat/sparks/open flames/hot surfaces. No smoking.
Do not spray on an open flame or other ignition source.
Pressurized container: Do not pierce or burn, even after use.
Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
Avoid contact during pregnancy/ while nursing.
Wash skin thoroughly after handling.
Do not eat, drink or smoke when using this product.
Use only outdoors or in a well-ventilated area.
Contaminated work clothing must not be allowed out of the workplace.
Wear protective gloves.
In case of inadequate ventilation wear respiratory protection.

Response
IF ON SKIN: Wash with plenty of soap and water.
IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/ doctor if you feel unwell.
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
IF exposed or concerned: Get medical advice/ attention.
If skin irritation or rash occurs: Get medical advice/ attention.
If eye irritation persists: Get medical advice/ attention.
Take off contaminated clothing and wash before reuse.

Storage
Store in a well-ventilated place. Keep container tightly closed.
Store locked up.
Protect from sunlight. Do not expose to temperatures exceeding 50 °C/ 122 °F.

Disposal
Dispose of contents/ container to an approved waste disposal plant.

Other hazards
No data available

3. COMPOSITION/INFORMATION ON INGREDIENTS

This product is a mixture.

Component	CASRN	Concentration
Polymethylenepolyphenylisocyanate, propoxylated glycerin polymer	57029-46-6	>= 30.0 - <= 60.0 %
Diphenylmethane Diisocyanate, isomers and homologues	9016-87-9	>= 10.0 - <= 30.0 %
Polymethylenepolyphenyl polyisocyanate, polypropyleneglycol copolymer	53862-89-8	>= 10.0 - <= 30.0 %
Tris(1-chloro-2-propyl) phosphate	13674-84-5	>= 5.0 - <= 10.0 %
Paraffin waxes and Hydrocarbon waxes, chlorinated	63449-39-8	>= 5.0 - <= 10.0 %
Isobutane	75-28-5	>= 5.0 - <= 10.0 %
4,4' -Methylenediphenyl diisocyanate	101-68-8	>= 5.0 - <= 10.0 %
Methyl ether	115-10-6	>= 1.0 - <= 5.0 %
Propane	74-98-6	>= 1.0 - <= 5.0 %

Note
Note: CAS 101-68-8 is an MDI isomer that is part of CAS 9016-87-9.

4. FIRST AID MEASURES

Description of first aid measures
General advice:
First Aid responders should pay attention to self-protection and use the recommended protective clothing (chemical resistant gloves, splash protection). If potential for exposure exists refer to Section 8 for specific personal protective equipment.

Inhalation: Move person to fresh air. If not breathing, give artificial respiration; if by mouth to mouth use rescuer protection (pocket mask, etc). If breathing is difficult, oxygen should be administered by qualified personnel. Call a physician or transport to a medical facility.

Skin contact: Remove material from skin immediately by washing with soap and plenty of water. Remove contaminated clothing and shoes while washing. Seek medical attention if irritation persists. Wash clothing before reuse. An MDI skin decontamination study demonstrated that cleaning very soon after exposure is important, and that a polyglycol-based skin cleanser or corn oil may be more effective than soap and water. Discard items which cannot be decontaminated, including leather articles such as shoes, belts and watchbands. Suitable emergency safety shower facility should be available in work area.

Eye contact: Immediately flush eyes with water; remove contact lenses, if present, after the first 5 minutes, then continue flushing eyes for at least 15 minutes. Obtain medical attention without delay, preferably from an ophthalmologist. Suitable emergency eye wash facility should be immediately available.

Ingestion: If swallowed, seek medical attention. Do not induce vomiting unless directed to do so by medical personnel.

Most important symptoms and effects, both acute and delayed:
Aside from the information found under Description of first aid measures (above) and Indication of immediate medical attention and special treatment needed (below), any additional important symptoms and effects are described in Section 11: Toxicology Information.

Indication of any immediate medical attention and special treatment needed
Notes to physician: Maintain adequate ventilation and oxygenation of the patient. May cause respiratory sensitization or asthma-like symptoms. Bronchodilators, expectorants and antitussives may be of help. Treat bronchospasm with inhaled beta2 agonist and oral or parenteral corticosteroids. Respiratory symptoms, including pulmonary edema, may be delayed. Persons receiving significant exposure should be observed 24-48 hours for signs of respiratory distress. Exposure may increase "myocardial irritability". Do not administer sympathomimetic drugs such as epinephrine unless absolutely necessary. If you are sensitized to diisocyanates, consult your physician regarding working with other respiratory irritants or sensitizers. Although cholinesterase depression has been reported with this material, it is not of benefit in determining exposure and need not be considered in the treatment of persons exposed to the material. Treatment of exposure should be directed at the control of symptoms and the clinical condition of the patient. Excessive exposure may aggravate preexisting asthma and other respiratory disorders (e.g. emphysema, bronchitis, reactive airways dysfunction syndrome). Repeated excessive exposure may aggravate preexisting lung disease.

5. FIREFIGHTING MEASURES

Suitable extinguishing media: Water fog or fine spray. Dry chemical fire extinguishers. Carbon dioxide fire extinguishers. Foam. Alcohol resistant foams (ATC type) are preferred. General purpose synthetic foams (including AFFF) or protein foams may function, but will be less effective.

Unsuitable extinguishing media: Do not use direct water stream. Straight or direct water streams may not be effective to extinguish fire.

Special hazards arising from the substance or mixture
Hazardous combustion products: During a fire, smoke may contain the original material in addition to combustion products of varying composition which may be toxic and/or irritating. Combustion products may include and are not limited to: Nitrogen oxides. Isocyanates. Hydrogen chloride. Carbon monoxide. Carbon dioxide. Hydrogen cyanide.

Unusual Fire and Explosion Hazards: Contains flammable propellant. Aerosol cans exposed to fire can rupture and become flaming projectiles. Propellant release may result in a fireball. Vapors are heavier than air and may travel a long distance and accumulate in low lying areas. Ignition and/or flash back may occur. Dense smoke is produced when product burns.

Advice for firefighters
Fire Fighting Procedures: Keep people away. Isolate fire and deny unnecessary entry. Stay upwind. Keep out of low areas where gases (fumes) can accumulate. Water may not be effective in extinguishing fire. Do not use direct water stream. May spread fire. Fight fire from protected location or safe distance. Consider the use of unmanned hose holders or monitor nozzles. Eliminate ignition sources. Move container from fire area if this is possible without hazard. Use water spray to cool fire-exposed containers and fire-affected zone until fire is out.

Special protective equipment for firefighters: Wear positive-pressure self-contained breathing apparatus (SCBA) and protective fire fighting clothing (includes fire fighting helmet, coat, trousers, boots, and gloves). Avoid contact with this material during fire fighting operations. If contact is likely, change to full chemical resistant fire fighting clothing with self-contained breathing apparatus. If this is not available, wear full chemical resistant clothing with self-contained breathing apparatus and fight fire from a remote location. For protective equipment in post-fire or non-fire clean-up situations, refer to the relevant sections.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures: Evacuate area. Spilled material may cause a slipping hazard. Only trained and properly protected personnel must be involved in clean-up operations. Keep personnel out of low areas. Keep personnel out of confined or poorly ventilated areas. Keep upwind of spill. Ventilate area of leak or spill. No smoking in area. For large spills, warn public of downwind explosion hazard. Check area with combustible gas detector before reentering area. Ground and bond all containers and handling equipment. Eliminate all sources of ignition in vicinity of spill or released vapor to avoid fire or explosion. Vapor explosion hazard. Keep out of sewers. See Section 10 for more specific information. Use appropriate safety equipment. For additional information, refer to Section 8, Exposure Controls and Personal Protection. Confined space entry procedures must be followed before entering the area. Refer to section 7, Handling, for additional precautionary measures.

Environmental precautions: Prevent from entering into soil, ditches, sewers, waterways and/or groundwater. See Section 12, Ecological Information. Spills or discharge to natural waterways is likely to kill aquatic organisms.

Methods and materials for containment and cleaning up: Contain spilled material if possible. Ground and bond all containers and handling equipment. Isolate area until gas has dispersed. Use non-sparking tools in cleanup operations. Eliminate all sources of ignition in vicinity of spill or released vapor to avoid fire or explosion. Check area with combustible gas detector before reentering area. Ground and bond all containers and handling equipment. Collect in suitable and properly labeled containers. Absorb with materials such as: Clay. Dirt. Milsorb®. Sand. Sawdust. Vermiculite. See Section 10 for more specific information. See Section 13, Disposal Considerations, for additional information.

7. HANDLING AND STORAGE

Precautions for safe handling: Do not enter confined spaces unless adequately ventilated. Keep away from heat, sparks and flame. Avoid breathing vapor. Avoid contact with eyes, skin, and clothing. Avoid prolonged or repeated contact with skin. Wash thoroughly after handling. Keep container closed. Use only with adequate ventilation. No smoking, open flames or sources of ignition in handling and storage area. Vapors are heavier than air and may travel a long distance and accumulate in low lying areas. Ignition and/or flash back may occur. Contents under pressure. Do not puncture or incinerate container. Containers, even those that have been emptied, can contain vapors. Do not cut, drill, grind, weld, or perform similar operations on or near empty containers. Never use air pressure for transferring product. Use of non-sparking or explosion-proof equipment may be necessary, depending upon the type of operation. See Section 8, EXPOSURE CONTROLS AND PERSONAL PROTECTION.

Conditions for safe storage: Minimize sources of ignition, such as static build-up, heat, spark or flame. Store in a dry place. See Section 10 for more specific information.

Storage stability

Storage temperature:	**Storage Period:**
25 °C (77 °F)	18 Month

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Control parameters

If exposure limits exist, they are listed below. If no exposure limits are displayed, then no values are applicable.

Component	Regulation	Type of listing	Value
Isobutane	ACGIH	STEL	1,000 ppm
	Further information: EX: Explosion hazard: the substance is a flammable asphyxiant or excursions above the TLV® could approach 10% of the lower explosive limit.; CNS impair: Central Nervous System impairment		
4,4' -Methylenediphenyl diisocyanate	Dow IHG	TWA	0.005 ppm
	Dow IHG	STEL	0.02 ppm
	ACGIH	TWA	0.005 ppm
	Further information: resp sens: Respiratory sensitization		
	OSHA Z-1	C	0.2 mg/m3 0.02 ppm
	Further information: (b): The value in mg/m3 is approximate.; ©: Ceiling limit is to be determined from breathing-zone air samples.		
Methyl ether	US WEEL	TWA	1,000 ppm
Propane	ACGIH		See Further information
	Further information: See Appendix F: Minimal Oxygen Content; EX: Explosion hazard: the substance is a flammable asphyxiant or excursions above the TLV® could approach 10% of the lower explosive limit.; asphyxia: Asphyxia; D: Simple asphyxiant; see discussion covering Minimal Oxygen Content found in the 'Definitions and Notations' section following the NIC tables		
	OSHA Z-1	TWA	1,800 mg/m3 1,000 ppm
	Further information: (b): The value in mg/m3 is approximate.		
	CAL PEL	PEL	1,800 mg/m3 1,000 ppm
	Further information: (h): A number of gases and vapors, when present in high		

	concentrations, act primarily as asphyxiants without other adverse effects. A concentration limit is not included for each material because the limiting factor is the available oxygen. (Several of these materials present fire or explosion hazards.)		
	NIOSH REL	TWA	1,800 mg/m3 1,000 ppm

This material contains a simple asphyxiant which may displace oxygen. Insure adequate ventilation to prevent an oxygen deficient atmosphere.
The minimum requirement of 19.5% oxygen at sea level (148 torr O2, dry air) provides an adequate amount of oxygen for most work assignments.

Exposure controls
Engineering controls: Use only with adequate ventilation. Local exhaust ventilation may be necessary for some operations. Provide general and/or local exhaust ventilation to control airborne levels below the exposure guidelines. Exhaust systems should be designed to move the air away from the source of vapor/aerosol generation and people working at this point. The odor and irritancy of this material are inadequate to warn of excessive exposure. Lethal concentrations may exist in areas with poor ventilation.

Individual protection measures
Eye/face protection: Use safety glasses (with side shields).
Skin protection
Hand protection: Use gloves chemically resistant to this material. Examples of preferred glove barrier materials include: Butyl rubber. Chlorinated polyethylene. Polyethylene. Ethyl vinyl alcohol laminate ("EVAL"). Examples of acceptable glove barrier materials include: Neoprene. Nitrile/butadiene rubber ("nitrile" or "NBR"). Viton. Polyvinyl chloride ("PVC" or "vinyl"). NOTICE: The selection of a specific glove for a particular application and duration of use in a workplace should also take into account all relevant workplace factors such as, but not limited to: Other chemicals which may be handled, physical requirements (cut/puncture protection, dexterity, thermal protection), potential body reactions to glove materials, as well as the instructions/specifications provided by the glove supplier.
Other protection: Use protective clothing chemically resistant to this material. Selection of specific items such as face shield, boots, apron, or full body suit will depend on the task.
Respiratory protection: Atmospheric levels should be maintained below the exposure guideline. When atmospheric levels may exceed the exposure guideline, use an approved air-purifying respirator equipped with an organic vapor sorbent and a particle filter. For situations where the atmospheric levels may exceed the level for which an air-purifying respirator is effective, use a positive-pressure air-supplying respirator (air line or self-contained breathing apparatus). For emergency response or for situations where the atmospheric level is unknown, use an approved positive-pressure self-contained breathing apparatus or positive-pressure air line with auxiliary self-contained air supply. In confined or poorly ventilated areas, use an approved self-contained breathing apparatus or positive pressure air line with auxiliary self-contained air supply.
The following should be effective types of air-purifying respirators: Organic vapor cartridge with a particulate pre-filter.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance

Physical state	Foam
Color	Yellow

Odor	Mild
Odor Threshold	0.4 ppm *Based on Literature for MDI.* Odor is inadequate warning of excessive exposure.
pH	*Not applicable*
Melting point/range	No test data available
Freezing point	No test data available
Boiling point (760 mmHg)	No test data available
Flash point	**closed cup** -104 °C (-155 °F) *Estimated.*
Evaporation Rate (Butyl Acetate = 1)	No test data available
Flammability (solid, gas)	Not expected to form explosive dust-air mixtures.
Lower explosion limit	No test data available
Upper explosion limit	No test data available
Vapor Pressure	1,151 kPa at 55 °C (131 °F) *Calculated.*
Relative Vapor Density (air = 1)	No test data available
Relative Density (water = 1)	1.06 *Estimated.*
Water solubility	insoluble
Partition coefficient: n-octanol/water	No data available
Auto-ignition temperature	No test data available
Decomposition temperature	No test data available
Kinematic Viscosity	Not applicable
Explosive properties	Not explosive
Oxidizing properties	No
Molecular weight	No test data available

NOTE: The physical data presented above are typical values and should not be construed as a specification.

10. STABILITY AND REACTIVITY

Reactivity: No data available

Chemical stability: Stable under recommended storage conditions. See Storage, Section 7. Unstable at elevated temperatures.

Possibility of hazardous reactions: Can occur. Exposure to elevated temperatures can cause product to decompose and generate gas. This can cause pressure build-up and/or rupturing of closed containers. Acids.

Conditions to avoid: Avoid temperatures above 50 °C
Elevated temperatures can cause container to vent and/or rupture. Exposure to elevated temperatures can cause product to decompose.

Incompatible materials: Avoid contact with: Acids. Alcohols. Amines. Ammonia. Bases. Metal compounds. Strong oxidizers. Products based on diisocyanates like TDI and MDI react with many

materials to release heat. The reaction rate increases with temperature as well as with increased contact; these reactions can become violent. Contact is increased by stirring or if the other material acts as a solvent. Products based on diisocyanates such as TDI and MDI are not soluble in water and will sink to the bottom, but react slowly at the interface. The reaction forms carbon dioxide gas and a layer of solid polyurea. Reaction with water will generate carbon dioxide and heat.

Hazardous decomposition products: Decomposition products depend upon temperature, air supply and the presence of other materials. Toxic gases are released during decomposition.

11. TOXICOLOGICAL INFORMATION

Toxicological information appears in this section when such data is available.

Acute toxicity

Acute oral toxicity

Low toxicity if swallowed. Small amounts swallowed incidentally as a result of normal handling operations are not likely to cause injury; however, swallowing larger amounts may cause injury. Observations in animals include: Gastrointestinal irritation.

As product: Single dose oral LD50 has not been determined.

LD50, Rat, > 2,000 mg/kg Estimated.

Acute dermal toxicity

Prolonged skin contact is unlikely to result in absorption of harmful amounts.

As product: The dermal LD50 has not been determined.

LD50, Rabbit, > 2,000 mg/kg Estimated.

Acute inhalation toxicity

In confined or poorly ventilated areas, vapor can easily accumulate and can cause unconsciousness and death due to displacement of oxygen. Excessive exposure may cause irritation to upper respiratory tract (nose and throat) and lungs. May cause pulmonary edema (fluid in the lungs.) Effects may be delayed. May cause central nervous system depression. Symptoms of excessive exposure may be anesthetic or narcotic effects; dizziness and drowsiness may be observed. Excessive exposure may increase sensitivity to epinephrine and increase myocardial irritability (irregular heartbeats). Decreased lung function has been associated with overexposure to isocyanates.

The LC50 has not been determined.,

Skin corrosion/irritation

Prolonged contact may cause moderate skin irritation with local redness.
Material may stick to skin causing irritation upon removal.
May stain skin.

Serious eye damage/eye irritation

May cause moderate eye irritation.
May cause slight temporary corneal injury.

Sensitization
Skin contact may cause an allergic skin reaction.
Animal studies have shown that skin contact with isocyanates may play a role in respiratory sensitization.

May cause allergic respiratory reaction.
MDI concentrations below the exposure guidelines may cause allergic respiratory reactions in individuals already sensitized.
Asthma-like symptoms may include coughing, difficult breathing and a feeling of tightness in the chest.
Occasionally, breathing difficulties may be life threatening.

Specific Target Organ Systemic Toxicity (Single Exposure)
Contains component(s) which are classified as specific target organ toxicant, single exposure, category 3.

Specific Target Organ Systemic Toxicity (Repeated Exposure)
Tissue injury in the upper respiratory tract and lungs has been observed in laboratory animals after repeated excessive exposures to MDI/polymeric MDI aerosols.
Contains component(s) which have been reported to cause effects on the following organs in animals: kidney
Liver.

Carcinogenicity
Lung tumors have been observed in laboratory animals exposed to respirable aerosol droplets of MDI/Polymeric MDI (6 mg/m3) for their lifetime. Tumors occurred concurrently with respiratory irritation and lung injury. Current exposure guidelines are expected to protect against these effects reported for MDI.

Teratogenicity
In laboratory animals, MDI/polymeric MDI did not cause birth defects; other fetal effects occurred only at high doses which were toxic to the mother. Contains component(s) which caused birth defects in laboratory animals only at doses toxic to the mother.

Reproductive toxicity
Based on information for component(s): May cause harm to breastfed babies.

Mutagenicity
In vitro genetic toxicity studies were negative for component(s) tested. Genetic toxicity data on MDI are inconclusive. MDI was weakly positive in some in vitro studies; other in vitro studies were negative.
Animal mutagenicity studies were predominantly negative.

Aspiration Hazard
Based on physical properties, not likely to be an aspiration hazard.

Carcinogenicity

Component	**List**	**Classification**
Paraffin waxes and Hydrocarbon waxes, chlorinated	IARC	Group 2B: Possibly carcinogenic to humans
	US NTP	Reasonably anticipated to be a human carcinogen

12. ECOLOGICAL INFORMATION

Ecotoxicological information appears in this section when such data is available.

Toxicity

Polymethylenepolyphenylisocyanate, propoxylated glycerin polymer

Acute toxicity to fish
For this family of materials:
Material is practically non-toxic to aquatic organisms on an acute basis (LC50/EC50/EL50/LL50 >100 mg/L in the most sensitive species tested).

Diphenylmethane Diisocyanate, isomers and homologues

Acute toxicity to fish
The measured ecotoxicity is that of the hydrolyzed product, generally under conditions maximizing production of soluble species.
Material is practically non-toxic to aquatic organisms on an acute basis (LC50/EC50/EL50/LL50 >100 mg/L in the most sensitive species tested).
Based on information for a similar material:
LC50, Danio rerio (zebra fish), static test, 96 Hour, > 1,000 mg/l, OECD Test Guideline 203 or Equivalent

Acute toxicity to aquatic invertebrates
Based on information for a similar material:
EC50, Daphnia magna (Water flea), static test, 24 Hour, > 1,000 mg/l, OECD Test Guideline 202 or Equivalent

Acute toxicity to algae/aquatic plants
Based on information for a similar material:
NOEC, Desmodesmus subspicatus (green algae), static test, 72 Hour, Growth rate inhibition, 1,640 mg/l, OECD Test Guideline 201 or Equivalent

Toxicity to bacteria
Based on information for a similar material:
EC50, activated sludge, static test, 3 Hour, Respiration rates., > 100 mg/l

Toxicity to soil-dwelling organisms
EC50, Eisenia fetida (earthworms), Based on information for a similar material:, 14 d, > 1,000 mg/kg

Toxicity to terrestrial plants
EC50, Avena sativa (oats), Growth inhibition, 1,000 mg/l
EC50, Lactuca sativa (lettuce), Growth inhibition, 1,000 mg/l

Polymethylenepolyphenyl polyisocyanate, polypropyleneglycol copolymer

Acute toxicity to fish
Not expected to be acutely toxic to aquatic organisms.

Tris(1-chloro-2-propyl) phosphate

Acute toxicity to fish

Material is slightly toxic to aquatic organisms on an acute basis (LC50/EC50 between 10 and 100 mg/L in the most sensitive species tested).
LC50, Lepomis macrochirus (Bluegill sunfish), static test, 96 Hour, 84 mg/l, OECD Test Guideline 203 or Equivalent

Acute toxicity to aquatic invertebrates
EC50, Daphnia magna (Water flea), 48 Hour, 131 mg/l

Acute toxicity to algae/aquatic plants
ErC50, Pseudokirchneriella subcapitata (green algae), static test, 96 Hour, Growth rate inhibition, 82 mg/l, OECD Test Guideline 201 or Equivalent

Toxicity to bacteria
EC50, activated sludge, Respiration inhibition, 3 Hour, 784 mg/l, OECD 209 Test

Chronic toxicity to aquatic invertebrates
NOEC, Daphnia magna (Water flea), semi-static test, 21 d, number of offspring, 32 mg/l

Paraffin waxes and Hydrocarbon waxes, chlorinated

Acute toxicity to fish
Material is highly toxic to aquatic organisms on an acute basis (LC50/EC50 between 0.1 and 1 mg/L in the most sensitive species tested).
LC50, Oncorhynchus mykiss (rainbow trout), 96 Hour, > 0.1 mg/l

Chronic toxicity to fish
Based on data from similar materials
NOEC, Oncorhynchus mykiss (rainbow trout), 60 d, 4.5 mg/l

Isobutane

Acute toxicity to fish
No relevant data found.

4,4' -Methylenediphenyl diisocyanate

Acute toxicity to fish
The measured ecotoxicity is that of the hydrolyzed product, generally under conditions maximizing production of soluble species.
Material is practically non-toxic to aquatic organisms on an acute basis (LC50/EC50/EL50/LL50 >100 mg/L in the most sensitive species tested).
Based on information for a similar material:
LC50, Danio rerio (zebra fish), static test, 96 Hour, > 1,000 mg/l, OECD Test Guideline 203 or Equivalent

Acute toxicity to aquatic invertebrates
Based on information for a similar material:
EC50, Daphnia magna (Water flea), static test, 24 Hour, > 1,000 mg/l, OECD Test Guideline 202 or Equivalent

Acute toxicity to algae/aquatic plants
Based on information for a similar material:
NOEC, Desmodesmus subspicatus (green algae), static test, 72 Hour, Growth rate inhibition, 1,640 mg/l, OECD Test Guideline 201 or Equivalent

Toxicity to bacteria

Based on information for a similar material:
EC50, activated sludge, static test, 3 Hour, Respiration rates., > 100 mg/l

Toxicity to soil-dwelling organisms
EC50, Eisenia fetida (earthworms), Based on information for a similar material:, 14 d, > 1,000 mg/kg

Toxicity to terrestrial plants
EC50, Avena sativa (oats), Growth inhibition, 1,000 mg/l
EC50, Lactuca sativa (lettuce), Growth inhibition, 1,000 mg/l

Methyl ether

Acute toxicity to fish
Material is practically non-toxic to aquatic organisms on an acute basis (LC50/EC50/EL50/LL50 >100 mg/L in the most sensitive species tested).
LC50, Poecilia reticulata (guppy), semi-static test, 96 Hour, > 4,000 mg/l

Acute toxicity to aquatic invertebrates
LC50, Daphnia magna (Water flea), 48 Hour, > 4,000 mg/l, OECD Test Guideline 202 or Equivalent

Propane

Acute toxicity to fish
No relevant data found.

Persistence and degradability

Polymethylenepolyphenylisocyanate, propoxylated glycerin polymer
Biodegradability: For this family of materials: Material is readily biodegradable. Passes OECD test(s) for ready biodegradability.

Diphenylmethane Diisocyanate, isomers and homologues
Biodegradability: In the aquatic and terrestrial environment, material reacts with water forming predominantly insoluble polyureas which appear to be stable. In the atmospheric environment, material is expected to have a short tropospheric half-life, based on calculations and by analogy with related diisocyanates.
10-day Window: Not applicable
Biodegradation: 0 %
Exposure time: 28 d
Method: OECD Test Guideline 302C or Equivalent

Polymethylenepolyphenyl polyisocyanate, polypropyleneglycol copolymer
Biodegradability: Expected to degrade slowly in the environment.

Tris(1-chloro-2-propyl) phosphate
Biodegradability: Material is expected to biodegrade very slowly (in the environment). Fails to pass OECD/EEC tests for ready biodegradability. Material is ultimately biodegradable (reaches > 70% mineralization in OECD test(s) for inherent biodegradability).
10-day Window: Fail
Biodegradation: 14 %
Exposure time: 28 d
Method: OECD Test Guideline 301E or Equivalent
10-day Window: Not applicable

Biodegradation: 95 %
Exposure time: 64 d
Method: OECD Test Guideline 302A or Equivalent

Theoretical Oxygen Demand: 1.17 mg/mg

Photodegradation
Test Type: Half-life (indirect photolysis)
Sensitization: OH radicals
Atmospheric half-life: 0.24 d
Method: Estimated.

Paraffin waxes and Hydrocarbon waxes, chlorinated

Biodegradability: Expected to degrade slowly in the environment.
For similar material(s):
Biodegradation: 5 %
Exposure time: 28 d
Method: OECD Test Guideline 301D

Theoretical Oxygen Demand: 2.89 mg/mg

Isobutane

Biodegradability: Biodegradation may occur under aerobic conditions (in the presence of oxygen).

Theoretical Oxygen Demand: 3.58 mg/mg

Photodegradation
Test Type: Half-life (indirect photolysis)
Sensitization: OH radicals
Atmospheric half-life: 4.4 d
Method: Estimated.

4,4' -Methylenediphenyl diisocyanate

Biodegradability: In the aquatic and terrestrial environment, material reacts with water forming predominantly insoluble polyureas which appear to be stable. In the atmospheric environment, material is expected to have a short tropospheric half-life, based on calculations and by analogy with related diisocyanates.
10-day Window: Not applicable
Biodegradation: 0 %
Exposure time: 28 d
Method: OECD Test Guideline 302C or Equivalent

Methyl ether

Biodegradability: Material is expected to biodegrade very slowly (in the environment). Fails to pass OECD/EEC tests for ready biodegradability.
10-day Window: Fail
Biodegradation: 5 %
Exposure time: 28 d
Method: OECD Test Guideline 301A or Equivalent

Theoretical Oxygen Demand: 2.08 mg/mg

Photodegradation
Test Type: Half-life (indirect photolysis)
Sensitization: OH radicals
Atmospheric half-life: 6.4 d
Method: Estimated.

Propane

Biodegradability: No relevant data found.

Theoretical Oxygen Demand: 3.64 mg/mg

Photodegradation
Test Type: Half-life (indirect photolysis)
Sensitization: OH radicals
Atmospheric half-life: 8.4 d
Method: Estimated.

Bioaccumulative potential

Polymethylenepolyphenylisocyanate, propoxylated glycerin polymer

Bioaccumulation: No relevant data found.

Diphenylmethane Diisocyanate, isomers and homologues

Bioaccumulation: Bioconcentration potential is low (BCF < 100 or Log Pow < 3). Reacts with water. In the aquatic and terrestrial environment, movement is expected to be limited by its reaction with water forming predominantly insoluble polyureas.
Bioconcentration factor (BCF): 92 Cyprinus carpio (Carp) 28 d

Polymethylenepolyphenyl polyisocyanate, polypropyleneglycol copolymer

Bioaccumulation: In the aquatic and terrestrial environment, movement is expected to be limited by its reaction with water forming predominantly insoluble polyureas.

Tris(1-chloro-2-propyl) phosphate

Bioaccumulation: Bioconcentration potential is low (BCF < 100 or Log Pow < 3).
Partition coefficient: n-octanol/water(log Pow): 2.59 Measured
Bioconcentration factor (BCF): 0.8 - 4.6 Cyprinus carpio (Carp) 42 d Measured

Paraffin waxes and Hydrocarbon waxes, chlorinated

Bioaccumulation: Bioconcentration potential is low (BCF less than 100 or log Pow greater than 7).
Partition coefficient: n-octanol/water(log Pow): 7.4 Estimated.

Isobutane

Bioaccumulation: Bioconcentration potential is low (BCF < 100 or Log Pow < 3).
Partition coefficient: n-octanol/water(log Pow): 2.76 Measured

4,4' -Methylenediphenyl diisocyanate

Bioaccumulation: Bioconcentration potential is low (BCF < 100 or Log Pow < 3). Reacts with water. In the aquatic and terrestrial environment, movement is expected to be limited by its reaction with water forming predominantly insoluble polyureas.
Bioconcentration factor (BCF): 92 Cyprinus carpio (Carp) 28 d

Methyl ether

Bioaccumulation: Bioconcentration potential is low (BCF < 100 or Log Pow < 3).
Partition coefficient: n-octanol/water(log Pow): 0.10 Measured

Propane
Bioaccumulation: Bioconcentration potential is low (BCF < 100 or Log Pow < 3).
Partition coefficient: n-octanol/water(log Pow): 2.36 Measured

Mobility in soil

Polymethylenepolyphenylisocyanate, propoxylated glycerin polymer
No relevant data found.

Diphenylmethane Diisocyanate, isomers and homologues
In the aquatic and terrestrial environment, movement is expected to be limited by its reaction with water forming predominantly insoluble polyureas.

Polymethylenepolyphenyl polyisocyanate, polypropyleneglycol copolymer
In the aquatic and terrestrial environment, movement is expected to be limited by its reaction with water forming predominantly insoluble polyureas.

Tris(1-chloro-2-propyl) phosphate
Potential for mobility in soil is slight (Koc between 2000 and 5000).
Partition coefficient (Koc): 1300 Estimated.

Paraffin waxes and Hydrocarbon waxes, chlorinated
Given its very low Henry's constant, volatilization from natural bodies of water or moist soil is not expected to be an important fate process.
Expected to be relatively immobile in soil (Koc > 5000).
Partition coefficient (Koc): > 5000 Estimated.

Isobutane
Potential for mobility in soil is very high (Koc between 0 and 50).
Partition coefficient (Koc): 35 Estimated.

4,4' -Methylenediphenyl diisocyanate
In the aquatic and terrestrial environment, movement is expected to be limited by its reaction with water forming predominantly insoluble polyureas.

Methyl ether
Potential for mobility in soil is very high (Koc between 0 and 50).
Partition coefficient (Koc): 1.29 - 14 Estimated.

Propane
Potential for mobility in soil is very high (Koc between 0 and 50).
Partition coefficient (Koc): 24 - 460 Estimated.

13. DISPOSAL CONSIDERATIONS

Disposal methods: DO NOT DUMP INTO ANY SEWERS, ON THE GROUND, OR INTO ANY BODY OF WATER. All disposal practices must be in compliance with all Federal, State/Provincial and local laws and regulations. Regulations may vary in different locations. Waste characterizations and

compliance with applicable laws are the responsibility solely of the waste generator. AS YOUR SUPPLIER, WE HAVE NO CONTROL OVER THE MANAGEMENT PRACTICES OR MANUFACTURING PROCESSES OF PARTIES HANDLING OR USING THIS MATERIAL. THE INFORMATION PRESENTED HERE PERTAINS ONLY TO THE PRODUCT AS SHIPPED IN ITS INTENDED CONDITION AS DESCRIBED IN MSDS SECTION: Composition Information. FOR UNUSED & UNCONTAMINATED PRODUCT, the preferred options include sending to a licensed, permitted: Incinerator or other thermal destruction device.

14. TRANSPORT INFORMATION

DOT

Proper shipping name	Aerosols
UN number	UN 1950
Class	2.1
Packing group	

Classification for SEA transport (IMO-IMDG):

Proper shipping name	AEROSOLS
UN number	UN 1950
Class	2.1
Packing group	
Marine pollutant	Paraffin waxes and Hydrocarbon waxes, chlorinated
Transport in bulk according to Annex I or II of MARPOL 73/78 and the IBC or IGC Code	Consult IMO regulations before transporting ocean bulk

Classification for AIR transport (IATA/ICAO):

Proper shipping name	Aerosols, flammable
UN number	UN 1950
Class	2.1
Packing group	

This information is not intended to convey all specific regulatory or operational requirements/information relating to this product. Transportation classifications may vary by container volume and may be influenced by regional or country variations in regulations. Additional transportation system information can be obtained through an authorized sales or customer service representative. It is the responsibility of the transporting organization to follow all applicable laws, regulations and rules relating to the transportation of the material.

15. REGULATORY INFORMATION

Superfund Amendments and Reauthorization Act of 1986 Title III (Emergency Planning and Community Right-to-Know Act of 1986) Sections 311 and 312
Gases under pressure

Flammable (gases, aerosols, liquids, or solids)
Specific target organ toxicity (single or repeated exposure)
Respiratory or skin sensitisation
Skin corrosion or irritation
Serious eye damage or eye irritation
Reproductive toxicity

Superfund Amendments and Reauthorization Act of 1986 Title III (Emergency Planning and Community Right-to-Know Act of 1986) Section 313
This product contains the following substances which are subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and which are listed in 40 CFR 372.

Components	**CASRN**
Diphenylmethane Diisocyanate, isomers and homologues	9016-87-9
4,4' -Methylenediphenyl diisocyanate	101-68-8

Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) Section 103
Calculated RQ exceeds reasonably attainable upper limit.

Components	**CASRN**	**RQ (RCRA Code)**
4,4' -Methylenediphenyl diisocyanate	101-68-8	5000 lbs RQ

Pennsylvania Worker and Community Right-To-Know Act:
The following chemicals are listed because of the additional requirements of Pennsylvania law:

Components	**CASRN**
Isobutane	75-28-5
Methyl ether	115-10-6
Propane	74-98-6

California Prop. 65
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

United States TSCA Inventory (TSCA)
All components of this product are in compliance with the inventory listing requirements of the U.S. Toxic Substances Control Act (TSCA) Chemical Substance Inventory.

16. OTHER INFORMATION

Hazard Rating System
HMIS

Health	Flammability	Physical Hazard
4*	4	3

* = Chronic Effects (See Hazards Identification)

Revision
Identification Number: 162845 / A749 / Issue Date: 06/29/2020 / Version: 9.0

Most recent revision(s) are noted by the bold, double bars in left-hand margin throughout this document.

Legend

ACGIH	USA. ACGIH Threshold Limit Values (TLV)
C	Ceiling
CAL PEL	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
Dow IHG	Dow Industrial Hygiene Guideline
NIOSH REL	USA. NIOSH Recommended Exposure Limits
OSHA Z-1	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
PEL	Permissible exposure limit
STEL	Short-term exposure limit
TWA	8-hr TWA
US WEEL	USA. Workplace Environmental Exposure Levels (WEEL)

Full text of other abbreviations

AICS - Australian Inventory of Chemical Substances; AIIC - Australian Inventory of Industrial Chemicals; ASTM - American Society for the Testing of Materials; bw - Body weight; CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act; CMR - Carcinogen, Mutagen or Reproductive Toxicant; DIN - Standard of the German Institute for Standardisation; DOT - Department of Transportation; DSL - Domestic Substances List (Canada); ECx - Concentration associated with x% response; EHS - Extremely Hazardous Substance; ELx - Loading rate associated with x% response; EmS - Emergency Schedule; ENCS - Existing and New Chemical Substances (Japan); ErCx - Concentration associated with x% growth rate response; ERG - Emergency Response Guide; GHS - Globally Harmonized System; GLP - Good Laboratory Practice; HMIS - Hazardous Materials Identification System; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; IBC - International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk; IC50 - Half maximal inhibitory concentration; ICAO - International Civil Aviation Organization; IECSC - Inventory of Existing Chemical Substances in China; IMDG - International Maritime Dangerous Goods; IMO - International Maritime Organization; ISHL - Industrial Safety and Health Law (Japan); ISO - International Organisation for Standardization; KECI - Korea Existing Chemicals Inventory; LC50 - Lethal Concentration to 50 % of a test population; LD50 - Lethal Dose to 50% of a test population (Median Lethal Dose); MARPOL - International Convention for the Prevention of Pollution from Ships; MSHA - Mine Safety and Health Administration; n.o.s. - Not Otherwise Specified; NFPA - National Fire Protection Association; NO(A)EC - No Observed (Adverse) Effect Concentration; NO(A)EL - No Observed (Adverse) Effect Level; NOELR - No Observable Effect Loading Rate; NTP - National Toxicology Program; NZIoC - New Zealand Inventory of Chemicals; OECD - Organization for Economic Co-operation and Development; OPPTS - Office of Chemical Safety and Pollution Prevention; PBT - Persistent, Bioaccumulative and Toxic substance; PICCS - Philippines Inventory of Chemicals and Chemical Substances; (Q)SAR - (Quantitative) Structure Activity Relationship; RCRA - Resource Conservation and Recovery Act; REACH - Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals; RQ - Reportable Quantity; SADT - Self-Accelerating Decomposition Temperature; SARA - Superfund Amendments and Reauthorization Act; SDS - Safety Data Sheet; TCSI - Taiwan Chemical Substance Inventory; TSCA - Toxic Substances Control Act (United States); UN - United Nations; UNRTDG - United Nations Recommendations on the Transport of Dangerous Goods; vPvB - Very Persistent and Very Bioaccumulative

Information Source and References

This SDS is prepared by Product Regulatory Services and Hazard Communications Groups from information supplied by internal references within our company.

DDP SPECIALTY ELECTRONIC MATERIALS US, INC. urges each customer or recipient of this (M)SDS to study it carefully and consult appropriate expertise, as necessary or appropriate, to become aware of and understand the data contained in this (M)SDS and any hazards associated with the product. The information herein is provided in good faith and believed to be accurate as of the effective date shown above. However, no warranty, express or implied, is given. Regulatory requirements are subject to change and may differ between various locations. It is the buyer's/user's responsibility to ensure that his activities comply with all federal, state, provincial or local laws. The information presented here pertains only to the product as shipped. Since conditions for use of the product are not under the control of the manufacturer, it is the buyer's/user's duty to determine the conditions necessary for the safe use of this product. Due to the proliferation of sources for information such as manufacturer-specific (M)SDSs, we are not and cannot be responsible for (M)SDSs obtained from any source other than ourselves. If you have obtained an (M)SDS from another source or if you are not sure that the (M)SDS you have is current, please contact us for the most current version.
US

Appendix D
Laboratory Data Reports

PARADIGM
ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213652

Client: **Inventum Engineering, P.C.**

Project Reference: Riverview

Sample Identifier:	AQ - Fire Quench - 08112021		
Lab Sample ID:	213652-01	**Date Sampled:**	8/11/2021
Matrix:	Water	**Date Received:**	8/12/2021

Mercury

Analyte	Result	Units	Qualifier	Date Analyzed
Mercury	**0.105**	mg/L		8/16/2021 12:54

Method Reference(s): EPA 245.1
Preparation Date: 8/16/2021
Data File: Hg210816A

This report is part of a multipage document and should only be evaluated in its entirety. The Chain of Custody provides additional sample information, including compliance with the sample condition requirements upon receipt.

Report Prepared Thursday, August 19, 2021

PARADIGM
ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213652

Client: **Inventum Engineering, P.C.**

Project Reference: Riverview

Sample Identifier: AQ - Fire Quench - 08112021
Lab Sample ID: 213652-01 **Date Sampled:** 8/11/2021
Matrix: Water **Date Received:** 8/12/2021

Priority Pollutant Metals (ICP)

Analyte	Result	Units	Qualifier	Date Analyzed
Aluminum	**19.6**	mg/L		8/13/2021 17:48
Antimony	< 0.0600	mg/L		8/13/2021 17:48
Arsenic	**0.0543**	mg/L		8/16/2021 13:16
Beryllium	< 0.00500	mg/L		8/13/2021 17:48
Cadmium	< 0.00500	mg/L		8/13/2021 17:48
Chromium	**0.113**	mg/L		8/13/2021 17:48
Copper	**0.192**	mg/L		8/13/2021 17:48
Iron	**146**	mg/L		8/13/2021 17:48
Lead	**0.264**	mg/L		8/13/2021 17:48
Manganese	**6.66**	mg/L		8/13/2021 17:48
Nickel	**0.0503**	mg/L		8/13/2021 17:48
Selenium	**0.0133**	mg/L	J	8/13/2021 17:48
Silver	< 0.0100	mg/L		8/13/2021 17:48
Thallium	< 0.0250	mg/L		8/13/2021 17:48
Zinc	**1.28**	mg/L		8/13/2021 17:48

Method Reference(s): EPA 6010C
EPA 3005A
Preparation Date: 8/12/2021
Data File: 210813B

PARADIGM
ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213652

Client: **Inventum Engineering, P.C.**

Project Reference: Riverview

Sample Identifier: AQ - Fire Quench - 08112021
Lab Sample ID: 213652-01 **Date Sampled:** 8/11/2021
Matrix: Water **Date Received:** 8/12/2021

Semi-Volatile Organics (PAHs)

Analyte	Result	Units	Qualifier	Date Analyzed
Acenaphthene	< 5000	ug/L		8/17/2021 15:58
Acenaphthylene	< 5000	ug/L		8/17/2021 15:58
Anthracene	< 5000	ug/L		8/17/2021 15:58
Benzo (a) anthracene	< 5000	ug/L		8/17/2021 15:58
Benzo (a) pyrene	< 5000	ug/L		8/17/2021 15:58
Benzo (b) fluoranthene	< 5000	ug/L		8/17/2021 15:58
Benzo (g,h,i) perylene	< 5000	ug/L		8/17/2021 15:58
Benzo (k) fluoranthene	< 5000	ug/L		8/17/2021 15:58
Chrysene	< 5000	ug/L		8/17/2021 15:58
Dibenz (a,h) anthracene	< 5000	ug/L		8/17/2021 15:58
Fluoranthene	< 5000	ug/L		8/17/2021 15:58
Fluorene	< 5000	ug/L		8/17/2021 15:58
Hexachlorobenzene	< 5000	ug/L		8/17/2021 15:58
Indeno (1,2,3-cd) pyrene	< 5000	ug/L		8/17/2021 15:58
Naphthalene	**31200**	ug/L		8/17/2021 15:58
Phenanthrene	< 5000	ug/L		8/17/2021 15:58
Pyrene	< 5000	ug/L		8/17/2021 15:58

Surrogate	Percent Recovery	Limits	Outliers	Date Analyzed
2-Fluorobiphenyl	NC	30.9 - 98.1		8/17/2021 15:58
Nitrobenzene-d5	NC	49.6 - 104		8/17/2021 15:58
Terphenyl-d14	NC	56.5 - 118		8/17/2021 15:58

Tailing factor criteria was not met for this analytical batch. All other quality control criteria was within acceptable limts.

Method Reference(s): EPA 625.1
Preparation Date: 8/13/2021
Data File: B56313.D

Report Prepared Thursday, August 19, 2021

PARADIGM
ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213652

Client: **Inventum Engineering, P.C.**

Project Reference: Riverview

Sample Identifier: AQ - Fire Quench - 08112021
Lab Sample ID: 213652-01 **Date Sampled:** 8/11/2021
Matrix: Water **Date Received:** 8/12/2021

Semi-Volatile Organics (Acid/Base Neutrals)

Analyte	Result	Units	Qualifier	Date Analyzed
1,1-Biphenyl	< 5000	ug/L		8/17/2021 16:28
1,2,4,5-Tetrachlorobenzene	< 5000	ug/L		8/17/2021 16:28
1,2,4-Trichlorobenzene	< 5000	ug/L		8/17/2021 16:28
1,2-Dichlorobenzene	< 5000	ug/L		8/17/2021 16:28
1,3-Dichlorobenzene	< 5000	ug/L		8/17/2021 16:28
1,4-Dichlorobenzene	< 5000	ug/L		8/17/2021 16:28
2,2-Oxybis (1-chloropropane)	< 5000	ug/L		8/17/2021 16:28
2,3,4,6-Tetrachlorophenol	< 5000	ug/L		8/17/2021 16:28
2,4,5-Trichlorophenol	< 5000	ug/L		8/17/2021 16:28
2,4,6-Trichlorophenol	< 5000	ug/L		8/17/2021 16:28
2,4-Dichlorophenol	< 5000	ug/L		8/17/2021 16:28
2,4-Dimethylphenol	< 5000	ug/L		8/17/2021 16:28
2,4-Dinitrophenol	< 10000	ug/L		8/17/2021 16:28
2,4-Dinitrotoluene	< 5000	ug/L		8/17/2021 16:28
2,6-Dinitrotoluene	< 5000	ug/L		8/17/2021 16:28
2-Chloronaphthalene	< 5000	ug/L		8/17/2021 16:28
2-Chlorophenol	< 5000	ug/L		8/17/2021 16:28
2-Methylnapthalene	< 5000	ug/L		8/17/2021 16:28
2-Methylphenol	< 5000	ug/L		8/17/2021 16:28
2-Nitroaniline	< 10000	ug/L		8/17/2021 16:28
2-Nitrophenol	< 5000	ug/L		8/17/2021 16:28
3&4-Methylphenol	< 5000	ug/L		8/17/2021 16:28
3,3'-Dichlorobenzidine	< 5000	ug/L		8/17/2021 16:28

PARADIGM
ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213652

Client: **Inventum Engineering, P.C.**

Project Reference: Riverview

Sample Identifier: AQ - Fire Quench - 08112021
Lab Sample ID: 213652-01 **Date Sampled:** 8/11/2021
Matrix: Water **Date Received:** 8/12/2021

3-Nitroaniline	< 10000	ug/L	8/17/2021	16:28
4,6-Dinitro-2-methylphenol	< 10000	ug/L	8/17/2021	16:28
4-Bromophenyl phenyl ether	< 5000	ug/L	8/17/2021	16:28
4-Chloro-3-methylphenol	< 5000	ug/L	8/17/2021	16:28
4-Chloroaniline	< 5000	ug/L	8/17/2021	16:28
4-Chlorophenyl phenyl ether	< 5000	ug/L	8/17/2021	16:28
4-Nitroaniline	< 10000	ug/L	8/17/2021	16:28
4-Nitrophenol	< 10000	ug/L	8/17/2021	16:28
Acenaphthene	< 5000	ug/L	8/17/2021	16:28
Acenaphthylene	< 5000	ug/L	8/17/2021	16:28
Acetophenone	< 5000	ug/L	8/17/2021	16:28
Anthracene	< 5000	ug/L	8/17/2021	16:28
Atrazine	< 12500	ug/L	8/17/2021	16:28
Benzaldehyde	< 5000	ug/L	8/17/2021	16:28
Benzo (a) anthracene	< 5000	ug/L	8/17/2021	16:28
Benzo (a) pyrene	< 5000	ug/L	8/17/2021	16:28
Benzo (b) fluoranthene	< 5000	ug/L	8/17/2021	16:28
Benzo (g,h,i) perylene	< 5000	ug/L	8/17/2021	16:28
Benzo (k) fluoranthene	< 5000	ug/L	8/17/2021	16:28
Bis (2-chloroethoxy) methane	< 5000	ug/L	8/17/2021	16:28
Bis (2-chloroethyl) ether	< 5000	ug/L	8/17/2021	16:28
Bis (2-ethylhexyl) phthalate	< 5000	ug/L	8/17/2021	16:28
Butylbenzylphthalate	< 5000	ug/L	8/17/2021	16:28
Caprolactam	< 5000	ug/L	8/17/2021	16:28
Carbazole	< 5000	ug/L	8/17/2021	16:28

PARADIGM
ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213652

Client: **Inventum Engineering, P.C.**

Project Reference: Riverview

Sample Identifier: AQ - Fire Quench - 08112021
Lab Sample ID: 213652-01 **Date Sampled:** 8/11/2021
Matrix: Water **Date Received:** 8/12/2021

Chrysene	< 5000	ug/L	8/17/2021	16:28
Dibenz (a,h) anthracene	< 5000	ug/L	8/17/2021	16:28
Dibenzofuran	< 5000	ug/L	8/17/2021	16:28
Diethyl phthalate	< 5000	ug/L	8/17/2021	16:28
Dimethyl phthalate	< 10000	ug/L	8/17/2021	16:28
Di-n-butyl phthalate	< 5000	ug/L	8/17/2021	16:28
Di-n-octylphthalate	< 5000	ug/L	8/17/2021	16:28
Fluoranthene	< 5000	ug/L	8/17/2021	16:28
Fluorene	< 5000	ug/L	8/17/2021	16:28
Hexachlorobenzene	< 5000	ug/L	8/17/2021	16:28
Hexachlorobutadiene	< 5000	ug/L	8/17/2021	16:28
Hexachlorocyclopentadiene	< 5000	ug/L	8/17/2021	16:28
Hexachloroethane	< 5000	ug/L	8/17/2021	16:28
Indeno (1,2,3-cd) pyrene	< 5000	ug/L	8/17/2021	16:28
Isophorone	< 5000	ug/L	8/17/2021	16:28
Naphthalene	**34500**	ug/L	8/17/2021	16:28
Nitrobenzene	< 5000	ug/L	8/17/2021	16:28
N-Nitroso-di-n-propylamine	< 5000	ug/L	8/17/2021	16:28
N-Nitrosodiphenylamine	< 5000	ug/L	8/17/2021	16:28
Pentachlorophenol	< 10000	ug/L	8/17/2021	16:28
Phenanthrene	< 5000	ug/L	8/17/2021	16:28
Phenol	< 5000	ug/L	8/17/2021	16:28
Pyrene	< 5000	ug/L	8/17/2021	16:28

PARADIGM
ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213652

Client: **Inventum Engineering, P.C.**

Project Reference: Riverview

Sample Identifier: AQ - Fire Quench - 08112021

Lab Sample ID: 213652-01 **Date Sampled:** 8/11/2021

Matrix: Water **Date Received:** 8/12/2021

Surrogate	Percent Recovery	Limits	Outliers	Date Analyzed	
2,4,6-Tribromophenol	NC	55.4 - 111		8/17/2021	16:28
2-Fluorobiphenyl	NC	30.9 - 98.1		8/17/2021	16:28
2-Fluorophenol	NC	10 - 105		8/17/2021	16:28
Nitrobenzene-d5	NC	49.6 - 104		8/17/2021	16:28
Phenol-d5	NC	10 - 105		8/17/2021	16:28
Terphenyl-d14	NC	56.5 - 118		8/17/2021	16:28

Method Reference(s): EPA 8270D
EPA 3510C
Preparation Date: 8/17/2021
Data File: B56314.D

PARADIGM
ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213652

Client: **Inventum Engineering, P.C.**

Project Reference: Riverview

Sample Identifier: AQ - Fire Quench - 08112021
Lab Sample ID: 213652-01 **Date Sampled:** 8/11/2021
Matrix: Water **Date Received:** 8/12/2021

Volatile Organics

Analyte	Result	Units	Qualifier	Date Analyzed
1,1,1-Trichloroethane	< 20.0	ug/L		8/13/2021 13:52
1,1,2,2-Tetrachloroethane	< 20.0	ug/L		8/13/2021 13:52
1,1,2-Trichloroethane	< 20.0	ug/L		8/13/2021 13:52
1,1-Dichloroethane	< 20.0	ug/L		8/13/2021 13:52
1,1-Dichloroethene	< 20.0	ug/L		8/13/2021 13:52
1,2-Dichlorobenzene	< 20.0	ug/L		8/13/2021 13:52
1,2-Dichloroethane	< 20.0	ug/L		8/13/2021 13:52
1,2-Dichloropropane	< 20.0	ug/L		8/13/2021 13:52
1,3-Dichlorobenzene	< 20.0	ug/L		8/13/2021 13:52
1,4-Dichlorobenzene	< 20.0	ug/L		8/13/2021 13:52
2-Chloroethyl vinyl Ether	< 50.0	ug/L		8/13/2021 13:52
Benzene	**340**	ug/L		8/13/2021 13:52
Bromodichloromethane	< 20.0	ug/L		8/13/2021 13:52
Bromoform	< 50.0	ug/L		8/13/2021 13:52
Bromomethane	< 20.0	ug/L		8/13/2021 13:52
Carbon Tetrachloride	< 20.0	ug/L		8/13/2021 13:52
Chlorobenzene	< 20.0	ug/L		8/13/2021 13:52
Chloroethane	< 20.0	ug/L		8/13/2021 13:52
Chloroform	< 20.0	ug/L		8/13/2021 13:52
Chloromethane	< 20.0	ug/L		8/13/2021 13:52
cis-1,3-Dichloropropene	< 20.0	ug/L		8/13/2021 13:52
Dibromochloromethane	< 20.0	ug/L		8/13/2021 13:52
Ethylbenzene	**31.1**	ug/L		8/13/2021 13:52

PARADIGM
ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213652

Client: **Inventum Engineering, P.C.**

Project Reference: Riverview

Sample Identifier: AQ - Fire Quench - 08112021
Lab Sample ID: 213652-01 **Date Sampled:** 8/11/2021
Matrix: Water **Date Received:** 8/12/2021

Methylene chloride	< 50.0	ug/L	8/13/2021	13:52
Tetrachloroethene	< 20.0	ug/L	8/13/2021	13:52
Toluene	**485**	ug/L	8/13/2021	13:52
trans-1,2-Dichloroethene	< 20.0	ug/L	8/13/2021	13:52
trans-1,3-Dichloropropene	< 20.0	ug/L	8/13/2021	13:52
Trichloroethene	< 20.0	ug/L	8/13/2021	13:52
Trichlorofluoromethane	< 20.0	ug/L	8/13/2021	13:52
Vinyl chloride	< 20.0	ug/L	8/13/2021	13:52

Surrogate	Percent Recovery	Limits	Outliers	Date Analyzed	
1,2-Dichloroethane-d4	**121**	83 - 120	*	8/13/2021	13:52
4-Bromofluorobenzene	**111**	65.5 - 118		8/13/2021	13:52
Pentafluorobenzene	**103**	91.2 - 109		8/13/2021	13:52
Toluene-D8	**88.2**	79.7 - 112		8/13/2021	13:52

Method Reference(s): EPA 624.1
Data File: z03554.D

PARADIGM
ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213652

Client: **Inventum Engineering, P.C.**

Project Reference: Riverview

Sample Identifier: AQ - Fire Quench - 08112021
Lab Sample ID: 213652-01 **Date Sampled:** 8/11/2021
Matrix: Water **Date Received:** 8/12/2021

Volatile Organics

Analyte	Result	Units	Qualifier	Date Analyzed
1,1,1-Trichloroethane	< 20.0	ug/L		8/13/2021 13:52
1,1,2,2-Tetrachloroethane	< 20.0	ug/L		8/13/2021 13:52
1,1,2-Trichloroethane	< 20.0	ug/L		8/13/2021 13:52
1,1-Dichloroethane	< 20.0	ug/L		8/13/2021 13:52
1,1-Dichloroethene	< 20.0	ug/L		8/13/2021 13:52
1,2,3-Trichlorobenzene	< 50.0	ug/L		8/13/2021 13:52
1,2,4-Trichlorobenzene	< 50.0	ug/L		8/13/2021 13:52
1,2-Dibromo-3-Chloropropane	< 100	ug/L		8/13/2021 13:52
1,2-Dibromoethane	< 20.0	ug/L		8/13/2021 13:52
1,2-Dichlorobenzene	< 20.0	ug/L		8/13/2021 13:52
1,2-Dichloroethane	< 20.0	ug/L		8/13/2021 13:52
1,2-Dichloropropane	< 20.0	ug/L		8/13/2021 13:52
1,3-Dichlorobenzene	< 20.0	ug/L		8/13/2021 13:52
1,4-Dichlorobenzene	< 20.0	ug/L		8/13/2021 13:52
1,4-Dioxane	< 100	ug/L		8/13/2021 13:52
2-Butanone	< 100	ug/L		8/13/2021 13:52
2-Hexanone	< 50.0	ug/L		8/13/2021 13:52
4-Methyl-2-pentanone	< 50.0	ug/L		8/13/2021 13:52
Acetone	< 100	ug/L		8/13/2021 13:52
Benzene	**340**	ug/L		8/13/2021 13:52
Bromochloromethane	< 50.0	ug/L		8/13/2021 13:52
Bromodichloromethane	< 20.0	ug/L		8/13/2021 13:52
Bromoform	< 50.0	ug/L		8/13/2021 13:52

PARADIGM
ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213652

Client: **Inventum Engineering, P.C.**

Project Reference: Riverview

Sample Identifier: AQ - Fire Quench - 08112021
Lab Sample ID: 213652-01 **Date Sampled:** 8/11/2021
Matrix: Water **Date Received:** 8/12/2021

Bromomethane	< 20.0	ug/L	8/13/2021	13:52
Carbon disulfide	**23.6**	ug/L	8/13/2021	13:52
Carbon Tetrachloride	< 20.0	ug/L	8/13/2021	13:52
Chlorobenzene	< 20.0	ug/L	8/13/2021	13:52
Chloroethane	< 20.0	ug/L	8/13/2021	13:52
Chloroform	< 20.0	ug/L	8/13/2021	13:52
Chloromethane	< 20.0	ug/L	8/13/2021	13:52
cis-1,2-Dichloroethene	< 20.0	ug/L	8/13/2021	13:52
cis-1,3-Dichloropropene	< 20.0	ug/L	8/13/2021	13:52
Cyclohexane	< 100	ug/L	8/13/2021	13:52
Dibromochloromethane	< 20.0	ug/L	8/13/2021	13:52
Dichlorodifluoromethane	< 20.0	ug/L	8/13/2021	13:52
Ethylbenzene	**31.1**	ug/L	8/13/2021	13:52
Freon 113	< 20.0	ug/L	8/13/2021	13:52
Isopropylbenzene	< 20.0	ug/L	8/13/2021	13:52
m,p-Xylene	**530**	ug/L	8/13/2021	13:52
Methyl acetate	< 20.0	ug/L	8/13/2021	13:52
Methyl tert-butyl Ether	< 20.0	ug/L	8/13/2021	13:52
Methylcyclohexane	< 20.0	ug/L	8/13/2021	13:52
Methylene chloride	< 50.0	ug/L	8/13/2021	13:52
o-Xylene	**184**	ug/L	8/13/2021	13:52
Styrene	< 50.0	ug/L	8/13/2021	13:52
Tetrachloroethene	< 20.0	ug/L	8/13/2021	13:52
Toluene	**485**	ug/L	8/13/2021	13:52
trans-1,2-Dichloroethene	< 20.0	ug/L	8/13/2021	13:52

PARADIGM
ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213652

Client: **Inventum Engineering, P.C.**

Project Reference: Riverview

Sample Identifier: AQ - Fire Quench - 08112021
Lab Sample ID: 213652-01 **Date Sampled:** 8/11/2021
Matrix: Water **Date Received:** 8/12/2021

trans-1,3-Dichloropropene	< 20.0	ug/L	8/13/2021	13:52
Trichloroethene	< 20.0	ug/L	8/13/2021	13:52
Trichlorofluoromethane	< 20.0	ug/L	8/13/2021	13:52
Vinyl chloride	< 20.0	ug/L	8/13/2021	13:52

Surrogate	Percent Recovery	Limits	Outliers	Date Analyzed	
1,2-Dichloroethane-d4	**121**	83 - 120	*	8/13/2021	13:52
4-Bromofluorobenzene	**111**	65.5 - 118		8/13/2021	13:52
Pentafluorobenzene	**103**	91.2 - 109		8/13/2021	13:52
Toluene-D8	**88.2**	79.7 - 112		8/13/2021	13:52

Method Reference(s): EPA 8260C
EPA 5030C
Data File: z03554.D

PARADIGM
ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213652

Client: **Inventum Engineering, P.C.**

Project Reference: Riverview

Sample Identifier:	AQ - Fire Quench - 08112021		
Lab Sample ID:	213652-01	**Date Sampled:**	8/11/2021
Matrix:	Water	**Date Received:**	8/12/2021

Total Cyanide

Analyte	Result	Units	Qualifier	Date Analyzed
Cyanide, Total	**10.9**	mg/L		8/17/2021

Method Reference(s): SM 4500 CN E - 2011
SM 4500 CN C - 2011

Preparation Date: 8/17/2021

This report is part of a multipage document and should only be evaluated in its entirety. The Chain of Custody provides additional sample information, including compliance with the sample condition requirements upon receipt.

