M E M O R A N D U M

TO: Burgess Brothers Landfill Site File

cc: Thomas Condon, On-Scene Coordinator (OSC), U.S. Environmental Protection Agency (EPA) Region I, Emergency Planning and Response Branch (EPRB); and Anni Loughlin, Section Chief, Maine, Vermont, and Connecticut Superfund Section, U.S. EPA Region I

FROM: George Mavris, Project Leader, Weston Solutions, Inc. (WESTON®), Superfund Technical Assessment and Response Team IV (START)

DATE: 10 June 2016

RE: Groundwater, Surface Water, and Influent/Effluent Sampling Activities at the Burgess Brothers Landfill, Bennington/Woodford, Bennington County, Vermont, Technical Direction Document (TDD) Number (No.) TO1-01-16-03-0003; Task No. 0099. Document Control (DC) No. A-00058.

INTRODUCTION

Perfluorinated compounds (PFCs) have been detected in drinking water samples collected in the communities of Hoosick Falls, New York and in North Bennington and Bennington, Vermont (VT) at concentrations exceeding the State of Vermont and Federal EPA drinking water advisory levels. Due to concerns that nearby former manufacturing facilities may have disposed of PFC-containing materials into the Burgess Brothers Landfill, the Vermont Department of Environmental Conservation (VT DEC) had requested U.S. EPA assistance in collecting groundwater samples from selected monitoring wells at the Burgess Brothers Landfill to determine if suspected wastes buried at the landfill may have leached from the landfill and into the groundwater.

On 23 March 2016, groundwater samples were collected from four on-site overburden monitoring wells. Based on the analytical results of these groundwater samples, where two PFCs were detected above laboratory method detection limits (MDLs) in the groundwater samples collected from the monitoring wells, VT DEC requested additional EPA assistance. Specifically, VT DEC requested assistance with collecting surface water samples from a small on-site stream and influent/effluent water samples from the on-site groundwater treatment system to determine if these media had been impacted by PFCs leaching out of the landfill.

SITE HISTORY AND BACKGROUND

The Burgess Brothers Landfill Site (Site), located off of Route 9 in Bennington/Woodford, VT, is an approximately 3-acre salvage yard and landfill, which is part of a larger 60-acre plot. The geographic coordinates of the site, as measured from the approximate site center, are 42° 52' 40" north latitude and 73° 09' 00" west longitude (see Attachment A, Figure 1). The site was placed

on EPA's National Priority List (NPL) in 1989. The site is bordered by the Green Mountain National Forest to the north and residential properties to the west. The Burgess Brothers Landfill site operated as a sand pit, salvage yard, and landfill from the 1940s until the mid-1970s. Union Carbide Corp.'s Bennington Plant disposed of wastes from battery manufacturing, an unknown quantity of lead sludge, and the equivalent of 47,780 drums of hazardous wastes at the site into unlined settling lagoons adjacent to the bank of the sand pit. Facility operations contaminated soil, groundwater, and surface water with heavy metals and volatile organic compounds (VOCs). In 1991, potentially responsible parties (PRPs) agreed to begin the site cleanup. By 1999, a landfill cap was constructed and a soil vapor extraction/air sparging system was installed. Following construction of the site's remedy, operation and maintenance activities and monitoring are ongoing. In 2002 the air sparging system was discontinued due to lack of effectiveness. In 2005 the vapor extraction system was shut down until late 2006 and then again in 2011. The Site cleanup plan was updated in 2011 to address groundwater contamination that extended beyond the landfill cap.

PURPOSE OF SAMPLING

Due to concerns that wastes buried at the landfill may have leached from the landfill and into the groundwater, EPA requested that Weston Solutions, Inc. (WESTON®), Superfund Technical Assessment and Response Team IV (START), collect groundwater samples to determine if the groundwater has been impacted by PFCs.

PFCs are a class of synthetic compounds formed from carbon chains with fluorine attached. The chemical structure of PFCs gives them unique properties, such as thermal stability and the ability to repel both water and oil, that make them useful components in a wide variety of consumer and industrial products, including non-stick cookware, food packaging, waterproof clothing, fabric stain protectors, lubricants, paints, and firefighting foams such as aqueous film-forming foam (AFFF). PFCs have been in use since the 1950s. Because they help reduce friction, they are also used in a variety of other industries, including aerospace, automotive, building and construction, and electronics. PFCs break down very slowly in the environment and are often characterized as persistent. They also build up in the bodies of exposed humans and animals and stay there for long periods of time. Unlike many other persistent chemicals, PFCs are not stored in body fat. However, PFCs are similar to other persistent chemicals due to the long half-life of the persistent chemicals in the human body. This slow elimination time makes it difficult to determine how changes in lifestyle, diet, or other exposure-related factors influence the concentrations of PFCs in the blood.

SAMPLING ACTIVITIES (ROUND 1) – 23 MARCH 2016

On 23 March 2016, WESTON®, START personnel George Mavris, Kenneth Robinson, Bill Mahany, Andrew Danikas, and Sara Evarts; and EPA On-Scene Coordinator (OSC) Tom Condon mobilized to the Burgess Brothers Landfill, located in Bennington/Woodford, VT to collect groundwater samples from four on-site monitoring wells. Vern Lincoln of Environmental Partners Group (EPG) (consultant for the Potentially Responsible Party) accompanied the EPA/START team to the site.

V. Lincoln located the four monitoring wells (P-01, P-02, P-08, and W-30T) that were selected for sampling (see Attachment A, Figure 2). The following table summarizes the monitoring well specifications. The well depths and screened intervals were provided to START by V. Lincoln.

