February 28, 2022

Mr. Jason Pelton
Professional Geologist
Division of Environmental Remediation
NYS Department of Environmental Conservation
625 Broadway
Albany, NY 12233-7012

RE: NYSDEC Standby Engineering Contract D007625-06
Northrop Grumman (OU2) – NYSDEC Site No. 130003A & 130003B
DECHC-05 Area Pre-Design Investigation Data Summary Report

Dear Mr. Pelton:

Henningson, Durham, & Richardson Architecture and Engineering, P.C. (HDR) has prepared this Data Summary Report (Report) to present a summary of activities and data associated with the pre-design investigation (PDI) for the Northrop Grumman-Bethpage Facility/Naval Weapons Industrial Reserve Plant (NYSDEC Site #130003A/130003B) in Bethpage, Town of Oyster Bay, Nassau County, NY. The Site location is shown on **Figure 1.** The PDI is part of the New York State Department of Environmental Conservation's (NYSDEC) Division of Environmental Remediation (DER) activities being performed by HDR under Work Assignments D007625-52, Tasks 3 and 4. The work reported herein was completed according to the NYSDEC-approved Final Workplan dated 2021-03-31 and provided for reference as **Attachment 1**.

1.0 Introduction

Vertical profile borings (VPBs) were drilled at three locations, designated DECHC05-VPB-1, DECHC05-VPB-2, and DECHC05-VPB-3, during the 2021 PDI work activities. The three VPBs were drilled just south of the Southern State Parkway in an area designated as the HC-05 area. Each boring was drilled to the Raritan Clay estimated to be 1,000 feet below ground surface (bgs). The locations of DECHC05-VPB-1, DECHC05-VPB-2 and DECHC05-VPB-3 are shown on **Figure 2**.

2.0 VPB Investigation Activities

2.1 Field Methods

HDR completed the 2021 PDI tasks in accordance with the NYSDEC-approved work plan. From May 26 through December 23, 2021, HDR's licensed drilling subcontractor, Delta Well and Pump (Delta) of Ronkonkoma, New York, advanced three VPBs to the Raritan Clay encountered at 983 (DECHC-05-VPB-1), 983 feet bgs (DECHC-05-VPB-2) and 987 feet bgs (DECHC05-VPB-3). The final VPB depth was determined by the visual observation of Raritan clay. DECHC-05-VPB-1 was

drilled to a depth of 1,008 feet bgs with a total sampling depth of 1,010 feet as a final split spoon soil sample was collected from 1,080 to 1,010 feet bgs. DECHC-05-VPB-2 was drilled to a depth of 994 feet bgs. DECHC-05-VPB-3 was drilled to a depth of 1,000 feet bgs with a total sampling depth of 1,002 feet as a final split spoon soil sample was collected from 1,000 to 1,002 feet bgs.

New York 811 was contacted at least two days prior to the start of work to make sure there were no subsurface utilities at each drilling location. The 811 tickets are provided as **Attachment 2**. A subsurface utility contractor, Ground Penetrating Radar Systems, LLC, was also hired to ensure there were no subsurface utilities at each drilling location. Each boring was advanced into the subsurface with a truck mounted drill rig using mud rotary drilling techniques. In addition to 2-foot-long split spoon samples collected at various depths, soil cuttings recovered within drilling mud were used to examine and log aquifer materials and screen for the visual and photo-ionic presence of contamination. To screen for the presence of volatile vapors, readings were collected directly off the soil using a photo-ionization detector (PID), equipped with a 10.6 eV lamp, and calibrated daily to 100 parts per million (ppm) of isobutylene. The soil boring logs for the three VPBs are provided as **Attachment 3**.

Discrete groundwater samples were collected using a hydropunch sampler at each location. Groundwater samples were collected at 20-foot intervals starting at a specified depth and continuing to the final depth of each borehole. All groundwater samples were placed in laboratory-supplied glassware, stored on ice, and submitted to TestAmerica of Edison, New Jersey (TestAmerica), a New York State Department of Health (NYSDOH) certified laboratory, for the analysis of volatile organic compounds (VOCs) and tentatively identified compounds (TICs) by Environmental Protection Agency (EPA) Method 8260. The laboratory analytical reports are provided as **Attachment 4**.

Laboratory reporting and deliverables for all samples was completed in accordance with NYSDEC July 2005 Analytical Services Protocol (ASP), Category B and were subjected to data validation by Environmental Data Services of Pittsburgh, Pennsylvania. The data usability summary reports (DUSRs) are provided as **Attachment 5**.

After the completion of each VPB, a monitoring well was installed in the borehole. Analytical data and lithology were used to select the screened interval. Monitoring wells were generally screened in sand and gravel portions of the aquifer that contained the highest concentration of VOCs. Wells were constructed of 4-inch schedule 80 PVC riser and .020-slot well screen. Risers were set below grade and fit with a J-plug and a flush manhole cover. Monitoring well construction logs are provided as **Attachment 6**.

Monitoring wells were developed to remove cuttings from the filter pack and surrounding aquifer. A combination of air lifting, and pump and surge techniques were used to develop the wells. Wells were developed according to NYSDEC policy, until turbidity (NTUs) readings were at or below 50

NTUs for DECHC05-MW-01 and DECHC05-MW-2 and at 130 NTUs for DECHC05-MW-3. Grout (cement-bentonite grout) in the annulus was given over 24 hours to set before development occurred at each location. Well development logs can be found in **Attachment 7**.

HDR did not conduct groundwater sampling of the three new monitoring wells as stipulated in the NYSDEC-approved work plan.

2.2 Geophysical Logging

Downhole Gamma logging was completed at each VPB by Delta. The geophysical logs for VPB-1 through VPB-3, provided by Delta, are presented as **Attachment 8**.

2.3 Community Air Monitoring

In accordance with the June 2017 to August 2019 community air monitoring plan (CAMP) established for the Northrop Grumman Site, HDR staff deployed upwind and downwind air monitoring stations during all subsurface intrusive activities. Each CAMP enclosure contained a Dust Trak II for dust monitoring and a MiniRae 3000 PID for VOC vapor monitoring. Both enclosures were connected to a Netronix system that uploaded real-time data and automatically calculated 15-minute average calculations for each meter. The system was programmed to notify field personnel via short message service (SMS) text message or email in the instance of an exceedance, to facilitate rapid investigation and/or corrective action. The upwind and downwind CAMP station data are presented as **Attachment 9**.

2.4 Investigation Derived Waste (IDW)

Eastern Environmental Solutions, Inc. of Manorville, New York was subcontracted by HDR to provide IDW characterization and disposal services for the PDI field activities. IDW generated during the 2021 PDI field activities were soil cuttings from drilling, residual drilling fluids, monitoring well development water, and personal protective equipment (PPE). Solid IDW (soil cuttings) was placed in a roll off container at each drilling location. Eastern Environmental characterized and disposed off the soil cuttings at the end of drilling. PPE was disposed of as municipal waste.

Liquid IDW fluid generated during drilling, installation and development of the monitoring wells was containerized in a 21,000-gallon capacity fractionation tank staged at the Department of Transportation (DOT) facility at Seamans Neck Road. With permission from the Nassau County Department of Public Works (NCDPW), water from the top of the tanks was discharged to the sanitary sewer at a rate not exceeding 100 gpm and the remaining mud/sediment in the bottom of the tanks was disposed of separately by Eastern Environmental. The discharge to the manhole was under constant supervision of HDR during discharge activities. IDW disposal documents are provided as **Appendix 10**.

2.5 *Elevation/Location Surveying*

Monitoring well location surveying was not performed by HDR under the PDI activities as stipulated in the NYSDEC-approved work plan.

2.6 Deviation from Work Plan

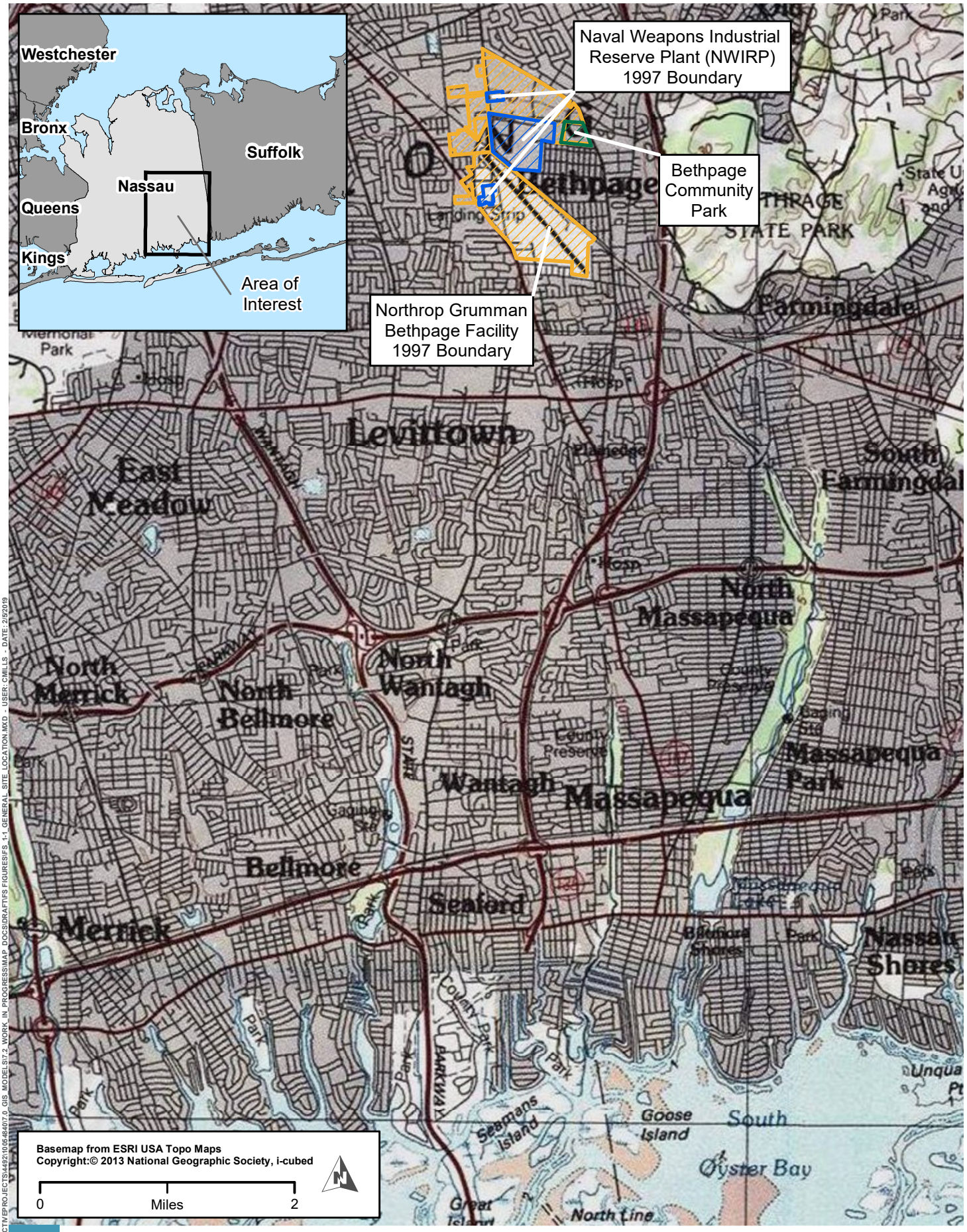
The original work plan identified the drilling of a VPB and installation of a monitoring well near the intersection of Arthur Avenue and David Place. However, based on groundwater sampling results obtained from DECHC-05-VPB-1 and DECHC-05-VPB-2 it was determined to relocate DECHC-05-VPB-3 and the associated monitoring well to the intersection of Wicks Avenue and Howard Avenue. This location corresponds to the Department of Navy's RE-133 monitoring wells and was selected to re-assess the presence of toluene in deep, grab groundwater samples in a VPB and to allow for the installation of a monitoring well at a depth greater than the existing Department of Navy monitoring wells (RE133D1 and RE133D2).

Figures

Figure 1	General Site Location
Figure 2	Vertical Profile Boring Locations

Attachments

Attachment 1	PDI Work Plan
Attachment 2	New York 811 Tickets
Attachment 3	VPB Logs
Attachment 4	Groundwater Analytical Data – VPB Samples
Attachment 5	Data Usability Summary Report
Attachment 6	Monitoring Well Construction Logs
Attachment 7	Monitoring Well Development Logs
Attachment 8	Geophysical Logs
Attachment 9	Community Air Monitoring Data
Attachment 10	IDW Disposal Documents



PATH: \\MAHPI-FILE01\ACTIVE\PROJECTS\44921\00\84840\7.0_GIS_MODEL\S\7.2_WORK_IN_PROGRESS\MAP_DOCS\DRAFT\FS FIGURES\FS 1-1_GENERAL_SITE_LOCATION.MXD - USER: CMILLS - DATE: 2/9/2019

HDR

NEW YORK STATE OF OPPORTUNITY | Department of Environmental Conservation

GENERAL SITE LOCATION

NYSDEC SITE # 130003

FIGURE 1

VERTICAL PROFILE BORING LOCATIONS

NYSDEC SITE # 130003

FIGURE 2

PATH: \\MAHPI-FILE01\ACTIVEPROJECTS\4492\10054840\7.0_GIS_MODELS\7.2_WORK_IN_PROGRESS\MAP_DOCS\DRAFT\HC05-PDI\FIGURE 1 - POTENTIAL VPBS EXTRACTION WELLS AND DISCHARGE LOCATIONS HC05.MXD - USER: HROSADO - DATE: 2/22/2022

ATTACHMENT 1

PDI Work Plan

Pre-Design Investigation – Scope of Work

HDR Work Assignments D007625-52 Northrop Grumman-Bethpage Facility/Naval Weapons Industrial Reserve Plant

New York State Department of Environmental Conservation's (NYSDEC) Division of Environmental Remediation (DER) has issued the above referenced assignment under contract D007625 for the Northrop Grumman-Bethpage Facility/Naval Weapons Industrial Reserve Plant (NYSDEC Site #130003A/130003B) in Bethpage, Town of Oyster Bay, Nassau County, NY. NYSDEC is currently finalizing agreements with the responsible parties for the implementation of portions of the selected remedy as outlined in the December 2019 Amended Record of Decision (AROD). For those portions of the plume where the responsible parties have declined to implement further action, NYSDEC will perform the remedy implementation. The previously approved scope of work for Work Assignment #52 includes pre-design investigations (PDI) to refine the limits of the groundwater contamination under Tasks 3 and 4 and to provide the details necessary to support a remedial design program.

Pre-Design Investigation

A PDI will be completed to collect additional groundwater quality and subsurface geology data needed to support the future Remedial Design. The PDI will be focused on defining the nature and extent of site contaminants (i.e., toluene) near the DECHC-05 extraction well location as shown on AROD Figures 12 and 13. As shown on Figure 1 of this Work Plan, initially three vertical profile borings (VPBs) will be installed. The data collected from these three VPBs, combined with data collected from a nearby Navy VPB (RW8), will be used to determine if additional VPBs are needed in this area to support the remedial design.

The PDI activities as described will require approximately six to eight months to complete.

Preparations for Site Field Work – HDR will complete the necessary steps to initiate the drilling and sampling activities associated with this PDI. This includes assisting NYSDEC and the drilling contractor in securing the necessary permits, access, approvals, and public notifications for the work. A HDR subcontractor will pre-clear the selected drilling locations using precision utility locating equipment to clear each location for subsurface utilities and obstructions. It is expected that the NYSDEC will hand deliver drilling notices to residents near each of the proposed drilling locations.

Vertical Profile Borings – A drilling contractor (Delta Well & Pump) will be utilized to complete up to three VPBs (Figure 1) to the Raritan Clay to an estimated depth of 1,000 feet bgs. Mud rotary drilling techniques will be used to advance the borings and discrete groundwater sampling will be conducted at 20-ft intervals beginning at 600 feet bgs. The groundwater samples will be

analyzed for volatile organic compounds (VOCs) with quick-turn-around (Table 1) so the preliminary results can be used to guide the VPB drilling program. Soil cuttings recovered in the drilling mud will be logged by the onsite HDR representative, and split spoon soil samples will be collected at various depths to examine and log the aquifer materials. A select number of soil samples from within potential extraction well screen zones will be retained and turned over to the NYSDEC for future grain size analysis in the event the location is selected for an extraction well.

Other activities that will be completed as part of the VPB drilling program include:

- Upwind and downwind community air monitoring during intrusive activities.
- A HDR subcontractor will perform downhole gamma logging of each VPB to supplement the soil sampling and to assist in placement of the permanent monitoring well screens.
- A HDR subcontractor will manage, transport and dispose of IDW (drilling cuttings, drilling mud, development water).

Approximately 90 working days in the field are anticipated to drill each VPB, install the associated monitoring well, and complete the monitoring well development (described below).

Monitoring Well Installation & Sampling – Following evaluation of results from the VPB groundwater samples, HDR will instruct the drilling contractor to install a single permanent groundwater monitoring well at each of the VPB locations. Each of the three wells will be installed with the screen interval being placed at the highest toluene concentration detected in the respective VPB (for costing purposes the 3 monitoring wells are assumed to be 900 feet deep). In boreholes where a monitoring well would be installed at a shallower depth than the boring completion depth, clean sand will be used to backfill the borehole to the desired depth. Each well will be constructed with 20-feet of Schedule 120 PVC well screen (20 slot) and sufficient Schedule 120 PVC riser to reach the ground surface. The screen will be surrounded by an appropriately sized sand pack from the bottom of the borehole to approximately 20 feet above the top of the screen. A bentonite seal (10-feet) will be placed on top of the sand pack to create a seal and to prevent the grout from penetrating the sand pack. The remainder of the borehole annulus will be filled with neat cement grout. Once the monitoring wells are completed and allowed to stand for a minimum of 48 hours the well will be developed using pump and surge techniques until residual sediments are removed and the monitoring well produces water of acceptable turbidity.

HDR personnel will conduct one groundwater sampling round for the 3 new monitoring wells (Figure 1). Groundwater samples designated for VOC analysis will be collected via low-flow purge and sample collection methodology. All groundwater samples will be analyzed for VOCs, 1,4-dioxane and PFAS related compounds (Table 1). A standard turn-around time of 30 days is assumed. The HDR Standby Laboratory will conduct the laboratory analysis. A DUSR will be completed by an HDR data validation subcontractor. The groundwater sampling for the three

monitoring wells is anticipated to require one day in the field to complete and will be scheduled to be contemporaneous with the routine sampling in the area conducted by the responsible parties.

Pre-Design Document Preparation- HDR will prepare a Pre-Design Investigation Letter Report to summarize the results of data obtained from the activities described above to inform the remedial design. These data will include vertical profile boring results and logs. The previously completed permit matrix will also be included as attachments to the report. HDR will also prepare electronic data deliverables (EDDs) that conform to the NYSDEC required formats for the groundwater data obtained, EQuIS 5 will be used to create the EDDs.

ATTACHMENT 2

New York 811 Tickets

Colleen Romano

From: ny@occinc.com
Sent: Tuesday, November 02, 2021 7:31 AM
To: COLLEEN97@DELTAWELL.COM
Subject: Ticket: 213060129

New York 811

Ticket No:	213060129	ROUTINE	
Original Call Date:	11/02/21	**Time:** 7:24 AM	CALL
Start Date:	11/05/21	**Time:** 7:00 AM	**Lead Time:** 20

Caller Information

Company:	DELTA WELL & PUMP	**Type:**	CONTRACTOR
Contact Name:	COLLEEN ROMANO	**Contact Phone:**	(631)981-2255
Field Contact:	COLLEEN ROMANO	**Alt. Phone:**	(631)981-2255
Best Time:		**Fax Phone:**	(631)981-2369
Address:	97 UNION AVE; RONKONKOMA, NY 11779		
Email Address:	COLLEEN97@DELTAWELL.COM		

Dig Site Information

Type of Work:	INSTALL MONITORING WELL		
Type of Equipment:	DRILL RIG		
Work Being Done For:	HDR		
In Street: X	**On Sidewalk:** X	**Private Property:**	**Other:** X
Front:	**Rear:**	**Side:**	

Dig Site Location

State:	NY	**County:**	NASSAU
Place:	SEAFORD		
Dig Street:	WICKS AVE	**Address:**	3921
Nearest Intersecting Street:	HOWARD AVE		
Second Intersecting Street:	BRUCE PL		

Location of Work:

MARK BOTH SIDES OF THE STREET IN FRONT OF THE ADDRESS AND GOING TO THE INTERSECTION OF HOWARD AVE INCLUDING THE INTERSECTION OF WICKS AVE AND HOWARDS

Remarks:

Map Coord NW Lat: 40.698147 **Lon:** -73.488537 **SE Lat:** 40.697362 **Lon:** -73.487577

Operators Notified:

LIL	- NATIONAL GRID	LIPA01	- LONG ISLAND POWER AUTHORITY
NYWSER01	- NEW YORK AMERICAN WATER	TWNOB01	- TOWN OF OYSTER BAY
VZL	- VERIZON COMMUNICATIONS		

Link To Map for C_EMAIL

EXCAVATOR RESPONSIBILITIES

IMPORTANT NOTE: YOU MUST CONTACT ANY OTHER UTILITIES DIRECTLY.

Colleen Romano

From: ny@occinc.com
Sent: Friday, November 05, 2021 11:55 AM
To: COLLEEN97@DELTAWELL.COM
Subject: Ticket Check Status for NY Ticket 213060129

Ticket Number: **213060129**
Location: 3921 WICKS AVE SEAFORD, NY

As of **11/05/21 11:54 EDT**, participating facility owners have responded to Ticket Check as follows:

District Code	Status
NATIONAL GRID	Marked Additional Locator Information
LONG ISLAND POWER AUTHORITY	Clear/No conflict
NEW YORK AMERICAN WATER	Marked
TOWN OF OYSTER BAY	Clear/No conflict town of hempstead
VERIZON COMMUNICATIONS	Marked

To review this ticket in its entirety, visit Search and Status ® on www.managetickets.com.

Colleen Romano

From: agt_comm@irth.com
Sent: Friday, November 05, 2021 11:53 AM
To: COLLEEN97@DELTAWELL.COM
Subject: Ticket 213060129 - Mark Out Request

==========

To: DELTA WELL & PUMP Attn: COLLEEN ROMANO
Voice: 6319812255 Fax: 6319812369
Re: Mark Out Request

This is an important message in regard to your mark out request. Please be advised that:

==========

Ticket: 213060129
County: NASSAU Place: SEAFORD
Address: 3921 WICKS AVE

VZL:
Verizon's facilities have been marked according to your markout request. The area was painted.

==========

For questions about your mark out request in NASSAU County please call: 516 576-7156; for SUFFOLK call 631 580-5128; for QUEENS call 516 313-6381 / 646 300-2786.

==========

Colleen Romano

From: ny@occinc.com
Sent: Friday, November 05, 2021 5:46 AM
To: COLLEEN97@DELTAWELL.COM
Subject: Ticket Check Status for NY Ticket 213060129

Ticket Number: **213060129**
Location: 3921 WICKS AVE SEAFORD, NY

As of **11/05/21 5:46 EDT**, participating facility owners have responded to Ticket Check as follows:

District Code	Status
NATIONAL GRID	Marked Additional Locator Information
LONG ISLAND POWER AUTHORITY	Clear/No conflict
NEW YORK AMERICAN WATER	Marked
TOWN OF OYSTER BAY	Clear/No conflict town of hempstead
VERIZON COMMUNICATIONS	48-hour delay 48 Hour Extension (2 Business days) Is Needed To Complete This Markout Request.
For inquiries regarding this Verizon mark out request, please contact VZ Locate Center 844-661-0660

To review this ticket in its entirety, visit Search and Status ® on www.managetickets.com.

Colleen Romano

From: amwaternyprs@korweb.com
Sent: Tuesday, November 02, 2021 10:51 AM
To: COLLEEN97@DELTAWELL.COM
Subject: Ticket 213060129 for NYWSER01 - Status Change

Our records indicate you called in dig request **213060129** at **3921 WICKS AVE, SEAFORD, NY**.

This email is a status update relating to ticket number **213060129** for code **NYWSER01**.

Ticket:	**213060129**
Member Code:	**NYWSER01**
Company:	**DELTA WELL & PUMP**
Done For:	**HDR**
Work to begin on:	**11/5/2021 7:00:00 AM**
County:	**NASSAU**
City:	**SEAFORD**
Address:	**3921WICKS AVE**
Contact:	**COLLEEN ROMANO**
Phone:	**(631)981-2255**
Completed on:	**11/2/2021 10:47:42 AM**
Response:	**2-MARKED**

Facility	Work Performed	Action Code
WATER	**Marked**	**PAINTED**

Remarks:

Notes:

American Water has completed your Ticket. Any changes to your scope of work will need to be updated by NY811. If you have questions about this positive response, please reply to this email. Thank you for calling 811! Please use care and dig safely.

Colleen Romano

From: agt_comm@irth.com
Sent: Wednesday, November 03, 2021 10:00 AM
To: COLLEEN97@DELTAWELL.COM
Subject: Ticket 213060129 - Response to Markout Request

==========

To: DELTA WELL & PUMP Attn: COLLEEN ROMANO
Voice: 6319812255 Fax: 6319812369
Re: Response to Markout Request

Hello. This is a message in response to your markout request for National Grid facilities.

==========

Ticket: 213060129
County: NASSAU Place: SEAFORD
Address: 3921 WICKS AVE

LIL:
Gas facilties have been marked.

==========

National Grid Thanks You, for your mark out request..

==========

This message was generated by an automated system. Please do not reply to this email.

Colleen Romano

From: agt_comm@irth.com
Sent: Friday, November 05, 2021 5:46 AM
To: COLLEEN97@DELTAWELL.COM
Subject: Ticket 213060129 - Mark Out Request

==========

To: DELTA WELL & PUMP Attn: COLLEEN ROMANO
Voice: 6319812255 Fax: 6319812369
Re: Mark Out Request

This is an important message in regard to your mark out request. Please be advised that:

==========

Ticket: 213060129
County: NASSAU Place: SEAFORD
Address: 3921 WICKS AVE

VZL:
As per article 753-4.5 section B we are informing contractor that we need an extension of two business days to complete this request.

==========

For questions about your mark out request in NASSAU County please call: 516 576-7156; for SUFFOLK call 631 580-5128; for QUEENS call 516 313-6381 / 646 300-2786.

==========

Colleen Romano

From: ny@occinc.com
Sent: Friday, June 11, 2021 7:57 AM
To: COLLEEN97@DELTAWELL.COM
Subject: Ticket: 211620290

New York 811

Ticket No:	211620290	ROUTINE	
Original Call Date:	6/11/21	**Time:** 7:50 AM	CALL
Start Date:	6/16/21	**Time:** 7:00 AM	**Lead Time:** 20

Caller Information

Company:	DELTA WELL & PUMP	**Type:**	CONTRACTOR
Contact Name:	COLLEEN ROMANO	**Contact Phone:**	(631)981-2255
Field Contact:	COLLEEN ROMANO	**Alt. Phone:**	(631)981-2255
Best Time:		**Fax Phone:**	(631)981-2369
Address:	97 UNION AVE; RONKONKOMA, NY 11779		
Email Address:	COLLEEN97@DELTAWELL.COM		

Dig Site Information

Type of Work:	INSTALLING MONITORING WELL		
Type of Equipment:	DRILL RIG		
Work Being Done For:	HDR		
In Street: X	**On Sidewalk:** X	**Private Property:**	**Other:** X
Front:	**Rear:**	**Side:**	

Dig Site Location

State:	NY	**County:**	NASSAU
Place:	NORTH WANTAGH		
Dig Street:	JACOB DR	**Address:**	
Nearest Intersecting Street:	ARTHUR AVE W		
Second Intersecting Street:	EVE DR		

Location of Work:
MARK BOTH SIDES OF THE STREET, SIDEWALK AND GRASSY AREAS FROM 1206 TO 1216 JACOB DR
Remarks:

Map Coord NW Lat: 40.694814 **Lon:** -73.489556 **SE Lat:** 40.694195 **Lon:** -73.488641

Operators Notified:

CBLWB01	- CABLEVISION OF WOODBURY	LIL	- NATIONAL GRID
LIPA01	- LONG ISLAND POWER AUTHORITY	NYWSER01	- NEW YORK AMERICAN WATER
VZL	- VERIZON COMMUNICATIONS		

Link To Map for C_EMAIL

EXCAVATOR RESPONSIBILITIES

IMPORTANT NOTE: YOU MUST CONTACT ANY OTHER UTILITIES DIRECTLY.

Colleen Romano

From: ny@occinc.com
Sent: Monday, June 14, 2021 1:57 PM
To: COLLEEN97@DELTAWELL.COM
Subject: Ticket Check Status for NY Ticket 211620290

Ticket Number: **211620290**
Location: JACOB DR NORTH WANTAGH, NY

As of **6/14/21 13:57 EDT**, participating facility owners have responded to Ticket Check as follows:

District Code	Status
CABLEVISION OF WOODBURY	Clear/No conflict
NATIONAL GRID	Clear/No conflict
LONG ISLAND POWER AUTHORITY	Clear/No conflict
NEW YORK AMERICAN WATER	Marked
VERIZON COMMUNICATIONS	Clear/No conflict

To review this ticket in its entirety, visit Search and Status ® on www.managetickets.com.

Colleen Romano

From: amwaternyprs@korweb.com
Sent: Friday, June 11, 2021 2:23 PM
To: COLLEEN97@DELTAWELL.COM
Subject: Ticket 211620290 for NYWSER01 - Status Change

Our records indicate you called in dig request **211620290** at **JACOB DR, NORTH WANTAGH, NY**.

This email is a status update relating to ticket number **211620290** for code **NYWSER01**.

Ticket:	**211620290**
Member Code:	**NYWSER01**
Company:	**DELTA WELL & PUMP**
Done For:	**HDR**
Work to begin on:	**6/16/2021 7:00:00 AM**
County:	**NASSAU**
City:	**NORTH WANTAGH**
Address:	**JACOB DR**
Contact:	**COLLEEN ROMANO**
Phone:	**(631)981-2255**
Completed on:	**6/11/2021 2:20:19 PM**
Response:	**2-MARKED**

Facility	Work Performed	Action Code
WATER	**Marked**	

Remarks:

Notes:

American Water has completed your Ticket. Any changes to your scope of work will need to be updated by NY811. If you have questions about this positive response, please reply to this email. Thank you for calling 811! Please use care and dig safely.

Colleen Romano

From: agt_comm@irth.com
Sent: Friday, June 11, 2021 1:29 PM
To: COLLEEN97@DELTAWELL.COM
Subject: Ticket 211620290 - Response to Markout Request

==========

To: DELTA WELL & PUMP Attn: COLLEEN ROMANO
Voice: 6319812255 Fax: 6319812369
Re: Response to Markout Request

Hello. This is a message in response to your markout request for National Grid facilities.

==========

Ticket: 211620290
County: NASSAU Place: NORTH WANTAGH
Address: JACOB DR

LIL:
National Grid gas facilities are not in conflict with the excavation site as defined by the mark out request.

==========

National Grid Thanks You, for your mark out request..

==========

Colleen Romano

From: vztpositivenotification@verizon.com
To: colleen97@deltawell.com
Subject: 211620290 for Verizon Member Code VZL

Dear Excavator,

Your request to locate Verizon facilities for the ticket identified above has been reviewed. The extent of work described in the request noted above has been compared with our facility records. Verizon has determined that the excavation location and scope of work you have identified does not conflict with our underground facilities. If you have questions or have additional information where you feel Verizon's underground facilities are in the excavation area, do not hesitate to contact our National Facility Locate Call Center at 800-492-3100.

Thank you and remember to dig safely!

Please do not reply to this email as the account is not monitored.

Colleen Romano

From: ny@occinc.com
Sent: Thursday, August 12, 2021 11:44 AM
To: colleen97@deltawell.com
Subject: Ticket: 212241033

New York 811

Ticket No:	212241033	ROUTINE	
Original Call Date:	8/12/21	**Time:** 11:35 AM	CALL
Start Date:	8/17/21	**Time:** 7:00 AM	**Lead Time:** 20

Caller Information

Company:	DELTA WELL AND PUMP	**Type:**	CONTRACTOR
Contact Name:	COLLEEN ROMANO	**Contact Phone:**	(631)981-2255
Field Contact:	COLLEEN ROMANO	**Alt. Phone:**	(631)981-2255
Best Time:	8AM-4PM	**Fax Phone:**	(631)981-2369
Address:	PO BOX 1309; RONKONKOMA, NY 11779		
Email Address:	colleen97@deltawell.com		

Dig Site Information

Type of Work:	INSTALL MONITORING WELL		
Type of Equipment:	DRILL RIG		
Work Being Done For:	HDR		
In Street:	**On Sidewalk:**	**Private Property:** X	**Other:**
Front: X	**Rear:**	**Side:**	

Dig Site Location

State:	NY	**County:**	NASSAU
Place:	NORTH WANTAGH		
Dig Street:	ALKEN AVE	**Address:**	
Nearest Intersecting Street:	BAYBERRY LN		
Second Intersecting Street:	GOLD ST		

Location of Work:
STARTING FROM THE INTERSECTION OF BAY BERRY LN AND ALKEN AVE HEAD NORTH FOR 834 FT AT THIS POINT THERE ARE WHITE MARKINGS ON THE GRASS MARK A 100 FT RADIUS OF THIS AREA

Remarks:

Map Coord NW Lat: 40.698910 **Lon:** -73.491978 **SE Lat:** 40.697811 **Lon:** -73.490534

Operators Notified:

CBLWB01	- CABLEVISION OF WOODBURY	LIL	- NATIONAL GRID
LIPA01	- LONG ISLAND POWER AUTHORITY	NYWSER01	- NEW YORK AMERICAN WATER
TWNOB01	- TOWN OF OYSTER BAY	VZL	- VERIZON COMMUNICATIONS

Link To Map for C_EMAIL

EXCAVATOR RESPONSIBILITIES

IMPORTANT NOTE: YOU MUST CONTACT ANY OTHER UTILITIES DIRECTLY.

Did you know that you can submit your tickets online?
- Eliminate hold times.
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Click the link below to Register for ITIC and start submitting your tickets on line today!
New York 811

EXCAVATOR MUST CONFIRM ALL POSITIVE RESPONSES BEFORE COMMENCING WORK

Colleen Romano

From: ny@occinc.com
Sent: Tuesday, August 17, 2021 11:09 AM
To: colleen97@deltawell.com
Subject: Ticket Check Status for NY Ticket 212241033

Ticket Number: **212241033**
Location: ALKEN AVE NORTH WANTAGH, NY

As of **8/17/21 11:08 EDT**, participating facility owners have responded to Ticket Check as follows:

District Code	Status
CABLEVISION OF WOODBURY	Clear/No conflict
NATIONAL GRID	Clear/No conflict
LONG ISLAND POWER AUTHORITY	Clear/No conflict
NEW YORK AMERICAN WATER	Clear/No conflict
TOWN OF OYSTER BAY	Clear/No conflict town of hempstead
VERIZON COMMUNICATIONS	Marked

To review this ticket in its entirety, visit Search and Status ® on www.managetickets.com.

Colleen Romano

From: ny@occinc.com
Sent: Tuesday, August 17, 2021 9:43 AM
To: colleen97@deltawell.com
Subject: Ticket Check Status for NY Ticket 212241033

Ticket Number: **212241033**
Location: ALKEN AVE NORTH WANTAGH, NY

As of **8/17/21 9:42 EDT**, participating facility owners have responded to Ticket Check as follows:

District Code	Status
CABLEVISION OF WOODBURY	Clear/No conflict
NATIONAL GRID	Clear/No conflict
LONG ISLAND POWER AUTHORITY	Clear/No conflict
NEW YORK AMERICAN WATER	Clear/No conflict
TOWN OF OYSTER BAY	Clear/No conflict town of hempstead
VERIZON COMMUNICATIONS	48-hour delay 48 Hour Extension (2 Business days) Is Needed To Complete This Markout Request.
For inquiries regarding this Verizon mark out request, please contact VZ Locate Center 844-661-0660

To review this ticket in its entirety, visit Search and Status ® on www.managetickets.com.

Colleen Romano

From: ny@occinc.com
Sent: Tuesday, August 17, 2021 9:42 AM
To: colleen97@deltawell.com
Subject: Ticket Check Status for NY Ticket 212241033

Ticket Number: **212241033**
Location: ALKEN AVE NORTH WANTAGH, NY

As of **8/17/21 9:42 EDT**, participating facility owners have responded to Ticket Check as follows:

District Code	Status
CABLEVISION OF WOODBURY	48-hour delay
NATIONAL GRID	Clear/No conflict
LONG ISLAND POWER AUTHORITY	Clear/No conflict
NEW YORK AMERICAN WATER	Clear/No conflict
TOWN OF OYSTER BAY	Clear/No conflict town of hempstead
VERIZON COMMUNICATIONS	48-hour delay 48 Hour Extension (2 Business days) Is Needed To Complete This Markout Request.
For inquiries regarding this Verizon mark out request, please contact VZ Locate Center 844-661-0660

To review this ticket in its entirety, visit Search and Status ® on www.managetickets.com.

Colleen Romano

From: ny@occinc.com
Sent: Tuesday, August 17, 2021 7:45 AM
To: colleen97@deltawell.com
Subject: Ticket Check Status for NY Ticket 212241033

Ticket Number: **212241033**
Location: ALKEN AVE NORTH WANTAGH, NY

As of **8/17/21 7:45 EDT**, participating facility owners have responded to Ticket Check as follows:

District Code	Status
CABLEVISION OF WOODBURY	48-hour delay
NATIONAL GRID	Clear/No conflict
LONG ISLAND POWER AUTHORITY	48-hour delay
NEW YORK AMERICAN WATER	Clear/No conflict
TOWN OF OYSTER BAY	Clear/No conflict town of hempstead
VERIZON COMMUNICATIONS	48-hour delay 48 Hour Extension (2 Business days) Is Needed To Complete This Markout Request.
For inquiries regarding this Verizon mark out request, please contact VZ Locate Center 844-661-0660

To review this ticket in its entirety, visit Search and Status ® on www.managetickets.com.

Colleen Romano

From: ny@occinc.com
Sent: Tuesday, August 17, 2021 5:52 AM
To: colleen97@deltawell.com
Subject: Ticket Check Status for NY Ticket 212241033

Ticket Number: **212241033**
Location: ALKEN AVE NORTH WANTAGH, NY

As of **8/17/21 5:52 EDT**, participating facility owners have responded to Ticket Check as follows:

District Code	Status
CABLEVISION OF WOODBURY	48-hour delay
NATIONAL GRID	48-hour delay
LONG ISLAND POWER AUTHORITY	48-hour delay
NEW YORK AMERICAN WATER	Clear/No conflict
TOWN OF OYSTER BAY	Clear/No conflict town of hempstead
VERIZON COMMUNICATIONS	48-hour delay 48 Hour Extension (2 Business days) Is Needed To Complete This Markout Request.
For inquiries regarding this Verizon mark out request, please contact VZ Locate Center 844-661-0660

To review this ticket in its entirety, visit Search and Status ® on www.managetickets.com.

Colleen Romano

From: agt_comm@irth.com
Sent: Tuesday, August 17, 2021 11:07 AM
To: colleen97@deltawell.com
Subject: Ticket 212241033 - Mark Out Request

==========

To: DELTA WELL AND PUMP Attn: COLLEEN ROMANO
Voice: 6319812255 Fax: 6319812369
Re: Mark Out Request

This is an important message in regard to your mark out request. Please be advised that:

==========

Ticket: 212241033
County: NASSAU Place: NORTH WANTAGH
Address: ALKEN AVE

VZL:
Verizon's facilities have been marked according to your markout request. The area was painted.

==========

For questions about your mark out request in NASSAU County please call: 516 576-7156; for SUFFOLK call 631 580-5128; for QUEENS call 516 313-6381 / 646 300-2786.

==========

Colleen Romano

From: agt_comm@irth.com
Sent: Tuesday, August 17, 2021 7:44 AM
To: colleen97@deltawell.com
Subject: Ticket 212241033 - Response to Markout Request

==========

To: DELTA WELL AND PUMP Attn: COLLEEN ROMANO
Voice: 6319812255 Fax: 6319812369
Re: Response to Markout Request

Hello. This is a message in response to your markout request for National Grid facilities.

==========

Ticket: 212241033
County: NASSAU Place: NORTH WANTAGH
Address: ALKEN AVE

LIL:
National Grid gas facilities are not in conflict with the excavation site as defined by the mark out request.

==========

National Grid Thanks You, for your mark out request..

==========

Colleen Romano

From: agt_comm@irth.com
Sent: Tuesday, August 17, 2021 5:53 AM
To: colleen97@deltawell.com
Subject: Ticket 212241033 - Mark Out Request

==========

To: DELTA WELL AND PUMP Attn: COLLEEN ROMANO
Voice: 6319812255 Fax: 6319812369
Re: Mark Out Request

This is an important message in regard to your mark out request. Please be advised that:

==========

Ticket: 212241033
County: NASSAU Place: NORTH WANTAGH
Address: ALKEN AVE

VZL:
As per article 753-4.5 section B we are informing contractor that we need an extension of two business days to complete this request.

==========

For questions about your mark out request in NASSAU County please call: 516 576-7156; for SUFFOLK call 631 580-5128; for QUEENS call 516 313-6381 / 646 300-2786.

==========

Colleen Romano

From: agt_comm@irth.com
Sent: Monday, August 16, 2021 8:03 PM
To: colleen97@deltawell.com
Subject: Ticket 212241033 - Response to Markout Request

==========

To: DELTA WELL AND PUMP Attn: COLLEEN ROMANO
Voice: 6319812255 Fax: 6319812369
Re: Response to Markout Request

Hello. This is a message in response to your markout request for National Grid facilities.

==========

Ticket: 212241033
County: NASSAU Place: NORTH WANTAGH
Address: ALKEN AVE

LIL:
Your markout request has been delayed by Premier Utility Services for 48 hours. Wait until you are notified that the markout is completed before commencing work. Please contact 1-866-507-3010 ext 3 with any questions.