Report Prepared Thursday, August 19, 2021

PARADIGM
ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213652

Client: **Inventum Engineering, P.C.**

Project Reference: Riverview

Sample Identifier:	AQ - Fire Quench - 08112021		
Lab Sample ID:	213652-01	**Date Sampled:**	8/11/2021
Matrix:	Water	**Date Received:**	8/12/2021

SGT - HEM

Analyte	Result	Units	Qualifier	Date Analyzed
Total Petroleum Hydrocarbon (Silica Gel / HEM)	< 9.57	mg/L		8/17/2021

Method Reference(s): EPA 1664B
Preparation Date: 8/16/2021

This report is part of a multipage document and should only be evaluated in its entirety. The Chain of Custody provides additional sample information, including compliance with the sample condition requirements upon receipt.

Report Prepared Thursday, August 19, 2021

PARADIGM
ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213652

Client: **Inventum Engineering, P.C.**

Project Reference: Riverview

Sample Identifier:	AQ - Fire Wharf - 08112021		
Lab Sample ID:	213652-02	**Date Sampled:**	8/11/2021
Matrix:	Water	**Date Received:**	8/12/2021

Mercury

Analyte	Result	Units	Qualifier	Date Analyzed
Mercury	< 0.000200	mg/L		8/16/2021 12:42

Method Reference(s): EPA 245.1
Preparation Date: 8/16/2021
Data File: Hg210816A

Report Prepared Thursday, August 19, 2021

PARADIGM
ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213652

Client: **Inventum Engineering, P.C.**

Project Reference: Riverview

Sample Identifier: AQ - Fire Wharf - 08112021
Lab Sample ID: 213652-02 **Date Sampled:** 8/11/2021
Matrix: Water **Date Received:** 8/12/2021

Priority Pollutant Metals (ICP)

Analyte	Result	Units	Qualifier	Date Analyzed
Aluminum	**0.259**	mg/L		8/13/2021 15:46
Antimony	< 0.0600	mg/L		8/13/2021 15:46
Arsenic	< 0.0100	mg/L		8/13/2021 15:46
Beryllium	< 0.00500	mg/L		8/13/2021 15:46
Cadmium	< 0.00500	mg/L		8/13/2021 15:46
Chromium	< 0.0100	mg/L		8/13/2021 15:46
Copper	< 0.0200	mg/L		8/13/2021 15:46
Iron	**3.02**	mg/L		8/13/2021 15:46
Lead	**0.0179**	mg/L		8/13/2021 15:46
Manganese	**0.113**	mg/L		8/13/2021 15:46
Nickel	< 0.0400	mg/L		8/13/2021 15:46
Selenium	< 0.0200	mg/L		8/13/2021 15:46
Silver	< 0.0100	mg/L		8/13/2021 15:46
Thallium	< 0.0250	mg/L		8/13/2021 15:46
Zinc	**0.129**	mg/L		8/13/2021 15:46

Method Reference(s): EPA 6010C
EPA 3005A
Preparation Date: 8/12/2021
Data File: 210813B

PARADIGM
ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213652

Client: **Inventum Engineering, P.C.**

Project Reference: Riverview

Sample Identifier: AQ - Fire Wharf - 08112021
Lab Sample ID: 213652-02 **Date Sampled:** 8/11/2021
Matrix: Water **Date Received:** 8/12/2021

Semi-Volatile Organics (PAHs)

Analyte	Result	Units	Qualifier	Date Analyzed
Acenaphthene	< 10.0	ug/L		8/16/2021 20:08
Acenaphthylene	< 10.0	ug/L		8/16/2021 20:08
Anthracene	< 10.0	ug/L		8/16/2021 20:08
Benzo (a) anthracene	< 10.0	ug/L		8/16/2021 20:08
Benzo (a) pyrene	< 10.0	ug/L		8/16/2021 20:08
Benzo (b) fluoranthene	< 10.0	ug/L		8/16/2021 20:08
Benzo (g,h,i) perylene	< 10.0	ug/L		8/16/2021 20:08
Benzo (k) fluoranthene	< 10.0	ug/L		8/16/2021 20:08
Chrysene	< 10.0	ug/L		8/16/2021 20:08
Dibenz (a,h) anthracene	< 10.0	ug/L		8/16/2021 20:08
Fluoranthene	< 10.0	ug/L		8/16/2021 20:08
Fluorene	< 10.0	ug/L		8/16/2021 20:08
Hexachlorobenzene	< 10.0	ug/L		8/16/2021 20:08
Indeno (1,2,3-cd) pyrene	< 10.0	ug/L		8/16/2021 20:08
Naphthalene	< 10.0	ug/L		8/16/2021 20:08
Phenanthrene	< 10.0	ug/L		8/16/2021 20:08
Pyrene	< 10.0	ug/L		8/16/2021 20:08

Surrogate	Percent Recovery	Limits	Outliers	Date Analyzed
2-Fluorobiphenyl	**62.2**	30.9 - 98.1		8/16/2021 20:08
Nitrobenzene-d5	**69.6**	49.6 - 104		8/16/2021 20:08
Terphenyl-d14	**81.7**	56.5 - 118		8/16/2021 20:08

Method Reference(s): EPA 625.1
Preparation Date: 8/13/2021
Data File: B56296.D

PARADIGM ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213652

Client: **Inventum Engineering, P.C.**

Project Reference: Riverview

Sample Identifier: AQ - Fire Wharf - 08112021
Lab Sample ID: 213652-02 **Date Sampled:** 8/11/2021
Matrix: Water **Date Received:** 8/12/2021

Semi-Volatile Organics (Acid/Base Neutrals)

Analyte	Result	Units	Qualifier	Date Analyzed
1,1-Biphenyl	< 10.0	ug/L		8/17/2021 13:28
1,2,4,5-Tetrachlorobenzene	< 10.0	ug/L		8/17/2021 13:28
1,2,4-Trichlorobenzene	< 10.0	ug/L		8/17/2021 13:28
1,2-Dichlorobenzene	< 10.0	ug/L		8/17/2021 13:28
1,3-Dichlorobenzene	< 10.0	ug/L		8/17/2021 13:28
1,4-Dichlorobenzene	< 10.0	ug/L		8/17/2021 13:28
2,2-Oxybis (1-chloropropane)	< 10.0	ug/L		8/17/2021 13:28
2,3,4,6-Tetrachlorophenol	< 10.0	ug/L		8/17/2021 13:28
2,4,5-Trichlorophenol	< 10.0	ug/L		8/17/2021 13:28
2,4,6-Trichlorophenol	< 10.0	ug/L		8/17/2021 13:28
2,4-Dichlorophenol	< 10.0	ug/L		8/17/2021 13:28
2,4-Dimethylphenol	< 10.0	ug/L		8/17/2021 13:28
2,4-Dinitrophenol	< 20.0	ug/L		8/17/2021 13:28
2,4-Dinitrotoluene	< 10.0	ug/L		8/17/2021 13:28
2,6-Dinitrotoluene	< 10.0	ug/L		8/17/2021 13:28
2-Chloronaphthalene	< 10.0	ug/L		8/17/2021 13:28
2-Chlorophenol	< 10.0	ug/L		8/17/2021 13:28
2-Methylnapthalene	< 10.0	ug/L		8/17/2021 13:28
2-Methylphenol	< 10.0	ug/L		8/17/2021 13:28
2-Nitroaniline	< 20.0	ug/L		8/17/2021 13:28
2-Nitrophenol	< 10.0	ug/L		8/17/2021 13:28
3&4-Methylphenol	< 10.0	ug/L		8/17/2021 13:28
3,3'-Dichlorobenzidine	< 10.0	ug/L		8/17/2021 13:28

PARADIGM
ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213652

Client: **Inventum Engineering, P.C.**

Project Reference: Riverview

Sample Identifier: AQ - Fire Wharf - 08112021
Lab Sample ID: 213652-02 **Date Sampled:** 8/11/2021
Matrix: Water **Date Received:** 8/12/2021

3-Nitroaniline	< 20.0	ug/L	8/17/2021	13:28
4,6-Dinitro-2-methylphenol	< 20.0	ug/L	8/17/2021	13:28
4-Bromophenyl phenyl ether	< 10.0	ug/L	8/17/2021	13:28
4-Chloro-3-methylphenol	< 10.0	ug/L	8/17/2021	13:28
4-Chloroaniline	< 10.0	ug/L	8/17/2021	13:28
4-Chlorophenyl phenyl ether	< 10.0	ug/L	8/17/2021	13:28
4-Nitroaniline	< 20.0	ug/L	8/17/2021	13:28
4-Nitrophenol	< 20.0	ug/L	8/17/2021	13:28
Acenaphthene	< 10.0	ug/L	8/17/2021	13:28
Acenaphthylene	< 10.0	ug/L	8/17/2021	13:28
Acetophenone	< 10.0	ug/L	8/17/2021	13:28
Anthracene	< 10.0	ug/L	8/17/2021	13:28
Atrazine	< 25.0	ug/L	8/17/2021	13:28
Benzaldehyde	< 10.0	ug/L	8/17/2021	13:28
Benzo (a) anthracene	< 10.0	ug/L	8/17/2021	13:28
Benzo (a) pyrene	< 10.0	ug/L	8/17/2021	13:28
Benzo (b) fluoranthene	< 10.0	ug/L	8/17/2021	13:28
Benzo (g,h,i) perylene	< 10.0	ug/L	8/17/2021	13:28
Benzo (k) fluoranthene	< 10.0	ug/L	8/17/2021	13:28
Bis (2-chloroethoxy) methane	< 10.0	ug/L	8/17/2021	13:28
Bis (2-chloroethyl) ether	< 10.0	ug/L	8/17/2021	13:28
Bis (2-ethylhexyl) phthalate	< 10.0	ug/L	8/17/2021	13:28
Butylbenzylphthalate	< 10.0	ug/L	8/17/2021	13:28
Caprolactam	< 10.0	ug/L	8/17/2021	13:28
Carbazole	< 10.0	ug/L	8/17/2021	13:28

PARADIGM
ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213652

Client: **Inventum Engineering, P.C.**

Project Reference: Riverview

Sample Identifier: AQ - Fire Wharf - 08112021
Lab Sample ID: 213652-02 **Date Sampled:** 8/11/2021
Matrix: Water **Date Received:** 8/12/2021

Chrysene	< 10.0	ug/L	8/17/2021	13:28
Dibenz (a,h) anthracene	< 10.0	ug/L	8/17/2021	13:28
Dibenzofuran	< 10.0	ug/L	8/17/2021	13:28
Diethyl phthalate	< 10.0	ug/L	8/17/2021	13:28
Dimethyl phthalate	< 20.0	ug/L	8/17/2021	13:28
Di-n-butyl phthalate	< 10.0	ug/L	8/17/2021	13:28
Di-n-octylphthalate	< 10.0	ug/L	8/17/2021	13:28
Fluoranthene	< 10.0	ug/L	8/17/2021	13:28
Fluorene	< 10.0	ug/L	8/17/2021	13:28
Hexachlorobenzene	< 10.0	ug/L	8/17/2021	13:28
Hexachlorobutadiene	< 10.0	ug/L	8/17/2021	13:28
Hexachlorocyclopentadiene	< 10.0	ug/L	8/17/2021	13:28
Hexachloroethane	< 10.0	ug/L	8/17/2021	13:28
Indeno (1,2,3-cd) pyrene	< 10.0	ug/L	8/17/2021	13:28
Isophorone	< 10.0	ug/L	8/17/2021	13:28
Naphthalene	< 10.0	ug/L	8/17/2021	13:28
Nitrobenzene	< 10.0	ug/L	8/17/2021	13:28
N-Nitroso-di-n-propylamine	< 10.0	ug/L	8/17/2021	13:28
N-Nitrosodiphenylamine	< 10.0	ug/L	8/17/2021	13:28
Pentachlorophenol	< 20.0	ug/L	8/17/2021	13:28
Phenanthrene	< 10.0	ug/L	8/17/2021	13:28
Phenol	< 10.0	ug/L	8/17/2021	13:28
Pyrene	< 10.0	ug/L	8/17/2021	13:28

PARADIGM
ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213652

Client: **Inventum Engineering, P.C.**

Project Reference: Riverview

Sample Identifier: AQ - Fire Wharf - 08112021
Lab Sample ID: 213652-02 **Date Sampled:** 8/11/2021
Matrix: Water **Date Received:** 8/12/2021

Surrogate	Percent Recovery	Limits	Outliers	Date Analyzed
2,4,6-Tribromophenol	**63.0**	55.4 - 111		8/17/2021 13:28
2-Fluorobiphenyl	**32.6**	30.9 - 98.1		8/17/2021 13:28
2-Fluorophenol	**27.1**	10 - 105		8/17/2021 13:28
Nitrobenzene-d5	**55.5**	49.6 - 104		8/17/2021 13:28
Phenol-d5	**20.3**	10 - 105		8/17/2021 13:28
Terphenyl-d14	**70.4**	56.5 - 118		8/17/2021 13:28

Method Reference(s): EPA 8270D
EPA 3510C
Preparation Date: 8/17/2021
Data File: B56308.D

PARADIGM
ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213652

Client: **Inventum Engineering, P.C.**

Project Reference: Riverview

Sample Identifier: AQ - Fire Wharf - 08112021
Lab Sample ID: 213652-02 **Date Sampled:** 8/11/2021
Matrix: Water **Date Received:** 8/12/2021

Volatile Organics

Analyte	Result	Units	Qualifier	Date Analyzed
1,1,1-Trichloroethane	< 2.00	ug/L		8/13/2021 14:13
1,1,2,2-Tetrachloroethane	< 2.00	ug/L		8/13/2021 14:13
1,1,2-Trichloroethane	< 2.00	ug/L		8/13/2021 14:13
1,1-Dichloroethane	< 2.00	ug/L		8/13/2021 14:13
1,1-Dichloroethene	< 2.00	ug/L		8/13/2021 14:13
1,2-Dichlorobenzene	< 2.00	ug/L		8/13/2021 14:13
1,2-Dichloroethane	< 2.00	ug/L		8/13/2021 14:13
1,2-Dichloropropane	< 2.00	ug/L		8/13/2021 14:13
1,3-Dichlorobenzene	< 2.00	ug/L		8/13/2021 14:13
1,4-Dichlorobenzene	< 2.00	ug/L		8/13/2021 14:13
2-Chloroethyl vinyl Ether	< 5.00	ug/L		8/13/2021 14:13
Benzene	< 1.00	ug/L		8/13/2021 14:13
Bromodichloromethane	< 2.00	ug/L		8/13/2021 14:13
Bromoform	< 5.00	ug/L		8/13/2021 14:13
Bromomethane	< 2.00	ug/L		8/13/2021 14:13
Carbon Tetrachloride	< 2.00	ug/L		8/13/2021 14:13
Chlorobenzene	< 2.00	ug/L		8/13/2021 14:13
Chloroethane	< 2.00	ug/L		8/13/2021 14:13
Chloroform	< 2.00	ug/L		8/13/2021 14:13
Chloromethane	< 2.00	ug/L		8/13/2021 14:13
cis-1,3-Dichloropropene	< 2.00	ug/L		8/13/2021 14:13
Dibromochloromethane	< 2.00	ug/L		8/13/2021 14:13
Ethylbenzene	< 2.00	ug/L		8/13/2021 14:13

PARADIGM
ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213652

Client: **Inventum Engineering, P.C.**

Project Reference: Riverview

Sample Identifier: AQ - Fire Wharf - 08112021
Lab Sample ID: 213652-02 **Date Sampled:** 8/11/2021
Matrix: Water **Date Received:** 8/12/2021

Methylene chloride	< 5.00	ug/L	8/13/2021	14:13
Tetrachloroethene	< 2.00	ug/L	8/13/2021	14:13
Toluene	< 2.00	ug/L	8/13/2021	14:13
trans-1,2-Dichloroethene	< 2.00	ug/L	8/13/2021	14:13
trans-1,3-Dichloropropene	< 2.00	ug/L	8/13/2021	14:13
Trichloroethene	< 2.00	ug/L	8/13/2021	14:13
Trichlorofluoromethane	< 2.00	ug/L	8/13/2021	14:13
Vinyl chloride	< 2.00	ug/L	8/13/2021	14:13

Surrogate	Percent Recovery	Limits	Outliers	Date Analyzed	
1,2-Dichloroethane-d4	**116**	83 - 120		8/13/2021	14:13
4-Bromofluorobenzene	**107**	65.5 - 118		8/13/2021	14:13
Pentafluorobenzene	**107**	91.2 - 109		8/13/2021	14:13
Toluene-D8	**98.4**	79.7 - 112		8/13/2021	14:13

Method Reference(s): EPA 624.1
Data File: z03555.D

PARADIGM
ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213652

Client: **Inventum Engineering, P.C.**

Project Reference: Riverview

Sample Identifier: AQ - Fire Wharf - 08112021
Lab Sample ID: 213652-02 **Date Sampled:** 8/11/2021
Matrix: Water **Date Received:** 8/12/2021

Volatile Organics

Analyte	Result	Units	Qualifier	Date Analyzed
1,1,1-Trichloroethane	< 2.00	ug/L		8/13/2021 14:13
1,1,2,2-Tetrachloroethane	< 2.00	ug/L		8/13/2021 14:13
1,1,2-Trichloroethane	< 2.00	ug/L		8/13/2021 14:13
1,1-Dichloroethane	< 2.00	ug/L		8/13/2021 14:13
1,1-Dichloroethene	< 2.00	ug/L		8/13/2021 14:13
1,2,3-Trichlorobenzene	< 5.00	ug/L		8/13/2021 14:13
1,2,4-Trichlorobenzene	< 5.00	ug/L		8/13/2021 14:13
1,2-Dibromo-3-Chloropropane	< 10.0	ug/L		8/13/2021 14:13
1,2-Dibromoethane	< 2.00	ug/L		8/13/2021 14:13
1,2-Dichlorobenzene	< 2.00	ug/L		8/13/2021 14:13
1,2-Dichloroethane	< 2.00	ug/L		8/13/2021 14:13
1,2-Dichloropropane	< 2.00	ug/L		8/13/2021 14:13
1,3-Dichlorobenzene	< 2.00	ug/L		8/13/2021 14:13
1,4-Dichlorobenzene	< 2.00	ug/L		8/13/2021 14:13
1,4-Dioxane	< 10.0	ug/L		8/13/2021 14:13
2-Butanone	< 10.0	ug/L		8/13/2021 14:13
2-Hexanone	< 5.00	ug/L		8/13/2021 14:13
4-Methyl-2-pentanone	< 5.00	ug/L		8/13/2021 14:13
Acetone	< 10.0	ug/L		8/13/2021 14:13
Benzene	< 1.00	ug/L		8/13/2021 14:13
Bromochloromethane	< 5.00	ug/L		8/13/2021 14:13
Bromodichloromethane	< 2.00	ug/L		8/13/2021 14:13
Bromoform	< 5.00	ug/L		8/13/2021 14:13

PARADIGM
ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213652

Client: **Inventum Engineering, P.C.**

Project Reference: Riverview

Sample Identifier: AQ - Fire Wharf - 08112021
Lab Sample ID: 213652-02 **Date Sampled:** 8/11/2021
Matrix: Water **Date Received:** 8/12/2021

Bromomethane	< 2.00	ug/L	8/13/2021	14:13
Carbon disulfide	< 2.00	ug/L	8/13/2021	14:13
Carbon Tetrachloride	< 2.00	ug/L	8/13/2021	14:13
Chlorobenzene	< 2.00	ug/L	8/13/2021	14:13
Chloroethane	< 2.00	ug/L	8/13/2021	14:13
Chloroform	< 2.00	ug/L	8/13/2021	14:13
Chloromethane	< 2.00	ug/L	8/13/2021	14:13
cis-1,2-Dichloroethene	< 2.00	ug/L	8/13/2021	14:13
cis-1,3-Dichloropropene	< 2.00	ug/L	8/13/2021	14:13
Cyclohexane	< 10.0	ug/L	8/13/2021	14:13
Dibromochloromethane	< 2.00	ug/L	8/13/2021	14:13
Dichlorodifluoromethane	< 2.00	ug/L	8/13/2021	14:13
Ethylbenzene	< 2.00	ug/L	8/13/2021	14:13
Freon 113	< 2.00	ug/L	8/13/2021	14:13
Isopropylbenzene	< 2.00	ug/L	8/13/2021	14:13
m,p-Xylene	< 2.00	ug/L	8/13/2021	14:13
Methyl acetate	< 2.00	ug/L	8/13/2021	14:13
Methyl tert-butyl Ether	< 2.00	ug/L	8/13/2021	14:13
Methylcyclohexane	< 2.00	ug/L	8/13/2021	14:13
Methylene chloride	< 5.00	ug/L	8/13/2021	14:13
o-Xylene	< 2.00	ug/L	8/13/2021	14:13
Styrene	< 5.00	ug/L	8/13/2021	14:13
Tetrachloroethene	< 2.00	ug/L	8/13/2021	14:13
Toluene	< 2.00	ug/L	8/13/2021	14:13
trans-1,2-Dichloroethene	< 2.00	ug/L	8/13/2021	14:13

PARADIGM
ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213652

Client: **Inventum Engineering, P.C.**

Project Reference: Riverview

Sample Identifier: AQ - Fire Wharf - 08112021
Lab Sample ID: 213652-02 **Date Sampled:** 8/11/2021
Matrix: Water **Date Received:** 8/12/2021

trans-1,3-Dichloropropene	< 2.00	ug/L	8/13/2021	14:13
Trichloroethene	< 2.00	ug/L	8/13/2021	14:13
Trichlorofluoromethane	< 2.00	ug/L	8/13/2021	14:13
Vinyl chloride	< 2.00	ug/L	8/13/2021	14:13

Surrogate	Percent Recovery	Limits	Outliers	Date Analyzed	
1,2-Dichloroethane-d4	**116**	83 - 120		8/13/2021	14:13
4-Bromofluorobenzene	**107**	65.5 - 118		8/13/2021	14:13
Pentafluorobenzene	**107**	91.2 - 109		8/13/2021	14:13
Toluene-D8	**98.4**	79.7 - 112		8/13/2021	14:13

Method Reference(s): EPA 8260C
EPA 5030C
Data File: z03555.D

PARADIGM
ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213652

Client: **Inventum Engineering, P.C.**

Project Reference: Riverview

Sample Identifier:	AQ - Fire Wharf - 08112021		
Lab Sample ID:	213652-02	**Date Sampled:**	8/11/2021
Matrix:	Water	**Date Received:**	8/12/2021

Total Cyanide

Analyte	Result	Units	Qualifier	Date Analyzed
Cyanide, Total	< 0.0100	mg/L		8/17/2021

Method Reference(s): SM 4500 CN E - 2011
SM 4500 CN C - 2011

Preparation Date: 8/17/2021

This report is part of a multipage document and should only be evaluated in its entirety. The Chain of Custody provides additional sample information, including compliance with the sample condition requirements upon receipt.

Report Prepared Thursday, August 19, 2021

PARADIGM
ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213652

Client: **Inventum Engineering, P.C.**

Project Reference: Riverview

Sample Identifier:	AQ - Fire Wharf - 08112021		
Lab Sample ID:	213652-02	**Date Sampled:**	8/11/2021
Matrix:	Water	**Date Received:**	8/12/2021

SGT - HEM

Analyte	Result	Units	Qualifier	Date Analyzed
Total Petroleum Hydrocarbon (Silica Gel / HEM)	< 5.01	mg/L		8/17/2021

Method Reference(s): EPA 1664B
Preparation Date: 8/16/2021

This report is part of a multipage document and should only be evaluated in its entirety. The Chain of Custody provides additional sample information, including compliance with the sample condition requirements upon receipt.

Report Prepared Thursday, August 19, 2021

PARADIGM
ENVIRONMENTAL SERVICES, INC.

Analytical Report Appendix

The reported results relate only to the samples as they have been received by the laboratory.

Each page of this document is part of a multipage report. This document may not be reproduced except in its entirety, without the prior consent of Paradigm Environmental Services, Inc.

All soil/sludge samples have been reported on a dry weight basis, unless qualified "reported as received". Other solids are reported as received.

Low level Volatiles blank reports for soil/solid matrix are based on a nominal 5 gram weight. Sample results and reporting limits are based on actual weight, which may be more or less than 5 grams.

The Chain of Custody provides additional information, including compliance with sample condition requirements upon receipt. Sample condition requirements are defined under the 2003 NELAC Standard, sections 5.5.8.3.1 and 5.5.8.3.2.

NYSDOH ELAP does not certify for all parameters. Paradigm Environmental Services or the indicated subcontracted laboratory does hold certification for all analytes where certification is offered by ELAP unless otherwise specified. Aliquots separated for certain tests, such as TCLP, are indicated on the Chain of Custody and final reports with an "A" suffix.

Data qualifiers are used, when necessary, to provide additional information about the data. This information may be communicated as a flag or as text at the bottom of the report. Please refer to the following list of analyte-specific, frequently used data flags and their meaning:

"<" = Analyzed for but not detected at or above the quantitation limit.
"E" = Result has been estimated, calibration limit exceeded.
"Z" = See case narrative.
"D" = Sample, Laboratory Control Sample, or Matrix Spike Duplicate results above Relative Percent Difference limit.
"M" = Matrix spike recoveries outside QC limits. Matrix bias indicated.
"B" = Method blank contained trace levels of analyte. Refer to included method blank report.
"J" = Result estimated between the quantitation limit and half the quantitation limit.
"L" = Laboratory Control Sample recovery outside accepted QC limits.
"P" = Concentration differs by more than 40% between the primary and secondary analytical columns.
"NC" = Not calculable. Applicable to RPD if sample or duplicate result is non-detect or estimated (see primary report for data flags). Applicable to MS if sample is greater or equal to ten times the spike added. Applicable to sample surrogates or MS if sample dilution is 10x or higher.
"" = Indicates any recoveries outside associated acceptance windows. Surrogate outliers in samples are presumed matrix effects. LCS demonstrates method compliance unless otherwise noted.*
"(1)" = Indicates data from primary column used for QC calculation.
"A" = denotes a parameter for which ELAP does not offer approval as part of their laboratory certification program.
"F" = denotes a parameter for which Paradigm does not carry certification, the results for which should therefore only be used where ELAP certification is not required, such as personal exposure assessment.

GENERAL TERMS AND CONDITIONS
LABORATORY SERVICES

These Terms and Conditions embody the whole agreement of the parties in the absence of a signed and executed contract between the Laboratory (LAB) and Client. They shall supersede all previous communications, representations, or agreements, either verbal or written, between the parties. The LAB specifically rejects all additional, inconsistent, or conflicting terms, whether printed or otherwise set forth in any purchase order or other communication from the Client to the LAB. The invalidity or unenforceability in whole or in part of any provision, tern or condition hereof shall not affect in any way the validity or enforceability of the remainder of the Terms and Conditions. No waiver by LAB of any provision, term, or condition hereof or of any breach by or obligation of the Client hereunder shall constitute a waiver of such provision, term, or condition on any other occasion or a waiver of any other breach by or obligation of the Client. This agreement shall be administered and interpreted under the laws of the state which services are procured.

Warranty. Recognizing that the nature of many samples is unknown and that some may contain potentially hazardous components, LAB warrants only that it will perform testing services, obtain findings, and prepare reports in accordance with generally accepted analytical laboratory principles and practices at the time of performance of services. LAB makes no other warranty, express or implied.

Scope and Compensation. LAB agrees to perform the services described in the chain of custody to which these terms and conditions are attached. Unless the parties agree in writing to the contrary, the duties of LAB shall not be construed to exceed the services specifically described. LAB wi use LAB default method for all tests unless specified otherwise on the Work Order.
Payment terms are net 30 days from the date of invoice. All overdue payments are subject to an interest charge of one and one-half percent (1-1/2%) per month or a portion thereof. Client shall also be responsible for costs of collection, including payment of reasonable attorney fees if such expense is incurred. The prices, unless stated, do not include any sale, use or other taxes. Such taxes will be added to invoice prices when required.

Prices. Compensation for services performed will be based on the current Lab Analytical Fee Schedule or on quotations agreed to in writing by the parties. Turnaround time based charges are determined from the time of resolution of all work order questions. Testimony, court appearances or data compilation for legal action will be charged separately. Evaluation and reporting of initial screening runs may incur additional fees.

Limitations of Liability. In the event of any error, omission, or other professional negligence, the sole and exclusive responsibility of LAB shall be to re-perform the deficient work at its own expense and LAB shall have no other liability whatsoever. All claims shall be deemed waived unless made in writing and received by LAB within ninety (90) days following completion of services.
LAB shall have no liability, obligation, or responsibility of any kind for losses, costs, expenses, or other damages (including but not limited to any special, direct, incidental or consequential damages) with respect to LAB's services or results.
All results provided by LAB are strictly for the use of its clients and LAB is in no way responsible for the use of such results by clients or third parties. All reports should be considered in their entirety, and LAB is not responsible for the separation, detachment, or other use of any portion of these reports. Client may not assign the lab report without the written consent of the LAB.
Client covenants and agrees, at its/his/her sole expense, to indemnify, protect, defend, and save harmless the LAB from and against any and all damages, losses, liabilities, obligations, penalties, claims, litigation, demands, defenses, judgments, suits, actions, proceedings, costs, disbursements and/or expenses (including, without limitation attorneys' and experts' fees and disbursements) of any kind whatsoever which may at any time be imposed upon, incurred by or asserted or awarded against client relating to, resulting from or arising out of (a) the breach of this agreement by this client, (b) the negligence of the client in handling, delivering or disclosing any hazardous substance, (c) the violation of the Client of any applicable law, (d) non-compliance by the Client with any environmental permit or (e) a material misrepresentation in disclosing the materials to be tested.

Hazard Disclosure. Client represents and warrants that any sample delivered to LAB will be preceded or accompanied by complete written disclosure of the presence of any hazardous substances known or suspected by Client. Client further warrants that any sample containing any hazardous substance that is to be delivered to LAB will be packaged, labeled, transported, and delivered properly and in accordance with applicable laws.

Sample Handling. Prior to LAB's acceptance of any sample (or after any revocation of acceptance), the entire risk of loss or of damage to such sample remains with Client. Samples are accepted when receipt is acknowledged on chain of custody documentation. In no event will LAB have any responsibility for the action or inaction of any carrier shipping or delivering any sample to or from LAB premises.
Client authorizes LAB to proceed with the analysis of samples as received by the laboratory, recognizing that any samples not in compliance with all current DOH-ELAP-NELAP requirements for containers, preservation or holding time will be noted as such on th final report.
Disposal of hazardous waste samples is the responsibility of the Client. If the Client does not wish such samples returned, LAB may add storage and disposal fees to the final invoice. Maximum storage time for samples is 30 days after completion of analysis unless modified by applicable state or federal laws. Client will be required to give the LAB written instructions concerning disposal of these samples.
LAB reserves the absolute right, exercisable at any time, to refuse to receive delivery of, refuse to accept, or revoke acceptance of any sample, which, in the sole judgment of LAB (a) is of unsuitable volume, (b) may be or become unsuitable for or may pose a risk in handling, transport, or processing for any health, safety, environmental or other reason whether or not due to the presence in the sample of any hazardous substance, and whether or not such presence has been disclosed to LAB by Client or (c) if the condition or sample date make the sample unsuitable for analysis.

Legal Responsibility. LAB is solely responsible for performance of this contract, and no affiliated company, director, officer, employee, or agent shall have any legal responsibility hereunder, whether in contract or tort including negligence.

Assignment. LAB may assign its performance obligations under this contract to other parties, as it deems necessary. LAB shall disclose to Client any assignee (subcontractor) by ELAP ID # on the submitted final report.

Force Majeure. LAB shall have no responsibility or liability to the Client for any failure or delay in performance by LAB, which results in whole or in part from any cause or circumstance beyond the reasonable control of LAB. Such causes and circumstances shall include, but not limited to, acts of God, acts or orders of any government authority, strikes or other labor disputes, natural disasters, accidents, wars, civil disturbances, difficulties or delays in transportation, mail or delivery services, inability to obtain sufficient services or supplies from LAB's usual suppliers, or any other cause beyond LAB's reasonable control.

Law. This contract shall be continued under the laws of the State of New York without regard to its conflicts of laws provision.

179 Lake Avenue, Rochester, NY 14608 Office (585) 647-2530 Fax (585) 647-3311

CHAIN OF CUSTODY

1 of 2

PARADIGM ENVIRONMENTAL SERVICES, INC.

REPORT TO:	INVOICE TO:	
CLIENT: INVENTUM ENGINEERING	CLIENT: SAME	LAB PROJECT ID: 213652
ADDRESS: 481 CARLISLE AVE SUITE 202	ADDRESS:	
CITY: HERNDON STATE: VA ZIP: 20170	CITY: STATE: ZIP:	Quotation #:
PHONE: (585) 734-5255	PHONE: 571-217-6761	Email: john.black@inventumeng.com roxanne.birx@inventumeng.com
ATTN: ROXANNE BIRX	ATTN: JOHN BLACK	

PROJECT REFERENCE: Riverview

Matrix Codes:
AQ - Aqueous Liquid; NQ - Non-Aqueous Liquid; WA - Water; WG - Groundwater; DW - Drinking Water; WW - Wastewater; SO - Soil; SL - Sludge; SD - Solid; PT - Paint; WP - Wipe; CK - Caulk; OL - Oil; AR - Air

REQUESTED ANALYSIS

DATE COLLECTED	TIME COLLECTED	COMPOSITE	GRAB	SAMPLE IDENTIFIER	MATRIX CODES	NUMBER OF CONTAINERS	SGT-HEM 1664A	TOTAL Cn 335.4	BOD 5210 B (per email 8/12/21)	TSS 2540 D	TOTAL P 365.1	TOTAL Hg 245.1	TOTAL ARSNC 200.7	TOTAL SELENIUM 200.7	TOTAL PHENLS 420.4	PAH 625	TOTAL Ammonia 350.1	PRIORITY METALS 200.8	IRON 200.8	ALUMINUM 200.8	MANGANESE 200.8	SURFACTANTS SM5540C	TCL VOCs 8260	TCL SVOCs 8270	REMARKS	PARADIGM LAB SAMPLE NUMBER
8/11/21	14:00		X	AQ-FIREQUENCH-08112021	WA	12	✓	✓	-	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	VOCs C24 per email CP 8/12/21	01
8/11/21	14:15		X	AQ-FIRE WHARF-08112021	WA	12	✓	✓	-	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		02
						per V.Sun + Sub chain CP 8/12/21																			All metals by 200.7 per email. Sub sent directly to sub lab. CP 8/12/21	

Turnaround Time		Report Supplements			
Availability contingent upon lab approval; additional fees may apply.					
Standard 5 day	☐	None Required	☐	None Required	☐
10 day	☐	Batch QC	☒	Basic EDD	☐
Rush 3 day	☒	Category A	☐	NYSDEC EDD	☒
Rush 2 day	☐	Category B	☐	LEVEL IV DATA	
Rush 1 day	☐				
Date Needed _____ please indicate date needed: _____		Other please indicate package needed: _____	☐	Other EDD please indicate EDD needed: _____	☐

Roxanne Birx — Sampled By — 8/11/21 14:00 — Date/Time

[signature] — Relinquished By — 8/11/21 1450 — Date/Time

Brian Zeal — Received By — 8/11/21 3:15 — Date/Time

[signature] — Received @ Lab By — 8/12/21 12:47 — Date/Time

Total Cost:

P.I.F.

10°C iced started in field 8/11/21 16:59

By signing this form, client agrees to Paradigm Terms and Conditions (reverse).

Custody Seal N/A, Samples delivered by Paradigm. CP 8/12/21

See additional page for sample conditions.

PARADIGM

Chain of Custody Supplement

Client: Inventum Engineering **Completed by:** Glenn Pezzulo

Lab Project ID: 213652 **Date:** 8/12/21

Sample Condition Requirements

Per NELAC/ELAP 210/241/242/243/244

Condition	NELAC compliance with the sample condition requirements upon receipt — Yes	No	N/A
Container Type	X		
Comments			
Transferred to method-compliant container			X
Headspace (<1 mL)	X VOA		X
Comments			
Preservation	X metals VOA TCN		X
Comments			
Chlorine Absent (<0.10 ppm per test strip)	X SVOA 625		X
Comments	VOA 624: Cl⁻ neg.		
Holding Time	X		
Comments			
Temperature	X		X metals
Comments	10 °C iced started in field		
Compliant Sample Quantity/Type	X	X SVOA - 610/8270 low volume	
Comments	Samples for BOD, TSS, T. Phos, T. Phenols, NH_3, Surfactants sent directly to sub lab.		

ANALYTICAL REPORT

Lab Number:	L2143136
Client:	Paradigm Environmental Services 179 Lake Avenue Rochester, NY 14608
ATTN:	Jane Daloia
Phone:	(585) 647-2530
Project Name:	RIVERVIEW
Project Number:	RIVERVIEW
Report Date:	08/17/21

Certifications & Approvals: MA (M-MA086), NH NELAP (2064), CT (PH-0574), IL (200077), ME (MA00086), MD (348), NJ (MA935), NY (11148), NC (25700/666), PA (68-03671), RI (LAO00065), TX (T104704476), VT (VT-0935), VA (460195), USDA (Permit #P330-17-00196).

Eight Walkup Drive, Westborough, MA 01581-1019
508-898-9220 (Fax) 508-898-9193 800-624-9220 - www.alphalab.com

Project Name: RIVERVIEW
Project Number: RIVERVIEW

Lab Number: L2143136
Report Date: 08/17/21

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L2143136-01	AQ-FIRE QUENCH-08112021	WATER	Not Specified	08/11/21 14:00	08/11/21
L2143136-02	AQ-FIRE WHARF-08112021	WATER	Not Specified	08/11/21 14:15	08/11/21

Project Name:	RIVERVIEW	**Lab Number:**	L2143136
Project Number:	RIVERVIEW	**Report Date:**	08/17/21

Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet NELAP requirements for all NELAP accredited parameters unless otherwise noted in the following narrative. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. Tentatively Identified Compounds (TICs), if requested, are reported for compounds identified to be present and are not part of the method/program Target Compound List, even if only a subset of the TCL are being reported. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively.

When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances, the specific failure is not narrated but noted in the associated QC Outlier Summary Report, located directly after the Case Narrative. QC information is also incorporated in the Data Usability Assessment table (Format 11) of our Data Merger tool, where it can be reviewed in conjunction with the sample result, associated regulatory criteria and any associated data usability implications.

Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

HOLD POLICY - For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Alpha Project Manager and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Project Management at 800-624-9220 with any questions.

Project Name:	RIVERVIEW	**Lab Number:**	L2143136
Project Number:	RIVERVIEW	**Report Date:**	08/17/21

Case Narrative (continued)

Report Submission

All non-detect (ND) or estimated concentrations (J-qualified) have been quantitated to the limit noted in the MDL column.

Surfactants, MBAS

L2143136-02: The sample has an elevated detection limit due to the dilution required by the sample matrix.

BOD, 5 day

L2143136-02 was set at the correct dilution for BOD analysis according to prep screening; however, not enough depletion occurred. Therefore, the sample result is reported as "non-detect" at an elevated detection limit. Due to the expiration of the method required holding time, re-analysis could not be performed.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature: Melissa Sturgis Melissa Sturgis

Title: Technical Director/Representative Date: 08/17/21

INORGANICS
&
MISCELLANEOUS

Project Name: RIVERVIEW
Project Number: RIVERVIEW

Lab Number: L2143136
Report Date: 08/17/21

SAMPLE RESULTS

Lab ID: L2143136-01
Client ID: AQ-FIRE QUENCH-08112021
Sample Location: Not Specified

Date Collected: 08/11/21 14:00
Date Received: 08/11/21
Field Prep: Not Specified

Sample Depth:
Matrix: Water

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Solids, Total Suspended	2300		mg/l	10	NA	10	-	08/12/21 15:35	121,2540D	AC
Nitrogen, Ammonia	362.		mg/l	9.38	3.00	125	08/12/21 18:00	08/13/21 18:15	121,4500NH3-BH	AT
Phosphorus, Total	3.31		mg/l	0.500	0.200	50	08/16/21 08:00	08/16/21 11:50	121,4500P-E	SD
BOD, 5 day	310		mg/l	80	NA	40	08/12/21 13:50	08/17/21 08:40	121,5210B	MT
Phenolics, Total	0.68		mg/l	0.030	0.006	1	08/16/21 16:52	08/17/21 11:35	4,420.1	KP
Surfactants, MBAS	2.54		mg/l	1.25	0.500	25	08/13/21 00:30	08/13/21 03:27	121,5540C	AW

Project Name: RIVERVIEW
Project Number: RIVERVIEW

Lab Number: L2143136
Report Date: 08/17/21

SAMPLE RESULTS

Lab ID: L2143136-02
Client ID: AQ-FIRE WHARF-08112021
Sample Location: Not Specified

Date Collected: 08/11/21 14:15
Date Received: 08/11/21
Field Prep: Not Specified

Sample Depth:
Matrix: Water

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Solids, Total Suspended	2500		mg/l	10	NA	10	-	08/12/21 15:35	121,2540D	AC
Nitrogen, Ammonia	0.282		mg/l	0.150	0.048	2	08/12/21 18:00	08/13/21 18:16	121,4500NH3-BH	AT
Phosphorus, Total	0.083		mg/l	0.020	0.008	2	08/16/21 08:00	08/16/21 11:51	121,4500P-E	SD
BOD, 5 day	ND		mg/l	10	NA	5	08/12/21 13:50	08/17/21 08:40	121,5210B	MT
Phenolics, Total	ND		mg/l	0.030	0.006	1	08/16/21 16:52	08/17/21 11:36	4,420.1	KP
Surfactants, MBAS	ND		mg/l	0.250	0.100	5	08/13/21 00:30	08/13/21 03:28	121,5540C	AW

Project Name: RIVERVIEW
Project Number: RIVERVIEW
Lab Number: L2143136
Report Date: 08/17/21

Method Blank Analysis
Batch Quality Control

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab for sample(s): 01-02 Batch: WG1534284-1										
BOD, 5 day	ND		mg/l	2.0	NA	1	08/12/21 13:50	08/17/21 08:40	121,5210B	MT
General Chemistry - Westborough Lab for sample(s): 01-02 Batch: WG1534450-1										
Solids, Total Suspended	ND		mg/l	1.0	NA	1	-	08/12/21 15:35	121,2540D	AC
General Chemistry - Westborough Lab for sample(s): 01-02 Batch: WG1534510-1										
Nitrogen, Ammonia	ND		mg/l	0.075	0.024	1	08/12/21 18:00	08/13/21 18:11	121,4500NH3-BH	AT
General Chemistry - Westborough Lab for sample(s): 01-02 Batch: WG1534587-1										
Surfactants, MBAS	ND		mg/l	0.050	0.020	1	08/13/21 00:30	08/13/21 03:22	121,5540C	AW
General Chemistry - Westborough Lab for sample(s): 01-02 Batch: WG1535386-1										
Phosphorus, Total	ND		mg/l	0.010	0.004	1	08/16/21 08:00	08/16/21 11:32	121,4500P-E	SD
General Chemistry - Westborough Lab for sample(s): 01-02 Batch: WG1535616-1										
Phenolics, Total	0.008	J	mg/l	0.030	0.006	1	08/16/21 16:52	08/17/21 11:33	4,420.1	KP

Lab Control Sample Analysis

Batch Quality Control

Project Name: RIVERVIEW
Project Number: RIVERVIEW

Lab Number: L2143136
Report Date: 08/17/21

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01-02 Batch: WG1534284-2								
BOD, 5 day	109		-		85-115	-		20
General Chemistry - Westborough Lab Associated sample(s): 01-02 Batch: WG1534450-2								
Solids, Total Suspended	100		-		80-120	-		
General Chemistry - Westborough Lab Associated sample(s): 01-02 Batch: WG1534510-2								
Nitrogen, Ammonia	102		-		80-120	-		20
General Chemistry - Westborough Lab Associated sample(s): 01-02 Batch: WG1534587-2								
Surfactants, MBAS	98		-		90-110	-		
General Chemistry - Westborough Lab Associated sample(s): 01-02 Batch: WG1535386-2								
Phosphorus, Total	105		-		80-120	-		
General Chemistry - Westborough Lab Associated sample(s): 01-02 Batch: WG1535616-2								
Phenolics, Total	80		-		70-130	-		

Matrix Spike Analysis
Batch Quality Control

Project Name: RIVERVIEW
Project Number: RIVERVIEW

Lab Number: L2143136
Report Date: 08/17/21

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	Qual	MSD Found	MSD %Recovery	Qual	Recovery Limits	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01-02 QC Batch ID: WG1534284-4 QC Sample: L2142963-01 Client ID: MS Sample												
BOD, 5 day	63.	400	560	126		-	-		50-145	-		35
General Chemistry - Westborough Lab Associated sample(s): 01-02 QC Batch ID: WG1534510-4 QC Sample: L2141168-78 Client ID: MS Sample												
Nitrogen, Ammonia	0.030J	4	3.66	92		-	-		80-120	-		20
General Chemistry - Westborough Lab Associated sample(s): 01-02 QC Batch ID: WG1534587-4 QC Sample: L2142961-04 Client ID: MS Sample												
Surfactants, MBAS	ND	0.4	0.370	92		-	-		52-157	-		32
General Chemistry - Westborough Lab Associated sample(s): 01-02 QC Batch ID: WG1535386-4 QC Sample: L2142511-01 Client ID: MS Sample												
Phosphorus, Total	6.07	2.5	8.46	96		-	-		75-125	-		20
General Chemistry - Westborough Lab Associated sample(s): 01-02 QC Batch ID: WG1535616-4 QC Sample: L2143565-01 Client ID: MS Sample												
Phenolics, Total	0.023J	0.4	0.35	87		-	-		70-130	-		20

Lab Duplicate Analysis

Batch Quality Control

Project Name: RIVERVIEW
Project Number: RIVERVIEW

Lab Number: L2143136
Report Date: 08/17/21

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01-02 QC Batch ID: WG1534284-3 QC Sample: L2142963-01 Client ID: DUP Sample						
BOD, 5 day	63.	59	mg/l	7		35
General Chemistry - Westborough Lab Associated sample(s): 01-02 QC Batch ID: WG1534450-3 QC Sample: L2142707-01 Client ID: DUP Sample						
Solids, Total Suspended	150	160	mg/l	6		29
General Chemistry - Westborough Lab Associated sample(s): 01-02 QC Batch ID: WG1534510-3 QC Sample: L2141168-78 Client ID: DUP Sample						
Nitrogen, Ammonia	0.030J	0.108	mg/l	NC		20
General Chemistry - Westborough Lab Associated sample(s): 01-02 QC Batch ID: WG1534587-3 QC Sample: L2142961-04 Client ID: DUP Sample						
Surfactants, MBAS	ND	ND	mg/l	NC		32
General Chemistry - Westborough Lab Associated sample(s): 01-02 QC Batch ID: WG1535386-3 QC Sample: L2142511-01 Client ID: DUP Sample						
Phosphorus, Total	6.07	5.57	mg/l	9		20
General Chemistry - Westborough Lab Associated sample(s): 01-02 QC Batch ID: WG1535616-3 QC Sample: L2143565-01 Client ID: DUP Sample						
Phenolics, Total	0.023J	0.013J	mg/l	NC		20

Project Name: RIVERVIEW
Project Number: RIVERVIEW

Lab Number: L2143136
Report Date: 08/17/21

Sample Receipt and Container Information

Were project specific reporting limits specified? YES

Cooler Information

Cooler	Custody Seal
A	Absent

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L2143136-01A	Plastic 120ml H2SO4 preserved	A	<2	<2	4.4	Y	Absent		TPHOS-4500(28),NH3-4500(28)
L2143136-01B	Plastic 120ml H2SO4 preserved	A	<2	<2	4.4	Y	Absent		TPHOS-4500(28),NH3-4500(28)
L2143136-01C	Plastic 500ml unpreserved	A	7	7	4.4	Y	Absent		BOD-5210(2)
L2143136-01D	Plastic 500ml unpreserved	A	7	7	4.4	Y	Absent		MBAS-5540(2)
L2143136-01E	Amber 500ml H2SO4 preserved	A	<2	<2	4.4	Y	Absent		NY-TPHENOL-420(28)
L2143136-01F	Plastic 950ml unpreserved	A	7	7	4.4	Y	Absent		TSS-2540-LOW(7)
L2143136-02A	Plastic 120ml H2SO4 preserved	A	<2	<2	4.4	Y	Absent		TPHOS-4500(28),NH3-4500(28)
L2143136-02B	Plastic 120ml H2SO4 preserved	A	<2	<2	4.4	Y	Absent		TPHOS-4500(28),NH3-4500(28)
L2143136-02C	Plastic 500ml unpreserved	A	7	7	4.4	Y	Absent		BOD-5210(2)
L2143136-02D	Plastic 500ml unpreserved	A	7	7	4.4	Y	Absent		MBAS-5540(2)
L2143136-02E	Amber 500ml H2SO4 preserved	A	<2	<2	4.4	Y	Absent		NY-TPHENOL-420(28)
L2143136-02F	Plastic 950ml unpreserved	A	7	7	4.4	Y	Absent		TSS-2540-LOW(7)

*Values in parentheses indicate holding time in days

Project Name:	RIVERVIEW	**Lab Number:**	L2143136
Project Number:	RIVERVIEW	**Report Date:**	08/17/21

GLOSSARY

Acronyms

DL	- Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the limit of quantitation (LOQ). The DL includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
EDL	- Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).
EMPC	- Estimated Maximum Possible Concentration: The concentration that results from the signal present at the retention time of an analyte when the ions meet all of the identification criteria except the ion abundance ratio criteria. An EMPC is a worst-case estimate of the concentration.
EPA	- Environmental Protection Agency.
LCS	- Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LCSD	- Laboratory Control Sample Duplicate: Refer to LCS.
LFB	- Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LOD	- Limit of Detection: This value represents the level to which a target analyte can reliably be detected for a specific analyte in a specific matrix by a specific method. The LOD includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
LOQ	- Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.) Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
MDL	- Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
MS	- Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available. For Method 332.0, the spike recovery is calculated using the native concentration, including estimated values.
MSD	- Matrix Spike Sample Duplicate: Refer to MS.
NA	- Not Applicable.
NC	- Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.
NDPA/DPA	- N-Nitrosodiphenylamine/Diphenylamine.
NI	- Not Ignitable.
NP	- Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.
NR	- No Results: Term is utilized when 'No Target Compounds Requested' is reported for the analysis of Volatile or Semivolatile Organic TIC only requests.
RL	- Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
RPD	- Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.
SRM	- Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.
STLP	- Semi-dynamic Tank Leaching Procedure per EPA Method 1315.
TEF	- Toxic Equivalency Factors: The values assigned to each dioxin and furan to evaluate their toxicity relative to 2,3,7,8-TCDD.
TEQ	- Toxic Equivalent: The measure of a sample's toxicity derived by multiplying each dioxin and furan by its corresponding TEF and then summing the resulting values.
TIC	- Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations.