Monitoring Well	Total Depth* (feet)	Screened Interval (feet)	Inner Well Diameter (inches)	Protective Casing	Type of Sampling Pump
P-01	10.06	1.06 – 10.06	1	None	Peristaltic
P-02	13.09	3.09 – 13.09	1	None	Peristaltic
P-08	15.92	5.92 – 15.92	1	None	Peristaltic
W-30T	15.34	5.0 – 15.0	2	Steel	Peristaltic

* Measured from top of inner polyvinyl chloride (PVC) casing.

START personnel established a support zone and calibrated air monitoring instruments, including four MultiRAE Plus units with the following sensors: carbon monoxide (CO); hydrogen sulfide (H_2S); VOC; oxygen (O_2); and Lower Explosive Limit (LEL) sensors. A radiation detection instrument, a Ludlum Model 19A Gamma Radiation Meter, was also prepared. Background readings on the MultiRAE Plus were as follows: O_2 (20.9%); CO [0 parts per million (ppm)]; H_2S (0 ppm); LEL (0%); and PID (0 ppm VOC). The radiation meter had background levels between 10-12 microRoentgens per hour (µR/hour).

START member A. Danikas conducted a tailgate safety and operations meeting, and START and EPA personnel signed the Health and Safety Plan (HASP). Site activities were conducted in accordance with the site HASP, which was prepared as a separate document, entitled *Weston Solutions, Inc., Region I START Site Health and Safety Plan (HASP) for the Burgess Brothers Landfill Site, Bennington, Bennington County, Vermont*, dated March 2016.

Care was taken by the sampling team to ensure that no potential PFC-containing materials were utilized during sampling. No materials containing Teflon, Gore-Tex, or other waterproofing materials were utilized while sampling. Extra care was taken to assure that clothing, storage containers, and sampling equipment did not contain potential PFC sources.

Sampling activities were performed in accordance with the site Sampling and Analysis Plan (SAP), which was prepared as a separate document, entitled *Sampling and Analysis Plan for the Burgess Brothers Landfill, Bennington, Bennington County, Vermont*, dated March 2016. Modifications to the SAP are noted later in this section.

Prior to beginning purging and sampling activities, a Field Trip Blank was prepared by removing the caps from the two laboratory-provided bottles. The full bottle labeled Field Trip Blank was carefully poured into the empty bottle marked Field Trip Blank and gently shaken in an up-and-down manner to allow the preservative to dissolve. Both bottles were then recapped, and the Field Trip Blank bottle was returned to the re-sealable bag and placed in the sample cooler in a location away from the sampling points.

Three of the monitoring wells (P-01, P-02, and P-08) were constructed of 1-inch polyvinyl chloride (PVC) casing and secured with a PVC cap, and one well (W-30T) was constructed of a 2-inch PVC inner casing with an outer steel casing that was secured with a padlock. The key to the padlock was provided by V. Lincoln. The PVC caps and well cap were removed, and the headspace of the wells were screened for VOCs and combustible gases using a MultiRAE Plus unit. The radiation meter was carried around the site from well to well to monitor for radiation. Readings were recorded on the low-flow groundwater sampling Field Data Sheets.

The cap was removed from W-30T, and the dedicated Teflon and silicon tubing in the well were removed and placed aside until purging and sampling were completed. The tubing was then placed back into the well when the sampling was completed. None of the other monitoring wells had dedicated tubing.

Prior to placing tubing into the well, the water level was measured and recorded. Due to concerns that the four monitoring wells were installed in fine-grained overburden material, and that the water level meter could then easily stir sediment at the bottom of the wells, START did not measure the total depths of the wells. The water level meter was removed from the wells, and high density polyethylene (HDPE) tubing was then measured and lowered slowly (to minimize disturbance) into the well to the midpoint of the saturated zone to be sampled.

Since the top of the water table in all four wells ranged from approximately 3 to 5 feet below the top of the inner PVC casing, adjustable rate peristaltic pumps (suction) were used to purge the wells and to collect groundwater samples for PFC analysis.

Following the placement of the tubing into the well and connecting the tubing into the YSI flow cell, the water level meter was lowered into the well to the top of the water column and remained in the well while purging to record drawdown of the water column. The pump was set at its lowest speed setting and slowly increased until discharge occurred. The water level was checked and the pump speed adjusted to its lowest setting to minimize drawdown. The well was purged for a few minutes until the water was clear before running into the YSI flow cell. During well purging, water quality parameters [temperature, specific conductance, pH, oxidation-reduction potential (ORP), and dissolved oxygen (DO)] were measured using a YSI water quality meter. Turbidity was measured by collecting a groundwater sample at a point prior to entering the YSI flow cell and measured with a turbidity meter. When all the above indicator field parameters stabilized, purging was considered complete and sampling began.

Prior to collecting the groundwater sample, the peristaltic pump was turned off and an approximate 1-foot length of the HDPE tubing (between the peristaltic pump head and flow cell) was cut to provide a clean, uncontaminated sample collection point. The pump was then turned on and allowed to flow for approximately one minute.

The pump remained at a slow, constant flow [approximately 100 - 110 milliliters per minute (mL/min)] during sampling. The sample number was written on the bottle caps with indelible ink (Sharpie). The sample bottles were carefully filled nearly to the top, being careful not to overfill the bottles during sample collection. The caps were then turned securely on the bottles and the bottles gently shaken in an up-and-down manner to allow the preservative to dissolve. The

bottles were then placed in a re-sealable bag before repeating this process with the other empty bottles.

Split samples, consisting of two 500-mL containers, were collected by V. Lincoln. The first split sample was collected at monitoring well P-08. The collection of split samples alternated between START and EPG, *i.e*. START collected a sample in one container, then EPG collected a sample in one container, and the sequence was repeated until all containers for that sample station were completed. Groundwater samples from P-08 and W-30T were collected in this manner. START allowed the peristaltic pumps to continue running at monitoring wells P-01 and P-02 after START collected groundwater samples, and the split samples from these wells were collected by V. Lincoln following the collection of samples by START due to the late arrival of sample containers for EPG.