==========

National Grid Thanks You, for your mark out request..

==========

Colleen Romano

From: amwaternyprs@korweb.com
Sent: Thursday, August 12, 2021 2:30 PM
To: COLLEEN97@DELTAWELL.COM
Subject: Ticket 212241033 for NYWSER01 - does not require a locate

Ticket 212241033 for NYWSER01 - does not require a locate

Our records indicate you called in dig request **212241033** at **ALKEN AVE, NORTH WANTAGH, NY**.

This email is a status update relating to ticket number **212241033** for code **NYWSER01**.

Ticket:	**212241033**
Member Code:	**NYWSER01**
Company:	**DELTA WELL AND PUMP**
Done For:	**HDR**
Work to begin on:	**8/17/2021 7:00:00 AM**
County:	**NASSAU**
City:	**NORTH WANTAGH**
Address:	**ALKEN AVE**
Contact:	**COLLEEN ROMANO**
Phone:	**(631)981-2255**
Completed on:	
Response:	

Facility	Work Performed	Action Code

Remarks:

Notes:

American Water has completed your Ticket. Any changes to your scope of work will need to be updated by NY811. If you have questions about this positive response, please reply to this email. Thank you for calling 811! Please use care and dig safely.

ATTACHMENT 3

VPB Logs

FIELD BORING LOG

BORING ID: DECHC05-VPB-01
PROJECT: DECHC-05 Area PDI
LOCATION: Wicks Avenue & Bruce Place

Geologist:	D. Matuszewski	Depth to Groundwater:	49 feet bgs	Start Date: 4/12/2021	Weather: --
Drilling Method:	Mud Rotary	Drilling Company:	Delta Well & Pump Co., Inc.	Start Time: 0:00	--
Total Depth:	1010 Feet			End Time: 6/2/2021	

Depth Below Ground Surface (ft)	Soil Description (Field Observations)	USCS	SPT Blows	Recovery Length (inches)	PID Reading (ppm)	Time	Remarks / Samples
0	Grass surface - Brown-orange (7.5 4/1) organic soil, SILTY SAND, with GRAVEL (medium, rounded)	SP	--	--	0.0	--	Hand cleared: 0-6 feet bgs
5	--	--	--	--	--	--	***NOTE: Soil descriptions are from drill cuttings with the exception of depths where split spoon samples were collected as indicated in the "Remarks/Samples" column of this boring log.***
10	Brown orange (7.5 4/1) SILTY SAND and CLAY, light orange to grey, low plasticity	SP	--	--	0.0	--	
15	--	--	--	--	--	--	
20	Brown orange (7.5 4/1) SILTY SAND, light orange to grey	SP	--	--	0.0	--	--
25	--	--	--	--	--	--	--
30	Brown orange (7.5 4/1) SILTY SAND, light orange to grey	SP	--	--	0.0	--	--
35	--	--	--	--	--	--	--
40	--	--	--	--	--	--	--
45	Orange to brown (7.5 4/1) fine to coarse SAND and GRAVEL, (medium, subrounded)	SP	--	--	0	--	Water table at 49 ftbgs
50	--	--	--	--	--	--	--
55	--	--	--	--	--	--	--
60	Dark Grey (7.5 4/1) SAND with trace CLAY and subrounded medium Gravel	SC	--	--	0.0	--	--
65	--	--	--	--	--	--	--
70	--	--	--	--	--	--	--
75	Orange to brown (7.5 4/1) medium to coarse SAND trace GRAVEL (medium, rounded)	SP	--	--	0.0	--	--
80	--	--	--	--	--	--	--
85	--	--	--	--	--	--	--
90	Gray to grayish brown (2.5 YR 5/1) SILTY CLAY	SC	--	--	0.0	--	--
95	--	--	--	--	--	--	--
100							

Geologist Remarks: Boundaries/contact are approximated and may be transitional since descriptions are based on observations of screened wash samples from mud rotary drilling.

Depth Below Ground Surface (ft)	Soil Description (Field Observations)	USCS	SPT Blows	Recovery Length (inches)	PID Reading (ppm)	Time	Remarks / Samples
100	Dark Grey (2.5Y 4/1) fine to medium SAND, trace light orange CLAY and GRAVEL, lignite present	SP-SC	--	--	0.0	--	--
105		--	--	--	--	--	--
110	Dark Grey (2.5Y 4/1) fine to medium SAND, trace light orange CLAY and GRAVEL, lignite present	SP-SC	--	--	0.0	--	--
115		--	--	--	--	--	--
120		--	--	--	--	--	--
125	Gray (2.5Y 4/1) sub-angular medium to fine SAND some gravel (medium, rounded) trace lignite	SP	--	--	0.0	--	--
130		--	--	--	--	--	--
135		--	--	--	--	--	--
140	Dark grey (2.5Y 4/1) fine SAND trace clay, micaceous,	SP-SC	--	--	0.0	--	--
145		--	--	--	--	--	--
150		--	--	--	--	--	--
155	Dark grey (2.5 Y 4/1) medium to fine SAND trace lignite	SP	--	--	0.0	--	--
160		--	--	--	--	--	--
165	Dark grey (2.5 Y 4/1) medium to fine angular SAND, some clay, trace lignite	SP	--	--	0.0	--	--
170		--	--	--	--	--	--
175	Dark Grey (2.5 Y 4/1) fine angular SAND, some CLAY lignite present	SP-SC	--	--	0.0	--	--
180		--	--	--	--	--	--
185	Dark Grey (2.5 Y 4/1) fine angular SAND, some CLAY lignite present	SP-SC	--	--	0.0	--	--
190		--	--	--	--	--	--
195	Grey (2.5 Y 4/1) poorly graded fine SAND ; some lignite fine gravel	SP	--	--	0.0	--	--
200		--	--	--	--	--	--
205	Grey (2.5 Y 4/1) poorly graded fine SAND ; some lignite fine gravel	SP	--	--	0.0	--	--
210							

Geologist Remarks: Boundaries/contact are approximated and may be transitional since descriptions are based on observations of screened wash samples from mud rotary drilling.

Depth Below Ground Surface (ft)	Soil Description (Field Observations)	USCS	SPT Blows	Recovery Length (inches)	PID Reading (ppm)	Time	Remarks / Samples
210	Dark to light grey (2.5 Y 4/5) mediun to fine SAND some lignite.	SP	--	--	0.0	--	--
215		--	--	--	--	--	--
220		--	--	--	--	--	--
225		--	--	--	--	--	--
230	Light Grey (2.5Y 4/5) medium SAND with GRAVEL (small, rounded) trace lignite.	SP-SC	--	--	0	--	--
235		--	--	--	--	--	--
240		--	--	--	--	--	--
245	Grey (2.5Y 5/1) fine to medium SAND, trace clay and lignite.	SW-SC	--	--	0.0	--	--
250		--	--	--	--	--	--
255		--	--	--	--	--	--
260		--	--	--	--	--	--
265	Dark Grey (10YR 3/1) medium to fine SAND trace soft plastic clay.	CH	--	--	0.0	--	--
270		--	--	--	--	--	--
275		--	--	--	--	--	--
280	Dark grey (10YR 3/1) CLAY with medium to fine SAND, trace lignite.	CH	--	--	0.0	--	--
285		--	--	--	--	--	--
290		--	--	--	--	--	--
295	Dark grey to black (2.5 Y 4/1) SILT with trace clay and medium to fine sand, trace lignite and mica.	SM	--	--	0.0	--	--
300		--	--	--	--	--	--
305		--	--	--	--	--	--
310		--	--	--	--	--	--
315		--	--	--	--	--	--
320	Dark grey (2.5 Y 4/1) soft CLAY and SILT some medium to fine sand, trace lignite, micaceous.	CH	--	--	0.0	--	--

Geologist Remarks: Boundaries/contact are approximated and may be transitional since descriptions are based on observations of screened wash samples from mud rotary drilling.

Depth Below Ground Surface (ft)	Soil Description (Field Observations)	USCS	SPT Blows	Recovery Length (inches)	PID Reading (ppm)	Time	Remarks / Samples
320							
		--	--	--	--	--	--
325							
		--	--	--	--	--	--
330							
	Very dark grey (7.5 YR 3/1) CLAYEY SILT, some lignite.	ML	--	--	0.0	--	--
335							
		--	--	--	--	--	--
340							
		--	--	--	--	--	--
345							
	Dark grey (10YR 3/1) medium to fine SAND trace clay and lignite.	SP	--	--	0.0	--	--
350							
		--	--	--	--	--	--
355							
		--	--	--	--	--	--
360							
		--	--	--	--	--	--
365							
	Dark grey (10YR 3/1) medium to fine SAND trace clay and lignite.	SP	--	--	0.0	--	--
370							
		--	--	--	--	--	--
375							
		--	--	--	--	--	--
380							
		--	--	--	--	--	--
385							
	Dark grey (10YR 3/1) low plasticity soft CLAY with fine SAND, lignite, micaceous.	CM	--	--	0.0	--	--
390							
		--	--	--	--	--	--
395							
		--	--	--	--	--	--
400							
	Grey (10YR 4/1) medium to fine SAND, trace silt and lignite.	SP	--	--	0.0	--	
405							
		--	--	--	--	--	--
410							
		--	--	--	--	--	--
415							
		--	--	--	--	--	--
420							
	Very dark grey (10YR 3/1) CLAYEY SILT and medium to fine SAND, trace lignite, micaceous.	SW-SM	--	--	0.1	--	--
425							
430		--	--	--	--	--	--

Geologist Remarks: Boundaries/contact are approximated and may be transitional since descriptions are based on observations of screened wash samples from mud rotary drilling.

Depth Below Ground Surface (ft)	Soil Description (Field Observations)	USCS	SPT Blows	Recovery Length (inches)	PID Reading (ppm)	Time	Remarks / Samples
430		--	--	--	--	--	--
435		--	--	--	--	--	--
440	Very dark Grey (10YR 3/1) CLAY, some silt, lignite and mica present.	CL	--	--	--	--	--
445		--	--	--	--	--	--
450		--	--	--	--	--	--
455	Very dark grey soft (10YR 3/1) CLAY some silt and fine sand, some lignite.	CL	--	--	--	--	--
460		--	--	--	--	--	--
465		--	--	--	--	--	--
470		--	--	--	--	--	--
475		--	--	--	--	--	--
480	Very dark grey soft plastic CLAY (10YR 3/1), some silt and fine sand.	CM	--	--	--	--	--
485		--	--	--	--	--	--
490	Dark grey (10YR 3/1) micaceous fine to medium SAND with lignite.	SP	--	--	--	--	--
495		--	--	--	--	--	--
500	Dark grey (10YR 3/1) fine to medium SAND some lignite.	SP	--	--	--	--	--
505		--	--	--	--	--	--
510		--	--	--	--	--	--
515	Dark grey (10YR 3/1) medium to fine SILTY SAND; mica and lignite present.	SP	--	--	--	--	--
520		--	--	--	--	--	--
525	Grey (10YR 3/1) medium to fine SAND; trace silt and lignite.	SP	--	--	--	--	--
530		--	--	--	--	--	--
535		--	--	--	--	--	--
540							

Geologist Remarks: Boundaries/contact are approximated and may be transitional since descriptions are based on observations of screened wash samples from mud rotary drilling.

Depth Below Ground Surface (ft)	Soil Description (Field Observations)	USCS	SPT Blows	Recovery Length (inches)	PID Reading (ppm)	Time	Remarks / Samples
540	Dark gray (10YR 4/1) fine SAND with SILT, some coarser sand, trace light gray clay, little mica flakes, trace lignite.	SP	--	--	--	--	--
545		--	--	--	--	--	--
550		--	--	--	--	--	--
555	Gray to dark grey (10YR 3/1) medium to fine SAND, trace clay and lignite.	SP	--	--	--	--	--
560		--	--	--	--	--	--
565		--	--	--	--	--	--
570		--	--	--	--	--	--
575		--	--	--	--	--	--
580		--	--	--	--	--	--
585		--	--	--	--	--	--
590		--	--	--	--	--	--
595	598-600': Grey to dark grey (2.5Y 6/1) medium to fine SAND; trace mica	SP	15-25-20-20	24	0.0	--	Split-spoon @ 598-600 ft bgs (4/27/21)
600		--	--	--	--	1330	DECHC05-VPB01-GW-600-602-0 (4/27/21)
605		--	--	--	--	--	--
610		--	--	--	--	--	--
615	617-619': Grey to light grey (2.5 Y 4/1) medium to fine SAND and fine SILT, trace mica.	SP	10-13-10-10	24	0.0	--	Split-spoon @ 617-619 ft bgs (4/27/21)
620		--	--	--	--	1000	DECHC05-VPB01-GW-620-622-0 (4/28/21)
625	Grey to light grey (2.5 Y 4/1) medium to fine SAND; and fine SILT; trace mica	SP	--	--	0.0	--	--
630		--	--	--	--	--	--
635	638-340': Grey to light grey (2.5Y 6/1) medium to fine SAND, some fine silt, trace mica.	SM	10-15-20-14	1	0.0	--	Split-spoon @ 638-640 ft bgs (4/28/21)
640		--	--	--	--	--	--
645		--	--	--	--	NA - DRY	DECHC05-VPB01-GW-640-642-0 (4/28/21)
650							

Geologist Remarks: Boundaries/contact are approximated and may be transitional since descriptions are based on observations of screened wash samples from mud rotary drilling.

Depth Below Ground Surface (ft)	Soil Description (Field Observations)	USCS	SPT Blows	Recovery Length (inches)	PID Reading (ppm)	Time	Remarks / Samples
650		--	--	--	--	--	--
655	658-660': Grey to light grey (2.5YR 6/1) fine SAND, trace mica.	SP	25-35-35-25	12	0.0	--	Split-spoon @ 658-660 ft bgs (4/29/21)
660		--	--	--	--	NA - DRY	Attempted sampling DECHC05-VPB01-GW-660-662-0, No water (4/29/21)
665		--	--	--	--	1345	DECHC05-VPB01-GW-665-667-0 (4/29/21)
670		--	--	--	--	--	--
675	678-680': Grey to light grey (2.5y 6/1) medium to fine SAND; black lignite laminae	SP	25-31-30-28	12	0.0		Split-spoon @ 678-680 ft bgs
680		--	--	--	--	1015	DECHC05-VPB01-GW-680-682-0 (4/30/21)
685		--	--	--	--	--	--
690		--	--	--	--	--	
695	698-699': Dark grey (5Y 5/1) medium plasticity CLAY and fine SILT	SP	15-22-22-16	13	0.0	--	Split-spoon @ 698-700 ft bgs (4/30/21)
700	699-700': Grey (10YR 8/2) medium to fine SAND, some mica and lignite.	MC	--	--	0.0	1230	DECHC05-VPB01-GW-700-702-0 (4/30/21)
705		--	--	--	--	--	--
710		--	--	--	--	--	--
715	718-720': Light tan to very light grey (10YR 8/1 to 10YR 8/2) coarse to medium SAND, trace mica.	SP	18-23-27-15	8	0.0	--	Split-spoon @ 718-720 ft bgs (4/30/21)
720		--	--	--	--	1335	DECHC05-VPB01-GW-720-722-0 (4/30/21)
725		--	--	--	--	--	--
730		--	--	--	--	--	--
735	738-740': Light grey (10YR 8/1) medium to fine SAND; trace mica	SP	18-15-22-11	24	0.0	--	Split-spoon @ 738-740 ft bgs (4/30/21)
740		--	--	--	--	NA - DRY	Attempted sampling DECHC05-VPB01-GW-740-742-0, No water (5/3/21)
745		--	--	--	--	1300	DECHC05-VPB01-GW-745-747-0 (5/3/21)
750		--	--	--	--	--	--
755	758-760': Very light grey to white (10YR 5/1) fine to coarse SAND, trace mica.	SP	25-25-25-25	24	0.2	--	Split-spoon @ 758-760 ftbgs:
760							

Geologist Remarks: Boundaries/contact are approximated and may be transitional since descriptions are based on observations of screened wash samples from mud rotary drilling.

Depth Below Ground Surface (ft)	Soil Description (Field Observations)	USCS	SPT Blows	Recovery Length (inches)	PID Reading (ppm)	Time	Remarks / Samples
760		--	--	--	--	1510	DECHC05-VPB01-GW-760-762-0 (5/3/21)
765		--	--	--	--	--	--
770		--	--	--	--	--	--
775	778-780': Dark grey to light grey (5Y 6/1 to 5Y 4/1) medium to fine SAND, trace coarse sand and fat plastic clay.	SP-MC	27-24-31-29	15	0.0	--	Split-spoon @ 778-780 ft bgs
780		--	--	--	--	1130	DECHC05-VPB01-GW-780-782-0
785		--	--	--	--	--	
790		--	--	--	--	--	--
795	798-800': Light grey (5Y 7/1) fine to medium SAND, trace silt and mica.	SP	28-30-32-14	24	0.1	--	Split-spoon @ 798-800 ft bgs
800		--	--	--	--	1400	DECHC05-VPB01-GW-800-802-0 (5/4/21)
805		--	--	--	--	--	--
810		--	--	--	--	--	--
815	818-820': Light grey (5Y 7/1) fine SAND, trace silt and mica.	SP	23-14-28-30	11	0.9	--	Split-spoon @ 818-820 ft bgs
820		--	--	--	--	1010	DECHC05-VPB01-GW-820-822-0 (5/5/21)
825		--	--	--	--	--	--
830		--	--	--	--	--	--
835	838-840': Light grey (5Y 7/1) fine SAND, trace mica.	SP	22-19-25-18	10	0.1	--	Split-spoon @ 838-840 ft bgs
840		--	--	--	--	1030	DECHC05-VPB01-GW-840-842-0 (5/6/21)
845	Very hard drilling	--	--	--	--	--	--
850		--	--	--	--	--	--
855	858-860': Light grey (5Y 7/1) fine SAND, trace mica.	SP	25-23-28-31	18	0.1	--	Split-spoon @ 858-860 ft bgs (5/6/21)
860		--	--	--	--	1330	DECHC05-VPB01-GW-860-862-0 (5/6/21)
865		--	--	--	--	--	--
870							

Geologist Remarks: Boundaries/contact are approximated and may be transitional since descriptions are based on observations of screened wash samples from mud rotary drilling.

Depth Below Ground Surface (ft)	Soil Description (Field Observations)	USCS	SPT Blows	Recovery Length (inches)	PID Reading (ppm)	Time	Remarks / Samples
870							
		--	--	--	--	--	--
875	878-880': Light grey (5Y 7/1) fine SAND, trace silt and mica.	SP-	10-17-18-22	24	0.2	--	Split-spoon @ 878-880 ft bgs (5/7/21)
880		--	--	--	--	1030	DECHC05-VPB01-GW-880-882-0 (5/7/21)
885		--	--	--	--	--	--
890		--	--	--	--	--	--
895	898-900': Light grey (5Y 6/1) fat plastic CLAY	CL	3-2-2-4	4	0.0	--	Split-spoon @ 898-900 ft bgs (5/7/21)
900		--	--	--	--	--	--
905		--	--	--	--	1430	DECHC05-VPB01-GW-905-907-0 (5/7/21)
910		--	--	--	--	--	--
915	918-920': Light grey (5Y 6/1) fine to very fine SAND, trace clay laminae (black) and mica	SP	7-5-15-35	24	0.1		Split-spoon @ 918-920 ft bgs (5/10/21)
920		--	--	--	--	1530	DECHC05-VPB01-GW-920-922-0 (5/10/21)
925	Light grey (5Y 6/1) fine to very fine SAND; trace CLAY laminae (black) and mica	SP	--	--	0.0	--	--
930		--	--	--	--	--	--
935	938-940': Light grey to dark grey (5Y7/1 to 5Y3/1) fine SAND, trace silt and mica (937' - 4" of dark grey (5Y 4/1) CLAY)	SP	5-7-15-20	24	0.1	--	Split-spoon @ 938-940 ft bgs
940		--	--	--	--	NA - DRY	Attempted sampling DECHC05-VPB01-GW-940-942-0, No water
945		--	--	--	--	--	DECHC05-VPB01-945-947-0 - DRY SAMPLE
950		--	--	--	--	--	--
955	958-960': Light grey (5Y 6/1) medium to fine SAND, trace silt and mica.	SP	12-14-11-21	24	0.1	--	Split-spoon @ 958-960 ft bgs (5/12/21)
960		--	--	--	--	1015	DECHC05-VPB01-GW-960-962-0 (5/12/21)
965		--	--	--	--	--	--
970		--	--	--	--	--	--
975	978-980': Light grey (5Y 6/1) medium to fine SAND, some mica.	SP	11-21-14-20	13	0.2	--	Split-spoon @ 978-980 ft bgs
980							

Geologist Remarks: Boundaries/contact are approximated and may be transitional since descriptions are based on observations of screened wash samples from mud rotary drilling.

Depth Below Ground Surface (ft)	Soil Description (Field Observations)	USCS	SPT Blows	Recovery Length (inches)	PID Reading (ppm)	Time	Remarks / Samples
980	983' Drillers noted significantly harder drilling (CLAY)	--	--	--	--	1315	DECHC05-VPB01-GW-980-982-0 (5/12/21)
985		--	--	--	--	--	Raritan Formation at 983'
990		--	--	--	--	--	--
995	998-1000': Dark grey (5Y 6/1) plastic CLAY with siltstone to fine sandstone, gravel, trace medium sand.	SM-GC	12-15-5-21	8	0.0	--	Split-spoon @ 998-1000 ft bgs (5/13/21)
1000	1003 - 1005': Dark grey (5Y 6/1) dense hard nonplastic CLAY, trace lignite.	CL	11-14-12-10	10	0.0	--	Split-spoon @ 1003-1005 ft bgs (5/13/21)
1005	1008 - 1010': Grey to red (5Y 4/1 to 7.5 YR 5/4) hard low plasticity CLAY	CL	11-15-12-14	13	0.0	--	Split-spoon @ 1008-1010 ft bgs (5/13/21)
1010	--	--	--	--	--	--	Total Drilled Depth = 1,008 feet Total Sampled Depth = 1,010 feet
--	--	--	--	--	--	--	--
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Geologist Remarks: Boundaries/contact are approximated and may be transitional since descriptions are based on observations of screened wash samples from mud rotary drilling.

FIELD BORING LOG

BORING ID: DECHC05-VPB-02
PROJECT: DECHC-05 Area PDI
LOCATION: Alken Avenue

Geologist:	D. Matuszewski	Depth to Groundwater:	47 feet bgs	Start Date: 8/19/2021	Weather: --
Drilling Method:	Mud Rotary	Drilling Company:	Delta Well & Pump Co., Inc.	Start Time: 0:00	--
Total Depth:	994 Feet			End Time: 11/4/2021	

Depth Below Ground Surface (ft)	Soil Description (Field Observations)	USCS	SPT Blows	Recovery Length (inches)	PID Reading (ppm)	Time	Remarks / Samples
0	Grass surface - Brown-orange (7.5 4/1) organic soil, SILTY SAND, with GRAVEL (medium, rounded).	SP	--	--	0.0	--	Hand cleared: 0-6 feet bgs
5	--	--	--	--	--	--	***NOTE: Soil descriptions are from drill cuttings with the exception of depths where split spoon samples were collected as indicated in the "Remarks/Samples" column of this boring log.***
10	Brown orange (7.5 4/1) SILTY SAND.	SP	--	--	--	--	
15	--	--	--	--	--	--	
20	Brown orange (7.5 4/1) SILTY SAND, light orange to grey.	SP	--	--	0.0	--	--
25	--	--	--	--	--	--	--
30	Brown orange (7.5 4/1) SILTY SAND, light orange to grey.	SP	--	--	--	--	--
35	--	--	--	--	--	--	--
40	--	--	--	--	--	--	--
45	Orange to brown (7.5 4/1) fine to coarse SAND and GRAVEL, (medium, subrounded).	SP	--	--	0	--	Water table at 47 ftbgs
50	--	--	--	--	--	--	--
55	--	--	--	--	--	--	--
60	Dark Grey (7.5 4/1) Sand with trace clay and subrounded medium gravel.	SC	--	--	0.0	--	--
65	--	--	--	--	--	--	--
70	--	--	--	--	--	--	--
75	Orange to brown (7.5 4/1) medium to coarse SAND, trace gravel (medium, rounded).	SP	--	--	0.0	--	--
80	--	--	--	--	--	--	--
85	--	--	--	--	--	--	--
90	Gray to grayish brown (2.5 YR 5/1) SILTY CLAY.	SC	--	--	0.0	--	--
95	--	--	--	--	--	--	--
100							

Geologist Remarks: Boundaries/contact are approximated and may be transitional since descriptions are based on observations of screened wash samples from mud rotary drilling.

Depth Below Ground Surface (ft)	Soil Description (Field Observations)	USCS	SPT Blows	Recovery Length (inches)	PID Reading (ppm)	Time	Remarks / Samples
100	Dark grey (2.5Y 4/1) fine to medium SAND, trace light orange clay and gravel, lignite present.	SP-SC	--	--	0.0	--	--
105		--	--	--	--	--	--
110	Dark grey (2.5Y 4/1) fine to medium SAND, trace light orange clay and gravel, lignite present.	SP-SC	--	--	0.0	--	--
115		--	--	--	--	--	--
120	Gray (2.5Y 4/1) sub-angular medium to fine SAND some gravel (medium, rounded) trace lignite.	SP	--	--	0.0	--	--
125		--	--	--	--	--	--
130		--	--	--	--	--	--
135	Gray (2.5Y 4/1) sub-angular medium to fine SAND, some gravel (medium, rounded) trace lignite.	SP	--	--	0.0	--	--
140		--	--	--	--	--	--
145		--	--	--	--	--	--
150		--	--	--	--	--	--
155	Dark gray (2.5 Y 4/1) medium to fine SAND, trace lignite.	SP	--	--	0.0	--	--
160		--	--	--	--	--	--
165	Dark gray (2.5 Y 4/1) medium to fine SAND, trace lignite.	SP	--	--	0.0	--	--
170		--	--	--	--	--	--
175	Dark gray (2.5 Y 4/1) medium to fine SAND, trace lignite.	SP-SC	--	--	0.0	--	--
180		--	--	--	--	--	--
185	Dark gray (2.5 Y 4/1) medium to fine SAND, trace lignite.	SP-SC	--	--	0.0	--	--
190		--	--	--	--	--	--
195	Dark gray (2.5 Y 4/1) medium to fine SAND, trace lignite.	SP	--	--	0.0	--	--
200		--	--	--	--	--	--
205	Dark gray (2.5 Y 4/1) medium to fine SAND, trace lignite.	SP	--	--	0.0	--	--
210							

Geologist Remarks: Boundaries/contact are approximated and may be transitional since descriptions are based on observations of screened wash samples from mud rotary drilling.

Depth Below Ground Surface (ft)	Soil Description (Field Observations)	USCS	SPT Blows	Recovery Length (inches)	PID Reading (ppm)	Time	Remarks / Samples
210	Dark to light gray (2.5 Y 4/5) mediun to fine SAND, some lignite.	SP	--	--	0.0	--	--
215		--	--	--	--	--	--
220	Dark to light gray (2.5 Y 4/5) mediun to fine SAND, some lignite.	SP	--	--	0.0	--	--
225		--	--	--	--	--	--
230	Light gray (2.5Y 4/5) medium to fine SAND some lignite.	SP	--	--	0.0	--	--
235		--	--	--	--	--	--
240		--	--	--	--	--	--
245	Gray (2.5Y 5/1) fine to medium SAND, trace clay.	SP	--	--	0.0	--	--
250		--	--	--	--	--	--
255	Gray (2.5Y 5/1) fine to medium SAND, trace clay.	SP	--	--	0.0	--	--
260		--	--	--	--	--	--
265	Dark Gray (10YR 3/1) medium to fine SILT, trace soft plastic clay.	CH	--	--	0.0	--	--
270		--	--	--	--	--	--
275		--	--	--	--	--	--
280	Dark gray (10YR 3/1) plastic CLAY with medium to fine SAND.	CH	--	--	0.0	--	--
285		--	--	--	--	--	--
290		--	--	--	--	--	--
295	Dark gray (2.5 Y 4/1) plastic CLAY with medium SAND, trace lignite and mica.	SM	--	--	0.0	--	--
300		--	--	--	--	--	--
305	Dark grey to black (2.5 Y 4/1) SILT with trace CLAY and medium to fine SAND, trace lignite and mica	SM	--	--	0.0	--	--
310		--	--	--	--	--	--
315	Dark gray (2.5 Y 4/1) soft CLAY and SILT, some medium to fine SAND, trace lignite, micaceous.	CH	--	--	0.0	--	--
320							

Geologist Remarks: Boundaries/contact are approximated and may be transitional since descriptions are based on observations of screened wash samples from mud rotary drilling.

Depth Below Ground Surface (ft)	Soil Description (Field Observations)	USCS	SPT Blows	Recovery Length (inches)	PID Reading (ppm)	Time	Remarks / Samples
320	Very dark gray (7.5 YR 3/1) CLAYEY SILT, some lignite.	ML	--	--	0.0	--	--
325		--	--	--	--	--	--
330	Very dark gray (7.5 YR 3/1) CLAYEY SILT, some lignite.	ML	--	--	0.0	--	--
335		--	--	--	--	--	--
340		--	--	--	--	--	--
345	Dark gray (10YR 3/1) medium to fine SAND, trace clay and lignite.	SP	--	--	0.0	--	--
350		--	--	--	--	--	--
355	Dark gray (10YR 3/1) medium to fine SAND, trace clay and lignite.	SP	--	--	0.0	--	--
360		--	--	--	--	--	--
365	Dark gray (10YR 3/1) medium to fine SAND, trace clay and lignite.	SP	--	--	0.0	--	--
370		--	--	--	--	--	--
375	Dark gray (10YR 3/1) medium to fine SAND, trace clay and lignite.	SP	--	--	0.0	--	--
380		--	--	--	--	--	--
385	Dark gray (10YR 3/1) low plasticity soft CLAY with fine sand and lignite, micaceous.	CM	--	--	0.0	--	--
390		--	--	--	--	--	--
395		--	--	--	--	--	--
400	Gray (10YR 4/1) medium to fine SAND, trace silt and lignite.	SP	--	--	0.0	--	
405		--	--	--	--	--	--
410	Gray (10YR 4/1) CLAY, trace silt and lignite.	CH	--	--	0.0	--	--
415		--	--	--	--	--	--
420	Very dark gray (10YR 3/1) CLAYEY SILT and medium to fine SAND, trace lignite, micaceous.	SW-SM	--	--	0.1	--	--
425		--	--	--	--	--	--
430							

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Depth Below Ground Surface (ft)	Soil Description (Field Observations)	USCS	SPT Blows	Recovery Length (inches)	PID Reading (ppm)	Time	Remarks / Samples
430	Very dark gray (10YR 3/1) CLAY, some silt, lignite and mica present.	CL	--	--	0.4	--	--
435		--	--	--	--	--	--
440		CL	--	--	0.4	--	--
445	Very dark gray (10YR 3/1) CLAY, some silt, lignite and mica present.	--	--	--	--	--	--
450		--	--	--	--	--	--
455	Very dark gray (10YR 3/1) CLAY, some silt, lignite and mica present.	CL	--	--	1.0	--	--
460		--	--	--	--	--	--
465	Very dark gray soft (10YR 3/1) SILT and fine SAND, some lignite.	CL	--	--	1.0	--	--
470		--	--	--	--	--	--
475		--	--	--	--	--	--
480	Very dark gray soft (10YR 3/1) SILT and fine SAND, some lignite.	CM	--	--	0.0	--	--
485		--	--	--	--	--	--
490	Dark gray (10YR 3/1) micaceous fine to medium SAND with lignite.	SP	--	--	0.0	--	--
495		--	--	--	--	--	--
500	Dark gray (10YR 3/1) fine to medium SAND, trace to some lignite.	SP	--	--	0.3	--	--
505		--	--	--	--	--	--
510		--	--	--	--	--	--
515	Dark gray (10YR 3/1) fine to medium SAND, trace to some lignite.	SP	--	--	0.0	--	--
520		--	--	--	--	--	--
525	Gray (10YR 3/1) medium to fine SAND, trace silt and lignite.	SP	--	--	0.0	--	--
530		--	--	--	--	--	--
535							
540	Gray (10YR 3/1) medium to fine SAND, trace silt and lignite.	SM	--	--	0.0	--	--

Geologist Remarks: Boundaries/contact are approximated and may be transitional since descriptions are based on observations of screened wash samples from mud rotary drilling.

Depth Below Ground Surface (ft)	Soil Description (Field Observations)	USCS	SPT Blows	Recovery Length (inches)	PID Reading (ppm)	Time	Remarks / Samples
540	Black to light tan SAND (medium to fine) and lignite, micaceous 10YR 3/1.	SP	--	--	--	--	--
545		--	--	--	--	--	--
550		--	--	--	--	--	--
555	Black to light tan SAND (medium to fine) and lignite, micaceous 10YR 3/1.	SP	--	--	--	--	--
560		--	--	--	--	--	--
565		--	--	--	--	--	--
570	Black to light tan SAND (medium to fine) and lignite, micaceous 10YR 3/1.	SP	--	--	--	--	--
575		--	--	--	--	--	--
580		--	--	--	--	--	--
585	Black to light tan SAND (medium to fine) and lignite, micaceous, rounded to angular lignite 10YR 3/1.	SP	--	--	--	--	--
590		--	--	--	--	--	--
595	(598-600') 598-598.5': CLAY, high plasticity, wet, light gray to dark gray 5Y 6/1.	CH	25-31-32-30	14	--	--	Split-spoon @ 598-600 ft bgs (9/17/21)
600	598.5-600': SAND (fine) gray to dark gray, black lignite laminations 5Y 6/1.	SP	--	--	0.0	1245	DECHC05-VPB02-GW-600-602-0 (9/20/21)
605		--	--	--	--	--	--
610		--	--	--	--	--	--
615	618-620': Light gray to dark gray SAND (fine) and SILT, micaceous, trace clay medium plasticity, wet, 5Y 8/1.	SP-MH	28-31-30-25	19	0.0	--	Split-spoon @ 618-620 ft bgs (9/20/21)
620		--	--	--	--	1500	DECHC05-VPB02-GW-620-622-0 (9/20/21)
625		SP	--	--	0.0	--	--
630		--	--	--	--	--	--
635	638-640': Light gray CLAY, hard, plastic, 5Y6/1	CH	14-12-15-21	12	0.0	--	Split-spoon @ 638-640 ft bgs: No GW Sample collected (9/21/21)
640		--	--	--	--	--	--
645		--	--	--	--	--	--
650							

Geologist Remarks: Boundaries/contact are approximated and may be transitional since descriptions are based on observations of screened wash samples from mud rotary drilling.

Depth Below Ground Surface (ft)	Soil Description (Field Observations)	USCS	SPT Blows	Recovery Length (inches)	PID Reading (ppm)	Time	Remarks / Samples
650		--	--	--	--	--	--
655	(658-660') 658-658.5': Dark brown CLAY medium plasticity.	CH	12-14-21-35	18	0.0	--	Split-spoon @ 658-660 ft bgs (9/21/21)
660	658.5-660': SAND (medium to fine) micaceous, light grey, 5Y7/1.	SP	--	--	--	1330	DECHC05-VPB02-GW-660-662-0 (9/21/21)
665		--	--	--	--	--	--
670		--	--	--	--	--	--
675	678-680': Light gray SAND (medium to coarse) trace silt, micaceous, 5Y 5/1.	SP	12-15-21-22	12	0.0		Split-spoon @ 678-680 ft bgs (9/21/21)
680		--	--	--	--	1030	DECHC05-VPB02-680-682-0 (9/22/21)
685		--	--	--	--	--	--
690		--	--	--	--	--	--
695	698-700': SAND (fine) with trace lignite laminae and silt, micaceous, light gray to black.	SP	20-21-30-32	18	0.0	--	Split-spoon @ 698-700 ft bgs (9/22/21)
700		--	--	--	--	1300	DECHC05-VPB02-GW-700-702-0 (9/22/21)
705		--	--	--	--	--	--
710		--	--	--	--	--	--
715	718-720': Grey to light grey SAND (medium) trace lignite, micaceous, 5Y 6/1.	SP	20-30-35-25	13	0.0	--	Split-spoon @ 718-720 ft bgs (9/22/21)
720		--	--	--	--	1045	DECHC05-VPB02-GW-720-722-0 (9/23/21)
725		--	--	--	--	--	--
730		--	--	--	--	--	--
735	738-740': Light grey SAND (fine) trace silt, micaceous, trace clay lenses 5Y6/1.	SP	25-22-31-20	8	0.0	--	Split-spoon @ 738-740 ft bgs (9/23/21)
740		--	--	--	--	1330	DECHC05-VPB02-GW-740-742-0 (9/23/21) - No Recovery
745		--	--	--	--	--	--
750		--	--	--	--	--	--
755	758-760': Light grey SAND (medium-fine) and GRAVEL (Medium, Sub rounded) 5Y 6/1.	SP - GP	35-36-33-32	3	0.0	--	Split-spoon @ 758-760 ft bgs (9/23/21)
760							

Geologist Remarks: Boundaries/contact are approximated and may be transitional since descriptions are based on observations of screened wash samples from mud rotary drilling.

Depth Below Ground Surface (ft)	Soil Description (Field Observations)	USCS	SPT Blows	Recovery Length (inches)	PID Reading (ppm)	Time	Remarks / Samples
760		--	--	--	--	1045	DECHC05-VPB02-GW-760-762-0 (9/24/21)
765		--	--	--	--	--	--
770		--	--	--	--	--	--
775	778-780': Light grey SILT (fine) non plastic, with black organic laminations throughout 5Y 6/1.	MC	25--30-28-29	18	0.0	--	Split-spoon @ 778-780 ft bgs
780		--	--	--	--	NA - DRY	Attempted sampling DECHC05-VPB02-GW-780-782-0 Hydropunch dry (9/27/21)
785	SAND (medium to coarse), some lignite and gravel (fine).	--	--	--	--	--	--
790		--	--	--	--	--	--
795	798-800': Dark grey to grey CLAYEY SILT, medium plasticity, some lignite laminae, trace sand (fine) lenses, 5Y 7/1.	CH-MH	30-25-40-21	9	0.0		Split-spoon @ 798-800 ft bgs
800		--	--	--	--	1045	DECHC05-VPB02-GW-805-807-0 (9/28/21)
805		--	--	--	--	--	--
810		--	--	--	--	--	--
815	818-820': Grey to light grey SILTY SAND (medium to fine) 5Y 7/1.	SP	20-15-25-30	4	0.0	--	Split-spoon @ 818-820 ftbgs:
820		--	--	--	--	NA - DRY	Attempted sampling DECHC05-VPB02-GW-820-822-0, No Water (9/28/21)
825	Clay medium plasticity, Hard drilling between 828 and 838	--	--	--	--	1030	DECHC05-VPB02-825-827-0 (9/29/21)
830		--	--	--	--	--	--
835	(838-840) 838-838.5': Grey CLAY high plasticity.	SP	25-30-31-20	5	0.0	NA - DRY	Split-spoon @ 838-840 ft bgs (9/29/21)
840	838.5-840': Grey to light grey SILTY SAND (medium to fine), micaceous.	--	--	--	--	--	Attempted sampling DECHC05-VPB02-GW-840-842-0, No Water
845		--	--	--	--	--	--
850		--	--	--	--	1215	DECHC05-VPB02-850-852-0 (9/30/21)
855	858-860': Grey SILTY SAND (fine to medium), medium stiff, N6, mostly sand, fine some silt.	SM	7-8-6-8	16	0.0	--	Split-spoon @ 858-860 ft bgs (9/30/21)
860		--	--	--	--	1520	DECHC05-VPB02-GW-860-862-0 (9/30/21)
865		--	--	--	--	--	--
870							

Geologist Remarks: Boundaries/contact are approximated and may be transitional since descriptions are based on observations of screened wash samples from mud rotary drilling.

Depth Below Ground Surface (ft)	Soil Description (Field Observations)	USCS	SPT Blows	Recovery Length (inches)	PID Reading (ppm)	Time	Remarks / Samples
870							
		--	--	--	--	--	--
875	878-880':Light grey SILTY SAND (fine), Stiff, mostly sand (fine) some silt.	SM	8-8-10-5	22	0.0	1005	Split-spoon @ 878-880 ft bgs (10/1/21)
880		--	--	--	--	NA - DRY	DECHC05-VPB02-GW-880-882-0 DRY (10/1/21)
885		--	--	--	--	--	--
890		--	--	--	--	--	--
895	898-900': Grey SILTY SAND (fine), medium stiff, mostly sand, fine, some silt.	SM	8-6-5-6	16	0.0		Split-spoon @ 898-900 ft bgs (10/1/21)
900		--	--	--	--	1145	DECHC05-VPB02-900-902-0 (10/5/21)
905		--	--	--	--	--	
910		--	--	--	--	--	--
915	918-920': Grey to light grey SAND (medium to fine) trace SILT (medium) 5Y 4/1.	SP	12-14-11-15	12	0.0	--	Split-spoon @ 918-920 ft bgs
920		--	--	--	--	1315	DECHC05-VPB02-GW-920-922-0 (10/5/21)
925		--	--	--	--	--	--
930		--	--	--	--	--	--
935	938-940': Grey to light grey SAND (medium to fine) trace silt (m) 5Y 4/1.	SP	12-14-11-15	12	0.0	--	Split-spoon @ 938-940 ft bgs
940		--	--	--	--	1315	DECHC05-VPB02-GW-940-942-0 (10/6/21)
945		--	--	--	--	--	
950		--	--	--	--	--	--
955	958-960': Few gravel (sm) in core and medium piece of pyrite matrix gravel quartz conglomerate.	--	--	--	--	--	--
960		--	--	--	--	--	--
965	965-967': CLAY, high plasticity dark grey.	CH	12-14-11-10	8	0.0	--	Split-spoon @ 965-967 ft bgs (10/7/21)
970	967-970': SAND (fine) and SILT, micaceous light grey 5Y 7/1.	SP-MH	12-14-20-14	24	0.0	--	Split-spoon @ 967-970 ft bgs (10/7/21)
975		--	--	--	--	--	--
980							

Geologist Remarks: Boundaries/contact are approximated and may be transitional since descriptions are based on observations of screened wash samples from mud rotary drilling.