Report Format: DU Report with 'J' Qualifiers

Project Name:	RIVERVIEW	**Lab Number:**	L2143136
Project Number:	RIVERVIEW	**Report Date:**	08/17/21

Footnotes

1 - The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

Terms

Analytical Method: Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

Difference: With respect to Total Oxidizable Precursor (TOP) Assay analysis, the difference is defined as the Post-Treatment value minus the Pre-Treatment value.

Final pH: As it pertains to Sample Receipt & Container Information section of the report, Final pH reflects pH of container determined after adjustment at the laboratory, if applicable. If no adjustment required, value reflects Initial pH.

Frozen Date/Time: With respect to Volatile Organics in soil, Frozen Date/Time reflects the date/time at which associated Reagent Water-preserved vials were initially frozen. Note: If frozen date/time is beyond 48 hours from sample collection, value will be reflected in 'bold'.

Initial pH: As it pertains to Sample Receipt & Container Information section of the report, Initial pH reflects pH of container determined upon receipt, if applicable.

PAH Total: With respect to Alkylated PAH analyses, the 'PAHs, Total' result is defined as the summation of results for all or a subset of the following compounds: Naphthalene, C1-C4 Naphthalenes, 2-Methylnaphthalene, 1-Methylnaphthalene, Biphenyl, Acenaphthylene, Acenaphthene, Fluorene, C1-C3 Fluorenes, Phenanthrene, C1-C4 Phenanthrenes/Anthracenes, Anthracene, Fluoranthene, Pyrene, C1-C4 Fluoranthenes/Pyrenes, Benz(a)anthracene, Chrysene, C1-C4 Chrysenes, Benzo(b)fluoranthene, Benzo(j)+(k)fluoranthene, Benzo(e)pyrene, Benzo(a)pyrene, Perylene, Indeno(1,2,3-cd)pyrene, Dibenz(ah)+(ac)anthracene, Benzo(g,h,i)perylene. If a 'Total' result is requested, the results of its individual components will also be reported.

PFAS Total: With respect to PFAS analyses, the 'PFAS, Total (5)' result is defined as the summation of results for: PFHpA, PFHxS, PFOA, PFNA and PFOS. In addition, the 'PFAS, Total (6)' result is defined as the summation of results for: PFHpA, PFHxS, PFOA, PFNA, PFDA and PFOS. For MassDEP DW compliance analysis only, the 'PFAS, Total (6)' result is defined as the summation of results at or above the RL. Note: If a 'Total' result is requested, the results of its individual components will also be reported.

The target compound Chlordane (CAS No. 57-74-9) is reported for GC ECD analyses. Per EPA,this compound "refers to a mixture of chlordane isomers, other chlorinated hydrocarbons and numerous other components." (Reference: USEPA Toxicological Review of Chlordane, In Support of Summary Information on the Integrated Risk Information System (IRIS), December 1997.)

Total: With respect to Organic analyses, a 'Total' result is defined as the summation of results for individual isomers or Aroclors. If a 'Total' result is requested, the results of its individual components will also be reported. This is applicable to 'Total' results for methods 8260, 8081 and 8082.

Data Qualifiers

A - Spectra identified as "Aldol Condensates" are byproducts of the extraction/concentration procedures when acetone is introduced in the process.

B - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).

C - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.

D - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.

E - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

F - The ratio of quantifier ion response to qualifier ion response falls outside of the laboratory criteria. Results are considered to be an estimated maximum concentration.

G - The concentration may be biased high due to matrix interferences (i.e, co-elution) with non-target compound(s). The result should be considered estimated.

H - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.

I - The lower value for the two columns has been reported due to obvious interference.

J - Estimated value. The Target analyte concentration is below the quantitation limit (RL), but above the Method Detection Limit (MDL) or Estimated Detection Limit (EDL) for SPME-related analyses. This represents an estimated concentration for Tentatively Identified Compounds (TICs).

M - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.

ND - Not detected at the method detection limit (MDL) for the sample, or estimated detection limit (EDL) for SPME-related analyses.

Report Format: DU Report with 'J' Qualifiers

Project Name:	RIVERVIEW	**Lab Number:**	L2143136
Project Number:	RIVERVIEW	**Report Date:**	08/17/21

Data Qualifiers

NJ - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.

P - The RPD between the results for the two columns exceeds the method-specified criteria.

Q - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)

R - Analytical results are from sample re-analysis.

RE - Analytical results are from sample re-extraction.

S - Analytical results are from modified screening analysis.

Project Name:	RIVERVIEW	**Lab Number:**	L2143136
Project Number:	RIVERVIEW	**Report Date:**	08/17/21

REFERENCES

4 Methods for Chemical Analysis of Water and Wastes. EPA 600/4-79-020. Revised March 1983.

121 Standard Methods for the Examination of Water and Wastewater. APHA-AWWA-WEF. Standard Methods Online.

LIMITATION OF LIABILITIES

Alpha Analytical performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical be held liable for any incidental, consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding time and splitting of samples in the field.

Certification Information

The following analytes are not included in our Primary NELAP Scope of Accreditation:

Westborough Facility
EPA 624/624.1: m/p-xylene, o-xylene, Naphthalene
EPA 625/625.1: alpha-Terpineol
EPA 8260C/8260D: NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene, Azobenzene; SCM: Iodomethane (methyl iodide), 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.
EPA 8270D/8270E: NPW: Dimethylnaphthalene,1,4-Diphenylhydrazine, alpha-Terpineol; SCM: Dimethylnaphthalene,1,4-Diphenylhydrazine.
SM4500: NPW: Amenable Cyanide; SCM: Total Phosphorus, TKN, NO2, NO3.

Mansfield Facility
SM 2540D: TSS
EPA 8082A: NPW: PCB: 1, 5, 31, 87,101, 110, 141, 151, 153, 180, 183, 187.
EPA TO-15: Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.
Biological Tissue Matrix: EPA 3050B

The following analytes are included in our Massachusetts DEP Scope of Accreditation

Westborough Facility:

Drinking Water
EPA 300.0: Chloride, Nitrate-N, Fluoride, Sulfate; **EPA 353.2**: Nitrate-N, Nitrite-N; **SM4500NO3-F**: Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE, EPA 180.1, SM2130B, SM4500Cl-D, SM2320B, SM2540C, SM4500H-B, SM4500NO2-B**
EPA 332: Perchlorate; **EPA 524.2:** THMs and VOCs; **EPA 504.1:** EDB, DBCP.
Microbiology: **SM9215B; SM9223-P/A, SM9223B-Colilert-QT,SM9222D**.

Non-Potable Water
SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2320B, SM4500CL-E, SM4500F-BC, SM4500NH3-BH: Ammonia-N and Kjeldahl-N, **EPA 350.1**: Ammonia-N, **LACHAT 10-107-06-1-B**: Ammonia-N, **EPA 351.1, SM4500NO3-F, EPA 353.2**: Nitrate-N, **SM4500P-E, SM4500P-B, E, SM4500SO4-E, SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, EPA 420.1, SM4500-CN-CE, SM2540D, EPA 300: Chloride, Sulfate, Nitrate.**
EPA 624.1: Volatile Halocarbons & Aromatics,
EPA 608.3: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs
EPA 625.1: SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045**: PCB-Oil.
Microbiology: **SM9223B-Colilert-QT; Enterolert-QT, SM9221E, EPA 1600, EPA 1603, SM9222D.**

Mansfield Facility:

Drinking Water
EPA 200.7: Al, Ba, Cd, Cr, Cu, Fe, Mn, Ni, Na, Ag, Ca, Zn. **EPA 200.8:** Al, Sb, As, Ba, Be, Cd, Cr, Cu, Pb, Mn, Ni, Se, Ag, TL, Zn. **EPA 245.1** Hg.
EPA 522, EPA 537.1.

Non-Potable Water
EPA 200.7: Al, Sb, As, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Sr, TL, Ti, V, Zn.
EPA 200.8: Al, Sb, As, Be, Cd, Cr, Cu, Fe, Pb, Mn, Ni, K, Se, Ag, Na, TL, Zn.
EPA 245.1 Hg.
SM2340B

For a complete listing of analytes and methods, please contact your Alpha Project Manager.

179 Lake Avenue, Rochester, NY 14608 Office (585) 647-2530 Fax (585) 647-3311

L 2143136 11148

CHAIN OF CUSTODY

REPORT TO:		INVOICE TO:		LAB PROJECT ID
CLIENT:	Paradigm Environmental	CLIENT:	Same	
ADDRESS:	179 Lake Ave	ADDRESS:		
CITY:	Rochester STATE: NY ZIP 14608	CITY:	STATE: ZIP:	Quotation #:
PHONE:		PHONE:		Email: reporting@paradigmenv.com
ATTN:	Reporting	ATTN:		

PROJECT REFERENCE

Riverview

Matrix Codes:

AQ - Aqueous Liquid; NQ - Non-Aqueous Liquid; WA - Water; WG - Groundwater; DW - Drinking Water; WW - Wastewater; SO - Soil; SL - Sludge; SD - Solid; PT - Paint; WP - Wipe; CK - Caulk; OL - Oil; AR - Air

REQUESTED ANALYSIS

DATE COLLECTED	TIME COLLECTED	COMPOSITE	GRAB	SAMPLE IDENTIFIER	MATRIX CODES	NUMBER OF CONTAINERS	BOD	TSS	T. Phosphorus	T. Phenolics	Ammonia	Surfactants					REMARKS	PARADIGM LAB SAMPLE NUMBER
8/11/2021	14:00		X	AQ - Fire Quench - 08112021	WA	6	X	X	X	X	X	X					Please rush all samples on a 3 day	
8/11/2021	14:15		X	AQ - Fire Wharf - 08112021	WA	6	X	X	X	X	X	X					turn except BOD since it is a 5 day	
																	process.	

Turnaround Time		Report Supplements			
Availability contingent upon lab approval; additional fees may apply.					
Standard 5 day	☐	None Required	☐	None Required	☐
10 day	☐	Batch QC	☒	Basic EDD	☐
Rush 3 day	☒	Category A	☐	NYSDEC EDD	☒
Rush 2 day	☐	Category B	☐		
Rush 1 day	☐				
Other please indicate date needed:	☐	Other please indicate package needed:	☐	Other EDD please indicate EDD needed:	☐

Client

Sampled By: Brian Zach	Date/Time: 8/11/21	16:50
Relinquished By:	Date/Time: 8/11/21	1650
Received By:	Date/Time: 8/12/21	00:25
Received @ Lab By:	Date/Time:	

Total Cost:

P.I.F.

By signing this form, client agrees to Paradigm Terms and Conditions (reverse).

See additional page for sample conditions.

PARADIGM
ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213873

Client: **Inventum Engineering, P.C.**

Project Reference: Bench Scale Test

Sample Identifier:	SD-RACKCOG-08252021		
Lab Sample ID:	213873-01	**Date Sampled:**	8/25/2021
Matrix:	Solid	**Date Received:**	8/26/2021

Corrosivity as pH

Analyte	Result	Units	Qualifier	Date Analyzed
Corrosivity (as pH)	6.77 @ 22.2 C	S.U.		8/31/2021 10:53

Method Reference(s): EPA 9045D

This report is part of a multipage document and should only be evaluated in its entirety. The Chain of Custody provides additional sample information, including compliance with the sample condition requirements upon receipt.

Report Prepared Wednesday, September 15, 2021

PARADIGM
ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213873

Client: **Inventum Engineering, P.C.**

Project Reference: Bench Scale Test

Sample Identifier:	SD-RACKCOG-08252021		
Lab Sample ID:	213873-01	**Date Sampled:**	8/25/2021
Matrix:	Solid	**Date Received:**	8/26/2021

Flash Point

Analyte	Result	Units	Qualifier	Date Analyzed
Flash Point, Celsius	>70.0	C		8/31/2021

Method Reference(s): EPA 1010A

Report Prepared Wednesday, September 15, 2021

PARADIGM
ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213873

Client: **Inventum Engineering, P.C.**

Project Reference: Bench Scale Test

Sample Identifier:	SD-RACKCOG-08252021		
Lab Sample ID:	213873-01	**Date Sampled:**	8/25/2021
Matrix:	Solid	**Date Received:**	8/26/2021

Mercury

Analyte	Result	Units	Qualifier	Date Analyzed
Mercury	**94.6**	mg/Kg		9/1/2021 10:56

Method Reference(s): EPA 7471B
Preparation Date: 8/31/2021
Data File: Hg210901B

Report Prepared Wednesday, September 15, 2021

PARADIGM
ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213873

Client: **Inventum Engineering, P.C.**

Project Reference: Bench Scale Test

Sample Identifier: SD-RACKCOG-08252021
Lab Sample ID: 213873-01 **Date Sampled:** 8/25/2021
Matrix: Solid **Date Received:** 8/26/2021

TAL Metals (ICP)

Analyte	Result	Units	Qualifier	Date Analyzed
Aluminum	**24.1**	mg/Kg	DM	8/31/2021 13:52
Antimony	< 2.97	mg/Kg		8/31/2021 13:52
Arsenic	**1.89**	mg/Kg		9/1/2021 15:29
Barium	< 4.95	mg/Kg		8/31/2021 13:52
Beryllium	< 0.248	mg/Kg		8/31/2021 13:52
Cadmium	**1.56**	mg/Kg	D	8/31/2021 13:52
Calcium	< 124	mg/Kg		8/31/2021 13:52
Chromium	**10.2**	mg/Kg	D	8/31/2021 13:52
Cobalt	< 2.48	mg/Kg		8/31/2021 13:52
Copper	**2.77**	mg/Kg	D	9/2/2021 11:36
Iron	**23900**	mg/Kg	D	8/31/2021 14:24
Lead	**17.6**	mg/Kg	D	8/31/2021 13:52
Magnesium	< 124	mg/Kg		8/31/2021 13:52
Manganese	**374**	mg/Kg	DM	8/31/2021 14:24
Nickel	< 1.98	mg/Kg		8/31/2021 13:52
Potassium	< 124	mg/Kg		8/31/2021 13:52
Selenium	< 0.990	mg/Kg		8/31/2021 13:52
Silver	< 0.495	mg/Kg	M	8/31/2021 13:52
Sodium	< 124	mg/Kg		8/31/2021 13:52
Sulfur	**110000**	mg/Kg	A	8/31/2021 07:58
Thallium	< 1.24	mg/Kg	M	8/31/2021 13:52
Vanadium	**15.8**	mg/Kg	DM	8/31/2021 13:52
Zinc	**14.1**	mg/Kg	B	9/1/2021 15:29

PARADIGM
ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213873

Client: **Inventum Engineering, P.C.**

Project Reference: Bench Scale Test

Sample Identifier:	SD-RACKCOG-08252021		
Lab Sample ID:	213873-01	**Date Sampled:**	8/25/2021
Matrix:	Solid	**Date Received:**	8/26/2021

Method Reference(s):	EPA 6010C
	EPA 3050B
Preparation Date:	8/30/2021
Data File:	210831B

This report is part of a multipage document and should only be evaluated in its entirety. The Chain of Custody provides additional sample information, including compliance with the sample condition requirements upon receipt.

Report Prepared Wednesday, September 15, 2021

PARADIGM
ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213873

Client: **Inventum Engineering, P.C.**

Project Reference: Bench Scale Test

Sample Identifier:	SD-RACKCOG-08252021		
Lab Sample ID:	213873-01	**Date Sampled:**	8/25/2021
Matrix:	Solid	**Date Received:**	8/26/2021

PCBs

Analyte	Result	Units	Qualifier	Date Analyzed
PCB-1016	< 2.79	mg/Kg		9/1/2021 21:48
PCB-1221	< 2.79	mg/Kg		9/1/2021 21:48
PCB-1232	< 2.79	mg/Kg		9/1/2021 21:48
PCB-1242	< 2.79	mg/Kg		9/1/2021 21:48
PCB-1248	< 2.79	mg/Kg		9/1/2021 21:48
PCB-1254	< 2.79	mg/Kg		9/1/2021 21:48
PCB-1260	< 2.79	mg/Kg		9/1/2021 21:48
PCB-1262	< 2.79	mg/Kg		9/1/2021 21:48
PCB-1268	< 2.79	mg/Kg		9/1/2021 21:48

Surrogate	Percent Recovery	Limits	Outliers	Date Analyzed
Tetrachloro-m-xylene	NC	18.5 - 93.4		9/1/2021 21:48

Reporting limit elevated due to sample matrix

Method Reference(s): EPA 8082A
EPA 3546

Preparation Date: 8/30/2021

PARADIGM
ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213873

Client: **Inventum Engineering, P.C.**

Project Reference: Bench Scale Test

Sample Identifier: SD-RACKCOG-08252021
Lab Sample ID: 213873-01 **Date Sampled:** 8/25/2021
Matrix: Solid **Date Received:** 8/26/2021

Semi-Volatile Organics (Acid/Base Neutrals)

Analyte	Result	Units	Qualifier	Date Analyzed
1,1-Biphenyl	< 19400000	ug/Kg		9/1/2021 19:54
1,2,4,5-Tetrachlorobenzene	< 19400000	ug/Kg		9/1/2021 19:54
1,2,4-Trichlorobenzene	< 19400000	ug/Kg		9/1/2021 19:54
1,2-Dichlorobenzene	< 19400000	ug/Kg		9/1/2021 19:54
1,3-Dichlorobenzene	< 19400000	ug/Kg		9/1/2021 19:54
1,4-Dichlorobenzene	< 19400000	ug/Kg		9/1/2021 19:54
2,2-Oxybis (1-chloropropane)	< 19400000	ug/Kg		9/1/2021 19:54
2,3,4,6-Tetrachlorophenol	< 19400000	ug/Kg		9/1/2021 19:54
2,4,5-Trichlorophenol	< 19400000	ug/Kg		9/1/2021 19:54
2,4,6-Trichlorophenol	< 19400000	ug/Kg		9/1/2021 19:54
2,4-Dichlorophenol	< 19400000	ug/Kg		9/1/2021 19:54
2,4-Dimethylphenol	< 19400000	ug/Kg		9/1/2021 19:54
2,4-Dinitrophenol	< 77700000	ug/Kg		9/1/2021 19:54
2,4-Dinitrotoluene	< 19400000	ug/Kg		9/1/2021 19:54
2,6-Dinitrotoluene	< 19400000	ug/Kg		9/1/2021 19:54
2-Chloronaphthalene	< 19400000	ug/Kg		9/1/2021 19:54
2-Chlorophenol	< 19400000	ug/Kg		9/1/2021 19:54
2-Methylnapthalene	< 19400000	ug/Kg		9/1/2021 19:54
2-Methylphenol	< 19400000	ug/Kg		9/1/2021 19:54
2-Nitroaniline	< 19400000	ug/Kg		9/1/2021 19:54
2-Nitrophenol	< 19400000	ug/Kg		9/1/2021 19:54
3&4-Methylphenol	< 19400000	ug/Kg		9/1/2021 19:54
3,3'-Dichlorobenzidine	< 19400000	ug/Kg		9/1/2021 19:54

PARADIGM
ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213873

Client: **Inventum Engineering, P.C.**

Project Reference: Bench Scale Test

Sample Identifier: SD-RACKCOG-08252021
Lab Sample ID: 213873-01 **Date Sampled:** 8/25/2021
Matrix: Solid **Date Received:** 8/26/2021

3-Nitroaniline	< 19400000	ug/Kg	9/1/2021	19:54
4,6-Dinitro-2-methylphenol	< 38800000	ug/Kg	9/1/2021	19:54
4-Bromophenyl phenyl ether	< 19400000	ug/Kg	9/1/2021	19:54
4-Chloro-3-methylphenol	< 19400000	ug/Kg	9/1/2021	19:54
4-Chloroaniline	< 19400000	ug/Kg	9/1/2021	19:54
4-Chlorophenyl phenyl ether	< 19400000	ug/Kg	9/1/2021	19:54
4-Nitroaniline	< 19400000	ug/Kg	9/1/2021	19:54
4-Nitrophenol	< 19400000	ug/Kg	9/1/2021	19:54
Acenaphthene	< 19400000	ug/Kg	9/1/2021	19:54
Acenaphthylene	< 19400000	ug/Kg	9/1/2021	19:54
Acetophenone	< 19400000	ug/Kg	9/1/2021	19:54
Anthracene	< 19400000	ug/Kg	9/1/2021	19:54
Atrazine	< 19400000	ug/Kg	9/1/2021	19:54
Benzaldehyde	< 19400000	ug/Kg	9/1/2021	19:54
Benzo (a) anthracene	< 19400000	ug/Kg	9/1/2021	19:54
Benzo (a) pyrene	< 19400000	ug/Kg	9/1/2021	19:54
Benzo (b) fluoranthene	< 19400000	ug/Kg	9/1/2021	19:54
Benzo (g,h,i) perylene	< 19400000	ug/Kg	9/1/2021	19:54
Benzo (k) fluoranthene	< 19400000	ug/Kg	9/1/2021	19:54
Bis (2-chloroethoxy) methane	< 19400000	ug/Kg	9/1/2021	19:54
Bis (2-chloroethyl) ether	< 19400000	ug/Kg	9/1/2021	19:54
Bis (2-ethylhexyl) phthalate	< 19400000	ug/Kg	9/1/2021	19:54
Butylbenzylphthalate	< 19400000	ug/Kg	9/1/2021	19:54
Caprolactam	< 19400000	ug/Kg	9/1/2021	19:54
Carbazole	< 19400000	ug/Kg	9/1/2021	19:54

PARADIGM ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213873

Client: **Inventum Engineering, P.C.**

Project Reference: Bench Scale Test

Sample Identifier: SD-RACKCOG-08252021

Lab Sample ID: 213873-01 **Date Sampled:** 8/25/2021

Matrix: Solid **Date Received:** 8/26/2021

Chrysene	< 19400000	ug/Kg	9/1/2021	19:54
Dibenz (a,h) anthracene	< 19400000	ug/Kg	9/1/2021	19:54
Dibenzofuran	< 19400000	ug/Kg	9/1/2021	19:54
Diethyl phthalate	< 19400000	ug/Kg	9/1/2021	19:54
Dimethyl phthalate	< 19400000	ug/Kg	9/1/2021	19:54
Di-n-butyl phthalate	< 19400000	ug/Kg	9/1/2021	19:54
Di-n-octylphthalate	< 19400000	ug/Kg	9/1/2021	19:54
Fluoranthene	< 19400000	ug/Kg	9/1/2021	19:54
Fluorene	< 19400000	ug/Kg	9/1/2021	19:54
Hexachlorobenzene	< 19400000	ug/Kg	9/1/2021	19:54
Hexachlorobutadiene	< 19400000	ug/Kg	9/1/2021	19:54
Hexachlorocyclopentadiene	< 77700000	ug/Kg	9/1/2021	19:54
Hexachloroethane	< 19400000	ug/Kg	9/1/2021	19:54
Indeno (1,2,3-cd) pyrene	< 19400000	ug/Kg	9/1/2021	19:54
Isophorone	< 19400000	ug/Kg	9/1/2021	19:54
Naphthalene	**479000000**	ug/Kg	9/1/2021	19:54
Nitrobenzene	< 19400000	ug/Kg	9/1/2021	19:54
N-Nitroso-di-n-propylamine	< 19400000	ug/Kg	9/1/2021	19:54
N-Nitrosodiphenylamine	< 19400000	ug/Kg	9/1/2021	19:54
Pentachlorophenol	< 38800000	ug/Kg	9/1/2021	19:54
Phenanthrene	< 19400000	ug/Kg	9/1/2021	19:54
Phenol	< 19400000	ug/Kg	9/1/2021	19:54
Pyrene	< 19400000	ug/Kg	9/1/2021	19:54

PARADIGM
ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213873

Client: **Inventum Engineering, P.C.**

Project Reference: Bench Scale Test

Sample Identifier: SD-RACKCOG-08252021

Lab Sample ID: 213873-01 **Date Sampled:** 8/25/2021

Matrix: Solid **Date Received:** 8/26/2021

Surrogate	Percent Recovery	Limits	Outliers	Date Analyzed	
2,4,6-Tribromophenol	NC	36.4 - 87.2		9/1/2021	19:54
2-Fluorobiphenyl	NC	44 - 84		9/1/2021	19:54
2-Fluorophenol	NC	43.2 - 82.1		9/1/2021	19:54
Nitrobenzene-d5	NC	36.4 - 82.2		9/1/2021	19:54
Phenol-d5	NC	41.1 - 81.4		9/1/2021	19:54
Terphenyl-d14	NC	43.8 - 103		9/1/2021	19:54

Method Reference(s): EPA 8270D
EPA 3546
Preparation Date: 8/31/2021
Data File: B56651.D

PARADIGM
ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213873

Client: **Inventum Engineering, P.C.**

Project Reference: Bench Scale Test

Sample Identifier: SD-RACKCOG-08252021
Lab Sample ID: 213873-01 **Date Sampled:** 8/25/2021
Matrix: Solid **Date Received:** 8/26/2021

Volatile Organics

Analyte	Result	Units	Qualifier	Date Analyzed
1,1,1-Trichloroethane	< 41700	ug/Kg		9/1/2021 13:26
1,1,2,2-Tetrachloroethane	< 41700	ug/Kg		9/1/2021 13:26
1,1,2-Trichloroethane	< 41700	ug/Kg		9/1/2021 13:26
1,1-Dichloroethane	< 41700	ug/Kg		9/1/2021 13:26
1,1-Dichloroethene	< 41700	ug/Kg		9/1/2021 13:26
1,2,3-Trichlorobenzene	< 104000	ug/Kg		9/1/2021 13:26
1,2,4-Trichlorobenzene	< 104000	ug/Kg		9/1/2021 13:26
1,2-Dibromo-3-Chloropropane	< 208000	ug/Kg		9/1/2021 13:26
1,2-Dibromoethane	< 41700	ug/Kg		9/1/2021 13:26
1,2-Dichlorobenzene	< 41700	ug/Kg		9/1/2021 13:26
1,2-Dichloroethane	< 41700	ug/Kg		9/1/2021 13:26
1,2-Dichloropropane	< 41700	ug/Kg		9/1/2021 13:26
1,3-Dichlorobenzene	< 41700	ug/Kg		9/1/2021 13:26
1,4-Dichlorobenzene	< 41700	ug/Kg		9/1/2021 13:26
1,4-Dioxane	< 208000	ug/Kg		9/1/2021 13:26
2-Butanone	< 208000	ug/Kg		9/1/2021 13:26
2-Hexanone	< 104000	ug/Kg		9/1/2021 13:26
4-Methyl-2-pentanone	< 104000	ug/Kg		9/1/2021 13:26
Acetone	< 208000	ug/Kg		9/1/2021 13:26
Benzene	< 41700	ug/Kg		9/1/2021 13:26
Bromochloromethane	< 104000	ug/Kg		9/1/2021 13:26
Bromodichloromethane	< 41700	ug/Kg		9/1/2021 13:26
Bromoform	< 104000	ug/Kg		9/1/2021 13:26

PARADIGM ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213873

Client: **Inventum Engineering, P.C.**

Project Reference: Bench Scale Test

Sample Identifier: SD-RACKCOG-08252021
Lab Sample ID: 213873-01 **Date Sampled:** 8/25/2021
Matrix: Solid **Date Received:** 8/26/2021

Bromomethane	< 41700	ug/Kg	9/1/2021	13:26
Carbon disulfide	< 41700	ug/Kg	9/1/2021	13:26
Carbon Tetrachloride	< 41700	ug/Kg	9/1/2021	13:26
Chlorobenzene	< 41700	ug/Kg	9/1/2021	13:26
Chloroethane	< 41700	ug/Kg	9/1/2021	13:26
Chloroform	< 41700	ug/Kg	9/1/2021	13:26
Chloromethane	< 41700	ug/Kg	9/1/2021	13:26
cis-1,2-Dichloroethene	< 41700	ug/Kg	9/1/2021	13:26
cis-1,3-Dichloropropene	< 41700	ug/Kg	9/1/2021	13:26
Cyclohexane	< 208000	ug/Kg	9/1/2021	13:26
Dibromochloromethane	< 41700	ug/Kg	9/1/2021	13:26
Dichlorodifluoromethane	< 41700	ug/Kg	9/1/2021	13:26
Ethylbenzene	< 41700	ug/Kg	9/1/2021	13:26
Freon 113	< 41700	ug/Kg	9/1/2021	13:26
Isopropylbenzene	< 41700	ug/Kg	9/1/2021	13:26
m,p-Xylene	< 41700	ug/Kg	9/1/2021	13:26
Methyl acetate	< 41700	ug/Kg	9/1/2021	13:26
Methyl tert-butyl Ether	< 41700	ug/Kg	9/1/2021	13:26
Methylcyclohexane	< 41700	ug/Kg	9/1/2021	13:26
Methylene chloride	< 104000	ug/Kg	9/1/2021	13:26
o-Xylene	< 41700	ug/Kg	9/1/2021	13:26
Styrene	< 104000	ug/Kg	9/1/2021	13:26
Tetrachloroethene	< 41700	ug/Kg	9/1/2021	13:26
Toluene	< 41700	ug/Kg	9/1/2021	13:26
trans-1,2-Dichloroethene	< 41700	ug/Kg	9/1/2021	13:26

PARADIGM
ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213873

Client: **Inventum Engineering, P.C.**

Project Reference: Bench Scale Test

Sample Identifier: SD-RACKCOG-08252021
Lab Sample ID: 213873-01 **Date Sampled:** 8/25/2021
Matrix: Solid **Date Received:** 8/26/2021

trans-1,3-Dichloropropene	< 41700	ug/Kg		9/1/2021	13:26
Trichloroethene	< 41700	ug/Kg		9/1/2021	13:26
Trichlorofluoromethane	< 41700	ug/Kg		9/1/2021	13:26
Vinyl chloride	< 41700	ug/Kg		9/1/2021	13:26

Surrogate	Percent Recovery	Limits	Outliers	Date Analyzed	
1,2-Dichloroethane-d4	**120**	88.8 - 123		9/1/2021	13:26
4-Bromofluorobenzene	**124**	68.7 - 115	*	9/1/2021	13:26
Pentafluorobenzene	**108**	80.2 - 112		9/1/2021	13:26
Toluene-D8	**95.4**	83.5 - 123		9/1/2021	13:26

Reporting limit elevated due to non-target compounds

Method Reference(s): EPA 8260C
EPA 5035A -- H

Data File: z03865.D

PARADIGM
ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213873

Client: **Inventum Engineering, P.C.**

Project Reference: Bench Scale Test

Sample Identifier:	SD-RACKCOG-08252021		
Lab Sample ID:	213873-01	**Date Sampled:**	8/25/2021
Matrix:	Solid	**Date Received:**	8/26/2021

Dioxane

Analyte	Result	Units	Qualifier	Date Analyzed
1,4-Dioxane	< 2500	ug/Kg		9/3/2021 15:54

Method Reference(s): EPA 8270D SIM
EPA 3546
Preparation Date: 9/7/2021
Data File: B56708.D

Report Prepared Wednesday, September 15, 2021

PARADIGM
ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213873

Client: **Inventum Engineering, P.C.**

Project Reference: Bench Scale Test

Sample Identifier:	SD-RACKCOG-08252021		
Lab Sample ID:	213873-01A	**Date Sampled:**	8/25/2021
Matrix:	TCLP Extract	**Date Received:**	8/26/2021

Total Cyanide

Analyte	Result	Units	Qualifier	Date Analyzed
Cyanide, Total	<	mg/L		

Method Reference(s): SM 4500 CN E - 2011
SM 4500 CN C - 2011

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Report Prepared Wednesday, September 15, 2021

PARADIGM
ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213873

Client: **Inventum Engineering, P.C.**

Project Reference: Bench Scale Test

Sample Identifier: SD-RACKCOG-08252021
Lab Sample ID: 213873-01A **Date Sampled:** 8/25/2021
Matrix: TCLP Extract **Date Received:** 8/26/2021

TCLP Semi-Volatile Organics

Analyte	Result	Units	Regulatory Limit	Qualifier	Date Analyzed
1,4-Dichlorobenzene	< 50.0	ug/L	7500		8/31/2021 20:07
2,4,5-Trichlorophenol	< 50.0	ug/L	400000		8/31/2021 20:07
2,4,6-Trichlorophenol	< 50.0	ug/L	2000		8/31/2021 20:07
2,4-Dinitrotoluene	< 50.0	ug/L	130		8/31/2021 20:07
Cresols (as m,p,o-Cresol)	**679**	ug/L	200000		8/31/2021 20:07
Hexachlorobenzene	< 50.0	ug/L	130		8/31/2021 20:07
Hexachlorobutadiene	< 50.0	ug/L	500		8/31/2021 20:07
Hexachloroethane	< 50.0	ug/L	3000		8/31/2021 20:07
Nitrobenzene	< 50.0	ug/L	2000		8/31/2021 20:07
Pentachlorophenol	< 100	ug/L	100000		8/31/2021 20:07
Pyridine	**38.3**	ug/L	5000	J	8/31/2021 20:07

Surrogate	Percent Recovery	Limits	Outliers	Date Analyzed
2,4,6-Tribromophenol	**83.5**	55.4 - 111		8/31/2021 20:07
2-Fluorobiphenyl	**56.9**	30.9 - 98.1		8/31/2021 20:07
2-Fluorophenol	**61.9**	10 - 105		8/31/2021 20:07
Nitrobenzene-d5	**74.7**	49.6 - 104		8/31/2021 20:07
Phenol-d5	**19.3**	10 - 105		8/31/2021 20:07
Terphenyl-d14	**76.8**	56.5 - 118		8/31/2021 20:07

Method Reference(s): EPA 8270D
EPA 1311 / 3510C
Preparation Date: 8/31/2021
Data File: B56632.D

PARADIGM
ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213873

Client: **Inventum Engineering, P.C.**

Project Reference: Bench Scale Test

Sample Identifier:	SD-RACKCOG-08252021		
Lab Sample ID:	213873-01A	**Date Sampled:**	8/25/2021
Matrix:	TCLP Extract	**Date Received:**	8/26/2021

TCLP Mercury

Analyte	Result	Units	Regulatory Limit	Qualifier	Date Analyzed
Mercury	< 0.00200	mg/L	0.2		8/31/2021 10:49

Method Reference(s): EPA 7470A
EPA 1311
Preparation Date: 8/30/2021
Data File: Hg210831A

Report Prepared Wednesday, September 15, 2021

PARADIGM
ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213873

Client: **Inventum Engineering, P.C.**

Project Reference: Bench Scale Test

Sample Identifier:	SD-RACKCOG-08252021		
Lab Sample ID:	213873-01A	**Date Sampled:**	8/25/2021
Matrix:	TCLP Extract	**Date Received:**	8/26/2021

TCLP Pesticides

Analyte	Result	Units	Regulatory Limit	Qualifier	Date Analyzed
Chlordane	**12.4**	ug/L	30		9/2/2021 13:46
Endrin	**48.6**	ug/L	20		9/2/2021 13:46
gamma-BHC (Lindane)	**14.5**	ug/L	400	JP	9/2/2021 13:46
Heptachlor	< 20.0	ug/L	8		9/2/2021 13:46
Heptachlor Epoxide	< 20.0	ug/L	8		9/2/2021 13:46
Methoxychlor	< 20.0	ug/L	10000		9/2/2021 13:46
Toxaphene	< 400	ug/L	500		9/2/2021 13:46

Surrogate	Percent Recovery	Limits	Outliers	Date Analyzed
Decachlorobiphenyl (1)	NC	10 - 185		9/2/2021 13:46
Tetrachloro-m-xylene (1)	NC	20.4 - 124		9/2/2021 13:46

Method Reference(s): EPA 8081B
EPA 1311 / 3510C

Preparation Date: 9/1/2021

PARADIGM
ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213873

Client: **Inventum Engineering, P.C.**

Project Reference: Bench Scale Test

Sample Identifier:	SD-RACKCOG-08252021		
Lab Sample ID:	213873-01A	**Date Sampled:**	8/25/2021
Matrix:	TCLP Extract	**Date Received:**	8/26/2021

TCLP RCRA Metals (ICP)

Analyte	Result	Units	Regulatory Limit	Qualifier	Date Analyzed
Arsenic	< 0.500	mg/L	5		8/30/2021 18:01
Barium	< 0.500	mg/L	100		8/30/2021 18:01
Boron	**0.656**	mg/L	N/A		8/30/2021 18:01
Cadmium	< 0.0250	mg/L	1		8/30/2021 18:01
Chromium	< 0.500	mg/L	5		8/30/2021 18:01
Lead	< 0.500	mg/L	5		8/30/2021 18:01
Selenium	< 0.200	mg/L	1		8/30/2021 18:01
Silver	< 0.500	mg/L	5		8/30/2021 18:01

Method Reference(s): EPA 6010C
EPA 1311 / 3005A
Preparation Date: 8/30/2021
Data File: 210830B

Report Prepared Wednesday, September 15, 2021

PARADIGM
ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213873

Client: **Inventum Engineering, P.C.**

Project Reference: Bench Scale Test

Sample Identifier: SD-RACKCOG-08252021
Lab Sample ID: 213873-01A **Date Sampled:** 8/25/2021
Matrix: TCLP Extract **Date Received:** 8/26/2021

TCLP Volatile Organics

Analyte	Result	Units	Regulatory Limit	Qualifier	Date Analyzed
1,1-Dichloroethene	< 200	ug/L	700		8/30/2021 16:04
1,2-Dichloroethane	< 200	ug/L	500		8/30/2021 16:04
2-Butanone	< 1000	ug/L	200000		8/30/2021 16:04
Benzene	< 200	ug/L	500		8/30/2021 16:04
Carbon Tetrachloride	< 200	ug/L	500		8/30/2021 16:04
Chlorobenzene	< 200	ug/L	100000		8/30/2021 16:04
Chloroform	< 200	ug/L	6000		8/30/2021 16:04
Tetrachloroethene	< 200	ug/L	700		8/30/2021 16:04
Trichloroethene	< 200	ug/L	500		8/30/2021 16:04
Vinyl chloride	< 200	ug/L	200		8/30/2021 16:04

Surrogate	Percent Recovery	Limits	Outliers	Date Analyzed
1,2-Dichloroethane-d4	**120**	83 - 120		8/30/2021 16:04
4-Bromofluorobenzene	**107**	65.5 - 118		8/30/2021 16:04
Pentafluorobenzene	**107**	91.2 - 109		8/30/2021 16:04
Toluene-D8	**91.9**	79.7 - 112		8/30/2021 16:04

Reporting limit elevated due to non-target compounds
Method Reference(s): EPA 8260C
EPA 1311 / 5030C
Data File: z03823.D

Report Prepared Wednesday, September 15, 2021

PARADIGM
ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213873

Client: **Inventum Engineering, P.C.**

Project Reference: Bench Scale Test

Sample Identifier:	AQ-COGAQ-08252021		
Lab Sample ID:	213873-02	**Date Sampled:**	8/25/2021
Matrix:	Water	**Date Received:**	8/26/2021

Corrosivity as pH

Analyte	Result	Units	Qualifier	Date Analyzed
Corrosivity (as pH)	6.82 @ 11.5 C	S.U.		8/30/2021 09:45

Method Reference(s): EPA 9045D

ELAP does not offer this test for approval as part of their laboratory certification program.

Report Prepared Wednesday, September 15, 2021

PARADIGM
ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213873

Client: **Inventum Engineering, P.C.**

Project Reference: Bench Scale Test

Sample Identifier:	AQ-COGAQ-08252021		
Lab Sample ID:	213873-02	**Date Sampled:**	8/25/2021
Matrix:	Water	**Date Received:**	8/26/2021

Flash Point

Analyte	Result	Units	Qualifier	Date Analyzed
Flash Point, Celsius	>70.0	C		9/1/2021

Method Reference(s): EPA 1010A

ELAP does not offer this test for approval as part of their laboratory certification program.

Report Prepared Wednesday, September 15, 2021

PARADIGM ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213873

Client: **Inventum Engineering, P.C.**

Project Reference: Bench Scale Test

Sample Identifier: AQ-COGAQ-08252021
Lab Sample ID: 213873-02 **Date Sampled:** 8/25/2021
Matrix: Water **Date Received:** 8/26/2021

TAL Metals (ICP)

Analyte	Result	Units	Qualifier	Date Analyzed
Aluminum	**0.251**	mg/L		8/31/2021 12:10
Antimony	< 0.0600	mg/L		8/31/2021 12:10
Arsenic	**0.00810**	mg/L	J	8/31/2021 12:10
Barium	**0.0755**	mg/L	J	8/31/2021 12:10
Beryllium	< 0.00500	mg/L		8/31/2021 12:10
Cadmium	< 0.00500	mg/L		8/31/2021 12:10
Calcium	**235**	mg/L		8/31/2021 12:10
Chromium	< 0.0100	mg/L		8/31/2021 12:10
Cobalt	< 0.0500	mg/L		8/31/2021 12:10
Copper	< 0.0200	mg/L		8/31/2021 12:10
Iron	**33.6**	mg/L		8/31/2021 12:10
Lead	< 0.0100	mg/L		8/31/2021 12:10
Magnesium	**42.1**	mg/L		8/31/2021 12:10
Manganese	**7.44**	mg/L		8/31/2021 12:10
Nickel	< 0.0400	mg/L		8/31/2021 12:10
Potassium	**50.5**	mg/L		8/31/2021 12:10
Selenium	< 0.0200	mg/L		8/31/2021 12:10
Silver	< 0.0100	mg/L		8/31/2021 12:10
Sodium	**46.8**	mg/L		8/31/2021 12:10
Thallium	< 0.0250	mg/L		8/31/2021 12:10
Vanadium	< 0.0250	mg/L		8/31/2021 12:10
Zinc	< 0.0600	mg/L		8/31/2021 12:10

PARADIGM
ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213873

Client: **Inventum Engineering, P.C.**

Project Reference: Bench Scale Test

Sample Identifier:	AQ-COGAQ-08252021		
Lab Sample ID:	213873-02	**Date Sampled:**	8/25/2021
Matrix:	Water	**Date Received:**	8/26/2021

Method Reference(s):	EPA 6010C
	EPA 3005A
Preparation Date:	8/30/2021
Data File:	210831B

This report is part of a multipage document and should only be evaluated in its entirety. The Chain of Custody provides additional sample information, including compliance with the sample condition requirements upon receipt.

Report Prepared Wednesday, September 15, 2021

PARADIGM
ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213873

Client: **Inventum Engineering, P.C.**

Project Reference: Bench Scale Test

Sample Identifier:	AQ-COGAQ-08252021		
Lab Sample ID:	213873-02	**Date Sampled:**	8/25/2021
Matrix:	Water	**Date Received:**	8/26/2021

PCBs

Analyte	Result	Units	Qualifier	Date Analyzed
PCB-1016	< 1.00	ug/L		9/2/2021 10:00
PCB-1221	< 1.00	ug/L		9/2/2021 10:00
PCB-1232	< 1.00	ug/L		9/2/2021 10:00
PCB-1242	< 1.00	ug/L		9/2/2021 10:00
PCB-1248	< 1.00	ug/L		9/2/2021 10:00
PCB-1254	< 1.00	ug/L		9/2/2021 10:00
PCB-1260	< 1.00	ug/L		9/2/2021 10:00
PCB-1262	< 1.00	ug/L		9/2/2021 10:00
PCB-1268	< 1.00	ug/L		9/2/2021 10:00

Surrogate	Percent Recovery	Limits	Outliers	Date Analyzed
Tetrachloro-m-xylene	**45.2**	21.7 - 95.7		9/2/2021 10:00

Method Reference(s): EPA 8082A
EPA 3510C

Preparation Date: 9/2/2021

PARADIGM
ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213873

Client: **Inventum Engineering, P.C.**

Project Reference: Bench Scale Test

Sample Identifier: AQ-COGAQ-08252021
Lab Sample ID: 213873-02 **Date Sampled:** 8/25/2021
Matrix: Water **Date Received:** 8/26/2021

Semi-Volatile Organics (Acid/Base Neutrals)

Analyte	Result	Units	Qualifier	Date Analyzed
1,1-Biphenyl	< 4840	ug/L		9/3/2021 06:24
1,2,4,5-Tetrachlorobenzene	< 4840	ug/L		9/3/2021 06:24
1,2,4-Trichlorobenzene	< 4840	ug/L		9/3/2021 06:24
1,2-Dichlorobenzene	< 4840	ug/L		9/3/2021 06:24
1,3-Dichlorobenzene	< 4840	ug/L		9/3/2021 06:24
1,4-Dichlorobenzene	< 4840	ug/L		9/3/2021 06:24
2,2-Oxybis (1-chloropropane)	< 4840	ug/L		9/3/2021 06:24
2,3,4,6-Tetrachlorophenol	< 4840	ug/L		9/3/2021 06:24
2,4,5-Trichlorophenol	< 4840	ug/L		9/3/2021 06:24
2,4,6-Trichlorophenol	< 4840	ug/L		9/3/2021 06:24
2,4-Dichlorophenol	< 4840	ug/L		9/3/2021 06:24
2,4-Dimethylphenol	< 4840	ug/L		9/3/2021 06:24
2,4-Dinitrophenol	< 9690	ug/L		9/3/2021 06:24
2,4-Dinitrotoluene	< 4840	ug/L		9/3/2021 06:24
2,6-Dinitrotoluene	< 4840	ug/L		9/3/2021 06:24
2-Chloronaphthalene	< 4840	ug/L		9/3/2021 06:24
2-Chlorophenol	< 4840	ug/L		9/3/2021 06:24
2-Methylnapthalene	**3560**	ug/L	J	9/3/2021 06:24
2-Methylphenol	< 4840	ug/L		9/3/2021 06:24
2-Nitroaniline	< 9690	ug/L		9/3/2021 06:24
2-Nitrophenol	< 4840	ug/L		9/3/2021 06:24
3&4-Methylphenol	< 4840	ug/L		9/3/2021 06:24
3,3'-Dichlorobenzidine	< 4840	ug/L		9/3/2021 06:24

PARADIGM ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213873

Client: **Inventum Engineering, P.C.**

Project Reference: Bench Scale Test

Sample Identifier: AQ-COGAQ-08252021
Lab Sample ID: 213873-02 **Date Sampled:** 8/25/2021
Matrix: Water **Date Received:** 8/26/2021

3-Nitroaniline	< 9690	ug/L		9/3/2021	06:24
4,6-Dinitro-2-methylphenol	< 9690	ug/L		9/3/2021	06:24
4-Bromophenyl phenyl ether	< 4840	ug/L		9/3/2021	06:24
4-Chloro-3-methylphenol	< 4840	ug/L		9/3/2021	06:24
4-Chloroaniline	< 4840	ug/L		9/3/2021	06:24
4-Chlorophenyl phenyl ether	< 4840	ug/L		9/3/2021	06:24
4-Nitroaniline	< 9690	ug/L		9/3/2021	06:24
4-Nitrophenol	< 9690	ug/L		9/3/2021	06:24
Acenaphthene	< 4840	ug/L		9/3/2021	06:24
Acenaphthylene	< 4840	ug/L		9/3/2021	06:24
Acetophenone	**2500**	ug/L	J	9/3/2021	06:24
Anthracene	< 4840	ug/L		9/3/2021	06:24
Atrazine	< 12100	ug/L		9/3/2021	06:24
Benzaldehyde	< 4840	ug/L		9/3/2021	06:24
Benzo (a) anthracene	< 4840	ug/L		9/3/2021	06:24
Benzo (a) pyrene	< 4840	ug/L		9/3/2021	06:24
Benzo (b) fluoranthene	< 4840	ug/L		9/3/2021	06:24
Benzo (g,h,i) perylene	< 4840	ug/L		9/3/2021	06:24
Benzo (k) fluoranthene	< 4840	ug/L		9/3/2021	06:24
Bis (2-chloroethoxy) methane	< 4840	ug/L		9/3/2021	06:24
Bis (2-chloroethyl) ether	< 4840	ug/L		9/3/2021	06:24
Bis (2-ethylhexyl) phthalate	< 4840	ug/L		9/3/2021	06:24
Butylbenzylphthalate	< 4840	ug/L		9/3/2021	06:24
Caprolactam	< 4840	ug/L		9/3/2021	06:24
Carbazole	< 4840	ug/L		9/3/2021	06:24

PARADIGM ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213873

Client: **Inventum Engineering, P.C.**

Project Reference: Bench Scale Test

Sample Identifier: AQ-COGAQ-08252021

Lab Sample ID: 213873-02 **Date Sampled:** 8/25/2021

Matrix: Water **Date Received:** 8/26/2021

Chrysene	< 4840	ug/L	9/3/2021	06:24
Dibenz (a,h) anthracene	< 4840	ug/L	9/3/2021	06:24
Dibenzofuran	< 4840	ug/L	9/3/2021	06:24
Diethyl phthalate	< 4840	ug/L	9/3/2021	06:24
Dimethyl phthalate	< 9690	ug/L	9/3/2021	06:24
Di-n-butyl phthalate	< 4840	ug/L	9/3/2021	06:24
Di-n-octylphthalate	< 4840	ug/L	9/3/2021	06:24
Fluoranthene	< 4840	ug/L	9/3/2021	06:24
Fluorene	< 4840	ug/L	9/3/2021	06:24
Hexachlorobenzene	< 4840	ug/L	9/3/2021	06:24
Hexachlorobutadiene	< 4840	ug/L	9/3/2021	06:24
Hexachlorocyclopentadiene	< 4840	ug/L	9/3/2021	06:24
Hexachloroethane	< 4840	ug/L	9/3/2021	06:24
Indeno (1,2,3-cd) pyrene	< 4840	ug/L	9/3/2021	06:24
Isophorone	< 4840	ug/L	9/3/2021	06:24
Naphthalene	**54400**	ug/L	9/3/2021	06:24
Nitrobenzene	< 4840	ug/L	9/3/2021	06:24
N-Nitroso-di-n-propylamine	< 4840	ug/L	9/3/2021	06:24
N-Nitrosodiphenylamine	< 4840	ug/L	9/3/2021	06:24
Pentachlorophenol	< 9690	ug/L	9/3/2021	06:24
Phenanthrene	< 4840	ug/L	9/3/2021	06:24
Phenol	< 4840	ug/L	9/3/2021	06:24
Pyrene	< 4840	ug/L	9/3/2021	06:24

PARADIGM
ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213873

Client: **Inventum Engineering, P.C.**

Project Reference: Bench Scale Test

Sample Identifier: AQ-COGAQ-08252021

Lab Sample ID: 213873-02 **Date Sampled:** 8/25/2021

Matrix: Water **Date Received:** 8/26/2021

Surrogate	Percent Recovery	Limits	Outliers	Date Analyzed	
2,4,6-Tribromophenol	NC	55.4 - 111		9/3/2021	06:24
2-Fluorobiphenyl	NC	30.9 - 98.1		9/3/2021	06:24
2-Fluorophenol	NC	10 - 105		9/3/2021	06:24
Nitrobenzene-d5	NC	49.6 - 104		9/3/2021	06:24
Phenol-d5	NC	10 - 105		9/3/2021	06:24
Terphenyl-d14	NC	56.5 - 118		9/3/2021	06:24

Method Reference(s): EPA 8270D
EPA 3510C
Preparation Date: 8/31/2021
Data File: B56695.D

PARADIGM
ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213873

Client: **Inventum Engineering, P.C.**

Project Reference: Bench Scale Test

Sample Identifier: AQ-COGAQ-08252021
Lab Sample ID: 213873-02 **Date Sampled:** 8/25/2021
Matrix: Water **Date Received:** 8/26/2021

Volatile Organics

Analyte	Result	Units	Qualifier	Date Analyzed
1,1,1-Trichloroethane	< 200	ug/L		8/30/2021 16:45
1,1,2,2-Tetrachloroethane	< 200	ug/L		8/30/2021 16:45
1,1,2-Trichloroethane	< 200	ug/L		8/30/2021 16:45
1,1-Dichloroethane	< 200	ug/L		8/30/2021 16:45
1,1-Dichloroethene	< 200	ug/L		8/30/2021 16:45
1,2,3-Trichlorobenzene	< 500	ug/L		8/30/2021 16:45
1,2,4-Trichlorobenzene	< 500	ug/L		8/30/2021 16:45
1,2-Dibromo-3-Chloropropane	< 1000	ug/L		8/30/2021 16:45
1,2-Dibromoethane	< 200	ug/L		8/30/2021 16:45
1,2-Dichlorobenzene	< 200	ug/L		8/30/2021 16:45
1,2-Dichloroethane	< 200	ug/L		8/30/2021 16:45
1,2-Dichloropropane	< 200	ug/L		8/30/2021 16:45
1,3-Dichlorobenzene	< 200	ug/L		8/30/2021 16:45
1,4-Dichlorobenzene	< 200	ug/L		8/30/2021 16:45
1,4-Dioxane	< 1000	ug/L		8/30/2021 16:45
2-Butanone	< 1000	ug/L		8/30/2021 16:45
2-Hexanone	< 500	ug/L		8/30/2021 16:45
4-Methyl-2-pentanone	< 500	ug/L		8/30/2021 16:45
Acetone	< 1000	ug/L		8/30/2021 16:45
Benzene	**1910**	ug/L		8/30/2021 16:45
Bromochloromethane	< 500	ug/L		8/30/2021 16:45
Bromodichloromethane	< 200	ug/L		8/30/2021 16:45
Bromoform	< 500	ug/L		8/30/2021 16:45

PARADIGM
ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213873

Client: **Inventum Engineering, P.C.**

Project Reference: Bench Scale Test

Sample Identifier: AQ-COGAQ-08252021
Lab Sample ID: 213873-02 **Date Sampled:** 8/25/2021
Matrix: Water **Date Received:** 8/26/2021

Bromomethane	< 200	ug/L		8/30/2021	16:45
Carbon disulfide	< 200	ug/L		8/30/2021	16:45
Carbon Tetrachloride	< 200	ug/L		8/30/2021	16:45
Chlorobenzene	< 200	ug/L		8/30/2021	16:45
Chloroethane	< 200	ug/L		8/30/2021	16:45
Chloroform	< 200	ug/L		8/30/2021	16:45
Chloromethane	< 200	ug/L		8/30/2021	16:45
cis-1,2-Dichloroethene	< 200	ug/L		8/30/2021	16:45
cis-1,3-Dichloropropene	< 200	ug/L		8/30/2021	16:45
Cyclohexane	< 1000	ug/L		8/30/2021	16:45
Dibromochloromethane	< 200	ug/L		8/30/2021	16:45
Dichlorodifluoromethane	< 200	ug/L		8/30/2021	16:45
Ethylbenzene	**129**	ug/L	J	8/30/2021	16:45
Freon 113	< 200	ug/L		8/30/2021	16:45
Isopropylbenzene	< 200	ug/L		8/30/2021	16:45
m,p-Xylene	**2180**	ug/L		8/30/2021	16:45
Methyl acetate	< 200	ug/L		8/30/2021	16:45
Methyl tert-butyl Ether	< 200	ug/L		8/30/2021	16:45
Methylcyclohexane	< 200	ug/L		8/30/2021	16:45
Methylene chloride	< 500	ug/L		8/30/2021	16:45
o-Xylene	**731**	ug/L		8/30/2021	16:45
Styrene	< 500	ug/L		8/30/2021	16:45
Tetrachloroethene	< 200	ug/L		8/30/2021	16:45
Toluene	**2440**	ug/L		8/30/2021	16:45
trans-1,2-Dichloroethene	< 200	ug/L		8/30/2021	16:45

PARADIGM
ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213873

Client: **Inventum Engineering, P.C.**

Project Reference: Bench Scale Test

Sample Identifier: AQ-COGAQ-08252021
Lab Sample ID: 213873-02 **Date Sampled:** 8/25/2021
Matrix: Water **Date Received:** 8/26/2021

trans-1,3-Dichloropropene	< 200	ug/L	8/30/2021	16:45
Trichloroethene	< 200	ug/L	8/30/2021	16:45
Trichlorofluoromethane	< 200	ug/L	8/30/2021	16:45
Vinyl chloride	< 200	ug/L	8/30/2021	16:45

Surrogate	Percent Recovery	Limits	Outliers	Date Analyzed	
1,2-Dichloroethane-d4	**121**	83 - 120	*	8/30/2021	16:45
4-Bromofluorobenzene	**97.5**	65.5 - 118		8/30/2021	16:45
Pentafluorobenzene	**105**	91.2 - 109		8/30/2021	16:45
Toluene-D8	**91.4**	79.7 - 112		8/30/2021	16:45

Method Reference(s): EPA 8260C
EPA 5030C
Data File: z03825.D

PARADIGM
ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213873

Client: **Inventum Engineering, P.C.**

Project Reference: Bench Scale Test

Sample Identifier:	AQ-COGAQ-08252021		
Lab Sample ID:	213873-02	**Date Sampled:**	8/25/2021
Matrix:	Water	**Date Received:**	8/26/2021

Dioxane

Analyte	Result	Units	Qualifier	Date Analyzed
1,4-Dioxane	**0.583**	ug/L		9/1/2021 16:48

The ions present elute within the same retention time range as 1,4-Dioxane, and due to interferences in the mass spectra 1,4-Dioxane cannot be eliminated as a constituent of the sample. There may also be additional components present.