Relevant information and observations pertaining to the sample location were recorded, and the sampling location was photo-documented. Well purge water and decontamination fluids generated during decontamination of the YSI water quality meters and water level meters was containerized in 5-gallon pails and taken by V. Lincoln to dispose of at the on-site groundwater treatment system following the collection of the groundwater samples.

The caps were then placed on the monitoring wells P-01, P-02, and P-08. Monitoring well W-30T was secured with a padlock on the metal casing.

One field equipment (rinsate) blank was collected by running laboratory-provided PFC-free water through HDPE and silicon tubing using a peristaltic pump. Two pieces of HDPE tubing (about 1 foot each) and one piece of silicon tubing were cut. The HDPE tubing was inserted into each end of the silicon tubing, and the silicon tubing was placed in the peristaltic pump housing. One end of the HDPE tubing was then inserted into the laboratory-provided PFC-free water container and the other end into the laboratory-provided Field Rinsate Blank container. The peristaltic pump was turned on at the slowest rate possible (approximately 100 to 110 mL/min) to attain flow, and two containers were filled. The bottles were gently shaken in an up-and-down manner to allow the preservative to dissolve. The bottles were then placed in a re-sealable bag and placed in a sample cooler with ice.

Chain-of-custody activities (Scribe) were completed following the collection of groundwater samples from the last well, and the samples were prepared for shipment following Weston Solutions, Inc. sample shipment protocol. The bottles were placed in the shipping container (coolers), and ice and packing materials sufficient to keep samples cool and protected from damage during shipping were added. The chain-of custody documentation was placed in a re-sealable bag and placed atop the samples prior to sealing the shipping container. The sample cooler was delivered to the nearest Federal Express (FedEx) office for next day delivery to the analytical laboratory.

Modifications to the *Sampling and Analysis Plan for the Burgess Brothers Landfill, Bennington, Bennington County, Vermont,* dated March 2016, include the following:

- The pump rate during sampling was adjusted to a flow rate of approximately 100 - 110 mL/min to prevent splashing, and not 200 - 300 mL/min as stated in the SAP.

- An approximate 6-inch piece of silicon tubing with a clamp was not fitted over the HDPE tubing, as stated in the SAP, prior to collecting the groundwater sample, as the pressure exerted when the clamp was closed caused the silicon tubing to disconnect from the HDPE tubing.

Field activities were completed for the day, and all personnel departed the site.

ANALYTICAL DATA SUMMARY

On 1 April 2016, START received the analytical results from Eurofins Eaton Analytical, located in South Bend, Indiana. The groundwater samples were analyzed using EPA Method 537, *Determination Of Selected Perfluorinated Alkyl Acids In Drinking Water By Solid Phase Extraction and Liquid Chromatography/Tandem Mass Spectrometry (LC/MS/MS).* Although PFCs are a class of synthetic compounds numbering more than 24, only six specific PFCs were analyzed by the laboratory for this sampling event, as shown in the table below.

Perfluorinated Compounds	CAS Number
Perfluorobutanesulfonic acid (PFBS)	375-73-5
Perfluoroheptanoic acid (PFHpA)	375-85-9
Perfluorohexanesulfonic acid (PFHxS)	355-46-4
Perfluorononanoic acid (PFNA)	375-95-1
Perfluorooctane sulfonate (PFOS)	1763-23-1
Perfluorooctanoic acid (PFOA)	335-67-1

The PFC data are summarized in Attachment B, Table 1. Analytical results received from Eurofins Eaton Analytical indicated that two PFCs were detected above laboratory method detection limits in the groundwater samples collected from the monitoring wells. These included perfluoroheptanoic acid (PFHpA) and perfluorooctanoic acid (PFOA).

PFHpA was detected in the groundwater in two of the monitoring wells (P-01 and P-02) at concentrations ranging from 3.2 nanograms per Liter (ng/L) or parts per trillion (ppt) in monitoring well P-02 to 5.8 ng/L in monitoring well P-01 (see Attachment B, Table 1). PFOA was detected in the groundwater in all four of the monitoring wells sampled, at concentrations ranging from 3.2 ng/L in W-30T to 64 ng/L in P-01.

Based on a map prepared by XDD, Strategic Environmental Solutions, entitled Site Map, and dated May 2007, the presumed groundwater flow direction in the overburden aquifer is to the southwest. P-01 is the most upgradient monitoring well, and W-30T is the most downgradient. Based on the recent sampling results, PFC-contaminated groundwater appears to be migrating to the southwest in the overburden aquifer with concentrations decreasing consistently in a downgradient direction.

SAMPLING ACTIVITIES (ROUND 2) – 26 APRIL 2016

On 26 April 2016, START personnel John Kelly and Bonnie Mace; and EPA Remedial Project Manager (RPM) Terry Connelly mobilized to the Burgess Brothers Landfill, in Woodford/Bennington, Bennington County, VT to collect two surface water samples (P-17 and P-23) from a small on-site stream and two influent (SP-101 and SP-102) and one effluent (SP-304) water samples from the on-site groundwater treatment system (see Attachment A, Figure 2).

START personnel established a support zone and calibrated an air monitoring instrument (MultiRAE Plus unit) with CO, H_2S, VOC, O_2, and LEL sensors. Background readings on the MultiRAE Plus were as follows: O_2 (20.9%); CO (0 ppm); H_2S (0 ppm); LEL (0%); and PID (0 ppm VOC).

START personnel member J. Kelly conducted a tailgate safety and operations meeting, and START and EPA personnel signed the HASP. Site activities were conducted in accordance with the site HASP. Again, care was taken by the sampling team to ensure that no potential PFC-containing materials were utilized during sampling.