Depth Below Ground Surface (ft)	Soil Description (Field Observations)	USCS	SPT Blows	Recovery Length (inches)	PID Reading (ppm)	Time	Remarks / Samples
980	978-980': SILTY SAND (medium to fine) with trace CLAY, micaceous, light grey.	SP-MH	10-12-14-11	18	0.0	1345	Split-spoon @ 978-980 ft bgs (10/8/21)'DEC-HC-05-VPB-02-GW-980-982-0 (10/8/21)
985	988-990': CLAY, high plasticity, hard, white to light grey.	CH	11-11-12-10	8	0.0	--	Split-spoon @ 988-990 ft bgs (10/9/21)
990		--	--	--	--	--	Raritan Formation at 983'
995		--	--	--	--	--	Total sampled depth = 990 ft bgs Total drilled depth = 994 ft bgs
1000		--	--	--	--	--	--
1005		--	--	--	--	--	--
1010	--	--	--	--	--	--	--
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Geologist Remarks: Boundaries/contact are approximated and may be transitional since descriptions are based on observations of screened wash samples from mud rotary drilling.

FIELD BORING LOG

BORING ID: DECHC05-VPB-03
PROJECT: DECHC-05 Area PDI
LOCATION: Wicks Avenue and Howard Avenue

Geologist:	D. Matuszewski	Depth to Groundwater:	48 feet bgs	Start Date: 11/23/2021	Weather: --
Drilling Method:	Mud Rotary	Drilling Company:	Delta Well & Pump Co., Inc.	Start Time: 0:00	--
Total Depth:	1,002 Feet			End Time: 12/23/2021	

Depth Below Ground Surface (ft)	Soil Description (Field Observations)	USCS	SPT Blows	Recovery Length (inches)	PID Reading (ppm)	Time	Remarks / Samples
0	Grass surface - Brown-orange (7.5 4/1) organic soil, SILTY SAND, with GRAVEL (medium, rounded).	SP	--	--	0.0	--	Hand cleared: 0-6 feet bgs
5	--	--	--	--	--	--	***NOTE: Soil descriptions are from drill cuttings with the exception of depths where split spoon samples were collected as indicated in the "Remarks/Samples" column of this boring log.***
10	Brown orange (7.5 4/1) SILTY SAND and CLAY, light orange to grey, low plasticity.	SP	--	--	0.0	--	
15	--	--	--	--	--	--	
20		--	--	--	--	--	--
25	Brown orange (7.5 4/1) SILTY SAND, light orange to grey.	SP	--	--	0.0	--	--
30		--	--	--	--	--	--
35	--	--	--	--	--	--	--
40	Brown orange (7.5 4/1) SILTY SAND, light orange to grey.	SP	--	--	0.0	--	--
45		--	--	--	--	--	Water table at 48 ftbgs
50	Orange to brown (7.5 4/1) fine to coarse SAND and GRAVEL, (medium, subrounded).	SP	--	--	0	--	--
55	--	--	--	--	--	--	--
60	Dark Grey (7.5 4/1) Sand with trace CLAY and subrounded medium gravel.	SC	--	--	0.0	--	--
65	--	--	--	--	--	--	--
70	--	--	--	--	--	--	--
75	Orange to brown (7.5 4/1) medium to coarse SAND trace GRAVEL (medium, rounded).	SP	--	--	0.0	--	--
80	--	--	--	--	--	--	--
85	--	--	--	--	--	--	--
90		--	--	--	--	--	--
95		--	--	--	--	--	--
100	Gray to grayish brown (2.5 YR 5/1) SILTY CLAY	SC	--	--	0.0	--	--

Geologist Remarks: Boundaries/contact are approximated and may be transitional since descriptions are based on observations of screened wash samples from mud rotary drilling.

Depth Below Ground Surface (ft)	Soil Description (Field Observations)	USCS	SPT Blows	Recovery Length (inches)	PID Reading (ppm)	Time	Remarks / Samples
100	Dark Grey (2.5Y 4/1) fine to medium SAND trace light orange clay and gravel, lignite present.	SP-SC	--	--	0.0	--	--
105		--	--	--	--	--	--
110		--	--	--	--	--	--
115	Dark Grey (2.5Y 4/1) fine to medium SAND trace light orange clay and gravel, lignite present.	SP-SC	--	--	0.0	--	--
120		--	--	--	--	--	--
125	Gray (2.5Y 4/1) sub-angular medium to fine SAND some gravel (medium, rounded) trace lignite.	SP	--	--	0.0	--	--
130		--	--	--	--	--	--
135		--	--	--	--	--	--
140	Gray (2.5Y 4/1) sub-angular medium to fine SAND some gravel (medium, rounded) trace lignite.	SP	--	--	0.0	--	--
145	Dark grey (2.5Y 4/1) fine SAND, trace clay, micaceous.	SP	--	--	0.0	--	--
150		--	--	--	--	--	--
155	Dark grey (2.5 Y 4/1) medium to fine SAND trace lignite.	SP	--	--	0.0	--	--
160		--	--	--	--	--	--
165	Dark grey (2.5 Y 4/1) medium to fine SAND trace lignite.	SP	--	--	0.0	--	--
170		--	--	--	--	--	--
175	Dark Grey (2.5 Y 4/1) fine angular SAND, some clay lignite present.	SP-SC	--	--	0.0	--	--
180		--	--	--	--	--	--
185	Dark Grey (2.5 Y 4/1) fine angular SAND, some clay lignite present.	SP-SC	--	--	0.0	--	--
190		--	--	--	--	--	--
195	Grey (2.5 Y 4/1) poorly graded fine SAND ; some lignite fine gravel.	SP	--	--	0.0	--	--
200		--	--	--	--	--	--
205	Grey (2.5 Y 4/1) poorly graded fine SAND ; some lignite fine gravel.	SP	--	--	0.0	--	--
210							

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Depth Below Ground Surface (ft)	Soil Description (Field Observations)	USCS	SPT Blows	Recovery Length (inches)	PID Reading (ppm)	Time	Remarks / Samples
210	Dark to light grey (2.5 Y 4/5) mediun to fine SAND some lignite.	SP	--	--	0.0	--	--
215		--	--	--	--	--	--
220	Dark to light grey (2.5 Y 4/5) mediun to fine SAND some lignite.	SP	--	--	--	--	--
225		--	--	--	--	--	--
230	Light Grey (2.5Y 4/5) medium SAND with GRAVEL (small, rounded) trace lignite.	SP-SC	--	--	--	--	--
235		--	--	--	--	--	--
240		--	--	--	--	--	--
245	Grey (2.5Y 5/1) medium SAND with GRAVEL, trace clay and lignite.	SW-SC	--	--	--	--	--
250		--	--	--	--	--	--
255		--	--	--	--	--	--
260	Grey (2.5Y 5/1) medium SAND with GRAVEL, trace clay and lignite.	SW-SC	--	--	--	--	--
265		--	--	--	--	--	--
270	Grey (2.5Y 5/1) medium SAND with GRAVEL, trace clay and lignite.	SW-SC	--	--	--	--	--
275		--	--	--	--	--	--
280	Dark grey (10YR 3/1) plastic CLAY with medium to fine SAND.	CH	--	--	--	--	--
285		--	--	--	--	--	--
290		--	--	--	--	--	--
295	Dark grey to black (2.5 Y 4/1) SILT with trace CLAY and medium to fine SAND, trace lignite and mica.	SM	--	--	--	--	--
300		--	--	--	--	--	--
305	Dark grey to black (2.5 Y 4/1) SILT with trace CLAY and medium to fine SAND, trace lignite and mica.	SM	--	--	--	--	--
310		--	--	--	--	--	--
315	Grey (2.5Y 5/1) fine to medium SAND, trace clay and lignite.	SW-SC	--	--	0.0	--	--
320							

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Depth Below Ground Surface (ft)	Soil Description (Field Observations)	USCS	SPT Blows	Recovery Length (inches)	PID Reading (ppm)	Time	Remarks / Samples
320	Grey (2.5Y 5/1) fine to medium SAND, trace clay and lignite.	SW-SC	--	--	0.0	--	--
325		--	--	--	--	--	--
330	Grey (2.5Y 5/1) fine to medium SAND, trace clay and lignite.	SW-SC	--	--	0.0	--	--
335		--	--	--	--	--	--
340		--	--	--	--	--	--
345	Dark grey (10YR 3/1) plastic CLAY with medium to fine SAND.	CH	--	--	0.0	--	--
350		--	--	--	--	--	--
355	Dark grey (10YR 3/1) plastic CLAY with medium to fine SAND.	CH	--	--	0.0	--	--
360		--	--	--	--	--	--
365	Dark grey (10YR 3/1) medium to fine SAND trace clay and lignite.	SP	--	--	0.0	--	--
370		--	--	--	--	--	--
375		--	--	--	--	--	--
380	Grey (2.5Y 5/1) fine to medium SAND, trace CLAY and lignite	SW-SC	--	--	--	--	--
385	Dark grey (10YR 3/1) low plasticity soft CLAY with fine SAND; and lignite, micaceous.	CM	--	--	0.0	--	--
390		--	--	--	--	--	--
395		--	--	--	--	--	--
400	Dark grey (10YR 3/1) low plasticity soft CLAY with fine SAND; and lignite, micaceous.	CM	--	--	0.0	--	
405		--	--	--	--	--	--
410	Grey (10YR 4/1) medium to fine SAND; trace silt and lignite.	SP	--	--	0.0	--	--
415		--	--	--	--	--	--
420	Grey (10YR 4/1) medium to fine SAND; trace silt and lignite.	SP	--	--	0.0	--	--
425		--	--	--	--	--	--
430							

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Depth Below Ground Surface (ft)	Soil Description (Field Observations)	USCS	SPT Blows	Recovery Length (inches)	PID Reading (ppm)	Time	Remarks / Samples
430	Very dark grey (10YR 3/1) CLAY; some silt; lignite and mica present.	CL	--	--	0.0	--	--
435		--	--	--	--	--	--
440	Very dark grey (10YR 3/1) CLAY; some silt; lignite and mica present.	CL	--	--	0.0	--	--
445		--	--	--	--	--	--
450		--	--	--	--	--	--
455	Dark grey (10YR 3/1) micaceous fine to medium SAND with lignite.	SP	--	--	0.0	--	--
460		--	--	--	--	--	--
465	Dark grey (10YR 3/1) micaceous fine to medium SAND with lignite.	SP	--	--	0.0	--	--
470		--	--	--	--	--	--
475		--	--	--	--	--	--
480	Very dark grey soft plastic CLAY (10YR 3/1); some silt and fine sand.	CM	--	--	0.0	--	--
485		--	--	--	--	--	--
490	Dark grey (10YR 3/1) micaceous fine to medium SAND with lignite.	SP	--	--	0.0	--	--
495		--	--	--	--	--	--
500	Dark grey (10YR 3/1) fine to medium SAND some lignite.	SP	--	--	0.3	--	--
505		--	--	--	--	--	--
510		--	--	--	--	--	--
515	Very dark grey soft plastic CLAY (10YR 3/1); some silt and fine sand.	CM	--	--	0.0	--	--
520		--	--	--	--	--	--
525	Very dark grey soft plastic CLAY (10YR 3/1); some silt and fine sand.	CM	--	--	0.0	--	--
530		--	--	--	--	--	--
535	Grey (10YR 3/1) medium to fine SAND; trace silt and lignite.	SP	--	--	0.0	--	--
540							

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Depth Below Ground Surface (ft)	Soil Description (Field Observations)	USCS	SPT Blows	Recovery Length (inches)	PID Reading (ppm)	Time	Remarks / Samples
540	Dark gray (10YR 4/1) fine SAND with SILT; some coarser sand; trace light gray clay; trace lignite; little mica flakes.	SP	--	--	0.0	--	--
545		--	--	--	--	--	--
550		--	--	--	--	--	--
555	Gray to dark grey (10YR 3/1) medium to fine SAND; trace clay and lignite.	SP	--	--	0.0	--	--
560		--	--	--	--	--	--
565		--	--	--	--	--	--
570	Gray to dark grey (10YR 3/1) medium to fine SAND; trace clay and lignite.	SP	--	--	0.0	--	--
575		--	--	--	--	--	--
580		--	--	--	--	--	--
585	Gray to dark grey (10YR 3/1) medium to fine SAND; trace clay and lignite.	SP	--	--	0.0	--	--
590		--	--	--	--	--	--
595	Grey to dark grey (2.5Y 6/1) medium to fine SAND; trace mica.	SP	--	--	0.0	--	--
600		--	--	--	--	--	--
605	Grey to dark grey (2.5Y 6/1) medium to fine SAND; trace mica.	SP	--	--	0.0	--	--
610		--	--	--	--	--	--
615	Grey to light grey (2.5 Y 4/1) medium to fine SAND; and fine SILT; trace mica.	SP	--	--	0.0	--	--
620		--	--	--	--	--	--
625	Very dark grey soft plastic CLAY (10YR 3/1); some silt and fine sand.	CM	--	--	0.0	--	--
630		--	--	--	--	--	--
635		--	--	--	--	--	--
640	Grey to light grey (2.5Y 6/1) medium to fine SAND; some fine silt; trace mica.	SM	--	--	0.0	--	--
645		--	--	--	--	--	--
650							

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Depth Below Ground Surface (ft)	Soil Description (Field Observations)	USCS	SPT Blows	Recovery Length (inches)	PID Reading (ppm)	Time	Remarks / Samples
650		--	--	--	--	--	--
655	Grey to light grey (2.5YR 6/1) fine SAND; trace mica.	SP	--	--	0.0	--	--
660		--	--	--	--	--	--
665	Grey to light grey (2.5YR 6/1) fine SAND; trace mica.	SP	--	--	0.0	--	--
670		--	--	--	--	--	--
675	Grey to light grey (2.5YR 6/1) fine SAND; trace mica.	SP	--	--	0.0	--	--
680		--	--	--	--	--	--
685	Grey to light grey (2.5YR 6/1) fine SAND; trace mica.	SP	--	--	0.0	--	--
690		--	--	--	--	--	--
695		--	--	--	--	--	--
700	Grey (10YR 8/2) medium to fine SAND; some mica and lignite.	SP	--	--	0.0	--	--
705		--	--	--	--	--	--
710		--	--	--	--	--	--
715	Very dark grey soft plastic CLAY (10YR 3/1); some silt and fine sand.	CM	--	--	0.0	--	--
720		--	--	--	--	--	--
725	Light tan to very light grey (10YR 8/1 to 10YR 8/2) coarse to medium SAND; trace mica.	SP	--	--	0.0	--	--
730		--	--	--	--	--	--
735	Light grey (10YR 8/1) medium to fine SAND; trace mica.	SP	--	--	0.0	--	--
740		--	--	--	--	--	--
745	Light grey (10YR 8/1) medium to fine SAND; trace mica.	SP	--	--	0.0	--	--
750		--	--	--	--	--	--
755	Very light grey to white (10YR 5/1) fine to coarse SAND; trace mica.	SP	--	--	0.0	--	--
760							

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Depth Below Ground Surface (ft)	Soil Description (Field Observations)	USCS	SPT Blows	Recovery Length (inches)	PID Reading (ppm)	Time	Remarks / Samples
760							
765	Dark grey to light grey (5Y 6/1 to 5Y 4/1) medium to fine SAND; trace coarse sand and fat plastic clay.	--	--	--	--	--	--
770		SP-MC	--	--	0.0	--	--
775		--	--	--	--	--	--
780		--	--	--	--	--	--
785		--	--	--	--	--	--
790	Very dark grey soft plastic CLAY (10YR 3/1); some silt and fine sand.	CM	--	--	0.0	--	--
795		--	--	--	--	--	--
800	Light grey (5Y 7/1) fine to medium SAND; trace silt and mica.	SP	--	--	0.1	--	--
805		--	--	--	--	NA - DRY	Attempted samplijng DECHC05-VPB03-GW-800-802-0 -No Water
810	Light grey (5Y 7/1) fine to medium SAND; trace silt and mica.	SP	--	--	0.0	NA - DRY	Attempted sampling DECHC05-VPB03-GW-805-807-0 -No Water
815		--	--	--	--	NA - DRY	Attempted sampling DECHC05-VPB03-GW-810-812-0 -No Water
820	Light grey (5Y 7/1) fine to medium SAND; trace silt and mica.	SP	--	--	0.9	--	--
825		--	--	--	--	1230	DECHC05-VPB03-GW-820-822-0 (12/10/21)
830		--	--	--	--	--	--
835	Light grey (5Y 7/1) fine to medium SAND; trace silt and mica.	SP	--	--	--	--	--
840		--	--	--	--	--	--
845		--	--	--	--	1020	DECHC05-VPB03-GW-840-842-0 (12/10/21)
850	Very dark grey soft plastic CLAY (10YR 3/1); some silt and fine sand.	CM	--	--	--	--	--
855		--	--	--	--	--	--
860	Very dark grey soft plastic CLAY (10YR 3/1); some silt and fine sand.	CM	--	--	0.0	--	--
865		--	--	--	--	1245	DECHC05-VPB03-GW-860-862-0 (12/10/21)
870	Very dark grey soft plastic CLAY (10YR 3/1); some silt and fine sand.	CM	--	--	0.0	--	--

Geologist Remarks: Boundaries/contact are approximated and may be transitional since descriptions are based on observations of screened wash samples from mud rotary drilling.

Depth Below Ground Surface (ft)	Soil Description (Field Observations)	USCS	SPT Blows	Recovery Length (inches)	PID Reading (ppm)	Time	Remarks / Samples
870							
		--	--	--	--	--	--
875	Very dark grey soft plastic CLAY (10YR 3/1); some silt and fine sand.	CM	--	--	0.2	--	--
880		--	--	--	--	NA - DRY	Attempted sampling DECHC05-VPB03-GW-880-882-0 -No Water
885		--	--	--	--	NA - DRY	Attempted sampling DECHC05-VPB03-GW-885-887-0- No Water
890	Light grey (5Y 6/1) fat plastic CLAY.	CL	--	--	0.0	1315	DECHC05-VPB03-GW-890-892-0 (12/13/21)
895		--	--	--	--	--	--
900	Light grey (5Y 6/1) fat plastic CLAY.	--	--	--	--	1530	DECHC05-VPB03-GW-900-902-0 (12/14/21)
905		--	--	--	--	--	--
910		--	--	--	--	--	--
915	Light grey (5Y 6/1) fine to very fine SAND; trace clay.	SP	--	--	0.1	--	--
920		--	--	--	--	1230	DECHC05-VPB03-GW-920-922-0 Sample contains large amount of sediment. May be drilling mud
925	Light grey (5Y 6/1) fine to very fine SAND; trace clay.	SP	--	--	0.0	--	--
930		--	--	--	--	--	--
935	Light grey to dark grey (5Y7/1 to 5Y3/1) fine SAND; trace silt and mica.	SP	--	--	0.0	--	--
940		--	--	--	--	1230	DECHC05-VPB03-GW-940-942-0 (12/14/21)
945	Light grey to dark grey (5Y7/1 to 5Y3/1) fine SAND; trace silt and mica.	SP	--	--	--	--	--
950		--	--	--	--	--	--
955	Light grey (5Y 6/1) medium to fine SAND; trace silt and mica	SP	--	--	--	--	--
960		--	--	--	--	1515	DECHC05-VPB03-GW-960-962-0 Sample contains large amount of sediment. May be drilling mud
965	Light grey (5Y 6/1) medium to fine SAND; trace silt and mica.	SP	--	--	--	--	--
970		--	--	--	--	--	--
975	Light grey (5Y 6/1) medium to fine SAND; trace silt and mica.	SP	--	--	--	--	--
980							

Geologist Remarks: Boundaries/contact are approximated and may be transitional since descriptions are based on observations of screened wash samples from mud rotary drilling.

Depth Below Ground Surface (ft)	Soil Description (Field Observations)	USCS	SPT Blows	Recovery Length (inches)	PID Reading (ppm)	Time	Remarks / Samples
980	983' Drillers noted significantly harder Drilling (CLAY)	--	--	--	--	1045	DECHC05-VPB03-GW-980-982-0 (12/15/21)
985		--	--	--	--	--	Raritan Formation at 987'
990	Dark grey (5Y 6/1) plastic CLAY Trace medium SAND	SM	--	--	0.0	--	
995	1000-1002': Dark grey (5Y 6/1) dense hard nonplastic CLAY	CL	11-14-12-10	7	0.0	1000	Split-spoon @ 1000-1002 ft bgs (12/15/21)
1000		--	--	--	--	--	Total drilled depth = 1,000 ft Total sampled depth = 1,002 ft
1005		--	--	--	--	--	--
1010	--	--	--	--	--	--	--
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Geologist Remarks: Boundaries/contact are approximated and may be transitional since descriptions are based on observations of screened wash samples from mud rotary drilling.

ATTACHMENT 4

Groundwater Analytical Data-VPB Samples

VPB Groundwater Sample Analytical Results
Northrop Grumman-Bethpage Facility/Naval Weapons Industrial Reserve Plant
Nassau County, New York

Client ID	NY 703.6 Table 3	DECHC05-VPB01-GW-600-602-0			DECHC05-TB-20210427			DECHC05-VPB01-GW-620-622-0			DECHC05-VPB01-GW-620-622-1			DECHC05-TB-20210428			DECHC05-VPB01-GW-665-667-0			DECHC05-TB-20210429			DECHC05-VPB01-GW-680-682-0			DECHC05-VPB01-GW-700-702-0		
Lab Sample ID	GW Discharge to	460-233019-1			460-233019-2			460-233112-1			460-233112-2			460-233112-3			460-233268-1			460-233268-2			460-233335-1			460-233335-2		
Sampling Date	Class GA Waters	04/27/2021 13:30:00			04/27/2021 13:00:00			04/28/2021 10:00:00			04/28/2021 10:00:00			04/28/2021 00:00:00			04/29/2021 13:45:00			04/29/2021 13:00:00			04/30/2021 10:15:00			04/30/2021 12:30:00		
Matrix		Water			Water			Water			Water			Water			Water			Water			Water			Water		
Dilution Factor		1			1			1			1			1			1			1			1			1		
Unit	ug/l	ug/l			ug/l			ug/l			ug/l			ug/l			ug/l			ug/l			ug/l			ug/l		
		Result	Q	MDL	Result	Q	MDL	Result	Q	MDL	Result	Q	MDL	Result	Q	MDL	Result	Q	MDL	Result	Q	MDL	Result	Q	MDL	Result	Q	MDL
WATER BY 8260D																												
1,1,1-Trichloroethane	NA	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24
1,1,2,2-Tetrachloroethane	NA	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37
1,1,2-Trichloro-1,2,2-trifluoroethane	NA	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31
1,1,2-Trichloroethane	1	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20
1,1-Dichloroethane	NA	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26
1,1-Dichloroethene	NA	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26
1,2,3-Trichlorobenzene	NA	0.36	U	0.36	0.36	U	0.36	0.36	U	0.36	0.36	U	0.36	0.36	U	0.36	0.36	U	0.36	0.36	U	0.36	0.36	U	0.36	0.36	U	0.36
1,2,4-Trichlorobenzene	NA	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37
1,2-Dibromo-3-Chloropropane	0.04	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38
1,2-Dichlorobenzene	3	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21
1,2-Dichloroethane	0.6	0.43	U	0.43	0.43	U	0.43	0.43	U	0.43	0.43	U	0.43	0.43	U	0.43	0.43	U	0.43	0.43	U	0.43	0.43	U	0.43	0.43	U	0.43
1,2-Dichloropropane	1	0.35	U	0.35	0.35	U	0.35	0.35	U	0.35	0.35	U	0.35	0.35	U	0.35	0.35	U	0.35	0.35	U	0.35	0.35	U	0.35	0.35	U	0.35
1,3-Dichlorobenzene	3	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34
1,4-Dichlorobenzene	3	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33
1,4-Dioxane	NA	28	U	28	28	U	28	28	U	28	28	U	28	28	U	28	28	U	28	28	U	28	28	U	28	28	U	28
2-Butanone (MEK)	NA	1.9	U	1.9	1.9	U	1.9	5.5		1.9	5.3		1.9	1.9	U	1.9	1.9	U	1.9	1.9	U	1.9	1.9	U	1.9	1.9	U	1.9
2-Hexanone	NA	1.1	U	1.1	1.1	U	1.1	1.1	U	1.1	1.1	U	1.1	1.1	U	1.1	1.1	U	1.1	1.1	U	1.1	1.1	U	1.1	1.1	U	1.1
4-Methyl-2-pentanone (MIBK)	NA	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3
Acetone	NA	7.4		4.4	4.4	U	4.4	14		4.4	13		4.4	4.4	U	4.4	4.4	U	4.4	4.4	U	4.4	4.4	U	4.4	4.4	U	4.4
Benzene	1	0.47	J	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20
Bromoform	NA	0.54	U	0.54	0.54	U	0.54	0.54	U	0.54	0.54	U	0.54	0.54	U	0.54	0.54	U	0.54	0.54	U	0.54	0.54	U	0.54	0.54	U	0.54
Bromomethane	NA	0.55	U	0.55	0.55	U	0.55	0.55	U	0.55	0.55	U	0.55	0.55	U	0.55	0.55	U	0.55	0.55	U	0.55	0.55	U	0.55	0.55	U	0.55
Carbon disulfide	120	0.82	U	0.82	0.82	U	0.82	0.82	U	0.82	0.82	U	0.82	0.82	U	0.82	0.82	U	0.82	0.82	U	0.82	0.82	U	0.82	0.82	U	0.82
Carbon tetrachloride	5	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21
Chlorobenzene	NA	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38
Chlorobromomethane	NA	0.41	U	0.41	0.41	U	0.41	0.41	U	0.41	0.41	U	0.41	0.41	U	0.41	0.41	U *-	0.41	0.41	U	0.41	0.41	U	0.41	0.41	U	0.41
Chlorodibromomethane	NA	0.28	U	0.28	0.28	U	0.28	0.28	U	0.28	0.28	U	0.28	0.28	U	0.28	0.28	U	0.28	0.28	U	0.28	0.28	U	0.28	0.28	U	0.28
Chloroethane	NA	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32
Chloroform	7	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33
Chloromethane	NA	0.40	U	0.40	0.40	U	0.40	0.40	U	0.40	0.40	U	0.40	0.40	U	0.40	0.40	U	0.40	0.40	U	0.40	0.40	U	0.40	0.40	U	0.40
cis-1,2-Dichloroethene	NA	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22
cis-1,3-Dichloropropene	NA	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22
Cyclohexane	NA	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32
Dichlorobromomethane	NA	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34
Dichlorodifluoromethane	NA	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31
Ethylbenzene	NA	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30
Ethylene Dibromide	0.0006	0.50	U	0.50	0.50	U	0.50	0.50	U	0.50	0.50	U	0.50	0.50	U	0.50	0.50	U	0.50	0.50	U	0.50	0.50	U	0.50	0.50	U	0.50
Isopropylbenzene	NA	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34
Methyl acetate	NA	4.8	J	0.79	0.79	U	0.79	9.8		0.79	8.7		0.79	0.79	U	0.79	0.79	U	0.79	0.79	U	0.79	0.79	U	0.79	0.79	U	0.79
Methyl tert-butyl ether	NA	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22
Methylcyclohexane	NA	0.71	U	0.71	0.71	U	0.71	0.71	U	0.71	0.71	U	0.71	0.71	U	0.71	0.71	U	0.71	0.71	U	0.71	0.71	U	0.71	0.71	U	0.71
Methylene Chloride	5	0.32	U	0.32	0.36	J	0.32	0.32	U	0.32	0.32	U	0.32	0.58	J	0.32	0.32	U	0.32	0.55	J	0.32	0.32	U	0.32	0.32	U	0.32
m-Xylene & p-Xylene	NA	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30
o-Xylene	NA	0.36	U	0.36	0.36	U	0.36	0.36	U	0.36	0.36	U	0.36	0.36	U	0.36	0.36	U	0.36	0.36	U	0.36	0.36	U	0.36	0.36	U	0.36
Styrene	5	0.42	U	0.42	0.42	U	0.42	0.42	U	0.42	0.42	U	0.42	0.42	U	0.42	0.42	U	0.42	0.42	U	0.42	0.42	U	0.42	0.42	U	0.42
Tetrachloroethene	NA	0.25	U	0.25	0.25	U	0.25	0.25	U	0.25	0.25	U	0.25	0.25	U	0.25	0.25	U *-	0.25	0.25	U	0.25	0.25	U	0.25	0.25	U	0.25
Toluene	NA	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38
trans-1,2-Dichloroethene	NA	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24
trans-1,3-Dichloropropene	NA	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22
Trichloroethene	5	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31
Trichlorofluoromethane	NA	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32
Vinyl chloride	2	0.17	U	0.17	0.17	U	0.17	0.17	U	0.17	0.17	U	0.17	0.17	U	0.17	0.17	U	0.17	0.17	U	0.17	0.17	U	0.17	0.17	U	0.17
Total Conc	NA	12.67			0.36			29.3			27.0			0.58			0.0			0.55			0.0			0.0		

J : Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
U : Indicates the analyte was analyzed for but not detected.

VPB Groundwater Sample Analytical Results
Northrop Grumman-Bethpage Facility/Naval Weapons Industrial Reserve Plant
Nassau County, New York

Client ID	DECHCH05-TB 20210430			DECHC05-VPB01-GW-720-722-0			DECHC05-VPB01-GW-745-747-0			DECHC05-TB-20210503			DECHC05-VPB01-GW-760-762-0			DECHC05-VPB01-GW-780-782-0			DECHC05-VPB01-GW-800-802-0			DECHC05-TB20210504			DECHC05-VPB01-GW-820-822-0			DECHC05-TB20210505			DECHC05-VPB01-GW
Lab Sample ID	460-233335-3			460-233335-4			460-233422-1			460-233422-2			460-233530-1			460-233530-2			460-233530-3			460-233530-4			460-233641-1			460-233641-2			460
Sampling Date	04/30/2021 00:00:00			04/30/2021 13:55:00			05/03/2021 13:00:00			05/03/2021 00:00:00			05/03/2021 15:10:00			05/04/2021 11:30:00			05/04/2021 14:00:00			05/04/2021 12:00:00			05/05/2021 10:10:00			05/05/2021 12:00:00			05/06/202
Matrix	Water			Water			Water			Water			Water			Water			Water			Water			Water			Water			
Dilution Factor	1			1			1			1			1			1			1			1			1			1			
Unit	ug/l			ug/l			ug/l			ug/l			ug/l			ug/l			ug/l			ug/l			ug/l			ug/l			
	Result	Q	MDL	Result	Q	MDL	Result	Q	MDL	Result	Q	MDL	Result	Q	MDL	Result	Q	MDL	Result	Q	MDL	Result	Q	MDL	Result	Q	MDL	Result	Q	MDL	Result	Q
WATER BY 8260D																																
1,1,1-Trichloroethane	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U
1,1,2,2-Tetrachloroethane	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U
1,1,2-Trichloro-1,2,2-trifluoroethane	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U
1,1,2-Trichloroethane	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U
1,1-Dichloroethane	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U
1,1-Dichloroethene	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U
1,2,3-Trichlorobenzene	0.36	U	0.36	0.36	U	0.36	0.36	U	0.36	0.36	U	0.36	0.36	U	0.36	0.36	U	0.36	0.36	U	0.36	0.36	U	0.36	0.36	U	0.36	0.36	U	0.36	0.36	U
1,2,4-Trichlorobenzene	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U
1,2-Dibromo-3-Chloropropane	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U
1,2-Dichlorobenzene	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U
1,2-Dichloroethane	0.43	U	0.43	0.43	U	0.43	0.43	U	0.43	0.43	U	0.43	0.43	U	0.43	0.43	U	0.43	0.43	U	0.43	0.43	U	0.43	0.43	U	0.43	0.43	U	0.43	0.43	U
1,2-Dichloropropane	0.35	U	0.35	0.35	U	0.35	0.35	U	0.35	0.35	U	0.35	0.35	U	0.35	0.35	U	0.35	0.35	U	0.35	0.35	U	0.35	0.35	U	0.35	0.35	U	0.35	0.35	U
1,3-Dichlorobenzene	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U
1,4-Dichlorobenzene	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U
1,4-Dioxane	28	U	28	28	U	28	28	U	28	28	U	28	28	U	28	28	U	28	28	U	28	28	U	28	28	U	28	28	U	28	28	U	28	U
2-Butanone (MEK)	1.9	U	1.9	1.9	U	1.9	1.9	U	1.9	1.9	U	1.9	2.8	J	1.9	2.3	J	1.9	1.9	U	1.9	1.9	U	1.9	1.9	U	1.9	1.9	U	1.9	1.9	U
2-Hexanone	1.1	U	1.1	1.1	U	1.1	1.1	U	1.1	1.1	U	1.1	1.1	U	1.1	1.1	U	1.1	1.1	U	1.1	1.1	U	1.1	1.1	U	1.1	1.1	U	1.1	1.1	U
4-Methyl-2-pentanone (MIBK)	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U
Acetone	4.4	U	4.4	4.4	U	4.4	8.9		4.4	4.4	U	4.4	5.6		4.4	4.4	U	4.4	4.4	U	4.4	4.4	U	4.4	4.4	U	4.4	4.4	U	4.4	5.4		
Benzene	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U
Bromoform	0.54	U	0.54	0.54	U	0.54	0.54	U	0.54	0.54	U	0.54	0.54	U	0.54	0.54	U	0.54	0.54	U	0.54	0.54	U	0.54	0.54	U	0.54	0.54	U	0.54	0.54	U
Bromomethane	0.55	U	0.55	0.55	U	0.55	0.55	U	0.55	0.55	U	0.55	0.55	U	0.55	0.55	U	0.55	0.55	U	0.55	0.55	U	0.55	0.55	U	0.55	0.55	U	0.55	0.55	U
Carbon disulfide	0.82	U	0.82	0.82	U	0.82	0.82	U	0.82	0.82	U	0.82	0.82	U	0.82	0.82	U	0.82	0.82	U	0.82	0.82	U	0.82	0.82	U	0.82	0.82	U	0.82	0.82	U
Carbon tetrachloride	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U
Chlorobenzene	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U
Chlorobromomethane	0.41	U	0.41	0.41	U	0.41	0.41	U	0.41	0.41	U	0.41	0.41	U	0.41	0.41	U	0.41	0.41	U	0.41	0.41	U	0.41	0.41	U	0.41	0.41	U	0.41	0.41	U
Chlorodibromomethane	0.28	U	0.28	0.28	U	0.28	0.28	U	0.28	0.28	U	0.28	0.28	U	0.28	0.28	U	0.28	0.28	U	0.28	0.28	U	0.28	0.28	U	0.28	0.28	U	0.28	0.28	U
Chloroethane	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U
Chloroform	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U
Chloromethane	0.40	U	0.40	0.40	U	0.40	0.40	U	0.40	0.40	U	0.40	0.40	U	0.40	0.40	U	0.40	0.40	U	0.40	0.40	U	0.40	0.40	U	0.40	0.40	U	0.40	0.40	U
cis-1,2-Dichloroethene	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U
cis-1,3-Dichloropropene	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U
Cyclohexane	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U
Dichlorobromomethane	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U
Dichlorodifluoromethane	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U
Ethylbenzene	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U
Ethylene Dibromide	0.50	U	0.50	0.50	U	0.50	0.50	U	0.50	0.50	U	0.50	0.50	U	0.50	0.50	U	0.50	0.50	U	0.50	0.50	U	0.50	0.50	U	0.50	0.50	U	0.50	0.50	U
Isopropylbenzene	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U
Methyl acetate	0.79	U	0.79	0.79	U	0.79	0.79	U	0.79	0.79	U	0.79	0.79	U	0.79	0.79	U	0.79	0.79	U	0.79	0.79	U	0.79	0.79	U	0.79	0.79	U	0.79	0.79	U *-
Methyl tert-butyl ether	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U
Methylcyclohexane	0.71	U	0.71	0.71	U	0.71	0.71	U	0.71	0.71	U	0.71	0.71	U	0.71	0.71	U	0.71	0.71	U	0.71	0.71	U	0.71	0.71	U	0.71	0.71	U	0.71	0.71	U
Methylene Chloride	0.60	J	0.32	0.32	U	0.32	0.32	U	0.32	0.54	J	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.62	J	0.32	0.32	U	0.32	0.54	J	0.32	0.32	U
m-Xylene & p-Xylene	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U
o-Xylene	0.36	U	0.36	0.36	U	0.36	0.36	U	0.36	0.36	U	0.36	0.36	U	0.36	0.36	U	0.36	0.36	U	0.36	0.36	U	0.36	0.36	U	0.36	0.36	U	0.36	0.36	U
Styrene	0.42	U	0.42	0.42	U	0.42	0.42	U	0.42	0.42	U	0.42	0.42	U	0.42	0.42	U	0.42	0.42	U	0.42	0.42	U	0.42	0.42	U	0.42	0.42	U	0.42	0.42	U
Tetrachloroethene	0.25	U	0.25	0.25	U	0.25	0.25	U	0.25	0.25	U	0.25	0.25	U	0.25	0.25	U	0.25	0.25	U	0.25	0.25	U	0.25	0.25	U	0.25	0.25	U	0.25	0.25	U
Toluene	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U
trans-1,2-Dichloroethene	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U
trans-1,3-Dichloropropene	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U
Trichloroethene	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U
Trichlorofluoromethane	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U
Vinyl chloride	0.17	U	0.17	0.17	U	0.17	0.17	U	0.17	0.17	U	0.17	0.17	U	0.17	0.17	U	0.17	0.17	U	0.17	0.17	U	0.17	0.17	U	0.17	0.17	U	0.17	0.17	U
Total Conc	0.6			0.0			8.9			0.54			8.4			2.3			0.0			0.62			0.0			0.54			5.4	

J : Result is less than the RL but greater tha
U : Indicates the analyte was analyzed for b

VPB Groundwater Sample Analytical Results
Northrop Grumman-Bethpage Facility/Naval Weapons Industrial Reserve Plant
Nassau County, New York