Method Reference(s): EPA 8270D SIM
EPA 3510C
Preparation Date: 8/31/2021
Data File: B56644.D

Report Prepared Wednesday, September 15, 2021

PARADIGM
ENVIRONMENTAL SERVICES, INC.

Analytical Report Appendix

The reported results relate only to the samples as they have been received by the laboratory.

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All soil/sludge samples have been reported on a dry weight basis, unless qualified "reported as received". Other solids are reported as received.

Low level Volatiles blank reports for soil/solid matrix are based on a nominal 5 gram weight. Sample results and reporting limits are based on actual weight, which may be more or less than 5 grams.

The Chain of Custody provides additional information, including compliance with sample condition requirements upon receipt. Sample condition requirements are defined under the 2003 NELAC Standard, sections 5.5.8.3.1 and 5.5.8.3.2.

NYSDOH ELAP does not certify for all parameters. Paradigm Environmental Services or the indicated subcontracted laboratory does hold certification for all analytes where certification is offered by ELAP unless otherwise specified. Aliquots separated for certain tests, such as TCLP, are indicated on the Chain of Custody and final reports with an "A" suffix.

Data qualifiers are used, when necessary, to provide additional information about the data. This information may be communicated as a flag or as text at the bottom of the report. Please refer to the following list of analyte-specific, frequently used data flags and their meaning:

"<" = Analyzed for but not detected at or above the quantitation limit.
"E" = Result has been estimated, calibration limit exceeded.
"Z" = See case narrative.
"D" = Sample, Laboratory Control Sample, or Matrix Spike Duplicate results above Relative Percent Difference limit.
"M" = Matrix spike recoveries outside QC limits. Matrix bias indicated.
"B" = Method blank contained trace levels of analyte. Refer to included method blank report.
"J" = Result estimated between the quantitation limit and half the quantitation limit.
"L" = Laboratory Control Sample recovery outside accepted QC limits.
"P" = Concentration differs by more than 40% between the primary and secondary analytical columns.
"NC" = Not calculable. Applicable to RPD if sample or duplicate result is non-detect or estimated (see primary report for data flags). Applicable to MS if sample is greater or equal to ten times the spike added. Applicable to sample surrogates or MS if sample dilution is 10x or higher.
"" = Indicates any recoveries outside associated acceptance windows. Surrogate outliers in samples are presumed matrix effects. LCS demonstrates method compliance unless otherwise noted.*
"(1)" = Indicates data from primary column used for QC calculation.
"A" = denotes a parameter for which ELAP does not offer approval as part of their laboratory certification program.
"F" = denotes a parameter for which Paradigm does not carry certification, the results for which should therefore only be used where ELAP certification is not required, such as personal exposure assessment.

GENERAL TERMS AND CONDITIONS
LABORATORY SERVICES

These Terms and Conditions embody the whole agreement of the parties in the absence of a signed and executed contract between the Laboratory (LAB) and Client. They shall supersede all previous communications, representations, or agreements, either verbal or written, between the parties. The LAB specifically rejects all additional, inconsistent, or conflicting terms, whether printed or otherwise set forth in any purchase order or other communication from the Client to the LAB. The invalidity or unenforceability in whole or in part of any provision, tern or condition hereof shall not affect in any way the validity or enforceability of the remainder of the Terms and Conditions. No waiver by LAB of any provision, term, or condition hereof or of any breach by or obligation of the Client hereunder shall constitute a waiver of such provision, term, or condition on any other occasion or a waiver of any other breach by or obligation of the Client. This agreement shall be administered and interpreted under the laws of the state which services are procured.

Warranty. Recognizing that the nature of many samples is unknown and that some may contain potentially hazardous components, LAB warrants only that it will perform testing services, obtain findings, and prepare reports in accordance with generally accepted analytical laboratory principles and practices at the time of performance of services. LAB makes no other warranty, express or implied.

Scope and Compensation. LAB agrees to perform the services described in the chain of custody to which these terms and conditions are attached. Unless the parties agree in writing to the contrary, the duties of LAB shall not be construed to exceed the services specifically described. LAB wi use LAB default method for all tests unless specified otherwise on the Work Order.
Payment terms are net 30 days from the date of invoice. All overdue payments are subject to an interest charge of one and one-half percent (1-1/2%) per month or a portion thereof. Client shall also be responsible for costs of collection, including payment of reasonable attorney fees if such expense is incurred. The prices, unless stated, do not include any sale, use or other taxes. Such taxes will be added to invoice prices when required.

Prices. Compensation for services performed will be based on the current Lab Analytical Fee Schedule or on quotations agreed to in writing by the parties. Turnaround time based charges are determined from the time of resolution of all work order questions. Testimony, court appearances or data compilation for legal action will be charged separately. Evaluation and reporting of initial screening runs may incur additional fees.

Limitations of Liability. In the event of any error, omission, or other professional negligence, the sole and exclusive responsibility of LAB shall be to re-perform the deficient work at its own expense and LAB shall have no other liability whatsoever. All claims shall be deemed waived unless made in writing and received by LAB within ninety (90) days following completion of services.
LAB shall have no liability, obligation, or responsibility of any kind for losses, costs, expenses, or other damages (including but not limited to any special, direct, incidental or consequential damages) with respect to LAB's services or results.
All results provided by LAB are strictly for the use of its clients and LAB is in no way responsible for the use of such results by clients or third parties. All reports should be considered in their entirety, and LAB is not responsible for the separation, detachment, or other use of any portion of these reports. Client may not assign the lab report without the written consent of the LAB.
Client covenants and agrees, at its/his/her sole expense, to indemnify, protect, defend, and save harmless the LAB from and against any and all damages, losses, liabilities, obligations, penalties, claims, litigation, demands, defenses, judgments, suits, actions, proceedings, costs, disbursements and/or expenses (including, without limitation attorneys' and experts' fees and disbursements) of any kind whatsoever which may at any time be imposed upon, incurred by or asserted or awarded against client relating to, resulting from or arising out of (a) the breach of this agreement by this client, (b) the negligence of the client in handling, delivering or disclosing any hazardous substance, (c) the violation of the Client of any applicable law, (d) non-compliance by the Client with any environmental permit or (e) a material misrepresentation in disclosing the materials to be tested.

Hazard Disclosure. Client represents and warrants that any sample delivered to LAB will be preceded or accompanied by complete written disclosure of the presence of any hazardous substances known or suspected by Client. Client further warrants that any sample containing any hazardous substance that is to be delivered to LAB will be packaged, labeled, transported, and delivered properly and in accordance with applicable laws.

Sample Handling. Prior to LAB's acceptance of any sample (or after any revocation of acceptance), the entire risk of loss or of damage to such sample remains with Client. Samples are accepted when receipt is acknowledged on chain of custody documentation. In no event will LAB have any responsibility for the action or inaction of any carrier shipping or delivering any sample to or from LAB premises.
Client authorizes LAB to proceed with the analysis of samples as received by the laboratory, recognizing that any samples not in compliance with all current DOH-ELAP-NELAP requirements for containers, preservation or holding time will be noted as such on th final report.
Disposal of hazardous waste samples is the responsibility of the Client. If the Client does not wish such samples returned, LAB may add storage and disposal fees to the final invoice. Maximum storage time for samples is 30 days after completion of analysis unless modified by applicable state or federal laws. Client will be required to give the LAB written instructions concerning disposal of these samples.
LAB reserves the absolute right, exercisable at any time, to refuse to receive delivery of, refuse to accept, or revoke acceptance of any sample, which, in the sole judgment of LAB (a) is of unsuitable volume, (b) may be or become unsuitable for or may pose a risk in handling, transport, or processing for any health, safety, environmental or other reason whether or not due to the presence in the sample of any hazardous substance, and whether or not such presence has been disclosed to LAB by Client or (c) if the condition or sample date make the sample unsuitable for analysis.

Legal Responsibility. LAB is solely responsible for performance of this contract, and no affiliated company, director, officer, employee, or agent shall have any legal responsibility hereunder, whether in contract or tort including negligence.

Assignment. LAB may assign its performance obligations under this contract to other parties, as it deems necessary. LAB shall disclose to Client any assignee (subcontractor) by ELAP ID # on the submitted final report.

Force Majeure. LAB shall have no responsibility or liability to the Client for any failure or delay in performance by LAB, which results in whole or in part from any cause or circumstance beyond the reasonable control of LAB. Such causes and circumstances shall include, but not limited to, acts of God, acts or orders of any government authority, strikes or other labor disputes, natural disasters, accidents, wars, civil disturbances, difficulties or delays in transportation, mail or delivery services, inability to obtain sufficient services or supplies from LAB's usual suppliers, or any other cause beyond LAB's reasonable control.

Law. This contract shall be continued under the laws of the State of New York without regard to its conflicts of laws provision.

179 Lake Avenue, Rochester, NY 14608 Office (585) 647-2530 Fax (585) 647-3311

1 of 2

PARADIGM

CHAIN OF CUSTODY

REPORT TO:

CLIENT: INVENTUM ENGINEERING
ADDRESS: 481 CARLISLE DR SUITE 202
CITY: HERNDON STATE: VA ZIP: 20170
PHONE: 585-734-5255
ATTN: ROXANNE BIRX

INVOICE TO:

CLIENT: SAME
ADDRESS:
CITY: STATE: ZIP:
PHONE:
ATTN: JOHN BLACK

LAB PROJECT ID: 213873
Quotation #:
Email: john.black@inventumeng.com roxanne.birx@inventumeng.com

PROJECT REFERENCE
BENCH SCALE TEST

Matrix Codes:
AQ - Aqueous Liquid; NQ - Non-Aqueous Liquid; WA - Water; WG - Groundwater; DW - Drinking Water; WW - Wastewater; SO - Soil; SG - Sludge; SD - Solid; PT - Paint; WP - Wipe; CK - Caulk; OL - Oil; AR - Air

REQUESTED ANALYSIS

DATE COLLECTED	TIME COLLECTED	COMPOSITE	GRAB	SAMPLE IDENTIFIER	MATRIX CODES	NUMBER OF CONTAINERS	VOCs 5035A/8260C	SVOCs 8270 D	CYANIDE SM4500 CN C-2011	TAL METALS 6010C	MERCURY 7470A	PCBs 8270 D	PEST HERB 8081B/8151A	1,4 DIOXANE	PFAS ASTM D7968	TCLP FULL LIST	TCLP BORON CYANIDES, FLUORIDE NITRATES+ NITRITES, URANIUM	PAINT FILTER	HAZ CHAT	BTU + FLASH POINT	TOTAL SULFUR	CYANIDE 9012	LOW LEVEL HG	PFAS 537 MOD	PH	PARADIGM LAB SAMPLE NUMBER
8/25/21	1305		X	SD-RACKCOG-08252021	SD	25	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓					01A
8/25/21	1325		X	AQ-COGAQ-08252021	WA	9 11 rec'd 8/26/21	✓	✓		✓		✓	✓	✓					✓			✓	✓	✓	✓	02

Included bottle order to clearly list parameters if chain is too sloppy.

Turnaround Time		Report Supplements		
Availability contingent upon lab approval; additional fees may apply.				
Standard 5 day	☒	None Required	☐	None Required ☐
10 day	☐	Batch QC	☒	Basic EDD ☒
Rush 3 day	☐	Category A	☐	NYSDEC EDD ☒
Rush 2 day	☐	Category B	☐	LEVEL IV DATA
Rush 1 day	☐			
Date Needed _____ please indicate date needed:		Other please indicate package needed:	☐	Other EDD please indicate EDD needed : ☐

ROXANNE BIRX — Sampled By — 8/25/21 1305 — Date/Time
Relinquished By — 8/25/21 1400 — Date/Time
Received By — 8/25/21 16:00 — Date/Time
Received @ Lab By — 8/26/21 1642 — Date/Time

Total Cost:

P.I.F.

3°C iced 8/26/21 15:57

By signing this form, client agrees to Paradigm Terms and Conditions (reverse).

Custody Seal N/A. Samples delivered by Paradigm GP 8/26/21

See additional page for sample conditions.

2082

PARADIGM

Chain of Custody Supplement

Client: Inventum | Completed by: McPail
Lab Project ID: 213873 | Date: 8/26/21

Sample Condition Requirements
Per NELAC/ELAP 210/241/242/243/244

Condition	Yes	No	N/A
	NELAC compliance with the sample condition requirements upon receipt		
Container Type	✓		
Comments: Transferred portion of 02 to 8oz glass jar ~~w/H2SO4~~ eem 8/27/21 for reactivity ~~pH<2~~ eem 8/27/21			
Transferred to method-compliant container	~~S3 to 6-3~~ ~~S3 to 6-3~~		✓
Headspace (<1 mL)	VOA-02		
Comments: Transferred portion of 02 to 8oz glass jar for Flash			
Preservation	~~VOA-02~~ ~~TCN-02~~ LLHg-02		✓
Comments			
Chlorine Absent (<0.10 ppm per test strip)			✓
Comments			
Holding Time	✓	pH-02	
Comments			
Temperature	✓		Met poly-02
Comments: 3°C iced			
Compliant Sample Quantity/Type	✓	X reactivity 02	
Comments: No bottle certs for 125ml poly, 250 poly not in cert bottles. No bottle cert for VOA-02, PFAS sent directly to sub lab			

Adirondack Environmental Services, Inc

Date: *02-Sep-21*

CLIENT:	Paradigm Environmental	**Client Sample ID:**	SD-RackCDG-08252021
Work Order:	**210830012**	**Collection Date:**	8/25/2021 1:05:00 PM
Reference:	Analysis of Samples / Project# 213873	**Lab Sample ID:**	210830012-001
PO#:		**Matrix:**	SOLID

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
CYANIDE, TOTAL - SW 9012B						Analyst: **KB**
(Prep: 9010C - 8/31/2021)						
Cyanide	**287**	50.0		µg/g	100	8/31/2021 4:32:21 PM
HEAT VALUE - ASTM D240-09						Analyst: **CP**
Heat Value	**12000**	500		btu/lb	1	9/1/2021
SW 7.3.3.2, NOT ELAP CERTIFIED						Analyst: **KB**
(Prep: E335.4 - 9/2/2021)						
Reactive Cyanide	**1.4**	1.0		µg/g	1	9/2/2021 12:42:55 PM
SW 7.3.4.2, NOT ELAP CERTIFIED						Analyst: **CS**
(Prep: E335.4 - 9/2/2021)						
Reactive Sulfide	**20**	10		µg/g	1	9/2/2021
REACTIVITY - SW 7.3.4.2, NOT ELAP CERTIFIED						Analyst: **CS**
Reactivity	**Non Reactive**	0			1	9/2/2021

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quanititation limits
B - Analyte detected in the associated Method Blank
X - Value exceeds Maximum Contaminant Level
E - Value above quantitation range-Estimate
S - LCS Spike below accepted limits (+ above)
Z - RPD outside accepted recovery limits
N - Matrix Spike below accepted limits (+ above)
T - Tentitively Identified Compound-Estimated Conc.

Adirondack Environmental Services, Inc

Date: *02-Sep-21*

CLIENT:	Paradigm Environmental	**Client Sample ID:**	AQ-COG AQ-08252021
Work Order:	**210830012**	**Collection Date:**	8/25/2021 1:25:00 PM
Reference:	Analysis of Samples / Project# 213873	**Lab Sample ID:**	210830012-002
PO#:		**Matrix:**	WATER

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
CYANIDE, TOTAL - EPA 335.4 REV 1.0						Analyst: **KB**
(Prep: 335.4 - 8/31/2021)						
Cyanide	**1.2**	0.10		mg/L	10	8/31/2021 4:06:26 PM
SW 7.3.3.2, NOT ELAP CERTIFIED						Analyst: **KB**
(Prep: E335.4 - 9/1/2021)						
Reactive Cyanide	**ND**	1.0		µg/g	1	9/2/2021 12:41:09 PM
SW 7.3.4.2, NOT ELAP CERTIFIED						Analyst: **CS**
(Prep: E335.4 - 9/1/2021)						
Reactive Sulfide	**16**	10		µg/g	1	9/2/2021
REACTIVITY - SW 7.3.4.2, NOT ELAP CERTIFIED						Analyst: **CS**
Reactivity	**Non Reactive**	0			1	9/2/2021

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quanititation limits
B - Analyte detected in the associated Method Blank
X - Value exceeds Maximum Contaminant Level
E - Value above quantitation range-Estimate
S - LCS Spike below accepted limits (+ above)
Z - RPD outside accepted recovery limits
N - Matrix Spike below accepted limits (+ above)
T - Tentitively Identified Compound-Estimated Conc.

Adirondack Environmental Services, Inc

Date: *02-Sep-21*

CLIENT:	Paradigm Environmental	**Client Sample ID:**	SD-RackCDG-08252021
Work Order:	**210830012**	**Collection Date:**	8/25/2021 1:05:00 PM
Reference:	Analysis of Samples / Project# 213873	**Lab Sample ID:**	210830012-003
PO#:		**Matrix:**	TCLP-EXTRACT

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
TCLP HERBICIDES - EPA 8321B						Analyst: **KF**
(Prep: SW3535A - 8/30/2021)						
2,4,5-TP (Silvex)-TCLP	**ND**	0.050		mg/L	1	8/30/2021 7:45:00 PM
2,4-D-TCLP	**ND**	0.050		mg/L	1	8/30/2021 7:45:00 PM
Surr: Acifluorfen	**63.4**	52.5-128		%REC	1	8/30/2021 7:45:00 PM
Surr: DCAA	**91.7**	56.2-139		%REC	1	8/30/2021 7:45:00 PM

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quanititation limits
B - Analyte detected in the associated Method Blank
X - Value exceeds Maximum Contaminant Level
E - Value above quantitation range-Estimate
S - LCS Spike below accepted limits (+ above)
Z - RPD outside accepted recovery limits
N - Matrix Spike below accepted limits (+ above)
T - Tentitively Identified Compound-Estimated Conc.

179 Lake Avenue, Rochester, NY 14608 Office (585) 647-2530 Fax (585) 647-3311

210830012

CHAIN OF CUSTODY

ADIRONDACK: ELAP ID: 1

210830012 Demo

REPORT TO:		INVOICE TO:			
COMPANY:	Paradigm Environmental	COMPANY:	Same	LAB PROJECT #:	CLIENT PROJECT
ADDRESS:		ADDRESS:			
CITY: STATE: ZIP:		CITY: STATE: ZIP:		TURNAROUND TIME: (WORKING DAYS)	
PHONE: FAX:		PHONE: FAX:			STD
PROJECT NAME/SITE NAME:		ATTN:	Reporting	☐ 1 ☐ 2 ☐ 3 ☐ 5	
		COMMENTS:	Please email results to reporting@paradigmenv.com	Date Due: 9/3 for data	

REQUESTED ANALYSIS

Report to Floyd

ASP Cat B Package Due 9/17

	DATE	TIME	COMPOSITE	GRAB	SAMPLE LOCATION/FIELD ID	MATRIX	NUMBER OF CONTAINERS	BTX	TCN	1,4 Dioxane SIM 8260/21	Reactivity	Cyanide	TCLP Herb	REMARKS	PARADIGM SAMPLE NUMBER
001	1	8/25/21	1305	X	SD-RackCOG-08252021	Soil	1	X			X	X		213373-01	
002	2	8/25/21	1325	X	AQ-COG-AQ-0825 2021	W	~~2~~ 1		X	X	X			213373-02 Limited vol reactivity	
003	3	8/25/21	1305	X	SD-RACK COG--05252021 TCLP extract		1						1	213373-01A	
	4													Sample Spinon 8/27/21	
	5														
	6														
	7														
	8														
	9														
	10														

LAB USE ONLY BELOW THIS LINE

Sample Condition: Per NELAC/ELAP 210/241/242/243/244

Receipt Parameter	NELAC Compliance	
Container Type:	Y ☐	N ☐
Comments: Not ADS		
Preservation:	Y ☐	N ☐
Comments:		
Holding Time:	Y ☐	N ☐
Comments:		
Temperature:	Y ☐	N ☐
Comments: 4°		

Client

	Date/Time	
Sampled By: Molly Kail	8/30/21 per m 8/27/21	8:30
Relinquished By:	Date/Time	
Received By:	8/30/21	1220
Received @ Lab By:	8/30/21	4:24 PM

Total Cost:

P.I.F.

Adirondack Environmental Services Inc.®
Experience is the solution
314 North Pearl Street • Albany, New York 12207 • (518) 434-4546 • Fax (518) 434-0891

TERMS, CONDITIONS & LIMITATIONS

All service rendered by the **Adirondack Environmental Services, Inc.** are undertaken and all rates are based upon the following terms:

(a) Neither **Adirondack Environmental Services, Inc.,** nor any of its employees, agents or sub-contractors shall be liable for any loss or damage arising out of **Adirondack Environmental Services, Inc.'s** performance or nonperformance, whether by way of negligence or breach of contract, or otherwise, in any amount greater than twice the amount billed to the customer for the work leading to the claim of the customer. Said remedy shall be the sole and exclusive remedy against **Adirondack Environmental Services, Inc.** arising out of its work.

(b) All claims made must be in writing within forty-five (45) days after delivery of the **Adirondack Environmental Services, Inc.** report regarding said work or such claim shall be deemed or irrevocably waived.

(c) **Adirondack Environmental Services, Inc.** reports are submitted in writing and are for our customers only. Our customers are considered to be only those entities being billed for our services. Acquisition of an **Adirondack Environmental Services, Inc.** report by other than our customer does not constitute a representation of **Adirondack Environmental Services, Inc.** as to the accuracy of the contents thereof.

(d) In no event shall **Adirondack Environmental Services, Inc.,** its employees, agents or sub-contractors be responsible for consequential or special damages of any kind or in any amount.

(e) No deviation from the terms set forth herein shall bind **Adirondack Environmental Services, Inc.** unless in writing and signed by a Director of **Adirondack Environmental Services, Inc.**

(f) Results pertain only to items analyzed. Information supplied by client is assumed to be correct. This information may be used on reports and in calculations and **Adirondack Environmental Services, Inc.** is not responsible for the accuracy of this information.

(g) Payments by Credit Card/Purchase Cards are subject to a 3% additional charge.

ANALYTICAL REPORT

Lab Number:	L2145703
Client:	Paradigm Environmental Services 179 Lake Avenue Rochester, NY 14608
ATTN:	Jane Daloia
Phone:	(585) 647-2530
Project Name:	BENCH SCALE TEST
Project Number:	BENCH SCALE TEST
Report Date:	09/09/21

Certifications & Approvals: MA (M-MA030), NH NELAP (2062), CT (PH-0141), DoD (L2474), FL (E87814), IL (200081), LA (85084), ME (MA00030), MD (350), NJ (MA015), NY (11627), NC (685), OH (CL106), PA (68-02089), RI (LAO00299), TX (T104704419), VT (VT-0015), VA (460194), WA (C954), US Army Corps of Engineers, USDA (Permit #P330-17-00150), USFWS (Permit #206964).

320 Forbes Boulevard, Mansfield, MA 02048-1806
508-822-9300 (Fax) 508-822-3288 800-624-9220 - www.alphalab.com

Project Name: BENCH SCALE TEST
Project Number: BENCH SCALE TEST

Lab Number: L2145703
Report Date: 09/09/21

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L2145703-01	SD-RACKCOG-08252021	SOLID	Not Specified	08/25/21 13:05	08/25/21
L2145703-02	AQ-COGAQ-08252021	WATER	Not Specified	08/25/21 13:25	08/25/21

Project Name:	BENCH SCALE TEST	**Lab Number:**	L2145703
Project Number:	BENCH SCALE TEST	**Report Date:**	09/09/21

Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet NELAP requirements for all NELAP accredited parameters unless otherwise noted in the following narrative. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. Tentatively Identified Compounds (TICs), if requested, are reported for compounds identified to be present and are not part of the method/program Target Compound List, even if only a subset of the TCL are being reported. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively.

When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances, the specific failure is not narrated but noted in the associated QC Outlier Summary Report, located directly after the Case Narrative. QC information is also incorporated in the Data Usability Assessment table (Format 11) of our Data Merger tool, where it can be reviewed in conjunction with the sample result, associated regulatory criteria and any associated data usability implications.

Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

HOLD POLICY - For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Alpha Project Manager and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Project Management at 800-624-9220 with any questions.

Project Name:	BENCH SCALE TEST	**Lab Number:**	L2145703
Project Number:	BENCH SCALE TEST	**Report Date:**	09/09/21

Case Narrative (continued)

Report Submission

All non-detect (ND) or estimated concentrations (J-qualified) have been quantitated to the limit noted in the MDL column.

Perfluorinated Alkyl Acids by Isotope Dilution

L2145703-01: The sample has elevated detection limits due to the limited sample volume utilized during extraction, as required by the sample matrix.

L2145703-01 and -02: Extracted Internal Standard recoveries were outside the acceptance criteria for individual analytes. Please refer to the surrogate section of the report for details.

L2145703-02: The sample was centrifuged and decanted prior to extraction due to sample matrix.

L2145703-02: The 6:2FTS result is not reported because the quadratic fit of the curve does not allow for an estimated "E" flagged value. The sample was re-extracted on dilution and the result within the calibration curve is reported for this compound.

WG1541092-4: Extracted Internal Standard recoveries were outside the acceptance criteria for individual analytes. Please refer to the surrogate section of the report for details.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature:  Alycia Mogayzel

Title: Technical Director/Representative Date: 09/09/21

ORGANICS

SEMIVOLATILES

Project Name: BENCH SCALE TEST
Project Number: BENCH SCALE TEST
Lab Number: L2145703
Report Date: 09/09/21

SAMPLE RESULTS

Lab ID: L2145703-01
Client ID: SD-RACKCOG-08252021
Sample Location: Not Specified

Date Collected: 08/25/21 13:05
Date Received: 08/25/21
Field Prep: Not Specified

Sample Depth:
Matrix: Solid
Analytical Method: 134,LCMSMS-ID
Analytical Date: 09/01/21 02:26
Analyst: SG
Percent Solids: 34%

Extraction Method: ALPHA 23528
Extraction Date: 08/31/21 09:32

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab						
Perfluorobutanoic Acid (PFBA)	ND		ng/g	26.8	1.22	1
Perfluoropentanoic Acid (PFPeA)	ND		ng/g	26.8	2.47	1
Perfluorobutanesulfonic Acid (PFBS)	ND		ng/g	13.4	2.09	1
Perfluorohexanoic Acid (PFHxA)	ND		ng/g	26.8	2.82	1
Perfluoroheptanoic Acid (PFHpA)	ND		ng/g	13.4	2.42	1
Perfluorohexanesulfonic Acid (PFHxS)	ND		ng/g	13.4	3.24	1
Perfluorooctanoic Acid (PFOA)	ND		ng/g	13.4	2.25	1
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND		ng/g	26.8	9.63	1
Perfluoroheptanesulfonic Acid (PFHpS)	ND		ng/g	26.8	7.32	1
Perfluorononanoic Acid (PFNA)	ND		ng/g	13.4	4.02	1
Perfluorooctanesulfonic Acid (PFOS)	ND		ng/g	13.4	6.97	1
Perfluorodecanoic Acid (PFDA)	ND		ng/g	13.4	3.59	1
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND		ng/g	26.8	15.4	1
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND		ng/g	26.8	10.8	1
Perfluoroundecanoic Acid (PFUnA)	ND		ng/g	26.8	2.51	1
Perfluorodecanesulfonic Acid (PFDS)	ND		ng/g	26.8	8.20	1
Perfluorooctanesulfonamide (FOSA)	ND		ng/g	26.8	5.26	1
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND		ng/g	26.8	4.53	1
Perfluorododecanoic Acid (PFDoA)	ND		ng/g	26.8	3.75	1
Perfluorotridecanoic Acid (PFTrDA)	ND		ng/g	26.8	11.0	1
Perfluorotetradecanoic Acid (PFTA)	ND		ng/g	26.8	2.90	1
PFOA/PFOS, Total	ND		ng/g	13.4	2.25	1

Project Name: BENCH SCALE TEST **Lab Number:** L2145703

Project Number: BENCH SCALE TEST **Report Date:** 09/09/21

SAMPLE RESULTS

Lab ID: L2145703-01 Date Collected: 08/25/21 13:05

Client ID: SD-RACKCOG-08252021 Date Received: 08/25/21

Sample Location: Not Specified Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor

Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab

Surrogate (Extracted Internal Standard)	% Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	97		61-135
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	98		58-150
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	101		74-139
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	83		66-128
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	99		71-129
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	103		78-139
Perfluoro[13C8]Octanoic Acid (M8PFOA)	96		75-130
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	**195**	Q	20-154
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	96		72-140
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	107		79-136
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	101		75-130
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	138		19-175
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	106		31-134
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	105		61-155
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	42		10-117
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	117		34-137
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	100		54-150
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	85		24-159

Project Name: BENCH SCALE TEST
Project Number: BENCH SCALE TEST
Lab Number: L2145703
Report Date: 09/09/21

SAMPLE RESULTS

Lab ID: L2145703-02
Client ID: AQ-COGAQ-08252021
Sample Location: Not Specified

Date Collected: 08/25/21 13:25
Date Received: 08/25/21
Field Prep: Not Specified

Sample Depth:
Matrix: Water
Analytical Method: 134,LCMSMS-ID
Analytical Date: 08/28/21 20:42
Analyst: MP

Extraction Method: ALPHA 23528
Extraction Date: 08/27/21 08:50

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab						
Perfluorobutanoic Acid (PFBA)	50.3		ng/l	1.77	0.362	1
Perfluoropentanoic Acid (PFPeA)	48.2		ng/l	1.77	0.351	1
Perfluorobutanesulfonic Acid (PFBS)	ND		ng/l	1.77	0.211	1
Perfluorohexanoic Acid (PFHxA)	23.0		ng/l	1.77	0.291	1
Perfluoroheptanoic Acid (PFHpA)	6.05		ng/l	1.77	0.200	1
Perfluorohexanesulfonic Acid (PFHxS)	ND		ng/l	1.77	0.334	1
Perfluorooctanoic Acid (PFOA)	6.19		ng/l	1.77	0.209	1
Perfluoroheptanesulfonic Acid (PFHpS)	ND		ng/l	1.77	0.610	1
Perfluorononanoic Acid (PFNA)	0.745	J	ng/l	1.77	0.277	1
Perfluorooctanesulfonic Acid (PFOS)	7.68	F	ng/l	1.77	0.447	1
Perfluorodecanoic Acid (PFDA)	0.497	J	ng/l	1.77	0.270	1
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND		ng/l	1.77	1.08	1
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND		ng/l	1.77	0.575	1
Perfluoroundecanoic Acid (PFUnA)	ND		ng/l	1.77	0.231	1
Perfluorodecanesulfonic Acid (PFDS)	ND		ng/l	1.77	0.870	1
Perfluorooctanesulfonamide (FOSA)	ND		ng/l	1.77	0.515	1
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND		ng/l	1.77	0.713	1
Perfluorododecanoic Acid (PFDoA)	ND		ng/l	1.77	0.330	1
Perfluorotridecanoic Acid (PFTrDA)	ND		ng/l	1.77	0.290	1
Perfluorotetradecanoic Acid (PFTA)	ND		ng/l	1.77	0.220	1
PFOA/PFOS, Total	13.9		ng/l	1.77	0.209	1

Project Name: BENCH SCALE TEST **Lab Number:** L2145703

Project Number: BENCH SCALE TEST **Report Date:** 09/09/21

SAMPLE RESULTS

Lab ID: L2145703-02 Date Collected: 08/25/21 13:25

Client ID: AQ-COGAQ-08252021 Date Received: 08/25/21

Sample Location: Not Specified Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor

Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab

Surrogate (Extracted Internal Standard)	% Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	**52**	Q	58-132
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	98		62-163
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	107		70-131
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	87		57-129
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	122		60-129
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	105		71-134
Perfluoro[13C8]Octanoic Acid (M8PFOA)	86		62-129
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	95		59-139
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	99		69-131
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	82		62-124
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	63		10-162
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	25		24-116
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	69		55-137
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	43		10-112
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	58		27-126
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	58		48-131
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	47		22-136

Project Name: BENCH SCALE TEST
Project Number: BENCH SCALE TEST
Lab Number: L2145703
Report Date: 09/09/21

SAMPLE RESULTS

Lab ID: L2145703-02 RE
Client ID: AQ-COGAQ-08252021
Sample Location: Not Specified

Date Collected: 08/25/21 13:25
Date Received: 08/25/21
Field Prep: Not Specified

Sample Depth:
Matrix: Water
Analytical Method: 134,LCMSMS-ID
Analytical Date: 08/30/21 18:21
Analyst: RS

Extraction Method: ALPHA 23528
Extraction Date: 08/30/21 07:20

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab						
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	563		ng/l	20.0	13.3	1

Surrogate (Extracted Internal Standard)	% Recovery	Qualifier	Acceptance Criteria
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	68		14-147

Project Name: BENCH SCALE TEST
Project Number: BENCH SCALE TEST
Lab Number: L2145703
Report Date: 09/09/21

Method Blank Analysis
Batch Quality Control

Analytical Method: 134,LCMSMS-ID
Analytical Date: 08/28/21 17:06
Analyst: MP

Extraction Method: ALPHA 23528
Extraction Date: 08/27/21 08:50

Parameter	Result	Qualifier	Units	RL	MDL
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab for sample(s): 02 Batch: WG1539834-1					
Perfluorobutanoic Acid (PFBA)	ND		ng/l	2.00	0.408
Perfluoropentanoic Acid (PFPeA)	ND		ng/l	2.00	0.396
Perfluorobutanesulfonic Acid (PFBS)	ND		ng/l	2.00	0.238
Perfluorohexanoic Acid (PFHxA)	ND		ng/l	2.00	0.328
Perfluoroheptanoic Acid (PFHpA)	ND		ng/l	2.00	0.225
Perfluorohexanesulfonic Acid (PFHxS)	ND		ng/l	2.00	0.376
Perfluorooctanoic Acid (PFOA)	ND		ng/l	2.00	0.236
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND		ng/l	2.00	1.33
Perfluoroheptanesulfonic Acid (PFHpS)	ND		ng/l	2.00	0.688
Perfluorononanoic Acid (PFNA)	ND		ng/l	2.00	0.312
Perfluorooctanesulfonic Acid (PFOS)	ND		ng/l	2.00	0.504
Perfluorodecanoic Acid (PFDA)	ND		ng/l	2.00	0.304
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND		ng/l	2.00	1.21
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND		ng/l	2.00	0.648
Perfluoroundecanoic Acid (PFUnA)	ND		ng/l	2.00	0.260
Perfluorodecanesulfonic Acid (PFDS)	ND		ng/l	2.00	0.980
Perfluorooctanesulfonamide (FOSA)	ND		ng/l	2.00	0.580
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND		ng/l	2.00	0.804
Perfluorododecanoic Acid (PFDoA)	ND		ng/l	2.00	0.372
Perfluorotridecanoic Acid (PFTrDA)	ND		ng/l	2.00	0.327
Perfluorotetradecanoic Acid (PFTA)	ND		ng/l	2.00	0.248
PFOA/PFOS, Total	ND		ng/l	2.00	0.236

Project Name: BENCH SCALE TEST
Project Number: BENCH SCALE TEST
Lab Number: L2145703
Report Date: 09/09/21

Method Blank Analysis
Batch Quality Control

Analytical Method: 134,LCMSMS-ID
Analytical Date: 08/28/21 17:06
Analyst: MP

Extraction Method: ALPHA 23528
Extraction Date: 08/27/21 08:50

Parameter	Result	Qualifier	Units	RL	MDL
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab for sample(s): 02 Batch: WG1539834-1					

Surrogate (Extracted Internal Standard)	%Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	107		58-132
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	113		62-163
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	110		70-131
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	109		57-129
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	109		60-129
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	111		71-134
Perfluoro[13C8]Octanoic Acid (M8PFOA)	105		62-129
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	131		14-147
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	102		59-139
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	110		69-131
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	105		62-124
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	126		10-162
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	86		24-116
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	111		55-137
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	42		10-112
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	90		27-126
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	104		48-131
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	85		22-136

Project Name: BENCH SCALE TEST
Project Number: BENCH SCALE TEST
Lab Number: L2145703
Report Date: 09/09/21

Method Blank Analysis
Batch Quality Control

Analytical Method: 134,LCMSMS-ID
Analytical Date: 09/01/21 18:23
Analyst: SG

Extraction Method: ALPHA 23528
Extraction Date: 08/27/21 08:50

Parameter	Result	Qualifier	Units	RL	MDL
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab for sample(s): 02 Batch: WG1539834-1					
Perfluorooctanesulfonamide (FOSA)	ND		ng/l	2.00	0.580

Surrogate (Extracted Internal Standard)	%Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	91		10-112

Project Name: BENCH SCALE TEST
Project Number: BENCH SCALE TEST
Lab Number: L2145703
Report Date: 09/09/21

Method Blank Analysis
Batch Quality Control

Analytical Method: 134,LCMSMS-ID
Analytical Date: 08/30/21 17:48
Analyst: RS

Extraction Method: ALPHA 23528
Extraction Date: 08/30/21 07:20

Parameter	Result	Qualifier	Units	RL	MDL
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab for sample(s): 02 Batch: WG1540526-1					
Perfluorobutanoic Acid (PFBA)	ND		ng/l	2.00	0.408
Perfluoropentanoic Acid (PFPeA)	ND		ng/l	2.00	0.396
Perfluorobutanesulfonic Acid (PFBS)	ND		ng/l	2.00	0.238
Perfluorohexanoic Acid (PFHxA)	ND		ng/l	2.00	0.328
Perfluoroheptanoic Acid (PFHpA)	ND		ng/l	2.00	0.225
Perfluorohexanesulfonic Acid (PFHxS)	ND		ng/l	2.00	0.376
Perfluorooctanoic Acid (PFOA)	ND		ng/l	2.00	0.236
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND		ng/l	2.00	1.33
Perfluoroheptanesulfonic Acid (PFHpS)	ND		ng/l	2.00	0.688
Perfluorononanoic Acid (PFNA)	ND		ng/l	2.00	0.312
Perfluorooctanesulfonic Acid (PFOS)	ND		ng/l	2.00	0.504
Perfluorodecanoic Acid (PFDA)	ND		ng/l	2.00	0.304
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND		ng/l	2.00	1.21
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND		ng/l	2.00	0.648
Perfluoroundecanoic Acid (PFUnA)	ND		ng/l	2.00	0.260
Perfluorodecanesulfonic Acid (PFDS)	ND		ng/l	2.00	0.980
Perfluorooctanesulfonamide (FOSA)	ND		ng/l	2.00	0.580
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND		ng/l	2.00	0.804
Perfluorododecanoic Acid (PFDoA)	ND		ng/l	2.00	0.372
Perfluorotridecanoic Acid (PFTrDA)	ND		ng/l	2.00	0.327
Perfluorotetradecanoic Acid (PFTA)	ND		ng/l	2.00	0.248
PFOA/PFOS, Total	ND		ng/l	2.00	0.236

Project Name: BENCH SCALE TEST
Project Number: BENCH SCALE TEST
Lab Number: L2145703
Report Date: 09/09/21

Method Blank Analysis
Batch Quality Control

Analytical Method: 134,LCMSMS-ID
Analytical Date: 08/30/21 17:48
Analyst: RS

Extraction Method: ALPHA 23528
Extraction Date: 08/30/21 07:20

Parameter	Result	Qualifier	Units	RL	MDL
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab for sample(s): 02 Batch: WG1540526-1					

Surrogate (Extracted Internal Standard)	%Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	104		58-132
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	116		62-163
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	103		70-131
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	102		57-129
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	104		60-129
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	106		71-134
Perfluoro[13C8]Octanoic Acid (M8PFOA)	101		62-129
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	115		14-147
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	107		59-139
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	105		69-131
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	101		62-124
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	111		10-162
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	89		24-116
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	105		55-137
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	44		10-112
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	82		27-126
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	100		48-131
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	82		22-136

Project Name: BENCH SCALE TEST
Project Number: BENCH SCALE TEST
Lab Number: L2145703
Report Date: 09/09/21

Method Blank Analysis
Batch Quality Control

Analytical Method: 134,LCMSMS-ID
Analytical Date: 09/01/21 01:19
Analyst: SG

Extraction Method: ALPHA 23528
Extraction Date: 08/31/21 09:32

Parameter	Result	Qualifier	Units	RL	MDL
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab for sample(s): 01 Batch: WG1541092-1					
Perfluorobutanoic Acid (PFBA)	ND		ng/g	0.500	0.023
Perfluoropentanoic Acid (PFPeA)	ND		ng/g	0.500	0.046
Perfluorobutanesulfonic Acid (PFBS)	ND		ng/g	0.250	0.039
Perfluorohexanoic Acid (PFHxA)	ND		ng/g	0.500	0.053
Perfluoroheptanoic Acid (PFHpA)	ND		ng/g	0.250	0.045
Perfluorohexanesulfonic Acid (PFHxS)	ND		ng/g	0.250	0.061
Perfluorooctanoic Acid (PFOA)	0.048	J	ng/g	0.250	0.042
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND		ng/g	0.500	0.180
Perfluoroheptanesulfonic Acid (PFHpS)	ND		ng/g	0.500	0.136
Perfluorononanoic Acid (PFNA)	ND		ng/g	0.250	0.075
Perfluorooctanesulfonic Acid (PFOS)	ND		ng/g	0.250	0.130
Perfluorodecanoic Acid (PFDA)	ND		ng/g	0.250	0.067
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND		ng/g	0.500	0.287
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND		ng/g	0.500	0.202
Perfluoroundecanoic Acid (PFUnA)	ND		ng/g	0.500	0.047
Perfluorodecanesulfonic Acid (PFDS)	ND		ng/g	0.500	0.153
Perfluorooctanesulfonamide (FOSA)	ND		ng/g	0.500	0.098
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND		ng/g	0.500	0.085
Perfluorododecanoic Acid (PFDoA)	ND		ng/g	0.500	0.070
Perfluorotridecanoic Acid (PFTrDA)	ND		ng/g	0.500	0.204
Perfluorotetradecanoic Acid (PFTA)	ND		ng/g	0.500	0.054
PFOA/PFOS, Total	0.048	J	ng/g	0.250	0.042

Project Name: BENCH SCALE TEST
Project Number: BENCH SCALE TEST
Lab Number: L2145703
Report Date: 09/09/21

Method Blank Analysis
Batch Quality Control

Analytical Method: 134,LCMSMS-ID
Analytical Date: 09/01/21 01:19
Analyst: SG

Extraction Method: ALPHA 23528
Extraction Date: 08/31/21 09:32

Parameter	Result	Qualifier	Units	RL	MDL
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab for sample(s): 01 Batch: WG1541092-1					

Surrogate (Extracted Internal Standard)	%Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	96		61-135
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	93		58-150
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	99		74-139
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	98		66-128
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	99		71-129
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	104		78-139
Perfluoro[13C8]Octanoic Acid (M8PFOA)	99		75-130
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	65		20-154
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	104		72-140
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	108		79-136
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	100		75-130
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	74		19-175
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	79		31-134
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	106		61-155
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	66		10-117
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	76		34-137
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	101		54-150
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	87		24-159

Lab Control Sample Analysis

Batch Quality Control

Project Name: BENCH SCALE TEST

Project Number: BENCH SCALE TEST

Lab Number: L2145703

Report Date: 09/09/21

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 02 Batch: WG1539834-2								
Perfluorobutanoic Acid (PFBA)	94		-		67-148	-		30
Perfluoropentanoic Acid (PFPeA)	92		-		63-161	-		30
Perfluorobutanesulfonic Acid (PFBS)	93		-		65-157	-		30
Perfluorohexanoic Acid (PFHxA)	94		-		69-168	-		30
Perfluoroheptanoic Acid (PFHpA)	93		-		58-159	-		30
Perfluorohexanesulfonic Acid (PFHxS)	94		-		69-177	-		30
Perfluorooctanoic Acid (PFOA)	98		-		63-159	-		30
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	105		-		49-187	-		30
Perfluoroheptanesulfonic Acid (PFHpS)	98		-		61-179	-		30
Perfluorononanoic Acid (PFNA)	93		-		68-171	-		30
Perfluorooctanesulfonic Acid (PFOS)	104		-		52-151	-		30
Perfluorodecanoic Acid (PFDA)	95		-		63-171	-		30
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	106		-		56-173	-		30
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	109		-		60-166	-		30
Perfluoroundecanoic Acid (PFUnA)	92		-		60-153	-		30
Perfluorodecanesulfonic Acid (PFDS)	94		-		38-156	-		30
Perfluorooctanesulfonamide (FOSA)	95		-		46-170	-		30
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	85		-		45-170	-		30
Perfluorododecanoic Acid (PFDoA)	94		-		67-153	-		30
Perfluorotridecanoic Acid (PFTrDA)	114		-		48-158	-		30
Perfluorotetradecanoic Acid (PFTA)	98		-		59-182	-		30

Lab Control Sample Analysis

Batch Quality Control

Project Name: BENCH SCALE TEST
Project Number: BENCH SCALE TEST

Lab Number: L2145703
Report Date: 09/09/21

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits

Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 02 Batch: WG1539834-2

Surrogate (Extracted Internal Standard)	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	108				58-132
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	113				62-163
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	109				70-131
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	110				57-129
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	110				60-129
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	110				71-134
Perfluoro[13C8]Octanoic Acid (M8PFOA)	104				62-129
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	129				14-147
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	104				59-139
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	107				69-131
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	102				62-124
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	134				10-162
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	84				24-116
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	106				55-137
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	23				10-112
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	94				27-126
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	102				48-131
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	77				22-136

Lab Control Sample Analysis

Batch Quality Control

Project Name: BENCH SCALE TEST
Project Number: BENCH SCALE TEST

Lab Number: L2145703
Report Date: 09/09/21

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 02 Batch: WG1539834-2								
Perfluorooctanesulfonamide (FOSA)	86		-		46-170	-		30

Surrogate (Extracted Internal Standard)	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	91				10-112

Lab Control Sample Analysis

Batch Quality Control

Project Name: BENCH SCALE TEST

Project Number: BENCH SCALE TEST

Lab Number: L2145703

Report Date: 09/09/21

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 02 Batch: WG1540526-2								
Perfluorobutanoic Acid (PFBA)	101		-		67-148	-		30
Perfluoropentanoic Acid (PFPeA)	98		-		63-161	-		30
Perfluorobutanesulfonic Acid (PFBS)	98		-		65-157	-		30
Perfluorohexanoic Acid (PFHxA)	98		-		69-168	-		30
Perfluoroheptanoic Acid (PFHpA)	98		-		58-159	-		30
Perfluorohexanesulfonic Acid (PFHxS)	102		-		69-177	-		30
Perfluorooctanoic Acid (PFOA)	102		-		63-159	-		30
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	109		-		49-187	-		30
Perfluoroheptanesulfonic Acid (PFHpS)	99		-		61-179	-		30
Perfluorononanoic Acid (PFNA)	92		-		68-171	-		30
Perfluorooctanesulfonic Acid (PFOS)	105		-		52-151	-		30
Perfluorodecanoic Acid (PFDA)	98		-		63-171	-		30
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	106		-		56-173	-		30
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	99		-		60-166	-		30
Perfluoroundecanoic Acid (PFUnA)	100		-		60-153	-		30
Perfluorodecanesulfonic Acid (PFDS)	103		-		38-156	-		30
Perfluorooctanesulfonamide (FOSA)	94		-		46-170	-		30
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	100		-		45-170	-		30
Perfluorododecanoic Acid (PFDoA)	99		-		67-153	-		30
Perfluorotridecanoic Acid (PFTrDA)	121		-		48-158	-		30
Perfluorotetradecanoic Acid (PFTA)	104		-		59-182	-		30

Lab Control Sample Analysis

Batch Quality Control

Project Name: BENCH SCALE TEST

Project Number: BENCH SCALE TEST

Lab Number: L2145703

Report Date: 09/09/21

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 02 Batch: WG1540526-2								

Surrogate (Extracted Internal Standard)	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	110				58-132
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	123				62-163
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	116				70-131
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	110				57-129
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	108				60-129
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	116				71-134
Perfluoro[13C8]Octanoic Acid (M8PFOA)	107				62-129
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	128				14-147
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	114				59-139
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	119				69-131
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	110				62-124
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	130				10-162
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	100				24-116
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	114				55-137
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	59				10-112
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	92				27-126
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	110				48-131
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	95				22-136

Lab Control Sample Analysis
Batch Quality Control

Project Name: BENCH SCALE TEST
Project Number: BENCH SCALE TEST

Lab Number: L2145703
Report Date: 09/09/21

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 01 Batch: WG1541092-2								
Perfluorobutanoic Acid (PFBA)	94		-		71-135	-		30
Perfluoropentanoic Acid (PFPeA)	92		-		69-132	-		30
Perfluorobutanesulfonic Acid (PFBS)	94		-		72-128	-		30
Perfluorohexanoic Acid (PFHxA)	96		-		70-132	-		30
Perfluoroheptanoic Acid (PFHpA)	94		-		71-131	-		30
Perfluorohexanesulfonic Acid (PFHxS)	94		-		67-130	-		30
Perfluorooctanoic Acid (PFOA)	97		-		69-133	-		30
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	96		-		64-140	-		30
Perfluoroheptanesulfonic Acid (PFHpS)	95		-		70-132	-		30
Perfluorononanoic Acid (PFNA)	90		-		72-129	-		30
Perfluorooctanesulfonic Acid (PFOS)	101		-		68-136	-		30
Perfluorodecanoic Acid (PFDA)	92		-		69-133	-		30
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	110		-		65-137	-		30
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	95		-		63-144	-		30
Perfluoroundecanoic Acid (PFUnA)	95		-		64-136	-		30
Perfluorodecanesulfonic Acid (PFDS)	96		-		59-134	-		30
Perfluorooctanesulfonamide (FOSA)	94		-		67-137	-		30
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	101		-		61-139	-		30
Perfluorododecanoic Acid (PFDoA)	96		-		69-135	-		30
Perfluorotridecanoic Acid (PFTrDA)	112		-		66-139	-		30
Perfluorotetradecanoic Acid (PFTA)	94		-		69-133	-		30