START and EPA personnel met with V. Lincoln and the groundwater treatment system operator in the on-site building. The groundwater treatment system operator reviewed the system plans and pointed out the influent/effluent sampling ports to the sampling team (see Attachment A, Figure 2).

Sampling activities were performed in accordance with the revised site SAP, entitled *Sampling and Analysis Plan for the Burgess Brothers Landfill, Bennington, Bennington County, Vermont*, dated April 2016.

A second Field Trip Blank was prepared prior to collecting the groundwater samples following the same method used during the 23 March 2016 sampling event.

Influent and Effluent Water Samples

Two influent water samples (SP-101 and SP-102), a field duplicate of sample SP-101 (SP-1101), and one effluent water sample (SP-304) were collected directly from metal ports in the on-site groundwater treatment system. Prior to purging and collecting effluent sample SP-304, dedicated Teflon tubing which was attached to the sampling port was removed (see Attachment C, Photo-Documentation Log). The tubing was placed back on the sampling port once the effluent sample was collected.

Prior to collecting the samples, the groundwater treatment system was purged for approximately 15 minutes. During purging, water quality parameters (temperature, specific conductance, pH, ORP, DO, and turbidity) were recorded at approximately 5-minute intervals using a YSI instrument. Purging rates recorded prior to collecting influent samples SP-101 and SP-1101 ranged from 270 mL/min to 460 mL/min; and from 300 mL/min to 330 mL/min for SP-102.

Given the limited spacing in the on-site groundwater treatment system building among the piping and treatment components, it was more efficient and safer to have one person collect all of the samples and hand them over to the respective parties. J. Kelly collected both the EPA/START samples and the split samples for the PRP. The collection of split samples alternated between EPA/START and EPG, *i.e*. J. Kelly collected a sample in one container and handed it over to B. Mace, then collected a sample in another container (provided by the PRP) and handed it over to V. Lincoln. This sequence was repeated until all containers for that sample station were completed.

The sample bottles at each sample location were carefully filled nearly to the top, being careful not to overfill the bottles during sample collection. The caps were then turned securely on the bottles, and the bottles gently shaken in an up-and-down manner to allow the preservative to dissolve. The sample number was written on the bottle caps with indelible ink (Sharpie). The bottles were then placed in a re-sealable bag and placed in a sample cooler with ice.

Relevant information and observations pertaining to the sample locations were recorded, and the sampling locations were photo-documented. Purge water and decontamination fluids generated during decontamination of the YSI water quality meters were containerized in 5-gallon pails and placed back into the groundwater treatment system following the collection of the influent/effluent samples.

Surface Water Samples

EPA RPM T. Connelly showed the sampling team the location where the two surface water samples were to be collected. The two surface water samples (SW-P17 and SW-P23) were collected from a small on-site stream, beginning with the most downstream sample location (SW-P23) and proceeding upstream (SW-P17) (see Attachment A, Figure 2). Water quality parameters (temperature, specific conductance, pH, ORP, DO, and turbidity) were recorded prior to collecting the surface water samples at a location approximately 5 feet downstream of the sample location.

The surface water samples were collected first by immersing a laboratory-provided container in the stream and rinsing the container three times. Water collected in the container was then gently poured into a pre-preserved laboratory-provided container. This process was repeated until all three containers were filled. The bottles were then placed in a re-sealable bag and placed in a sample cooler with ice.

Due to the limited space in the stream, it was more efficient and safer to have one person collect the surface water samples. Again, J. Kelly collected both the EPA/START samples and the split samples for the PRP, alternating between collecting one container for EPA/START and then one container for EPG, and handing over to samples to the respective parties until all containers for that sample station were completed.

Relevant information and observations pertaining to the sample locations were recorded, and the sampling locations were photo-documented.

Chain-of-Custody

The chain-of-custody activities (Scribe) were completed following the completion of sampling activities. The bottles were placed in the shipping container (coolers), and ice and packing materials sufficient to keep samples cool and protected from damage during shipping were added. The chain-of custody documentation was placed in a re-sealable bag and placed atop the samples prior to sealing the shipping container. The sample coolers was delivered to the nearest FedEx office for next-day delivery to the analytical laboratory.

Field activities were completed on 26 April 2016.

Analytical Data Summary (Round 2) - Samples collected on 26 April 2016

Influent and Effluent Water Samples

PFHpA and PFOA were detected in both influent water samples (SP-101 and SP-102) at concentrations ranging from 3.7 ng/L in SP-101 to 4.4 ng/L in SP-102 and 48 ng/L in SP-102 to 55 ng/L in SP-101, respectively. PFCs were not detected in the effluent water sample (SP-304) (see Attachment B, Table 2).

Surface Water Samples

One PFC, PFOA, was detected in the two surface water samples SW-P17 and SW-P23 at concentrations of 3.5 ng/L and 4.8 ng/L, respectively.

SUMMARY

Based on one round of groundwater sampling conducted on four overburden monitoring wells, two PFCs have been detected at concentrations above the laboratory MDLs in the overburden aquifer. PFHpA was detected in the groundwater in two of the monitoring wells (P-01 and P-02), and PFOA was detected in the groundwater in all four of the monitoring wells. Based on these sampling results, PFC-contaminated groundwater appears to be migrating to the southwest in the overburden aquifer with concentrations decreasing consistently in a downgradient direction.

Two PFCs, PFHpA and PFOA, were detected in the influent water samples collected at the on-site groundwater treatment system; however, PFCs were not detected in the effluent water sample. Based on these limited results, it appears that the on-site groundwater treatment system is removing the PFCs from the water as it moves through the system.

The occurrence of PFOA in surface water samples may suggest that PFC-contamination is present in the landfill area, and may indicate wastes buried at the landfill may have leached from the landfill and into the groundwater and surface water.