Client ID	840-842-0	DECHC05-VPB01-GW-860-862-0			DECHC05-TB20210506			DECHC05-VPB01-GW-880-882-0			DECHC05-VPB01-GW-905-907-0			DECHC05-TB20210507			DECHC05-VPB01-GW-920-922-0			DECHC05-TB20210510			DECHC05-VPB01-960-962-0			DECHC05-VPB01-980-982-0			DECHC05-TB20210512		
Lab Sample ID	-233762-1	460-233762-2			460-233762-3			460-234029-1			460-234029-2			460-234029-3			460-234028-1			460-234028-2			460-234190-1			460-234190-2			460-234190-3		
Sampling Date	1 10:30:00	05/06/2021 13:30:00			05/06/2021 12:00:00			05/07/2021 10:30:00			05/07/2021 14:30:00			05/07/2021 12:00:00			05/10/2021 15:30:00			05/10/2021 12:00:00			05/12/2021 10:15:00			05/12/2021 13:15:00			05/12/2021 12:00:00		
Matrix	Water	Water			Water			Water			Water			Water			Water			Water			Water			Water			Water		
Dilution Factor	1	1			1			1			1			1			1			1			1			1			1		
Unit	ug/l	ug/l			ug/l			ug/l			ug/l			ug/l			ug/l			ug/l			ug/l			ug/l			ug/l		
	MDL	Result	Q	MDL	Result	Q	MDL	Result	Q	MDL	Result	Q	MDL	Result	Q	MDL	Result	Q	MDL	Result	Q	MDL	Result	Q	MDL	Result	Q	MDL	Result	Q	MDL
WATER BY 8260D																																
1,1,1-Trichloroethane	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24
1,1,2,2-Tetrachloroethane	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U F1	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37
1,1,2-Trichloro-1,2,2-trifluoroethane	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U F2	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31
1,1,2-Trichloroethane	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20
1,1-Dichloroethane	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26
1,1-Dichloroethene	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26
1,2,3-Trichlorobenzene	0.36	0.36	U	0.36	0.36	U	0.36	0.36	U	0.36	0.36	U	0.36	0.36	U	0.36	0.36	U	0.36	0.36	U	0.36	0.36	U	0.36	0.36	U	0.36	0.36	U	0.36	0.36	U	0.36
1,2,4-Trichlorobenzene	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37
1,2-Dibromo-3-Chloropropane	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38
1,2-Dichlorobenzene	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21
1,2-Dichloroethane	0.43	0.43	U	0.43	0.43	U	0.43	0.43	U	0.43	0.43	U	0.43	0.43	U	0.43	0.43	U	0.43	0.43	U	0.43	0.43	U	0.43	0.43	U	0.43	0.43	U	0.43	0.43	U	0.43
1,2-Dichloropropane	0.35	0.35	U	0.35	0.35	U	0.35	0.35	U	0.35	0.35	U	0.35	0.35	U	0.35	0.35	U	0.35	0.35	U	0.35	0.35	U	0.35	0.35	U	0.35	0.35	U	0.35	0.35	U	0.35
1,3-Dichlorobenzene	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34
1,4-Dichlorobenzene	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33
1,4-Dioxane	28	28	U	28	28	U	28	28	U	28	28	U	28	28	U	28	28	U	28	28	U	28	28	U	28	28	U	28	28	U	28	28	U	28
2-Butanone (MEK)	1.9	1.9	U	1.9	1.9	U	1.9	1.9	U	1.9	1.9	U	1.9	1.9	U	1.9	1.9	U	1.9	1.9	U	1.9	1.9	U	1.9	1.9	U	1.9	1.9	U	1.9	1.9	U	1.9
2-Hexanone	1.1	1.1	U	1.1	1.1	U	1.1	1.1	U	1.1	1.1	U	1.1	1.1	U	1.1	1.1	U	1.1	1.1	U	1.1	1.1	U	1.1	1.1	U	1.1	1.1	U	1.1	1.1	U	1.1
4-Methyl-2-pentanone (MIBK)	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3
Acetone	4.4	4.4	U	4.4	4.4	U	4.4	4.4	U	4.4	4.4	U	4.4	4.4	U	4.4	4.4	U	4.4	4.4	U	4.4	4.4	U	4.4	4.4	U	4.4	4.4	U	4.4	4.4	U	4.4
Benzene	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20
Bromoform	0.54	0.54	U	0.54	0.54	U	0.54	0.54	U	0.54	0.54	U	0.54	0.54	U	0.54	0.54	U	0.54	0.54	U	0.54	0.54	U	0.54	0.54	U	0.54	0.54	U	0.54	0.54	U	0.54
Bromomethane	0.55	0.55	U	0.55	0.55	U	0.55	0.55	U	0.55	0.55	U	0.55	0.55	U	0.55	0.55	U	0.55	0.55	U	0.55	0.55	U F1	0.55	0.55	U	0.55	0.55	U	0.55	0.55	U	0.55
Carbon disulfide	0.82	0.82	U	0.82	0.82	U	0.82	0.82	U	0.82	0.82	U	0.82	0.82	U	0.82	0.82	U	0.82	0.82	U	0.82	0.82	U	0.82	0.82	U	0.82	0.82	U	0.82	0.82	U	0.82
Carbon tetrachloride	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21
Chlorobenzene	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38
Chlorobromomethane	0.41	0.41	U	0.41	0.41	U	0.41	0.41	U	0.41	0.41	U	0.41	0.41	U	0.41	0.41	U	0.41	0.41	U	0.41	0.41	U F1	0.41	0.41	U	0.41	0.41	U	0.41	0.41	U	0.41
Chlorodibromomethane	0.28	0.28	U	0.28	0.28	U	0.28	0.28	U	0.28	0.28	U	0.28	0.28	U	0.28	0.28	U	0.28	0.28	U	0.28	0.28	U	0.28	0.28	U	0.28	0.28	U	0.28	0.28	U	0.28
Chloroethane	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32
Chloroform	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33
Chloromethane	0.40	0.40	U	0.40	0.40	U	0.40	0.40	U	0.40	0.40	U	0.40	0.40	U	0.40	0.40	U	0.40	0.40	U	0.40	0.40	U F2	0.40	0.40	U	0.40	0.40	U	0.40	0.40	U	0.40
cis-1,2-Dichloroethene	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22
cis-1,3-Dichloropropene	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22
Cyclohexane	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32
Dichlorobromomethane	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34
Dichlorodifluoromethane	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31
Ethylbenzene	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30
Ethylene Dibromide	0.50	0.50	U	0.50	0.50	U	0.50	0.50	U	0.50	0.50	U	0.50	0.50	U	0.50	0.50	U	0.50	0.50	U	0.50	0.50	U	0.50	0.50	U	0.50	0.50	U	0.50	0.50	U	0.50
Isopropylbenzene	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34
Methyl acetate	0.79	0.79	U *-	0.79	0.79	U *-	0.79	0.79	U	0.79	0.79	U	0.79	0.79	U	0.79	0.79	U	0.79	0.79	U	0.79	0.79	U	0.79	0.79	U	0.79	0.79	U	0.79	0.79	U	0.79
Methyl tert-butyl ether	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22
Methylcyclohexane	0.71	0.71	U	0.71	0.71	U	0.71	0.71	U	0.71	0.71	U	0.71	0.71	U	0.71	0.71	U	0.71	0.71	U	0.71	0.71	U F2	0.71	0.71	U	0.71	0.71	U	0.71	0.71	U	0.71
Methylene Chloride	0.32	0.32	U	0.32	0.47	J	0.32	0.32	U	0.32	0.32	U	0.32	0.61	J	0.32	0.32	U	0.32	0.56	J	0.32	0.32	U	0.32	0.32	U	0.32	0.65	J	0.32
m-Xylene & p-Xylene	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30
o-Xylene	0.36	0.36	U	0.36	0.36	U	0.36	0.36	U	0.36	0.36	U	0.36	0.36	U	0.36	0.36	U	0.36	0.36	U	0.36	0.36	U	0.36	0.36	U	0.36	0.36	U	0.36	0.36	U	0.36
Styrene	0.42	0.42	U	0.42	0.42	U	0.42	0.42	U	0.42	0.42	U	0.42	0.42	U	0.42	0.42	U	0.42	0.42	U	0.42	0.42	U	0.42	0.42	U	0.42	0.42	U	0.42	0.42	U	0.42
Tetrachloroethene	0.25	0.25	U	0.25	0.25	U	0.25	0.25	U	0.25	0.25	U	0.25	0.25	U	0.25	0.25	U	0.25	0.25	U	0.25	0.25	U F1	0.25	0.25	U	0.25	0.25	U	0.25	0.25	U	0.25
Toluene	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38
trans-1,2-Dichloroethene	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24
trans-1,3-Dichloropropene	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22
Trichloroethene	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31
Trichlorofluoromethane	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32
Vinyl chloride	0.17	0.17	U	0.17	0.17	U	0.17	0.17	U	0.17	0.17	U	0.17	0.17	U	0.17	0.17	U	0.17	0.17	U	0.17	0.17	U	0.17	0.17	U	0.17	0.17	U	0.17	0.17	U	0.17
Total Conc		0.0			0.47			0.0			0.0			0.61			0.0			0.56			0.0			0.0			0.65		

J : Result is less than the RL but greater tha
U : Indicates the analyte was analyzed for b

VPB Groundwater Sample Analytical Results
Northrop Grumman-Bethpage Facility/Naval Weapons Industrial Reserve Plant
Nassau County, New York

Client ID	NY 703.6 Table 3	DECHC05-VPB02-GW-600-602-0			DECHC05-VPB02-GW-620-622-0			DECHC05-VPB02-GW-660-662-0			DECHC05-VPB02-GW-680-682-0			DECHC05-TB-20210922-0			DECHC05-VPB02-GW-700-702-0			C05-VPB02-GW-720-722-0			TB-20210923			DECHC05-VPB02-GW-760-762-0			DECHC05-TB-09242021-0		
Lab Sample ID	GW Discharge to	460-243408-1			460-243408-2			460-243408-3			460-243408-4			460-243408-5			460-243408-6			460-243519-1			460-243519-2			460-243680-1			460-243680-2		
Sampling Date	Class GA Waters	09/20/2021 12:45:00			09/21/2021 13:00:00			09/21/2021 13:30:00			09/22/2021 10:30:00			09/22/2021 13:00:00			09/22/2021 13:00:00			09/23/2021 10:45:00			09/23/2021 00:00:00			09/24/2021 10:45:00			09/24/2021 00:00:00		
Matrix		Water			Water			Water			Water			Water			Water			Water			Water			Water			Water		
Dilution Factor		1			1			1			1			1			1			1			1			1			1		
Unit	ug/l	ug/l			ug/l			ug/l			ug/l			ug/l			ug/l			ug/l			ug/l			ug/l			ug/l		
		Result	Q	MDL	Result	Q	MDL	Result	Q	MDL	Result	Q	MDL	Result	Q	MDL	Result	Q	MDL	Result	Q	MDL	Result	Q	MDL	Result	Q	MDL	Result	Q	MDL
WATER BY 8260D																															
1,1,1-Trichloroethane	NA	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24
1,1,2,2-Tetrachloroethane	NA	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37
1,1,2-Trichloro-1,2,2-trifluoroethane	NA	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31
1,1,2-Trichloroethane	1	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20
1,1-Dichloroethane	NA	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26
1,1-Dichloroethene	NA	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26
1,2,4-Trichlorobenzene	NA	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37
1,2-Dibromo-3-Chloropropane	0.04	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38
1,2-Dichlorobenzene	3	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21
1,2-Dichloroethane	0.6	0.43	U	0.43	0.43	U	0.43	0.43	U	0.43	0.43	U	0.43	0.43	U	0.43	0.43	U	0.43	0.43	U	0.43	0.43	U	0.43	0.43	U	0.43	0.43	U	0.43
1,2-Dichloropropane	1	0.35	U	0.35	0.35	U	0.35	0.35	U	0.35	0.35	U	0.35	0.35	U	0.35	0.35	U	0.35	0.35	U	0.35	0.35	U	0.35	0.35	U	0.35	0.35	U	0.35
1,3-Dichlorobenzene	3	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34
1,4-Dichlorobenzene	3	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33
2-Butanone (MEK)	NA	6.3		1.9	1.9	U	1.9	1.9	U	1.9	1.9	U	1.9	1.9	U	1.9	1.9	U	1.9	1.9	U	1.9	1.9	U	1.9	1.9	U	1.9	1.9	U	1.9
2-Hexanone	NA	1.1	U *-	1.1	1.1	U *-	1.1	1.1	U *-	1.1	1.1	U *-	1.1	1.1	U *-	1.1	1.1	U *-	1.1	1.1	U	1.1	1.1	U	1.1	1.1	U	1.1	1.1	U	1.1
4-Methyl-2-pentanone (MIBK)	NA	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3
Acetone	NA	46		4.4	4.4	U	4.4	7.9		4.4	5.4		4.4	4.4	U	4.4	9.8		4.4	4.4	U	4.4	4.4	U	4.4	5.1		4.4	4.4	U	4.4
Benzene	1	0.72	J	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20
Bromoform	NA	0.54	U	0.54	0.54	U	0.54	0.54	U	0.54	0.54	U	0.54	0.54	U	0.54	0.54	U	0.54	0.54	U	0.54	0.54	U	0.54	0.54	U	0.54	0.54	U	0.54
Bromomethane	NA	0.55	U	0.55	0.55	U	0.55	0.55	U	0.55	0.55	U	0.55	0.55	U	0.55	0.55	U	0.55	0.55	J *+	0.55	0.55	U *+	0.55	0.55	U *+	0.55	0.55	U *+	0.55
Carbon disulfide	120	0.82	U	0.82	0.82	U	0.82	0.82	U	0.82	0.82	U	0.82	0.82	U	0.82	0.82	U	0.82	0.82	U	0.82	0.82	U	0.82	0.82	U	0.82	0.82	U	0.82
Carbon tetrachloride	5	0.21	U *+	0.21	0.21	U *+	0.21	0.21	U *+	0.21	0.21	U *+	0.21	0.21	U *+	0.21	0.21	U *+	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21
Chlorobenzene	NA	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38
Chlorodibromomethane	NA	0.28	U	0.28	0.28	U	0.28	0.28	U	0.28	0.28	U	0.28	0.28	U	0.28	0.28	U	0.28	0.28	U	0.28	0.28	U	0.28	0.28	U	0.28	0.28	U	0.28
Chloroethane	NA	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32
Chloroform	7	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33
Chloromethane	NA	0.40	U	0.40	0.40	U	0.40	0.40	U	0.40	0.40	U	0.40	0.40	U	0.40	0.40	U	0.40	0.40	U	0.40	0.40	U	0.40	0.40	U	0.40	0.40	U	0.40
cis-1,2-Dichloroethene	NA	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22
cis-1,3-Dichloropropene	NA	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22
Cyclohexane	NA	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32
Dichlorobromomethane	NA	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34
Dichlorodifluoromethane	NA	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31
Ethylbenzene	NA	0.34	J	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30
Ethylene Dibromide	0.0006	0.50	U	0.50	0.50	U	0.50	0.50	U	0.50	0.50	U	0.50	0.50	U	0.50	0.50	U	0.50	0.50	U	0.50	0.50	U	0.50	0.50	U	0.50	0.50	U	0.50
Isopropylbenzene	NA	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34
Methyl acetate	NA	0.79	U	0.79	0.79	U	0.79	0.79	U	0.79	0.79	U	0.79	0.79	U	0.79	0.79	U	0.79	0.79	U	0.79	0.79	U	0.79	0.79	U	0.79	0.79	U	0.79
Methyl tert-butyl ether	NA	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22
Methylcyclohexane	NA	0.71	U	0.71	0.71	U	0.71	0.71	U	0.71	0.71	U	0.71	0.71	U	0.71	0.71	U	0.71	0.71	U	0.71	0.71	U	0.71	0.71	U	0.71	0.71	U	0.71
Methylene Chloride	5	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32
m-Xylene & p-Xylene	NA	0.79	J	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30
o-Xylene	NA	0.36	U	0.36	0.36	U	0.36	0.36	U	0.36	0.36	U	0.36	0.36	U	0.36	0.36	U	0.36	0.36	U	0.36	0.36	U	0.36	0.36	U	0.36	0.36	U	0.36
Styrene	5	0.42	U	0.42	0.42	U	0.42	0.42	U	0.42	0.42	U	0.42	0.42	U	0.42	0.42	U	0.42	0.42	U	0.42	0.42	U	0.42	0.42	U	0.42	0.42	U	0.42
Tetrachloroethene	NA	0.25	U	0.25	0.25	U	0.25	0.25	U	0.25	0.25	U	0.25	0.25	U	0.25	0.25	U	0.25	0.25	U	0.25	0.25	U	0.25	0.25	U	0.25	0.25	U	0.25
Toluene	NA	1.7		0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38
trans-1,2-Dichloroethene	NA	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24
trans-1,3-Dichloropropene	NA	0.22	U *+	0.22	0.22	U *+	0.22	0.22	U *+	0.22	0.22	U *+	0.22	0.22	U *+	0.22	0.22	U *+	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22
Trichloroethene	5	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31
Trichlorofluoromethane	NA	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32
Vinyl chloride	2	0.17	U	0.17	0.17	U	0.17	0.17	U	0.17	0.17	U	0.17	0.17	U	0.17	0.17	U	0.17	0.17	U	0.17	0.17	U	0.17	0.17	U	0.17	0.17	U	0.17
Xylenes, Total	NA	1.1	J	0.65	0.65	U	0.65	0.65	U	0.65	0.65	U	0.65	0.65	U	0.65	0.65	U	0.65	0.65	U	0.65	0.65	U	0.65	0.65	U	0.65	0.65	U	0.65
Total Conc	NA	56.95			0.0			7.9			5.4			0.0			9.8			0.0			0.0			5.1			0.0		

*- : LCS and/or LCSD is outside acceptance limits, low biased.
*+ : LCS and/or LCSD is outside acceptance limits, high biased.
J : Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
U : Indicates the analyte was analyzed for but not detected.

VPB Groundwater Sample Analytical Results
Northrop Grumman-Bethpage Facility/Naval Weapons Industrial Reserve Plant
Nassau County, New York

Client ID	DECHC05-VPB02-GW-805-807-0			DECHC05-VPB02-TB0928202			DECHC05-VPB02-GW-825-827-0			DECHC05-TB20210928-0			DECHC05-VPB02-GW-850-852-0			DECHC05-TB20210930-0			DECHC05-VPB02-GW-860-862-0			DECHC05-VPB02-GW-860-862-1			DECHC05-TB20211001			DECHC05-VPB02-GW-900-902-1		
Lab Sample ID	460-243834-1			460-243834-2			460-243951-1			460-243951-2			460-244028-1			460-244028-2			460-244142-1			460-244142-2			460-244142-3			460-244449-1		
Sampling Date	09/28/2021 10:45:00			09/28/2021 00:00:00			09/29/2021 10:30:00			09/29/2021 00:00:00			09/30/2021 12:15:00			09/30/2021 00:00:00			09/30/2021 15:20:00			09/30/2021 15:20:00			09/30/2021 00:00:00			10/05/2021 11:45:00		
Matrix	Water			Water			Water			Water			Water			Water			Water			Water			Water			Water		
Dilution Factor	1			1			1			1			1			1			1			1			1			1		
Unit	ug/l			ug/l			ug/l			ug/l			ug/l			ug/l			ug/l			ug/l			ug/l			ug/l		
	Result	Q	MDL	Result	Q	MDL	Result	Q	MDL	Result	Q	MDL	Result	Q	MDL	Result	Q	MDL	Result	Q	MDL	Result	Q	MDL	Result	Q	MDL	Result	Q	MDL
WATER BY 8260D																														
1,1,1-Trichloroethane	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24
1,1,2,2-Tetrachloroethane	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37
1,1,2-Trichloro-1,2,2-trifluoroethane	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31
1,1,2-Trichloroethane	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20
1,1-Dichloroethane	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26
1,1-Dichloroethene	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26
1,2,4-Trichlorobenzene	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U F1 F2	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37
1,2-Dibromo-3-Chloropropane	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38
1,2-Dichlorobenzene	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21
1,2-Dichloroethane	0.43	U	0.43	0.43	U	0.43	0.43	U	0.43	0.43	U	0.43	0.43	U	0.43	0.43	U	0.43	0.43	U	0.43	0.43	U	0.43	0.43	U	0.43	0.43	U	0.43
1,2-Dichloropropane	0.35	U	0.35	0.35	U	0.35	0.35	U	0.35	0.35	U	0.35	0.35	U	0.35	0.35	U	0.35	0.35	U	0.35	0.35	U	0.35	0.35	U	0.35	0.35	U	0.35
1,3-Dichlorobenzene	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U F1	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34
1,4-Dichlorobenzene	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U F1	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33
2-Butanone (MEK)	1.9	U	1.9	1.9	U	1.9	4.0	J	1.9	1.9	U	1.9	1.9	U	1.9	1.9	U	1.9	1.9	U	1.9	1.9	U	1.9	1.9	U	1.9	1.9	U	1.9
2-Hexanone	1.1	U	1.1	1.1	U	1.1	1.1	U	1.1	1.1	U *-	1.1	1.1	U *- F1	1.1	1.1	U *-	1.1	1.1	U	1.1	1.1	U	1.1	1.1	U	1.1	1.1	U	1.1
4-Methyl-2-pentanone (MIBK)	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3
Acetone	11		4.4	4.4	U	4.4	14		4.4	4.4	U	4.4	4.4	U	4.4	4.4	U	4.4	4.4	U	4.4	4.4	U	4.4	4.4	U	4.4	8.4		4.4
Benzene	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20
Bromoform	0.54	U	0.54	0.54	U	0.54	0.54	U	0.54	0.54	U	0.54	0.54	U	0.54	0.54	U	0.54	0.54	U	0.54	0.54	U	0.54	0.54	U	0.54	0.54	U	0.54
Bromomethane	0.55	U	0.55	0.55	U	0.55	0.55	U	0.55	0.55	U	0.55	0.55	U	0.55	0.55	U	0.55	0.55	U	0.55	0.55	U	0.55	0.55	U	0.55	0.55	U	0.55
Carbon disulfide	0.82	U	0.82	0.82	U	0.82	0.82	U	0.82	0.82	U	0.82	0.82	U	0.82	0.82	U	0.82	0.82	U	0.82	0.82	U	0.82	0.82	U	0.82	0.82	U	0.82
Carbon tetrachloride	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21
Chlorobenzene	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38
Chlorodibromomethane	0.28	U	0.28	0.28	U	0.28	0.28	U	0.28	0.28	U	0.28	0.28	U	0.28	0.28	U	0.28	0.28	U	0.28	0.28	U	0.28	0.28	U	0.28	0.28	U	0.28
Chloroethane	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32
Chloroform	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33
Chloromethane	0.40	U	0.40	0.40	U	0.40	0.40	U	0.40	0.40	U	0.40	0.40	U	0.40	0.40	U	0.40	0.40	U	0.40	0.40	U	0.40	0.40	U	0.40	0.40	U	0.40
cis-1,2-Dichloroethene	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22
cis-1,3-Dichloropropene	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22
Cyclohexane	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U F1	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32
Dichlorobromomethane	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34
Dichlorodifluoromethane	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31
Ethylbenzene	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30
Ethylene Dibromide	0.50	U	0.50	0.50	U	0.50	0.50	U	0.50	0.50	U	0.50	0.50	U	0.50	0.50	U	0.50	0.50	U	0.50	0.50	U	0.50	0.50	U	0.50	0.50	U	0.50
Isopropylbenzene	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34
Methyl acetate	0.79	U	0.79	0.79	U	0.79	0.79	U	0.79	0.79	U	0.79	0.79	U	0.79	0.79	U	0.79	0.79	U	0.79	0.79	U	0.79	0.79	U	0.79	0.79	U	0.79
Methyl tert-butyl ether	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22
Methylcyclohexane	0.71	U	0.71	0.71	U	0.71	0.71	U	0.71	0.71	U	0.71	0.71	U F1	0.71	0.71	U	0.71	0.71	U	0.71	0.71	U	0.71	0.71	U	0.71	0.71	U	0.71
Methylene Chloride	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32
m-Xylene & p-Xylene	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30
o-Xylene	0.36	U	0.36	0.36	U	0.36	0.36	U	0.36	0.36	U	0.36	0.36	U	0.36	0.36	U	0.36	0.36	U	0.36	0.36	U	0.36	0.36	U	0.36	0.36	U	0.36
Styrene	0.42	U	0.42	0.42	U	0.42	0.42	U	0.42	0.42	U	0.42	0.42	U	0.42	0.42	U	0.42	0.42	U	0.42	0.42	U	0.42	0.42	U	0.42	0.42	U	0.42
Tetrachloroethene	0.25	U	0.25	0.25	U	0.25	0.25	U	0.25	0.25	U	0.25	0.25	U	0.25	0.25	U	0.25	0.25	U	0.25	0.25	U	0.25	0.25	U	0.25	0.25	U	0.25
Toluene	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38
trans-1,2-Dichloroethene	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24
trans-1,3-Dichloropropene	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U *+	0.22	0.22	U *+	0.22	0.22	U *+	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22
Trichloroethene	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31
Trichlorofluoromethane	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32
Vinyl chloride	0.17	U	0.17	0.17	U	0.17	0.17	U	0.17	0.17	U	0.17	0.17	U	0.17	0.17	U	0.17	0.17	U	0.17	0.17	U	0.17	0.17	U	0.17	0.17	U	0.17
Xylenes, Total	0.65	U	0.65	0.65	U	0.65	0.65	U	0.65	0.65	U	0.65	0.65	U	0.65	0.65	U	0.65	0.65	U	0.65	0.65	U	0.65	0.65	U	0.65	0.65	U	0.65
Total Conc	11.0			0.0			18.0			0.0			0.0			0.0			0.0			0.0			0.0			8.4		

*- : LCS and/or LCSD is outside acceptance l
*+ : LCS and/or LCSD is outside acceptance
J : Result is less than the RL but greater tha
U : Indicates the analyte was analyzed for b

VPB Groundwater Sample Analytical Results
Northrop Grumman-Bethpage Facility/Naval Weapons Industrial Reserve Plant
Nassau County, New York

Client ID	DECHC05-VPB02-GW-900-902-0			DECHC05-VPB02-GW-920-922-0			DECHC05-VPB02-GW-940-942			DECHC05-VPB02-TB20211006			EB20211006			EB20211007			FB20211007			TB20211007			DECHCO5-VPB02-GW-980-982-0			FB-20211008-1		
Lab Sample ID	460-244449-2			460-244449-3			460-244449-4			460-244449-5			460-244901-1			460-244901-2			460-244901-3			460-244901-4			460-244662-1			460-244662-2		
Sampling Date	10/05/2021 11:45:00			10/05/2021 13:15:00			10/06/2021 13:15:00			10/06/2021 00:00:00			10/06/2021 13:00:00			10/07/2021 13:00:00			10/07/2021 13:00:00			10/07/2021 13:00:00			10/08/2021 13:45:00			10/08/2021 13:00:00		
Matrix	Water			Water			Water			Water			Water			Water			Water			Water			Water			Water		
Dilution Factor	1			1			1			1			1			1			1			1			1			1		
Unit	ug/l			ug/l			ug/l			ug/l			ug/l			ug/l			ug/l			ug/l			ug/l			ug/l		
	Result	Q	MDL	Result	Q	MDL	Result	Q	MDL	Result	Q	MDL	Result	Q	MDL	Result	Q	MDL	Result	Q	MDL	Result	Q	MDL	Result	Q	MDL	Result	Q	MDL
WATER BY 8260D																														
1,1,1-Trichloroethane	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24
1,1,2,2-Tetrachloroethane	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37
1,1,2-Trichloro-1,2,2-trifluoroethane	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31
1,1,2-Trichloroethane	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20
1,1-Dichloroethane	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26
1,1-Dichloroethene	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26
1,2,4-Trichlorobenzene	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37
1,2-Dibromo-3-Chloropropane	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38
1,2-Dichlorobenzene	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21
1,2-Dichloroethane	0.43	U	0.43	0.43	U	0.43	0.43	U	0.43	0.43	U	0.43	0.43	U	0.43	0.43	U	0.43	0.43	U	0.43	0.43	U	0.43	0.43	U	0.43	0.43	U	0.43
1,2-Dichloropropane	0.35	U	0.35	0.35	U	0.35	0.35	U	0.35	0.35	U	0.35	0.35	U	0.35	0.35	U	0.35	0.35	U	0.35	0.35	U	0.35	0.35	U	0.35	0.35	U	0.35
1,3-Dichlorobenzene	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34
1,4-Dichlorobenzene	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33
2-Butanone (MEK)	1.9	U	1.9	1.9	U	1.9	1.9	U	1.9	1.9	U	1.9	1.9	U *-	1.9	1.9	U *-	1.9	1.9	U *-	1.9	1.9	U *-	1.9	1.9	U	1.9	1.9	U	1.9
2-Hexanone	1.1	U	1.1	1.1	U	1.1	1.1	U	1.1	1.1	U	1.1	1.1	U	1.1	1.1	U	1.1	1.1	U	1.1	1.1	U	1.1	1.1	U	1.1	1.1	U	1.1
4-Methyl-2-pentanone (MIBK)	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3
Acetone	8.2		4.4	4.4	U	4.4	4.4	U	4.4	4.4	U	4.4	4.4	U	4.4	4.4	U	4.4	4.4	U	4.4	4.4	U	4.4	4.4	U	4.4	4.4	U	4.4
Benzene	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20
Bromoform	0.54	U	0.54	0.54	U	0.54	0.54	U	0.54	0.54	U	0.54	0.54	U	0.54	0.54	U	0.54	0.54	U	0.54	0.54	U	0.54	0.54	U	0.54	0.54	U	0.54
Bromomethane	0.55	U	0.55	0.55	U	0.55	0.55	U	0.55	0.55	U	0.55	0.55	U	0.55	0.55	U	0.55	0.55	U	0.55	0.55	U	0.55	0.55	U *+	0.55	0.55	U *+	0.55
Carbon disulfide	0.82	U	0.82	0.82	U	0.82	0.82	U	0.82	0.82	U	0.82	0.82	U	0.82	0.82	U	0.82	0.82	U	0.82	0.82	U	0.82	0.82	U	0.82	0.82	U	0.82
Carbon tetrachloride	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21
Chlorobenzene	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38
Chlorodibromomethane	0.28	U	0.28	0.28	U	0.28	0.28	U	0.28	0.28	U	0.28	0.28	U	0.28	0.28	U	0.28	0.28	U	0.28	0.28	U	0.28	0.28	U	0.28	0.28	U	0.28
Chloroethane	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32
Chloroform	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33
Chloromethane	0.40	U	0.40	0.40	U	0.40	0.40	U	0.40	0.40	U	0.40	0.40	U	0.40	0.40	U	0.40	0.40	U	0.40	0.40	U	0.40	0.40	U	0.40	0.40	U	0.40
cis-1,2-Dichloroethene	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22
cis-1,3-Dichloropropene	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22
Cyclohexane	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32
Dichlorobromomethane	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34
Dichlorodifluoromethane	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31
Ethylbenzene	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30
Ethylene Dibromide	0.50	U	0.50	0.50	U	0.50	0.50	U	0.50	0.50	U	0.50	0.50	U	0.50	0.50	U	0.50	0.50	U	0.50	0.50	U	0.50	0.50	U	0.50	0.50	U	0.50
Isopropylbenzene	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34
Methyl acetate	0.79	U	0.79	0.79	U	0.79	0.79	U	0.79	0.79	U	0.79	0.79	U	0.79	0.79	U	0.79	0.79	U	0.79	0.79	U	0.79	0.79	U	0.79	0.79	U	0.79
Methyl tert-butyl ether	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22
Methylcyclohexane	0.71	U	0.71	0.71	U	0.71	0.71	U	0.71	0.71	U	0.71	0.71	U	0.71	0.71	U	0.71	0.71	U	0.71	0.71	U	0.71	0.71	U	0.71	0.71	U	0.71
Methylene Chloride	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32
m-Xylene & p-Xylene	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30
o-Xylene	0.36	U	0.36	0.36	U	0.36	0.36	U	0.36	0.36	U	0.36	0.36	U	0.36	0.36	U	0.36	0.36	U	0.36	0.36	U	0.36	0.36	U	0.36	0.36	U	0.36
Styrene	0.42	U	0.42	0.42	U	0.42	0.42	U	0.42	0.42	U	0.42	0.42	U	0.42	0.42	U	0.42	0.42	U	0.42	0.42	U	0.42	0.42	U	0.42	0.42	U	0.42
Tetrachloroethene	0.25	U	0.25	0.25	U	0.25	0.25	U	0.25	0.25	U	0.25	0.25	U	0.25	0.25	U	0.25	0.25	U	0.25	0.25	U	0.25	0.25	U	0.25	0.25	U	0.25
Toluene	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38
trans-1,2-Dichloroethene	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24
trans-1,3-Dichloropropene	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22
Trichloroethene	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31
Trichlorofluoromethane	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32
Vinyl chloride	0.17	U	0.17	0.17	U	0.17	0.17	U	0.17	0.17	U	0.17	0.17	U	0.17	0.17	U	0.17	0.17	U	0.17	0.17	U	0.17	0.17	U	0.17	0.17	U	0.17
Xylenes, Total	0.65	U	0.65	0.65	U	0.65	0.65	U	0.65	0.65	U	0.65	0.65	U	0.65	0.65	U	0.65	0.65	U	0.65	0.65	U	0.65	0.65	U	0.65	0.65	U	0.65
Total Conc	8.2			0.0			0.0			0.0			0.0			0.0			0.0			0.0			0.0			0.0		

*- : LCS and/or LCSD is outside acceptance l
*+ : LCS and/or LCSD is outside acceptance
J : Result is less than the RL but greater tha
U : Indicates the analyte was analyzed for b

VPB Groundwater Sample Analytical Results
Northrop Grumman-Bethpage Facility/Naval Weapons Industrial Reserve Plant
Nassau County, New York

Client ID			**TB-20211008**
Lab Sample ID			460-244662-3
Sampling Date			10/08/2021 13:45:00
Matrix			Water
Dilution Factor			1
Unit			ug/l
	Result	Q	MDL
WATER BY 8260D			
1,1,1-Trichloroethane	0.24	U	0.24
1,1,2,2-Tetrachloroethane	0.37	U	0.37
1,1,2-Trichloro-1,2,2-trifluoroethane	0.31	U	0.31
1,1,2-Trichloroethane	0.20	U	0.20
1,1-Dichloroethane	0.26	U	0.26
1,1-Dichloroethene	0.26	U	0.26
1,2,4-Trichlorobenzene	0.37	U	0.37
1,2-Dibromo-3-Chloropropane	0.38	U	0.38
1,2-Dichlorobenzene	0.21	U	0.21
1,2-Dichloroethane	0.43	U	0.43
1,2-Dichloropropane	0.35	U	0.35
1,3-Dichlorobenzene	0.34	U	0.34
1,4-Dichlorobenzene	0.33	U	0.33
2-Butanone (MEK)	1.9	U	1.9
2-Hexanone	1.1	U	1.1
4-Methyl-2-pentanone (MIBK)	1.3	U	1.3
Acetone	4.4	U	4.4
Benzene	0.20	U	0.20
Bromoform	0.54	U	0.54
Bromomethane	0.55	U *+	0.55
Carbon disulfide	0.82	U	0.82
Carbon tetrachloride	0.21	U	0.21
Chlorobenzene	0.38	U	0.38
Chlorodibromomethane	0.28	U	0.28
Chloroethane	0.32	U	0.32
Chloroform	0.33	U	0.33
Chloromethane	0.40	U	0.40
cis-1,2-Dichloroethene	0.22	U	0.22
cis-1,3-Dichloropropene	0.22	U	0.22
Cyclohexane	0.32	U	0.32
Dichlorobromomethane	0.34	U	0.34
Dichlorodifluoromethane	0.31	U	0.31
Ethylbenzene	0.30	U	0.30
Ethylene Dibromide	0.50	U	0.50
Isopropylbenzene	0.34	U	0.34
Methyl acetate	0.79	U	0.79
Methyl tert-butyl ether	0.22	U	0.22
Methylcyclohexane	0.71	U	0.71
Methylene Chloride	0.32	U	0.32
m-Xylene & p-Xylene	0.30	U	0.30
o-Xylene	0.36	U	0.36
Styrene	0.42	U	0.42
Tetrachloroethene	0.25	U	0.25
Toluene	0.38	U	0.38
trans-1,2-Dichloroethene	0.24	U	0.24
trans-1,3-Dichloropropene	0.22	U	0.22
Trichloroethene	0.31	U	0.31
Trichlorofluoromethane	0.32	U	0.32
Vinyl chloride	0.17	U	0.17
Xylenes, Total	0.65	U	0.65
Total Conc	0.0		

*- : LCS and/or LCSD is outside acceptance l
*+ : LCS and/or LCSD is outside acceptance
J : Result is less than the RL but greater tha
U : Indicates the analyte was analyzed for b

VPB Groundwater Sample Analytical Results
Northrop Grumman-Bethpage Facility/Naval Weapons Industrial Reserve Plant
Nassau County, New York

Client ID	NY 703.6 Table 3	DECHCO5-VPB03-GW-820-822-0			DECHCO5-VPB03-GW-840-842-0			TB-20211210			DECHC05-VPB03-GW-860-862			TB-20211213			DECHC05-VPB03-GW-890-892-0			DECHC05-VPB03-GW-900-902-0			DECHC05-VPB03-GW-920-922		
Lab Sample ID	GW Discharge to	460-248847-2			460-248847-1			460-248847-3			460-249025-1			460-249025-2			460-249099-1			460-249099-2			460-249099-3		
Sampling Date	Class GA Waters	12/10/2021 13:30:00			12/10/2021 10:20:00			12/10/2021 11:15:00			12/10/2021 12:45:00			12/10/2021 12:45:00			12/13/2021 13:15:00			12/14/2021 15:30:00			12/14/2021 12:30:00		
Matrix		Water			Water			Water			Water			Water			Water			Water			Water		
Dilution Factor		1			1			1			1			1			1			1			1		
Unit	ug/l	ug/l			ug/l			ug/l			ug/l			ug/l			ug/l			ug/l			ug/l		
		Result	Q	MDL	Result	Q	MDL	Result	Q	MDL	Result	Q	MDL	Result	Q	MDL	Result	Q	MDL	Result	Q	MDL	Result	Q	MDL
WATER BY 8260D																									
1,1,1-Trichloroethane	NA	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	NR	U	0.24
1,1,2,2-Tetrachloroethane	NA	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37	NR	U	0.37
1,1,2-Trichloro-1,2,2-trifluoroethane	NA	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	NR	U	0.31
1,1,2-Trichloroethane	1	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	NR	U	0.20
1,1-Dichloroethane	NA	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	NR	U	0.26
1,1-Dichloroethene	NA	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	NR	U	0.26
1,2,4-Trichlorobenzene	NA	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37	NR	U	0.37
1,2-Dibromo-3-Chloropropane	0.04	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	NR	U	0.38
1,2-Dichlorobenzene	3	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	NR	U	0.21
1,2-Dichloroethane	0.6	0.43	U	0.43	0.43	U	0.43	0.43	U	0.43	0.43	U	0.43	0.43	U	0.43	0.43	U	0.43	0.43	U	0.43	NR	U	0.43
1,2-Dichloropropane	1	0.35	U	0.35	0.35	U	0.35	0.35	U	0.35	0.35	U	0.35	0.35	U	0.35	0.35	U	0.35	0.35	U	0.35	NR	U	0.35
1,3-Dichlorobenzene	3	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	NR	U	0.34
1,4-Dichlorobenzene	3	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	NR	U	0.33
2-Butanone (MEK)	NA	1.9	U	1.9	1.9	U	1.9	1.9	U	1.9	1.9	U	1.9	1.9	U	1.9	1.9	U	1.9	1.9	U	1.9	NR	U	1.9
2-Hexanone	NA	1.1	U	1.1	1.1	U	1.1	1.1	U	1.1	1.1	U	1.1	1.1	U	1.1	1.1	U	1.1	1.1	U	1.1	NR	U	1.1
4-Methyl-2-pentanone (MIBK)	NA	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	NR	U	1.3
Acetone	NA	7.1		4.4	10		4.4	4.4	U	4.4	5.4		4.4	4.4	U	4.4	8.6		4.4	6.5		4.4	NR	U	4.4
Benzene	1	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	NR	U	0.20
Bromoform	NA	0.54	U	0.54	0.54	U	0.54	0.54	U	0.54	0.54	U	0.54	0.54	U	0.54	0.54	U	0.54	0.54	U	0.54	NR	U	0.54
Bromomethane	NA	0.55	U	0.55	0.55	U	0.55	0.55	U	0.55	0.55	U *+	0.55	0.55	U	0.55	0.55	U	0.55	0.55	U	0.55	NR	U	0.55
Carbon disulfide	120	0.82	U	0.82	0.82	U	0.82	0.82	U	0.82	0.82	U	0.82	0.82	U	0.82	0.82	U	0.82	0.82	U	0.82	NR	U	0.82
Carbon tetrachloride	5	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	NR	U	0.21
Chlorobenzene	NA	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	NR	U	0.38
Chlorodibromomethane	NA	0.28	U	0.28	0.28	U	0.28	0.28	U	0.28	0.28	U	0.28	0.28	U	0.28	0.28	U	0.28	0.28	U	0.28	NR	U	0.28
Chloroethane	NA	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U *+	0.32	0.32	U *+	0.32	0.32	U	0.32	0.32	U	0.32	NR	U	0.32
Chloroform	7	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	NR	U	0.33
Chloromethane	NA	0.40	U	0.40	0.40	U	0.40	0.40	U	0.40	0.40	U	0.40	0.40	U	0.40	0.40	U	0.40	0.40	U	0.40	NR	U	0.40
cis-1,2-Dichloroethene	NA	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	NR	U	0.22
cis-1,3-Dichloropropene	NA	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	NR	U	0.22
Cyclohexane	NA	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	NR	U	0.32
Dichlorobromomethane	NA	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	NR	U	0.34
Dichlorodifluoromethane	NA	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	NR	U	0.31
Ethylbenzene	NA	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	NR	U	0.30
Ethylene Dibromide	0.0006	0.50	U	0.50	0.50	U	0.50	0.50	U	0.50	0.50	U	0.50	0.50	U	0.50	0.50	U	0.50	0.50	U	0.50	NR	U	0.50
Isopropylbenzene	NA	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	NR	U	0.34
Methyl acetate	NA	0.79	U	0.79	0.79	U	0.79	0.79	U	0.79	0.79	U	0.79	0.79	U	0.79	0.79	U	0.79	0.79	U	0.79	NR	U	0.79
Methyl tert-butyl ether	NA	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	NR	U	0.22
Methylcyclohexane	NA	0.71	U	0.71	0.71	U	0.71	0.71	U	0.71	0.71	U	0.71	0.71	U	0.71	0.71	U	0.71	0.71	U	0.71	NR	U	0.71
Methylene Chloride	5	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	NR	U	0.32
m-Xylene & p-Xylene	NA	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	NR	U	0.30
o-Xylene	NA	0.36	U	0.36	0.36	U	0.36	0.36	U	0.36	0.36	U	0.36	0.36	U	0.36	0.36	U	0.36	0.36	U	0.36	NR	U	0.36
Styrene	5	0.42	U	0.42	0.42	U	0.42	0.42	U	0.42	0.42	U	0.42	0.42	U	0.42	0.42	U	0.42	0.42	U	0.42	NR	U	0.42
Tetrachloroethene	NA	0.25	U	0.25	0.25	U	0.25	0.25	U	0.25	0.25	U	0.25	0.25	U	0.25	0.25	U	0.25	0.25	U	0.25	NR	U	0.25
Toluene	NA	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	NR	U	0.38
trans-1,2-Dichloroethene	NA	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	NR	U	0.24
trans-1,3-Dichloropropene	NA	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	NR	U	0.22
Trichloroethene	5	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	NR	U	0.31
Trichlorofluoromethane	NA	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U *+	0.32	0.32	U *+	0.32	0.32	U	0.32	0.32	U	0.32	NR	U	0.32
Vinyl chloride	2	0.17	U	0.17	0.17	U	0.17	0.17	U	0.17	0.17	U	0.17	0.17	U	0.17	0.17	U	0.17	0.17	U	0.17	NR	U	0.17
Xylenes, Total	NA	0.65	U	0.65	0.65	U	0.65	0.65	U	0.65	0.65	U	0.65	0.65	U	0.65	0.65	U	0.65	0.65	U	0.65	NR	U	0.65
Total Conc	NA	7.1			10.0			0.0			5.4			0.0			8.6			6.5			NR		

U : Indicates the analyte was analyzed for but not detected.

NR : Sample not analyzed by laboratory due to sediment content.