Lab Control Sample Analysis

Batch Quality Control

Project Name: BENCH SCALE TEST
Project Number: BENCH SCALE TEST

Lab Number: L2145703
Report Date: 09/09/21

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits

Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 01 Batch: WG1541092-2

Surrogate (Extracted Internal Standard)	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	104				61-135
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	101				58-150
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	107				74-139
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	103				66-128
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	104				71-129
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	112				78-139
Perfluoro[13C8]Octanoic Acid (M8PFOA)	103				75-130
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	85				20-154
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	111				72-140
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	116				79-136
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	112				75-130
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	86				19-175
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	80				31-134
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	109				61-155
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	66				10-117
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	81				34-137
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	106				54-150
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	92				24-159

Matrix Spike Analysis

Batch Quality Control

Project Name: BENCH SCALE TEST

Project Number: BENCH SCALE TEST

Lab Number: L2145703

Report Date: 09/09/21

Parameter	*Native Sample*	*MS Added*	*MS Found*	*MS %Recovery*	*Qual*	*MSD Found*	*MSD %Recovery*	*Qual*	*Recovery Limits*	*RPD*	*Qual*	*RPD Limits*
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 02 QC Batch ID: WG1539834-3 QC Sample: L2145493-01 Client ID: MS Sample												
Perfluorobutanoic Acid (PFBA)	ND	38.5	36.8	96		-	-		67-148	-		30
Perfluoropentanoic Acid (PFPeA)	ND	38.5	36.2	94		-	-		63-161	-		30
Perfluorobutanesulfonic Acid (PFBS)	ND	34.2	32.9	96		-	-		65-157	-		30
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	ND	36	35.3	98		-	-		37-219	-		30
Perfluorohexanoic Acid (PFHxA)	ND	38.5	36.8	96		-	-		69-168	-		30
Perfluoropentanesulfonic Acid (PFPeS)	ND	36.2	35.8	99		-	-		52-156	-		30
Perfluoroheptanoic Acid (PFHpA)	ND	38.5	36.1	94		-	-		58-159	-		30
Perfluorohexanesulfonic Acid (PFHxS)	ND	35.2	33.0	94		-	-		69-177	-		30
Perfluorooctanoic Acid (PFOA)	ND	38.5	37.9	98		-	-		63-159	-		30
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND	36.7	39.5	108		-	-		49-187	-		30
Perfluoroheptanesulfonic Acid (PFHpS)	ND	36.7	36.0	98		-	-		61-179	-		30
Perfluorononanoic Acid (PFNA)	ND	38.5	36.7	95		-	-		68-171	-		30
Perfluorooctanesulfonic Acid (PFOS)	ND	35.8	37.5	105		-	-		52-151	-		30
Perfluorodecanoic Acid (PFDA)	ND	38.5	36.9	96		-	-		63-171	-		30
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND	37	37.0	100		-	-		56-173	-		30
Perfluorononanesulfonic Acid (PFNS)	ND	37.1	36.1	97		-	-		48-150	-		30
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND	38.5	36.3	94		-	-		60-166	-		30
Perfluoroundecanoic Acid (PFUnA)	ND	38.5	35.8	93		-	-		60-153	-		30
Perfluorodecanesulfonic Acid (PFDS)	ND	37.1	37.0	100		-	-		38-156	-		30
Perfluorooctanesulfonamide (FOSA)	ND	38.5	35.1	91		-	-		46-170	-		30
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND	38.5	35.7	93		-	-		45-170	-		30
Perfluorododecanoic Acid (PFDoA)	ND	38.5	37.3	97		-	-		67-153	-		30

Matrix Spike Analysis

Batch Quality Control

Project Name: BENCH SCALE TEST
Project Number: BENCH SCALE TEST
Lab Number: L2145703
Report Date: 09/09/21

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	Qual	MSD Found	MSD %Recovery	Qual	Recovery Limits	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 02 QC Batch ID: WG1539834-3 QC Sample: L2145493-01 Client ID: MS Sample												
Perfluorotridecanoic Acid (PFTrDA)	ND	38.5	41.9	109		-	-		48-158	-		30
Perfluorotetradecanoic Acid (PFTA)	ND	38.5	36.9	96		-	-		59-182	-		30

Surrogate (Extracted Internal Standard)	MS % Recovery	MS Qualifier	MSD % Recovery	MSD Qualifier	Acceptance Criteria
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	131				10-162
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	139				12-142
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	142				14-147
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	106				27-126
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	90				24-116
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	116				55-137
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	106				62-124
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	110				57-129
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	111				60-129
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	113				71-134
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	105				48-131
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	91				22-136
Perfluoro[13C4]Butanoic Acid (MPFBA)	110				58-132
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	110				62-163
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	44				10-112
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	114				69-131
Perfluoro[13C8]Octanoic Acid (M8PFOA)	106				62-129
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	105				59-139
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	110				70-131

Matrix Spike Analysis

Batch Quality Control

Project Name: BENCH SCALE TEST

Project Number: BENCH SCALE TEST

Lab Number: L2145703

Report Date: 09/09/21

Parameter	*Native Sample*	*MS Added*	*MS Found*	*MS %Recovery*	*Qual*	*MSD Found*	*MSD %Recovery*	*Qual*	*Recovery Limits*	*RPD*	*Qual*	*RPD Limits*
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 02 QC Batch ID: WG1540526-3 QC Sample: L2146282-02 Client ID: MS Sample												
Perfluorobutanoic Acid (PFBA)	16.2	37	52.7	99		-	-		67-148	-		30
Perfluoropentanoic Acid (PFPeA)	33.5	37	68.2	94		-	-		63-161	-		30
Perfluorobutanesulfonic Acid (PFBS)	35.0	32.9	66.9	97		-	-		65-157	-		30
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	ND	34.6	35.6	103		-	-		37-219	-		30
Perfluorohexanoic Acid (PFHxA)	30.0	37	66.3	98		-	-		69-168	-		30
Perfluoropentanesulfonic Acid (PFPeS)	0.933J	34.8	38.1	107		-	-		52-156	-		30
Perfluoroheptanoic Acid (PFHpA)	17.3	37	53.7	98		-	-		58-159	-		30
Perfluorohexanesulfonic Acid (PFHxS)	6.13	33.8	40.2	101		-	-		69-177	-		30
Perfluorooctanoic Acid (PFOA)	77.0	37	115	103		-	-		63-159	-		30
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND	35.2	36.4	103		-	-		49-187	-		30
Perfluoroheptanesulfonic Acid (PFHpS)	0.804J	35.2	37.3	104		-	-		61-179	-		30
Perfluorononanoic Acid (PFNA)	5.57	37	40.7	95		-	-		68-171	-		30
Perfluorooctanesulfonic Acid (PFOS)	24.8	34.4	61.8	108		-	-		52-151	-		30
Perfluorodecanoic Acid (PFDA)	0.288JF	37	37.9	102		-	-		63-171	-		30
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND	35.5	38.5	108		-	-		56-173	-		30
Perfluorononanesulfonic Acid (PFNS)	ND	35.6	34.6	97		-	-		48-150	-		30
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND	37	37.5	101		-	-		60-166	-		30
Perfluoroundecanoic Acid (PFUnA)	ND	37	37.2	100		-	-		60-153	-		30
Perfluorodecanesulfonic Acid (PFDS)	ND	35.7	34.4	96		-	-		38-156	-		30
Perfluorooctanesulfonamide (FOSA)	ND	37	34.3F	93		-	-		46-170	-		30
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND	37	35.2	95		-	-		45-170	-		30
Perfluorododecanoic Acid (PFDoA)	ND	37	38.1	103		-	-		67-153	-		30

Matrix Spike Analysis

Batch Quality Control

Project Name: BENCH SCALE TEST
Project Number: BENCH SCALE TEST

Lab Number: L2145703
Report Date: 09/09/21

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	Qual	MSD Found	MSD %Recovery	Qual	Recovery Limits	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 02 QC Batch ID: WG1540526-3 QC Sample: L2146282-02 Client ID: MS Sample												
Perfluorotridecanoic Acid (PFTrDA)	ND	37	47.7	129		-	-		48-158	-		30
Perfluorotetradecanoic Acid (PFTA)	ND	37	37.6	102		-	-		59-182	-		30

Surrogate (Extracted Internal Standard)	MS % Recovery	MS Qualifier	MSD % Recovery	MSD Qualifier	Acceptance Criteria
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	105				10-162
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	**146**	Q			12-142
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	122				14-147
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	56				27-126
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	52				24-116
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	81				55-137
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	78				62-124
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	73				57-129
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	75				60-129
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	111				71-134
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	79				48-131
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	77				22-136
Perfluoro[13C4]Butanoic Acid (MPFBA)	73				58-132
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	72				62-163
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	11				10-112
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	108				69-131
Perfluoro[13C8]Octanoic Acid (M8PFOA)	75				62-129
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	83				59-139
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	110				70-131

Matrix Spike Analysis

Batch Quality Control

Project Name: BENCH SCALE TEST

Project Number: BENCH SCALE TEST

Lab Number: L2145703

Report Date: 09/09/21

Parameter	*Native Sample*	*MS Added*	*MS Found*	*MS %Recovery*	*Qual*	*MSD Found*	*MSD %Recovery*	*Qual*	*Recovery Limits*	*RPD*	*Qual*	*RPD Limits*
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1541092-3 QC Sample: L2145657-01 Client ID: MS Sample												
Perfluorobutanoic Acid (PFBA)	2.83	12.1	14.2	117		-	-		71-135	-		30
Perfluoropentanoic Acid (PFPeA)	2.05	12.1	12.5	103		-	-		69-132	-		30
Perfluorobutanesulfonic Acid (PFBS)	ND	10.8	10.3	96		-	-		72-128	-		30
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	ND	11.4	12.3	108		-	-		62-145	-		30
Perfluorohexanoic Acid (PFHxA)	0.544J	12.1	11.9	98		-	-		70-132	-		30
Perfluoropentanesulfonic Acid (PFPeS)	ND	11.4	11.3	99		-	-		73-123	-		30
Perfluoroheptanoic Acid (PFHpA)	0.338J	12.1	11.7	96		-	-		71-131	-		30
Perfluorohexanesulfonic Acid (PFHxS)	ND	11.1	10.4	94		-	-		67-130	-		30
Perfluorooctanoic Acid (PFOA)	0.604J	12.1	12.4	102		-	-		69-133	-		30
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND	11.6	11.4	99		-	-		64-140	-		30
Perfluoroheptanesulfonic Acid (PFHpS)	ND	11.6	11.1	96		-	-		70-132	-		30
Perfluorononanoic Acid (PFNA)	0.196J	12.1	11.3	93		-	-		72-129	-		30
Perfluorooctanesulfonic Acid (PFOS)	0.787F	11.3	12.2	108		-	-		68-136	-		30
Perfluorodecanoic Acid (PFDA)	ND	12.1	11.5	95		-	-		69-133	-		30
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND	11.7	12.0	103		-	-		65-137	-		30
Perfluorononanesulfonic Acid (PFNS)	ND	11.7	11.3	97		-	-		69-125	-		30
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND	12.1	13.7	113		-	-		63-144	-		30
Perfluoroundecanoic Acid (PFUnA)	ND	12.1	11.8	97		-	-		64-136	-		30
Perfluorodecanesulfonic Acid (PFDS)	ND	11.7	11.0	94		-	-		59-134	-		30
Perfluorooctanesulfonamide (FOSA)	ND	12.1	11.0	91		-	-		67-137	-		30
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND	12.1	11.4	94		-	-		61-139	-		30
Perfluorododecanoic Acid (PFDoA)	ND	12.1	11.4	94		-	-		69-135	-		30

Matrix Spike Analysis

Batch Quality Control

Project Name: BENCH SCALE TEST
Project Number: BENCH SCALE TEST
Lab Number: L2145703
Report Date: 09/09/21

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	Qual	MSD Found	MSD %Recovery	Qual	Recovery Limits	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1541092-3 QC Sample: L2145657-01 Client ID: MS Sample												
Perfluorotridecanoic Acid (PFTrDA)	ND	12.1	12.2	100		-	-		66-139	-		30
Perfluorotetradecanoic Acid (PFTA)	ND	12.1	12.0	99		-	-		69-133	-		30
2,3,3,3-Tetrafluoro-2-[1,1,2,2,3,3,3-Heptafluoropropoxy]-Propanoic Acid (HFPO-DA)	ND	118	176F	149		-	-		41-165	-		30
4,8-Dioxa-3h-Perfluorononanoic Acid (ADONA)	ND	11.5	9.83	86		-	-		68-143	-		30
Perfluorohexadecanoic Acid (PFHxDA)	ND	12.1	16.4	135		-	-		18-191	-		30
Perfluorooctadecanoic Acid (PFODA)	ND	12.1	11.5	95		-	-		10-123	-		30

Surrogate (Extracted Internal Standard)	MS % Recovery	MS Qualifier	MSD % Recovery	MSD Qualifier	Acceptance Criteria
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	**366**	Q			19-175
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	**267**	Q			14-167
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	**371**	Q			20-154
2,3,3,3-Tetrafluoro-2-[1,1,2,2,3,3,3-Heptafluoropropoxy]-13C3-Propanoic Acid (M3HFPO-DA)	182				10-203
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	**188**	Q			34-137
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	128				31-134
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	109				61-155
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	111				75-130
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	92				66-128
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	94				71-129
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	112				78-139
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	109				54-150
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	113				24-159
Perfluoro[13C2]Hexadecanoic Acid (M2PFHxDA)	90				10-145

Matrix Spike Analysis

Batch Quality Control

Project Name: BENCH SCALE TEST

Project Number: BENCH SCALE TEST

Lab Number: L2145703

Report Date: 09/09/21

Parameter	*Native Sample*	*MS Added*	*MS Found*	*MS %Recovery*	*Qual*	*MSD Found*	*MSD %Recovery*	*Qual*	*Recovery Limits*	*RPD*	*Qual*	*RPD Limits*
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1541092-3 QC Sample: L2145657-01 Client ID: MS Sample												

Surrogate (Extracted Internal Standard)	*MS % Recovery*	*MS Qualifier*	*MSD % Recovery*	*MSD Qualifier*	*Acceptance Criteria*
Perfluoro[13C4]Butanoic Acid (MPFBA)	103				61-135
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	97				58-150
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	65				10-117
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	118				79-136
Perfluoro[13C8]Octanoic Acid (M8PFOA)	107				75-130
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	121				72-140
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	111				74-139

Lab Duplicate Analysis
Batch Quality Control

Project Name: BENCH SCALE TEST
Project Number: BENCH SCALE TEST

Lab Number: L2145703
Report Date: 09/09/21

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 02 QC Batch ID: WG1539834-4 QC Sample: L2145698-01 Client ID: DUP Sample						
Perfluorobutanoic Acid (PFBA)	4.75	4.44	ng/l	7		30
Perfluoropentanoic Acid (PFPeA)	4.33	4.14	ng/l	4		30
Perfluorobutanesulfonic Acid (PFBS)	5.06	4.77	ng/l	6		30
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	ND	ND	ng/l	NC		30
Perfluorohexanoic Acid (PFHxA)	4.78	4.71	ng/l	1		30
Perfluoropentanesulfonic Acid (PFPeS)	0.238J	ND	ng/l	NC		30
Perfluoroheptanoic Acid (PFHpA)	5.15	4.90	ng/l	5		30
Perfluorohexanesulfonic Acid (PFHxS)	1.74J	1.83J	ng/l	NC		30
Perfluorooctanoic Acid (PFOA)	28.1	27.1	ng/l	4		30
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND	ND	ng/l	NC		30
Perfluoroheptanesulfonic Acid (PFHpS)	ND	ND	ng/l	NC		30
Perfluorononanoic Acid (PFNA)	1.32J	1.30J	ng/l	NC		30
Perfluorooctanesulfonic Acid (PFOS)	17.0	17.6	ng/l	3		30
Perfluorodecanoic Acid (PFDA)	1.66J	1.54J	ng/l	NC		30
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND	ND	ng/l	NC		30
Perfluorononanesulfonic Acid (PFNS)	ND	ND	ng/l	NC		30
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND	ND	ng/l	NC		30
Perfluoroundecanoic Acid (PFUnA)	ND	ND	ng/l	NC		30
Perfluorodecanesulfonic Acid (PFDS)	ND	ND	ng/l	NC		30
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND	ND	ng/l	NC		30

Lab Duplicate Analysis
Batch Quality Control

Project Name: BENCH SCALE TEST
Project Number: BENCH SCALE TEST

Lab Number: L2145703
Report Date: 09/09/21

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 02 QC Batch ID: WG1539834-4 QC Sample: L2145698-01 Client ID: DUP Sample						
Perfluorododecanoic Acid (PFDoA)	ND	ND	ng/l	NC		30
Perfluorotridecanoic Acid (PFTrDA)	ND	ND	ng/l	NC		30
Perfluorotetradecanoic Acid (PFTA)	ND	ND	ng/l	NC		30

Surrogate (Extracted Internal Standard)	%Recovery	Qualifier	%Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	72		67		58-132
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	67		64		62-163
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	102		99		70-131
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	**155**	Q	**143**	Q	12-142
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	72		64		57-129
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	73		66		60-129
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	104		99		71-134
Perfluoro[13C8]Octanoic Acid (M8PFOA)	72		65		62-129
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	133		126		14-147
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	72		63		59-139
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	106		100		69-131
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	77		64		62-124
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	132		114		10-162
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	51		50		24-116
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	82		72		55-137
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	56		46		27-126
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	79		69		48-131
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	68		57		22-136

Lab Duplicate Analysis
Batch Quality Control

Project Name: BENCH SCALE TEST
Project Number: BENCH SCALE TEST

Lab Number: L2145703
Report Date: 09/09/21

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 02 QC Batch ID: WG1539834-4 QC Sample: L2145698-01 Client ID: DUP Sample						
Perfluorooctanesulfonamide (FOSA)	ND	ND	ng/l	NC		30

Surrogate (Extracted Internal Standard)	%Recovery	Qualifier	%Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	95		87		10-112

Lab Duplicate Analysis
Batch Quality Control

Project Name: BENCH SCALE TEST
Project Number: BENCH SCALE TEST

Lab Number: L2145703
Report Date: 09/09/21

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 02 QC Batch ID: WG1540526-4 QC Sample: L2146282-03 Client ID: DUP Sample						
Perfluorobutanoic Acid (PFBA)	8.37	8.16	ng/l	3		30
Perfluoropentanoic Acid (PFPeA)	10.6	10.5	ng/l	1		30
Perfluorobutanesulfonic Acid (PFBS)	7.41	7.28	ng/l	2		30
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	ND	ND	ng/l	NC		30
Perfluorohexanoic Acid (PFHxA)	12.3	12.4	ng/l	1		30
Perfluoropentanesulfonic Acid (PFPeS)	0.450J	0.314J	ng/l	NC		30
Perfluoroheptanoic Acid (PFHpA)	8.71	8.62	ng/l	1		30
Perfluorohexanesulfonic Acid (PFHxS)	2.75	2.73	ng/l	1		30
Perfluorooctanoic Acid (PFOA)	58.5	57.2	ng/l	2		30
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND	ND	ng/l	NC		30
Perfluoroheptanesulfonic Acid (PFHpS)	ND	ND	ng/l	NC		30
Perfluorononanoic Acid (PFNA)	2.01	2.07	ng/l	3		30
Perfluorooctanesulfonic Acid (PFOS)	20.5	20.9	ng/l	2		30
Perfluorodecanoic Acid (PFDA)	0.539J	0.512J	ng/l	NC		30
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND	ND	ng/l	NC		30
Perfluorononanesulfonic Acid (PFNS)	ND	ND	ng/l	NC		30
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND	ND	ng/l	NC		30
Perfluoroundecanoic Acid (PFUnA)	ND	ND	ng/l	NC		30
Perfluorodecanesulfonic Acid (PFDS)	ND	ND	ng/l	NC		30
Perfluorooctanesulfonamide (FOSA)	ND	ND	ng/l	NC		30

Lab Duplicate Analysis
Batch Quality Control

Project Name: BENCH SCALE TEST
Project Number: BENCH SCALE TEST

Lab Number: L2145703
Report Date: 09/09/21

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 02 QC Batch ID: WG1540526-4 QC Sample: L2146282-03 Client ID: DUP Sample						
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND	ND	ng/l	NC		30
Perfluorododecanoic Acid (PFDoA)	ND	ND	ng/l	NC		30
Perfluorotridecanoic Acid (PFTrDA)	ND	ND	ng/l	NC		30
Perfluorotetradecanoic Acid (PFTA)	ND	ND	ng/l	NC		30

Surrogate (Extracted Internal Standard)	%Recovery	Qualifier	%Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	73		78		58-132
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	75		81		62-163
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	109		113		70-131
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	83		87		12-142
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	72		80		57-129
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	70		80		60-129
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	112		115		71-134
Perfluoro[13C8]Octanoic Acid (M8PFOA)	68		78		62-129
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	85		85		14-147
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	76		85		59-139
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	106		112		69-131
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	77		84		62-124
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	93		93		10-162
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	55		61		24-116
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	81		89		55-137
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	15		11		10-112
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	52		60		27-126
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	76		88		48-131

Lab Duplicate Analysis
Batch Quality Control

Project Name: BENCH SCALE TEST
Project Number: BENCH SCALE TEST

Lab Number: L2145703
Report Date: 09/09/21

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits

Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 02 QC Batch ID: WG1540526-4 QC Sample: L2146282-03 Client ID: DUP Sample

Surrogate (Extracted Internal Standard)	%Recovery	Qualifier	%Recovery	Qualifier	Acceptance Criteria
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	75		73		22-136

Lab Duplicate Analysis
Batch Quality Control

Project Name: BENCH SCALE TEST
Project Number: BENCH SCALE TEST

Lab Number: L2145703
Report Date: 09/09/21

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1541092-4 QC Sample: L2145703-01 Client ID: SD-RACKCOG-08252021						
Perfluorobutanoic Acid (PFBA)	ND	ND	ng/g	NC		30
Perfluoropentanoic Acid (PFPeA)	ND	ND	ng/g	NC		30
Perfluorobutanesulfonic Acid (PFBS)	ND	ND	ng/g	NC		30
Perfluorohexanoic Acid (PFHxA)	ND	ND	ng/g	NC		30
Perfluoroheptanoic Acid (PFHpA)	ND	ND	ng/g	NC		30
Perfluorohexanesulfonic Acid (PFHxS)	ND	ND	ng/g	NC		30
Perfluorooctanoic Acid (PFOA)	ND	ND	ng/g	NC		30
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND	ND	ng/g	NC		30
Perfluoroheptanesulfonic Acid (PFHpS)	ND	ND	ng/g	NC		30
Perfluorononanoic Acid (PFNA)	ND	ND	ng/g	NC		30
Perfluorooctanesulfonic Acid (PFOS)	ND	ND	ng/g	NC		30
Perfluorodecanoic Acid (PFDA)	ND	ND	ng/g	NC		30
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND	ND	ng/g	NC		30
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND	ND	ng/g	NC		30
Perfluoroundecanoic Acid (PFUnA)	ND	ND	ng/g	NC		30
Perfluorodecanesulfonic Acid (PFDS)	ND	ND	ng/g	NC		30
Perfluorooctanesulfonamide (FOSA)	ND	ND	ng/g	NC		30
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND	ND	ng/g	NC		30
Perfluorododecanoic Acid (PFDoA)	ND	ND	ng/g	NC		30
Perfluorotridecanoic Acid (PFTrDA)	ND	ND	ng/g	NC		30

Lab Duplicate Analysis
Batch Quality Control

Project Name: BENCH SCALE TEST
Project Number: BENCH SCALE TEST

Lab Number: L2145703
Report Date: 09/09/21

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1541092-4 QC Sample: L2145703-01 Client ID: SD-RACKCOG-08252021						
Perfluorotetradecanoic Acid (PFTA)	ND	ND	ng/g	NC		30

Surrogate (Extracted Internal Standard)	%Recovery	Qualifier	%Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	97		101		61-135
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	98		104		58-150
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	101		107		74-139
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	83		87		66-128
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	99		104		71-129
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	103		112		78-139
Perfluoro[13C8]Octanoic Acid (M8PFOA)	96		101		75-130
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	**195**	Q	**193**	Q	20-154
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	96		99		72-140
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	107		110		79-136
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	101		108		75-130
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	138		144		19-175
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	106		116		31-134
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	105		115		61-155
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	42		45		10-117
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	117		125		34-137
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	100		105		54-150
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	85		95		24-159

INORGANICS
&
MISCELLANEOUS

Project Name: BENCH SCALE TEST
Project Number: BENCH SCALE TEST

Lab Number: L2145703
Report Date: 09/09/21

SAMPLE RESULTS

Lab ID: L2145703-01
Client ID: SD-RACKCOG-08252021
Sample Location: Not Specified

Date Collected: 08/25/21 13:05
Date Received: 08/25/21
Field Prep: Not Specified

Sample Depth:
Matrix: Solid

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Mansfield Lab										
Solids, Total	33.9		%	0.100	0.100	1	-	09/01/21 11:51	121,2540G	NB

Lab Duplicate Analysis

Batch Quality Control

Project Name: BENCH SCALE TEST
Project Number: BENCH SCALE TEST

Lab Number: L2145703
Report Date: 09/09/21

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
General Chemistry - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1541732-1 QC Sample: L2145043-03 Client ID: DUP Sample						
Solids, Total	69.1	67.3	%	3		10

Project Name: BENCH SCALE TEST
Project Number: BENCH SCALE TEST

Lab Number: L2145703
Report Date: 09/09/21

Sample Receipt and Container Information

Were project specific reporting limits specified? YES

Cooler Information

Cooler	Custody Seal
A	Absent

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L2145703-01A	Plastic 8oz unpreserved	A	NA		4.9	Y	Absent		A2-NY-537-ISOTOPE(14)
L2145703-01B	Plastic 2oz unpreserved for TS	A	NA		4.9	Y	Absent		A2-TS(7)
L2145703-02A	Plastic 250ml unpreserved	A	NA		4.9	Y	Absent		A2-NY-537-ISOTOPE(14)
L2145703-02B	Plastic 250ml unpreserved	A	NA		4.9	Y	Absent		A2-NY-537-ISOTOPE(14)

*Values in parentheses indicate holding time in days

Project Name: BENCH SCALE TEST
Project Number: BENCH SCALE TEST

Lab Number: L2145703
Report Date: 09/09/21

PFAS PARAMETER SUMMARY

Parameter	Acronym	CAS Number
PERFLUOROALKYL CARBOXYLIC ACIDS (PFCAs)		
Perfluorooctadecanoic Acid	PFODA	16517-11-6
Perfluorohexadecanoic Acid	PFHxDA	67905-19-5
Perfluorotetradecanoic Acid	PFTA	376-06-7
Perfluorotridecanoic Acid	PFTrDA	72629-94-8
Perfluorododecanoic Acid	PFDoA	307-55-1
Perfluoroundecanoic Acid	PFUnA	2058-94-8
Perfluorodecanoic Acid	PFDA	335-76-2
Perfluorononanoic Acid	PFNA	375-95-1
Perfluorooctanoic Acid	PFOA	335-67-1
Perfluoroheptanoic Acid	PFHpA	375-85-9
Perfluorohexanoic Acid	PFHxA	307-24-4
Perfluoropentanoic Acid	PFPeA	2706-90-3
Perfluorobutanoic Acid	PFBA	375-22-4
PERFLUOROALKYL SULFONIC ACIDS (PFSAs)		
Perfluorododecanesulfonic Acid	PFDoDS	79780-39-5
Perfluorodecanesulfonic Acid	PFDS	335-77-3
Perfluorononanesulfonic Acid	PFNS	68259-12-1
Perfluorooctanesulfonic Acid	PFOS	1763-23-1
Perfluoroheptanesulfonic Acid	PFHpS	375-92-8
Perfluorohexanesulfonic Acid	PFHxS	355-46-4
Perfluoropentanesulfonic Acid	PFPeS	2706-91-4
Perfluorobutanesulfonic Acid	PFBS	375-73-5
FLUOROTELOMERS		
1H,1H,2H,2H-Perfluorododecanesulfonic Acid	10:2FTS	120226-60-0
1H,1H,2H,2H-Perfluorodecanesulfonic Acid	8:2FTS	39108-34-4
1H,1H,2H,2H-Perfluorooctanesulfonic Acid	6:2FTS	27619-97-2
1H,1H,2H,2H-Perfluorohexanesulfonic Acid	4:2FTS	757124-72-4
PERFLUOROALKANE SULFONAMIDES (FASAs)		
Perfluorooctanesulfonamide	FOSA	754-91-6
N-Ethyl Perfluorooctane Sulfonamide	NEtFOSA	4151-50-2
N-Methyl Perfluorooctane Sulfonamide	NMeFOSA	31506-32-8
PERFLUOROALKANE SULFONYL SUBSTANCES		
N-Ethyl Perfluorooctanesulfonamido Ethanol	NEtFOSE	1691-99-2
N-Methyl Perfluorooctanesulfonamido Ethanol	NMeFOSE	24448-09-7
N-Ethyl Perfluorooctanesulfonamidoacetic Acid	NEtFOSAA	2991-50-6
N-Methyl Perfluorooctanesulfonamidoacetic Acid	NMeFOSAA	2355-31-9
PER- and POLYFLUOROALKYL ETHER CARBOXYLIC ACIDS		
2,3,3,3-Tetrafluoro-2-[1,1,2,2,3,3,3-Heptafluoropropoxy]-Propanoic Acid	HFPO-DA	13252-13-6
4,8-Dioxa-3h-Perfluorononanoic Acid	ADONA	919005-14-4
CHLORO-PERFLUOROALKYL SULFONIC ACIDS		
11-Chloroeicosafluoro-3-Oxaundecane-1-Sulfonic Acid	11Cl-PF3OUdS	763051-92-9
9-Chlorohexadecafluoro-3-Oxanone-1-Sulfonic Acid	9Cl-PF3ONS	756426-58-1
PERFLUOROETHER SULFONIC ACIDS (PFESAs)		
Perfluoro(2-Ethoxyethane)Sulfonic Acid	PFEESA	113507-82-7
PERFLUOROETHER/POLYETHER CARBOXYLIC ACIDS (PFPCAs)		
Perfluoro-3-Methoxypropanoic Acid	PFMPA	377-73-1
Perfluoro-4-Methoxybutanoic Acid	PFMBA	863090-89-5
Nonafluoro-3,6-Dioxaheptanoic Acid	NFDHA	151772-58-6

Project Name:	BENCH SCALE TEST	**Lab Number:**	L2145703
Project Number:	BENCH SCALE TEST	**Report Date:**	09/09/21

GLOSSARY

Acronyms

DL	- Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the limit of quantitation (LOQ). The DL includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
EDL	- Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).
EMPC	- Estimated Maximum Possible Concentration: The concentration that results from the signal present at the retention time of an analyte when the ions meet all of the identification criteria except the ion abundance ratio criteria. An EMPC is a worst-case estimate of the concentration.
EPA	- Environmental Protection Agency.
LCS	- Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LCSD	- Laboratory Control Sample Duplicate: Refer to LCS.
LFB	- Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LOD	- Limit of Detection: This value represents the level to which a target analyte can reliably be detected for a specific analyte in a specific matrix by a specific method. The LOD includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
LOQ	- Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.) Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
MDL	- Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
MS	- Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available. For Method 332.0, the spike recovery is calculated using the native concentration, including estimated values.
MSD	- Matrix Spike Sample Duplicate: Refer to MS.
NA	- Not Applicable.
NC	- Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.
NDPA/DPA	- N-Nitrosodiphenylamine/Diphenylamine.
NI	- Not Ignitable.
NP	- Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.
NR	- No Results: Term is utilized when 'No Target Compounds Requested' is reported for the analysis of Volatile or Semivolatile Organic TIC only requests.
RL	- Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
RPD	- Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.
SRM	- Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.
STLP	- Semi-dynamic Tank Leaching Procedure per EPA Method 1315.
TEF	- Toxic Equivalency Factors: The values assigned to each dioxin and furan to evaluate their toxicity relative to 2,3,7,8-TCDD.
TEQ	- Toxic Equivalent: The measure of a sample's toxicity derived by multiplying each dioxin and furan by its corresponding TEF and then summing the resulting values.
TIC	- Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations.

Report Format: DU Report with 'J' Qualifiers

Project Name:	BENCH SCALE TEST	**Lab Number:**	L2145703
Project Number:	BENCH SCALE TEST	**Report Date:**	09/09/21

Footnotes

1 - The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

Terms

Analytical Method: Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

Difference: With respect to Total Oxidizable Precursor (TOP) Assay analysis, the difference is defined as the Post-Treatment value minus the Pre-Treatment value.

Final pH: As it pertains to Sample Receipt & Container Information section of the report, Final pH reflects pH of container determined after adjustment at the laboratory, if applicable. If no adjustment required, value reflects Initial pH.

Frozen Date/Time: With respect to Volatile Organics in soil, Frozen Date/Time reflects the date/time at which associated Reagent Water-preserved vials were initially frozen. Note: If frozen date/time is beyond 48 hours from sample collection, value will be reflected in 'bold'.

Initial pH: As it pertains to Sample Receipt & Container Information section of the report, Initial pH reflects pH of container determined upon receipt, if applicable.

PAH Total: With respect to Alkylated PAH analyses, the 'PAHs, Total' result is defined as the summation of results for all or a subset of the following compounds: Naphthalene, C1-C4 Naphthalenes, 2-Methylnaphthalene, 1-Methylnaphthalene, Biphenyl, Acenaphthylene, Acenaphthene, Fluorene, C1-C3 Fluorenes, Phenanthrene, C1-C4 Phenanthrenes/Anthracenes, Anthracene, Fluoranthene, Pyrene, C1-C4 Fluoranthenes/Pyrenes, Benz(a)anthracene, Chrysene, C1-C4 Chrysenes, Benzo(b)fluoranthene, Benzo(j)+(k)fluoranthene, Benzo(e)pyrene, Benzo(a)pyrene, Perylene, Indeno(1,2,3-cd)pyrene, Dibenz(ah)+(ac)anthracene, Benzo(g,h,i)perylene. If a 'Total' result is requested, the results of its individual components will also be reported.

PFAS Total: With respect to PFAS analyses, the 'PFAS, Total (5)' result is defined as the summation of results for: PFHpA, PFHxS, PFOA, PFNA and PFOS. In addition, the 'PFAS, Total (6)' result is defined as the summation of results for: PFHpA, PFHxS, PFOA, PFNA, PFDA and PFOS. For MassDEP DW compliance analysis only, the 'PFAS, Total (6)' result is defined as the summation of results at or above the RL. Note: If a 'Total' result is requested, the results of its individual components will also be reported.

The target compound Chlordane (CAS No. 57-74-9) is reported for GC ECD analyses. Per EPA,this compound "refers to a mixture of chlordane isomers, other chlorinated hydrocarbons and numerous other components." (Reference: USEPA Toxicological Review of Chlordane, In Support of Summary Information on the Integrated Risk Information System (IRIS), December 1997.)

Total: With respect to Organic analyses, a 'Total' result is defined as the summation of results for individual isomers or Aroclors. If a 'Total' result is requested, the results of its individual components will also be reported. This is applicable to 'Total' results for methods 8260, 8081 and 8082.

Data Qualifiers

A - Spectra identified as "Aldol Condensates" are byproducts of the extraction/concentration procedures when acetone is introduced in the process.

B - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).

C - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.

D - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.

E - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

F - The ratio of quantifier ion response to qualifier ion response falls outside of the laboratory criteria. Results are considered to be an estimated maximum concentration.

G - The concentration may be biased high due to matrix interferences (i.e, co-elution) with non-target compound(s). The result should be considered estimated.

H - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.

I - The lower value for the two columns has been reported due to obvious interference.

J - Estimated value. The Target analyte concentration is below the quantitation limit (RL), but above the Method Detection Limit (MDL) or Estimated Detection Limit (EDL) for SPME-related analyses. This represents an estimated concentration for Tentatively Identified Compounds (TICs).

M - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.

ND - Not detected at the method detection limit (MDL) for the sample, or estimated detection limit (EDL) for SPME-related analyses.

Report Format: DU Report with 'J' Qualifiers

Project Name:	BENCH SCALE TEST	**Lab Number:**	L2145703
Project Number:	BENCH SCALE TEST	**Report Date:**	09/09/21

Data Qualifiers

NJ - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.

P - The RPD between the results for the two columns exceeds the method-specified criteria.

Q - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)

R - Analytical results are from sample re-analysis.

RE - Analytical results are from sample re-extraction.

S - Analytical results are from modified screening analysis.

Project Name:	BENCH SCALE TEST	**Lab Number:**	L2145703
Project Number:	BENCH SCALE TEST	**Report Date:**	09/09/21

REFERENCES

121 Standard Methods for the Examination of Water and Wastewater. APHA-AWWA-WEF. Standard Methods Online.

134 Determination of Selected Perfluorinated Alkyl Acids in Drinking Water by Solid Phase Extraction and Liquid Chromatography/Tandem Mass Spectrometry (LC/MS/MS) using Isotope Dilution. Alpha SOP 23528.

LIMITATION OF LIABILITIES

Alpha Analytical performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical be held liable for any incidental, consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding time and splitting of samples in the field.

Certification Information

The following analytes are not included in our Primary NELAP Scope of Accreditation:

Westborough Facility
EPA 624/624.1: m/p-xylene, o-xylene, Naphthalene
EPA 625/625.1: alpha-Terpineol
EPA 8260C/8260D: NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene, Azobenzene; SCM: Iodomethane (methyl iodide), 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.
EPA 8270D/8270E: NPW: Dimethylnaphthalene,1,4-Diphenylhydrazine, alpha-Terpineol; SCM: Dimethylnaphthalene,1,4-Diphenylhydrazine.
SM4500: NPW: Amenable Cyanide; SCM: Total Phosphorus, TKN, NO2, NO3.

Mansfield Facility
SM 2540D: TSS
EPA 8082A: NPW: PCB: 1, 5, 31, 87,101, 110, 141, 151, 153, 180, 183, 187.
EPA TO-15: Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.
Biological Tissue Matrix: EPA 3050B

The following analytes are included in our Massachusetts DEP Scope of Accreditation

Westborough Facility:

Drinking Water
EPA 300.0: Chloride, Nitrate-N, Fluoride, Sulfate; **EPA 353.2**: Nitrate-N, Nitrite-N; **SM4500NO3-F**: Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE, EPA 180.1, SM2130B, SM4500Cl-D, SM2320B, SM2540C, SM4500H-B, SM4500NO2-B**
EPA 332: Perchlorate; **EPA 524.2:** THMs and VOCs; **EPA 504.1:** EDB, DBCP.
Microbiology: **SM9215B; SM9223-P/A, SM9223B-Colilert-QT,SM9222D**.

Non-Potable Water
SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2320B, SM4500CL-E, SM4500F-BC, SM4500NH3-BH: Ammonia-N and Kjeldahl-N, **EPA 350.1**: Ammonia-N, **LACHAT 10-107-06-1-B**: Ammonia-N, **EPA 351.1, SM4500NO3-F, EPA 353.2**: Nitrate-N, **SM4500P-E, SM4500P-B, E, SM4500SO4-E, SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, EPA 420.1, SM4500-CN-CE, SM2540D, EPA 300: Chloride, Sulfate, Nitrate.**
EPA 624.1: Volatile Halocarbons & Aromatics,
EPA 608.3: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs
EPA 625.1: SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045**: PCB-Oil.
Microbiology: **SM9223B-Colilert-QT; Enterolert-QT, SM9221E, EPA 1600, EPA 1603, SM9222D.**

Mansfield Facility:

Drinking Water
EPA 200.7: Al, Ba, Cd, Cr, Cu, Fe, Mn, Ni, Na, Ag, Ca, Zn. **EPA 200.8:** Al, Sb, As, Ba, Be, Cd, Cr, Cu, Pb, Mn, Ni, Se, Ag, TL, Zn. **EPA 245.1** Hg.
EPA 522, EPA 537.1.

Non-Potable Water
EPA 200.7: Al, Sb, As, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Sr, TL, Ti, V, Zn.
EPA 200.8: Al, Sb, As, Be, Cd, Cr, Cu, Fe, Pb, Mn, Ni, K, Se, Ag, Na, TL, Zn.
EPA 245.1 Hg.
SM2340B

For a complete listing of analytes and methods, please contact your Alpha Project Manager.

179 Lake Avenue, Rochester, NY 14608 Office (585) 647-2530 Fax (585) 647-3311

8/26/21

L2145703

CHAIN OF CUSTODY

11148

REPORT TO:		INVOICE TO:		LAB PROJECT ID
CLIENT:	Paradigm Environmental	CLIENT:	Same	
ADDRESS:	179 Lake Ave	ADDRESS:		Quotation #:
CITY:	Rochester STATE: NY ZIP 14608	CITY:	STATE: ZIP:	
PHONE:		PHONE:		Email: reporting@paradigmenv.com
ATTN:	Reporting	ATTN:		

PROJECT REFERENCE

Bench Scale Test

Matrix Codes:

AQ - Aqueous Liquid; NQ - Non-Aqueous Liquid; WA - Water; WG - Groundwater; DW - Drinking Water; WW - Wastewater; SO - Soil; SL - Sludge; SD - Solid; PT - Paint; WP - Wipe; CK - Caulk; OL - Oil; AR - Air

REQUESTED ANALYSIS

	DATE COLLECTED	TIME COLLECTED	COMPOSITE	GRAB	SAMPLE IDENTIFIER	MATRIX CODES	NUMBER OF CONTAINERS	PFAS	REMARKS	PARADIGM LAB SAMPLE NUMBER
-01	8/25/2021	1305		X	SD-RACKCOG-08252021	SO	2	X		
-00	8/25/2021	1325		X	AQ-COGAQ-08252021	WA	2	X		

8/26/21 0540

Turnaround Time		Report Supplements			
Availability contingent upon lab approval; additional fees may apply.					
Standard 5 day	X	None Required		None Required	
10 day		Batch QC	X	Basic EDD	X
Rush 3 day		Category A		NYSDEC EDD	X
Rush 2 day		Category B			
Rush 1 day					
Other		Other		Other EDD	
please indicate date needed:		please indicate package needed:		please indicate EDD needed:	

Client

Sampled By	Date/Time	Total Cost:
Brian Zuck	8/25/21 16:25	
Relinquished By	Date/Time	Log 1625
AM	8/25/21 1625	P.I.F.
Received By	Date/Time	
	8/26/21 02:20	
Received @ Lab By	Date/Time	
	8/26/21 4:00	

By signing this form, client agrees to Paradigm Terms and Conditions (reverse).

T. Hughes 8/26/21 0415

T. Hughes 8/26/21 0540

See additional page for sample conditions.

September 15, 2021 Service Request No:R2108819

Paradigm Environmental Services, Inc.
179 Lake Avenue
Rochester, NY 14608

Laboratory Results for: 213873

Dear Reporting,

Enclosed are the results of the sample(s) submitted to our laboratory August 30, 2021
For your reference, these analyses have been assigned our service request number **R2108819.**

All testing was performed according to our laboratory s quality assurance program and met the requirements of the TNI standards except as noted in the case narrative report. Any testing not included in the lab's accreditation is identified on a Non-Certified Analytes report. All results are intended to be considered in their entirety. ALS Environmental is not responsible for use of less than the complete report. Results apply only to the individual samples submitted to the lab for analysis, as listed in the report. The measurement uncertainty of the results included in this report is within that expected when using the prescribed method(s), and represented by Laboratory Control Sample control limits. Any events, such as QC failures or Holding Time exceedances, which may add to the uncertainty are explained in the report narrative or are flagged with qualifiers. The flags are explained in the Report Qualifiers and Definitions page of this report.

Please contact me if you have any questions. My extension is 7471. You may also contact me via email at Brady.Kalkman@alsglobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

Brady Kalkman
Project Manager

ADDRESS 1565 Jefferson Road, Building 300, Suite 360, Rochester, NY 14623
PHONE 1 585 288 5380 FA 1 585 288 8475
ALS Group USA, Corp.
dba ALS Environmental

Narrative Documents

ALS Environmental—Rochester Laboratory
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ALS Environmental

Client: Paradigm Environmental Services, Inc.
Project: 213873
Sample Matrix: Water

Service Request: R2108819
Date Received: 08/30/2021

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of ALS Environmental. This report contains analytical results for samples for the Tier level IV requested by the client.

Sample Receipt:

Two water samples were received for analysis at ALS Environmental on 08/30/2021. Any discrepancies upon initial sample inspection are annotated on the sample receipt and preservation form included within this report. The samples were stored at minimum in accordance with the analytical method requirements.

Metals:

No significant anomalies were noted with this analysis.

General Chemistry:

Method 300.0, R2108819-001: The sample was diluted to elevate the reporting limit above the presence of non-target background components indicated on the chromatogram. Sample contains a high concentration of acetate. The matrix interference prevented adequate resolution of one or more target compound(s) at the reporting limit.

Samples were spun for TCLP by Paradigm and then delivered to ALS Environmental for analysis.

Approved by _____ Date 09/15/2021

SAMPLE DETECTION SUMMARY

CLIENT ID: 213873-01A SD-RACKCOG-082 2021			Lab ID: R2108819-001			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Cyanide, Total	7.39			0.25	mg/L	Kelada-01

CLIENT ID: 213873-01B AQ-COGAQ-082 221			Lab ID: R2108819-002			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Mercury, Total	2660			50	ng/L	1631E

Sample Receipt Information

ALS Environmental—Rochester Laboratory
1565 Jefferson Road, Building 300, Suite 360, Rochester, NY 14623
Phone (585) 288-5380 Fax (585) 288-8475
www.alsglobal.com

Client: Paradigm Environmental Services, Inc. **Service Request:**R2108819
Pro ect: 213873

SAMPLE CROSS-REFERENCE

SAMPLE	CLIENT SAMPLE ID	DATE	TIME
R2108819-001	213873-01A SD-RACKCOG-08252021	8/25/2021	1305
R2108819-002	213873-01B AQ-COGAQ-0825221	8/25/2021	1325

179 Lake Avenue, Rochester, NY 14608 Office (585) 647-2530 Fax (585) 647-3311

1 of 1

CHAIN OF CUSTODY

NEC - TCN

ALS: ELAP ID: 10145

REPORT TO:		INVOICE TO:			
COMPANY:	Paradigm Environmental	COMPANY:	Same	LAB PROJECT #:	CLIENT PROJECT #:
ADDRESS:		ADDRESS:			
CITY: STATE: ZIP:		CITY: STATE: ZIP:		TURNAROUND TIME: (WORKING DAYS)	
PHONE: FAX:		PHONE: FAX:			STD / OTHER
PROJECT NAME/SITE NAME:		ATTN:	Reporting	ATTN:	Accounts Payable	☐ 1 ☐ 2 ☐ 3 ☐ 5 ☐
		COMMENTS:	Please email results to reporting@paradigmenv.com	Date Due: 9/3/21 For data	

REQUESTED ANALYSIS

	DATE	TIME	COMPOSITE	GRAB	SAMPLE LOCATION/FIELD ID	MATRIX	NUMBER OF CONTAINERS	Fluoride	Nitrate/Nitrite	Uranium	TCN		LL Hg 1631					REMARKS	PARADIGM LAB SAMPLE NUMBER
																		Report J Flags. ASP Cat B Package Due 9/17/21	
1	8/25/21	13:05		X	SD-RACKCOG-08252021	TCLP extract	4	X	X	X	X							213873-01A	
2	8/25/21	13:25		X	AQ-COGAQ-08252021	Water	1						X					213873-02	
3																			
4																			
5																		TCLP sample spun at	
6																		Paradigm 8/27/21.	
7																			
8																			
9																			
10																			

LAB USE ONLY BELOW THIS LINE

Sample Condition: Per NELAC/ELAP 210/241/242/243/244

Receipt Parameter	NELAC Compliance	
Container Type:	Y ☐	N ☐
Comments:		
Preservation:	Y ☐	N ☐
Comments:		
Holding Time:	Y ☐	N ☐
Comments:		
Temperature:	Y ☐	N ☐
Comments:		

Client

Sampled By: Donald W Dodd — Date/Time: 8.30.21 1643

Relinquished By — Date/Time

Received By — Date/Time

Received @ Lab By: [illegible] — Date/Time: 8/30/21 1643

Total Cost:

R2108819 5

Paradigm Environmental Services, Inc.

213873

Cooler Receipt and Preservation C

R2108819 5
Paradigm Environmental Services, Inc.
213873

Project/Client Paradigm Folder Number

Cooler received on 8/30/21 by: @

COURIER: ALS UPS FEDEX VELOCITY (CLIENT)

1	Were **Custody seals** on outside of cooler?	Y (N)	5a	**Perchlorate** samples have required headspace?	Y N (NA)
2	**Custody papers** properly completed (ink, signed)?	(Y) N	5b	Did VOA vials, Alk,or Sulfide have sig* **bubbles**?	Y N (NA)
3	Did all bottles arrive in good **condition** (unbroken)?	(Y) N	6	Where did the bottles originate?	ALS/ROC (CLIENT)
4	Circle: **Wet Ice Dry Ice Gel packs** present?	(Y) N	7	Soil VOA received as:	Bulk Encore 5035set (NA)

8. Temperature Readings Date: 8/30/21 Time: 1645 ID: IR#7 (IR#11) From: Temp Blank (Sample Bottle)

Observed Temp (°C)	7.5						
Within 0-6°C?	Y (N)	Y N	Y N	Y N	Y N	Y N	Y N
If <0°C, were samples frozen?	Y N	Y N	Y N	Y N	Y N	Y N	Y N

If out of Temperature, note packing/ice condition: _____ Ice melted Poorly Packed (described below) Same Day Rule

&Client Approval to Run Samples: _____ Standing Approval Client aware at drop-off Client notified by: _____

All samples held in storage location: Rack by C on 8/30/21 at 1641
5035 samples placed in storage location: _____ by _____ on _____ at _____ within 48 hours of sampling? Y N

Cooler Breakdown/Preservation Check**: Date: 8-31-21 Time: 0710 by: ME

9. Were all bottle labels complete (*i.e.* analysis, preservation, etc.)? YES (NO)
10. Did all bottle labels and tags agree with custody papers? YES (NO)
11. Were correct containers used for the tests indicated? (YES) NO
12. Were 5035 vials acceptable (no extra labels, not leaking)? YES NO (N/A)
13. Air Samples: Cassettes / Tubes Intact Y / N with MS Y / N Canisters Pressurized Tedlar® Bags Inflated (N/A)

pH	Lot of test paper	Reagent	Preserved? Yes	Preserved? No	Lot Received	Exp	Sample ID Adjusted	Vol. Added	Lot Added	Final pH
≥12	223419	NaOH	✓		Client Bottles					
≤2	↓	HNO_3	✓		↓					
≤2	↓	H_2SO_4	X							
<4		$NaHSO_4$								
5-9		For 608pest			No=Notify for 3day					
Residual Chlorine (-)		For CN, Phenol, 625, 608pest, 522	X		If +, contact PM to add $Na_2S_2O_3$ (625, 608, CN), ascorbic (phenol).					
		$Na_2S_2O_3$								
		ZnAcetate	-	-			**VOAs and 1664 Not to be tested before analysis. Otherwise, all bottles of all samples with chemical preservatives are checked (not just representatives).			
		HCl	**	**						

Bottle lot numbers: Client Bottles
Explain all Discrepancies/ Other Comments:

HPROD	BULK
HTR	FLDT
SUB	HGFB
ALS	LL3541

Labels secondary reviewed by: ME
PC Secondary Review: _____

*significant air bubbles: VOA > 5-6 mm : WC >1 in. diameter

Miscellaneous Forms

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REPORT QUALIFIERS AND DEFINITIONS

U	Analyte was analyzed for but not detected. The sample quantitation limit has been corrected for dilution and for percent moisture, unless otherwise noted in the case narrative.
J	Estimated value due to either being a Tentatively Identified Compound (TIC) or that the concentration is between the MRL and the MDL. Concentrations are not verified within the linear range of the calibration. For DoD: concentration >40% difference between two GC columns (pesticides/Arclors).
B	Analyte was also detected in the associated method blank at a concentration that may have contributed to the sample result.
E	Inorganics- Concentration is estimated due to the serial dilution was outside control limits.
E	Organics- Concentration has exceeded the calibration range for that specific analysis.
D	Concentration is a result of a dilution, typically a secondary analysis of the sample due to exceeding the calibration range or that a surrogate has been diluted out of the sample and cannot be assessed.
*	Indicates that a quality control parameter has exceeded laboratory limits. Under the ñNotesò column of the Form I, this qualifier denotes analysis was performed out of Holding Time.
H	Analysis was performed out of hold time for tests that have an ñimmediateò hold time criteria.
#	Spike was diluted out.
+	Correlation coefficient for MSA is <0.995.
N	Inorganics- Matrix spike recovery was outside laboratory limits.
N	Organics- Presumptive evidence of a compound (reported as a TIC) based on the MS library search.
S	Concentration has been determined using Method of Standard Additions (MSA).
W	Post-Digestion Spike recovery is outside control limits and the sample absorbance is <50% of the spike absorbance.
P	Concentration >40% difference between the two GC columns.
C	Confirmed by GC/MS
Q	DoD reports: indicates a pesticide/Aroclor is not confirmed (Ó100% Difference between two GC columns).
X	See Case Narrative for discussion.
MRL LOQ	Method Reporting Limit. Also known as: Limit of Quantitation (LOQ) The lowest concentration at which the method analyte may be reliably quantified under the method conditions.
MDL	Method Detection Limit. A statistical value derived from a study designed to provide the lowest concentration that will be detected 99% of the time. Values between the MDL and MRL are estimated (see J qualifier).
LOD	Limit of Detection. A value at or above the MDL which has been verified to be detectable.
ND	Non-Detect. Analyte was not detected at the concentration listed. Same as U qualifier.