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Attachments

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Attachment A

Figures

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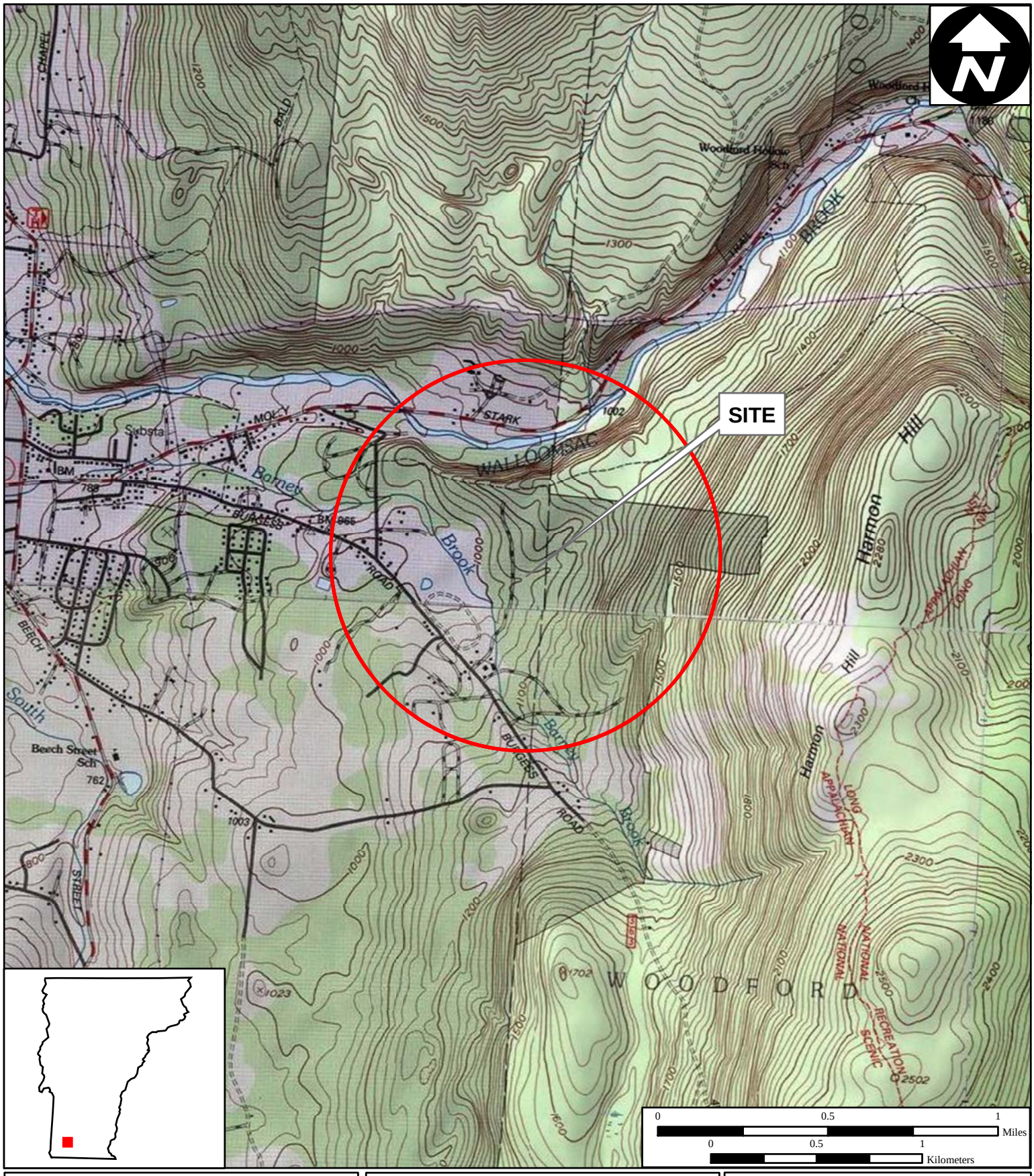

Figure 1

Site Location Map

Burgess Brothers Landfill
Route 9
Bennington/Woodford, Vermont

EPA Region I
Superfund Technical Assessment and Response Team (START) IV
Contract No. EP-S3-15-01

TDD Number:	TO1-01-16-03-0003
Created by:	A. Danikas
Created on:	15 March 2016
Modified by:	B. Mace
Modified on:	19 May 2016

Data Sources:
Topos: MicroPath/USGS/USA Topo Maps
Quadrangle Name: Bennington, VT
All other data: START

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Figure 2

Site Diagram and Sample Location Map

Burgess Brothers Landfill
Route 9
Bennington/Woodford, Vermont

EPA Region I
Superfund Technical Assessment and Response Team (START) IV
Contract No. EP-S3-15-01

TDD Number:	TO1-01-16-03-0003
Created by:	A. Danikas
Created on:	17 March 2016
Modified by:	B. Mace
Modified on:	19 May 2016

LEGEND

- Influent
- Effluent
- Surface Water
- Monitoring Well

N

0 75 150
Feet

Data Sources:
Imagery: ESRI, i-cubed, USDA FSA, USGS AEX, GeoEye, Getmapping, Aerogrid, IGP
Topos: MicroPath
All other data: START

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Attachment B

Tables and Spreadsheets

Table 1	Summary of Perfluorinated Compound Analysis, Groundwater Samples, Burgess Brothers Landfill, Bennington/Woodford, Vermont, 23 March 2016
Table 2	Summary of Perfluorinated Compound Analysis, Surface Water, Influent, and Effluent Samples, Burgess Brothers Landfill, Bennington/Woodford, Vermont, 26 April 2016

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TABLE 1

SUMMARY OF
PERFLUORINATED COMPOUNDS ANALYSIS
GROUNDWATER SAMPLES
BURGESS BROTHERS LANDFILL
BENNINGTON/WOODFORD, VERMONT
23 MARCH 2016