VPB Groundwater Sample Analytical Results
Northrop Grumman-Bethpage Facility/Naval Weapons Industrial Reserve Plant
Nassau County, New York

Client ID	DECHC05-VPB03-GW-940-942			TB-20211214			DECHC05-VPB03-GW-960-962-0			DECHC05-VPB03-GW-980-982-0			TB-20211215			EB-20211215			FB-20211215		
Lab Sample ID	460-249099-4			460-249099-5			460-249199-1			460-249199-2			460-249199-3			460-249199-4			460-249199-5		
Sampling Date	12/14/2021 12:30:00			12/14/2021 00:00:00			12/14/2021 15:15			12/15/2021 10:45:00			12/15/2021 00:00:00			12/15/2021 12:00:00			12/15/2021 12:00:00		
Matrix	Water			Water			Water			Water			Water			Water			Water		
Dilution Factor	1			1			1			1			1			1			1		
Unit	ug/l			ug/l			ug/l			ug/l			ug/l			ug/l			ug/l		
	Result	Q	MDL	Result	Q	MDL	Result	Q	MDL	Result	Q	MDL	Result	Q	MDL	Result	Q	MDL	Result	Q	MDL
WATER BY 8260D																					
1,1,1-Trichloroethane	0.24	U	0.24	0.24	U	0.24	NR	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24
1,1,2,2-Tetrachloroethane	0.37	U	0.37	0.37	U	0.37	NR	U	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37
1,1,2-Trichloro-1,2,2-trifluoroethane	0.31	U	0.31	0.31	U	0.31	NR	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31
1,1,2-Trichloroethane	0.20	U	0.20	0.20	U	0.20	NR	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20
1,1-Dichloroethane	0.26	U	0.26	0.26	U	0.26	NR	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26
1,1-Dichloroethene	0.26	U	0.26	0.26	U	0.26	NR	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26
1,2,4-Trichlorobenzene	0.37	U	0.37	0.37	U	0.37	NR	U	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37	0.37	U	0.37
1,2-Dibromo-3-Chloropropane	0.38	U	0.38	0.38	U	0.38	NR	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38
1,2-Dichlorobenzene	0.21	U	0.21	0.21	U	0.21	NR	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21
1,2-Dichloroethane	0.43	U	0.43	0.43	U	0.43	NR	U	0.43	0.43	U	0.43	0.43	U	0.43	0.43	U	0.43	0.43	U	0.43
1,2-Dichloropropane	0.35	U	0.35	0.35	U	0.35	NR	U	0.35	0.35	U	0.35	0.35	U	0.35	0.35	U	0.35	0.35	U	0.35
1,3-Dichlorobenzene	0.34	U	0.34	0.34	U	0.34	NR	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34
1,4-Dichlorobenzene	0.33	U	0.33	0.33	U	0.33	NR	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33
2-Butanone (MEK)	1.9	U	1.9	1.9	U	1.9	NR	U	1.9	4.3	J	1.9	1.9	U	1.9	1.9	U	1.9	1.9	U	1.9
2-Hexanone	1.1	U	1.1	1.1	U	1.1	NR	U	1.1	1.1	U	1.1	1.1	U	1.1	1.1	U	1.1	1.1	U	1.1
4-Methyl-2-pentanone (MIBK)	1.3	U	1.3	1.3	U	1.3	NR	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3
Acetone	4.4	U	4.4	4.4	U	4.4	NR	U	4.4	16		4.4	4.4	U	4.4	4.4	U	4.4	4.4	U	4.4
Benzene	0.20	U	0.20	0.20	U	0.20	NR	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20
Bromoform	0.54	U	0.54	0.54	U	0.54	NR	U	0.54	0.54	U	0.54	0.54	U	0.54	0.54	U	0.54	0.54	U	0.54
Bromomethane	0.55	U	0.55	0.55	U	0.55	NR	U	0.55	0.55	U	0.55	0.55	U	0.55	0.55	U	0.55	0.55	U	0.55
Carbon disulfide	0.82	U	0.82	0.82	U	0.82	NR	U	0.82	0.82	U	0.82	0.82	U	0.82	0.82	U	0.82	0.82	U	0.82
Carbon tetrachloride	0.21	U	0.21	0.21	U	0.21	NR	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21
Chlorobenzene	0.38	U	0.38	0.38	U	0.38	NR	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38
Chlorodibromomethane	0.28	U	0.28	0.28	U	0.28	NR	U	0.28	0.28	U	0.28	0.28	U	0.28	0.28	U	0.28	0.28	U	0.28
Chloroethane	0.32	U	0.32	0.32	U	0.32	NR	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32
Chloroform	0.33	U	0.33	0.33	U	0.33	NR	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33	0.33	U	0.33
Chloromethane	0.40	U	0.40	0.40	U	0.40	NR	U	0.40	0.40	U	0.40	0.40	U	0.40	0.40	U	0.40	0.40	U	0.40
cis-1,2-Dichloroethene	0.22	U	0.22	0.22	U	0.22	NR	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22
cis-1,3-Dichloropropene	0.22	U	0.22	0.22	U	0.22	NR	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22
Cyclohexane	0.32	U	0.32	0.32	U	0.32	NR	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32
Dichlorobromomethane	0.34	U	0.34	0.34	U	0.34	NR	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34
Dichlorodifluoromethane	0.31	U	0.31	0.31	U	0.31	NR	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31
Ethylbenzene	0.30	U	0.30	0.30	U	0.30	NR	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30
Ethylene Dibromide	0.50	U	0.50	0.50	U	0.50	NR	U	0.50	0.50	U	0.50	0.50	U	0.50	0.50	U	0.50	0.50	U	0.50
Isopropylbenzene	0.34	U	0.34	0.34	U	0.34	NR	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34	0.34	U	0.34
Methyl acetate	0.79	U	0.79	0.79	U	0.79	NR	U	0.79	0.79	U	0.79	0.79	U	0.79	0.79	U	0.79	0.79	U	0.79
Methyl tert-butyl ether	0.22	U	0.22	0.22	U	0.22	NR	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22
Methylcyclohexane	0.71	U	0.71	0.71	U	0.71	NR	U	0.71	0.71	U	0.71	0.71	U	0.71	0.71	U	0.71	0.71	U	0.71
Methylene Chloride	0.32	U	0.32	0.32	U	0.32	NR	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32
m-Xylene & p-Xylene	0.30	U	0.30	0.30	U	0.30	NR	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30	0.30	U	0.30
o-Xylene	0.36	U	0.36	0.36	U	0.36	NR	U	0.36	0.36	U	0.36	0.36	U	0.36	0.36	U	0.36	0.36	U	0.36
Styrene	0.42	U	0.42	0.42	U	0.42	NR	U	0.42	0.42	U	0.42	0.42	U	0.42	0.42	U	0.42	0.42	U	0.42
Tetrachloroethene	0.25	U	0.25	0.25	U	0.25	NR	U	0.25	0.25	U	0.25	0.25	U	0.25	0.25	U	0.25	0.25	U	0.25
Toluene	0.38	U	0.38	0.38	U	0.38	NR	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38	0.38	U	0.38
trans-1,2-Dichloroethene	0.24	U	0.24	0.24	U	0.24	NR	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24
trans-1,3-Dichloropropene	0.22	U	0.22	0.22	U	0.22	NR	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22
Trichloroethene	0.31	U	0.31	0.31	U	0.31	NR	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31
Trichlorofluoromethane	0.32	U	0.32	0.32	U	0.32	NR	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32
Vinyl chloride	0.17	U	0.17	0.17	U	0.17	NR	U	0.17	0.17	U	0.17	0.17	U	0.17	0.17	U	0.17	0.17	U	0.17
Xylenes, Total	0.65	U	0.65	0.65	U	0.65	NR	U	0.65	0.65	U	0.65	0.65	U	0.65	0.65	U	0.65	0.65	U	0.65
Total Conc	0.0			0.0			NR			20.3			0.0			0.0			0.0		

U : Indicates the analyte was analyzed for b

NR : Sample not analyzed by laboratory due

ATTACHMENT 5

Data Usability Summary Report

DATA USABILITY SUMMARY REPORT

Northrop Grumman WA52
(April, May and June 2021 Sampling)

Chemical Analyses Performed by:

Eurofins TestAmerica,Edison, NJ

Prepared by

ENVIRONMENTAL DATA SERVICES, LTD.

Prepared for

HDR

Report Released August 9, 2021

5 Brilliant Avenue, Pittsburgh, PA 15215
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ENVIRONMENTAL DATA SERVICES, LTD.

DATA USABILITY SUMMARY REPORT FOR VOLATILES

PROJECT: Northrop Grumman

CLIENT: HDR

LABORATORY: Eurofins TestAmerica, Edison

SAMPLE DELIVERY GROUP: J223019-1

SAMPLE DATES: April 27, 2021

The above sample delivery group (SDG) consists of the following samples:

Sample Identification	Laboratory Identification
DECHC05-VPB01-GW-600-602-0-20210427	460-233019-1
DECHC05-TB-20210427-20210427	460-233019-2

The samples described above were analyzed via USEPA SW-846 8260D to determine the concentrations of low/medium volatile organic analytes (VOAs).

Project specific quality assurance (QA) objectives, as well as the USEPA Region II SOP, Validating Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry SW-846 Method 8260B & 8260C, SOP NO. HW-24 Revision 4, September 2014 have been considered during validation of this data and its usability.

Table 1 provides a summary of major and minor data quality issues identified for this data set. All data are acceptable except those results which have been qualified with “R,” rejected. Data validation qualifiers along with associated descriptions are provided in Table 2. All data qualification related to this group of samples is detailed on the attached sheets.

Per USEPA Region 2 Validation Guidance, “All data users should note two facts. First, the "R" flag means that the associated value is unusable. In other words, due to significant quality control (QC) problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables even as a last resort. The second, no analyte concentration, even if it has passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data, but any value potentially contains error.”

HOLDING TIME/SAMPLE HANDLING

The amount of an analyte in a sample can change with time due to chemical instability, degradation, volatilization, etc. If the specified holding time is exceeded, the data may not be valid. Proper sample handling and preservation also play a role in the chemical stability of analytes in the sample matrix. If samples are not collected and stored using proper containers and/or preservatives, data may not be valid.

The samples in this delivery group were received by the laboratory within the proper temperature range as specified in the validation guidance.

The samples in this delivery group were prepared and analyzed within the holding time specified in the validation guidelines.

BLANK CONTAMINATION

Quality assurance blanks include method, storage, trip, field, or rinse blanks. Blanks are prepared to identify any contamination, which may have been introduced into the samples during preparation and analysis or field activity. Method and storage blanks measure laboratory contamination. Trip blanks measure cross contamination during shipment. Field and rinse blanks measure cross contamination during field operations.

Method Blanks

Method blanks were prepared and analyzed in association with the samples in this delivery group at the specified frequency. Upon examination of method blank data, no analyte was positively identified at a concentration equal to or above the method detection limit (MDL) in any associated method blank.

Storage Blanks

No storage blanks were submitted in association with this SDG.

Trip Blanks

Trip blank DECHC05-TB-20210427 was submitted in association with all samples in this SDG. Methylene chloride was positively identified in the trip blank. All associated samples were evaluated per validation guidance and no qualification was determined to be necessary on this basis.

Field Blanks

No samples were submitted as field blanks in association with this SDG.

MASS SPECTROMETER TUNING

Tuning and performance criteria are established to ensure adequate mass resolution, proper identification of compounds, and to some degree, sufficient instrument sensitivity. These criteria are not sample specific. Instrument performance is determined using standard materials. Therefore, these criteria should be met in all circumstances.

The tuning standard for volatiles is bromofluorobenzene (BFB).

All tunes associated with this SDG were fully compliant.

CALIBRATION

Satisfactory instrument calibration is established to ensure that the instrument is capable of producing acceptable quantitative results. The initial calibration curve demonstrates that the instrument is capable of giving acceptable performance at the beginning of an analytical sequence. The continuing calibration verifies that the instrument is continuing to provide satisfactory daily performance. Additionally, a continuing calibration is analyzed at the end of each 12-hour analytical sequence, denoted as a “closing” calibration verification, and ascertains acceptable performance at the conclusion of the analytical sequence.

Response Factor

The relative response factor (RRF) measures the instruments responses to specific chemical compounds. The RRFs for the VOA target compound list (TCL) compounds must be greater than the RRFs listed in Region II validation guidelines. A value less than the respective criteria indicates serious detection and quantitation problems. If the mean RRF of the initial calibration or the continuing calibration RRF is below the specified limit for any analyte, those analytes detected in environmental samples will be qualified as estimated. All non-detects for those analytes will be rejected.

The RRF values in all initial and continuing calibrations for method 8260D were found to be acceptable in all cases.

Percent Relative Standard Deviation and Percent Deviation

Percent relative standard deviation (%RSD) is calculated from the initial calibration and is used to indicate stability of a specific compound over the calibration range. Percent deviation (%D) compares the response factor of the continuing calibration with the mean response factor of the initial calibration. Therefore, %D is a measure of the instrument’s daily performance.

The following QC criteria have been applied for this project:

The %RSD of initial calibration must be ≤20%.

A %RSD value outside initial calibration limit indicates the potential for quantitation errors. For this reason, all positive results are qualified as estimated and non-detect results are qualified using professional judgement.

The %D for opening continuing calibration must be ≤30%.

A value outside these limits indicates the potential for detection and quantitation errors. For these reasons, all positive results are qualified as “J,” estimated, and non-detects are qualified with "UJ."

All initial calibration and continuing calibration %RSD and %D values were within defined QC criteria.

Please note, the laboratory did not perform closing continuing calibration verifications. Therefore, those criteria were not evaluated during validation. No qualification was applied on this basis.

INTERNAL STANDARDS PERFORMANCE

Internal standard performance criteria are meant to ensure that the gas chromatography/mass spectrometry (GC/MS) sensitivity and response are stable during every experimental run.

The internal standard area count must not vary by more than a factor of two from the associated continuing calibration standard. The retention time of the internal standard must not vary by more than +/- 30 seconds from the associated continuing calibration standard. The area count must be within -50% to +200% range of the associated standard. If area count is >200%, non-detected results are not qualified while positive results associated with the non-compliant internal standard are qualified "J," estimated. However, when an observed area count is <50%, positive results associated with the non-compliant are qualified "J," estimated, while non-detected results are rejected.

Internal standard area counts are within acceptance criteria for all samples.

SURROGATES

All samples are spiked with surrogate compounds prior to sample preparation and analyses to evaluate overall laboratory performance and efficiency of the analytical technique. The observed recovery must be within laboratory limits as outlined in the project specific validation guidance.

The reported sample analyses and method blank analyses had observed surrogate recoveries within the established acceptance limits in all cases.

COMPOUND IDENTIFICATION

Volatile

The project target analyte compounds are identified on the GC/MS by using the analytes relative retention time (RRT) and ion spectra. For the results to be a positive hit, the sample peak must be within $\pm$0.06 RRT units of the standard compound and have ion spectra which has a ratio of the primary and secondary ion intensities within 20% of that in the standard compound. In the cases where there is not an adequate ion spectrum match, the laboratory may have provided false positive identifications.

All samples were evaluated, and all identification criteria were met. Therefore, no analytes were qualified for compound identification.

Volatile Tentatively Identified Compounds

Tentatively Identified Compounds (TICs) were reported by the laboratory and reviewed for quality assurance. For all TIC results where there is presumptive evidence of a match, being greater than or equal to 85% match, the results are qualified “NJ,” tentatively identified. If the non-target compound is reported as an unknown, the result is qualified “J,” estimated. Likewise, if it is determined that the identification of a TIC is unacceptable, the tentative identification of the compound is changed to “unknown” and the result is qualified “J,” estimated.

Volatile TICs were not reported.

MATRIX SPIKE/MATRIX SPIKE DUPLICATE

The matrix spike and matrix spike duplicate (MS/MSD) are generated to determine the precision and accuracy of the analytical procedure in a given sample matrix.

No samples were submitted for MS/MSD evaluations in association with this SDG.

LABORATORY CONTROL SAMPLE/LABORATORY CONTROL SAMPLE DUPLICATE

The Laboratory Control Sample (LCS) is spiked with the same analytes at the same concentrations as the matrix spike. The LCS results are used to verify that the laboratory can perform the analysis in a clean matrix.

LCS evaluations were processed at the proper frequency. Upon evaluation of precision and accuracy criteria no issues were noted that would require qualification of sample results.

REPORTING

Dilutions, re-extractions, and other re-analyses were not present in the laboratory data package.

OTHER QUALITY CONTROL DATA OUT OF SPECIFICATION

None.

FIELD DUPLICATE

Field duplicates are two (or more) field samples collected at the same time in the same location. Each of the samples represents the same population and is carried through all steps of the sampling and analytical procedures in an identical manner. Field duplicate results are used to assess precision of the total method, including sampling, analysis, and site heterogeneity.

No samples were submitted as a field duplicate pair in association with this SDG.

SYSTEM PERFORMANCE AND OVERALL ASSESSMENT

Overall the laboratory data generated met the project goals and quality control criteria, with the exceptions identified in this report and as summarized in Table 1.

Table 1
Review Elements Summary

	Were acceptance criteria met?		
	Yes	No	
Volatiles		**Major**	**Minor**
Holding Time	x		
Method Blanks	x		
Storage Blanks	NA		
Trip Blanks	x		
Field Blanks	x		
Mass Spectrometer Tuning	x		
Calibration Response Factor	x		
Calibration Percent Relative Standard Deviation and Percent Difference	x		
Internal Standards	x		
Surrogates	x		
Compound Identification - Volatile	x		
Tentatively Identified Compounds - Volatile	NA		
Matrix Spike/Matrix Spike Duplicate	NA		
Laboratory Control Sample/Laboratory Control Sample Duplicate	x		
Other Quality Control Data out of Specification	x		
Field Duplicate	NA		

Major= Major data quality issue identified resulting in rejection of data.
Minor= Minor data quality issue identified resulting in the qualification of data. Data qualification should be used to inform the data users of data limitations.
NA = Not applicable

Table 2
Data Validation Qualifiers

Data Qualifier	Definition
U	The analyte was analyzed for but was not detected above the level of the reported sample quantitation limit.
J	The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
J+	The result is an estimated quantity, but the result may be biased high.
J-	The result is an estimated quantity, but the result may be biased low.
NJ	The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.
UJ	The analyte was analyzed for but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.
R	The data are unusable. The sample results are rejected due to serious deficiencies in meeting Quality Control (QC) criteria. The analyte may or may not be present in the sample.

ENVIRONMENTAL DATA SERVICES, LTD.

DATA USABILITY SUMMARY REPORT FOR VOLATILES

PROJECT: Northrop Grumman

CLIENT: HDR

LABORATORY: Eurofins TestAmerica, Edison

SAMPLE DELIVERY GROUP: J223112-1

SAMPLE DATES: April 28, 2021

The above sample delivery group (SDG) consists of the following samples:

Sample Identification	Laboratory Identification
DECHC05-VPB01-GW-620-622-0	460-233112-1
DECHC05-VPB01-GW-620-622-1	460-233112-2
DECHC05-TB-20210428	460-233112-3

The samples described above were analyzed via USEPA SW-846 8260D to determine the concentrations of low/medium volatile organic analytes (VOAs).

Project specific quality assurance (QA) objectives, as well as the USEPA Region II SOP, Validating Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry SW-846 Method 8260B & 8260C, SOP NO. HW-24 Revision 4, September 2014 have been considered during validation of this data and its usability.

Table 1 provides a summary of major and minor data quality issues identified for this data set. All data are acceptable except those results which have been qualified with “R,” rejected. Data validation qualifiers along with associated descriptions are provided in Table 2. All data qualification related to this group of samples is detailed on the attached sheets.

Per USEPA Region 2 Validation Guidance, “All data users should note two facts. First, the "R" flag means that the associated value is unusable. In other words, due to significant quality control (QC) problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables even as a last resort. The second, no analyte concentration, even if it has passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data, but any value potentially contains error.”

HOLDING TIME/SAMPLE HANDLING

The amount of an analyte in a sample can change with time due to chemical instability, degradation, volatilization, etc. If the specified holding time is exceeded, the data may not be valid. Proper sample handling and preservation also play a role in the chemical stability of analytes in the sample matrix. If samples are not collected and stored using proper containers and/or preservatives, data may not be valid.

The samples in this delivery group were received by the laboratory within the proper temperature range as specified in the validation guidance.

The samples in this delivery group were prepared and analyzed within the holding time specified in the validation guidelines.

Sample identifications listed on the chain of custody were different than reported by the laboratory. Validation was conducted using laboratory reported sample identifications.

BLANK CONTAMINATION

Quality assurance blanks include method, storage, trip, field, or rinse blanks. Blanks are prepared to identify any contamination, which may have been introduced into the samples during preparation and analysis or field activity. Method and storage blanks measure laboratory contamination. Trip blanks measure cross contamination during shipment. Field and rinse blanks measure cross contamination during field operations.

Method Blanks

Method blanks were prepared and analyzed in association with the samples in this delivery group at the specified frequency. Upon examination of method blank data, no analyte was positively identified at a concentration equal to or above the method detection limit (MDL) in any associated method blank.

Storage Blanks

No storage blanks were submitted in association with this SDG.

Trip Blanks

Trip blank DECHC05-TB-20210428 was submitted in association with all samples in this SDG. Methylene chloride was positively identified in the trip blank. All associated samples were evaluated per validation guidance and no qualification was determined to be necessary on this basis.

Field Blanks

No samples were submitted as field blanks in association with this SDG.

MASS SPECTROMETER TUNING

Tuning and performance criteria are established to ensure adequate mass resolution, proper identification of compounds, and to some degree, sufficient instrument sensitivity. These criteria are not sample specific. Instrument performance is determined using standard materials. Therefore, these criteria should be met in all circumstances.

The tuning standard for volatiles is bromofluorobenzene (BFB).

All tunes associated with this SDG were fully compliant.

CALIBRATION

Satisfactory instrument calibration is established to ensure that the instrument is capable of producing acceptable quantitative results. The initial calibration curve demonstrates that the instrument is capable of giving acceptable performance at the beginning of an analytical sequence. The continuing calibration verifies that the instrument is continuing to provide satisfactory daily performance. Additionally, a continuing calibration is analyzed at the end of each 12-hour analytical sequence, denoted as a “closing” calibration verification, and ascertains acceptable performance at the conclusion of the analytical sequence.

Response Factor

The relative response factor (RRF) measures the instruments responses to specific chemical compounds. The RRFs for the VOA target compound list (TCL) compounds must be greater than the RRFs listed in Region II validation guidelines. A value less than the respective criteria indicates serious detection and quantitation problems. If the mean RRF of the initial calibration or the continuing calibration RRF is below the specified limit for any analyte, those analytes detected in environmental samples will be qualified as estimated. All non-detects for those analytes will be rejected.

The RRF values in all initial and continuing calibrations were found to be acceptable in all cases.

Percent Relative Standard Deviation and Percent Deviation

Percent relative standard deviation (%RSD) is calculated from the initial calibration and is used to indicate stability of a specific compound over the calibration range. Percent deviation (%D) compares the response factor of the continuing calibration with the mean response factor of the initial calibration. Therefore, %D is a measure of the instrument’s daily performance.

The following QC criteria have been applied for this project:

The %RSD of initial calibration must be ≤20%.

A %RSD value outside initial calibration limit indicates the potential for quantitation errors. For this reason, all positive results are qualified as estimated and non-detect results are qualified using professional judgement.

The %D for opening continuing calibration must be ≤30%.

A value outside these limits indicates the potential for detection and quantitation errors. For these reasons, all positive results are qualified as “J,” estimated, and non-detects are qualified with "UJ."

All initial calibration and continuing calibration %RSD and %D values were within defined QC criteria.

Please note, the laboratory did not perform closing continuing calibration verifications. Therefore, those criteria were not evaluated during validation. No qualification was applied on this basis.

INTERNAL STANDARDS PERFORMANCE

Internal standard performance criteria are meant to ensure that the gas chromatography/mass spectrometry (GC/MS) sensitivity and response are stable during every experimental run.

The internal standard area count must not vary by more than a factor of two from the associated continuing calibration standard. The retention time of the internal standard must not vary by more than +/- 30 seconds from the associated continuing calibration standard. The area count must be within -50% to +200% range of the associated standard. If area count is >200%, non-detected results are not qualified while positive results associated with the non-compliant internal standard are qualified "J," estimated. However, when an observed area count is <50%, positive results associated with the non-compliant are qualified "J," estimated, while non-detected results are rejected.

Internal standard area counts are within acceptance criteria for all samples.

SURROGATES

All samples are spiked with surrogate compounds prior to sample preparation and analyses to evaluate overall laboratory performance and efficiency of the analytical technique. The observed recovery must be within laboratory limits as outlined in the project specific validation guidance.

The reported sample analyses and method blank analyses had observed surrogate recoveries within the established acceptance limits in all cases.

COMPOUND IDENTIFICATION

Volatile

The project target analyte compounds are identified on the GC/MS by using the analytes relative retention time (RRT) and ion spectra. For the results to be a positive hit, the sample peak must be within $\pm$0.06 RRT units of the standard compound and have ion spectra which has a ratio of the primary and secondary ion intensities within 20% of that in the standard compound. In the cases where there is not an adequate ion spectrum match, the laboratory may have provided false positive identifications.

All samples were evaluated, and all identification criteria were met. Therefore, no analytes were qualified for compound identification.

Volatile Tentatively Identified Compounds

Tentatively Identified Compounds (TICs) were reported by the laboratory and reviewed for quality assurance. For all TIC results where there is presumptive evidence of a match, being greater than or equal to 85% match, the results are qualified “NJ,” tentatively identified. If the non-target compound is reported as an unknown, the result is qualified “J,” estimated. Likewise, if it is determined that the identification of a TIC is unacceptable, the tentative identification of the compound is changed to “unknown” and the result is qualified “J,” estimated.

Volatile TICs were not reported.

MATRIX SPIKE/MATRIX SPIKE DUPLICATE

The matrix spike and matrix spike duplicate (MS/MSD) are generated to determine the precision and accuracy of the analytical procedure in a given sample matrix.

No samples were submitted for MS/MSD evaluations in association with this SDG.

LABORATORY CONTROL SAMPLE/LABORATORY CONTROL SAMPLE DUPLICATE

The Laboratory Control Sample (LCS) is spiked with the same analytes at the same concentrations as the matrix spike. The LCS results are used to verify that the laboratory can perform the analysis in a clean matrix.

LCS evaluations were processed at the proper frequency. Upon evaluation of precision and accuracy criteria no issues were noted that would require qualification of sample results.

REPORTING

Dilutions, re-extractions, and other re-analyses were not present in the laboratory data package.

OTHER QUALITY CONTROL DATA OUT OF SPECIFICATION

None.

FIELD DUPLICATE

Field duplicates are two (or more) field samples collected at the same time in the same location. Each of the samples represents the same population and is carried through all steps of the sampling and analytical procedures in an identical manner. Field duplicate results are used to assess precision of the total method, including sampling, analysis, and site heterogeneity.

Samples DECHC05-VPB01-GW-620-622-0 and DECHC05-VPB01-GW-620-622-1 were submitted as field duplicate pair in association with this SDG. Upon evaluation adequate field precision was demonstrated.

SYSTEM PERFORMANCE AND OVERALL ASSESSMENT

Overall the laboratory data generated met the project goals and quality control criteria, with the exceptions identified in this report and as summarized in Table 1.

Table 1
Review Elements Summary

	Were acceptance criteria met?		
	Yes	No	
Volatiles		**Major**	**Minor**
Holding Time	x		
Method Blanks	x		
Storage Blanks	NA		
Trip Blanks	x		
Field Blanks	NA		
Mass Spectrometer Tuning	x		
Calibration Response Factor	x		
Calibration Percent Relative Standard Deviation and Percent Difference	x		
Internal Standards	x		
Surrogates	x		
Compound Identification - Volatile	x		
Tentatively Identified Compounds - Volatile	NA		
Matrix Spike/Matrix Spike Duplicate	NA		
Laboratory Control Sample/Laboratory Control Sample Duplicate	x		
Other Quality Control Data out of Specification	x		
Field Duplicate	x		

Major= Major data quality issue identified resulting in rejection of data.
Minor= Minor data quality issue identified resulting in the qualification of data. Data qualification should be used to inform the data users of data limitations.
NA = Not applicable

Table 2
Data Validation Qualifiers

Data Qualifier	Definition
U	The analyte was analyzed for but was not detected above the level of the reported sample quantitation limit.
J	The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
J+	The result is an estimated quantity, but the result may be biased high.
J-	The result is an estimated quantity, but the result may be biased low.
NJ	The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.
UJ	The analyte was analyzed for but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.
R	The data are unusable. The sample results are rejected due to serious deficiencies in meeting Quality Control (QC) criteria. The analyte may or may not be present in the sample.

ENVIRONMENTAL DATA SERVICES, LTD.

DATA USABILITY SUMMARY REPORT FOR VOLATILES

PROJECT: Northrop Grumman

CLIENT: HDR

LABORATORY: Eurofins TestAmerica, Edison

SAMPLE DELIVERY GROUP: J233268-1

SAMPLE DATES: April 29, 2021

The above sample delivery group (SDG) consists of the following samples:

Sample Identification	Laboratory Identification
DECHC05-VPB01-GW-665-667-0-20210429	460-233268-1
DECHC05-TB-20210429-20210429	460-233268-2

The samples described above were analyzed via USEPA SW-846 8260D to determine the concentrations of low/medium volatile organic analytes (VOAs).

Project specific quality assurance (QA) objectives, as well as the USEPA Region II SOP, Validating Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry SW-846 Method 8260B & 8260C, SOP NO. HW-24 Revision 4, September 2014 have been considered during validation of this data and its usability.

Table 1 provides a summary of major and minor data quality issues identified for this data set. All data are acceptable except those results which have been qualified with “R,” rejected. Data validation qualifiers along with associated descriptions are provided in Table 2. All data qualification related to this group of samples is detailed on the attached sheets.

Per USEPA Region 2 Validation Guidance, “All data users should note two facts. First, the "R" flag means that the associated value is unusable. In other words, due to significant quality control (QC) problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables even as a last resort. The second, no analyte concentration, even if it has passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data, but any value potentially contains error.”

HOLDING TIME/SAMPLE HANDLING

The amount of an analyte in a sample can change with time due to chemical instability, degradation, volatilization, etc. If the specified holding time is exceeded, the data may not be valid. Proper sample handling and preservation also play a role in the chemical stability of analytes in the sample matrix. If samples are not collected and stored using proper containers and/or preservatives, data may not be valid.

The samples in this delivery group were received by the laboratory within the proper temperature range as specified in the validation guidance.

The samples in this delivery group were prepared and analyzed within the holding time specified in the validation guidelines.

BLANK CONTAMINATION

Quality assurance blanks include method, storage, trip, field, or rinse blanks. Blanks are prepared to identify any contamination, which may have been introduced into the samples during preparation and analysis or field activity. Method and storage blanks measure laboratory contamination. Trip blanks measure cross contamination during shipment. Field and rinse blanks measure cross contamination during field operations.

Method Blanks

Method blanks were prepared and analyzed in association with the samples in this delivery group at the specified frequency. Upon examination of method blank data, no analyte was positively identified at a concentration equal to or above the method detection limit (MDL) in any associated method blank.

Storage Blanks

No storage blanks were submitted in association with this SDG.

Trip Blanks

Trip blank DECHC05-TB-20210429 was submitted in association with all samples in this SDG. Methylene chloride was positively identified in the trip blank. All associated samples were evaluated per validation guidance and no qualification was determined to be necessary on this basis.

Field Blanks

No samples were submitted as field blanks in association with this SDG.

MASS SPECTROMETER TUNING

Tuning and performance criteria are established to ensure adequate mass resolution, proper identification of compounds, and to some degree, sufficient instrument sensitivity. These criteria are not sample specific. Instrument performance is determined using standard materials. Therefore, these criteria should be met in all circumstances.

The tuning standard for volatiles is bromofluorobenzene (BFB).

All tunes associated with this SDG were fully compliant.

CALIBRATION

Satisfactory instrument calibration is established to ensure that the instrument is capable of producing acceptable quantitative results. The initial calibration curve demonstrates that the instrument is capable of giving acceptable performance at the beginning of an analytical sequence. The continuing calibration verifies that the instrument is continuing to provide satisfactory daily performance. Additionally, a continuing calibration is analyzed at the end of each 12-hour analytical sequence, denoted as a “closing” calibration verification, and ascertains acceptable performance at the conclusion of the analytical sequence.

Response Factor

The relative response factor (RRF) measures the instruments responses to specific chemical compounds. The RRFs for the VOA target compound list (TCL) compounds must be greater than the RRFs listed in Region II validation guidelines. A value less than the respective criteria indicates serious detection and quantitation problems. If the mean RRF of the initial calibration or the continuing calibration RRF is below the specified limit for any analyte, those analytes detected in environmental samples will be qualified as estimated. All non-detects for those analytes will be rejected.

The RRF values in all initial and continuing calibrations were found to be acceptable in all cases.

Percent Relative Standard Deviation and Percent Deviation

Percent relative standard deviation (%RSD) is calculated from the initial calibration and is used to indicate stability of a specific compound over the calibration range. Percent deviation (%D) compares the response factor of the continuing calibration with the mean response factor of the initial calibration. Therefore, %D is a measure of the instrument’s daily performance.

The following QC criteria have been applied for this project:

The %RSD of initial calibration must be ≤20%.

A %RSD value outside initial calibration limit indicates the potential for quantitation errors. For this reason, all positive results are qualified as estimated and non-detect results are qualified using professional judgement.

The %D for opening continuing calibration must be ≤30%.

A value outside these limits indicates the potential for detection and quantitation errors. For these reasons, all positive results are qualified as “J,” estimated, and non-detects are qualified with "UJ."

All initial calibration and continuing calibration %RSD and %D values were within defined QC criteria with the following exceptions.

The continuing calibration associated with sample DECHC05-VPB01-GW-665-667-0-20210429 exhibited non-compliant %Ds for bromomethane, bromoform, and 1,2-dibromo-3-chloropropane. Results reported for the impacted analytes in the associated sample have been qualified “UJ” on this basis.

The continuing calibration associated with sample DECHC05-TB-20210429-20210429 exhibited a non-compliant %D for bromomethane. The result reported for bromomethane in the associated sample has been qualified “UJ” on this basis.

Please note, the laboratory did not perform closing continuing calibration verifications. Therefore, those criteria were not evaluated during validation. No qualification was applied on this basis.

INTERNAL STANDARDS PERFORMANCE

Internal standard performance criteria are meant to ensure that the gas chromatography/mass spectrometry (GC/MS) sensitivity and response are stable during every experimental run.

The internal standard area count must not vary by more than a factor of two from the associated continuing calibration standard. The retention time of the internal standard must not vary by more than +/- 30 seconds from the associated continuing calibration standard. The area count must be within -50% to +200% range of the associated standard. If area count is >200%, non-detected results are not qualified while positive results associated with the non-compliant internal standard are qualified "J," estimated. However, when an observed area count is <50%, positive results associated with the non-compliant are qualified "J," estimated, while non-detected results are rejected.

Internal standard area counts are within acceptance criteria for all samples.

SURROGATES

All samples are spiked with surrogate compounds prior to sample preparation and analyses to evaluate overall laboratory performance and efficiency of the analytical technique. The observed recovery must be within laboratory limits as outlined in the project specific validation guidance.

The reported sample analyses and method blank analyses had observed surrogate recoveries within the established acceptance limits in all cases.

COMPOUND IDENTIFICATION

Volatile

The project target analyte compounds are identified on the GC/MS by using the analytes relative retention time (RRT) and ion spectra. For the results to be a positive hit, the sample peak must be within $\pm$0.06 RRT units of the standard compound and have ion spectra which has a ratio of the primary and secondary ion intensities within 20% of that in the standard compound. In the cases where there is not an adequate ion spectrum match, the laboratory may have provided false positive identifications.

All samples were evaluated, and all identification criteria were met. Therefore, no analytes were qualified for compound identification.

Volatile Tentatively Identified Compounds

Tentatively Identified Compounds (TICs) were reported by the laboratory and reviewed for quality assurance. For all TIC results where there is presumptive evidence of a match, being greater than or equal to 85% match, the results are qualified “NJ,” tentatively identified. If the non-target compound is reported as an unknown, the result is qualified “J,” estimated. Likewise, if it is determined that the identification of a TIC is unacceptable, the tentative identification of the compound is changed to “unknown” and the result is qualified “J,” estimated.

Volatile TICs were not reported.

MATRIX SPIKE/MATRIX SPIKE DUPLICATE

The matrix spike and matrix spike duplicate (MS/MSD) are generated to determine the precision and accuracy of the analytical procedure in a given sample matrix.

No samples were submitted for MS/MSD evaluations in association with this SDG.

LABORATORY CONTROL SAMPLE/LABORATORY CONTROL SAMPLE DUPLICATE

The Laboratory Control Sample (LCS) is spiked with the same analytes at the same concentrations as the matrix spike. The LCS results are used to verify that the laboratory can perform the analysis in a clean matrix.

LCS evaluations were processed at the proper frequency. Upon evaluation of precision and accuracy criteria no issues were noted that would require qualification of sample results.

REPORTING

Dilutions, re-extractions, and other re-analyses were not present in the laboratory data package.

OTHER QUALITY CONTROL DATA OUT OF SPECIFICATION

None.

FIELD DUPLICATE

Field duplicates are two (or more) field samples collected at the same time in the same location. Each of the samples represents the same population and is carried through all steps of the sampling and analytical procedures in an identical manner. Field duplicate results are used to assess precision of the total method, including sampling, analysis, and site heterogeneity.

No samples were submitted as a field duplicate pair in association with this SDG.

SYSTEM PERFORMANCE AND OVERALL ASSESSMENT

Overall the laboratory data generated met the project goals and quality control criteria, with the exceptions identified in this report and as summarized in Table 1.

Table 1
Review Elements Summary

	Were acceptance criteria met?		
	Yes	No	
Volatiles		**Major**	**Minor**
Holding Time	x		
Method Blanks	x		
Storage Blanks	NA		
Trip Blanks	x		
Field Blanks	NA		
Mass Spectrometer Tuning	x		
Calibration Response Factor	x		
Calibration Percent Relative Standard Deviation and Percent Difference			x
Internal Standards	x		
Surrogates	x		
Compound Identification - Volatile	x		
Tentatively Identified Compounds - Volatile	NA		
Matrix Spike/Matrix Spike Duplicate	NA		
Laboratory Control Sample/Laboratory Control Sample Duplicate	x		
Other Quality Control Data out of Specification	x		
Field Duplicate	NA		

Major= Major data quality issue identified resulting in rejection of data.
Minor= Minor data quality issue identified resulting in the qualification of data. Data qualification should be used to inform the data users of data limitations.
NA = Not applicable

Table 2
Data Validation Qualifiers

Data Qualifier	Definition
U	The analyte was analyzed for but was not detected above the level of the reported sample quantitation limit.
J	The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
J+	The result is an estimated quantity, but the result may be biased high.
J-	The result is an estimated quantity, but the result may be biased low.
NJ	The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.
UJ	The analyte was analyzed for but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.
R	The data are unusable. The sample results are rejected due to serious deficiencies in meeting Quality Control (QC) criteria. The analyte may or may not be present in the sample.

ENVIRONMENTAL DATA SERVICES, LTD.

DATA USABILITY SUMMARY REPORT FOR VOLATILES

PROJECT: Northrop Grumman

CLIENT: HDR

LABORATORY: Eurofins TestAmerica, Edison

SAMPLE DELIVERY GROUP: J233335-1

SAMPLE DATES: April 30, 2021

The above sample delivery group (SDG) consists of the following samples:

Sample Identification	Laboratory Identification
DECHC05-VPB01-GW-680-682-0-20210430	460-233335-1
DECHC05-VPB01-GW-700-702-0-20210430	460-233335-2
DECHCH05-TB 20210430-20210430	460-233335-3
DECHC05-VPB01-GW-720-722-0-20210430	460-233335-4

The samples described above were analyzed via USEPA SW-846 8260D to determine the concentrations of low/medium volatile organic analytes (VOAs).

Project specific quality assurance (QA) objectives, as well as the USEPA Region II SOP, Validating Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry SW-846 Method 8260B & 8260C, SOP NO. HW-24 Revision 4, September 2014 have been considered during validation of this data and its usability.

Table 1 provides a summary of major and minor data quality issues identified for this data set. All data are acceptable except those results which have been qualified with “R,” rejected. Data validation qualifiers along with associated descriptions are provided in Table 2. All data qualification related to this group of samples is detailed on the attached sheets.

Per USEPA Region 2 Validation Guidance, “All data users should note two facts. First, the "R" flag means that the associated value is unusable. In other words, due to significant quality control (QC) problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables even as a last resort. The second, no analyte concentration, even if it has passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data, but any value potentially contains error.”

HOLDING TIME/SAMPLE HANDLING

The amount of an analyte in a sample can change with time due to chemical instability, degradation, volatilization, etc. If the specified holding time is exceeded, the data may not be valid. Proper sample handling and preservation also play a role in the chemical stability of analytes in the sample matrix. If samples are not collected and stored using proper containers and/or preservatives, data may not be valid.

The samples in this delivery group were received by the laboratory within the proper temperature range as specified in the validation guidance.

The samples in this delivery group were prepared and analyzed within the holding time specified in the validation guidelines.

BLANK CONTAMINATION

Quality assurance blanks include method, storage, trip, field, or rinse blanks. Blanks are prepared to identify any contamination, which may have been introduced into the samples during preparation and analysis or field activity. Method and storage blanks measure laboratory contamination. Trip blanks measure cross contamination during shipment. Field and rinse blanks measure cross contamination during field operations.

Method Blanks

Method blanks were prepared and analyzed in association with the samples in this delivery group at the specified frequency. Upon examination of method blank data, no analyte was positively identified at a concentration equal to or above the method detection limit (MDL) in any associated method blank.

Storage Blanks

No storage blanks were submitted in association with this SDG.

Trip Blanks

Trip blank DECHC05-TB-20210430 was submitted in association with all samples in this SDG. Methylene chloride was positively identified in the trip blank. All associated samples were evaluated per validation guidance and no qualification was determined to be necessary on this basis.

Field Blanks

No samples were submitted as field blanks in association with this SDG.

MASS SPECTROMETER TUNING

Tuning and performance criteria are established to ensure adequate mass resolution, proper identification of compounds, and to some degree, sufficient instrument sensitivity. These criteria are not sample specific. Instrument performance is determined using standard materials. Therefore, these criteria should be met in all circumstances.

The tuning standard for volatiles is bromofluorobenzene (BFB).

All tunes associated with this SDG were fully compliant.