Rochester Lab ID # for State Certifications[1]

Connecticut ID # PH0556	Maine ID #NY0032	Pennsylvania ID# 68-786
Delaware Approved	New Hampshire ID # 2941	Rhode Island ID # 158
DoD ELAP #65817	New York ID # 10145	Virginia #460167
Florida ID # E87674	North Carolina #676	

[1] Analyses were performed according to our laboratoryôs NELAP-approved quality assurance program and any applicable state or agency requirements. The test results meet requirements of the current NELAP/TNI standards or state or agency requirements, where applicable, except as noted in the case narrative. Since not all analyte/method/matrix combinations are offered for state/NELAC accreditation, this report may contain results which are not accredited. For a specific list of accredited analytes, contact the laboratory or go to https://www.alsglobal.com/locations/americas/north-america/usa/new-york/rochester-environmental

ALS Laboratory Group

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Client: Paradigm Environmental Services, Inc. **Service Request:** R2108819
Project: 213873

Non-Certified Analytes

Certifying Agency: New York Department of Health

Method	Matrix	Analyte
200.8	Water	Uranium, Total

Client:	Paradigm Environmental Services, Inc.	**Service Request:**	R2108819
Project:	213873/		

Sample Name:	213873-01A SD-RACKCOG-08252021	**Date Collected:**	08/25/21
Lab Code:	R2108819-001	**Date Received:**	08/30/21
Sample Matrix:	Water		

Analysis Method	Extracted/Digested By	Analyzed By
200.8	CKUTZER	KMCLAEN
300.0		CWOODS
353.2		GNITAJOUPPI
Kelada-01		CWOODS

Sample Name:	213873-01B AQ-COGAQ-0825221	**Date Collected:**	08/25/21
Lab Code:	R2108819-002	**Date Received:**	08/30/21
Sample Matrix:	Water		

Analysis Method	Extracted/Digested By	Analyzed By
1631E		KMCLAEN

The preparation methods associated with this report are found in these tables unless discussed in the case narrative.

Water/Liquid Matrix

Analytical Method	Preparation Method
200.7	200.2
200.8	200.2
6010C	3005A/3010A
6020A	ILM05.3
9034 Sulfide Acid Soluble	9030B
SM 4500-CN-E Residual Cyanide	SM 4500-CN-G
SM 4500-CN-E WAD Cyanide	SM 4500-CN-I

Solid/Soil/Non-Aqueous Matrix

Analytical Method	Preparation Method
6010C	3050B
6020A	3050B
6010C TCLP (1311) extract	3005A/3010A
6010 SPLP (1312) extract	3005A/3010A
7199	3060A
300.0 Anions/ 350.1/ 353.2/ SM 2320B/ SM 5210B/ 9056A Anions	DI extraction
For analytical methods not listed, the preparation method is the same as the analytical method reference.	

Sample Results

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Metals

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www.alsglobal.com

Analytical Report

Client:	Paradigm Environmental Services, Inc.	**Service Request:**	R2108819
Project:	213873	**Date Collected:**	08/25/21 13:05
Sample Matrix:	Water	**Date Received:**	08/30/21 16:43
Sample Name:	213873-01A SD-RACKCOG-08252021	**Basis:**	NA
Lab Code:	R2108819-001		

Inorganic Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Date Extracted	Q
Uranium, Total	200.8	ND U	ug/L	5.0	5	09/03/21 12:34	09/02/21	

Analytical Report

Client:	Paradigm Environmental Services, Inc.	**Service Request:**	R2108819
Project:	213873	**Date Collected:**	08/25/21 13:25
Sample Matrix:	Water	**Date Received:**	08/30/21 16:43
Sample Name:	213873-01B AQ-COGAQ-0825221	**Basis:**	NA
Lab Code:	R2108819-002		

Inorganic Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Q
Mercury, Total	1631E	**2660**	ng/L	50	50	09/02/21 15:46	

General Chemistry

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Analytical Report

Client:	Paradigm Environmental Services, Inc.	**Service Request:**	R2108819
Project:	213873	**Date Collected:**	08/25/21 13:05
Sample Matrix:	Water	**Date Received:**	08/30/21 16:43
Sample Name:	213873-01A SD-RACKCOG-08252021	**Basis:**	NA
Lab Code:	R2108819-001		

Inorganic Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Q
Cyanide, Total	Kelada-01	**7.39**	mg/L	0.25	50	09/03/21 17:39	
Fluoride, undistilled	300.0	ND U	mg/L	40	400	09/10/21 11:20	
Nitrate+Nitrite as Nitrogen	353.2	ND U	mg/L	5.0	100	09/09/21 17:53	

QC Summary Forms

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Metals

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Analytical Report

Client:	Paradigm Environmental Services, Inc.	**Service Request:**	R2108819
Project:	213873	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
Sample Name:	Method Blank	**Basis:**	NA
Lab Code:	R2108819-MB		

Inorganic Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Date Extracted	Q
Mercury, Total	1631E	ND U	ng/L	1.0	1	09/02/21 12:26	NA	
Uranium, Total	200.8	ND U	ug/L	1.0	1	09/03/21 11:54	09/02/21	

Client: Paradigm Environmental Services, Inc.
Project: 213873
Sample Matrix: Water

Service Request: R2108819
Date Analyzed: 09/02/21

Lab Control Sample Summary
Inorganic Parameters

Units:ng/L
Basis:NA

Lab Control Sample
R2108819-LCS

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
Mercury, Total	1631E	4.88	5.0	98	77-128

Client: Paradigm Environmental Services, Inc.
Project: 213873
Sample Matrix: Water

Service Request: R2108819
Date Analyzed: 09/03/21

Lab Control Sample Summary
Inorganic Parameters

Units:ug/L
Basis:NA

Lab Control Sample
R2108819-LCS

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
Uranium, Total	200.8	22.0	20.0	110	80-120

General Chemistry

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Analytical Report

Client:	Paradigm Environmental Services, Inc.	**Service Request:**	R2108819
Project:	213873	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
Sample Name:	Method Blank	**Basis:**	NA
Lab Code:	R2108819-MB		

Inorganic Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Q
Cyanide, Total	Kelada-01	ND U	mg/L	0.0050	1	09/03/21 15:03	
Fluoride, undistilled	300.0	ND U	mg/L	0.10	1	09/10/21 09:09	
Nitrate+Nitrite as Nitrogen	353.2	ND U	mg/L	0.050	1	09/09/21 17:13	

Client: Paradigm Environmental Services, Inc.
Project: 213873
Sample Matrix: Water

Service Request: R2108819
Date Analyzed: 09/03/21 - 09/10/21

Lab Control Sample Summary
General Chemistry Parameters

Units:mg/L
Basis:NA

Lab Control Sample
R2108819-LCS

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
Cyanide, Total	Kelada-01	0.0942	0.100	94	90-110
Fluoride, undistilled	300.0	0.94	1.00	94	90-110
Nitrate+Nitrite as Nitrogen	353.2	0.499	0.500	100	90-110

PARADIGM
ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213873

Client: **Inventum Engineering, P.C.**

Project Reference: Bench Scale Test

Sample Identifier:	SD-RACKCOG-08252021		
Lab Sample ID:	213873-01	**Date Sampled:**	8/25/2021
Matrix:	Solid	**Date Received:**	8/26/2021

Corrosivity as pH

Analyte	Result	Units	Qualifier	Date Analyzed
Corrosivity (as pH)	6.77 @ 22.2 C	S.U.		8/31/2021 10:53

Method Reference(s): EPA 9045D

This report is part of a multipage document and should only be evaluated in its entirety. The Chain of Custody provides additional sample information, including compliance with the sample condition requirements upon receipt.

Report Prepared Wednesday, September 15, 2021

PARADIGM
ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213873

Client: **Inventum Engineering, P.C.**

Project Reference: Bench Scale Test

Sample Identifier:	SD-RACKCOG-08252021		
Lab Sample ID:	213873-01	**Date Sampled:**	8/25/2021
Matrix:	Solid	**Date Received:**	8/26/2021

Flash Point

Analyte	Result	Units	Qualifier	Date Analyzed
Flash Point, Celsius	>70.0	C		8/31/2021

Method Reference(s): EPA 1010A

Report Prepared Wednesday, September 15, 2021

PARADIGM
ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213873

Client: **Inventum Engineering, P.C.**

Project Reference: Bench Scale Test

Sample Identifier:	SD-RACKCOG-08252021		
Lab Sample ID:	213873-01	**Date Sampled:**	8/25/2021
Matrix:	Solid	**Date Received:**	8/26/2021

Mercury

Analyte	Result	Units	Qualifier	Date Analyzed
Mercury	**94.6**	mg/Kg		9/1/2021 10:56

Method Reference(s): EPA 7471B
Preparation Date: 8/31/2021
Data File: Hg210901B

Report Prepared Wednesday, September 15, 2021

PARADIGM
ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213873

Client: **Inventum Engineering, P.C.**

Project Reference: Bench Scale Test

Sample Identifier: SD-RACKCOG-08252021
Lab Sample ID: 213873-01 **Date Sampled:** 8/25/2021
Matrix: Solid **Date Received:** 8/26/2021

TAL Metals (ICP)

Analyte	Result	Units	Qualifier	Date Analyzed
Aluminum	**24.1**	mg/Kg	DM	8/31/2021 13:52
Antimony	< 2.97	mg/Kg		8/31/2021 13:52
Arsenic	**1.89**	mg/Kg		9/1/2021 15:29
Barium	< 4.95	mg/Kg		8/31/2021 13:52
Beryllium	< 0.248	mg/Kg		8/31/2021 13:52
Cadmium	**1.56**	mg/Kg	D	8/31/2021 13:52
Calcium	< 124	mg/Kg		8/31/2021 13:52
Chromium	**10.2**	mg/Kg	D	8/31/2021 13:52
Cobalt	< 2.48	mg/Kg		8/31/2021 13:52
Copper	**2.77**	mg/Kg	D	9/2/2021 11:36
Iron	**23900**	mg/Kg	D	8/31/2021 14:24
Lead	**17.6**	mg/Kg	D	8/31/2021 13:52
Magnesium	< 124	mg/Kg		8/31/2021 13:52
Manganese	**374**	mg/Kg	DM	8/31/2021 14:24
Nickel	< 1.98	mg/Kg		8/31/2021 13:52
Potassium	< 124	mg/Kg		8/31/2021 13:52
Selenium	< 0.990	mg/Kg		8/31/2021 13:52
Silver	< 0.495	mg/Kg	M	8/31/2021 13:52
Sodium	< 124	mg/Kg		8/31/2021 13:52
Sulfur	**110000**	mg/Kg	A	8/31/2021 07:58
Thallium	< 1.24	mg/Kg	M	8/31/2021 13:52
Vanadium	**15.8**	mg/Kg	DM	8/31/2021 13:52
Zinc	**14.1**	mg/Kg	B	9/1/2021 15:29

PARADIGM
ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213873

Client: **Inventum Engineering, P.C.**

Project Reference: Bench Scale Test

Sample Identifier:	SD-RACKCOG-08252021		
Lab Sample ID:	213873-01	**Date Sampled:**	8/25/2021
Matrix:	Solid	**Date Received:**	8/26/2021

Method Reference(s):	EPA 6010C
	EPA 3050B
Preparation Date:	8/30/2021
Data File:	210831B

This report is part of a multipage document and should only be evaluated in its entirety. The Chain of Custody provides additional sample information, including compliance with the sample condition requirements upon receipt.

Report Prepared Wednesday, September 15, 2021

PARADIGM
ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213873

Client: **Inventum Engineering, P.C.**

Project Reference: Bench Scale Test

Sample Identifier:	SD-RACKCOG-08252021		
Lab Sample ID:	213873-01	**Date Sampled:**	8/25/2021
Matrix:	Solid	**Date Received:**	8/26/2021

PCBs

Analyte	Result	Units	Qualifier	Date Analyzed
PCB-1016	< 2.79	mg/Kg		9/1/2021 21:48
PCB-1221	< 2.79	mg/Kg		9/1/2021 21:48
PCB-1232	< 2.79	mg/Kg		9/1/2021 21:48
PCB-1242	< 2.79	mg/Kg		9/1/2021 21:48
PCB-1248	< 2.79	mg/Kg		9/1/2021 21:48
PCB-1254	< 2.79	mg/Kg		9/1/2021 21:48
PCB-1260	< 2.79	mg/Kg		9/1/2021 21:48
PCB-1262	< 2.79	mg/Kg		9/1/2021 21:48
PCB-1268	< 2.79	mg/Kg		9/1/2021 21:48

Surrogate	Percent Recovery	Limits	Outliers	Date Analyzed
Tetrachloro-m-xylene	NC	18.5 - 93.4		9/1/2021 21:48

Reporting limit elevated due to sample matrix

Method Reference(s): EPA 8082A
EPA 3546

Preparation Date: 8/30/2021

PARADIGM
ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213873

Client: **Inventum Engineering, P.C.**

Project Reference: Bench Scale Test

Sample Identifier: SD-RACKCOG-08252021
Lab Sample ID: 213873-01 **Date Sampled:** 8/25/2021
Matrix: Solid **Date Received:** 8/26/2021

Semi-Volatile Organics (Acid/Base Neutrals)

Analyte	Result	Units	Qualifier	Date Analyzed
1,1-Biphenyl	< 19400000	ug/Kg		9/1/2021 19:54
1,2,4,5-Tetrachlorobenzene	< 19400000	ug/Kg		9/1/2021 19:54
1,2,4-Trichlorobenzene	< 19400000	ug/Kg		9/1/2021 19:54
1,2-Dichlorobenzene	< 19400000	ug/Kg		9/1/2021 19:54
1,3-Dichlorobenzene	< 19400000	ug/Kg		9/1/2021 19:54
1,4-Dichlorobenzene	< 19400000	ug/Kg		9/1/2021 19:54
2,2-Oxybis (1-chloropropane)	< 19400000	ug/Kg		9/1/2021 19:54
2,3,4,6-Tetrachlorophenol	< 19400000	ug/Kg		9/1/2021 19:54
2,4,5-Trichlorophenol	< 19400000	ug/Kg		9/1/2021 19:54
2,4,6-Trichlorophenol	< 19400000	ug/Kg		9/1/2021 19:54
2,4-Dichlorophenol	< 19400000	ug/Kg		9/1/2021 19:54
2,4-Dimethylphenol	< 19400000	ug/Kg		9/1/2021 19:54
2,4-Dinitrophenol	< 77700000	ug/Kg		9/1/2021 19:54
2,4-Dinitrotoluene	< 19400000	ug/Kg		9/1/2021 19:54
2,6-Dinitrotoluene	< 19400000	ug/Kg		9/1/2021 19:54
2-Chloronaphthalene	< 19400000	ug/Kg		9/1/2021 19:54
2-Chlorophenol	< 19400000	ug/Kg		9/1/2021 19:54
2-Methylnapthalene	< 19400000	ug/Kg		9/1/2021 19:54
2-Methylphenol	< 19400000	ug/Kg		9/1/2021 19:54
2-Nitroaniline	< 19400000	ug/Kg		9/1/2021 19:54
2-Nitrophenol	< 19400000	ug/Kg		9/1/2021 19:54
3&4-Methylphenol	< 19400000	ug/Kg		9/1/2021 19:54
3,3'-Dichlorobenzidine	< 19400000	ug/Kg		9/1/2021 19:54

PARADIGM
ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213873

Client: **Inventum Engineering, P.C.**

Project Reference: Bench Scale Test

Sample Identifier: SD-RACKCOG-08252021
Lab Sample ID: 213873-01 **Date Sampled:** 8/25/2021
Matrix: Solid **Date Received:** 8/26/2021

3-Nitroaniline	< 19400000	ug/Kg	9/1/2021	19:54
4,6-Dinitro-2-methylphenol	< 38800000	ug/Kg	9/1/2021	19:54
4-Bromophenyl phenyl ether	< 19400000	ug/Kg	9/1/2021	19:54
4-Chloro-3-methylphenol	< 19400000	ug/Kg	9/1/2021	19:54
4-Chloroaniline	< 19400000	ug/Kg	9/1/2021	19:54
4-Chlorophenyl phenyl ether	< 19400000	ug/Kg	9/1/2021	19:54
4-Nitroaniline	< 19400000	ug/Kg	9/1/2021	19:54
4-Nitrophenol	< 19400000	ug/Kg	9/1/2021	19:54
Acenaphthene	< 19400000	ug/Kg	9/1/2021	19:54
Acenaphthylene	< 19400000	ug/Kg	9/1/2021	19:54
Acetophenone	< 19400000	ug/Kg	9/1/2021	19:54
Anthracene	< 19400000	ug/Kg	9/1/2021	19:54
Atrazine	< 19400000	ug/Kg	9/1/2021	19:54
Benzaldehyde	< 19400000	ug/Kg	9/1/2021	19:54
Benzo (a) anthracene	< 19400000	ug/Kg	9/1/2021	19:54
Benzo (a) pyrene	< 19400000	ug/Kg	9/1/2021	19:54
Benzo (b) fluoranthene	< 19400000	ug/Kg	9/1/2021	19:54
Benzo (g,h,i) perylene	< 19400000	ug/Kg	9/1/2021	19:54
Benzo (k) fluoranthene	< 19400000	ug/Kg	9/1/2021	19:54
Bis (2-chloroethoxy) methane	< 19400000	ug/Kg	9/1/2021	19:54
Bis (2-chloroethyl) ether	< 19400000	ug/Kg	9/1/2021	19:54
Bis (2-ethylhexyl) phthalate	< 19400000	ug/Kg	9/1/2021	19:54
Butylbenzylphthalate	< 19400000	ug/Kg	9/1/2021	19:54
Caprolactam	< 19400000	ug/Kg	9/1/2021	19:54
Carbazole	< 19400000	ug/Kg	9/1/2021	19:54

PARADIGM ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213873

Client: **Inventum Engineering, P.C.**

Project Reference: Bench Scale Test

Sample Identifier: SD-RACKCOG-08252021

Lab Sample ID: 213873-01 **Date Sampled:** 8/25/2021

Matrix: Solid **Date Received:** 8/26/2021

Chrysene	< 19400000	ug/Kg	9/1/2021	19:54
Dibenz (a,h) anthracene	< 19400000	ug/Kg	9/1/2021	19:54
Dibenzofuran	< 19400000	ug/Kg	9/1/2021	19:54
Diethyl phthalate	< 19400000	ug/Kg	9/1/2021	19:54
Dimethyl phthalate	< 19400000	ug/Kg	9/1/2021	19:54
Di-n-butyl phthalate	< 19400000	ug/Kg	9/1/2021	19:54
Di-n-octylphthalate	< 19400000	ug/Kg	9/1/2021	19:54
Fluoranthene	< 19400000	ug/Kg	9/1/2021	19:54
Fluorene	< 19400000	ug/Kg	9/1/2021	19:54
Hexachlorobenzene	< 19400000	ug/Kg	9/1/2021	19:54
Hexachlorobutadiene	< 19400000	ug/Kg	9/1/2021	19:54
Hexachlorocyclopentadiene	< 77700000	ug/Kg	9/1/2021	19:54
Hexachloroethane	< 19400000	ug/Kg	9/1/2021	19:54
Indeno (1,2,3-cd) pyrene	< 19400000	ug/Kg	9/1/2021	19:54
Isophorone	< 19400000	ug/Kg	9/1/2021	19:54
Naphthalene	**479000000**	ug/Kg	9/1/2021	19:54
Nitrobenzene	< 19400000	ug/Kg	9/1/2021	19:54
N-Nitroso-di-n-propylamine	< 19400000	ug/Kg	9/1/2021	19:54
N-Nitrosodiphenylamine	< 19400000	ug/Kg	9/1/2021	19:54
Pentachlorophenol	< 38800000	ug/Kg	9/1/2021	19:54
Phenanthrene	< 19400000	ug/Kg	9/1/2021	19:54
Phenol	< 19400000	ug/Kg	9/1/2021	19:54
Pyrene	< 19400000	ug/Kg	9/1/2021	19:54

PARADIGM
ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213873

Client: **Inventum Engineering, P.C.**

Project Reference: Bench Scale Test

Sample Identifier: SD-RACKCOG-08252021

Lab Sample ID: 213873-01 **Date Sampled:** 8/25/2021

Matrix: Solid **Date Received:** 8/26/2021

Surrogate	Percent Recovery	Limits	Outliers	Date Analyzed	
2,4,6-Tribromophenol	NC	36.4 - 87.2		9/1/2021	19:54
2-Fluorobiphenyl	NC	44 - 84		9/1/2021	19:54
2-Fluorophenol	NC	43.2 - 82.1		9/1/2021	19:54
Nitrobenzene-d5	NC	36.4 - 82.2		9/1/2021	19:54
Phenol-d5	NC	41.1 - 81.4		9/1/2021	19:54
Terphenyl-d14	NC	43.8 - 103		9/1/2021	19:54

Method Reference(s): EPA 8270D
EPA 3546
Preparation Date: 8/31/2021
Data File: B56651.D

PARADIGM
ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213873

Client: **Inventum Engineering, P.C.**

Project Reference: Bench Scale Test

Sample Identifier: SD-RACKCOG-08252021
Lab Sample ID: 213873-01 **Date Sampled:** 8/25/2021
Matrix: Solid **Date Received:** 8/26/2021

Volatile Organics

Analyte	Result	Units	Qualifier	Date Analyzed
1,1,1-Trichloroethane	< 41700	ug/Kg		9/1/2021 13:26
1,1,2,2-Tetrachloroethane	< 41700	ug/Kg		9/1/2021 13:26
1,1,2-Trichloroethane	< 41700	ug/Kg		9/1/2021 13:26
1,1-Dichloroethane	< 41700	ug/Kg		9/1/2021 13:26
1,1-Dichloroethene	< 41700	ug/Kg		9/1/2021 13:26
1,2,3-Trichlorobenzene	< 104000	ug/Kg		9/1/2021 13:26
1,2,4-Trichlorobenzene	< 104000	ug/Kg		9/1/2021 13:26
1,2-Dibromo-3-Chloropropane	< 208000	ug/Kg		9/1/2021 13:26
1,2-Dibromoethane	< 41700	ug/Kg		9/1/2021 13:26
1,2-Dichlorobenzene	< 41700	ug/Kg		9/1/2021 13:26
1,2-Dichloroethane	< 41700	ug/Kg		9/1/2021 13:26
1,2-Dichloropropane	< 41700	ug/Kg		9/1/2021 13:26
1,3-Dichlorobenzene	< 41700	ug/Kg		9/1/2021 13:26
1,4-Dichlorobenzene	< 41700	ug/Kg		9/1/2021 13:26
1,4-Dioxane	< 208000	ug/Kg		9/1/2021 13:26
2-Butanone	< 208000	ug/Kg		9/1/2021 13:26
2-Hexanone	< 104000	ug/Kg		9/1/2021 13:26
4-Methyl-2-pentanone	< 104000	ug/Kg		9/1/2021 13:26
Acetone	< 208000	ug/Kg		9/1/2021 13:26
Benzene	< 41700	ug/Kg		9/1/2021 13:26
Bromochloromethane	< 104000	ug/Kg		9/1/2021 13:26
Bromodichloromethane	< 41700	ug/Kg		9/1/2021 13:26
Bromoform	< 104000	ug/Kg		9/1/2021 13:26

PARADIGM ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213873

Client: **Inventum Engineering, P.C.**

Project Reference: Bench Scale Test

Sample Identifier: SD-RACKCOG-08252021
Lab Sample ID: 213873-01 **Date Sampled:** 8/25/2021
Matrix: Solid **Date Received:** 8/26/2021

Bromomethane	< 41700	ug/Kg	9/1/2021	13:26
Carbon disulfide	< 41700	ug/Kg	9/1/2021	13:26
Carbon Tetrachloride	< 41700	ug/Kg	9/1/2021	13:26
Chlorobenzene	< 41700	ug/Kg	9/1/2021	13:26
Chloroethane	< 41700	ug/Kg	9/1/2021	13:26
Chloroform	< 41700	ug/Kg	9/1/2021	13:26
Chloromethane	< 41700	ug/Kg	9/1/2021	13:26
cis-1,2-Dichloroethene	< 41700	ug/Kg	9/1/2021	13:26
cis-1,3-Dichloropropene	< 41700	ug/Kg	9/1/2021	13:26
Cyclohexane	< 208000	ug/Kg	9/1/2021	13:26
Dibromochloromethane	< 41700	ug/Kg	9/1/2021	13:26
Dichlorodifluoromethane	< 41700	ug/Kg	9/1/2021	13:26
Ethylbenzene	< 41700	ug/Kg	9/1/2021	13:26
Freon 113	< 41700	ug/Kg	9/1/2021	13:26
Isopropylbenzene	< 41700	ug/Kg	9/1/2021	13:26
m,p-Xylene	< 41700	ug/Kg	9/1/2021	13:26
Methyl acetate	< 41700	ug/Kg	9/1/2021	13:26
Methyl tert-butyl Ether	< 41700	ug/Kg	9/1/2021	13:26
Methylcyclohexane	< 41700	ug/Kg	9/1/2021	13:26
Methylene chloride	< 104000	ug/Kg	9/1/2021	13:26
o-Xylene	< 41700	ug/Kg	9/1/2021	13:26
Styrene	< 104000	ug/Kg	9/1/2021	13:26
Tetrachloroethene	< 41700	ug/Kg	9/1/2021	13:26
Toluene	< 41700	ug/Kg	9/1/2021	13:26
trans-1,2-Dichloroethene	< 41700	ug/Kg	9/1/2021	13:26

PARADIGM
ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213873

Client: **Inventum Engineering, P.C.**

Project Reference: Bench Scale Test

Sample Identifier: SD-RACKCOG-08252021
Lab Sample ID: 213873-01 **Date Sampled:** 8/25/2021
Matrix: Solid **Date Received:** 8/26/2021

trans-1,3-Dichloropropene	< 41700	ug/Kg		9/1/2021	13:26
Trichloroethene	< 41700	ug/Kg		9/1/2021	13:26
Trichlorofluoromethane	< 41700	ug/Kg		9/1/2021	13:26
Vinyl chloride	< 41700	ug/Kg		9/1/2021	13:26

Surrogate	Percent Recovery	Limits	Outliers	Date Analyzed	
1,2-Dichloroethane-d4	**120**	88.8 - 123		9/1/2021	13:26
4-Bromofluorobenzene	**124**	68.7 - 115	*	9/1/2021	13:26
Pentafluorobenzene	**108**	80.2 - 112		9/1/2021	13:26
Toluene-D8	**95.4**	83.5 - 123		9/1/2021	13:26

Reporting limit elevated due to non-target compounds

Method Reference(s): EPA 8260C
EPA 5035A -- H

Data File: z03865.D

PARADIGM
ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213873

Client: **Inventum Engineering, P.C.**

Project Reference: Bench Scale Test

Sample Identifier:	SD-RACKCOG-08252021		
Lab Sample ID:	213873-01	**Date Sampled:**	8/25/2021
Matrix:	Solid	**Date Received:**	8/26/2021

Dioxane

Analyte	Result	Units	Qualifier	Date Analyzed
1,4-Dioxane	< 2500	ug/Kg		9/3/2021 15:54

Method Reference(s): EPA 8270D SIM
EPA 3546
Preparation Date: 9/7/2021
Data File: B56708.D

Report Prepared Wednesday, September 15, 2021

PARADIGM
ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213873

Client: **Inventum Engineering, P.C.**

Project Reference: Bench Scale Test

Sample Identifier:	SD-RACKCOG-08252021		
Lab Sample ID:	213873-01A	**Date Sampled:**	8/25/2021
Matrix:	TCLP Extract	**Date Received:**	8/26/2021

Total Cyanide

Analyte	Result	Units	Qualifier	Date Analyzed
Cyanide, Total	<	mg/L		

Method Reference(s): SM 4500 CN E - 2011
SM 4500 CN C - 2011

This report is part of a multipage document and should only be evaluated in its entirety. The Chain of Custody provides additional sample information, including compliance with the sample condition requirements upon receipt.

Report Prepared Wednesday, September 15, 2021

PARADIGM
ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213873

Client: **Inventum Engineering, P.C.**

Project Reference: Bench Scale Test

Sample Identifier: SD-RACKCOG-08252021
Lab Sample ID: 213873-01A **Date Sampled:** 8/25/2021
Matrix: TCLP Extract **Date Received:** 8/26/2021

TCLP Semi-Volatile Organics

Analyte	Result	Units	Regulatory Limit	Qualifier	Date Analyzed
1,4-Dichlorobenzene	< 50.0	ug/L	7500		8/31/2021 20:07
2,4,5-Trichlorophenol	< 50.0	ug/L	400000		8/31/2021 20:07
2,4,6-Trichlorophenol	< 50.0	ug/L	2000		8/31/2021 20:07
2,4-Dinitrotoluene	< 50.0	ug/L	130		8/31/2021 20:07
Cresols (as m,p,o-Cresol)	**679**	ug/L	200000		8/31/2021 20:07
Hexachlorobenzene	< 50.0	ug/L	130		8/31/2021 20:07
Hexachlorobutadiene	< 50.0	ug/L	500		8/31/2021 20:07
Hexachloroethane	< 50.0	ug/L	3000		8/31/2021 20:07
Nitrobenzene	< 50.0	ug/L	2000		8/31/2021 20:07
Pentachlorophenol	< 100	ug/L	100000		8/31/2021 20:07
Pyridine	**38.3**	ug/L	5000	J	8/31/2021 20:07

Surrogate	Percent Recovery	Limits	Outliers	Date Analyzed
2,4,6-Tribromophenol	**83.5**	55.4 - 111		8/31/2021 20:07
2-Fluorobiphenyl	**56.9**	30.9 - 98.1		8/31/2021 20:07
2-Fluorophenol	**61.9**	10 - 105		8/31/2021 20:07
Nitrobenzene-d5	**74.7**	49.6 - 104		8/31/2021 20:07
Phenol-d5	**19.3**	10 - 105		8/31/2021 20:07
Terphenyl-d14	**76.8**	56.5 - 118		8/31/2021 20:07

Method Reference(s): EPA 8270D
EPA 1311 / 3510C
Preparation Date: 8/31/2021
Data File: B56632.D

PARADIGM
ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213873

Client: **Inventum Engineering, P.C.**

Project Reference: Bench Scale Test

Sample Identifier:	SD-RACKCOG-08252021		
Lab Sample ID:	213873-01A	**Date Sampled:**	8/25/2021
Matrix:	TCLP Extract	**Date Received:**	8/26/2021

TCLP Mercury

Analyte	Result	Units	Regulatory Limit	Qualifier	Date Analyzed
Mercury	< 0.00200	mg/L	0.2		8/31/2021 10:49

Method Reference(s): EPA 7470A
EPA 1311
Preparation Date: 8/30/2021
Data File: Hg210831A

Report Prepared Wednesday, September 15, 2021

PARADIGM
ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213873

Client: **Inventum Engineering, P.C.**

Project Reference: Bench Scale Test

Sample Identifier:	SD-RACKCOG-08252021		
Lab Sample ID:	213873-01A	**Date Sampled:**	8/25/2021
Matrix:	TCLP Extract	**Date Received:**	8/26/2021

TCLP Pesticides

Analyte	Result	Units	Regulatory Limit	Qualifier	Date Analyzed
Chlordane	**12.4**	ug/L	30		9/2/2021 13:46
Endrin	**48.6**	ug/L	20		9/2/2021 13:46
gamma-BHC (Lindane)	**14.5**	ug/L	400	JP	9/2/2021 13:46
Heptachlor	< 20.0	ug/L	8		9/2/2021 13:46
Heptachlor Epoxide	< 20.0	ug/L	8		9/2/2021 13:46
Methoxychlor	< 20.0	ug/L	10000		9/2/2021 13:46
Toxaphene	< 400	ug/L	500		9/2/2021 13:46

Surrogate	Percent Recovery	Limits	Outliers	Date Analyzed
Decachlorobiphenyl (1)	NC	10 - 185		9/2/2021 13:46
Tetrachloro-m-xylene (1)	NC	20.4 - 124		9/2/2021 13:46

Method Reference(s): EPA 8081B
EPA 1311 / 3510C

Preparation Date: 9/1/2021

PARADIGM
ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213873

Client: **Inventum Engineering, P.C.**

Project Reference: Bench Scale Test

Sample Identifier:	SD-RACKCOG-08252021		
Lab Sample ID:	213873-01A	**Date Sampled:**	8/25/2021
Matrix:	TCLP Extract	**Date Received:**	8/26/2021

TCLP RCRA Metals (ICP)

Analyte	Result	Units	Regulatory Limit	Qualifier	Date Analyzed
Arsenic	< 0.500	mg/L	5		8/30/2021 18:01
Barium	< 0.500	mg/L	100		8/30/2021 18:01
Boron	**0.656**	mg/L	N/A		8/30/2021 18:01
Cadmium	< 0.0250	mg/L	1		8/30/2021 18:01
Chromium	< 0.500	mg/L	5		8/30/2021 18:01
Lead	< 0.500	mg/L	5		8/30/2021 18:01
Selenium	< 0.200	mg/L	1		8/30/2021 18:01
Silver	< 0.500	mg/L	5		8/30/2021 18:01

Method Reference(s): EPA 6010C
EPA 1311 / 3005A
Preparation Date: 8/30/2021
Data File: 210830B

Report Prepared Wednesday, September 15, 2021

PARADIGM
ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213873

Client: **Inventum Engineering, P.C.**

Project Reference: Bench Scale Test

Sample Identifier: SD-RACKCOG-08252021
Lab Sample ID: 213873-01A **Date Sampled:** 8/25/2021
Matrix: TCLP Extract **Date Received:** 8/26/2021

TCLP Volatile Organics

Analyte	Result	Units	Regulatory Limit	Qualifier	Date Analyzed
1,1-Dichloroethene	< 200	ug/L	700		8/30/2021 16:04
1,2-Dichloroethane	< 200	ug/L	500		8/30/2021 16:04
2-Butanone	< 1000	ug/L	200000		8/30/2021 16:04
Benzene	< 200	ug/L	500		8/30/2021 16:04
Carbon Tetrachloride	< 200	ug/L	500		8/30/2021 16:04
Chlorobenzene	< 200	ug/L	100000		8/30/2021 16:04
Chloroform	< 200	ug/L	6000		8/30/2021 16:04
Tetrachloroethene	< 200	ug/L	700		8/30/2021 16:04
Trichloroethene	< 200	ug/L	500		8/30/2021 16:04
Vinyl chloride	< 200	ug/L	200		8/30/2021 16:04

Surrogate	Percent Recovery	Limits	Outliers	Date Analyzed
1,2-Dichloroethane-d4	**120**	83 - 120		8/30/2021 16:04
4-Bromofluorobenzene	**107**	65.5 - 118		8/30/2021 16:04
Pentafluorobenzene	**107**	91.2 - 109		8/30/2021 16:04
Toluene-D8	**91.9**	79.7 - 112		8/30/2021 16:04

Reporting limit elevated due to non-target compounds
Method Reference(s): EPA 8260C
EPA 1311 / 5030C
Data File: z03823.D

Report Prepared Wednesday, September 15, 2021

PARADIGM
ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213873

Client: **Inventum Engineering, P.C.**

Project Reference: Bench Scale Test

Sample Identifier:	AQ-COGAQ-08252021		
Lab Sample ID:	213873-02	**Date Sampled:**	8/25/2021
Matrix:	Water	**Date Received:**	8/26/2021

Corrosivity as pH

Analyte	Result	Units	Qualifier	Date Analyzed
Corrosivity (as pH)	6.82 @ 11.5 C	S.U.		8/30/2021 09:45

Method Reference(s): EPA 9045D

ELAP does not offer this test for approval as part of their laboratory certification program.

Report Prepared Wednesday, September 15, 2021

PARADIGM
ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213873

Client: **Inventum Engineering, P.C.**

Project Reference: Bench Scale Test

Sample Identifier:	AQ-COGAQ-08252021		
Lab Sample ID:	213873-02	**Date Sampled:**	8/25/2021
Matrix:	Water	**Date Received:**	8/26/2021

Flash Point

Analyte	Result	Units	Qualifier	Date Analyzed
Flash Point, Celsius	>70.0	C		9/1/2021

Method Reference(s): EPA 1010A

ELAP does not offer this test for approval as part of their laboratory certification program.

Report Prepared Wednesday, September 15, 2021

PARADIGM ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213873

Client: **Inventum Engineering, P.C.**

Project Reference: Bench Scale Test

Sample Identifier: AQ-COGAQ-08252021
Lab Sample ID: 213873-02 **Date Sampled:** 8/25/2021
Matrix: Water **Date Received:** 8/26/2021

TAL Metals (ICP)

Analyte	Result	Units	Qualifier	Date Analyzed
Aluminum	**0.251**	mg/L		8/31/2021 12:10
Antimony	< 0.0600	mg/L		8/31/2021 12:10
Arsenic	**0.00810**	mg/L	J	8/31/2021 12:10
Barium	**0.0755**	mg/L	J	8/31/2021 12:10
Beryllium	< 0.00500	mg/L		8/31/2021 12:10
Cadmium	< 0.00500	mg/L		8/31/2021 12:10
Calcium	**235**	mg/L		8/31/2021 12:10
Chromium	< 0.0100	mg/L		8/31/2021 12:10
Cobalt	< 0.0500	mg/L		8/31/2021 12:10
Copper	< 0.0200	mg/L		8/31/2021 12:10
Iron	**33.6**	mg/L		8/31/2021 12:10
Lead	< 0.0100	mg/L		8/31/2021 12:10
Magnesium	**42.1**	mg/L		8/31/2021 12:10
Manganese	**7.44**	mg/L		8/31/2021 12:10
Nickel	< 0.0400	mg/L		8/31/2021 12:10
Potassium	**50.5**	mg/L		8/31/2021 12:10
Selenium	< 0.0200	mg/L		8/31/2021 12:10
Silver	< 0.0100	mg/L		8/31/2021 12:10
Sodium	**46.8**	mg/L		8/31/2021 12:10
Thallium	< 0.0250	mg/L		8/31/2021 12:10
Vanadium	< 0.0250	mg/L		8/31/2021 12:10
Zinc	< 0.0600	mg/L		8/31/2021 12:10

PARADIGM
ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213873

Client: **Inventum Engineering, P.C.**

Project Reference: Bench Scale Test

Sample Identifier:	AQ-COGAQ-08252021		
Lab Sample ID:	213873-02	**Date Sampled:**	8/25/2021
Matrix:	Water	**Date Received:**	8/26/2021

Method Reference(s):	EPA 6010C
	EPA 3005A
Preparation Date:	8/30/2021
Data File:	210831B

This report is part of a multipage document and should only be evaluated in its entirety. The Chain of Custody provides additional sample information, including compliance with the sample condition requirements upon receipt.

Report Prepared Wednesday, September 15, 2021

PARADIGM
ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213873

Client: **Inventum Engineering, P.C.**

Project Reference: Bench Scale Test

Sample Identifier:	AQ-COGAQ-08252021		
Lab Sample ID:	213873-02	**Date Sampled:**	8/25/2021
Matrix:	Water	**Date Received:**	8/26/2021

PCBs

Analyte	Result	Units	Qualifier	Date Analyzed
PCB-1016	< 1.00	ug/L		9/2/2021 10:00
PCB-1221	< 1.00	ug/L		9/2/2021 10:00
PCB-1232	< 1.00	ug/L		9/2/2021 10:00
PCB-1242	< 1.00	ug/L		9/2/2021 10:00
PCB-1248	< 1.00	ug/L		9/2/2021 10:00
PCB-1254	< 1.00	ug/L		9/2/2021 10:00
PCB-1260	< 1.00	ug/L		9/2/2021 10:00
PCB-1262	< 1.00	ug/L		9/2/2021 10:00
PCB-1268	< 1.00	ug/L		9/2/2021 10:00

Surrogate	Percent Recovery	Limits	Outliers	Date Analyzed
Tetrachloro-m-xylene	**45.2**	21.7 - 95.7		9/2/2021 10:00

Method Reference(s): EPA 8082A
EPA 3510C

Preparation Date: 9/2/2021

PARADIGM
ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213873

Client: **Inventum Engineering, P.C.**

Project Reference: Bench Scale Test

Sample Identifier: AQ-COGAQ-08252021
Lab Sample ID: 213873-02 **Date Sampled:** 8/25/2021
Matrix: Water **Date Received:** 8/26/2021

Semi-Volatile Organics (Acid/Base Neutrals)

Analyte	Result	Units	Qualifier	Date Analyzed
1,1-Biphenyl	< 4840	ug/L		9/3/2021 06:24
1,2,4,5-Tetrachlorobenzene	< 4840	ug/L		9/3/2021 06:24
1,2,4-Trichlorobenzene	< 4840	ug/L		9/3/2021 06:24
1,2-Dichlorobenzene	< 4840	ug/L		9/3/2021 06:24
1,3-Dichlorobenzene	< 4840	ug/L		9/3/2021 06:24
1,4-Dichlorobenzene	< 4840	ug/L		9/3/2021 06:24
2,2-Oxybis (1-chloropropane)	< 4840	ug/L		9/3/2021 06:24
2,3,4,6-Tetrachlorophenol	< 4840	ug/L		9/3/2021 06:24
2,4,5-Trichlorophenol	< 4840	ug/L		9/3/2021 06:24
2,4,6-Trichlorophenol	< 4840	ug/L		9/3/2021 06:24
2,4-Dichlorophenol	< 4840	ug/L		9/3/2021 06:24
2,4-Dimethylphenol	< 4840	ug/L		9/3/2021 06:24
2,4-Dinitrophenol	< 9690	ug/L		9/3/2021 06:24
2,4-Dinitrotoluene	< 4840	ug/L		9/3/2021 06:24
2,6-Dinitrotoluene	< 4840	ug/L		9/3/2021 06:24
2-Chloronaphthalene	< 4840	ug/L		9/3/2021 06:24
2-Chlorophenol	< 4840	ug/L		9/3/2021 06:24
2-Methylnapthalene	**3560**	ug/L	J	9/3/2021 06:24
2-Methylphenol	< 4840	ug/L		9/3/2021 06:24
2-Nitroaniline	< 9690	ug/L		9/3/2021 06:24
2-Nitrophenol	< 4840	ug/L		9/3/2021 06:24
3&4-Methylphenol	< 4840	ug/L		9/3/2021 06:24
3,3'-Dichlorobenzidine	< 4840	ug/L		9/3/2021 06:24

PARADIGM ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213873

Client: **Inventum Engineering, P.C.**

Project Reference: Bench Scale Test

Sample Identifier: AQ-COGAQ-08252021
Lab Sample ID: 213873-02 **Date Sampled:** 8/25/2021
Matrix: Water **Date Received:** 8/26/2021

3-Nitroaniline	< 9690	ug/L		9/3/2021	06:24
4,6-Dinitro-2-methylphenol	< 9690	ug/L		9/3/2021	06:24
4-Bromophenyl phenyl ether	< 4840	ug/L		9/3/2021	06:24
4-Chloro-3-methylphenol	< 4840	ug/L		9/3/2021	06:24
4-Chloroaniline	< 4840	ug/L		9/3/2021	06:24
4-Chlorophenyl phenyl ether	< 4840	ug/L		9/3/2021	06:24
4-Nitroaniline	< 9690	ug/L		9/3/2021	06:24
4-Nitrophenol	< 9690	ug/L		9/3/2021	06:24
Acenaphthene	< 4840	ug/L		9/3/2021	06:24
Acenaphthylene	< 4840	ug/L		9/3/2021	06:24
Acetophenone	**2500**	ug/L	J	9/3/2021	06:24
Anthracene	< 4840	ug/L		9/3/2021	06:24
Atrazine	< 12100	ug/L		9/3/2021	06:24
Benzaldehyde	< 4840	ug/L		9/3/2021	06:24
Benzo (a) anthracene	< 4840	ug/L		9/3/2021	06:24
Benzo (a) pyrene	< 4840	ug/L		9/3/2021	06:24
Benzo (b) fluoranthene	< 4840	ug/L		9/3/2021	06:24
Benzo (g,h,i) perylene	< 4840	ug/L		9/3/2021	06:24
Benzo (k) fluoranthene	< 4840	ug/L		9/3/2021	06:24
Bis (2-chloroethoxy) methane	< 4840	ug/L		9/3/2021	06:24
Bis (2-chloroethyl) ether	< 4840	ug/L		9/3/2021	06:24
Bis (2-ethylhexyl) phthalate	< 4840	ug/L		9/3/2021	06:24
Butylbenzylphthalate	< 4840	ug/L		9/3/2021	06:24
Caprolactam	< 4840	ug/L		9/3/2021	06:24
Carbazole	< 4840	ug/L		9/3/2021	06:24

PARADIGM ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213873

Client: **Inventum Engineering, P.C.**

Project Reference: Bench Scale Test

Sample Identifier: AQ-COGAQ-08252021

Lab Sample ID: 213873-02 **Date Sampled:** 8/25/2021

Matrix: Water **Date Received:** 8/26/2021

Chrysene	< 4840	ug/L	9/3/2021	06:24
Dibenz (a,h) anthracene	< 4840	ug/L	9/3/2021	06:24
Dibenzofuran	< 4840	ug/L	9/3/2021	06:24
Diethyl phthalate	< 4840	ug/L	9/3/2021	06:24
Dimethyl phthalate	< 9690	ug/L	9/3/2021	06:24
Di-n-butyl phthalate	< 4840	ug/L	9/3/2021	06:24
Di-n-octylphthalate	< 4840	ug/L	9/3/2021	06:24
Fluoranthene	< 4840	ug/L	9/3/2021	06:24
Fluorene	< 4840	ug/L	9/3/2021	06:24
Hexachlorobenzene	< 4840	ug/L	9/3/2021	06:24
Hexachlorobutadiene	< 4840	ug/L	9/3/2021	06:24
Hexachlorocyclopentadiene	< 4840	ug/L	9/3/2021	06:24
Hexachloroethane	< 4840	ug/L	9/3/2021	06:24
Indeno (1,2,3-cd) pyrene	< 4840	ug/L	9/3/2021	06:24
Isophorone	< 4840	ug/L	9/3/2021	06:24
Naphthalene	**54400**	ug/L	9/3/2021	06:24
Nitrobenzene	< 4840	ug/L	9/3/2021	06:24
N-Nitroso-di-n-propylamine	< 4840	ug/L	9/3/2021	06:24
N-Nitrosodiphenylamine	< 4840	ug/L	9/3/2021	06:24
Pentachlorophenol	< 9690	ug/L	9/3/2021	06:24
Phenanthrene	< 4840	ug/L	9/3/2021	06:24
Phenol	< 4840	ug/L	9/3/2021	06:24
Pyrene	< 4840	ug/L	9/3/2021	06:24

PARADIGM
ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213873

Client: **Inventum Engineering, P.C.**

Project Reference: Bench Scale Test

Sample Identifier: AQ-COGAQ-08252021

Lab Sample ID: 213873-02 **Date Sampled:** 8/25/2021

Matrix: Water **Date Received:** 8/26/2021

Surrogate	Percent Recovery	Limits	Outliers	Date Analyzed	
2,4,6-Tribromophenol	NC	55.4 - 111		9/3/2021	06:24
2-Fluorobiphenyl	NC	30.9 - 98.1		9/3/2021	06:24
2-Fluorophenol	NC	10 - 105		9/3/2021	06:24
Nitrobenzene-d5	NC	49.6 - 104		9/3/2021	06:24
Phenol-d5	NC	10 - 105		9/3/2021	06:24
Terphenyl-d14	NC	56.5 - 118		9/3/2021	06:24

Method Reference(s): EPA 8270D
EPA 3510C
Preparation Date: 8/31/2021
Data File: B56695.D

PARADIGM
ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213873

Client: **Inventum Engineering, P.C.**

Project Reference: Bench Scale Test

Sample Identifier: AQ-COGAQ-08252021
Lab Sample ID: 213873-02 **Date Sampled:** 8/25/2021
Matrix: Water **Date Received:** 8/26/2021

Volatile Organics

Analyte	Result	Units	Qualifier	Date Analyzed
1,1,1-Trichloroethane	< 200	ug/L		8/30/2021 16:45
1,1,2,2-Tetrachloroethane	< 200	ug/L		8/30/2021 16:45
1,1,2-Trichloroethane	< 200	ug/L		8/30/2021 16:45
1,1-Dichloroethane	< 200	ug/L		8/30/2021 16:45
1,1-Dichloroethene	< 200	ug/L		8/30/2021 16:45
1,2,3-Trichlorobenzene	< 500	ug/L		8/30/2021 16:45
1,2,4-Trichlorobenzene	< 500	ug/L		8/30/2021 16:45
1,2-Dibromo-3-Chloropropane	< 1000	ug/L		8/30/2021 16:45
1,2-Dibromoethane	< 200	ug/L		8/30/2021 16:45
1,2-Dichlorobenzene	< 200	ug/L		8/30/2021 16:45
1,2-Dichloroethane	< 200	ug/L		8/30/2021 16:45
1,2-Dichloropropane	< 200	ug/L		8/30/2021 16:45
1,3-Dichlorobenzene	< 200	ug/L		8/30/2021 16:45
1,4-Dichlorobenzene	< 200	ug/L		8/30/2021 16:45
1,4-Dioxane	< 1000	ug/L		8/30/2021 16:45
2-Butanone	< 1000	ug/L		8/30/2021 16:45
2-Hexanone	< 500	ug/L		8/30/2021 16:45
4-Methyl-2-pentanone	< 500	ug/L		8/30/2021 16:45
Acetone	< 1000	ug/L		8/30/2021 16:45
Benzene	**1910**	ug/L		8/30/2021 16:45
Bromochloromethane	< 500	ug/L		8/30/2021 16:45
Bromodichloromethane	< 200	ug/L		8/30/2021 16:45
Bromoform	< 500	ug/L		8/30/2021 16:45

PARADIGM
ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213873

Client: **Inventum Engineering, P.C.**

Project Reference: Bench Scale Test

Sample Identifier: AQ-COGAQ-08252021
Lab Sample ID: 213873-02 **Date Sampled:** 8/25/2021
Matrix: Water **Date Received:** 8/26/2021

Bromomethane	< 200	ug/L		8/30/2021	16:45
Carbon disulfide	< 200	ug/L		8/30/2021	16:45
Carbon Tetrachloride	< 200	ug/L		8/30/2021	16:45
Chlorobenzene	< 200	ug/L		8/30/2021	16:45
Chloroethane	< 200	ug/L		8/30/2021	16:45
Chloroform	< 200	ug/L		8/30/2021	16:45
Chloromethane	< 200	ug/L		8/30/2021	16:45
cis-1,2-Dichloroethene	< 200	ug/L		8/30/2021	16:45
cis-1,3-Dichloropropene	< 200	ug/L		8/30/2021	16:45
Cyclohexane	< 1000	ug/L		8/30/2021	16:45
Dibromochloromethane	< 200	ug/L		8/30/2021	16:45
Dichlorodifluoromethane	< 200	ug/L		8/30/2021	16:45
Ethylbenzene	**129**	ug/L	J	8/30/2021	16:45
Freon 113	< 200	ug/L		8/30/2021	16:45
Isopropylbenzene	< 200	ug/L		8/30/2021	16:45
m,p-Xylene	**2180**	ug/L		8/30/2021	16:45
Methyl acetate	< 200	ug/L		8/30/2021	16:45
Methyl tert-butyl Ether	< 200	ug/L		8/30/2021	16:45
Methylcyclohexane	< 200	ug/L		8/30/2021	16:45
Methylene chloride	< 500	ug/L		8/30/2021	16:45
o-Xylene	**731**	ug/L		8/30/2021	16:45
Styrene	< 500	ug/L		8/30/2021	16:45
Tetrachloroethene	< 200	ug/L		8/30/2021	16:45
Toluene	**2440**	ug/L		8/30/2021	16:45
trans-1,2-Dichloroethene	< 200	ug/L		8/30/2021	16:45

PARADIGM
ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213873

Client: **Inventum Engineering, P.C.**

Project Reference: Bench Scale Test

Sample Identifier: AQ-COGAQ-08252021
Lab Sample ID: 213873-02 **Date Sampled:** 8/25/2021
Matrix: Water **Date Received:** 8/26/2021

trans-1,3-Dichloropropene	< 200	ug/L	8/30/2021	16:45
Trichloroethene	< 200	ug/L	8/30/2021	16:45
Trichlorofluoromethane	< 200	ug/L	8/30/2021	16:45
Vinyl chloride	< 200	ug/L	8/30/2021	16:45

Surrogate	Percent Recovery	Limits	Outliers	Date Analyzed	
1,2-Dichloroethane-d4	**121**	83 - 120	*	8/30/2021	16:45
4-Bromofluorobenzene	**97.5**	65.5 - 118		8/30/2021	16:45
Pentafluorobenzene	**105**	91.2 - 109		8/30/2021	16:45
Toluene-D8	**91.4**	79.7 - 112		8/30/2021	16:45

Method Reference(s): EPA 8260C
EPA 5030C
Data File: z03825.D

PARADIGM
ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 213873

Client: **Inventum Engineering, P.C.**

Project Reference: Bench Scale Test

Sample Identifier:	AQ-COGAQ-08252021		
Lab Sample ID:	213873-02	**Date Sampled:**	8/25/2021
Matrix:	Water	**Date Received:**	8/26/2021

Dioxane

Analyte	Result	Units	Qualifier	Date Analyzed
1,4-Dioxane	**0.583**	ug/L		9/1/2021 16:48

The ions present elute within the same retention time range as 1,4-Dioxane, and due to interferences in the mass spectra 1,4-Dioxane cannot be eliminated as a constituent of the sample. There may also be additional components present.

Method Reference(s): EPA 8270D SIM
EPA 3510C
Preparation Date: 8/31/2021
Data File: B56644.D

Report Prepared Wednesday, September 15, 2021

PARADIGM
ENVIRONMENTAL SERVICES, INC.

Analytical Report Appendix

The reported results relate only to the samples as they have been received by the laboratory.

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All soil/sludge samples have been reported on a dry weight basis, unless qualified "reported as received". Other solids are reported as received.

Low level Volatiles blank reports for soil/solid matrix are based on a nominal 5 gram weight. Sample results and reporting limits are based on actual weight, which may be more or less than 5 grams.

The Chain of Custody provides additional information, including compliance with sample condition requirements upon receipt. Sample condition requirements are defined under the 2003 NELAC Standard, sections 5.5.8.3.1 and 5.5.8.3.2.

NYSDOH ELAP does not certify for all parameters. Paradigm Environmental Services or the indicated subcontracted laboratory does hold certification for all analytes where certification is offered by ELAP unless otherwise specified. Aliquots separated for certain tests, such as TCLP, are indicated on the Chain of Custody and final reports with an "A" suffix.