SAMPLE NUMBER		D33723	D33724	D33729	D33730	D33731	D33727	D33725	D33726
LOCATION		GW-P-01	GW-P-100	GW-P-02	GW-P-08	GW-W-30T	RB-01	TB-01	FTB-01
LABORATORY NUMBER		3419153	3419154	3419160	3419163	3419164	3419158	3419156	3419157
COMPOUND	**MDL**								
Perfluorobutanesulfonic acid (PFBS)	9	9 U	9 U	9 U	9 U	9 U	9 U	9 U	9 U
Perfluoroheptanoic acid (PFHpA)	1	**5.8**	**4.9**	**3.2**	1 U	1 U	1 U	1 U	1 U
Perfluorohexanesulfonic acid (PFHxS)	3	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U
Perfluorononanoic acid (PFNA)	2	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Perfluorooctane sulfonate (PFOS)	4	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U
Perfluorooctanoic acid (PFOA)	2	**64**	**58**	**45**	**4.7**	**3.2**	2 U	2 U	2 U
DILUTION FACTOR		0.99	0.98	0.99	0.99	0.98	1.0	0.95	1.0
DATE SAMPLED		3/23/2016	3/23/2016	3/23/2016	3/23/2016	3/23/2016	3/23/2016	3/23/2016	3/23/2016
DATE EXTRACTED		3/29/2016	3/29/2016	3/29/2016	3/29/2016	3/29/2016	3/29/2016	3/29/2016	3/29/2016
DATE ANALYZED		3/30/2016	3/30/2016	3/30/2016	3/30/2016	3/30/2016	3/31/2016	3/30/2016	3/31/2016

NOTES:

1) U = Values not detected above the Method Detection Limit (MDL).
2) Results are reported in nanograms per Liter (ng/L).
3) Sample GW-P-100 is a field duplicate of GW-P-01.
4) Values bolded and shaded in yellow were detected above the MDL.
5) RB-01 is the field rinsate blank.
6) TB-01 is the laboratory trip blank.
7) FTB-01 is the field trip blank.

TABLE 2

SUMMARY OF
PERFLUORINATED COMPOUNDS ANALYSIS
SURFACE WATER, INFLUENT, AND EFFLUENT WATER SAMPLES
BURGESS BROTHERS LANDFILL
BENNINGTON/WOODFORD, VERMONT
26 APRIL 2016

SAMPLE NUMBER		D33815	D33818	D33816	D33817	D33820	D33819	D33821	D33822
LOCATION		SP-101	SP-1101	SP-102	SP-304	SW-P17	SW-P23	TB-02	FTB-02
LABORATORY NUMBER		3438276	3438279	3438277	3438278	3438281	3438280	3438284	3438285
SAMPLE TYPE		Influent	Influent	Influent	Effluent	Surface Water	Surface Water	Lab Trip Blank	Field Trip Blank
COMPOUND	**MDL**								
Perfluorobutanesulfonic acid (PFBS)	9	9 U	9 U	9 U	9 U	9 U	9 U	9 U	9 U
Perfluoroheptanoic acid (PFHpA)	1	**3.7**	**3.5**	**4.4**	1 U	1 U	1 U	1 U	1 U
Perfluorohexanesulfonic acid (PFHxS)	3	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U
Perfluorononanoic acid (PFNA)	2	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Perfluorooctane sulfonate (PFOS)	4	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U
Perfluorooctanoic acid (PFOA)	2	**55**	**55**	**48**	2 U	**3.5**	**4.8**	2 U	2 U
DILUTION FACTOR		0.93	0.92	0.92	0.93	0.92	0.91	0.91	0.92
DATE SAMPLED		4/26/2016	4/26/2016	4/26/2016	4/26/2016	4/26/2016	4/26/2016	4/15/2016	4/26/2016
DATE EXTRACTED		5/6/2016	5/6/2016	5/6/2016	5/6/2016	5/6/2016	5/6/2016	5/6/2016	5/6/2016
DATE ANALYZED		5/7/2016	5/7/2016	5/7/2016	5/7/2016	5/8/2016	5/7/2016	5/8/2016	5/8/2016

NOTES:

1) U = Values not detected above the Method Detection Limit (MDL).
2) Results are reported in nanograms per Liter (ng/L).
3) Sample SP-1101 is a field duplicate of SP-101.
4) Values bolded and shaded in yellow were detected above the MDL.
5) TB-02 is the laboratory trip blank.
6) FTB-02 is the field trip blank.

Attachment C

Photo-documentation Log

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PHOTODOCUMENTATION LOG
Burgess Brothers Landfill ● Bennington/Woodford, Vermont

SCENE: View of monitoring well P-01. Photograph taken facing east.

DATE: 23 March 2016 **TIME:** 1257 hours
PHOTOGRAPHER: G. Mavris **CAMERA:** iPhone 6

SCENE: View of monitoring well P-02. Photograph taken facing northeast.

DATE: 23 March 2016 **TIME:** 1327 hours
PHOTOGRAPHER: G. Mavris **CAMERA:** iPhone 6

SCENE: View of monitoring well P-08. Photograph taken facing northeast.

DATE: 23 March 2016 **TIME:** 1329 hours
PHOTOGRAPHER: G. Mavris **CAMERA:** iPhone 6

SCENE: View of monitoring well W-30T. Photograph taken facing southwest.

DATE: 23 March 2016 **TIME:** 1430 hours
PHOTOGRAPHER: K. Robinson **CAMERA:** iPhone 6

SCENE: View of tubing removed from monitoring well W-30T prior to purging and sampling. Photograph taken facing southwest.
DATE: 23 March 2016 **TIME:** 1430 hours
PHOTOGRAPHER: K. Robinson **CAMERA:** iPhone 6

SCENE: View of influent sampling ports and sample locations SP-101 and SP-102.