CALIBRATION

Satisfactory instrument calibration is established to ensure that the instrument is capable of producing acceptable quantitative results. The initial calibration curve demonstrates that the instrument is capable of giving acceptable performance at the beginning of an analytical sequence. The continuing calibration verifies that the instrument is continuing to provide satisfactory daily performance. Additionally, a continuing calibration is analyzed at the end of each 12-hour analytical sequence, denoted as a “closing” calibration verification, and ascertains acceptable performance at the conclusion of the analytical sequence.

Response Factor

The relative response factor (RRF) measures the instruments responses to specific chemical compounds. The RRFs for the VOA target compound list (TCL) compounds must be greater than the RRFs listed in Region II validation guidelines. A value less than the respective criteria indicates serious detection and quantitation problems. If the mean RRF of the initial calibration or the continuing calibration RRF is below the specified limit for any analyte, those analytes detected in environmental samples will be qualified as estimated. All non-detects for those analytes will be rejected.

The RRF values in all initial and continuing calibrations were found to be acceptable in all cases.

Percent Relative Standard Deviation and Percent Deviation

Percent relative standard deviation (%RSD) is calculated from the initial calibration and is used to indicate stability of a specific compound over the calibration range. Percent deviation (%D) compares the response factor of the continuing calibration with the mean response factor of the initial calibration. Therefore, %D is a measure of the instrument’s daily performance.

The following QC criteria have been applied for this project:

The %RSD of initial calibration must be ≤20%.

A %RSD value outside initial calibration limit indicates the potential for quantitation errors. For this reason, all positive results are qualified as estimated and non-detect results are qualified using professional judgement.

The %D for opening continuing calibration must be ≤30%.

A value outside these limits indicates the potential for detection and quantitation errors. For these reasons, all positive results are qualified as “J,” estimated, and non-detects are qualified with "UJ."

All initial calibration and continuing calibration %RSD and %D values were within defined QC criteria with the following exceptions.

The continuing calibration associated with all samples in this SDG exhibited a non-compliant %D for bromomethane. The results reported for bromomethane in the associated samples have been qualified “UJ” on this basis.

Please note, the laboratory did not perform closing continuing calibration verifications. Therefore, those criteria were not evaluated during validation. No qualification was applied on this basis.

INTERNAL STANDARDS PERFORMANCE

Internal standard performance criteria are meant to ensure that the gas chromatography/mass spectrometry (GC/MS) sensitivity and response are stable during every experimental run.

The internal standard area count must not vary by more than a factor of two from the associated continuing calibration standard. The retention time of the internal standard must not vary by more than +/- 30 seconds from the associated continuing calibration standard. The area count must be within -50% to +200% range of the associated standard. If area count is >200%, non-detected results are not qualified while positive results associated with the non-compliant internal standard are qualified "J," estimated. However, when an observed area count is <50%, positive results associated with the non-compliant are qualified "J," estimated, while non-detected results are rejected.

Internal standard area counts are within acceptance criteria for all samples.

SURROGATES

All samples are spiked with surrogate compounds prior to sample preparation and analyses to evaluate overall laboratory performance and efficiency of the analytical technique. The observed recovery must be within laboratory limits as outlined in the project specific validation guidance.

The reported sample analyses and method blank analyses had observed surrogate recoveries within the established acceptance limits in all cases.

COMPOUND IDENTIFICATION

Volatile

The project target analyte compounds are identified on the GC/MS by using the analytes relative retention time (RRT) and ion spectra. For the results to be a positive hit, the sample peak must be within $\pm$0.06 RRT units of the standard compound and have ion spectra which has a ratio of the primary and secondary ion intensities within 20% of that in the standard compound. In the cases where there is not an adequate ion spectrum match, the laboratory may have provided false positive identifications.

All samples were evaluated, and all identification criteria were met. Therefore, no analytes were qualified for compound identification.

Volatile Tentatively Identified Compounds

Tentatively Identified Compounds (TICs) were reported by the laboratory and reviewed for quality assurance. For all TIC results where there is presumptive evidence of a match, being greater than or equal to 85% match, the results are qualified “NJ,” tentatively identified. If the non-target compound is reported as an unknown, the result is qualified “J,” estimated. Likewise, if it is determined that the identification of a TIC is unacceptable, the tentative identification of the compound is changed to “unknown” and the result is qualified “J,” estimated.

Volatile TICs were not reported.

MATRIX SPIKE/MATRIX SPIKE DUPLICATE

The matrix spike and matrix spike duplicate (MS/MSD) are generated to determine the precision and accuracy of the analytical procedure in a given sample matrix.

No samples were submitted for MS/MSD evaluations in association with this SDG.

LABORATORY CONTROL SAMPLE/LABORATORY CONTROL SAMPLE DUPLICATE

The Laboratory Control Sample (LCS) is spiked with the same analytes at the same concentrations as the matrix spike. The LCS results are used to verify that the laboratory can perform the analysis in a clean matrix.

LCS evaluations were processed at the proper frequency. Upon evaluation of precision and accuracy criteria no issues were noted that would require qualification of sample results.

REPORTING

Dilutions, re-extractions, and other re-analyses were not present in the laboratory data package.

OTHER QUALITY CONTROL DATA OUT OF SPECIFICATION

None.

FIELD DUPLICATE

Field duplicates are two (or more) field samples collected at the same time in the same location. Each of the samples represents the same population and is carried through all steps of the sampling and analytical procedures in an identical manner. Field duplicate results are used to assess precision of the total method, including sampling, analysis, and site heterogeneity.

No samples were submitted as field duplicate pair in association with this SDG.

SYSTEM PERFORMANCE AND OVERALL ASSESSMENT

Overall the laboratory data generated met the project goals and quality control criteria, with the exceptions identified in this report and as summarized in Table 1.

Table 1
Review Elements Summary

	Were acceptance criteria met?		
	Yes	No	
Volatiles		**Major**	**Minor**
Holding Time	x		
Method Blanks	x		
Storage Blanks	NA		
Trip Blanks	x		
Field Blanks	NA		
Mass Spectrometer Tuning	x		
Calibration Response Factor	x		
Calibration Percent Relative Standard Deviation and Percent Difference			x
Internal Standards	x		
Surrogates	x		
Compound Identification - Volatile	x		
Tentatively Identified Compounds - Volatile	NA		
Matrix Spike/Matrix Spike Duplicate	NA		
Laboratory Control Sample/Laboratory Control Sample Duplicate	x		
Other Quality Control Data out of Specification	x		
Field Duplicate	NA		

Major= Major data quality issue identified resulting in rejection of data.
Minor= Minor data quality issue identified resulting in the qualification of data. Data qualification should be used to inform the data users of data limitations.
NA = Not applicable

Table 2
Data Validation Qualifiers

Data Qualifier	Definition
U	The analyte was analyzed for but was not detected above the level of the reported sample quantitation limit.
J	The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
J+	The result is an estimated quantity, but the result may be biased high.
J-	The result is an estimated quantity, but the result may be biased low.
NJ	The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.
UJ	The analyte was analyzed for but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.
R	The data are unusable. The sample results are rejected due to serious deficiencies in meeting Quality Control (QC) criteria. The analyte may or may not be present in the sample.

ENVIRONMENTAL DATA SERVICES, LTD.

DATA USABILITY SUMMARY REPORT FOR VOLATILES

PROJECT: Northrop Grumman

CLIENT: HDR

LABORATORY: Eurofins TestAmerica, Edison

SAMPLE DELIVERY GROUP: J233422-1

SAMPLE DATES: May 3, 2021

The above sample delivery group (SDG) consists of the following samples:

Sample Identification	Laboratory Identification
DECHC05-VPB01-GW-745-747-0-20210503	460-233422-1
DECHC05-TB-20210503-20210503	460-233422-2

The samples described above were analyzed via USEPA SW-846 8260D to determine the concentrations of low/medium volatile organic analytes (VOAs).

Project specific quality assurance (QA) objectives, as well as the USEPA Region II SOP, Validating Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry SW-846 Method 8260B & 8260C, SOP NO. HW-24 Revision 4, September 2014 have been considered during validation of this data and its usability.

Table 1 provides a summary of major and minor data quality issues identified for this data set. All data are acceptable except those results which have been qualified with “R,” rejected. Data validation qualifiers along with associated descriptions are provided in Table 2. All data qualification related to this group of samples is detailed on the attached sheets.

Per USEPA Region 2 Validation Guidance, “All data users should note two facts. First, the "R" flag means that the associated value is unusable. In other words, due to significant quality control (QC) problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables even as a last resort. The second, no analyte concentration, even if it has passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data, but any value potentially contains error.”

HOLDING TIME/SAMPLE HANDLING

The amount of an analyte in a sample can change with time due to chemical instability, degradation, volatilization, etc. If the specified holding time is exceeded, the data may not be valid. Proper sample handling and preservation also play a role in the chemical stability of analytes in the sample matrix. If samples are not collected and stored using proper containers and/or preservatives, data may not be valid.

The samples in this delivery group were received by the laboratory within the proper temperature range as specified in the validation guidance.

The samples in this delivery group were prepared and analyzed within the holding time specified in the validation guidelines.

BLANK CONTAMINATION

Quality assurance blanks include method, storage, trip, field, or rinse blanks. Blanks are prepared to identify any contamination, which may have been introduced into the samples during preparation and analysis or field activity. Method and storage blanks measure laboratory contamination. Trip blanks measure cross contamination during shipment. Field and rinse blanks measure cross contamination during field operations.

Method Blanks

Method blanks were prepared and analyzed in association with the samples in this delivery group at the specified frequency. Upon examination of method blank data, no analyte was positively identified at a concentration equal to or above the method detection limit (MDL) in any associated method blank.

Storage Blanks

No storage blanks were submitted in association with this SDG.

Trip Blanks

Trip blank DECHC05-TB-20210503 was submitted in association with all samples in this SDG. Methylene chloride was positively identified in the trip blank. All associated samples were evaluated per validation guidance and no qualification was determined to be necessary on this basis.

Field Blanks

No samples were submitted as field blanks in association with this SDG.

MASS SPECTROMETER TUNING

Tuning and performance criteria are established to ensure adequate mass resolution, proper identification of compounds, and to some degree, sufficient instrument sensitivity. These criteria are not sample specific. Instrument performance is determined using standard materials. Therefore, these criteria should be met in all circumstances.

The tuning standard for volatiles is bromofluorobenzene (BFB).

All tunes associated with this SDG were fully compliant.

CALIBRATION

Satisfactory instrument calibration is established to ensure that the instrument is capable of producing acceptable quantitative results. The initial calibration curve demonstrates that the instrument is capable of giving acceptable performance at the beginning of an analytical sequence. The continuing calibration verifies that the instrument is continuing to provide satisfactory daily performance. Additionally, a continuing calibration is analyzed at the end of each 12-hour analytical sequence, denoted as a “closing” calibration verification, and ascertains acceptable performance at the conclusion of the analytical sequence.

Response Factor

The relative response factor (RRF) measures the instruments responses to specific chemical compounds. The RRFs for the VOA target compound list (TCL) compounds must be greater than the RRFs listed in Region II validation guidelines. A value less than the respective criteria indicates serious detection and quantitation problems. If the mean RRF of the initial calibration or the continuing calibration RRF is below the specified limit for any analyte, those analytes detected in environmental samples will be qualified as estimated. All non-detects for those analytes will be rejected.

The RRF values in all initial and continuing calibrations were found to be acceptable in all cases.

Percent Relative Standard Deviation and Percent Deviation

Percent relative standard deviation (%RSD) is calculated from the initial calibration and is used to indicate stability of a specific compound over the calibration range. Percent deviation (%D) compares the response factor of the continuing calibration with the mean response factor of the initial calibration. Therefore, %D is a measure of the instrument’s daily performance.

The following QC criteria have been applied for this project:

The %RSD of initial calibration must be ≤20%.

A %RSD value outside initial calibration limit indicates the potential for quantitation errors. For this reason, all positive results are qualified as estimated and non-detect results are qualified using professional judgement.

The %D for opening continuing calibration must be ≤30%.

A value outside these limits indicates the potential for detection and quantitation errors. For these reasons, all positive results are qualified as “J,” estimated, and non-detects are qualified with "UJ."

All initial calibration and continuing calibration %RSD and %D values were within defined QC criteria with the following exceptions. The continuing calibration associated with all samples in this SDG exhibited a non-compliant %D for bromomethane. The results reported for bromomethane in the associated samples have been qualified “UJ” on this basis.

Please note, the laboratory did not perform closing continuing calibration verifications. Therefore, those criteria were not evaluated during validation. No qualification was applied on this basis.

INTERNAL STANDARDS PERFORMANCE

Internal standard performance criteria are meant to ensure that the gas chromatography/mass spectrometry (GC/MS) sensitivity and response are stable during every experimental run.

The internal standard area count must not vary by more than a factor of two from the associated continuing calibration standard. The retention time of the internal standard must not vary by more than +/- 30 seconds from the associated continuing calibration standard. The area count must be within -50% to +200% range of the associated standard. If area count is >200%, non-detected results are not qualified while positive results associated with the non-compliant internal standard are qualified "J," estimated. However, when an observed area count is <50%, positive results associated with the non-compliant are qualified "J," estimated, while non-detected results are rejected.

Internal standard area counts are within acceptance criteria for all samples.

SURROGATES

All samples are spiked with surrogate compounds prior to sample preparation and analyses to evaluate overall laboratory performance and efficiency of the analytical technique. The observed recovery must be within laboratory limits as outlined in the project specific validation guidance.

The reported sample analyses and method blank analyses had observed surrogate recoveries within the established acceptance limits in all cases.

COMPOUND IDENTIFICATION

Volatile

The project target analyte compounds are identified on the GC/MS by using the analytes relative retention time (RRT) and ion spectra. For the results to be a positive hit, the sample peak must be within $\pm$0.06 RRT units of the standard compound and have ion spectra which has a ratio of the primary and secondary ion intensities within 20% of that in the standard compound. In the cases where there is not an adequate ion spectrum match, the laboratory may have provided false positive identifications.

All samples were evaluated, and all identification criteria were met. Therefore, no analytes were qualified for compound identification.

Volatile Tentatively Identified Compounds

Tentatively Identified Compounds (TICs) were reported by the laboratory and reviewed for quality assurance. For all TIC results where there is presumptive evidence of a match, being greater than or equal to 85% match, the results are qualified “NJ,” tentatively identified. If the non-target compound is reported as an unknown, the result is qualified “J,” estimated. Likewise, if it is determined that the identification of a TIC is unacceptable, the tentative identification of the compound is changed to “unknown” and the result is qualified “J,” estimated.

Volatile TICs were not reported.

MATRIX SPIKE/MATRIX SPIKE DUPLICATE

The matrix spike and matrix spike duplicate (MS/MSD) are generated to determine the precision and accuracy of the analytical procedure in a given sample matrix.

No samples were submitted for MS/MSD evaluations in association with this SDG.

LABORATORY CONTROL SAMPLE/LABORATORY CONTROL SAMPLE DUPLICATE

The Laboratory Control Sample (LCS) is spiked with the same analytes at the same concentrations as the matrix spike. The LCS results are used to verify that the laboratory can perform the analysis in a clean matrix.

LCS evaluations were processed at the proper frequency. Upon evaluation of precision and accuracy criteria no issues were noted that would require qualification of sample results.

REPORTING

Dilutions, re-extractions, and other re-analyses were not present in the laboratory data package.

OTHER QUALITY CONTROL DATA OUT OF SPECIFICATION

None.

FIELD DUPLICATE

Field duplicates are two (or more) field samples collected at the same time in the same location. Each of the samples represents the same population and is carried through all steps of the sampling and analytical procedures in an identical manner. Field duplicate results are used to assess precision of the total method, including sampling, analysis, and site heterogeneity.

No samples were submitted as field duplicate pair in association with this SDG.

SYSTEM PERFORMANCE AND OVERALL ASSESSMENT

Overall the laboratory data generated met the project goals and quality control criteria, with the exceptions identified in this report and as summarized in Table 1.

Table 1
Review Elements Summary

	Were acceptance criteria met?		
	Yes	No	
Volatiles		**Major**	**Minor**
Holding Time	x		
Method Blanks	x		
Storage Blanks	NA		
Trip Blanks	x		
Field Blanks	NA		
Mass Spectrometer Tuning	x		
Calibration Response Factor	x		
Calibration Percent Relative Standard Deviation and Percent Difference			x
Internal Standards	x		
Surrogates	x		
Compound Identification - Volatile	x		
Tentatively Identified Compounds - Volatile	NA		
Matrix Spike/Matrix Spike Duplicate	NA		
Laboratory Control Sample/Laboratory Control Sample Duplicate	x		
Other Quality Control Data out of Specification	x		
Field Duplicate	NA		

Major= Major data quality issue identified resulting in rejection of data.
Minor= Minor data quality issue identified resulting in the qualification of data. Data qualification should be used to inform the data users of data limitations.
NA = Not applicable

Table 2
Data Validation Qualifiers

Data Qualifier	Definition
U	The analyte was analyzed for but was not detected above the level of the reported sample quantitation limit.
J	The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
J+	The result is an estimated quantity, but the result may be biased high.
J-	The result is an estimated quantity, but the result may be biased low.
NJ	The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.
UJ	The analyte was analyzed for but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.
R	The data are unusable. The sample results are rejected due to serious deficiencies in meeting Quality Control (QC) criteria. The analyte may or may not be present in the sample.

ENVIRONMENTAL DATA SERVICES, LTD.

DATA USABILITY SUMMARY REPORT FOR VOLATILES

PROJECT: Northrop Grumman

CLIENT: HDR

LABORATORY: Eurofins TestAmerica, Edison

SAMPLE DELIVERY GROUP: J233530-1

SAMPLE DATES: May 3 and 4, 2021

The above sample delivery group (SDG) consists of the following samples:

Sample Identification	Laboratory Identification
DECHC05-VPB01-GW-760-762-0-20210503	460-233530-1
DECHC05-VPB01-GW-780-782-0-20210504	460-233530-2
DECHC05-VPB01-GW-800-802-0-20210504	460-233530-3
DECHC05-TB20210504-20210504	460-233530-4

The samples described above were analyzed via USEPA SW-846 8260D to determine the concentrations of low/medium volatile organic analytes (VOAs).

Project specific quality assurance (QA) objectives, as well as the USEPA Region II SOP, Validating Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry SW-846 Method 8260B & 8260C, SOP NO. HW-24 Revision 4, September 2014 have been considered during validation of this data and its usability.

Table 1 provides a summary of major and minor data quality issues identified for this data set. All data are acceptable except those results which have been qualified with “R,” rejected. Data validation qualifiers along with associated descriptions are provided in Table 2. All data qualification related to this group of samples is detailed on the attached sheets.

Per USEPA Region 2 Validation Guidance, “All data users should note two facts. First, the "R" flag means that the associated value is unusable. In other words, due to significant quality control (QC) problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables even as a last resort. The second, no analyte concentration, even if it has passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data, but any value potentially contains error.”

HOLDING TIME/SAMPLE HANDLING

The amount of an analyte in a sample can change with time due to chemical instability, degradation, volatilization, etc. If the specified holding time is exceeded, the data may not be valid. Proper sample handling and preservation also play a role in the chemical stability of analytes in the sample matrix. If samples are not collected and stored using proper containers and/or preservatives, data may not be valid.

The samples in this delivery group were received by the laboratory within the proper temperature range as specified in the validation guidance.

The samples in this delivery group were prepared and analyzed within the holding time specified in the validation guidelines.

BLANK CONTAMINATION

Quality assurance blanks include method, storage, trip, field, or rinse blanks. Blanks are prepared to identify any contamination, which may have been introduced into the samples during preparation and analysis or field activity. Method and storage blanks measure laboratory contamination. Trip blanks measure cross contamination during shipment. Field and rinse blanks measure cross contamination during field operations.

Method Blanks

Method blanks were prepared and analyzed in association with the samples in this delivery group at the specified frequency. Upon examination of method blank data, no analyte was positively identified at a concentration equal to or above the method detection limit (MDL) in any associated method blank.

Storage Blanks

No storage blanks were submitted in association with this SDG.

Trip Blanks

Trip blank DECHC05-TB20210504 was submitted in association with all samples in this SDG. Methylene chloride was positively identified in the trip blank. All associated samples were evaluated per validation guidance and no qualification was determined to be necessary on this basis.

Field Blanks

No samples were submitted as field blanks in association with this SDG.

MASS SPECTROMETER TUNING

Tuning and performance criteria are established to ensure adequate mass resolution, proper identification of compounds, and to some degree, sufficient instrument sensitivity. These criteria are not sample specific. Instrument performance is determined using standard materials. Therefore, these criteria should be met in all circumstances.

The tuning standard for volatiles is bromofluorobenzene (BFB).

All tunes associated with this SDG were fully compliant.

CALIBRATION

Satisfactory instrument calibration is established to ensure that the instrument is capable of producing acceptable quantitative results. The initial calibration curve demonstrates that the instrument is capable of giving acceptable performance at the beginning of an analytical sequence. The continuing calibration verifies that the instrument is continuing to provide satisfactory daily performance. Additionally, a continuing calibration is analyzed at the end of each 12-hour analytical sequence, denoted as a “closing” calibration verification, and ascertains acceptable performance at the conclusion of the analytical sequence.

Response Factor

The relative response factor (RRF) measures the instruments responses to specific chemical compounds. The RRFs for the VOA target compound list (TCL) compounds must be greater than the RRFs listed in Region II validation guidelines. A value less than the respective criteria indicates serious detection and quantitation problems. If the mean RRF of the initial calibration or the continuing calibration RRF is below the specified limit for any analyte, those analytes detected in environmental samples will be qualified as estimated. All non-detects for those analytes will be rejected.

The RRF values in all initial and continuing calibrations were found to be acceptable in all cases.

Percent Relative Standard Deviation and Percent Deviation

Percent relative standard deviation (%RSD) is calculated from the initial calibration and is used to indicate stability of a specific compound over the calibration range. Percent deviation (%D) compares the response factor of the continuing calibration with the mean response factor of the initial calibration. Therefore, %D is a measure of the instrument’s daily performance.

The following QC criteria have been applied for this project:

The %RSD of initial calibration must be ≤20%.

A %RSD value outside initial calibration limit indicates the potential for quantitation errors. For this reason, all positive results are qualified as estimated and non-detect results are qualified using professional judgement.

The %D for opening continuing calibration must be ≤30%.

A value outside these limits indicates the potential for detection and quantitation errors. For these reasons, all positive results are qualified as “J,” estimated, and non-detects are qualified with "UJ."

All initial calibration and continuing calibration %RSD and %D values were within defined QC criteria with the following exception. The continuing calibration associated with all samples in this SDG exhibited a non-compliant %D for bromomethane. The results reported for bromomethane in the associated samples have been qualified “UJ” on this basis.

Please note, the laboratory did not perform closing continuing calibration verifications. Therefore, those criteria were not evaluated during validation. No qualification was applied on this basis.

INTERNAL STANDARDS PERFORMANCE

Internal standard performance criteria are meant to ensure that the gas chromatography/mass spectrometry (GC/MS) sensitivity and response are stable during every experimental run.

The internal standard area count must not vary by more than a factor of two from the associated continuing calibration standard. The retention time of the internal standard must not vary by more than +/- 30 seconds from the associated continuing calibration standard. The area count must be within -50% to +200% range of the associated standard. If area count is >200%, non-detected results are not qualified while positive results associated with the non-compliant internal standard are qualified "J," estimated. However, when an observed area count is <50%, positive results associated with the non-compliant are qualified "J," estimated, while non-detected results are rejected.

Internal standard area counts are within acceptance criteria for all samples.

SURROGATES

All samples are spiked with surrogate compounds prior to sample preparation and analyses to evaluate overall laboratory performance and efficiency of the analytical technique. The observed recovery must be within laboratory limits as outlined in the project specific validation guidance.

The reported sample analyses and method blank analyses had observed surrogate recoveries within the established acceptance limits in all cases.

COMPOUND IDENTIFICATION

Volatile

The project target analyte compounds are identified on the GC/MS by using the analytes relative retention time (RRT) and ion spectra. For the results to be a positive hit, the sample peak must be within $\pm$0.06 RRT units of the standard compound and have ion spectra which has a ratio of the primary and secondary ion intensities within 20% of that in the standard compound. In the cases where there is not an adequate ion spectrum match, the laboratory may have provided false positive identifications.

All samples were evaluated, and all identification criteria were met. Therefore, no analytes were qualified for compound identification.

Volatile Tentatively Identified Compounds

Tentatively Identified Compounds (TICs) were reported by the laboratory and reviewed for quality assurance. For all TIC results where there is presumptive evidence of a match, being greater than or equal to 85% match, the results are qualified “NJ,” tentatively identified. If the non-target compound is reported as an unknown, the result is qualified “J,” estimated. Likewise, if it is determined that the identification of a TIC is unacceptable, the tentative identification of the compound is changed to “unknown” and the result is qualified “J,” estimated.

Volatile TICs were not reported.

MATRIX SPIKE/MATRIX SPIKE DUPLICATE

The matrix spike and matrix spike duplicate (MS/MSD) are generated to determine the precision and accuracy of the analytical procedure in a given sample matrix.

No samples were submitted for MS/MSD evaluations in association with this SDG.

LABORATORY CONTROL SAMPLE/LABORATORY CONTROL SAMPLE DUPLICATE

The Laboratory Control Sample (LCS) is spiked with the same analytes at the same concentrations as the matrix spike. The LCS results are used to verify that the laboratory can perform the analysis in a clean matrix.

LCS evaluations were processed at the proper frequency. Upon evaluation of precision and accuracy criteria no issues were noted that would require qualification of sample results.

REPORTING

Dilutions, re-extractions, and other re-analyses were not present in the laboratory data package.

OTHER QUALITY CONTROL DATA OUT OF SPECIFICATION

None.

FIELD DUPLICATE

Field duplicates are two (or more) field samples collected at the same time in the same location. Each of the samples represents the same population and is carried through all steps of the sampling and analytical procedures in an identical manner. Field duplicate results are used to assess precision of the total method, including sampling, analysis, and site heterogeneity.

No samples were submitted as field duplicate pair in association with this SDG.

SYSTEM PERFORMANCE AND OVERALL ASSESSMENT

Overall the laboratory data generated met the project goals and quality control criteria, with the exceptions identified in this report and as summarized in Table 1.

Table 1
Review Elements Summary

	Were acceptance criteria met?		
	Yes	No	
Volatiles		**Major**	**Minor**
Holding Time	x		
Method Blanks	x		
Storage Blanks	NA		
Trip Blanks	x		
Field Blanks	NA		
Mass Spectrometer Tuning	x		
Calibration Response Factor	x		
Calibration Percent Relative Standard Deviation and Percent Difference			x
Internal Standards	x		
Surrogates	x		
Compound Identification - Volatile	x		
Tentatively Identified Compounds - Volatile	NA		
Matrix Spike/Matrix Spike Duplicate	NA		
Laboratory Control Sample/Laboratory Control Sample Duplicate	x		
Other Quality Control Data out of Specification	x		
Field Duplicate	NA		

Major= Major data quality issue identified resulting in rejection of data.
Minor= Minor data quality issue identified resulting in the qualification of data. Data qualification should be used to inform the data users of data limitations.
NA = Not applicable

Table 2
Data Validation Qualifiers

Data Qualifier	Definition
U	The analyte was analyzed for but was not detected above the level of the reported sample quantitation limit.
J	The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
J+	The result is an estimated quantity, but the result may be biased high.
J-	The result is an estimated quantity, but the result may be biased low.
NJ	The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.
UJ	The analyte was analyzed for but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.
R	The data are unusable. The sample results are rejected due to serious deficiencies in meeting Quality Control (QC) criteria. The analyte may or may not be present in the sample.

ENVIRONMENTAL DATA SERVICES, LTD.

DATA USABILITY SUMMARY REPORT FOR VOLATILES

PROJECT: Northrop Grumman

CLIENT: HDR

LABORATORY: Eurofins TestAmerica, Edison

SAMPLE DELIVERY GROUP: J233641-1

SAMPLE DATES: May 5, 2021

The above sample delivery group (SDG) consists of the following samples:

Sample Identification	Laboratory Identification
DECHC05-VPB01-GW-820-822-0-20210505	460-233641-1
DECHC05-TB20210505-20210505	460-233641-2

The samples described above were analyzed via USEPA SW-846 8260D to determine the concentrations of low/medium volatile organic analytes (VOAs).

Project specific quality assurance (QA) objectives, as well as the USEPA Region II SOP, Validating Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry SW-846 Method 8260B & 8260C, SOP NO. HW-24 Revision 4, September 2014 have been considered during validation of this data and its usability.

Table 1 provides a summary of major and minor data quality issues identified for this data set. All data are acceptable except those results which have been qualified with “R,” rejected. Data validation qualifiers along with associated descriptions are provided in Table 2. All data qualification related to this group of samples is detailed on the attached sheets.

Per USEPA Region 2 Validation Guidance, “All data users should note two facts. First, the "R" flag means that the associated value is unusable. In other words, due to significant quality control (QC) problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables even as a last resort. The second, no analyte concentration, even if it has passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data, but any value potentially contains error.”

HOLDING TIME/SAMPLE HANDLING

The amount of an analyte in a sample can change with time due to chemical instability, degradation, volatilization, etc. If the specified holding time is exceeded, the data may not be valid. Proper sample handling and preservation also play a role in the chemical stability of analytes in the sample matrix. If samples are not collected and stored using proper containers and/or preservatives, data may not be valid.

The samples in this delivery group were received by the laboratory within the proper temperature range as specified in the validation guidance.

The samples in this delivery group were prepared and analyzed within the holding time specified in the validation guidelines.

BLANK CONTAMINATION

Quality assurance blanks include method, storage, trip, field, or rinse blanks. Blanks are prepared to identify any contamination, which may have been introduced into the samples during preparation and analysis or field activity. Method and storage blanks measure laboratory contamination. Trip blanks measure cross contamination during shipment. Field and rinse blanks measure cross contamination during field operations.

Method Blanks

Method blanks were prepared and analyzed in association with the samples in this delivery group at the specified frequency. Upon examination of method blank data, no analyte was positively identified at a concentration equal to or above the method detection limit (MDL) in any associated method blank.

Storage Blanks

No storage blanks were submitted in association with this SDG.

Trip Blanks

Trip blank DECHC05-TB20210505 was submitted in association with all samples in this SDG. Methylene chloride was positively identified in the trip blank. All associated samples were evaluated per validation guidance and no qualification was determined to be necessary on this basis.

Field Blanks

No samples were submitted as field blanks in association with this SDG.

MASS SPECTROMETER TUNING

Tuning and performance criteria are established to ensure adequate mass resolution, proper identification of compounds, and to some degree, sufficient instrument sensitivity. These criteria are not sample specific. Instrument performance is determined using standard materials. Therefore, these criteria should be met in all circumstances.

The tuning standard for volatiles is bromofluorobenzene (BFB).

All tunes associated with this SDG were fully compliant.

CALIBRATION

Satisfactory instrument calibration is established to ensure that the instrument is capable of producing acceptable quantitative results. The initial calibration curve demonstrates that the instrument is capable of giving acceptable performance at the beginning of an analytical sequence. The continuing calibration verifies that the instrument is continuing to provide satisfactory daily performance. Additionally, a continuing calibration is analyzed at the end of each 12-hour analytical sequence, denoted as a “closing” calibration verification, and ascertains acceptable performance at the conclusion of the analytical sequence.

Response Factor

The relative response factor (RRF) measures the instruments responses to specific chemical compounds. The RRFs for the VOA target compound list (TCL) compounds must be greater than the RRFs listed in Region II validation guidelines. A value less than the respective criteria indicates serious detection and quantitation problems. If the mean RRF of the initial calibration or the continuing calibration RRF is below the specified limit for any analyte, those analytes detected in environmental samples will be qualified as estimated. All non-detects for those analytes will be rejected.

The RRF values in all initial and continuing calibrations were found to be acceptable in all cases.

Percent Relative Standard Deviation and Percent Deviation

Percent relative standard deviation (%RSD) is calculated from the initial calibration and is used to indicate stability of a specific compound over the calibration range. Percent deviation (%D) compares the response factor of the continuing calibration with the mean response factor of the initial calibration. Therefore, %D is a measure of the instrument’s daily performance.

The following QC criteria have been applied for this project:

The %RSD of initial calibration must be ≤20%.

A %RSD value outside initial calibration limit indicates the potential for quantitation errors. For this reason, all positive results are qualified as estimated and non-detect results are qualified using professional judgement.

The %D for opening continuing calibration must be ≤30%.

A value outside these limits indicates the potential for detection and quantitation errors. For these reasons, all positive results are qualified as “J,” estimated, and non-detects are qualified with "UJ."

All initial calibration and continuing calibration %RSD and %D values were within defined QC criteria.

Please note, the laboratory did not perform closing continuing calibration verifications. Therefore, those criteria were not evaluated during validation. No qualification was applied on this basis.

INTERNAL STANDARDS PERFORMANCE

Internal standard performance criteria are meant to ensure that the gas chromatography/mass spectrometry (GC/MS) sensitivity and response are stable during every experimental run.

The internal standard area count must not vary by more than a factor of two from the associated continuing calibration standard. The retention time of the internal standard must not vary by more than +/- 30 seconds from the associated continuing calibration standard. The area count must be within -50% to +200% range of the associated standard. If area count is >200%, non-detected results are not qualified while positive results associated with the non-compliant internal standard are qualified "J," estimated. However, when an observed area count is <50%, positive results associated with the non-compliant are qualified "J," estimated, while non-detected results are rejected.

Internal standard area counts are within acceptance criteria for all samples.

SURROGATES

All samples are spiked with surrogate compounds prior to sample preparation and analyses to evaluate overall laboratory performance and efficiency of the analytical technique. The observed recovery must be within laboratory limits as outlined in the project specific validation guidance.

The reported sample analyses and method blank analyses had observed surrogate recoveries within the established acceptance limits in all cases.

COMPOUND IDENTIFICATION

Volatile

The project target analyte compounds are identified on the GC/MS by using the analytes relative retention time (RRT) and ion spectra. For the results to be a positive hit, the sample peak must be within $\pm$0.06 RRT units of the standard compound and have ion spectra which has a ratio of the primary and secondary ion intensities within 20% of that in the standard compound. In the cases where there is not an adequate ion spectrum match, the laboratory may have provided false positive identifications.

All samples were evaluated, and all identification criteria were met. Therefore, no analytes were qualified for compound identification.

Volatile Tentatively Identified Compounds

Tentatively Identified Compounds (TICs) were reported by the laboratory and reviewed for quality assurance. For all TIC results where there is presumptive evidence of a match, being greater than or equal to 85% match, the results are qualified “NJ,” tentatively identified. If the non-target compound is reported as an unknown, the result is qualified “J,” estimated. Likewise, if it is determined that the identification of a TIC is unacceptable, the tentative identification of the compound is changed to “unknown” and the result is qualified “J,” estimated.

Volatile TICs were not reported.

MATRIX SPIKE/MATRIX SPIKE DUPLICATE

The matrix spike and matrix spike duplicate (MS/MSD) are generated to determine the precision and accuracy of the analytical procedure in a given sample matrix.

No samples were submitted for MS/MSD evaluations in association with this SDG.

LABORATORY CONTROL SAMPLE/LABORATORY CONTROL SAMPLE DUPLICATE

The Laboratory Control Sample (LCS) is spiked with the same analytes at the same concentrations as the matrix spike. The LCS results are used to verify that the laboratory can perform the analysis in a clean matrix.

LCS evaluations were processed at the proper frequency. Upon evaluation of precision and accuracy criteria no issues were noted that would require qualification of sample results.

REPORTING

Dilutions, re-extractions, and other re-analyses were not present in the laboratory data package.

OTHER QUALITY CONTROL DATA OUT OF SPECIFICATION

None.

FIELD DUPLICATE

Field duplicates are two (or more) field samples collected at the same time in the same location. Each of the samples represents the same population and is carried through all steps of the sampling and analytical procedures in an identical manner. Field duplicate results are used to assess precision of the total method, including sampling, analysis, and site heterogeneity.

No samples were submitted as field duplicate pair in association with this SDG.

SYSTEM PERFORMANCE AND OVERALL ASSESSMENT

Overall the laboratory data generated met the project goals and quality control criteria, with the exceptions identified in this report and as summarized in Table 1.

Table 1
Review Elements Summary

	Were acceptance criteria met?		
	Yes	No	
Volatiles		**Major**	**Minor**
Holding Time	x		
Method Blanks	x		
Storage Blanks	NA		
Trip Blanks	x		
Field Blanks	NA		
Mass Spectrometer Tuning	x		
Calibration Response Factor	x		
Calibration Percent Relative Standard Deviation and Percent Difference	x		
Internal Standards	x		
Surrogates	x		
Compound Identification - Volatile	x		
Tentatively Identified Compounds - Volatile	NA		
Matrix Spike/Matrix Spike Duplicate	NA		
Laboratory Control Sample/Laboratory Control Sample Duplicate	x		
Other Quality Control Data out of Specification	x		
Field Duplicate	NA		

Major= Major data quality issue identified resulting in rejection of data.
Minor= Minor data quality issue identified resulting in the qualification of data. Data qualification should be used to inform the data users of data limitations.
NA = Not applicable

Table 2
Data Validation Qualifiers

Data Qualifier	Definition
U	The analyte was analyzed for but was not detected above the level of the reported sample quantitation limit.
J	The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
J+	The result is an estimated quantity, but the result may be biased high.
J-	The result is an estimated quantity, but the result may be biased low.
NJ	The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.
UJ	The analyte was analyzed for but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.
R	The data are unusable. The sample results are rejected due to serious deficiencies in meeting Quality Control (QC) criteria. The analyte may or may not be present in the sample.

ENVIRONMENTAL DATA SERVICES, LTD.

DATA USABILITY SUMMARY REPORT FOR VOLATILES

PROJECT: Northrop Grumman

CLIENT: HDR

LABORATORY: Eurofins TestAmerica, Edison

SAMPLE DELIVERY GROUP: J233762-1

SAMPLE DATES: May 6, 2021

The above sample delivery group (SDG) consists of the following samples:

Sample Identification	Laboratory Identification
DECHC05-VPB01-GW-840-842-0-20210506	460-233762-1
DECHC05-VPB01-GW-860-862-0-20210506	460-233762-2
DECHC05-TB20210506-20210506	460-233762-3

The samples described above were analyzed via USEPA SW-846 8260D to determine the concentrations of low/medium volatile organic analytes (VOAs).

Project specific quality assurance (QA) objectives, as well as the USEPA Region II SOP, Validating Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry SW-846 Method 8260B & 8260C, SOP NO. HW-24 Revision 4, September 2014 have been considered during validation of this data and its usability.

Table 1 provides a summary of major and minor data quality issues identified for this data set. All data are acceptable except those results which have been qualified with “R,” rejected. Data validation qualifiers along with associated descriptions are provided in Table 2. All data qualification related to this group of samples is detailed on the attached sheets.

Per USEPA Region 2 Validation Guidance, “All data users should note two facts. First, the "R" flag means that the associated value is unusable. In other words, due to significant quality control (QC) problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables even as a last resort. The second, no analyte concentration, even if it has passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data, but any value potentially contains error.”

HOLDING TIME/SAMPLE HANDLING

The amount of an analyte in a sample can change with time due to chemical instability, degradation, volatilization, etc. If the specified holding time is exceeded, the data may not be valid. Proper sample handling and preservation also play a role in the chemical stability of analytes in the sample matrix. If samples are not collected and stored using proper containers and/or preservatives, data may not be valid.

The samples in this delivery group were received by the laboratory within the proper temperature range as specified in the validation guidance.

The samples in this delivery group were prepared and analyzed within the holding time specified in the validation guidelines.

BLANK CONTAMINATION

Quality assurance blanks include method, storage, trip, field, or rinse blanks. Blanks are prepared to identify any contamination, which may have been introduced into the samples during preparation and analysis or field activity. Method and storage blanks measure laboratory contamination. Trip blanks measure cross contamination during shipment. Field and rinse blanks measure cross contamination during field operations.

Method Blanks

Method blanks were prepared and analyzed in association with the samples in this delivery group at the specified frequency. Upon examination of method blank data, no analyte was positively identified at a concentration equal to or above the method detection limit (MDL) in any associated method blank.

Storage Blanks

No storage blanks were submitted in association with this SDG.

Trip Blanks

Trip blank DECHC05-TB20210506 was submitted in association with all samples in this SDG. Methylene chloride was positively identified in the trip blank. All associated samples were evaluated per validation guidance and no qualification was determined to be necessary on this basis.

Field Blanks

No samples were submitted as field blanks in association with this SDG.

MASS SPECTROMETER TUNING

Tuning and performance criteria are established to ensure adequate mass resolution, proper identification of compounds, and to some degree, sufficient instrument sensitivity. These criteria are not sample specific. Instrument performance is determined using standard materials. Therefore, these criteria should be met in all circumstances.

The tuning standard for volatiles is bromofluorobenzene (BFB).

All tunes associated with this SDG were fully compliant.

CALIBRATION

Satisfactory instrument calibration is established to ensure that the instrument is capable of producing acceptable quantitative results. The initial calibration curve demonstrates that the instrument is capable of giving acceptable performance at the beginning of an analytical sequence. The continuing calibration verifies that the instrument is continuing to provide satisfactory daily performance. Additionally, a continuing calibration is analyzed at the end of each 12-hour analytical sequence, denoted as a “closing” calibration verification, and ascertains acceptable performance at the conclusion of the analytical sequence.

Response Factor

The relative response factor (RRF) measures the instruments responses to specific chemical compounds. The RRFs for the VOA target compound list (TCL) compounds must be greater than the RRFs listed in Region II validation guidelines. A value less than the respective criteria indicates serious detection and quantitation problems. If the mean RRF of the initial calibration or the continuing calibration RRF is below the specified limit for any analyte, those analytes detected in environmental samples will be qualified as estimated. All non-detects for those analytes will be rejected.

The RRF values in all initial and continuing calibrations were found to be acceptable in all cases.