Data qualifiers are used, when necessary, to provide additional information about the data. This information may be communicated as a flag or as text at the bottom of the report. Please refer to the following list of analyte-specific, frequently used data flags and their meaning:

"<" = Analyzed for but not detected at or above the quantitation limit.
"E" = Result has been estimated, calibration limit exceeded.
"Z" = See case narrative.
"D" = Sample, Laboratory Control Sample, or Matrix Spike Duplicate results above Relative Percent Difference limit.
"M" = Matrix spike recoveries outside QC limits. Matrix bias indicated.
"B" = Method blank contained trace levels of analyte. Refer to included method blank report.
"J" = Result estimated between the quantitation limit and half the quantitation limit.
"L" = Laboratory Control Sample recovery outside accepted QC limits.
"P" = Concentration differs by more than 40% between the primary and secondary analytical columns.
"NC" = Not calculable. Applicable to RPD if sample or duplicate result is non-detect or estimated (see primary report for data flags). Applicable to MS if sample is greater or equal to ten times the spike added. Applicable to sample surrogates or MS if sample dilution is 10x or higher.
"" = Indicates any recoveries outside associated acceptance windows. Surrogate outliers in samples are presumed matrix effects. LCS demonstrates method compliance unless otherwise noted.*
"(1)" = Indicates data from primary column used for QC calculation.
"A" = denotes a parameter for which ELAP does not offer approval as part of their laboratory certification program.
"F" = denotes a parameter for which Paradigm does not carry certification, the results for which should therefore only be used where ELAP certification is not required, such as personal exposure assessment.

GENERAL TERMS AND CONDITIONS
LABORATORY SERVICES

These Terms and Conditions embody the whole agreement of the parties in the absence of a signed and executed contract between the Laboratory (LAB) and Client. They shall supersede all previous communications, representations, or agreements, either verbal or written, between the parties. The LAB specifically rejects all additional, inconsistent, or conflicting terms, whether printed or otherwise set forth in any purchase order or other communication from the Client to the LAB. The invalidity or unenforceability in whole or in part of any provision, tern or condition hereof shall not affect in any way the validity or enforceability of the remainder of the Terms and Conditions. No waiver by LAB of any provision, term, or condition hereof or of any breach by or obligation of the Client hereunder shall constitute a waiver of such provision, term, or condition on any other occasion or a waiver of any other breach by or obligation of the Client. This agreement shall be administered and interpreted under the laws of the state which services are procured.

Warranty. Recognizing that the nature of many samples is unknown and that some may contain potentially hazardous components, LAB warrants only that it will perform testing services, obtain findings, and prepare reports in accordance with generally accepted analytical laboratory principles and practices at the time of performance of services. LAB makes no other warranty, express or implied.

Scope and Compensation. LAB agrees to perform the services described in the chain of custody to which these terms and conditions are attached. Unless the parties agree in writing to the contrary, the duties of LAB shall not be construed to exceed the services specifically described. LAB wi use LAB default method for all tests unless specified otherwise on the Work Order.
Payment terms are net 30 days from the date of invoice. All overdue payments are subject to an interest charge of one and one-half percent (1-1/2%) per month or a portion thereof. Client shall also be responsible for costs of collection, including payment of reasonable attorney fees if such expense is incurred. The prices, unless stated, do not include any sale, use or other taxes. Such taxes will be added to invoice prices when required.

Prices. Compensation for services performed will be based on the current Lab Analytical Fee Schedule or on quotations agreed to in writing by the parties. Turnaround time based charges are determined from the time of resolution of all work order questions. Testimony, court appearances or data compilation for legal action will be charged separately. Evaluation and reporting of initial screening runs may incur additional fees.

Limitations of Liability. In the event of any error, omission, or other professional negligence, the sole and exclusive responsibility of LAB shall be to re-perform the deficient work at its own expense and LAB shall have no other liability whatsoever. All claims shall be deemed waived unless made in writing and received by LAB within ninety (90) days following completion of services.
LAB shall have no liability, obligation, or responsibility of any kind for losses, costs, expenses, or other damages (including but not limited to any special, direct, incidental or consequential damages) with respect to LAB's services or results.
All results provided by LAB are strictly for the use of its clients and LAB is in no way responsible for the use of such results by clients or third parties. All reports should be considered in their entirety, and LAB is not responsible for the separation, detachment, or other use of any portion of these reports. Client may not assign the lab report without the written consent of the LAB.
Client covenants and agrees, at its/his/her sole expense, to indemnify, protect, defend, and save harmless the LAB from and against any and all damages, losses, liabilities, obligations, penalties, claims, litigation, demands, defenses, judgments, suits, actions, proceedings, costs, disbursements and/or expenses (including, without limitation attorneys' and experts' fees and disbursements) of any kind whatsoever which may at any time be imposed upon, incurred by or asserted or awarded against client relating to, resulting from or arising out of (a) the breach of this agreement by this client, (b) the negligence of the client in handling, delivering or disclosing any hazardous substance, (c) the violation of the Client of any applicable law, (d) non-compliance by the Client with any environmental permit or (e) a material misrepresentation in disclosing the materials to be tested.

Hazard Disclosure. Client represents and warrants that any sample delivered to LAB will be preceded or accompanied by complete written disclosure of the presence of any hazardous substances known or suspected by Client. Client further warrants that any sample containing any hazardous substance that is to be delivered to LAB will be packaged, labeled, transported, and delivered properly and in accordance with applicable laws.

Sample Handling. Prior to LAB's acceptance of any sample (or after any revocation of acceptance), the entire risk of loss or of damage to such sample remains with Client. Samples are accepted when receipt is acknowledged on chain of custody documentation. In no event will LAB have any responsibility for the action or inaction of any carrier shipping or delivering any sample to or from LAB premises.
Client authorizes LAB to proceed with the analysis of samples as received by the laboratory, recognizing that any samples not in compliance with all current DOH-ELAP-NELAP requirements for containers, preservation or holding time will be noted as such on th final report.
Disposal of hazardous waste samples is the responsibility of the Client. If the Client does not wish such samples returned, LAB may add storage and disposal fees to the final invoice. Maximum storage time for samples is 30 days after completion of analysis unless modified by applicable state or federal laws. Client will be required to give the LAB written instructions concerning disposal of these samples.
LAB reserves the absolute right, exercisable at any time, to refuse to receive delivery of, refuse to accept, or revoke acceptance of any sample, which, in the sole judgment of LAB (a) is of unsuitable volume, (b) may be or become unsuitable for or may pose a risk in handling, transport, or processing for any health, safety, environmental or other reason whether or not due to the presence in the sample of any hazardous substance, and whether or not such presence has been disclosed to LAB by Client or (c) if the condition or sample date make the sample unsuitable for analysis.

Legal Responsibility. LAB is solely responsible for performance of this contract, and no affiliated company, director, officer, employee, or agent shall have any legal responsibility hereunder, whether in contract or tort including negligence.

Assignment. LAB may assign its performance obligations under this contract to other parties, as it deems necessary. LAB shall disclose to Client any assignee (subcontractor) by ELAP ID # on the submitted final report.

Force Majeure. LAB shall have no responsibility or liability to the Client for any failure or delay in performance by LAB, which results in whole or in part from any cause or circumstance beyond the reasonable control of LAB. Such causes and circumstances shall include, but not limited to, acts of God, acts or orders of any government authority, strikes or other labor disputes, natural disasters, accidents, wars, civil disturbances, difficulties or delays in transportation, mail or delivery services, inability to obtain sufficient services or supplies from LAB's usual suppliers, or any other cause beyond LAB's reasonable control.

Law. This contract shall be continued under the laws of the State of New York without regard to its conflicts of laws provision.

179 Lake Avenue, Rochester, NY 14608 Office (585) 647-2530 Fax (585) 647-3311

1 of 2

PARADIGM

CHAIN OF CUSTODY

REPORT TO:

CLIENT: INVENTUM ENGINEERING
ADDRESS: 481 CARLISLE DR SUITE 202
CITY: HERNDON STATE: VA ZIP: 20170
PHONE: 585-734-5255
ATTN: ROXANNE BIRX

INVOICE TO:

CLIENT: SAME
ADDRESS:
CITY: STATE: ZIP:
PHONE:
ATTN: JOHN BLACK

LAB PROJECT ID: 213873
Quotation #:
Email: john.black@inventumeng.com roxanne.birx@inventumeng.com

PROJECT REFERENCE
BENCH SCALE TEST

Matrix Codes:
AQ - Aqueous Liquid; NQ - Non-Aqueous Liquid; WA - Water; WG - Groundwater; DW - Drinking Water; WW - Wastewater; SO - Soil; SG - Sludge; SD - Solid; PT - Paint; WP - Wipe; CK - Caulk; OL - Oil; AR - Air

REQUESTED ANALYSIS

DATE COLLECTED	TIME COLLECTED	COMPOSITE	GRAB	SAMPLE IDENTIFIER	MATRIX CODES	NUMBER OF CONTAINERS	VOCs 5035A/8260C	SVOCs 8270 D	CYANIDE SM4500 CN C-2011	TAL METALS 6010C	MERCURY 7470A	PCBs 8270 D	PEST HERB 8081B/8151A	1,4 DIOXANE	PFAS ASTM D7968	TCLP FULL LIST	TCLP BORON CYANIDES, FLUORIDE NITRATES+ NITRITES, URANIUM	PAINT FILTER	HAZ CHAT	BTU + FLASH POINT	TOTAL SULFUR	CYANIDE 9012	LOW LEVEL HG	PFAS 537 MOD	PH	PARADIGM LAB SAMPLE NUMBER
8/25/21	1305		X	SD-RACKCOG-08252021	SD	25	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓					01A
8/25/21	1325		X	AQ-COGAQ-08252021	WA	9 11 rec'd 8/26/21	✓	✓		✓		✓	✓	✓					✓			✓	✓	✓	✓	02

Included bottle order to clearly list parameters if chain is too sloppy.

Turnaround Time		Report Supplements		
Availability contingent upon lab approval; additional fees may apply.				
Standard 5 day	☒	None Required	☐	None Required ☐
10 day	☐	Batch QC	☒	Basic EDD ☒
Rush 3 day	☐	Category A	☐	NYSDEC EDD ☒
Rush 2 day	☐	Category B	☐	LEVEL IV DATA
Rush 1 day	☐			
Date Needed _____ please indicate date needed:		Other please indicate package needed:	☐	Other EDD please indicate EDD needed : ☐

ROXANNE BIRX — Sampled By — 8/25/21 1305 — Date/Time
Relinquished By — 8/25/21 1400 — Date/Time
Received By — 8/25/21 16:00 — Date/Time
Received @ Lab By — 8/26/21 1642 — Date/Time

Total Cost:

P.I.F.

3°C iced 8/26/21 15:57

By signing this form, client agrees to Paradigm Terms and Conditions (reverse).

Custody Seal N/A. Samples delivered by Paradigm GP 8/26/21

See additional page for sample conditions.

2082

Chain of Custody Supplement

PARADIGM

Client: Inventum Completed by: [signature]

Lab Project ID: 213873 Date: 8/26/21

Sample Condition Requirements

Per NELAC/ELAP 210/241/242/243/244

Condition	Yes	No	N/A
	NELAC compliance with the sample condition requirements upon receipt		
Container Type	✓		
Comments	Transferred portion of 02 to 8oz glass jar ~~w/H2SO4~~ eem 8/27/21 for reactivity ~~pH<2~~ eem 8/27/21		
Transferred to method-compliant container	~~S3 to 6-3~~ ~~S3 to 6-3~~		✓
Headspace (<1 mL)	VOA-02		
Comments	Transferred portion of 02 to 8oz glass jar for Flash		
Preservation	~~VOA-02~~ ~~TCN-02~~ LLHg-02		✓
Comments			
Chlorine Absent (<0.10 ppm per test strip)			✓
Comments			
Holding Time	✓	pH-02	
Comments			
Temperature	✓		MCT poly-02
Comments	3°C iced		
Compliant Sample Quantity/Type	✓	x reactivity 02	
Comments	No bottle certs for 125ml poly, 250 poly not in cert bottles. No bottle cert for VOA-02, PFAS sent directly to sub lab		

Adirondack Environmental Services, Inc

Date: *02-Sep-21*

CLIENT:	Paradigm Environmental	**Client Sample ID:**	SD-RackCDG-08252021
Work Order:	**210830012**	**Collection Date:**	8/25/2021 1:05:00 PM
Reference:	Analysis of Samples / Project# 213873	**Lab Sample ID:**	210830012-001
PO#:		**Matrix:**	SOLID

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
CYANIDE, TOTAL - SW 9012B						Analyst: **KB**
(Prep: 9010C - 8/31/2021)						
Cyanide	**287**	50.0		µg/g	100	8/31/2021 4:32:21 PM
HEAT VALUE - ASTM D240-09						Analyst: **CP**
Heat Value	**12000**	500		btu/lb	1	9/1/2021
SW 7.3.3.2, NOT ELAP CERTIFIED						Analyst: **KB**
(Prep: E335.4 - 9/2/2021)						
Reactive Cyanide	**1.4**	1.0		µg/g	1	9/2/2021 12:42:55 PM
SW 7.3.4.2, NOT ELAP CERTIFIED						Analyst: **CS**
(Prep: E335.4 - 9/2/2021)						
Reactive Sulfide	**20**	10		µg/g	1	9/2/2021
REACTIVITY - SW 7.3.4.2, NOT ELAP CERTIFIED						Analyst: **CS**
Reactivity	**Non Reactive**	0			1	9/2/2021

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quanititation limits
B - Analyte detected in the associated Method Blank
X - Value exceeds Maximum Contaminant Level
E - Value above quantitation range-Estimate
S - LCS Spike below accepted limits (+ above)
Z - RPD outside accepted recovery limits
N - Matrix Spike below accepted limits (+ above)
T - Tentitively Identified Compound-Estimated Conc.

Adirondack Environmental Services, Inc

Date: *02-Sep-21*

CLIENT:	Paradigm Environmental	**Client Sample ID:**	AQ-COG AQ-08252021
Work Order:	**210830012**	**Collection Date:**	8/25/2021 1:25:00 PM
Reference:	Analysis of Samples / Project# 213873	**Lab Sample ID:**	210830012-002
PO#:		**Matrix:**	WATER

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
CYANIDE, TOTAL - EPA 335.4 REV 1.0						Analyst: **KB**
(Prep: 335.4 - 8/31/2021)						
Cyanide	**1.2**	0.10		mg/L	10	8/31/2021 4:06:26 PM
SW 7.3.3.2, NOT ELAP CERTIFIED						Analyst: **KB**
(Prep: E335.4 - 9/1/2021)						
Reactive Cyanide	**ND**	1.0		µg/g	1	9/2/2021 12:41:09 PM
SW 7.3.4.2, NOT ELAP CERTIFIED						Analyst: **CS**
(Prep: E335.4 - 9/1/2021)						
Reactive Sulfide	**16**	10		µg/g	1	9/2/2021
REACTIVITY - SW 7.3.4.2, NOT ELAP CERTIFIED						Analyst: **CS**
Reactivity	**Non Reactive**	0			1	9/2/2021

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quanititation limits
B - Analyte detected in the associated Method Blank
X - Value exceeds Maximum Contaminant Level
E - Value above quantitation range-Estimate
S - LCS Spike below accepted limits (+ above)
Z - RPD outside accepted recovery limits
N - Matrix Spike below accepted limits (+ above)
T - Tentitively Identified Compound-Estimated Conc.

Adirondack Environmental Services, Inc

Date: *02-Sep-21*

CLIENT:	Paradigm Environmental	**Client Sample ID:**	SD-RackCDG-08252021
Work Order:	**210830012**	**Collection Date:**	8/25/2021 1:05:00 PM
Reference:	Analysis of Samples / Project# 213873	**Lab Sample ID:**	210830012-003
PO#:		**Matrix:**	TCLP-EXTRACT

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
TCLP HERBICIDES - EPA 8321B						Analyst: **KF**
(Prep: SW3535A - 8/30/2021)						
2,4,5-TP (Silvex)-TCLP	**ND**	0.050		mg/L	1	8/30/2021 7:45:00 PM
2,4-D-TCLP	**ND**	0.050		mg/L	1	8/30/2021 7:45:00 PM
Surr: Acifluorfen	**63.4**	52.5-128		%REC	1	8/30/2021 7:45:00 PM
Surr: DCAA	**91.7**	56.2-139		%REC	1	8/30/2021 7:45:00 PM

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quanititation limits
B - Analyte detected in the associated Method Blank
X - Value exceeds Maximum Contaminant Level
E - Value above quantitation range-Estimate
S - LCS Spike below accepted limits (+ above)
Z - RPD outside accepted recovery limits
N - Matrix Spike below accepted limits (+ above)
T - Tentitively Identified Compound-Estimated Conc.

179 Lake Avenue, Rochester, NY 14608 Office (585) 647-2530 Fax (585) 647-3311

210830012

CHAIN OF CUSTODY

ADIRONDACK: ELAP ID: 1

210830012 Demo

REPORT TO:		INVOICE TO:			
COMPANY:	Paradigm Environmental	COMPANY:	Same	LAB PROJECT #:	CLIENT PROJECT
ADDRESS:		ADDRESS:			
CITY: STATE: ZIP:		CITY: STATE: ZIP:		TURNAROUND TIME: (WORKING DAYS)	
PHONE: FAX:		PHONE: FAX:			STD
PROJECT NAME/SITE NAME:		ATTN:	Reporting	☐ 1 ☐ 2 ☐ 3 ☐ 5	
		COMMENTS:	Please email results to reporting@paradigmenv.com	Date Due: 9/3 for data	

REQUESTED ANALYSIS

Report to Floyd

ASP Cat B Package Due 9/17

	DATE	TIME	COMPOSITE	GRAB	SAMPLE LOCATION/FIELD ID	MATRIX	NUMBER OF CONTAINERS	BTX	TCN	1,4 Dioxane SIM 8260/21	Reactivity	Cyanide	TCLP Herb	REMARKS	PARADIGM SAMPLE NUMBER
001	1	8/25/21	1305	X	SD-RackCOG-08252021	Soil	1	X			X	X		213373-01	
002	2	8/25/21	1325	X	AQ-COG-AQ-0825 2021	W	~~2~~ 1		X	X	X			213373-02 Limited vol reactivity	
003	3	8/25/21	1305	X	SD-RACK COG--05252021 TCLP extract		1						1	213373-01A	
	4													Sample Spinon 8/27/21	
	5														
	6														
	7														
	8														
	9														
	10														

LAB USE ONLY BELOW THIS LINE

Sample Condition: Per NELAC/ELAP 210/241/242/243/244

Receipt Parameter	NELAC Compliance	
Container Type:	Y ☐	N ☐
Comments: Not ADS		
Preservation:	Y ☐	N ☐
Comments:		
Holding Time:	Y ☐	N ☐
Comments:		
Temperature:	Y ☐	N ☐
Comments: 4°		

Client

	Date/Time	
Sampled By: Molly Kail	8/30/21 per m 8/27/21	8:30
Relinquished By:	Date/Time	
Received By:	8/30/21	1220
Received @ Lab By:	8/30/21	4:24 PM

Total Cost:

P.I.F.

Adirondack Environmental Services Inc.®
Experience is the solution
314 North Pearl Street • Albany, New York 12207 • (518) 434-4546 • Fax (518) 434-0891

TERMS, CONDITIONS & LIMITATIONS

All service rendered by the **Adirondack Environmental Services, Inc.** are undertaken and all rates are based upon the following terms:

(a) Neither **Adirondack Environmental Services, Inc.,** nor any of its employees, agents or sub-contractors shall be liable for any loss or damage arising out of **Adirondack Environmental Services, Inc.'s** performance or nonperformance, whether by way of negligence or breach of contract, or otherwise, in any amount greater than twice the amount billed to the customer for the work leading to the claim of the customer. Said remedy shall be the sole and exclusive remedy against **Adirondack Environmental Services, Inc.** arising out of its work.

(b) All claims made must be in writing within forty-five (45) days after delivery of the **Adirondack Environmental Services, Inc.** report regarding said work or such claim shall be deemed or irrevocably waived.

(c) **Adirondack Environmental Services, Inc.** reports are submitted in writing and are for our customers only. Our customers are considered to be only those entities being billed for our services. Acquisition of an **Adirondack Environmental Services, Inc.** report by other than our customer does not constitute a representation of **Adirondack Environmental Services, Inc.** as to the accuracy of the contents thereof.

(d) In no event shall **Adirondack Environmental Services, Inc.,** its employees, agents or sub-contractors be responsible for consequential or special damages of any kind or in any amount.

(e) No deviation from the terms set forth herein shall bind **Adirondack Environmental Services, Inc.** unless in writing and signed by a Director of **Adirondack Environmental Services, Inc.**

(f) Results pertain only to items analyzed. Information supplied by client is assumed to be correct. This information may be used on reports and in calculations and **Adirondack Environmental Services, Inc.** is not responsible for the accuracy of this information.

(g) Payments by Credit Card/Purchase Cards are subject to a 3% additional charge.

ANALYTICAL REPORT

Lab Number:	L2145703
Client:	Paradigm Environmental Services 179 Lake Avenue Rochester, NY 14608
ATTN:	Jane Daloia
Phone:	(585) 647-2530
Project Name:	BENCH SCALE TEST
Project Number:	BENCH SCALE TEST
Report Date:	09/09/21

Certifications & Approvals: MA (M-MA030), NH NELAP (2062), CT (PH-0141), DoD (L2474), FL (E87814), IL (200081), LA (85084), ME (MA00030), MD (350), NJ (MA015), NY (11627), NC (685), OH (CL106), PA (68-02089), RI (LAO00299), TX (T104704419), VT (VT-0015), VA (460194), WA (C954), US Army Corps of Engineers, USDA (Permit #P330-17-00150), USFWS (Permit #206964).

320 Forbes Boulevard, Mansfield, MA 02048-1806
508-822-9300 (Fax) 508-822-3288 800-624-9220 - www.alphalab.com

Project Name: BENCH SCALE TEST
Project Number: BENCH SCALE TEST

Lab Number: L2145703
Report Date: 09/09/21

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L2145703-01	SD-RACKCOG-08252021	SOLID	Not Specified	08/25/21 13:05	08/25/21
L2145703-02	AQ-COGAQ-08252021	WATER	Not Specified	08/25/21 13:25	08/25/21

Project Name:	BENCH SCALE TEST	**Lab Number:**	L2145703
Project Number:	BENCH SCALE TEST	**Report Date:**	09/09/21

Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet NELAP requirements for all NELAP accredited parameters unless otherwise noted in the following narrative. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. Tentatively Identified Compounds (TICs), if requested, are reported for compounds identified to be present and are not part of the method/program Target Compound List, even if only a subset of the TCL are being reported. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively.

When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances, the specific failure is not narrated but noted in the associated QC Outlier Summary Report, located directly after the Case Narrative. QC information is also incorporated in the Data Usability Assessment table (Format 11) of our Data Merger tool, where it can be reviewed in conjunction with the sample result, associated regulatory criteria and any associated data usability implications.

Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

HOLD POLICY - For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Alpha Project Manager and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Project Management at 800-624-9220 with any questions.

Project Name:	BENCH SCALE TEST	**Lab Number:**	L2145703
Project Number:	BENCH SCALE TEST	**Report Date:**	09/09/21

Case Narrative (continued)

Report Submission

All non-detect (ND) or estimated concentrations (J-qualified) have been quantitated to the limit noted in the MDL column.

Perfluorinated Alkyl Acids by Isotope Dilution

L2145703-01: The sample has elevated detection limits due to the limited sample volume utilized during extraction, as required by the sample matrix.

L2145703-01 and -02: Extracted Internal Standard recoveries were outside the acceptance criteria for individual analytes. Please refer to the surrogate section of the report for details.

L2145703-02: The sample was centrifuged and decanted prior to extraction due to sample matrix.

L2145703-02: The 6:2FTS result is not reported because the quadratic fit of the curve does not allow for an estimated "E" flagged value. The sample was re-extracted on dilution and the result within the calibration curve is reported for this compound.

WG1541092-4: Extracted Internal Standard recoveries were outside the acceptance criteria for individual analytes. Please refer to the surrogate section of the report for details.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature:  Alycia Mogayzel

Title: Technical Director/Representative Date: 09/09/21

ORGANICS

SEMIVOLATILES

Project Name: BENCH SCALE TEST
Project Number: BENCH SCALE TEST
Lab Number: L2145703
Report Date: 09/09/21

SAMPLE RESULTS

Lab ID: L2145703-01
Client ID: SD-RACKCOG-08252021
Sample Location: Not Specified

Date Collected: 08/25/21 13:05
Date Received: 08/25/21
Field Prep: Not Specified

Sample Depth:
Matrix: Solid
Analytical Method: 134,LCMSMS-ID
Analytical Date: 09/01/21 02:26
Analyst: SG
Percent Solids: 34%

Extraction Method: ALPHA 23528
Extraction Date: 08/31/21 09:32

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab						
Perfluorobutanoic Acid (PFBA)	ND		ng/g	26.8	1.22	1
Perfluoropentanoic Acid (PFPeA)	ND		ng/g	26.8	2.47	1
Perfluorobutanesulfonic Acid (PFBS)	ND		ng/g	13.4	2.09	1
Perfluorohexanoic Acid (PFHxA)	ND		ng/g	26.8	2.82	1
Perfluoroheptanoic Acid (PFHpA)	ND		ng/g	13.4	2.42	1
Perfluorohexanesulfonic Acid (PFHxS)	ND		ng/g	13.4	3.24	1
Perfluorooctanoic Acid (PFOA)	ND		ng/g	13.4	2.25	1
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND		ng/g	26.8	9.63	1
Perfluoroheptanesulfonic Acid (PFHpS)	ND		ng/g	26.8	7.32	1
Perfluorononanoic Acid (PFNA)	ND		ng/g	13.4	4.02	1
Perfluorooctanesulfonic Acid (PFOS)	ND		ng/g	13.4	6.97	1
Perfluorodecanoic Acid (PFDA)	ND		ng/g	13.4	3.59	1
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND		ng/g	26.8	15.4	1
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND		ng/g	26.8	10.8	1
Perfluoroundecanoic Acid (PFUnA)	ND		ng/g	26.8	2.51	1
Perfluorodecanesulfonic Acid (PFDS)	ND		ng/g	26.8	8.20	1
Perfluorooctanesulfonamide (FOSA)	ND		ng/g	26.8	5.26	1
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND		ng/g	26.8	4.53	1
Perfluorododecanoic Acid (PFDoA)	ND		ng/g	26.8	3.75	1
Perfluorotridecanoic Acid (PFTrDA)	ND		ng/g	26.8	11.0	1
Perfluorotetradecanoic Acid (PFTA)	ND		ng/g	26.8	2.90	1
PFOA/PFOS, Total	ND		ng/g	13.4	2.25	1

Project Name: BENCH SCALE TEST **Lab Number:** L2145703

Project Number: BENCH SCALE TEST **Report Date:** 09/09/21

SAMPLE RESULTS

Lab ID: L2145703-01 Date Collected: 08/25/21 13:05

Client ID: SD-RACKCOG-08252021 Date Received: 08/25/21

Sample Location: Not Specified Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor

Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab

Surrogate (Extracted Internal Standard)	% Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	97		61-135
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	98		58-150
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	101		74-139
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	83		66-128
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	99		71-129
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	103		78-139
Perfluoro[13C8]Octanoic Acid (M8PFOA)	96		75-130
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	**195**	Q	20-154
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	96		72-140
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	107		79-136
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	101		75-130
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	138		19-175
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	106		31-134
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	105		61-155
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	42		10-117
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	117		34-137
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	100		54-150
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	85		24-159

Project Name: BENCH SCALE TEST
Project Number: BENCH SCALE TEST
Lab Number: L2145703
Report Date: 09/09/21

SAMPLE RESULTS

Lab ID: L2145703-02
Client ID: AQ-COGAQ-08252021
Sample Location: Not Specified

Date Collected: 08/25/21 13:25
Date Received: 08/25/21
Field Prep: Not Specified

Sample Depth:
Matrix: Water
Analytical Method: 134,LCMSMS-ID
Analytical Date: 08/28/21 20:42
Analyst: MP

Extraction Method: ALPHA 23528
Extraction Date: 08/27/21 08:50

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab						
Perfluorobutanoic Acid (PFBA)	50.3		ng/l	1.77	0.362	1
Perfluoropentanoic Acid (PFPeA)	48.2		ng/l	1.77	0.351	1
Perfluorobutanesulfonic Acid (PFBS)	ND		ng/l	1.77	0.211	1
Perfluorohexanoic Acid (PFHxA)	23.0		ng/l	1.77	0.291	1
Perfluoroheptanoic Acid (PFHpA)	6.05		ng/l	1.77	0.200	1
Perfluorohexanesulfonic Acid (PFHxS)	ND		ng/l	1.77	0.334	1
Perfluorooctanoic Acid (PFOA)	6.19		ng/l	1.77	0.209	1
Perfluoroheptanesulfonic Acid (PFHpS)	ND		ng/l	1.77	0.610	1
Perfluorononanoic Acid (PFNA)	0.745	J	ng/l	1.77	0.277	1
Perfluorooctanesulfonic Acid (PFOS)	7.68	F	ng/l	1.77	0.447	1
Perfluorodecanoic Acid (PFDA)	0.497	J	ng/l	1.77	0.270	1
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND		ng/l	1.77	1.08	1
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND		ng/l	1.77	0.575	1
Perfluoroundecanoic Acid (PFUnA)	ND		ng/l	1.77	0.231	1
Perfluorodecanesulfonic Acid (PFDS)	ND		ng/l	1.77	0.870	1
Perfluorooctanesulfonamide (FOSA)	ND		ng/l	1.77	0.515	1
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND		ng/l	1.77	0.713	1
Perfluorododecanoic Acid (PFDoA)	ND		ng/l	1.77	0.330	1
Perfluorotridecanoic Acid (PFTrDA)	ND		ng/l	1.77	0.290	1
Perfluorotetradecanoic Acid (PFTA)	ND		ng/l	1.77	0.220	1
PFOA/PFOS, Total	13.9		ng/l	1.77	0.209	1

Project Name: BENCH SCALE TEST **Lab Number:** L2145703

Project Number: BENCH SCALE TEST **Report Date:** 09/09/21

SAMPLE RESULTS

Lab ID: L2145703-02 Date Collected: 08/25/21 13:25

Client ID: AQ-COGAQ-08252021 Date Received: 08/25/21

Sample Location: Not Specified Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor

Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab

Surrogate (Extracted Internal Standard)	% Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	**52**	Q	58-132
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	98		62-163
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	107		70-131
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	87		57-129
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	122		60-129
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	105		71-134
Perfluoro[13C8]Octanoic Acid (M8PFOA)	86		62-129
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	95		59-139
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	99		69-131
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	82		62-124
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	63		10-162
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	25		24-116
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	69		55-137
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	43		10-112
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	58		27-126
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	58		48-131
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	47		22-136

Project Name: BENCH SCALE TEST
Project Number: BENCH SCALE TEST
Lab Number: L2145703
Report Date: 09/09/21

SAMPLE RESULTS

Lab ID: L2145703-02 RE
Client ID: AQ-COGAQ-08252021
Sample Location: Not Specified

Date Collected: 08/25/21 13:25
Date Received: 08/25/21
Field Prep: Not Specified

Sample Depth:
Matrix: Water
Analytical Method: 134,LCMSMS-ID
Analytical Date: 08/30/21 18:21
Analyst: RS

Extraction Method: ALPHA 23528
Extraction Date: 08/30/21 07:20

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab						
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	563		ng/l	20.0	13.3	1

Surrogate (Extracted Internal Standard)	% Recovery	Qualifier	Acceptance Criteria
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	68		14-147

Project Name: BENCH SCALE TEST
Project Number: BENCH SCALE TEST
Lab Number: L2145703
Report Date: 09/09/21

Method Blank Analysis
Batch Quality Control

Analytical Method: 134,LCMSMS-ID
Analytical Date: 08/28/21 17:06
Analyst: MP

Extraction Method: ALPHA 23528
Extraction Date: 08/27/21 08:50

Parameter	Result	Qualifier	Units	RL	MDL
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab for sample(s): 02 Batch: WG1539834-1					
Perfluorobutanoic Acid (PFBA)	ND		ng/l	2.00	0.408
Perfluoropentanoic Acid (PFPeA)	ND		ng/l	2.00	0.396
Perfluorobutanesulfonic Acid (PFBS)	ND		ng/l	2.00	0.238
Perfluorohexanoic Acid (PFHxA)	ND		ng/l	2.00	0.328
Perfluoroheptanoic Acid (PFHpA)	ND		ng/l	2.00	0.225
Perfluorohexanesulfonic Acid (PFHxS)	ND		ng/l	2.00	0.376
Perfluorooctanoic Acid (PFOA)	ND		ng/l	2.00	0.236
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND		ng/l	2.00	1.33
Perfluoroheptanesulfonic Acid (PFHpS)	ND		ng/l	2.00	0.688
Perfluorononanoic Acid (PFNA)	ND		ng/l	2.00	0.312
Perfluorooctanesulfonic Acid (PFOS)	ND		ng/l	2.00	0.504
Perfluorodecanoic Acid (PFDA)	ND		ng/l	2.00	0.304
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND		ng/l	2.00	1.21
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND		ng/l	2.00	0.648
Perfluoroundecanoic Acid (PFUnA)	ND		ng/l	2.00	0.260
Perfluorodecanesulfonic Acid (PFDS)	ND		ng/l	2.00	0.980
Perfluorooctanesulfonamide (FOSA)	ND		ng/l	2.00	0.580
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND		ng/l	2.00	0.804
Perfluorododecanoic Acid (PFDoA)	ND		ng/l	2.00	0.372
Perfluorotridecanoic Acid (PFTrDA)	ND		ng/l	2.00	0.327
Perfluorotetradecanoic Acid (PFTA)	ND		ng/l	2.00	0.248
PFOA/PFOS, Total	ND		ng/l	2.00	0.236

Project Name: BENCH SCALE TEST
Project Number: BENCH SCALE TEST
Lab Number: L2145703
Report Date: 09/09/21

Method Blank Analysis
Batch Quality Control

Analytical Method: 134,LCMSMS-ID
Analytical Date: 08/28/21 17:06
Analyst: MP

Extraction Method: ALPHA 23528
Extraction Date: 08/27/21 08:50

Parameter	Result	Qualifier	Units	RL	MDL
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab for sample(s): 02 Batch: WG1539834-1					

Surrogate (Extracted Internal Standard)	%Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	107		58-132
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	113		62-163
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	110		70-131
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	109		57-129
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	109		60-129
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	111		71-134
Perfluoro[13C8]Octanoic Acid (M8PFOA)	105		62-129
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	131		14-147
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	102		59-139
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	110		69-131
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	105		62-124
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	126		10-162
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	86		24-116
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	111		55-137
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	42		10-112
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	90		27-126
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	104		48-131
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	85		22-136

Project Name: BENCH SCALE TEST
Project Number: BENCH SCALE TEST
Lab Number: L2145703
Report Date: 09/09/21

Method Blank Analysis
Batch Quality Control

Analytical Method: 134,LCMSMS-ID
Analytical Date: 09/01/21 18:23
Analyst: SG

Extraction Method: ALPHA 23528
Extraction Date: 08/27/21 08:50

Parameter	Result	Qualifier	Units	RL	MDL
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab for sample(s): 02 Batch: WG1539834-1					
Perfluorooctanesulfonamide (FOSA)	ND		ng/l	2.00	0.580

Surrogate (Extracted Internal Standard)	%Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	91		10-112

Project Name: BENCH SCALE TEST
Project Number: BENCH SCALE TEST
Lab Number: L2145703
Report Date: 09/09/21

Method Blank Analysis
Batch Quality Control

Analytical Method: 134,LCMSMS-ID
Analytical Date: 08/30/21 17:48
Analyst: RS

Extraction Method: ALPHA 23528
Extraction Date: 08/30/21 07:20

Parameter	Result	Qualifier	Units	RL	MDL
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab for sample(s): 02 Batch: WG1540526-1					
Perfluorobutanoic Acid (PFBA)	ND		ng/l	2.00	0.408
Perfluoropentanoic Acid (PFPeA)	ND		ng/l	2.00	0.396
Perfluorobutanesulfonic Acid (PFBS)	ND		ng/l	2.00	0.238
Perfluorohexanoic Acid (PFHxA)	ND		ng/l	2.00	0.328
Perfluoroheptanoic Acid (PFHpA)	ND		ng/l	2.00	0.225
Perfluorohexanesulfonic Acid (PFHxS)	ND		ng/l	2.00	0.376
Perfluorooctanoic Acid (PFOA)	ND		ng/l	2.00	0.236
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND		ng/l	2.00	1.33
Perfluoroheptanesulfonic Acid (PFHpS)	ND		ng/l	2.00	0.688
Perfluorononanoic Acid (PFNA)	ND		ng/l	2.00	0.312
Perfluorooctanesulfonic Acid (PFOS)	ND		ng/l	2.00	0.504
Perfluorodecanoic Acid (PFDA)	ND		ng/l	2.00	0.304
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND		ng/l	2.00	1.21
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND		ng/l	2.00	0.648
Perfluoroundecanoic Acid (PFUnA)	ND		ng/l	2.00	0.260
Perfluorodecanesulfonic Acid (PFDS)	ND		ng/l	2.00	0.980
Perfluorooctanesulfonamide (FOSA)	ND		ng/l	2.00	0.580
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND		ng/l	2.00	0.804
Perfluorododecanoic Acid (PFDoA)	ND		ng/l	2.00	0.372
Perfluorotridecanoic Acid (PFTrDA)	ND		ng/l	2.00	0.327
Perfluorotetradecanoic Acid (PFTA)	ND		ng/l	2.00	0.248
PFOA/PFOS, Total	ND		ng/l	2.00	0.236

Project Name: BENCH SCALE TEST
Project Number: BENCH SCALE TEST
Lab Number: L2145703
Report Date: 09/09/21

Method Blank Analysis
Batch Quality Control

Analytical Method: 134,LCMSMS-ID
Analytical Date: 08/30/21 17:48
Analyst: RS

Extraction Method: ALPHA 23528
Extraction Date: 08/30/21 07:20

Parameter	Result	Qualifier	Units	RL	MDL
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab for sample(s): 02 Batch: WG1540526-1					

Surrogate (Extracted Internal Standard)	%Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	104		58-132
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	116		62-163
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	103		70-131
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	102		57-129
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	104		60-129
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	106		71-134
Perfluoro[13C8]Octanoic Acid (M8PFOA)	101		62-129
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	115		14-147
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	107		59-139
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	105		69-131
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	101		62-124
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	111		10-162
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	89		24-116
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	105		55-137
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	44		10-112
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	82		27-126
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	100		48-131
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	82		22-136

Project Name: BENCH SCALE TEST
Project Number: BENCH SCALE TEST
Lab Number: L2145703
Report Date: 09/09/21

Method Blank Analysis
Batch Quality Control

Analytical Method: 134,LCMSMS-ID
Analytical Date: 09/01/21 01:19
Analyst: SG

Extraction Method: ALPHA 23528
Extraction Date: 08/31/21 09:32

Parameter	Result	Qualifier	Units	RL	MDL
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab for sample(s): 01 Batch: WG1541092-1					
Perfluorobutanoic Acid (PFBA)	ND		ng/g	0.500	0.023
Perfluoropentanoic Acid (PFPeA)	ND		ng/g	0.500	0.046
Perfluorobutanesulfonic Acid (PFBS)	ND		ng/g	0.250	0.039
Perfluorohexanoic Acid (PFHxA)	ND		ng/g	0.500	0.053
Perfluoroheptanoic Acid (PFHpA)	ND		ng/g	0.250	0.045
Perfluorohexanesulfonic Acid (PFHxS)	ND		ng/g	0.250	0.061
Perfluorooctanoic Acid (PFOA)	0.048	J	ng/g	0.250	0.042
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND		ng/g	0.500	0.180
Perfluoroheptanesulfonic Acid (PFHpS)	ND		ng/g	0.500	0.136
Perfluorononanoic Acid (PFNA)	ND		ng/g	0.250	0.075
Perfluorooctanesulfonic Acid (PFOS)	ND		ng/g	0.250	0.130
Perfluorodecanoic Acid (PFDA)	ND		ng/g	0.250	0.067
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND		ng/g	0.500	0.287
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND		ng/g	0.500	0.202
Perfluoroundecanoic Acid (PFUnA)	ND		ng/g	0.500	0.047
Perfluorodecanesulfonic Acid (PFDS)	ND		ng/g	0.500	0.153
Perfluorooctanesulfonamide (FOSA)	ND		ng/g	0.500	0.098
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND		ng/g	0.500	0.085
Perfluorododecanoic Acid (PFDoA)	ND		ng/g	0.500	0.070
Perfluorotridecanoic Acid (PFTrDA)	ND		ng/g	0.500	0.204
Perfluorotetradecanoic Acid (PFTA)	ND		ng/g	0.500	0.054
PFOA/PFOS, Total	0.048	J	ng/g	0.250	0.042

Project Name: BENCH SCALE TEST
Project Number: BENCH SCALE TEST
Lab Number: L2145703
Report Date: 09/09/21

Method Blank Analysis
Batch Quality Control

Analytical Method: 134,LCMSMS-ID
Analytical Date: 09/01/21 01:19
Analyst: SG

Extraction Method: ALPHA 23528
Extraction Date: 08/31/21 09:32

Parameter	Result	Qualifier	Units	RL	MDL
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab for sample(s): 01 Batch: WG1541092-1					

Surrogate (Extracted Internal Standard)	%Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	96		61-135
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	93		58-150
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	99		74-139
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	98		66-128
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	99		71-129
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	104		78-139
Perfluoro[13C8]Octanoic Acid (M8PFOA)	99		75-130
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	65		20-154
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	104		72-140
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	108		79-136
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	100		75-130
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	74		19-175
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	79		31-134
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	106		61-155
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	66		10-117
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	76		34-137
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	101		54-150
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	87		24-159

Lab Control Sample Analysis

Batch Quality Control

Project Name: BENCH SCALE TEST

Project Number: BENCH SCALE TEST

Lab Number: L2145703

Report Date: 09/09/21

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 02 Batch: WG1539834-2								
Perfluorobutanoic Acid (PFBA)	94		-		67-148	-		30
Perfluoropentanoic Acid (PFPeA)	92		-		63-161	-		30
Perfluorobutanesulfonic Acid (PFBS)	93		-		65-157	-		30
Perfluorohexanoic Acid (PFHxA)	94		-		69-168	-		30
Perfluoroheptanoic Acid (PFHpA)	93		-		58-159	-		30
Perfluorohexanesulfonic Acid (PFHxS)	94		-		69-177	-		30
Perfluorooctanoic Acid (PFOA)	98		-		63-159	-		30
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	105		-		49-187	-		30
Perfluoroheptanesulfonic Acid (PFHpS)	98		-		61-179	-		30
Perfluorononanoic Acid (PFNA)	93		-		68-171	-		30
Perfluorooctanesulfonic Acid (PFOS)	104		-		52-151	-		30
Perfluorodecanoic Acid (PFDA)	95		-		63-171	-		30
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	106		-		56-173	-		30
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	109		-		60-166	-		30
Perfluoroundecanoic Acid (PFUnA)	92		-		60-153	-		30
Perfluorodecanesulfonic Acid (PFDS)	94		-		38-156	-		30
Perfluorooctanesulfonamide (FOSA)	95		-		46-170	-		30
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	85		-		45-170	-		30
Perfluorododecanoic Acid (PFDoA)	94		-		67-153	-		30
Perfluorotridecanoic Acid (PFTrDA)	114		-		48-158	-		30
Perfluorotetradecanoic Acid (PFTA)	98		-		59-182	-		30

Lab Control Sample Analysis

Batch Quality Control

Project Name: BENCH SCALE TEST
Project Number: BENCH SCALE TEST

Lab Number: L2145703
Report Date: 09/09/21

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits

Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 02 Batch: WG1539834-2

Surrogate (Extracted Internal Standard)	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	108				58-132
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	113				62-163
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	109				70-131
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	110				57-129
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	110				60-129
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	110				71-134
Perfluoro[13C8]Octanoic Acid (M8PFOA)	104				62-129
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	129				14-147
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	104				59-139
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	107				69-131
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	102				62-124
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	134				10-162
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	84				24-116
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	106				55-137
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	23				10-112
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	94				27-126
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	102				48-131
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	77				22-136

Lab Control Sample Analysis

Batch Quality Control

Project Name: BENCH SCALE TEST
Project Number: BENCH SCALE TEST

Lab Number: L2145703
Report Date: 09/09/21

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 02 Batch: WG1539834-2								
Perfluorooctanesulfonamide (FOSA)	86		-		46-170	-		30

Surrogate (Extracted Internal Standard)	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	91				10-112

Lab Control Sample Analysis

Batch Quality Control

Project Name: BENCH SCALE TEST

Project Number: BENCH SCALE TEST

Lab Number: L2145703

Report Date: 09/09/21

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 02 Batch: WG1540526-2								
Perfluorobutanoic Acid (PFBA)	101		-		67-148	-		30
Perfluoropentanoic Acid (PFPeA)	98		-		63-161	-		30
Perfluorobutanesulfonic Acid (PFBS)	98		-		65-157	-		30
Perfluorohexanoic Acid (PFHxA)	98		-		69-168	-		30
Perfluoroheptanoic Acid (PFHpA)	98		-		58-159	-		30
Perfluorohexanesulfonic Acid (PFHxS)	102		-		69-177	-		30
Perfluorooctanoic Acid (PFOA)	102		-		63-159	-		30
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	109		-		49-187	-		30
Perfluoroheptanesulfonic Acid (PFHpS)	99		-		61-179	-		30
Perfluorononanoic Acid (PFNA)	92		-		68-171	-		30
Perfluorooctanesulfonic Acid (PFOS)	105		-		52-151	-		30
Perfluorodecanoic Acid (PFDA)	98		-		63-171	-		30
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	106		-		56-173	-		30
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	99		-		60-166	-		30
Perfluoroundecanoic Acid (PFUnA)	100		-		60-153	-		30
Perfluorodecanesulfonic Acid (PFDS)	103		-		38-156	-		30
Perfluorooctanesulfonamide (FOSA)	94		-		46-170	-		30
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	100		-		45-170	-		30
Perfluorododecanoic Acid (PFDoA)	99		-		67-153	-		30
Perfluorotridecanoic Acid (PFTrDA)	121		-		48-158	-		30
Perfluorotetradecanoic Acid (PFTA)	104		-		59-182	-		30

Lab Control Sample Analysis

Batch Quality Control

Project Name: BENCH SCALE TEST

Project Number: BENCH SCALE TEST

Lab Number: L2145703

Report Date: 09/09/21

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 02 Batch: WG1540526-2								

Surrogate (Extracted Internal Standard)	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	110				58-132
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	123				62-163
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	116				70-131
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	110				57-129
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	108				60-129
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	116				71-134
Perfluoro[13C8]Octanoic Acid (M8PFOA)	107				62-129
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	128				14-147
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	114				59-139
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	119				69-131
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	110				62-124
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	130				10-162
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	100				24-116
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	114				55-137
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	59				10-112
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	92				27-126
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	110				48-131
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	95				22-136

Lab Control Sample Analysis
Batch Quality Control

Project Name: BENCH SCALE TEST
Project Number: BENCH SCALE TEST

Lab Number: L2145703
Report Date: 09/09/21

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 01 Batch: WG1541092-2								
Perfluorobutanoic Acid (PFBA)	94		-		71-135	-		30
Perfluoropentanoic Acid (PFPeA)	92		-		69-132	-		30
Perfluorobutanesulfonic Acid (PFBS)	94		-		72-128	-		30
Perfluorohexanoic Acid (PFHxA)	96		-		70-132	-		30
Perfluoroheptanoic Acid (PFHpA)	94		-		71-131	-		30
Perfluorohexanesulfonic Acid (PFHxS)	94		-		67-130	-		30
Perfluorooctanoic Acid (PFOA)	97		-		69-133	-		30
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	96		-		64-140	-		30
Perfluoroheptanesulfonic Acid (PFHpS)	95		-		70-132	-		30
Perfluorononanoic Acid (PFNA)	90		-		72-129	-		30
Perfluorooctanesulfonic Acid (PFOS)	101		-		68-136	-		30
Perfluorodecanoic Acid (PFDA)	92		-		69-133	-		30
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	110		-		65-137	-		30
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	95		-		63-144	-		30
Perfluoroundecanoic Acid (PFUnA)	95		-		64-136	-		30
Perfluorodecanesulfonic Acid (PFDS)	96		-		59-134	-		30
Perfluorooctanesulfonamide (FOSA)	94		-		67-137	-		30
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	101		-		61-139	-		30
Perfluorododecanoic Acid (PFDoA)	96		-		69-135	-		30
Perfluorotridecanoic Acid (PFTrDA)	112		-		66-139	-		30
Perfluorotetradecanoic Acid (PFTA)	94		-		69-133	-		30

Lab Control Sample Analysis

Batch Quality Control

Project Name: BENCH SCALE TEST
Project Number: BENCH SCALE TEST

Lab Number: L2145703
Report Date: 09/09/21

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits

Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 01 Batch: WG1541092-2

Surrogate (Extracted Internal Standard)	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	104				61-135
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	101				58-150
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	107				74-139
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	103				66-128
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	104				71-129
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	112				78-139
Perfluoro[13C8]Octanoic Acid (M8PFOA)	103				75-130
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	85				20-154
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	111				72-140
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	116				79-136
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	112				75-130
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	86				19-175
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	80				31-134
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	109				61-155
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	66				10-117
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	81				34-137
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	106				54-150
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	92				24-159

Matrix Spike Analysis

Batch Quality Control

Project Name: BENCH SCALE TEST

Project Number: BENCH SCALE TEST

Lab Number: L2145703

Report Date: 09/09/21

Parameter	*Native Sample*	*MS Added*	*MS Found*	*MS %Recovery*	*Qual*	*MSD Found*	*MSD %Recovery*	*Qual*	*Recovery Limits*	*RPD*	*Qual*	*RPD Limits*
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 02 QC Batch ID: WG1539834-3 QC Sample: L2145493-01 Client ID: MS Sample												
Perfluorobutanoic Acid (PFBA)	ND	38.5	36.8	96		-	-		67-148	-		30
Perfluoropentanoic Acid (PFPeA)	ND	38.5	36.2	94		-	-		63-161	-		30
Perfluorobutanesulfonic Acid (PFBS)	ND	34.2	32.9	96		-	-		65-157	-		30
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	ND	36	35.3	98		-	-		37-219	-		30
Perfluorohexanoic Acid (PFHxA)	ND	38.5	36.8	96		-	-		69-168	-		30
Perfluoropentanesulfonic Acid (PFPeS)	ND	36.2	35.8	99		-	-		52-156	-		30
Perfluoroheptanoic Acid (PFHpA)	ND	38.5	36.1	94		-	-		58-159	-		30
Perfluorohexanesulfonic Acid (PFHxS)	ND	35.2	33.0	94		-	-		69-177	-		30
Perfluorooctanoic Acid (PFOA)	ND	38.5	37.9	98		-	-		63-159	-		30
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND	36.7	39.5	108		-	-		49-187	-		30
Perfluoroheptanesulfonic Acid (PFHpS)	ND	36.7	36.0	98		-	-		61-179	-		30
Perfluorononanoic Acid (PFNA)	ND	38.5	36.7	95		-	-		68-171	-		30
Perfluorooctanesulfonic Acid (PFOS)	ND	35.8	37.5	105		-	-		52-151	-		30
Perfluorodecanoic Acid (PFDA)	ND	38.5	36.9	96		-	-		63-171	-		30
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND	37	37.0	100		-	-		56-173	-		30
Perfluorononanesulfonic Acid (PFNS)	ND	37.1	36.1	97		-	-		48-150	-		30
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND	38.5	36.3	94		-	-		60-166	-		30
Perfluoroundecanoic Acid (PFUnA)	ND	38.5	35.8	93		-	-		60-153	-		30
Perfluorodecanesulfonic Acid (PFDS)	ND	37.1	37.0	100		-	-		38-156	-		30
Perfluorooctanesulfonamide (FOSA)	ND	38.5	35.1	91		-	-		46-170	-		30
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND	38.5	35.7	93		-	-		45-170	-		30
Perfluorododecanoic Acid (PFDoA)	ND	38.5	37.3	97		-	-		67-153	-		30

Matrix Spike Analysis

Batch Quality Control

Project Name: BENCH SCALE TEST
Project Number: BENCH SCALE TEST
Lab Number: L2145703
Report Date: 09/09/21

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	Qual	MSD Found	MSD %Recovery	Qual	Recovery Limits	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 02 QC Batch ID: WG1539834-3 QC Sample: L2145493-01 Client ID: MS Sample												
Perfluorotridecanoic Acid (PFTrDA)	ND	38.5	41.9	109		-	-		48-158	-		30
Perfluorotetradecanoic Acid (PFTA)	ND	38.5	36.9	96		-	-		59-182	-		30

Surrogate (Extracted Internal Standard)	MS % Recovery	MS Qualifier	MSD % Recovery	MSD Qualifier	Acceptance Criteria
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	131				10-162
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	139				12-142
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	142				14-147
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	106				27-126
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	90				24-116
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	116				55-137
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	106				62-124
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	110				57-129
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	111				60-129
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	113				71-134
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	105				48-131
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	91				22-136
Perfluoro[13C4]Butanoic Acid (MPFBA)	110				58-132
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	110				62-163
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	44				10-112
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	114				69-131
Perfluoro[13C8]Octanoic Acid (M8PFOA)	106				62-129
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	105				59-139
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	110				70-131