DATE: 26 April 2016 **TIME:** 1045 hours
PHOTOGRAPHER: B. Mace **CAMERA:** iPhone 6

SCENE: View of influent sampling ports and sample locations SP-101 and SP-102.

DATE: 26 April 2016 **TIME:** 1138 hours
PHOTOGRAPHER: J. Kelly **CAMERA:** iPhone 6

SCENE: Close-up view of plumber's tape or polytetrafluoroethylene (PTFE) tape used on the joint threads.

DATE: 26 April 2016 **TIME:** 1138 hours
PHOTOGRAPHER: J. Kelly **CAMERA:** iPhone 6

SCENE: View of effluent port and sample location SP-304, with silicone and polyethylene tubing used for previous sampling still attached.
DATE: 26 April 2016 **TIME:** 1138 hours
PHOTOGRAPHER: J. Kelly **CAMERA:** iPhone 6

SCENE: Close-up view of effluent port and sample location SP-304 as sampled without any tubing attached.

DATE: 26 April 2016 **TIME:** 1252 hours
PHOTOGRAPHER: J. Kelly **CAMERA:** iPhone 6

SCENE: View of surface water sample location P-23, collected just upstream of the piezometer. Photograph taken facing south.
DATE: 26 April 2016 **TIME:** 1324 hours
PHOTOGRAPHER: J. Kelly **CAMERA:** iPhone 6

SCENE: View of surface water sample location P-17, collected just upstream of the piezometer. Photograph taken facing northeast.
DATE: 26 April 2016 **TIME:** 1357 hours
PHOTOGRAPHER: J. Kelly **CAMERA:** iPhone 6

SCENE: View of surface water sample location P-17, with the treatment building in the background. Photograph taken facing northwest.
DATE: 26 April 2016 **TIME:** 1400 hours
PHOTOGRAPHER: J. Kelly **CAMERA:** iPhone 6

SCENE: View of the treatment building. Photograph taken facing east.

DATE: 26 April 2016 **TIME:** 1420 hours
PHOTOGRAPHER: B. Mace **CAMERA:** iPhone 6

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Attachment D

Chain-of-Custody Records

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START Region 1
Weston Solutions Inc.
101 Billerica Drive
N. Billerica, MA 01862

Case #: 0876F
Site #: R01-160323TC
Lab Phone:
574-233-4777

No: 1-032316-155103-0003
DateShipped: 3/23/2016
Eurofins Eaton Analytical, Inc.
AirbillNo: 775946653909

Lab #	Sample #	Location	Analyses	Matrix	Collected	Sample Time	Container	Preservative	Lab QC
	D33723	GW-P-01	PFC - EPA 537	Water	3/23/2016	11:00	250 mL HDPE Bottle	Trizma	N
	D33723	GW-P-01	PFC - EPA 537	Water	3/23/2016	11:00	250 mL HDPE Bottle	Trizma	N
	D33723	GW-P-01	PFC - EPA 537	Water	3/23/2016	11:00	250 mL HDPE Bottle	Trizma	N
	D33724	GW-P-100	PFC - EPA 537	Water	3/23/2016	11:00	250 mL HDPE Bottle	Trizma	Y
	D33724	GW-P-100	PFC - EPA 537	Water	3/23/2016	11:00	250 mL HDPE Bottle	Trizma	Y
	D33724	GW-P-100	PFC - EPA 537	Water	3/23/2016	11:00	250 mL HDPE Bottle	Trizma	Y
	D33725	TB-01	PFOA/PFOS	Water	3/23/2016		250 mL HDPE Bottle	Trizma	Y
	D33726	FTB-01	PFOA/PFOS	Water	3/23/2016	10:30	250 mL HDPE Bottle	Trizma	Y
	D33727	RB-01	PFOA/PFOS	Water	3/23/2016	13:30	250 mL HDPE Bottle	Trizma	Y
	D33727	RB-01	PFOA/PFOS	Water	3/23/2016	13:30	250 mL HDPE Bottle	Trizma	Y
	D33728	SRS2190	PFOA/PFOS	Water	3/21/2016	13:30	1 mL ampule		Y

Special Instructions: Please contact John Burton @ John.Burton@westonsolutions.com, 1-978-552-2130 with 7 day verbal results.
Reporting limit:
PFBS = 0.02 ug/L, PFHpA = 0.02 ug/L, PFHxS = 0.02 ug/L
PFOA = 0.02 ug/L, PFNA = 0.02 ug/L, PFOS = 0.02 ug/L

SAMPLES TRANSFERRED FROM

CHAIN OF CUSTODY #

Items/Reason	Relinquished by (Signature and Organization)	Date/Time	Received by (Signature and Organization)	Date/Time	Sample Condition Upon Receipt

START Region 1	**Case #: 0876F**	**No: 1-032316-155103-0003**
Weston Solutions Inc.	Site #: R01-160323TC	DateShipped: 3/23/2016
101 Billerica Drive	Lab Phone:	Eurofins Eaton Analytical, Inc.
N. Billerica, MA 01862	574-233-4777	AirbillNo: 775946653909