Percent Relative Standard Deviation and Percent Deviation

Percent relative standard deviation (%RSD) is calculated from the initial calibration and is used to indicate stability of a specific compound over the calibration range. Percent deviation (%D) compares the response factor of the continuing calibration with the mean response factor of the initial calibration. Therefore, %D is a measure of the instrument’s daily performance.

The following QC criteria have been applied for this project:

The %RSD of initial calibration must be ≤20%.

A %RSD value outside initial calibration limit indicates the potential for quantitation errors. For this reason, all positive results are qualified as estimated and non-detect results are qualified using professional judgement.

The %D for opening continuing calibration must be ≤30%.

A value outside these limits indicates the potential for detection and quantitation errors. For these reasons, all positive results are qualified as “J,” estimated, and non-detects are qualified with "UJ."

All initial calibration and continuing calibration %RSD and %D values were within defined QC criteria with the following exceptions.

The continuing calibration associated with all samples exhibited non-compliant %Ds for bromomethane, and 1,2-dibromo-3-chloropropane. Results reported for the impacted analytes in the associated samples have been qualified “UJ” on this basis.

Please note, the laboratory did not perform closing continuing calibration verifications. Therefore, those criteria were not evaluated during validation. No qualification was applied on this basis.

INTERNAL STANDARDS PERFORMANCE

Internal standard performance criteria are meant to ensure that the gas chromatography/mass spectrometry (GC/MS) sensitivity and response are stable during every experimental run.

The internal standard area count must not vary by more than a factor of two from the associated continuing calibration standard. The retention time of the internal standard must not vary by more than +/- 30 seconds from the associated continuing calibration standard. The area count must be within -50% to +200% range of the associated standard. If area count is >200%, non-detected results are not qualified while positive results associated with the non-compliant internal standard are qualified "J," estimated. However, when an observed area count is <50%, positive results associated with the non-compliant are qualified "J," estimated, while non-detected results are rejected.

Internal standard area counts are within acceptance criteria for all samples.

SURROGATES

All samples are spiked with surrogate compounds prior to sample preparation and analyses to evaluate overall laboratory performance and efficiency of the analytical technique. The observed recovery must be within laboratory limits as outlined in the project specific validation guidance.

The reported sample analyses and method blank analyses had observed surrogate recoveries within the established acceptance limits in all cases.

COMPOUND IDENTIFICATION

Volatile

The project target analyte compounds are identified on the GC/MS by using the analytes relative retention time (RRT) and ion spectra. For the results to be a positive hit, the sample peak must be within $\pm$0.06 RRT units of the standard compound and have ion spectra which has a ratio of the primary and secondary ion intensities within 20% of that in the standard compound. In the cases where there is not an adequate ion spectrum match, the laboratory may have provided false positive identifications.

All samples were evaluated, and all identification criteria were met. Therefore, no analytes were qualified for compound identification.

Volatile Tentatively Identified Compounds

Tentatively Identified Compounds (TICs) were reported by the laboratory and reviewed for quality assurance. For all TIC results where there is presumptive evidence of a match, being greater than or equal to 85% match, the results are qualified “NJ,” tentatively identified. If the non-target compound is reported as an unknown, the result is qualified “J,” estimated. Likewise, if it is determined that the identification of a TIC is unacceptable, the tentative identification of the compound is changed to “unknown” and the result is qualified “J,” estimated.

Volatile TICs were not reported.

MATRIX SPIKE/MATRIX SPIKE DUPLICATE

The matrix spike and matrix spike duplicate (MS/MSD) are generated to determine the precision and accuracy of the analytical procedure in a given sample matrix.

No samples were submitted for MS/MSD evaluations in association with this SDG.

LABORATORY CONTROL SAMPLE/LABORATORY CONTROL SAMPLE DUPLICATE

The Laboratory Control Sample (LCS) is spiked with the same analytes at the same concentrations as the matrix spike. The LCS results are used to verify that the laboratory can perform the analysis in a clean matrix.

LCS evaluations were processed at the proper frequency. Upon evaluation of precision and accuracy criteria no issues were noted that would require qualification of sample results.

REPORTING

Dilutions, re-extractions, and other re-analyses were not present in the laboratory data package.

OTHER QUALITY CONTROL DATA OUT OF SPECIFICATION

None.

FIELD DUPLICATE

Field duplicates are two (or more) field samples collected at the same time in the same location. Each of the samples represents the same population and is carried through all steps of the sampling and analytical procedures in an identical manner. Field duplicate results are used to assess precision of the total method, including sampling, analysis, and site heterogeneity.

No samples were submitted as field duplicate pair in association with this SDG.

SYSTEM PERFORMANCE AND OVERALL ASSESSMENT

Overall the laboratory data generated met the project goals and quality control criteria, with the exceptions identified in this report and as summarized in Table 1.

Table 1
Review Elements Summary

	Were acceptance criteria met?		
	Yes	No	
Volatiles		**Major**	**Minor**
Holding Time	x		
Method Blanks	x		
Storage Blanks	NA		
Trip Blanks	x		
Field Blanks	NA		
Mass Spectrometer Tuning	x		
Calibration Response Factor	x		
Calibration Percent Relative Standard Deviation and Percent Difference			x
Internal Standards	x		
Surrogates	x		
Compound Identification - Volatile	x		
Tentatively Identified Compounds - Volatile	NA		
Matrix Spike/Matrix Spike Duplicate	NA		
Laboratory Control Sample/Laboratory Control Sample Duplicate	x		
Other Quality Control Data out of Specification	x		
Field Duplicate	NA		

Major= Major data quality issue identified resulting in rejection of data.
Minor= Minor data quality issue identified resulting in the qualification of data. Data qualification should be used to inform the data users of data limitations.
NA = Not applicable

Table 2
Data Validation Qualifiers

Data Qualifier	Definition
U	The analyte was analyzed for but was not detected above the level of the reported sample quantitation limit.
J	The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
J+	The result is an estimated quantity, but the result may be biased high.
J-	The result is an estimated quantity, but the result may be biased low.
NJ	The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.
UJ	The analyte was analyzed for but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.
R	The data are unusable. The sample results are rejected due to serious deficiencies in meeting Quality Control (QC) criteria. The analyte may or may not be present in the sample.

ENVIRONMENTAL DATA SERVICES, LTD.

DATA USABILITY SUMMARY REPORT FOR VOLATILES

PROJECT: Northrop Grumman

CLIENT: HDR

LABORATORY: Eurofins TestAmerica, Edison

SAMPLE DELIVERY GROUP: J234028-1

SAMPLE DATES: May 10, 2021

The above sample delivery group (SDG) consists of the following samples:

Sample Identification	Laboratory Identification
DECHC05-VPB01-GW-920-922-0-20210510	460-234028-1
DECHC05-TB20210510-20210510	460-234028-2

The samples described above were analyzed via USEPA SW-846 8260D to determine the concentrations of low/medium volatile organic analytes (VOAs).

Project specific quality assurance (QA) objectives, as well as the USEPA Region II SOP, Validating Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry SW-846 Method 8260B & 8260C, SOP NO. HW-24 Revision 4, September 2014 have been considered during validation of this data and its usability.

Table 1 provides a summary of major and minor data quality issues identified for this data set. All data are acceptable except those results which have been qualified with “R,” rejected. Data validation qualifiers along with associated descriptions are provided in Table 2. All data qualification related to this group of samples is detailed on the attached sheets.

Per USEPA Region 2 Validation Guidance, “All data users should note two facts. First, the "R" flag means that the associated value is unusable. In other words, due to significant quality control (QC) problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables even as a last resort. The second, no analyte concentration, even if it has passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data, but any value potentially contains error.”

HOLDING TIME/SAMPLE HANDLING

The amount of an analyte in a sample can change with time due to chemical instability, degradation, volatilization, etc. If the specified holding time is exceeded, the data may not be valid. Proper sample handling and preservation also play a role in the chemical stability of analytes in the sample matrix. If samples are not collected and stored using proper containers and/or preservatives, data may not be valid.

The samples in this delivery group were received by the laboratory within the proper temperature range as specified in the validation guidance.

The samples in this delivery group were prepared and analyzed within the holding time specified in the validation guidelines.

BLANK CONTAMINATION

Quality assurance blanks include method, storage, trip, field, or rinse blanks. Blanks are prepared to identify any contamination, which may have been introduced into the samples during preparation and analysis or field activity. Method and storage blanks measure laboratory contamination. Trip blanks measure cross contamination during shipment. Field and rinse blanks measure cross contamination during field operations.

Method Blanks

Method blanks were prepared and analyzed in association with the samples in this delivery group at the specified frequency. Upon examination of method blank data, no analyte was positively identified at a concentration equal to or above the method detection limit (MDL) in any associated method blank.

Storage Blanks

No storage blanks were submitted in association with this SDG.

Trip Blanks

Trip blank DECHC05-TB20210510 was submitted in association with all samples in this SDG. Methylene chloride was positively identified in the trip blank. All associated samples were evaluated per validation guidance and no qualification was determined to be necessary on this basis.

Field Blanks

No samples were submitted as field blanks in association with this SDG.

MASS SPECTROMETER TUNING

Tuning and performance criteria are established to ensure adequate mass resolution, proper identification of compounds, and to some degree, sufficient instrument sensitivity. These criteria are not sample specific. Instrument performance is determined using standard materials. Therefore, these criteria should be met in all circumstances.

The tuning standard for volatiles is bromofluorobenzene (BFB).

All tunes associated with this SDG were fully compliant.

CALIBRATION

Satisfactory instrument calibration is established to ensure that the instrument is capable of producing acceptable quantitative results. The initial calibration curve demonstrates that the instrument is capable of giving acceptable performance at the beginning of an analytical sequence. The continuing calibration verifies that the instrument is continuing to provide satisfactory daily performance. Additionally, a continuing calibration is analyzed at the end of each 12-hour analytical sequence, denoted as a “closing” calibration verification, and ascertains acceptable performance at the conclusion of the analytical sequence.

Response Factor

The relative response factor (RRF) measures the instruments responses to specific chemical compounds. The RRFs for the VOA target compound list (TCL) compounds must be greater than the RRFs listed in Region II validation guidelines. A value less than the respective criteria indicates serious detection and quantitation problems. If the mean RRF of the initial calibration or the continuing calibration RRF is below the specified limit for any analyte, those analytes detected in environmental samples will be qualified as estimated. All non-detects for those analytes will be rejected.

The RRF values in all initial and continuing calibrations were found to be acceptable in all cases.

Percent Relative Standard Deviation and Percent Deviation

Percent relative standard deviation (%RSD) is calculated from the initial calibration and is used to indicate stability of a specific compound over the calibration range. Percent deviation (%D) compares the response factor of the continuing calibration with the mean response factor of the initial calibration. Therefore, %D is a measure of the instrument’s daily performance.

The following QC criteria have been applied for this project:

The %RSD of initial calibration must be ≤20%.

A %RSD value outside initial calibration limit indicates the potential for quantitation errors. For this reason, all positive results are qualified as estimated and non-detect results are qualified using professional judgement.

The %D for opening continuing calibration must be ≤30%.

A value outside these limits indicates the potential for detection and quantitation errors. For these reasons, all positive results are qualified as “J,” estimated, and non-detects are qualified with "UJ."

All initial calibration and continuing calibration %RSD and %D values were within defined QC criteria with the following exceptions.
The continuing calibration associated with all samples exhibited non-compliant %Ds for bromomethane, and trichlorofluoromethane. Results reported for the impacted analytes in the associated samples have been qualified “UJ” on this basis.

Please note, the laboratory did not perform closing continuing calibration verifications. Therefore, those criteria were not evaluated during validation. No qualification was applied on this basis.

INTERNAL STANDARDS PERFORMANCE

Internal standard performance criteria are meant to ensure that the gas chromatography/mass spectrometry (GC/MS) sensitivity and response are stable during every experimental run.

The internal standard area count must not vary by more than a factor of two from the associated continuing calibration standard. The retention time of the internal standard must not vary by more than +/- 30 seconds from the associated continuing calibration standard. The area count must be within -50% to +200% range of the associated standard. If area count is >200%, non-detected results are not qualified while positive results associated with the non-compliant internal standard are qualified "J," estimated. However, when an observed area count is <50%, positive results associated with the non-compliant are qualified "J," estimated, while non-detected results are rejected.

Internal standard area counts are within acceptance criteria for all samples.

SURROGATES

All samples are spiked with surrogate compounds prior to sample preparation and analyses to evaluate overall laboratory performance and efficiency of the analytical technique. The observed recovery must be within laboratory limits as outlined in the project specific validation guidance.

The reported sample analyses and method blank analyses had observed surrogate recoveries within the established acceptance limits in all cases.

COMPOUND IDENTIFICATION

Volatile

The project target analyte compounds are identified on the GC/MS by using the analytes relative retention time (RRT) and ion spectra. For the results to be a positive hit, the sample peak must be within $\pm$0.06 RRT units of the standard compound and have ion spectra which has a ratio of the primary and secondary ion intensities within 20% of that in the standard compound. In the cases where there is not an adequate ion spectrum match, the laboratory may have provided false positive identifications.

All samples were evaluated, and all identification criteria were met. Therefore, no analytes were qualified for compound identification.

Volatile Tentatively Identified Compounds

Tentatively Identified Compounds (TICs) were reported by the laboratory and reviewed for quality assurance. For all TIC results where there is presumptive evidence of a match, being greater than or equal to 85% match, the results are qualified “NJ,” tentatively identified. If the non-target compound is reported as an unknown, the result is qualified “J,” estimated. Likewise, if it is determined that the identification of a TIC is unacceptable, the tentative identification of the compound is changed to “unknown” and the result is qualified “J,” estimated.

Volatile TICs were not reported.

MATRIX SPIKE/MATRIX SPIKE DUPLICATE

The matrix spike and matrix spike duplicate (MS/MSD) are generated to determine the precision and accuracy of the analytical procedure in a given sample matrix.

No samples were submitted for MS/MSD evaluations in association with this SDG.

LABORATORY CONTROL SAMPLE/LABORATORY CONTROL SAMPLE DUPLICATE

The Laboratory Control Sample (LCS) is spiked with the same analytes at the same concentrations as the matrix spike. The LCS results are used to verify that the laboratory can perform the analysis in a clean matrix.

LCS evaluations were processed at the proper frequency. Upon evaluation of precision and accuracy criteria no issues were noted that would require qualification of sample results.

REPORTING

Dilutions, re-extractions, and other re-analyses were not present in the laboratory data package.

OTHER QUALITY CONTROL DATA OUT OF SPECIFICATION

None.

FIELD DUPLICATE

Field duplicates are two (or more) field samples collected at the same time in the same location. Each of the samples represents the same population and is carried through all steps of the sampling and analytical procedures in an identical manner. Field duplicate results are used to assess precision of the total method, including sampling, analysis, and site heterogeneity.

No samples were submitted as field duplicate pair in association with this SDG.

SYSTEM PERFORMANCE AND OVERALL ASSESSMENT

Overall the laboratory data generated met the project goals and quality control criteria, with the exceptions identified in this report and as summarized in Table 1.

Table 1
Review Elements Summary

	Were acceptance criteria met?		
	Yes	No	
Volatiles		**Major**	**Minor**
Holding Time	x		
Method Blanks	x		
Storage Blanks	NA		
Trip Blanks	x		
Field Blanks	NA		
Mass Spectrometer Tuning	x		
Calibration Response Factor	x		
Calibration Percent Relative Standard Deviation and Percent Difference			x
Internal Standards	x		
Surrogates	x		
Compound Identification - Volatile	x		
Tentatively Identified Compounds - Volatile	NA		
Matrix Spike/Matrix Spike Duplicate	NA		
Laboratory Control Sample/Laboratory Control Sample Duplicate	x		
Other Quality Control Data out of Specification	x		
Field Duplicate	NA		

Major= Major data quality issue identified resulting in rejection of data.
Minor= Minor data quality issue identified resulting in the qualification of data. Data qualification should be used to inform the data users of data limitations.
NA = Not applicable

Table 2
Data Validation Qualifiers

Data Qualifier	Definition
U	The analyte was analyzed for but was not detected above the level of the reported sample quantitation limit.
J	The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
J+	The result is an estimated quantity, but the result may be biased high.
J-	The result is an estimated quantity, but the result may be biased low.
NJ	The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.
UJ	The analyte was analyzed for but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.
R	The data are unusable. The sample results are rejected due to serious deficiencies in meeting Quality Control (QC) criteria. The analyte may or may not be present in the sample.

ENVIRONMENTAL DATA SERVICES, LTD.

DATA USABILITY SUMMARY REPORT FOR VOLATILES

PROJECT: Northrop Grumman

CLIENT: HDR

LABORATORY: Eurofins TestAmerica, Edison

SAMPLE DELIVERY GROUP: J234029-1

SAMPLE DATES: May 7, 2021

The above sample delivery group (SDG) consists of the following samples:

Sample Identification	Laboratory Identification
DECHC05-VPB01-GW-880-882-0-20210507	460-234029-1
DECHC05-VPB01-GW-905-907-0-20210507	460-234029-2
DECHC05-TB20210507-20210507	460-234029-3

The samples described above were analyzed via USEPA SW-846 8260D to determine the concentrations of low/medium volatile organic analytes (VOAs).

Project specific quality assurance (QA) objectives, as well as the USEPA Region II SOP, Validating Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry SW-846 Method 8260B & 8260C, SOP NO. HW-24 Revision 4, September 2014 have been considered during validation of this data and its usability.

Table 1 provides a summary of major and minor data quality issues identified for this data set. All data are acceptable except those results which have been qualified with “R,” rejected. Data validation qualifiers along with associated descriptions are provided in Table 2. All data qualification related to this group of samples is detailed on the attached sheets.

Per USEPA Region 2 Validation Guidance, “All data users should note two facts. First, the "R" flag means that the associated value is unusable. In other words, due to significant quality control (QC) problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables even as a last resort. The second, no analyte concentration, even if it has passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data, but any value potentially contains error.”

HOLDING TIME/SAMPLE HANDLING

The amount of an analyte in a sample can change with time due to chemical instability, degradation, volatilization, etc. If the specified holding time is exceeded, the data may not be valid. Proper sample handling and preservation also play a role in the chemical stability of analytes in the sample matrix. If samples are not collected and stored using proper containers and/or preservatives, data may not be valid.

The samples in this delivery group were received by the laboratory within the proper temperature range as specified in the validation guidance.

The samples in this delivery group were prepared and analyzed within the holding time specified in the validation guidelines.

BLANK CONTAMINATION

Quality assurance blanks include method, storage, trip, field, or rinse blanks. Blanks are prepared to identify any contamination, which may have been introduced into the samples during preparation and analysis or field activity. Method and storage blanks measure laboratory contamination. Trip blanks measure cross contamination during shipment. Field and rinse blanks measure cross contamination during field operations.

Method Blanks

Method blanks were prepared and analyzed in association with the samples in this delivery group at the specified frequency. Upon examination of method blank data, no analyte was positively identified at a concentration equal to or above the method detection limit (MDL) in any associated method blank.

Storage Blanks

No storage blanks were submitted in association with this SDG.

Trip Blanks

Trip blank DECHC05-TB20210507 was submitted in association with all samples in this SDG. Methylene chloride was positively identified in the trip blank. All associated samples were evaluated per validation guidance and no qualification was determined to be necessary on this basis.

Field Blanks

No samples were submitted as field blanks in association with this SDG.

MASS SPECTROMETER TUNING

Tuning and performance criteria are established to ensure adequate mass resolution, proper identification of compounds, and to some degree, sufficient instrument sensitivity. These criteria are not sample specific. Instrument performance is determined using standard materials. Therefore, these criteria should be met in all circumstances.

The tuning standard for volatiles is bromofluorobenzene (BFB).

All tunes associated with this SDG were fully compliant.

CALIBRATION

Satisfactory instrument calibration is established to ensure that the instrument is capable of producing acceptable quantitative results. The initial calibration curve demonstrates that the instrument is capable of giving acceptable performance at the beginning of an analytical sequence. The continuing calibration verifies that the instrument is continuing to provide satisfactory daily performance. Additionally, a continuing calibration is analyzed at the end of each 12-hour analytical sequence, denoted as a “closing” calibration verification, and ascertains acceptable performance at the conclusion of the analytical sequence.

Response Factor

The relative response factor (RRF) measures the instruments responses to specific chemical compounds. The RRFs for the VOA target compound list (TCL) compounds must be greater than the RRFs listed in Region II validation guidelines. A value less than the respective criteria indicates serious detection and quantitation problems. If the mean RRF of the initial calibration or the continuing calibration RRF is below the specified limit for any analyte, those analytes detected in environmental samples will be qualified as estimated. All non-detects for those analytes will be rejected.

The RRF values in all initial and continuing calibrations were found to be acceptable in all cases.

Percent Relative Standard Deviation and Percent Deviation

Percent relative standard deviation (%RSD) is calculated from the initial calibration and is used to indicate stability of a specific compound over the calibration range. Percent deviation (%D) compares the response factor of the continuing calibration with the mean response factor of the initial calibration. Therefore, %D is a measure of the instrument’s daily performance.

The following QC criteria have been applied for this project:

The %RSD of initial calibration must be ≤20%.

A %RSD value outside initial calibration limit indicates the potential for quantitation errors. For this reason, all positive results are qualified as estimated and non-detect results are qualified using professional judgement.

The %D for opening continuing calibration must be ≤30%.

A value outside these limits indicates the potential for detection and quantitation errors. For these reasons, all positive results are qualified as “J,” estimated, and non-detects are qualified with "UJ."

All initial calibration and continuing calibration %RSD and %D values were within defined QC criteria with the following exceptions.

The continuing calibration associated with all samples exhibited non-compliant %Ds for bromomethane, and trichlorofluoromethane. Results reported for the impacted analytes in the associated samples have been qualified “UJ” on this basis.

Please note, the laboratory did not perform closing continuing calibration verifications. Therefore, those criteria were not evaluated during validation. No qualification was applied on this basis.

INTERNAL STANDARDS PERFORMANCE

Internal standard performance criteria are meant to ensure that the gas chromatography/mass spectrometry (GC/MS) sensitivity and response are stable during every experimental run.

The internal standard area count must not vary by more than a factor of two from the associated continuing calibration standard. The retention time of the internal standard must not vary by more than +/- 30 seconds from the associated continuing calibration standard. The area count must be within -50% to +200% range of the associated standard. If area count is >200%, non-detected results are not qualified while positive results associated with the non-compliant internal standard are qualified "J," estimated. However, when an observed area count is <50%, positive results associated with the non-compliant are qualified "J," estimated, while non-detected results are rejected.

Internal standard area counts are within acceptance criteria for all samples.

SURROGATES

All samples are spiked with surrogate compounds prior to sample preparation and analyses to evaluate overall laboratory performance and efficiency of the analytical technique. The observed recovery must be within laboratory limits as outlined in the project specific validation guidance.

The reported sample analyses and method blank analyses had observed surrogate recoveries within the established acceptance limits in all cases.

COMPOUND IDENTIFICATION

Volatile

The project target analyte compounds are identified on the GC/MS by using the analytes relative retention time (RRT) and ion spectra. For the results to be a positive hit, the sample peak must be within $\pm$0.06 RRT units of the standard compound and have ion spectra which has a ratio of the primary and secondary ion intensities within 20% of that in the standard compound. In the cases where there is not an adequate ion spectrum match, the laboratory may have provided false positive identifications.

All samples were evaluated, and all identification criteria were met. Therefore, no analytes were qualified for compound identification.

Volatile Tentatively Identified Compounds

Tentatively Identified Compounds (TICs) were reported by the laboratory and reviewed for quality assurance. For all TIC results where there is presumptive evidence of a match, being greater than or equal to 85% match, the results are qualified “NJ,” tentatively identified. If the non-target compound is reported as an unknown, the result is qualified “J,” estimated. Likewise, if it is determined that the identification of a TIC is unacceptable, the tentative identification of the compound is changed to “unknown” and the result is qualified “J,” estimated.

Volatile TICs were not reported.

MATRIX SPIKE/MATRIX SPIKE DUPLICATE

The matrix spike and matrix spike duplicate (MS/MSD) are generated to determine the precision and accuracy of the analytical procedure in a given sample matrix.

No samples were submitted for MS/MSD evaluations in association with this SDG.

LABORATORY CONTROL SAMPLE/LABORATORY CONTROL SAMPLE DUPLICATE

The Laboratory Control Sample (LCS) is spiked with the same analytes at the same concentrations as the matrix spike. The LCS results are used to verify that the laboratory can perform the analysis in a clean matrix.

LCS evaluations were processed at the proper frequency. Upon evaluation of precision and accuracy criteria no issues were noted that would require qualification of sample results.

REPORTING

Dilutions, re-extractions, and other re-analyses were not present in the laboratory data package.

OTHER QUALITY CONTROL DATA OUT OF SPECIFICATION

None.

FIELD DUPLICATE

Field duplicates are two (or more) field samples collected at the same time in the same location. Each of the samples represents the same population and is carried through all steps of the sampling and analytical procedures in an identical manner. Field duplicate results are used to assess precision of the total method, including sampling, analysis, and site heterogeneity.

No samples were submitted as field duplicate pair in association with this SDG.

SYSTEM PERFORMANCE AND OVERALL ASSESSMENT

Overall the laboratory data generated met the project goals and quality control criteria, with the exceptions identified in this report and as summarized in Table 1.

Table 1
Review Elements Summary

	Were acceptance criteria met?		
	Yes	No	
Volatiles		**Major**	**Minor**
Holding Time	x		
Method Blanks	x		
Storage Blanks	NA		
Trip Blanks	x		
Field Blanks	NA		
Mass Spectrometer Tuning	x		
Calibration Response Factor	x		
Calibration Percent Relative Standard Deviation and Percent Difference			x
Internal Standards	x		
Surrogates	x		
Compound Identification - Volatile	x		
Tentatively Identified Compounds - Volatile	NA		
Matrix Spike/Matrix Spike Duplicate	NA		
Laboratory Control Sample/Laboratory Control Sample Duplicate	x		
Other Quality Control Data out of Specification	x		
Field Duplicate	NA		

Major= Major data quality issue identified resulting in rejection of data.
Minor= Minor data quality issue identified resulting in the qualification of data. Data qualification should be used to inform the data users of data limitations.
NA = Not applicable

Table 2
Data Validation Qualifiers

Data Qualifier	Definition
U	The analyte was analyzed for but was not detected above the level of the reported sample quantitation limit.
J	The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
J+	The result is an estimated quantity, but the result may be biased high.
J-	The result is an estimated quantity, but the result may be biased low.
NJ	The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.
UJ	The analyte was analyzed for but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.
R	The data are unusable. The sample results are rejected due to serious deficiencies in meeting Quality Control (QC) criteria. The analyte may or may not be present in the sample.

ENVIRONMENTAL DATA SERVICES, LTD.

DATA USABILITY SUMMARY REPORT FOR VOLATILES

PROJECT: Northrop Grumman

CLIENT: HDR

LABORATORY: Eurofins TestAmerica, Edison

SAMPLE DELIVERY GROUP: J234190-1

SAMPLE DATES: May 12, 2021

The above sample delivery group (SDG) consists of the following samples:

Sample Identification	Laboratory Identification
DECHC05-VPB01-960-962-0-20210512	460-234190-1
DECHC05-VPB01-980-982-0-20210512	460-234190-2
DECHC05-TB20210512-20210512	460-234190-3

The samples described above were analyzed via USEPA SW-846 8260D to determine the concentrations of low/medium volatile organic analytes (VOAs).

Project specific quality assurance (QA) objectives, as well as the USEPA Region II SOP, Validating Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry SW-846 Method 8260B & 8260C, SOP NO. HW-24 Revision 4, September 2014 have been considered during validation of this data and its usability.

Table 1 provides a summary of major and minor data quality issues identified for this data set. All data are acceptable except those results which have been qualified with “R,” rejected. Data validation qualifiers along with associated descriptions are provided in Table 2. All data qualification related to this group of samples is detailed on the attached sheets.

Per USEPA Region 2 Validation Guidance, “All data users should note two facts. First, the "R" flag means that the associated value is unusable. In other words, due to significant quality control (QC) problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables even as a last resort. The second, no analyte concentration, even if it has passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data, but any value potentially contains error.”

HOLDING TIME/SAMPLE HANDLING

The amount of an analyte in a sample can change with time due to chemical instability, degradation, volatilization, etc. If the specified holding time is exceeded, the data may not be valid. Proper sample handling and preservation also play a role in the chemical stability of analytes in the sample matrix. If samples are not collected and stored using proper containers and/or preservatives, data may not be valid.

The samples in this delivery group were received by the laboratory within the proper temperature range as specified in the validation guidance.

The samples in this delivery group were prepared and analyzed within the holding time specified in the validation guidelines.

BLANK CONTAMINATION

Quality assurance blanks include method, storage, trip, field, or rinse blanks. Blanks are prepared to identify any contamination, which may have been introduced into the samples during preparation and analysis or field activity. Method and storage blanks measure laboratory contamination. Trip blanks measure cross contamination during shipment. Field and rinse blanks measure cross contamination during field operations.

Method Blanks

Method blanks were prepared and analyzed in association with the samples in this delivery group at the specified frequency. Upon examination of method blank data, no analyte was positively identified at a concentration equal to or above the method detection limit (MDL) in any associated method blank.

Storage Blanks

No storage blanks were submitted in association with this SDG.

Trip Blanks

Trip blank DECHC05-TB20210512 was submitted in association with all samples in this SDG. Methylene chloride was positively identified in the trip blank. All associated samples were evaluated per validation guidance and no qualification was determined to be necessary on this basis.

Field Blanks

No samples were submitted as field blanks in association with this SDG.

MASS SPECTROMETER TUNING

Tuning and performance criteria are established to ensure adequate mass resolution, proper identification of compounds, and to some degree, sufficient instrument sensitivity. These criteria are not sample specific. Instrument performance is determined using standard materials. Therefore, these criteria should be met in all circumstances.

The tuning standard for volatiles is bromofluorobenzene (BFB).

All tunes associated with this SDG were fully compliant.

CALIBRATION

Satisfactory instrument calibration is established to ensure that the instrument is capable of producing acceptable quantitative results. The initial calibration curve demonstrates that the instrument is capable of giving acceptable performance at the beginning of an analytical sequence. The continuing calibration verifies that the instrument is continuing to provide satisfactory daily performance. Additionally, a continuing calibration is analyzed at the end of each 12-hour analytical sequence, denoted as a “closing” calibration verification, and ascertains acceptable performance at the conclusion of the analytical sequence.

Response Factor

The relative response factor (RRF) measures the instruments responses to specific chemical compounds. The RRFs for the VOA target compound list (TCL) compounds must be greater than the RRFs listed in Region II validation guidelines. A value less than the respective criteria indicates serious detection and quantitation problems. If the mean RRF of the initial calibration or the continuing calibration RRF is below the specified limit for any analyte, those analytes detected in environmental samples will be qualified as estimated. All non-detects for those analytes will be rejected.

The RRF values in all initial and continuing calibrations were found to be acceptable in all cases.

Percent Relative Standard Deviation and Percent Deviation

Percent relative standard deviation (%RSD) is calculated from the initial calibration and is used to indicate stability of a specific compound over the calibration range. Percent deviation (%D) compares the response factor of the continuing calibration with the mean response factor of the initial calibration. Therefore, %D is a measure of the instrument’s daily performance.

The following QC criteria have been applied for this project:

The %RSD of initial calibration must be ≤20%.

A %RSD value outside initial calibration limit indicates the potential for quantitation errors. For this reason, all positive results are qualified as estimated and non-detect results are qualified using professional judgement.

The %D for opening continuing calibration must be ≤30%.

A value outside these limits indicates the potential for detection and quantitation errors. For these reasons, all positive results are qualified as “J,” estimated, and non-detects are qualified with "UJ."

All initial calibration and continuing calibration %RSD and %D values were within defined QC criteria with the following exceptions.

The observed %D for chloromethane, bromomethane, and 1,1,2,2-tetrachloroethane were non-compliant in the continuing calibration associated with all samples in this SDG. The non-detected results reported for the impacted analytes in the associated samples have been qualified “UJ” on this basis.

Please note, the laboratory did not perform closing continuing calibration verifications. Therefore, those criteria were not evaluated during validation. No qualification was applied on this basis.

INTERNAL STANDARDS PERFORMANCE

Internal standard performance criteria are meant to ensure that the gas chromatography/mass spectrometry (GC/MS) sensitivity and response are stable during every experimental run.

The internal standard area count must not vary by more than a factor of two from the associated continuing calibration standard. The retention time of the internal standard must not vary by more than +/- 30 seconds from the associated continuing calibration standard. The area count must be within -50% to +200% range of the associated standard. If area count is >200%, non-detected results are not qualified while positive results associated with the non-compliant internal standard are qualified "J," estimated. However, when an observed area count is <50%, positive results associated with the non-compliant are qualified "J," estimated, while non-detected results are rejected.

Internal standard area counts are within acceptance criteria for all samples.

SURROGATES

All samples are spiked with surrogate compounds prior to sample preparation and analyses to evaluate overall laboratory performance and efficiency of the analytical technique. The observed recovery must be within laboratory limits as outlined in the project specific validation guidance.

The reported sample analyses and method blank analyses had observed surrogate recoveries within the established acceptance limits in all cases.

COMPOUND IDENTIFICATION

Volatile

The project target analyte compounds are identified on the GC/MS by using the analytes relative retention time (RRT) and ion spectra. For the results to be a positive hit, the sample peak must be within $\pm$0.06 RRT units of the standard compound and have ion spectra which has a ratio of the primary and secondary ion intensities within 20% of that in the standard compound. In the cases where there is not an adequate ion spectrum match, the laboratory may have provided false positive identifications.

All samples were evaluated, and all identification criteria were met. Therefore, no analytes were qualified for compound identification.

Volatile Tentatively Identified Compounds

Tentatively Identified Compounds (TICs) were reported by the laboratory and reviewed for quality assurance. For all TIC results where there is presumptive evidence of a match, being greater than or equal to 85% match, the results are qualified “NJ,” tentatively identified. If the non-target compound is reported as an unknown, the result is qualified “J,” estimated. Likewise, if it is determined that the identification of a TIC is unacceptable, the tentative identification of the compound is changed to “unknown” and the result is qualified “J,” estimated.

Volatile TICs were not reported.

MATRIX SPIKE/MATRIX SPIKE DUPLICATE

The matrix spike and matrix spike duplicate (MS/MSD) are generated to determine the precision and accuracy of the analytical procedure in a given sample matrix.

Sample DECHC05-VPB01-960-962-0 was submitted for MS/MSD evaluations in association with this SDG. Upon evaluation all precision and accuracy indicators were favorable with the following exceptions. Poor precision was observed for chloromethane and 1,1,2-trichloro-1,2,2-trifluoroethane. No qualification was necessary per validation guidelines on this basis as the parent sample results for the impacted analytes are not detected. Various analytes exhibited moderately poor recovery in either the MS or MSD evaluations but were observed as compliant in the alternate evaluation (MS or MSD). Therefore, the poor recoveries were partnered with compliant recoveries and were overall inconclusive. Therefore, no qualification of the parent sample results was necessary on this basis.

LABORATORY CONTROL SAMPLE/LABORATORY CONTROL SAMPLE DUPLICATE

The Laboratory Control Sample (LCS) is spiked with the same analytes at the same concentrations as the matrix spike. The LCS results are used to verify that the laboratory can perform the analysis in a clean matrix.

LCS evaluations were processed at the proper frequency. Upon evaluation of precision and accuracy criteria no issues were noted that would require qualification of sample results.

REPORTING

Dilutions, re-extractions, and other re-analyses were not present in the laboratory data package.

OTHER QUALITY CONTROL DATA OUT OF SPECIFICATION

None.

FIELD DUPLICATE

Field duplicates are two (or more) field samples collected at the same time in the same location. Each of the samples represents the same population and is carried through all steps of the sampling and analytical procedures in an identical manner. Field duplicate results are used to assess precision of the total method, including sampling, analysis, and site heterogeneity.

No samples were submitted as field duplicate pair in association with this SDG.

SYSTEM PERFORMANCE AND OVERALL ASSESSMENT

Overall the laboratory data generated met the project goals and quality control criteria, with the exceptions identified in this report and as summarized in Table 1.

Table 1
Review Elements Summary

	Were acceptance criteria met?		
	Yes	No	
Volatiles		**Major**	**Minor**
Holding Time	x		
Method Blanks	x		
Storage Blanks	NA		
Trip Blanks	x		
Field Blanks	NA		
Mass Spectrometer Tuning	x		
Calibration Response Factor	x		
Calibration Percent Relative Standard Deviation and Percent Difference			x
Internal Standards	x		
Surrogates	x		
Compound Identification - Volatile	x		
Tentatively Identified Compounds - Volatile	NA		
Matrix Spike/Matrix Spike Duplicate	x		
Laboratory Control Sample/Laboratory Control Sample Duplicate	x		
Other Quality Control Data out of Specification	x		
Field Duplicate	NA		

Major= Major data quality issue identified resulting in rejection of data.
Minor= Minor data quality issue identified resulting in the qualification of data. Data qualification should be used to inform the data users of data limitations.
NA = Not applicable

Table 2
Data Validation Qualifiers

Data Qualifier	Definition
U	The analyte was analyzed for but was not detected above the level of the reported sample quantitation limit.
J	The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
J+	The result is an estimated quantity, but the result may be biased high.
J-	The result is an estimated quantity, but the result may be biased low.
NJ	The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.
UJ	The analyte was analyzed for but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.
R	The data are unusable. The sample results are rejected due to serious deficiencies in meeting Quality Control (QC) criteria. The analyte may or may not be present in the sample.

ENVIRONMENTAL DATA SERVICES, LTD.

DATA USABILITY SUMMARY REPORT FOR VOLATILES

PROJECT: Northrop Grumman

CLIENT: HDR

LABORATORY: Eurofins TestAmerica, Edison

SAMPLE DELIVERY GROUP: J236058-1

SAMPLE DATES: June 8, 2021

The above sample delivery group (SDG) consists of the following samples:

Sample Identification	Laboratory Identification
DECHC05-MW-01-IDW	460-236058-1

The samples described above were analyzed via USEPA SW-846 8260D to determine the concentrations of low/medium volatile organic analytes (VOAs).

Project specific quality assurance (QA) objectives, as well as the USEPA Region II SOP, Validating Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry SW-846 Method 8260B & 8260C, SOP NO. HW-24 Revision 4, September 2014 have been considered during validation of this data and its usability.

Table 1 provides a summary of major and minor data quality issues identified for this data set. All data are acceptable except those results which have been qualified with “R,” rejected. Data validation qualifiers along with associated descriptions are provided in Table 2. All data qualification related to this group of samples is detailed on the attached sheets.

Per USEPA Region 2 Validation Guidance, “All data users should note two facts. First, the "R" flag means that the associated value is unusable. In other words, due to significant quality control (QC) problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables even as a last resort. The second, no analyte concentration, even if it has passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data, but any value potentially contains error.”

HOLDING TIME/SAMPLE HANDLING

The amount of an analyte in a sample can change with time due to chemical instability, degradation, volatilization, etc. If the specified holding time is exceeded, the data may not be valid. Proper sample handling and preservation also play a role in the chemical stability of analytes in the sample matrix. If samples are not collected and stored using proper containers and/or preservatives, data may not be valid.

The samples in this delivery group were received by the laboratory within the proper temperature range as specified in the validation guidance.

The samples in this delivery group were prepared and analyzed within the holding time specified in the validation guidelines.

BLANK CONTAMINATION

Quality assurance blanks include method, storage, trip, field, or rinse blanks. Blanks are prepared to identify any contamination, which may have been introduced into the samples during preparation and analysis or field activity. Method and storage blanks measure laboratory contamination. Trip blanks measure cross contamination during shipment. Field and rinse blanks measure cross contamination during field operations.

Method Blanks

Method blanks were prepared and analyzed in association with the samples in this delivery group at the specified frequency. Upon examination of method blank data, no analyte was positively identified at a concentration equal to or above the method detection limit (MDL) in any associated method blank.

Storage Blanks

No storage blanks were submitted in association with this SDG.

Trip Blanks

No sample was submitted as a trip blank in association with this SDG.

Field Blanks

No samples were submitted as field blanks in association with this SDG.

MASS SPECTROMETER TUNING

Tuning and performance criteria are established to ensure adequate mass resolution, proper identification of compounds, and to some degree, sufficient instrument sensitivity. These criteria are not sample specific. Instrument performance is determined using standard materials. Therefore, these criteria should be met in all circumstances.

The tuning standard for volatiles is bromofluorobenzene (BFB).

All tunes associated with this SDG were fully compliant.

CALIBRATION

Satisfactory instrument calibration is established to ensure that the instrument is capable of producing acceptable quantitative results. The initial calibration curve demonstrates that the instrument is capable of giving acceptable performance at the beginning of an analytical sequence. The continuing calibration verifies that the instrument is continuing to provide satisfactory daily performance. Additionally, a continuing calibration is analyzed at the end of each 12-hour analytical sequence, denoted as a “closing” calibration verification, and ascertains acceptable performance at the conclusion of the analytical sequence.

Response Factor

The relative response factor (RRF) measures the instruments responses to specific chemical compounds. The RRFs for the VOA target compound list (TCL) compounds must be greater than the RRFs listed in Region II validation guidelines. A value less than the respective criteria indicates serious detection and quantitation problems. If the mean RRF of the initial calibration or the continuing calibration RRF is below the specified limit for any analyte, those analytes detected in environmental samples will be qualified as estimated. All non-detects for those analytes will be rejected.

The RRF values in all initial and continuing calibrations were found to be acceptable in all cases.

Percent Relative Standard Deviation and Percent Deviation

Percent relative standard deviation (%RSD) is calculated from the initial calibration and is used to indicate stability of a specific compound over the calibration range. Percent deviation (%D) compares the response factor of the continuing calibration with the mean response factor of the initial calibration. Therefore, %D is a measure of the instrument’s daily performance.

The following QC criteria have been applied for this project:

The %RSD of initial calibration must be ≤20%.