Matrix Spike Analysis

Batch Quality Control

Project Name: BENCH SCALE TEST

Project Number: BENCH SCALE TEST

Lab Number: L2145703

Report Date: 09/09/21

Parameter	*Native Sample*	*MS Added*	*MS Found*	*MS %Recovery*	*Qual*	*MSD Found*	*MSD %Recovery*	*Qual*	*Recovery Limits*	*RPD*	*Qual*	*RPD Limits*
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 02 QC Batch ID: WG1540526-3 QC Sample: L2146282-02 Client ID: MS Sample												
Perfluorobutanoic Acid (PFBA)	16.2	37	52.7	99		-	-		67-148	-		30
Perfluoropentanoic Acid (PFPeA)	33.5	37	68.2	94		-	-		63-161	-		30
Perfluorobutanesulfonic Acid (PFBS)	35.0	32.9	66.9	97		-	-		65-157	-		30
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	ND	34.6	35.6	103		-	-		37-219	-		30
Perfluorohexanoic Acid (PFHxA)	30.0	37	66.3	98		-	-		69-168	-		30
Perfluoropentanesulfonic Acid (PFPeS)	0.933J	34.8	38.1	107		-	-		52-156	-		30
Perfluoroheptanoic Acid (PFHpA)	17.3	37	53.7	98		-	-		58-159	-		30
Perfluorohexanesulfonic Acid (PFHxS)	6.13	33.8	40.2	101		-	-		69-177	-		30
Perfluorooctanoic Acid (PFOA)	77.0	37	115	103		-	-		63-159	-		30
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND	35.2	36.4	103		-	-		49-187	-		30
Perfluoroheptanesulfonic Acid (PFHpS)	0.804J	35.2	37.3	104		-	-		61-179	-		30
Perfluorononanoic Acid (PFNA)	5.57	37	40.7	95		-	-		68-171	-		30
Perfluorooctanesulfonic Acid (PFOS)	24.8	34.4	61.8	108		-	-		52-151	-		30
Perfluorodecanoic Acid (PFDA)	0.288JF	37	37.9	102		-	-		63-171	-		30
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND	35.5	38.5	108		-	-		56-173	-		30
Perfluorononanesulfonic Acid (PFNS)	ND	35.6	34.6	97		-	-		48-150	-		30
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND	37	37.5	101		-	-		60-166	-		30
Perfluoroundecanoic Acid (PFUnA)	ND	37	37.2	100		-	-		60-153	-		30
Perfluorodecanesulfonic Acid (PFDS)	ND	35.7	34.4	96		-	-		38-156	-		30
Perfluorooctanesulfonamide (FOSA)	ND	37	34.3F	93		-	-		46-170	-		30
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND	37	35.2	95		-	-		45-170	-		30
Perfluorododecanoic Acid (PFDoA)	ND	37	38.1	103		-	-		67-153	-		30

Matrix Spike Analysis

Batch Quality Control

Project Name: BENCH SCALE TEST
Project Number: BENCH SCALE TEST

Lab Number: L2145703
Report Date: 09/09/21

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	Qual	MSD Found	MSD %Recovery	Qual	Recovery Limits	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 02 QC Batch ID: WG1540526-3 QC Sample: L2146282-02 Client ID: MS Sample												
Perfluorotridecanoic Acid (PFTrDA)	ND	37	47.7	129		-	-		48-158	-		30
Perfluorotetradecanoic Acid (PFTA)	ND	37	37.6	102		-	-		59-182	-		30

Surrogate (Extracted Internal Standard)	MS % Recovery	MS Qualifier	MSD % Recovery	MSD Qualifier	Acceptance Criteria
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	105				10-162
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	**146**	Q			12-142
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	122				14-147
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	56				27-126
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	52				24-116
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	81				55-137
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	78				62-124
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	73				57-129
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	75				60-129
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	111				71-134
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	79				48-131
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	77				22-136
Perfluoro[13C4]Butanoic Acid (MPFBA)	73				58-132
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	72				62-163
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	11				10-112
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	108				69-131
Perfluoro[13C8]Octanoic Acid (M8PFOA)	75				62-129
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	83				59-139
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	110				70-131

Matrix Spike Analysis

Batch Quality Control

Project Name: BENCH SCALE TEST

Project Number: BENCH SCALE TEST

Lab Number: L2145703

Report Date: 09/09/21

Parameter	*Native Sample*	*MS Added*	*MS Found*	*MS %Recovery*	*Qual*	*MSD Found*	*MSD %Recovery*	*Qual*	*Recovery Limits*	*RPD*	*Qual*	*RPD Limits*
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1541092-3 QC Sample: L2145657-01 Client ID: MS Sample												
Perfluorobutanoic Acid (PFBA)	2.83	12.1	14.2	117		-	-		71-135	-		30
Perfluoropentanoic Acid (PFPeA)	2.05	12.1	12.5	103		-	-		69-132	-		30
Perfluorobutanesulfonic Acid (PFBS)	ND	10.8	10.3	96		-	-		72-128	-		30
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	ND	11.4	12.3	108		-	-		62-145	-		30
Perfluorohexanoic Acid (PFHxA)	0.544J	12.1	11.9	98		-	-		70-132	-		30
Perfluoropentanesulfonic Acid (PFPeS)	ND	11.4	11.3	99		-	-		73-123	-		30
Perfluoroheptanoic Acid (PFHpA)	0.338J	12.1	11.7	96		-	-		71-131	-		30
Perfluorohexanesulfonic Acid (PFHxS)	ND	11.1	10.4	94		-	-		67-130	-		30
Perfluorooctanoic Acid (PFOA)	0.604J	12.1	12.4	102		-	-		69-133	-		30
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND	11.6	11.4	99		-	-		64-140	-		30
Perfluoroheptanesulfonic Acid (PFHpS)	ND	11.6	11.1	96		-	-		70-132	-		30
Perfluorononanoic Acid (PFNA)	0.196J	12.1	11.3	93		-	-		72-129	-		30
Perfluorooctanesulfonic Acid (PFOS)	0.787F	11.3	12.2	108		-	-		68-136	-		30
Perfluorodecanoic Acid (PFDA)	ND	12.1	11.5	95		-	-		69-133	-		30
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND	11.7	12.0	103		-	-		65-137	-		30
Perfluorononanesulfonic Acid (PFNS)	ND	11.7	11.3	97		-	-		69-125	-		30
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND	12.1	13.7	113		-	-		63-144	-		30
Perfluoroundecanoic Acid (PFUnA)	ND	12.1	11.8	97		-	-		64-136	-		30
Perfluorodecanesulfonic Acid (PFDS)	ND	11.7	11.0	94		-	-		59-134	-		30
Perfluorooctanesulfonamide (FOSA)	ND	12.1	11.0	91		-	-		67-137	-		30
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND	12.1	11.4	94		-	-		61-139	-		30
Perfluorododecanoic Acid (PFDoA)	ND	12.1	11.4	94		-	-		69-135	-		30

Matrix Spike Analysis

Batch Quality Control

Project Name: BENCH SCALE TEST
Project Number: BENCH SCALE TEST
Lab Number: L2145703
Report Date: 09/09/21

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	Qual	MSD Found	MSD %Recovery	Qual	Recovery Limits	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1541092-3 QC Sample: L2145657-01 Client ID: MS Sample												
Perfluorotridecanoic Acid (PFTrDA)	ND	12.1	12.2	100		-	-		66-139	-		30
Perfluorotetradecanoic Acid (PFTA)	ND	12.1	12.0	99		-	-		69-133	-		30
2,3,3,3-Tetrafluoro-2-[1,1,2,2,3,3,3-Heptafluoropropoxy]-Propanoic Acid (HFPO-DA)	ND	118	176F	149		-	-		41-165	-		30
4,8-Dioxa-3h-Perfluorononanoic Acid (ADONA)	ND	11.5	9.83	86		-	-		68-143	-		30
Perfluorohexadecanoic Acid (PFHxDA)	ND	12.1	16.4	135		-	-		18-191	-		30
Perfluorooctadecanoic Acid (PFODA)	ND	12.1	11.5	95		-	-		10-123	-		30

Surrogate (Extracted Internal Standard)	MS % Recovery	MS Qualifier	MSD % Recovery	MSD Qualifier	Acceptance Criteria
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	**366**	Q			19-175
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	**267**	Q			14-167
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	**371**	Q			20-154
2,3,3,3-Tetrafluoro-2-[1,1,2,2,3,3,3-Heptafluoropropoxy]-13C3-Propanoic Acid (M3HFPO-DA)	182				10-203
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	**188**	Q			34-137
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	128				31-134
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	109				61-155
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	111				75-130
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	92				66-128
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	94				71-129
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	112				78-139
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	109				54-150
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	113				24-159
Perfluoro[13C2]Hexadecanoic Acid (M2PFHxDA)	90				10-145

Matrix Spike Analysis

Batch Quality Control

Project Name: BENCH SCALE TEST

Project Number: BENCH SCALE TEST

Lab Number: L2145703

Report Date: 09/09/21

Parameter	*Native Sample*	*MS Added*	*MS Found*	*MS %Recovery*	*Qual*	*MSD Found*	*MSD %Recovery*	*Qual*	*Recovery Limits*	*RPD*	*Qual*	*RPD Limits*
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1541092-3 QC Sample: L2145657-01 Client ID: MS Sample												

Surrogate (Extracted Internal Standard)	*MS % Recovery*	*MS Qualifier*	*MSD % Recovery*	*MSD Qualifier*	*Acceptance Criteria*
Perfluoro[13C4]Butanoic Acid (MPFBA)	103				61-135
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	97				58-150
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	65				10-117
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	118				79-136
Perfluoro[13C8]Octanoic Acid (M8PFOA)	107				75-130
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	121				72-140
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	111				74-139

Lab Duplicate Analysis
Batch Quality Control

Project Name: BENCH SCALE TEST
Project Number: BENCH SCALE TEST

Lab Number: L2145703
Report Date: 09/09/21

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 02 QC Batch ID: WG1539834-4 QC Sample: L2145698-01 Client ID: DUP Sample						
Perfluorobutanoic Acid (PFBA)	4.75	4.44	ng/l	7		30
Perfluoropentanoic Acid (PFPeA)	4.33	4.14	ng/l	4		30
Perfluorobutanesulfonic Acid (PFBS)	5.06	4.77	ng/l	6		30
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	ND	ND	ng/l	NC		30
Perfluorohexanoic Acid (PFHxA)	4.78	4.71	ng/l	1		30
Perfluoropentanesulfonic Acid (PFPeS)	0.238J	ND	ng/l	NC		30
Perfluoroheptanoic Acid (PFHpA)	5.15	4.90	ng/l	5		30
Perfluorohexanesulfonic Acid (PFHxS)	1.74J	1.83J	ng/l	NC		30
Perfluorooctanoic Acid (PFOA)	28.1	27.1	ng/l	4		30
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND	ND	ng/l	NC		30
Perfluoroheptanesulfonic Acid (PFHpS)	ND	ND	ng/l	NC		30
Perfluorononanoic Acid (PFNA)	1.32J	1.30J	ng/l	NC		30
Perfluorooctanesulfonic Acid (PFOS)	17.0	17.6	ng/l	3		30
Perfluorodecanoic Acid (PFDA)	1.66J	1.54J	ng/l	NC		30
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND	ND	ng/l	NC		30
Perfluorononanesulfonic Acid (PFNS)	ND	ND	ng/l	NC		30
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND	ND	ng/l	NC		30
Perfluoroundecanoic Acid (PFUnA)	ND	ND	ng/l	NC		30
Perfluorodecanesulfonic Acid (PFDS)	ND	ND	ng/l	NC		30
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND	ND	ng/l	NC		30

Lab Duplicate Analysis
Batch Quality Control

Project Name: BENCH SCALE TEST
Project Number: BENCH SCALE TEST

Lab Number: L2145703
Report Date: 09/09/21

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 02 QC Batch ID: WG1539834-4 QC Sample: L2145698-01 Client ID: DUP Sample						
Perfluorododecanoic Acid (PFDoA)	ND	ND	ng/l	NC		30
Perfluorotridecanoic Acid (PFTrDA)	ND	ND	ng/l	NC		30
Perfluorotetradecanoic Acid (PFTA)	ND	ND	ng/l	NC		30

Surrogate (Extracted Internal Standard)	%Recovery	Qualifier	%Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	72		67		58-132
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	67		64		62-163
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	102		99		70-131
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	**155**	Q	**143**	Q	12-142
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	72		64		57-129
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	73		66		60-129
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	104		99		71-134
Perfluoro[13C8]Octanoic Acid (M8PFOA)	72		65		62-129
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	133		126		14-147
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	72		63		59-139
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	106		100		69-131
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	77		64		62-124
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	132		114		10-162
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	51		50		24-116
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	82		72		55-137
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	56		46		27-126
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	79		69		48-131
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	68		57		22-136

Lab Duplicate Analysis
Batch Quality Control

Project Name: BENCH SCALE TEST
Project Number: BENCH SCALE TEST

Lab Number: L2145703
Report Date: 09/09/21

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 02 QC Batch ID: WG1539834-4 QC Sample: L2145698-01 Client ID: DUP Sample						
Perfluorooctanesulfonamide (FOSA)	ND	ND	ng/l	NC		30

Surrogate (Extracted Internal Standard)	%Recovery	Qualifier	%Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	95		87		10-112

Lab Duplicate Analysis
Batch Quality Control

Project Name: BENCH SCALE TEST
Project Number: BENCH SCALE TEST

Lab Number: L2145703
Report Date: 09/09/21

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 02 QC Batch ID: WG1540526-4 QC Sample: L2146282-03 Client ID: DUP Sample						
Perfluorobutanoic Acid (PFBA)	8.37	8.16	ng/l	3		30
Perfluoropentanoic Acid (PFPeA)	10.6	10.5	ng/l	1		30
Perfluorobutanesulfonic Acid (PFBS)	7.41	7.28	ng/l	2		30
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	ND	ND	ng/l	NC		30
Perfluorohexanoic Acid (PFHxA)	12.3	12.4	ng/l	1		30
Perfluoropentanesulfonic Acid (PFPeS)	0.450J	0.314J	ng/l	NC		30
Perfluoroheptanoic Acid (PFHpA)	8.71	8.62	ng/l	1		30
Perfluorohexanesulfonic Acid (PFHxS)	2.75	2.73	ng/l	1		30
Perfluorooctanoic Acid (PFOA)	58.5	57.2	ng/l	2		30
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND	ND	ng/l	NC		30
Perfluoroheptanesulfonic Acid (PFHpS)	ND	ND	ng/l	NC		30
Perfluorononanoic Acid (PFNA)	2.01	2.07	ng/l	3		30
Perfluorooctanesulfonic Acid (PFOS)	20.5	20.9	ng/l	2		30
Perfluorodecanoic Acid (PFDA)	0.539J	0.512J	ng/l	NC		30
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND	ND	ng/l	NC		30
Perfluorononanesulfonic Acid (PFNS)	ND	ND	ng/l	NC		30
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND	ND	ng/l	NC		30
Perfluoroundecanoic Acid (PFUnA)	ND	ND	ng/l	NC		30
Perfluorodecanesulfonic Acid (PFDS)	ND	ND	ng/l	NC		30
Perfluorooctanesulfonamide (FOSA)	ND	ND	ng/l	NC		30

Lab Duplicate Analysis
Batch Quality Control

Project Name: BENCH SCALE TEST
Project Number: BENCH SCALE TEST

Lab Number: L2145703
Report Date: 09/09/21

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 02 QC Batch ID: WG1540526-4 QC Sample: L2146282-03 Client ID: DUP Sample						
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND	ND	ng/l	NC		30
Perfluorododecanoic Acid (PFDoA)	ND	ND	ng/l	NC		30
Perfluorotridecanoic Acid (PFTrDA)	ND	ND	ng/l	NC		30
Perfluorotetradecanoic Acid (PFTA)	ND	ND	ng/l	NC		30

Surrogate (Extracted Internal Standard)	%Recovery	Qualifier	%Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	73		78		58-132
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	75		81		62-163
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	109		113		70-131
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	83		87		12-142
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	72		80		57-129
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	70		80		60-129
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	112		115		71-134
Perfluoro[13C8]Octanoic Acid (M8PFOA)	68		78		62-129
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	85		85		14-147
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	76		85		59-139
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	106		112		69-131
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	77		84		62-124
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	93		93		10-162
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	55		61		24-116
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	81		89		55-137
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	15		11		10-112
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	52		60		27-126
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	76		88		48-131

Lab Duplicate Analysis
Batch Quality Control

Project Name: BENCH SCALE TEST
Project Number: BENCH SCALE TEST

Lab Number: L2145703
Report Date: 09/09/21

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits

Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 02 QC Batch ID: WG1540526-4 QC Sample: L2146282-03 Client ID: DUP Sample

Surrogate (Extracted Internal Standard)	%Recovery	Qualifier	%Recovery	Qualifier	Acceptance Criteria
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	75		73		22-136

Lab Duplicate Analysis
Batch Quality Control

Project Name: BENCH SCALE TEST
Project Number: BENCH SCALE TEST

Lab Number: L2145703
Report Date: 09/09/21

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1541092-4 QC Sample: L2145703-01 Client ID: SD-RACKCOG-08252021						
Perfluorobutanoic Acid (PFBA)	ND	ND	ng/g	NC		30
Perfluoropentanoic Acid (PFPeA)	ND	ND	ng/g	NC		30
Perfluorobutanesulfonic Acid (PFBS)	ND	ND	ng/g	NC		30
Perfluorohexanoic Acid (PFHxA)	ND	ND	ng/g	NC		30
Perfluoroheptanoic Acid (PFHpA)	ND	ND	ng/g	NC		30
Perfluorohexanesulfonic Acid (PFHxS)	ND	ND	ng/g	NC		30
Perfluorooctanoic Acid (PFOA)	ND	ND	ng/g	NC		30
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND	ND	ng/g	NC		30
Perfluoroheptanesulfonic Acid (PFHpS)	ND	ND	ng/g	NC		30
Perfluorononanoic Acid (PFNA)	ND	ND	ng/g	NC		30
Perfluorooctanesulfonic Acid (PFOS)	ND	ND	ng/g	NC		30
Perfluorodecanoic Acid (PFDA)	ND	ND	ng/g	NC		30
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND	ND	ng/g	NC		30
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND	ND	ng/g	NC		30
Perfluoroundecanoic Acid (PFUnA)	ND	ND	ng/g	NC		30
Perfluorodecanesulfonic Acid (PFDS)	ND	ND	ng/g	NC		30
Perfluorooctanesulfonamide (FOSA)	ND	ND	ng/g	NC		30
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND	ND	ng/g	NC		30
Perfluorododecanoic Acid (PFDoA)	ND	ND	ng/g	NC		30
Perfluorotridecanoic Acid (PFTrDA)	ND	ND	ng/g	NC		30

Lab Duplicate Analysis
Batch Quality Control

Project Name: BENCH SCALE TEST
Project Number: BENCH SCALE TEST

Lab Number: L2145703
Report Date: 09/09/21

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1541092-4 QC Sample: L2145703-01 Client ID: SD-RACKCOG-08252021						
Perfluorotetradecanoic Acid (PFTA)	ND	ND	ng/g	NC		30

Surrogate (Extracted Internal Standard)	%Recovery	Qualifier	%Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	97		101		61-135
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	98		104		58-150
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	101		107		74-139
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	83		87		66-128
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	99		104		71-129
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	103		112		78-139
Perfluoro[13C8]Octanoic Acid (M8PFOA)	96		101		75-130
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	**195**	Q	**193**	Q	20-154
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	96		99		72-140
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	107		110		79-136
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	101		108		75-130
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	138		144		19-175
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	106		116		31-134
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	105		115		61-155
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	42		45		10-117
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	117		125		34-137
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	100		105		54-150
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	85		95		24-159

INORGANICS
&
MISCELLANEOUS

Project Name: BENCH SCALE TEST
Project Number: BENCH SCALE TEST

Lab Number: L2145703
Report Date: 09/09/21

SAMPLE RESULTS

Lab ID: L2145703-01
Client ID: SD-RACKCOG-08252021
Sample Location: Not Specified

Date Collected: 08/25/21 13:05
Date Received: 08/25/21
Field Prep: Not Specified

Sample Depth:
Matrix: Solid

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Mansfield Lab										
Solids, Total	33.9		%	0.100	0.100	1	-	09/01/21 11:51	121,2540G	NB

Lab Duplicate Analysis

Batch Quality Control

Project Name: BENCH SCALE TEST
Project Number: BENCH SCALE TEST

Lab Number: L2145703
Report Date: 09/09/21

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
General Chemistry - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1541732-1 QC Sample: L2145043-03 Client ID: DUP Sample						
Solids, Total	69.1	67.3	%	3		10

Project Name: BENCH SCALE TEST
Project Number: BENCH SCALE TEST

Lab Number: L2145703
Report Date: 09/09/21

Sample Receipt and Container Information

Were project specific reporting limits specified? YES

Cooler Information

Cooler	Custody Seal
A	Absent

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L2145703-01A	Plastic 8oz unpreserved	A	NA		4.9	Y	Absent		A2-NY-537-ISOTOPE(14)
L2145703-01B	Plastic 2oz unpreserved for TS	A	NA		4.9	Y	Absent		A2-TS(7)
L2145703-02A	Plastic 250ml unpreserved	A	NA		4.9	Y	Absent		A2-NY-537-ISOTOPE(14)
L2145703-02B	Plastic 250ml unpreserved	A	NA		4.9	Y	Absent		A2-NY-537-ISOTOPE(14)

*Values in parentheses indicate holding time in days

Project Name: BENCH SCALE TEST
Project Number: BENCH SCALE TEST

Lab Number: L2145703
Report Date: 09/09/21

PFAS PARAMETER SUMMARY

Parameter	Acronym	CAS Number
PERFLUOROALKYL CARBOXYLIC ACIDS (PFCAs)		
Perfluorooctadecanoic Acid	PFODA	16517-11-6
Perfluorohexadecanoic Acid	PFHxDA	67905-19-5
Perfluorotetradecanoic Acid	PFTA	376-06-7
Perfluorotridecanoic Acid	PFTrDA	72629-94-8
Perfluorododecanoic Acid	PFDoA	307-55-1
Perfluoroundecanoic Acid	PFUnA	2058-94-8
Perfluorodecanoic Acid	PFDA	335-76-2
Perfluorononanoic Acid	PFNA	375-95-1
Perfluorooctanoic Acid	PFOA	335-67-1
Perfluoroheptanoic Acid	PFHpA	375-85-9
Perfluorohexanoic Acid	PFHxA	307-24-4
Perfluoropentanoic Acid	PFPeA	2706-90-3
Perfluorobutanoic Acid	PFBA	375-22-4
PERFLUOROALKYL SULFONIC ACIDS (PFSAs)		
Perfluorododecanesulfonic Acid	PFDoDS	79780-39-5
Perfluorodecanesulfonic Acid	PFDS	335-77-3
Perfluorononanesulfonic Acid	PFNS	68259-12-1
Perfluorooctanesulfonic Acid	PFOS	1763-23-1
Perfluoroheptanesulfonic Acid	PFHpS	375-92-8
Perfluorohexanesulfonic Acid	PFHxS	355-46-4
Perfluoropentanesulfonic Acid	PFPeS	2706-91-4
Perfluorobutanesulfonic Acid	PFBS	375-73-5
FLUOROTELOMERS		
1H,1H,2H,2H-Perfluorododecanesulfonic Acid	10:2FTS	120226-60-0
1H,1H,2H,2H-Perfluorodecanesulfonic Acid	8:2FTS	39108-34-4
1H,1H,2H,2H-Perfluorooctanesulfonic Acid	6:2FTS	27619-97-2
1H,1H,2H,2H-Perfluorohexanesulfonic Acid	4:2FTS	757124-72-4
PERFLUOROALKANE SULFONAMIDES (FASAs)		
Perfluorooctanesulfonamide	FOSA	754-91-6
N-Ethyl Perfluorooctane Sulfonamide	NEtFOSA	4151-50-2
N-Methyl Perfluorooctane Sulfonamide	NMeFOSA	31506-32-8
PERFLUOROALKANE SULFONYL SUBSTANCES		
N-Ethyl Perfluorooctanesulfonamido Ethanol	NEtFOSE	1691-99-2
N-Methyl Perfluorooctanesulfonamido Ethanol	NMeFOSE	24448-09-7
N-Ethyl Perfluorooctanesulfonamidoacetic Acid	NEtFOSAA	2991-50-6
N-Methyl Perfluorooctanesulfonamidoacetic Acid	NMeFOSAA	2355-31-9
PER- and POLYFLUOROALKYL ETHER CARBOXYLIC ACIDS		
2,3,3,3-Tetrafluoro-2-[1,1,2,2,3,3,3-Heptafluoropropoxy]-Propanoic Acid	HFPO-DA	13252-13-6
4,8-Dioxa-3h-Perfluorononanoic Acid	ADONA	919005-14-4
CHLORO-PERFLUOROALKYL SULFONIC ACIDS		
11-Chloroeicosafluoro-3-Oxaundecane-1-Sulfonic Acid	11Cl-PF3OUdS	763051-92-9
9-Chlorohexadecafluoro-3-Oxanone-1-Sulfonic Acid	9Cl-PF3ONS	756426-58-1
PERFLUOROETHER SULFONIC ACIDS (PFESAs)		
Perfluoro(2-Ethoxyethane)Sulfonic Acid	PFEESA	113507-82-7
PERFLUOROETHER/POLYETHER CARBOXYLIC ACIDS (PFPCAs)		
Perfluoro-3-Methoxypropanoic Acid	PFMPA	377-73-1
Perfluoro-4-Methoxybutanoic Acid	PFMBA	863090-89-5
Nonafluoro-3,6-Dioxaheptanoic Acid	NFDHA	151772-58-6

Project Name:	BENCH SCALE TEST	**Lab Number:**	L2145703
Project Number:	BENCH SCALE TEST	**Report Date:**	09/09/21

GLOSSARY

Acronyms

DL	- Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the limit of quantitation (LOQ). The DL includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
EDL	- Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).
EMPC	- Estimated Maximum Possible Concentration: The concentration that results from the signal present at the retention time of an analyte when the ions meet all of the identification criteria except the ion abundance ratio criteria. An EMPC is a worst-case estimate of the concentration.
EPA	- Environmental Protection Agency.
LCS	- Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LCSD	- Laboratory Control Sample Duplicate: Refer to LCS.
LFB	- Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LOD	- Limit of Detection: This value represents the level to which a target analyte can reliably be detected for a specific analyte in a specific matrix by a specific method. The LOD includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
LOQ	- Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.) Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
MDL	- Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
MS	- Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available. For Method 332.0, the spike recovery is calculated using the native concentration, including estimated values.
MSD	- Matrix Spike Sample Duplicate: Refer to MS.
NA	- Not Applicable.
NC	- Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.
NDPA/DPA	- N-Nitrosodiphenylamine/Diphenylamine.
NI	- Not Ignitable.
NP	- Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.
NR	- No Results: Term is utilized when 'No Target Compounds Requested' is reported for the analysis of Volatile or Semivolatile Organic TIC only requests.
RL	- Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
RPD	- Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.
SRM	- Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.
STLP	- Semi-dynamic Tank Leaching Procedure per EPA Method 1315.
TEF	- Toxic Equivalency Factors: The values assigned to each dioxin and furan to evaluate their toxicity relative to 2,3,7,8-TCDD.
TEQ	- Toxic Equivalent: The measure of a sample's toxicity derived by multiplying each dioxin and furan by its corresponding TEF and then summing the resulting values.
TIC	- Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations.

Report Format: DU Report with 'J' Qualifiers

Project Name:	BENCH SCALE TEST	**Lab Number:**	L2145703
Project Number:	BENCH SCALE TEST	**Report Date:**	09/09/21

Footnotes

1 - The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

Terms

Analytical Method: Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

Difference: With respect to Total Oxidizable Precursor (TOP) Assay analysis, the difference is defined as the Post-Treatment value minus the Pre-Treatment value.

Final pH: As it pertains to Sample Receipt & Container Information section of the report, Final pH reflects pH of container determined after adjustment at the laboratory, if applicable. If no adjustment required, value reflects Initial pH.

Frozen Date/Time: With respect to Volatile Organics in soil, Frozen Date/Time reflects the date/time at which associated Reagent Water-preserved vials were initially frozen. Note: If frozen date/time is beyond 48 hours from sample collection, value will be reflected in 'bold'.

Initial pH: As it pertains to Sample Receipt & Container Information section of the report, Initial pH reflects pH of container determined upon receipt, if applicable.

PAH Total: With respect to Alkylated PAH analyses, the 'PAHs, Total' result is defined as the summation of results for all or a subset of the following compounds: Naphthalene, C1-C4 Naphthalenes, 2-Methylnaphthalene, 1-Methylnaphthalene, Biphenyl, Acenaphthylene, Acenaphthene, Fluorene, C1-C3 Fluorenes, Phenanthrene, C1-C4 Phenanthrenes/Anthracenes, Anthracene, Fluoranthene, Pyrene, C1-C4 Fluoranthenes/Pyrenes, Benz(a)anthracene, Chrysene, C1-C4 Chrysenes, Benzo(b)fluoranthene, Benzo(j)+(k)fluoranthene, Benzo(e)pyrene, Benzo(a)pyrene, Perylene, Indeno(1,2,3-cd)pyrene, Dibenz(ah)+(ac)anthracene, Benzo(g,h,i)perylene. If a 'Total' result is requested, the results of its individual components will also be reported.

PFAS Total: With respect to PFAS analyses, the 'PFAS, Total (5)' result is defined as the summation of results for: PFHpA, PFHxS, PFOA, PFNA and PFOS. In addition, the 'PFAS, Total (6)' result is defined as the summation of results for: PFHpA, PFHxS, PFOA, PFNA, PFDA and PFOS. For MassDEP DW compliance analysis only, the 'PFAS, Total (6)' result is defined as the summation of results at or above the RL. Note: If a 'Total' result is requested, the results of its individual components will also be reported.

The target compound Chlordane (CAS No. 57-74-9) is reported for GC ECD analyses. Per EPA,this compound "refers to a mixture of chlordane isomers, other chlorinated hydrocarbons and numerous other components." (Reference: USEPA Toxicological Review of Chlordane, In Support of Summary Information on the Integrated Risk Information System (IRIS), December 1997.)

Total: With respect to Organic analyses, a 'Total' result is defined as the summation of results for individual isomers or Aroclors. If a 'Total' result is requested, the results of its individual components will also be reported. This is applicable to 'Total' results for methods 8260, 8081 and 8082.

Data Qualifiers

A - Spectra identified as "Aldol Condensates" are byproducts of the extraction/concentration procedures when acetone is introduced in the process.

B - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).

C - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.

D - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.

E - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

F - The ratio of quantifier ion response to qualifier ion response falls outside of the laboratory criteria. Results are considered to be an estimated maximum concentration.

G - The concentration may be biased high due to matrix interferences (i.e, co-elution) with non-target compound(s). The result should be considered estimated.

H - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.

I - The lower value for the two columns has been reported due to obvious interference.

J - Estimated value. The Target analyte concentration is below the quantitation limit (RL), but above the Method Detection Limit (MDL) or Estimated Detection Limit (EDL) for SPME-related analyses. This represents an estimated concentration for Tentatively Identified Compounds (TICs).

M - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.

ND - Not detected at the method detection limit (MDL) for the sample, or estimated detection limit (EDL) for SPME-related analyses.

Report Format: DU Report with 'J' Qualifiers

Project Name:	BENCH SCALE TEST	**Lab Number:**	L2145703
Project Number:	BENCH SCALE TEST	**Report Date:**	09/09/21

Data Qualifiers

NJ - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.

P - The RPD between the results for the two columns exceeds the method-specified criteria.

Q - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)

R - Analytical results are from sample re-analysis.

RE - Analytical results are from sample re-extraction.

S - Analytical results are from modified screening analysis.

Project Name:	BENCH SCALE TEST	**Lab Number:**	L2145703
Project Number:	BENCH SCALE TEST	**Report Date:**	09/09/21

REFERENCES

121 Standard Methods for the Examination of Water and Wastewater. APHA-AWWA-WEF. Standard Methods Online.

134 Determination of Selected Perfluorinated Alkyl Acids in Drinking Water by Solid Phase Extraction and Liquid Chromatography/Tandem Mass Spectrometry (LC/MS/MS) using Isotope Dilution. Alpha SOP 23528.

LIMITATION OF LIABILITIES

Alpha Analytical performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical be held liable for any incidental, consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding time and splitting of samples in the field.

Certification Information

The following analytes are not included in our Primary NELAP Scope of Accreditation:

Westborough Facility
EPA 624/624.1: m/p-xylene, o-xylene, Naphthalene
EPA 625/625.1: alpha-Terpineol
EPA 8260C/8260D: NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene, Azobenzene; SCM: Iodomethane (methyl iodide), 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.
EPA 8270D/8270E: NPW: Dimethylnaphthalene,1,4-Diphenylhydrazine, alpha-Terpineol; SCM: Dimethylnaphthalene,1,4-Diphenylhydrazine.
SM4500: NPW: Amenable Cyanide; SCM: Total Phosphorus, TKN, NO2, NO3.

Mansfield Facility
SM 2540D: TSS
EPA 8082A: NPW: PCB: 1, 5, 31, 87,101, 110, 141, 151, 153, 180, 183, 187.
EPA TO-15: Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.
Biological Tissue Matrix: EPA 3050B

The following analytes are included in our Massachusetts DEP Scope of Accreditation

Westborough Facility:

Drinking Water
EPA 300.0: Chloride, Nitrate-N, Fluoride, Sulfate; **EPA 353.2**: Nitrate-N, Nitrite-N; **SM4500NO3-F**: Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE, EPA 180.1, SM2130B, SM4500Cl-D, SM2320B, SM2540C, SM4500H-B, SM4500NO2-B**
EPA 332: Perchlorate; **EPA 524.2:** THMs and VOCs; **EPA 504.1:** EDB, DBCP.
Microbiology: **SM9215B; SM9223-P/A, SM9223B-Colilert-QT,SM9222D**.

Non-Potable Water
SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2320B, SM4500CL-E, SM4500F-BC, SM4500NH3-BH: Ammonia-N and Kjeldahl-N, **EPA 350.1**: Ammonia-N, **LACHAT 10-107-06-1-B**: Ammonia-N, **EPA 351.1, SM4500NO3-F, EPA 353.2**: Nitrate-N, **SM4500P-E, SM4500P-B, E, SM4500SO4-E, SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, EPA 420.1, SM4500-CN-CE, SM2540D, EPA 300: Chloride, Sulfate, Nitrate.**
EPA 624.1: Volatile Halocarbons & Aromatics,
EPA 608.3: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs
EPA 625.1: SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045**: PCB-Oil.
Microbiology: **SM9223B-Colilert-QT; Enterolert-QT, SM9221E, EPA 1600, EPA 1603, SM9222D.**

Mansfield Facility:

Drinking Water
EPA 200.7: Al, Ba, Cd, Cr, Cu, Fe, Mn, Ni, Na, Ag, Ca, Zn. **EPA 200.8:** Al, Sb, As, Ba, Be, Cd, Cr, Cu, Pb, Mn, Ni, Se, Ag, TL, Zn. **EPA 245.1** Hg.
EPA 522, EPA 537.1.

Non-Potable Water
EPA 200.7: Al, Sb, As, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Sr, TL, Ti, V, Zn.
EPA 200.8: Al, Sb, As, Be, Cd, Cr, Cu, Fe, Pb, Mn, Ni, K, Se, Ag, Na, TL, Zn.
EPA 245.1 Hg.
SM2340B

For a complete listing of analytes and methods, please contact your Alpha Project Manager.

179 Lake Avenue, Rochester, NY 14608 Office (585) 647-2530 Fax (585) 647-3311

8/26/21

L2145703

CHAIN OF CUSTODY

11148

REPORT TO:		INVOICE TO:		LAB PROJECT ID
CLIENT:	Paradigm Environmental	CLIENT:	Same	
ADDRESS:	179 Lake Ave	ADDRESS:		Quotation #:
CITY:	Rochester STATE: NY ZIP 14608	CITY:	STATE: ZIP:	
PHONE:		PHONE:		Email: reporting@paradigmenv.com
ATTN:	Reporting	ATTN:		

PROJECT REFERENCE

Bench Scale Test

Matrix Codes:

AQ - Aqueous Liquid; NQ - Non-Aqueous Liquid; WA - Water; WG - Groundwater; DW - Drinking Water; WW - Wastewater; SO - Soil; SL - Sludge; SD - Solid; PT - Paint; WP - Wipe; CK - Caulk; OL - Oil; AR - Air

REQUESTED ANALYSIS

	DATE COLLECTED	TIME COLLECTED	COMPOSITE	GRAB	SAMPLE IDENTIFIER	MATRIX CODES	NUMBER OF CONTAINERS	PFAS	REMARKS	PARADIGM LAB SAMPLE NUMBER
-01	8/25/2021	1305		X	SD-RACKCOG-08252021	SO	2	X		
-00	8/25/2021	1325		X	AQ-COGAQ-08252021	WA	2	X		

8/26/21 0540

Turnaround Time		Report Supplements			
Availability contingent upon lab approval; additional fees may apply.					
Standard 5 day	X	None Required		None Required	
10 day		Batch QC	X	Basic EDD	X
Rush 3 day		Category A		NYSDEC EDD	X
Rush 2 day		Category B			
Rush 1 day					
Other		Other		Other EDD	
please indicate date needed:		please indicate package needed:		please indicate EDD needed:	

Client

Sampled By	Date/Time	Total Cost:
Brian Zuck	8/25/21 16:25	
Relinquished By	Date/Time	Log 1625
AM	8/25/21 1625	P.I.F.
Received By	Date/Time	
	8/26/21 02:20	
Received @ Lab By	Date/Time	
	8/26/21 4:00	

By signing this form, client agrees to Paradigm Terms and Conditions (reverse).

T. Hughes 8/26/21 0415

T. Hughes 8/26/21 0540

See additional page for sample conditions.

September 15, 2021 Service Request No:R2108819

Paradigm Environmental Services, Inc.
179 Lake Avenue
Rochester, NY 14608

Laboratory Results for: 213873

Dear Reporting,

Enclosed are the results of the sample(s) submitted to our laboratory August 30, 2021
For your reference, these analyses have been assigned our service request number **R2108819.**

All testing was performed according to our laboratory s quality assurance program and met the requirements of the TNI standards except as noted in the case narrative report. Any testing not included in the lab's accreditation is identified on a Non-Certified Analytes report. All results are intended to be considered in their entirety. ALS Environmental is not responsible for use of less than the complete report. Results apply only to the individual samples submitted to the lab for analysis, as listed in the report. The measurement uncertainty of the results included in this report is within that expected when using the prescribed method(s), and represented by Laboratory Control Sample control limits. Any events, such as QC failures or Holding Time exceedances, which may add to the uncertainty are explained in the report narrative or are flagged with qualifiers. The flags are explained in the Report Qualifiers and Definitions page of this report.

Please contact me if you have any questions. My extension is 7471. You may also contact me via email at Brady.Kalkman@alsglobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

Brady Kalkman
Project Manager

ADDRESS 1565 Jefferson Road, Building 300, Suite 360, Rochester, NY 14623
PHONE 1 585 288 5380 FA 1 585 288 8475
ALS Group USA, Corp.
dba ALS Environmental

Narrative Documents

ALS Environmental—Rochester Laboratory
1565 Jefferson Road, Building 300, Suite 360, Rochester, NY 14623
Phone (585) 288-5380 Fax (585) 288-8475
www.alsglobal.com

ALS Environmental

Client: Paradigm Environmental Services, Inc.
Project: 213873
Sample Matrix: Water

Service Request: R2108819
Date Received: 08/30/2021

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of ALS Environmental. This report contains analytical results for samples for the Tier level IV requested by the client.

Sample Receipt:

Two water samples were received for analysis at ALS Environmental on 08/30/2021. Any discrepancies upon initial sample inspection are annotated on the sample receipt and preservation form included within this report. The samples were stored at minimum in accordance with the analytical method requirements.

Metals:

No significant anomalies were noted with this analysis.

General Chemistry:

Method 300.0, R2108819-001: The sample was diluted to elevate the reporting limit above the presence of non-target background components indicated on the chromatogram. Sample contains a high concentration of acetate. The matrix interference prevented adequate resolution of one or more target compound(s) at the reporting limit.

Samples were spun for TCLP by Paradigm and then delivered to ALS Environmental for analysis.

Approved by _____ Date 09/15/2021

SAMPLE DETECTION SUMMARY

CLIENT ID: 213873-01A SD-RACKCOG-082 2021			Lab ID: R2108819-001			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Cyanide, Total	7.39			0.25	mg/L	Kelada-01

CLIENT ID: 213873-01B AQ-COGAQ-082 221			Lab ID: R2108819-002			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Mercury, Total	2660			50	ng/L	1631E

Sample Receipt Information

ALS Environmental—Rochester Laboratory
1565 Jefferson Road, Building 300, Suite 360, Rochester, NY 14623
Phone (585) 288-5380 Fax (585) 288-8475
www.alsglobal.com

Client: Paradigm Environmental Services, Inc. **Service Request:**R2108819
Pro ect: 213873

SAMPLE CROSS-REFERENCE

SAMPLE	CLIENT SAMPLE ID	DATE	TIME
R2108819-001	213873-01A SD-RACKCOG-08252021	8/25/2021	1305
R2108819-002	213873-01B AQ-COGAQ-0825221	8/25/2021	1325

179 Lake Avenue, Rochester, NY 14608 Office (585) 647-2530 Fax (585) 647-3311

1 of 1

CHAIN OF CUSTODY

NEC - TCN

ALS: ELAP ID: 10145

REPORT TO:		INVOICE TO:			
COMPANY:	Paradigm Environmental	COMPANY:	Same	LAB PROJECT #:	CLIENT PROJECT #:
ADDRESS:		ADDRESS:			
CITY: STATE: ZIP:		CITY: STATE: ZIP:		TURNAROUND TIME: (WORKING DAYS)	
PHONE: FAX:		PHONE: FAX:			STD / OTHER
PROJECT NAME/SITE NAME:		ATTN:	Reporting	ATTN:	Accounts Payable	☐ 1 ☐ 2 ☐ 3 ☐ 5 ☐
		COMMENTS:	Please email results to reporting@paradigmenv.com	Date Due: 9/3/21 For data	

REQUESTED ANALYSIS

	DATE	TIME	COMPOSITE	GRAB	SAMPLE LOCATION/FIELD ID	MATRIX	NUMBER OF CONTAINERS	Fluoride	Nitrate/Nitrite	Uranium	TCN		LL Hg 1631					REMARKS	PARADIGM LAB SAMPLE NUMBER
																		Report J Flags. ASP Cat B Package Due 9/17/21	
1	8/25/21	13:05		X	SD-RACKCOG-08252021	TCLP extract	4	X	X	X	X							213873-01A	
2	8/25/21	13:25		X	AQ-COGAQ-08252021	Water	1						X					213873-02	
3																			
4																			
5																		TCLP sample spun at	
6																		Paradigm 8/27/21.	
7																			
8																			
9																			
10																			

LAB USE ONLY BELOW THIS LINE

Sample Condition: Per NELAC/ELAP 210/241/242/243/244

Receipt Parameter	NELAC Compliance	
Container Type:	Y ☐	N ☐
Comments:		
Preservation:	Y ☐	N ☐
Comments:		
Holding Time:	Y ☐	N ☐
Comments:		
Temperature:	Y ☐	N ☐
Comments:		

Client

Sampled By: Donald W Dodd — Date/Time: 8.30.21 1643

Relinquished By — Date/Time

Received By — Date/Time

Received @ Lab By: [illegible] — Date/Time: 8/30/21 1643

Total Cost:

R2108819 5

Paradigm Environmental Services, Inc.

213873

Cooler Receipt and Preservation C

R2108819 5
Paradigm Environmental Services, Inc.
213873

Project/Client Paradigm Folder Number

Cooler received on 8/30/21 by: @

COURIER: ALS UPS FEDEX VELOCITY (CLIENT)

1	Were **Custody seals** on outside of cooler?	Y (N)	5a	**Perchlorate** samples have required headspace?	Y N (NA)
2	**Custody papers** properly completed (ink, signed)?	(Y) N	5b	Did VOA vials, Alk,or Sulfide have sig* **bubbles**?	Y N (NA)
3	Did all bottles arrive in good **condition** (unbroken)?	(Y) N	6	Where did the bottles originate?	ALS/ROC (CLIENT)
4	Circle: **Wet Ice Dry Ice Gel packs** present?	(Y) N	7	Soil VOA received as:	Bulk Encore 5035set (NA)

8. Temperature Readings Date: 8/30/21 Time: 1645 ID: IR#7 (IR#11) From: Temp Blank (Sample Bottle)

Observed Temp (°C)	7.5						
Within 0-6°C?	Y (N)	Y N	Y N	Y N	Y N	Y N	Y N
If <0°C, were samples frozen?	Y N	Y N	Y N	Y N	Y N	Y N	Y N

If out of Temperature, note packing/ice condition: _____ Ice melted Poorly Packed (described below) Same Day Rule

&Client Approval to Run Samples: _____ Standing Approval Client aware at drop-off Client notified by: _____

All samples held in storage location: Rack by C on 8/30/21 at 1641
5035 samples placed in storage location: _____ by _____ on _____ at _____ within 48 hours of sampling? Y N

Cooler Breakdown/Preservation Check**: Date: 8-31-21 Time: 0710 by: ME

9. Were all bottle labels complete (*i.e.* analysis, preservation, etc.)? YES (NO)
10. Did all bottle labels and tags agree with custody papers? YES (NO)
11. Were correct containers used for the tests indicated? (YES) NO
12. Were 5035 vials acceptable (no extra labels, not leaking)? YES NO (N/A)
13. Air Samples: Cassettes / Tubes Intact Y / N with MS Y / N Canisters Pressurized Tedlar® Bags Inflated (N/A)

pH	Lot of test paper	Reagent	Preserved? Yes	Preserved? No	Lot Received	Exp	Sample ID Adjusted	Vol. Added	Lot Added	Final pH
≥12	223419	NaOH	✓		Client Bottles					
≤2	↓	HNO_3	✓		↓					
≤2	↓	H_2SO_4	X							
<4		$NaHSO_4$								
5-9		For 608pest			No=Notify for 3day					
Residual Chlorine (-)		For CN, Phenol, 625, 608pest, 522	X		If +, contact PM to add $Na_2S_2O_3$ (625, 608, CN), ascorbic (phenol).					
		$Na_2S_2O_3$								
		ZnAcetate	-	-			**VOAs and 1664 Not to be tested before analysis. Otherwise, all bottles of all samples with chemical preservatives are checked (not just representatives).			
		HCl	**	**						

Bottle lot numbers: Client Bottles
Explain all Discrepancies/ Other Comments:

HPROD	BULK
HTR	FLDT
SUB	HGFB
ALS	LL3541

Labels secondary reviewed by: ME
PC Secondary Review: _____

*significant air bubbles: VOA > 5-6 mm : WC >1 in. diameter

Miscellaneous Forms

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REPORT QUALIFIERS AND DEFINITIONS

U	Analyte was analyzed for but not detected. The sample quantitation limit has been corrected for dilution and for percent moisture, unless otherwise noted in the case narrative.
J	Estimated value due to either being a Tentatively Identified Compound (TIC) or that the concentration is between the MRL and the MDL. Concentrations are not verified within the linear range of the calibration. For DoD: concentration >40% difference between two GC columns (pesticides/Arclors).
B	Analyte was also detected in the associated method blank at a concentration that may have contributed to the sample result.
E	Inorganics- Concentration is estimated due to the serial dilution was outside control limits.
E	Organics- Concentration has exceeded the calibration range for that specific analysis.
D	Concentration is a result of a dilution, typically a secondary analysis of the sample due to exceeding the calibration range or that a surrogate has been diluted out of the sample and cannot be assessed.
*	Indicates that a quality control parameter has exceeded laboratory limits. Under the ñNotesò column of the Form I, this qualifier denotes analysis was performed out of Holding Time.
H	Analysis was performed out of hold time for tests that have an ñimmediateò hold time criteria.
#	Spike was diluted out.
+	Correlation coefficient for MSA is <0.995.
N	Inorganics- Matrix spike recovery was outside laboratory limits.
N	Organics- Presumptive evidence of a compound (reported as a TIC) based on the MS library search.
S	Concentration has been determined using Method of Standard Additions (MSA).
W	Post-Digestion Spike recovery is outside control limits and the sample absorbance is <50% of the spike absorbance.
P	Concentration >40% difference between the two GC columns.
C	Confirmed by GC/MS
Q	DoD reports: indicates a pesticide/Aroclor is not confirmed (Ó100% Difference between two GC columns).
X	See Case Narrative for discussion.
MRL LOQ	Method Reporting Limit. Also known as: Limit of Quantitation (LOQ) The lowest concentration at which the method analyte may be reliably quantified under the method conditions.
MDL	Method Detection Limit. A statistical value derived from a study designed to provide the lowest concentration that will be detected 99% of the time. Values between the MDL and MRL are estimated (see J qualifier).
LOD	Limit of Detection. A value at or above the MDL which has been verified to be detectable.
ND	Non-Detect. Analyte was not detected at the concentration listed. Same as U qualifier.

Rochester Lab ID # for State Certifications[1]

Connecticut ID # PH0556	Maine ID #NY0032	Pennsylvania ID# 68-786
Delaware Approved	New Hampshire ID # 2941	Rhode Island ID # 158
DoD ELAP #65817	New York ID # 10145	Virginia #460167
Florida ID # E87674	North Carolina #676	

[1] Analyses were performed according to our laboratoryôs NELAP-approved quality assurance program and any applicable state or agency requirements. The test results meet requirements of the current NELAP/TNI standards or state or agency requirements, where applicable, except as noted in the case narrative. Since not all analyte/method/matrix combinations are offered for state/NELAC accreditation, this report may contain results which are not accredited. For a specific list of accredited analytes, contact the laboratory or go to https://www.alsglobal.com/locations/americas/north-america/usa/new-york/rochester-environmental

ALS Laboratory Group

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Client: Paradigm Environmental Services, Inc. **Service Request:** R2108819
Project: 213873

Non-Certified Analytes

Certifying Agency: New York Department of Health

Method	Matrix	Analyte
200.8	Water	Uranium, Total

Client:	Paradigm Environmental Services, Inc.	**Service Request:**	R2108819
Project:	213873/		

Sample Name:	213873-01A SD-RACKCOG-08252021	**Date Collected:**	08/25/21
Lab Code:	R2108819-001	**Date Received:**	08/30/21
Sample Matrix:	Water		

Analysis Method	Extracted/Digested By	Analyzed By
200.8	CKUTZER	KMCLAEN
300.0		CWOODS
353.2		GNITAJOUPPI
Kelada-01		CWOODS

Sample Name:	213873-01B AQ-COGAQ-0825221	**Date Collected:**	08/25/21
Lab Code:	R2108819-002	**Date Received:**	08/30/21
Sample Matrix:	Water		

Analysis Method	Extracted/Digested By	Analyzed By
1631E		KMCLAEN

The preparation methods associated with this report are found in these tables unless discussed in the case narrative.

Water/Liquid Matrix

Analytical Method	Preparation Method
200.7	200.2
200.8	200.2
6010C	3005A/3010A
6020A	ILM05.3
9034 Sulfide Acid Soluble	9030B
SM 4500-CN-E Residual Cyanide	SM 4500-CN-G
SM 4500-CN-E WAD Cyanide	SM 4500-CN-I

Solid/Soil/Non-Aqueous Matrix

Analytical Method	Preparation Method
6010C	3050B
6020A	3050B
6010C TCLP (1311) extract	3005A/3010A
6010 SPLP (1312) extract	3005A/3010A
7199	3060A
300.0 Anions/ 350.1/ 353.2/ SM 2320B/ SM 5210B/ 9056A Anions	DI extraction
For analytical methods not listed, the preparation method is the same as the analytical method reference.	

Sample Results

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Metals

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www.alsglobal.com

Analytical Report

Client:	Paradigm Environmental Services, Inc.	**Service Request:**	R2108819
Project:	213873	**Date Collected:**	08/25/21 13:05
Sample Matrix:	Water	**Date Received:**	08/30/21 16:43
Sample Name:	213873-01A SD-RACKCOG-08252021	**Basis:**	NA
Lab Code:	R2108819-001		

Inorganic Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Date Extracted	Q
Uranium, Total	200.8	ND U	ug/L	5.0	5	09/03/21 12:34	09/02/21	

Analytical Report

Client:	Paradigm Environmental Services, Inc.	**Service Request:**	R2108819
Project:	213873	**Date Collected:**	08/25/21 13:25
Sample Matrix:	Water	**Date Received:**	08/30/21 16:43
Sample Name:	213873-01B AQ-COGAQ-0825221	**Basis:**	NA
Lab Code:	R2108819-002		

Inorganic Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Q
Mercury, Total	1631E	**2660**	ng/L	50	50	09/02/21 15:46	

General Chemistry

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Analytical Report

Client:	Paradigm Environmental Services, Inc.	**Service Request:**	R2108819
Project:	213873	**Date Collected:**	08/25/21 13:05
Sample Matrix:	Water	**Date Received:**	08/30/21 16:43
Sample Name:	213873-01A SD-RACKCOG-08252021	**Basis:**	NA
Lab Code:	R2108819-001		

Inorganic Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Q
Cyanide, Total	Kelada-01	**7.39**	mg/L	0.25	50	09/03/21 17:39	
Fluoride, undistilled	300.0	ND U	mg/L	40	400	09/10/21 11:20	
Nitrate+Nitrite as Nitrogen	353.2	ND U	mg/L	5.0	100	09/09/21 17:53	

QC Summary Forms

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Metals

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Analytical Report

Client:	Paradigm Environmental Services, Inc.	**Service Request:**	R2108819
Project:	213873	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
Sample Name:	Method Blank	**Basis:**	NA
Lab Code:	R2108819-MB		

Inorganic Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Date Extracted	Q
Mercury, Total	1631E	ND U	ng/L	1.0	1	09/02/21 12:26	NA	
Uranium, Total	200.8	ND U	ug/L	1.0	1	09/03/21 11:54	09/02/21	

Client: Paradigm Environmental Services, Inc.
Project: 213873
Sample Matrix: Water

Service Request: R2108819
Date Analyzed: 09/02/21

Lab Control Sample Summary
Inorganic Parameters

Units:ng/L
Basis:NA

Lab Control Sample
R2108819-LCS

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
Mercury, Total	1631E	4.88	5.0	98	77-128

Client: Paradigm Environmental Services, Inc.
Project: 213873
Sample Matrix: Water

Service Request: R2108819
Date Analyzed: 09/03/21

Lab Control Sample Summary
Inorganic Parameters

Units:ug/L
Basis:NA

Lab Control Sample
R2108819-LCS

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
Uranium, Total	200.8	22.0	20.0	110	80-120

General Chemistry

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Analytical Report

Client:	Paradigm Environmental Services, Inc.	**Service Request:**	R2108819
Project:	213873	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
Sample Name:	Method Blank	**Basis:**	NA
Lab Code:	R2108819-MB		

Inorganic Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Q
Cyanide, Total	Kelada-01	ND U	mg/L	0.0050	1	09/03/21 15:03	
Fluoride, undistilled	300.0	ND U	mg/L	0.10	1	09/10/21 09:09	
Nitrate+Nitrite as Nitrogen	353.2	ND U	mg/L	0.050	1	09/09/21 17:13	

Client: Paradigm Environmental Services, Inc.
Project: 213873
Sample Matrix: Water

Service Request: R2108819
Date Analyzed: 09/03/21 - 09/10/21

Lab Control Sample Summary
General Chemistry Parameters

Units:mg/L
Basis:NA

Lab Control Sample
R2108819-LCS

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
Cyanide, Total	Kelada-01	0.0942	0.100	94	90-110
Fluoride, undistilled	300.0	0.94	1.00	94	90-110
Nitrate+Nitrite as Nitrogen	353.2	0.499	0.500	100	90-110