Lab #	Sample #	Location	Analyses	Matrix	Collected	Sample Time	Container	Preservative	Lab QC
	D33729	GW-P-02	PFC - EPA 537	Water	3/23/2016	11:50	250 mL HDPE Bottle	Trizma	N
	D33729	GW-P-02	PFC - EPA 537	Water	3/23/2016	11:50	250 mL HDPE Bottle	Trizma	N
	D33729	GW-P-02	PFC - EPA 537	Water	3/23/2016	11:50	250 mL HDPE Bottle	Trizma	Y
	D33729	GW-P-02	PFC - EPA 537	Water	3/23/2016	11:50	250 mL HDPE Bottle	Trizma	Y
	D33729	GW-P-02	PFC - EPA 537	Water	3/23/2016	11:50	250 mL HDPE Bottle	Trizma	Y
	D33729	GW-P-02	PFC - EPA 537	Water	3/23/2016	11:50	250 mL HDPE Bottle	Trizma	Y
	D33729	GW-P-02	PFC - EPA 537	Water	3/23/2016	11:50	250 mL HDPE Bottle	Trizma	Y
	D33729	GW-P-02	PFC - EPA 537	Water	3/23/2016	11:50	250 mL HDPE Bottle	Trizma	Y
	D33729	GW-P-02	PFC - EPA 537	Water	3/23/2016	11:50	250 mL HDPE Bottle	Trizma	N
	D33730	GW-P-08	PFC - EPA 537	Water	3/23/2016	12:00	250 mL HDPE Bottle	Trizma	N
	D33730	GW-P-08	PFC - EPA 537	Water	3/23/2016	12:00	250 mL HDPE Bottle	Trizma	N

Special Instructions: Please contact John Burton @ John.Burton@westonsolutions.com, 1-978-552-2130 with 7 day verbal results. Reporting limit: PFBS = 0.02 ug/L, PFHpA = 0.02 ug/L, PFHxS = 0.02 ug/L PFOA = 0.02 ug/L, PFNA = 0.02 ug/L, PFOS = 0.02 ug/L	**SAMPLES TRANSFERRED FROM** **CHAIN OF CUSTODY #**

Items/Reason	Relinquished by (Signature and Organization)	Date/Time	Received by (Signature and Organization)	Date/Time	Sample Condition Upon Receipt

START Region 1
Weston Solutions Inc.
101 Billerica Drive
N. Billerica, MA 01862

Case #: 0876F
Site #: R01-160323TC
Lab Phone:
574-233-4777

No: 1-032316-155103-0003
DateShipped: 3/23/2016
Eurofins Eaton Analytical, Inc.
AirbillNo: 775946653909

Lab #	Sample #	Location	Analyses	Matrix	Collected	Sample Time	Container	Preservative	Lab QC
	D33730	GW-P-08	PFC - EPA 537	Water	3/23/2016	12:00	250 mL HDPE Bottle	Trizma	N
	D33731	GW-W-30T	PFC - EPA 537	Water	3/23/2016	14:00	250 mL HDPE Bottle	Trizma	N
	D33731	GW-W-30T	PFC - EPA 537	Water	3/23/2016	14:00	250 mL HDPE Bottle	Trizma	N
	D33731	GW-W-30T	PFC - EPA 537	Water	3/23/2016	14:00	250 mL HDPE Bottle	Trizma	N

Special Instructions: Please contact John Burton @ John.Burton@westonsolutions.com, 1-978-552-2130 with 7 day verbal results.
Reporting limit:
PFBS = 0.02 ug/L, PFHpA = 0.02 ug/L, PFHxS = 0.02 ug/L
PFOA = 0.02 ug/L, PFNA = 0.02 ug/L, PFOS = 0.02 ug/L

SAMPLES TRANSFERRED FROM

CHAIN OF CUSTODY #

Items/Reason	Relinquished by (Signature and Organization)	Date/Time	Received by (Signature and Organization)	Date/Time	Sample Condition Upon Receipt

START Region 1
Weston Solutions Inc.
101 Billerica Drive
N. Billerica, MA 01862

Case #: 0880F
Site #: R01-160323TC
Lab Phone:
574-233-4777

No: 1-042716-095405-0004
DateShipped: 4/27/2016
Eurofins Eaton Analytical, Inc.
AirbillNo: 776204750936

Lab #	Sample #	Location	Analyses	Matrix	Collected	Sample Time	Numb Cont	Container	Preservative	Storage	Lab QC	Description
	D33815	SP-101	PFC - EPA 537	Waste	4/26/2016	11:14	3	250 mL HDPE Bottle	Trizma	Ice	N	
	D33816	SP-102	PFC - EPA 537	Water	4/26/2016	12:06	3	250 mL HDPE Bottle	Trizma	Ice	N	
	D33817	SP-304	PFC - EPA 537	Water	4/26/2016	12:40	3	250 mL HDPE Bottle	Trizma	Ice	N	
	D33818	SP-1101	PFC - EPA 537	Water	4/26/2016	11:23	3	250 mL HDPE Bottle	Trizma	Ice	N	
	D33819	SW-P23	PFC - EPA 537	Surface Water	4/26/2016	13:31	3	250 mL HDPE Bottle	Trizma	Ice	N	
	D33820	SW-P17	PFC - EPA 537	Surface Water	4/26/2016	13:48	9	250 mL HDPE Bottle	Trizma	Ice	Y	MS/MSD
	D33821	TB-02	PFC - EPA 537	Water	4/15/2016		1	250 mL HDPE Bottle	Trizma	Ice	Y	
	D33822	FTB-02	PFC - EPA 537	Water	4/26/2016	13:03	1	250 mL HDPE Bottle	Trizma	Ice	Y	
	D33823	SRS2184	PFC - EPA 537	PE	4/26/2016	14:00	1	ampule	4 C	Ice	Y	

Special Instructions: Please contact John Burton @ John.Burton@westonsolutions.com, 1-978-552-2130 with 14 day verbal results.

Reporting limit:

PFBS = 0.02 ug/L, PFHpA = 0.02 ug/L, PFHxS = 0.02 ug/L

PFOA = 0.02 ug/L, PFNA = 0.02 ug/L, PFOS = 0.02 ug/L

SAMPLES TRANSFERRED FROM

CHAIN OF CUSTODY #

Items/Reason	Relinquished by	Date	Received by	Date	Time		Items/Reason	Relinquished By	Date	Received by	Date	Time