A %RSD value outside initial calibration limit indicates the potential for quantitation errors. For this reason, all positive results are qualified as estimated and non-detect results are qualified using professional judgement.

The %D for opening continuing calibration must be ≤30%.

A value outside these limits indicates the potential for detection and quantitation errors. For these reasons, all positive results are qualified as “J,” estimated, and non-detects are qualified with "UJ."

All initial calibration and continuing calibration %RSD and %D values were within defined QC criteria.

Please note, the laboratory did not perform closing continuing calibration verifications. Therefore, those criteria were not evaluated during validation. No qualification was applied on this basis.

INTERNAL STANDARDS PERFORMANCE

Internal standard performance criteria are meant to ensure that the gas chromatography/mass spectrometry (GC/MS) sensitivity and response are stable during every experimental run.

The internal standard area count must not vary by more than a factor of two from the associated continuing calibration standard. The retention time of the internal standard must not vary by more than +/- 30 seconds from the associated continuing calibration standard. The area count must be within -50% to +200% range of the associated standard. If area count is >200%, non-detected results are not qualified while positive results associated with the non-compliant internal standard are qualified "J," estimated. However, when an observed area count is <50%, positive results associated with the non-compliant are qualified "J," estimated, while non-detected results are rejected.

Internal standard area counts are within acceptance criteria for all samples.

SURROGATES

All samples are spiked with surrogate compounds prior to sample preparation and analyses to evaluate overall laboratory performance and efficiency of the analytical technique. The observed recovery must be within laboratory limits as outlined in the project specific validation guidance.

The reported sample analyses and method blank analyses had observed surrogate recoveries within the established acceptance limits in all cases.

COMPOUND IDENTIFICATION

Volatile

The project target analyte compounds are identified on the GC/MS by using the analytes relative retention time (RRT) and ion spectra. For the results to be a positive hit, the sample peak must be within $\pm$0.06 RRT units of the standard compound and have ion spectra which has a ratio of the primary and secondary ion intensities within 20% of that in the standard compound. In the cases where there is not an adequate ion spectrum match, the laboratory may have provided false positive identifications.

All samples were evaluated, and all identification criteria were met. Therefore, no analytes were qualified for compound identification.

Volatile Tentatively Identified Compounds

Tentatively Identified Compounds (TICs) were reported by the laboratory and reviewed for quality assurance. For all TIC results where there is presumptive evidence of a match, being greater than or equal to 85% match, the results are qualified “NJ,” tentatively identified. If the non-target compound is reported as an unknown, the result is qualified “J,” estimated. Likewise, if it is determined that the identification of a TIC is unacceptable, the tentative identification of the compound is changed to “unknown” and the result is qualified “J,” estimated.

Volatile TICs were not reported.

MATRIX SPIKE/MATRIX SPIKE DUPLICATE

The matrix spike and matrix spike duplicate (MS/MSD) are generated to determine the precision and accuracy of the analytical procedure in a given sample matrix.

No samples were submitted for MS/MSD evaluations in association with this SDG.

LABORATORY CONTROL SAMPLE/LABORATORY CONTROL SAMPLE DUPLICATE

The Laboratory Control Sample (LCS) is spiked with the same analytes at the same concentrations as the matrix spike. The LCS results are used to verify that the laboratory can perform the analysis in a clean matrix.

LCS evaluations were processed at the proper frequency. Upon evaluation of precision and accuracy criteria no issues were noted that would require qualification of sample results with the following exceptions.

The observed recovery for 2-hexanone was lower than the lowest acceptance limit during both the LCS and LCS duplicate evaluations. Low bias is indicated and the non-detected 2-hexanone result reported for sample DECHC05-MW-01-IDW has been qualified “UJ” on this basis.

REPORTING

Dilutions, re-extractions, and other re-analyses were not present in the laboratory data package.

OTHER QUALITY CONTROL DATA OUT OF SPECIFICATION

None.

FIELD DUPLICATE

Field duplicates are two (or more) field samples collected at the same time in the same location. Each of the samples represents the same population and is carried through all steps of the sampling and analytical procedures in an identical manner. Field duplicate results are used to assess precision of the total method, including sampling, analysis, and site heterogeneity.

No samples were submitted as a field duplicate pair in association with this SDG.

SYSTEM PERFORMANCE AND OVERALL ASSESSMENT

Overall the laboratory data generated met the project goals and quality control criteria, with the exceptions identified in this report and as summarized in Table 1.

Table 1
Review Elements Summary

	Were acceptance criteria met?		
	Yes	No	
Volatiles		**Major**	**Minor**
Holding Time	x		
Method Blanks	x		
Storage Blanks	NA		
Trip Blanks	NA		
Field Blanks	NA		
Mass Spectrometer Tuning	x		
Calibration Response Factor	x		
Calibration Percent Relative Standard Deviation and Percent Difference	x		
Internal Standards	x		
Surrogates	x		
Compound Identification - Volatile	x		
Tentatively Identified Compounds - Volatile	NA		
Matrix Spike/Matrix Spike Duplicate	NA		
Laboratory Control Sample/Laboratory Control Sample Duplicate			x
Other Quality Control Data out of Specification	x		
Field Duplicate	NA		

Major= Major data quality issue identified resulting in rejection of data.
Minor= Minor data quality issue identified resulting in the qualification of data. Data qualification should be used to inform the data users of data limitations.
NA = Not applicable

Table 2
Data Validation Qualifiers

Data Qualifier	Definition
U	The analyte was analyzed for but was not detected above the level of the reported sample quantitation limit.
J	The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
J+	The result is an estimated quantity, but the result may be biased high.
J-	The result is an estimated quantity, but the result may be biased low.
NJ	The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.
UJ	The analyte was analyzed for but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.
R	The data are unusable. The sample results are rejected due to serious deficiencies in meeting Quality Control (QC) criteria. The analyte may or may not be present in the sample.

DATA USABILITY SUMMARY REPORT

Northrop Grumman WA52
(September and October 2021 Sampling)

Chemical Analyses Performed by:

Eurofins TestAmerica, Edison, NJ

Prepared by

ENVIRONMENTAL DATA SERVICES, LTD.

Prepared for

HDR

Report Released January 24, 2022

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ENVIRONMENTAL DATA SERVICES, LTD.

DATA USABILITY SUMMARY REPORT FOR VOLATILES

PROJECT: Northrop Grumman

CLIENT: HDR

LABORATORY: Eurofins TestAmerica, Edison

SAMPLE DELIVERY GROUP: 460-243408-1

SAMPLE DATES: September 20, 21, and 22, 2021

The above sample delivery group (SDG) consists of the following samples:

Sample Identification	Laboratory Identification
DECHC05-VPB02-GW-600-602-0	460-243408-1
DECHC05-VPB02-GW-620-622-0	460-243408-2
DECHC05-VPB02-GW-660-662-0	460-243408-3
DECHC05-VPB02-GW-680-682-0	460-243408-4
DECHC05-TB-20210922-0	460-243408-5
DECHC05-VPB02-GW-700-702-0	460-243408-6

The samples described above were analyzed via USEPA SW-846 8260D to determine the concentrations of low/medium volatile organic analytes (VOAs).

Project specific quality assurance (QA) objectives, as well as the USEPA Region II SOP, Validating Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry SW-846 Method 8260B & 8260C, SOP NO. HW-24 Revision 4, September 2014 have been considered during validation of this data and its usability.

Table 1 provides a summary of major and minor data quality issues identified for this data set. All data are acceptable except those results which have been qualified with “R,” rejected. Data validation qualifiers along with associated descriptions are provided in Table 2. All data qualification related to this group of samples is detailed on the attached sheets.

Per USEPA Region 2 Validation Guidance, “All data users should note two facts. First, the "R" flag means that the associated value is unusable. In other words, due to significant quality control (QC) problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables even as a last resort. The second, no analyte concentration, even if it has passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data, but any value potentially contains error.”

HOLDING TIME/SAMPLE HANDLING

The amount of an analyte in a sample can change with time due to chemical instability, degradation, volatilization, etc. If the specified holding time is exceeded, the data may not be valid. Proper sample handling and preservation also play a role in the chemical stability of analytes in the sample matrix. If samples are not collected and stored using proper containers and/or preservatives, data may not be valid.

The samples in this delivery group were received by the laboratory within the proper temperature range as specified in the validation guidance.

The samples in this delivery group were prepared and analyzed within the holding time specified in the validation guidelines.

BLANK CONTAMINATION

Quality assurance blanks include method, storage, trip, field, or rinse blanks. Blanks are prepared to identify any contamination, which may have been introduced into the samples during preparation and analysis or field activity. Method and storage blanks measure laboratory contamination. Trip blanks measure cross contamination during shipment. Field and rinse blanks measure cross contamination during field operations.

Method Blanks

Method blanks were prepared and analyzed in association with the samples in this delivery group at the specified frequency. Upon examination of method blank data, no analyte was positively identified at a concentration equal to or above the method detection limit (MDL) in any associated method blank.

Storage Blanks

No storage blanks were submitted in association with this SDG.

Trip Blanks

Trip blank DECHC05-TB-20210922-0 was submitted in association with all samples in this SDG. No problems were found for this criterion.

Field Blanks

No samples were submitted as field blanks in association with this SDG.

MASS SPECTROMETER TUNING

Tuning and performance criteria are established to ensure adequate mass resolution, proper identification of compounds, and to some degree, sufficient instrument sensitivity. These criteria are not sample specific. Instrument performance is determined using standard materials. Therefore, these criteria should be met in all circumstances.

The tuning standard for volatiles is bromofluorobenzene (BFB).

All tunes associated with this SDG were fully compliant.

CALIBRATION

Satisfactory instrument calibration is established to ensure that the instrument is capable of producing acceptable quantitative results. The initial calibration curve demonstrates that the instrument is capable of giving acceptable performance at the beginning of an analytical sequence. The continuing calibration verifies that the instrument is continuing to provide satisfactory daily performance. Additionally, a continuing calibration is analyzed at the end of each 12-hour analytical sequence, denoted as a “closing” calibration verification, and ascertains acceptable performance at the conclusion of the analytical sequence.

Response Factor

The relative response factor (RRF) measures the instruments responses to specific chemical compounds. The RRFs for the VOA target compound list (TCL) compounds must be greater than the RRFs listed in Region II validation guidelines. A value less than the respective criteria indicates serious detection and quantitation problems. If the mean RRF of the initial calibration or the continuing calibration RRF is below the specified limit for any analyte, those analytes detected in environmental samples will be qualified as estimated. All non-detects for those analytes will be rejected.

The RRF values in all initial and continuing calibrations for method 8260D were found to be acceptable in all cases.

Percent Relative Standard Deviation and Percent Deviation

Percent relative standard deviation (%RSD) is calculated from the initial calibration and is used to indicate stability of a specific compound over the calibration range. Percent deviation (%D) compares the response factor of the continuing calibration with the mean response factor of the initial calibration. Therefore, %D is a measure of the instrument’s daily performance.

The following QC criteria have been applied for this project:

The %RSD of initial calibration must be ≤20%.

A %RSD value outside initial calibration limit indicates the potential for quantitation errors. For this reason, all positive results are qualified as estimated and non-detect results are qualified using professional judgement.

The %D for opening continuing calibration must be ≤30%.

A value outside these limits indicates the potential for detection and quantitation errors. For these reasons, all positive results are qualified as “J,” estimated, and non-detects are qualified with "UJ."

All initial calibration and continuing calibration %RSD and %D values were within defined QC criteria.

Please note, the laboratory did not perform closing continuing calibration verifications. Therefore, those criteria were not evaluated during validation. No qualification was applied on this basis.

INTERNAL STANDARDS PERFORMANCE

Internal standard performance criteria are meant to ensure that the gas chromatography/mass spectrometry (GC/MS) sensitivity and response are stable during every experimental run.

The internal standard area count must not vary by more than a factor of two from the associated continuing calibration standard. The retention time of the internal standard must not vary by more than +/- 30 seconds from the associated continuing calibration standard. The area count must be within -50% to +200% range of the associated standard. If area count is >200%, non-detected results are not qualified while positive results associated with the non-compliant internal standard are qualified "J," estimated. However, when an observed area count is <50%, positive results associated with the non-compliant are qualified "J," estimated, while non-detected results are rejected.

Internal standard area counts are within acceptance criteria for all samples.

SURROGATES

All samples are spiked with surrogate compounds prior to sample preparation and analyses to evaluate overall laboratory performance and efficiency of the analytical technique. The observed recovery must be within laboratory limits as outlined in the project specific validation guidance.

The reported sample analyses and method blank analyses had observed surrogate recoveries within the established acceptance limits in all cases.

COMPOUND IDENTIFICATION

Volatile

The project target analyte compounds are identified on the GC/MS by using the analytes relative retention time (RRT) and ion spectra. For the results to be a positive hit, the sample peak must be within $\pm$0.06 RRT units of the standard compound and have ion spectra which has a ratio of the primary and secondary ion intensities within 20% of that in the standard compound. In the cases where there is not an adequate ion spectrum match, the laboratory may have provided false positive identifications.

All samples were evaluated, and all identification criteria were met. Therefore, no analytes were qualified for compound identification.

Volatile Tentatively Identified Compounds

Tentatively Identified Compounds (TICs) were reported by the laboratory and reviewed for quality assurance. For all TIC results where there is presumptive evidence of a match, being greater than or equal to 85% match, the results are qualified “NJ,” tentatively identified. If the non-target compound is reported as an unknown, the result is qualified “J,” estimated. Likewise, if it is determined that the identification of a TIC is unacceptable, the tentative identification of the compound is changed to “unknown” and the result is qualified “J,” estimated.

Volatile TICs were not reported.

MATRIX SPIKE/MATRIX SPIKE DUPLICATE

The matrix spike and matrix spike duplicate (MS/MSD) are generated to determine the precision and accuracy of the analytical procedure in a given sample matrix.

No samples were submitted for MS/MSD evaluations in association with this SDG.

LABORATORY CONTROL SAMPLE/LABORATORY CONTROL SAMPLE DUPLICATE

The Laboratory Control Sample (LCS) is spiked with the same analytes at the same concentrations as the matrix spike. The LCS results are used to verify that the laboratory can perform the analysis in a clean matrix.

LCS evaluations were processed at the proper frequency. Upon evaluation of precision and accuracy criteria no issues were noted that would require qualification of sample results.

REPORTING

Dilutions, re-extractions, and other re-analyses were not present in the laboratory data package.

OTHER QUALITY CONTROL DATA OUT OF SPECIFICATION

None.

FIELD DUPLICATE

Field duplicates are two (or more) field samples collected at the same time in the same location. Each of the samples represents the same population and is carried through all steps of the sampling and analytical procedures in an identical manner. Field duplicate results are used to assess precision of the total method, including sampling, analysis, and site heterogeneity.

No samples were submitted as a field duplicate pair in association with this SDG.

SYSTEM PERFORMANCE AND OVERALL ASSESSMENT

Overall the laboratory data generated met the project goals and quality control criteria, with the exceptions identified in this report and as summarized in Table 1.

Table 1
Review Elements Summary

	Were acceptance criteria met?		
	Yes	No	
Volatiles		**Major**	**Minor**
Holding Time	x		
Method Blanks	x		
Storage Blanks	NA		
Trip Blanks	x		
Field Blanks	x		
Mass Spectrometer Tuning	x		
Calibration Response Factor	x		
Calibration Percent Relative Standard Deviation and Percent Difference	x		
Internal Standards	x		
Surrogates	x		
Compound Identification - Volatile	x		
Tentatively Identified Compounds - Volatile	NA		
Matrix Spike/Matrix Spike Duplicate	NA		
Laboratory Control Sample/Laboratory Control Sample Duplicate	x		
Other Quality Control Data out of Specification	x		
Field Duplicate	NA		

Major= Major data quality issue identified resulting in rejection of data.
Minor= Minor data quality issue identified resulting in the qualification of data. Data qualification should be used to inform the data users of data limitations.
NA = Not applicable

Table 2
Data Validation Qualifiers

Data Qualifier	Definition
U	The analyte was analyzed for but was not detected above the level of the reported sample quantitation limit.
J	The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
J+	The result is an estimated quantity, but the result may be biased high.
J-	The result is an estimated quantity, but the result may be biased low.
NJ	The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.
UJ	The analyte was analyzed for but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.
R	The data are unusable. The sample results are rejected due to serious deficiencies in meeting Quality Control (QC) criteria. The analyte may or may not be present in the sample.

ENVIRONMENTAL DATA SERVICES, LTD.

DATA USABILITY SUMMARY REPORT FOR VOLATILES

PROJECT: Northrop Grumman

CLIENT: HDR

LABORATORY: Eurofins TestAmerica, Edison

SAMPLE DELIVERY GROUP: 460-243519-1

SAMPLE DATES: September 23, 2021

The above sample delivery group (SDG) consists of the following samples:

Sample Identification	Laboratory Identification
DECHC05-VPB02-GW-720-722-0	460-243519-1
TB-20210923	460-243519-2

The samples described above were analyzed via USEPA SW-846 8260D to determine the concentrations of low/medium volatile organic analytes (VOAs).

Project specific quality assurance (QA) objectives, as well as the USEPA Region II SOP, Validating Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry SW-846 Method 8260B & 8260C, SOP NO. HW-24 Revision 4, September 2014 have been considered during validation of this data and its usability.

Table 1 provides a summary of major and minor data quality issues identified for this data set. All data are acceptable except those results which have been qualified with “R,” rejected. Data validation qualifiers along with associated descriptions are provided in Table 2. All data qualification related to this group of samples is detailed on the attached sheets.

Per USEPA Region 2 Validation Guidance, “All data users should note two facts. First, the "R" flag means that the associated value is unusable. In other words, due to significant quality control (QC) problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables even as a last resort. The second, no analyte concentration, even if it has passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data, but any value potentially contains error.”

HOLDING TIME/SAMPLE HANDLING

The amount of an analyte in a sample can change with time due to chemical instability, degradation, volatilization, etc. If the specified holding time is exceeded, the data may not be valid. Proper sample handling and preservation also play a role in the chemical stability of analytes in the sample matrix. If samples are not collected and stored using proper containers and/or preservatives, data may not be valid.

The samples in this delivery group were received by the laboratory within the proper temperature range as specified in the validation guidance.

The samples in this delivery group were prepared and analyzed within the holding time specified in the validation guidelines.

BLANK CONTAMINATION

Quality assurance blanks include method, storage, trip, field, or rinse blanks. Blanks are prepared to identify any contamination, which may have been introduced into the samples during preparation and analysis or field activity. Method and storage blanks measure laboratory contamination. Trip blanks measure cross contamination during shipment. Field and rinse blanks measure cross contamination during field operations.

Method Blanks

Method blanks were prepared and analyzed in association with the samples in this delivery group at the specified frequency. Upon examination of method blank data, no analyte was positively identified at a concentration equal to or above the method detection limit (MDL) in any associated method blank.

Storage Blanks

No storage blanks were submitted in association with this SDG.

Trip Blanks

Trip blank TB-20210923 was submitted in association with all samples in this SDG. No problems were found for this criterion.

Field Blanks

No samples were submitted as field blanks in association with this SDG.

MASS SPECTROMETER TUNING

Tuning and performance criteria are established to ensure adequate mass resolution, proper identification of compounds, and to some degree, sufficient instrument sensitivity. These criteria are not sample specific. Instrument performance is determined using standard materials. Therefore, these criteria should be met in all circumstances.

The tuning standard for volatiles is bromofluorobenzene (BFB).

All tunes associated with this SDG were fully compliant.

CALIBRATION

Satisfactory instrument calibration is established to ensure that the instrument is capable of producing acceptable quantitative results. The initial calibration curve demonstrates that the instrument is capable of giving acceptable performance at the beginning of an analytical sequence. The continuing calibration verifies that the instrument is continuing to provide satisfactory daily performance. Additionally, a continuing calibration is analyzed at the end of each 12-hour analytical sequence, denoted as a “closing” calibration verification, and ascertains acceptable performance at the conclusion of the analytical sequence.

Response Factor

The relative response factor (RRF) measures the instruments responses to specific chemical compounds. The RRFs for the VOA target compound list (TCL) compounds must be greater than the RRFs listed in Region II validation guidelines. A value less than the respective criteria indicates serious detection and quantitation problems. If the mean RRF of the initial calibration or the continuing calibration RRF is below the specified limit for any analyte, those analytes detected in environmental samples will be qualified as estimated. All non-detects for those analytes will be rejected.

The RRF values in all initial and continuing calibrations for method 8260D were found to be acceptable in all cases.

Percent Relative Standard Deviation and Percent Deviation

Percent relative standard deviation (%RSD) is calculated from the initial calibration and is used to indicate stability of a specific compound over the calibration range. Percent deviation (%D) compares the response factor of the continuing calibration with the mean response factor of the initial calibration. Therefore, %D is a measure of the instrument’s daily performance.

The following QC criteria have been applied for this project:

The %RSD of initial calibration must be ≤20%.

A %RSD value outside initial calibration limit indicates the potential for quantitation errors. For this reason, all positive results are qualified as estimated and non-detect results are qualified using professional judgement.

The %D for opening continuing calibration must be ≤30%.

A value outside these limits indicates the potential for detection and quantitation errors. For these reasons, all positive results are qualified as “J,” estimated, and non-detects are qualified with "UJ."

All initial calibration and continuing calibration %RSD and %D values were within defined QC criteria.

Please note, the laboratory did not perform closing continuing calibration verifications. Therefore, those criteria were not evaluated during validation. No qualification was applied on this basis.

INTERNAL STANDARDS PERFORMANCE

Internal standard performance criteria are meant to ensure that the gas chromatography/mass spectrometry (GC/MS) sensitivity and response are stable during every experimental run.

The internal standard area count must not vary by more than a factor of two from the associated continuing calibration standard. The retention time of the internal standard must not vary by more than +/- 30 seconds from the associated continuing calibration standard. The area count must be within -50% to +200% range of the associated standard. If area count is >200%, non-detected results are not qualified while positive results associated with the non-compliant internal standard are qualified "J," estimated. However, when an observed area count is <50%, positive results associated with the non-compliant are qualified "J," estimated, while non-detected results are rejected.

Internal standard area counts are within acceptance criteria for all samples.

SURROGATES

All samples are spiked with surrogate compounds prior to sample preparation and analyses to evaluate overall laboratory performance and efficiency of the analytical technique. The observed recovery must be within laboratory limits as outlined in the project specific validation guidance.

The reported sample analyses and method blank analyses had observed surrogate recoveries within the established acceptance limits in all cases.

COMPOUND IDENTIFICATION

Volatile

The project target analyte compounds are identified on the GC/MS by using the analytes relative retention time (RRT) and ion spectra. For the results to be a positive hit, the sample peak must be within $\pm$0.06 RRT units of the standard compound and have ion spectra which has a ratio of the primary and secondary ion intensities within 20% of that in the standard compound. In the cases where there is not an adequate ion spectrum match, the laboratory may have provided false positive identifications.

All samples were evaluated, and all identification criteria were met. Therefore, no analytes were qualified for compound identification.

Volatile Tentatively Identified Compounds

Tentatively Identified Compounds (TICs) were reported by the laboratory and reviewed for quality assurance. For all TIC results where there is presumptive evidence of a match, being greater than or equal to 85% match, the results are qualified “NJ,” tentatively identified. If the non-target compound is reported as an unknown, the result is qualified “J,” estimated. Likewise, if it is determined that the identification of a TIC is unacceptable, the tentative identification of the compound is changed to “unknown” and the result is qualified “J,” estimated.

Volatile TICs were not reported.

MATRIX SPIKE/MATRIX SPIKE DUPLICATE

The matrix spike and matrix spike duplicate (MS/MSD) are generated to determine the precision and accuracy of the analytical procedure in a given sample matrix.

No samples were submitted for MS/MSD evaluations in association with this SDG.

LABORATORY CONTROL SAMPLE/LABORATORY CONTROL SAMPLE DUPLICATE

The Laboratory Control Sample (LCS) is spiked with the same analytes at the same concentrations as the matrix spike. The LCS results are used to verify that the laboratory can perform the analysis in a clean matrix.

LCS evaluations were processed at the proper frequency. Upon evaluation of precision and accuracy criteria no issues were noted that would require qualification of sample results.

REPORTING

Dilutions, re-extractions, and other re-analyses were not present in the laboratory data package.

OTHER QUALITY CONTROL DATA OUT OF SPECIFICATION

None.

FIELD DUPLICATE

Field duplicates are two (or more) field samples collected at the same time in the same location. Each of the samples represents the same population and is carried through all steps of the sampling and analytical procedures in an identical manner. Field duplicate results are used to assess precision of the total method, including sampling, analysis, and site heterogeneity.

No samples were submitted as a field duplicate pair in association with this SDG.

SYSTEM PERFORMANCE AND OVERALL ASSESSMENT

Overall the laboratory data generated met the project goals and quality control criteria, with the exceptions identified in this report and as summarized in Table 1.

Table 1
Review Elements Summary

	Were acceptance criteria met?		
	Yes	No	
Volatiles		**Major**	**Minor**
Holding Time	x		
Method Blanks	x		
Storage Blanks	NA		
Trip Blanks	x		
Field Blanks	x		
Mass Spectrometer Tuning	x		
Calibration Response Factor	x		
Calibration Percent Relative Standard Deviation and Percent Difference	x		
Internal Standards	x		
Surrogates	x		
Compound Identification - Volatile	x		
Tentatively Identified Compounds - Volatile	NA		
Matrix Spike/Matrix Spike Duplicate	NA		
Laboratory Control Sample/Laboratory Control Sample Duplicate	x		
Other Quality Control Data out of Specification	x		
Field Duplicate	NA		

Major= Major data quality issue identified resulting in rejection of data.
Minor= Minor data quality issue identified resulting in the qualification of data. Data qualification should be used to inform the data users of data limitations.
NA = Not applicable

Table 2
Data Validation Qualifiers

Data Qualifier	Definition
U	The analyte was analyzed for but was not detected above the level of the reported sample quantitation limit.
J	The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
J+	The result is an estimated quantity, but the result may be biased high.
J-	The result is an estimated quantity, but the result may be biased low.
NJ	The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.
UJ	The analyte was analyzed for but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.
R	The data are unusable. The sample results are rejected due to serious deficiencies in meeting Quality Control (QC) criteria. The analyte may or may not be present in the sample.

ENVIRONMENTAL DATA SERVICES, LTD.

DATA USABILITY SUMMARY REPORT FOR VOLATILES

PROJECT: Northrop Grumman

CLIENT: HDR

LABORATORY: Eurofins TestAmerica, Edison

SAMPLE DELIVERY GROUP: 460-243680-1

SAMPLE DATES: September 24, 2021

The above sample delivery group (SDG) consists of the following samples:

Sample Identification	Laboratory Identification
DECHC05-VPB02-GW-760-762-0	460-243680-1
DECHC05-TB-09242021-0	460-243680-2

The samples described above were analyzed via USEPA SW-846 8260D to determine the concentrations of low/medium volatile organic analytes (VOAs).

Project specific quality assurance (QA) objectives, as well as the USEPA Region II SOP, Validating Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry SW-846 Method 8260B & 8260C, SOP NO. HW-24 Revision 4, September 2014 have been considered during validation of this data and its usability.

Table 1 provides a summary of major and minor data quality issues identified for this data set. All data are acceptable except those results which have been qualified with “R,” rejected. Data validation qualifiers along with associated descriptions are provided in Table 2. All data qualification related to this group of samples is detailed on the attached sheets.

Per USEPA Region 2 Validation Guidance, “All data users should note two facts. First, the "R" flag means that the associated value is unusable. In other words, due to significant quality control (QC) problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables even as a last resort. The second, no analyte concentration, even if it has passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data, but any value potentially contains error.”

HOLDING TIME/SAMPLE HANDLING

The amount of an analyte in a sample can change with time due to chemical instability, degradation, volatilization, etc. If the specified holding time is exceeded, the data may not be valid. Proper sample handling and preservation also play a role in the chemical stability of analytes in the sample matrix. If samples are not collected and stored using proper containers and/or preservatives, data may not be valid.

The samples in this delivery group were received by the laboratory within the proper temperature range as specified in the validation guidance.

The samples in this delivery group were prepared and analyzed within the holding time specified in the validation guidelines.

BLANK CONTAMINATION

Quality assurance blanks include method, storage, trip, field, or rinse blanks. Blanks are prepared to identify any contamination, which may have been introduced into the samples during preparation and analysis or field activity. Method and storage blanks measure laboratory contamination. Trip blanks measure cross contamination during shipment. Field and rinse blanks measure cross contamination during field operations.

Method Blanks

Method blanks were prepared and analyzed in association with the samples in this delivery group at the specified frequency. Upon examination of method blank data, no analyte was positively identified at a concentration equal to or above the method detection limit (MDL) in any associated method blank.

Storage Blanks

No storage blanks were submitted in association with this SDG.

Trip Blanks

Trip blank DECHC05-TB-09242021-0 was submitted in association with all samples in this SDG. No problems were found for this criterion.

Field Blanks

No samples were submitted as field blanks in association with this SDG.

MASS SPECTROMETER TUNING

Tuning and performance criteria are established to ensure adequate mass resolution, proper identification of compounds, and to some degree, sufficient instrument sensitivity. These criteria are not sample specific. Instrument performance is determined using standard materials. Therefore, these criteria should be met in all circumstances.

The tuning standard for volatiles is bromofluorobenzene (BFB).

All tunes associated with this SDG were fully compliant.

CALIBRATION

Satisfactory instrument calibration is established to ensure that the instrument is capable of producing acceptable quantitative results. The initial calibration curve demonstrates that the instrument is capable of giving acceptable performance at the beginning of an analytical sequence. The continuing calibration verifies that the instrument is continuing to provide satisfactory daily performance. Additionally, a continuing calibration is analyzed at the end of each 12-hour analytical sequence, denoted as a “closing” calibration verification, and ascertains acceptable performance at the conclusion of the analytical sequence.

Response Factor

The relative response factor (RRF) measures the instruments responses to specific chemical compounds. The RRFs for the VOA target compound list (TCL) compounds must be greater than the RRFs listed in Region II validation guidelines. A value less than the respective criteria indicates serious detection and quantitation problems. If the mean RRF of the initial calibration or the continuing calibration RRF is below the specified limit for any analyte, those analytes detected in environmental samples will be qualified as estimated. All non-detects for those analytes will be rejected.

The RRF values in all initial and continuing calibrations for method 8260D were found to be acceptable in all cases.

Percent Relative Standard Deviation and Percent Deviation

Percent relative standard deviation (%RSD) is calculated from the initial calibration and is used to indicate stability of a specific compound over the calibration range. Percent deviation (%D) compares the response factor of the continuing calibration with the mean response factor of the initial calibration. Therefore, %D is a measure of the instrument’s daily performance.

The following QC criteria have been applied for this project:

The %RSD of initial calibration must be ≤20%.

A %RSD value outside initial calibration limit indicates the potential for quantitation errors. For this reason, all positive results are qualified as estimated and non-detect results are qualified using professional judgement.

The %D for opening continuing calibration must be ≤30%.

A value outside these limits indicates the potential for detection and quantitation errors. For these reasons, all positive results are qualified as “J,” estimated, and non-detects are qualified with "UJ."

All initial calibration and continuing calibration %RSD and %D values were within defined QC criteria.

Please note, the laboratory did not perform closing continuing calibration verifications. Therefore, those criteria were not evaluated during validation. No qualification was applied on this basis.

INTERNAL STANDARDS PERFORMANCE

Internal standard performance criteria are meant to ensure that the gas chromatography/mass spectrometry (GC/MS) sensitivity and response are stable during every experimental run.

The internal standard area count must not vary by more than a factor of two from the associated continuing calibration standard. The retention time of the internal standard must not vary by more than +/- 30 seconds from the associated continuing calibration standard. The area count must be within -50% to +200% range of the associated standard. If area count is >200%, non-detected results are not qualified while positive results associated with the non-compliant internal standard are qualified "J," estimated. However, when an observed area count is <50%, positive results associated with the non-compliant are qualified "J," estimated, while non-detected results are rejected.

Internal standard area counts are within acceptance criteria for all samples.

SURROGATES

All samples are spiked with surrogate compounds prior to sample preparation and analyses to evaluate overall laboratory performance and efficiency of the analytical technique. The observed recovery must be within laboratory limits as outlined in the project specific validation guidance.

The reported sample analyses and method blank analyses had observed surrogate recoveries within the established acceptance limits in all cases.

COMPOUND IDENTIFICATION

Volatile

The project target analyte compounds are identified on the GC/MS by using the analytes relative retention time (RRT) and ion spectra. For the results to be a positive hit, the sample peak must be within $\pm$0.06 RRT units of the standard compound and have ion spectra which has a ratio of the primary and secondary ion intensities within 20% of that in the standard compound. In the cases where there is not an adequate ion spectrum match, the laboratory may have provided false positive identifications.

All samples were evaluated, and all identification criteria were met. Therefore, no analytes were qualified for compound identification.

Volatile Tentatively Identified Compounds

Tentatively Identified Compounds (TICs) were reported by the laboratory and reviewed for quality assurance. For all TIC results where there is presumptive evidence of a match, being greater than or equal to 85% match, the results are qualified “NJ,” tentatively identified. If the non-target compound is reported as an unknown, the result is qualified “J,” estimated. Likewise, if it is determined that the identification of a TIC is unacceptable, the tentative identification of the compound is changed to “unknown” and the result is qualified “J,” estimated.

Volatile TICs were not reported.

MATRIX SPIKE/MATRIX SPIKE DUPLICATE

The matrix spike and matrix spike duplicate (MS/MSD) are generated to determine the precision and accuracy of the analytical procedure in a given sample matrix.

No samples were submitted for MS/MSD evaluations in association with this SDG.

LABORATORY CONTROL SAMPLE/LABORATORY CONTROL SAMPLE DUPLICATE

The Laboratory Control Sample (LCS) is spiked with the same analytes at the same concentrations as the matrix spike. The LCS results are used to verify that the laboratory can perform the analysis in a clean matrix.

LCS evaluations were processed at the proper frequency. Upon evaluation of precision and accuracy criteria no issues were noted that would require qualification of sample results.

REPORTING

Dilutions, re-extractions, and other re-analyses were not present in the laboratory data package.

OTHER QUALITY CONTROL DATA OUT OF SPECIFICATION

None.

FIELD DUPLICATE

Field duplicates are two (or more) field samples collected at the same time in the same location. Each of the samples represents the same population and is carried through all steps of the sampling and analytical procedures in an identical manner. Field duplicate results are used to assess precision of the total method, including sampling, analysis, and site heterogeneity.

No samples were submitted as a field duplicate pair in association with this SDG.

SYSTEM PERFORMANCE AND OVERALL ASSESSMENT

Overall the laboratory data generated met the project goals and quality control criteria, with the exceptions identified in this report and as summarized in Table 1.

Table 1
Review Elements Summary

	Were acceptance criteria met?		
	Yes	No	
Volatiles		**Major**	**Minor**
Holding Time	x		
Method Blanks	x		
Storage Blanks	NA		
Trip Blanks	x		
Field Blanks	NA		
Mass Spectrometer Tuning	x		
Calibration Response Factor	x		
Calibration Percent Relative Standard Deviation and Percent Difference	x		
Internal Standards	x		
Surrogates	x		
Compound Identification - Volatile	x		
Tentatively Identified Compounds - Volatile	NA		
Matrix Spike/Matrix Spike Duplicate	NA		
Laboratory Control Sample/Laboratory Control Sample Duplicate	x		
Other Quality Control Data out of Specification	x		
Field Duplicate	NA		

Major= Major data quality issue identified resulting in rejection of data.
Minor= Minor data quality issue identified resulting in the qualification of data. Data qualification should be used to inform the data users of data limitations.
NA = Not applicable

Table 2
Data Validation Qualifiers

Data Qualifier	Definition
U	The analyte was analyzed for but was not detected above the level of the reported sample quantitation limit.
J	The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
J+	The result is an estimated quantity, but the result may be biased high.
J-	The result is an estimated quantity, but the result may be biased low.
NJ	The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.
UJ	The analyte was analyzed for but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.
R	The data are unusable. The sample results are rejected due to serious deficiencies in meeting Quality Control (QC) criteria. The analyte may or may not be present in the sample.

ENVIRONMENTAL DATA SERVICES, LTD.

DATA USABILITY SUMMARY REPORT FOR VOLATILES

PROJECT: Northrop Grumman

CLIENT: HDR

LABORATORY: Eurofins TestAmerica, Edison

SAMPLE DELIVERY GROUP: 460-243834-1

SAMPLE DATES: September 28, 2021

The above sample delivery group (SDG) consists of the following samples:

Sample Identification	Laboratory Identification
DECHC05-VPB02-GW-805-807-0	460-243834-1
DECHC05-VPB02-TB0928202	460-243834-2

The samples described above were analyzed via USEPA SW-846 8260D to determine the concentrations of low/medium volatile organic analytes (VOAs).

Project specific quality assurance (QA) objectives, as well as the USEPA Region II SOP, Validating Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry SW-846 Method 8260B & 8260C, SOP NO. HW-24 Revision 4, September 2014 have been considered during validation of this data and its usability.

Table 1 provides a summary of major and minor data quality issues identified for this data set. All data are acceptable except those results which have been qualified with “R,” rejected. Data validation qualifiers along with associated descriptions are provided in Table 2. All data qualification related to this group of samples is detailed on the attached sheets.

Per USEPA Region 2 Validation Guidance, “All data users should note two facts. First, the "R" flag means that the associated value is unusable. In other words, due to significant quality control (QC) problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables even as a last resort. The second, no analyte concentration, even if it has passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data, but any value potentially contains error.”

HOLDING TIME/SAMPLE HANDLING

The amount of an analyte in a sample can change with time due to chemical instability, degradation, volatilization, etc. If the specified holding time is exceeded, the data may not be valid. Proper sample handling and preservation also play a role in the chemical stability of analytes in the sample matrix. If samples are not collected and stored using proper containers and/or preservatives, data may not be valid.

The samples in this delivery group were received by the laboratory within the proper temperature range as specified in the validation guidance.

The samples in this delivery group were prepared and analyzed within the holding time specified in the validation guidelines.

BLANK CONTAMINATION

Quality assurance blanks include method, storage, trip, field, or rinse blanks. Blanks are prepared to identify any contamination, which may have been introduced into the samples during preparation and analysis or field activity. Method and storage blanks measure laboratory contamination. Trip blanks measure cross contamination during shipment. Field and rinse blanks measure cross contamination during field operations.

Method Blanks

Method blanks were prepared and analyzed in association with the samples in this delivery group at the specified frequency. Upon examination of method blank data, no analyte was positively identified at a concentration equal to or above the method detection limit (MDL) in any associated method blank.

Storage Blanks

No storage blanks were submitted in association with this SDG.

Trip Blanks

Trip blank DECHC05-VPB02-TB0928202 was submitted in association with all samples in this SDG. No problems were found for this criterion.

Field Blanks

No samples were submitted as field blanks in association with this SDG.

MASS SPECTROMETER TUNING

Tuning and performance criteria are established to ensure adequate mass resolution, proper identification of compounds, and to some degree, sufficient instrument sensitivity. These criteria are not sample specific. Instrument performance is determined using standard materials. Therefore, these criteria should be met in all circumstances.

The tuning standard for volatiles is bromofluorobenzene (BFB).

All tunes associated with this SDG were fully compliant.

CALIBRATION

Satisfactory instrument calibration is established to ensure that the instrument is capable of producing acceptable quantitative results. The initial calibration curve demonstrates that the instrument is capable of giving acceptable performance at the beginning of an analytical sequence. The continuing calibration verifies that the instrument is continuing to provide satisfactory daily performance. Additionally, a continuing calibration is analyzed at the end of each 12-hour analytical sequence, denoted as a “closing” calibration verification, and ascertains acceptable performance at the conclusion of the analytical sequence.

Response Factor

The relative response factor (RRF) measures the instruments responses to specific chemical compounds. The RRFs for the VOA target compound list (TCL) compounds must be greater than the RRFs listed in Region II validation guidelines. A value less than the respective criteria indicates serious detection and quantitation problems. If the mean RRF of the initial calibration or the continuing calibration RRF is below the specified limit for any analyte, those analytes detected in environmental samples will be qualified as estimated. All non-detects for those analytes will be rejected.

The RRF values in all initial and continuing calibrations for method 8260D were found to be acceptable in all cases.

Percent Relative Standard Deviation and Percent Deviation

Percent relative standard deviation (%RSD) is calculated from the initial calibration and is used to indicate stability of a specific compound over the calibration range. Percent deviation (%D) compares the response factor of the continuing calibration with the mean response factor of the initial calibration. Therefore, %D is a measure of the instrument’s daily performance.

The following QC criteria have been applied for this project:

The %RSD of initial calibration must be ≤20%.

A %RSD value outside initial calibration limit indicates the potential for quantitation errors. For this reason, all positive results are qualified as estimated and non-detect results are qualified using professional judgement.

The %D for opening continuing calibration must be ≤30%.

A value outside these limits indicates the potential for detection and quantitation errors. For these reasons, all positive results are qualified as “J,” estimated, and non-detects are qualified with "UJ."

All initial calibration and continuing calibration %RSD and %D values were within defined QC criteria with the following exceptions. The continuing calibration associated with all samples in this SDG exhibited non-compliant %Ds for dichlorodifluoromethane and chloromethane. Results reported for the impacted analytes in the associated samples have been qualified “UJ” on this basis.

Please note, the laboratory did not perform closing continuing calibration verifications. Therefore, those criteria were not evaluated during validation. No qualification was applied on this basis.

INTERNAL STANDARDS PERFORMANCE

Internal standard performance criteria are meant to ensure that the gas chromatography/mass spectrometry (GC/MS) sensitivity and response are stable during every experimental run.

The internal standard area count must not vary by more than a factor of two from the associated continuing calibration standard. The retention time of the internal standard must not vary by more than +/- 30 seconds from the associated continuing calibration standard. The area count must be within -50% to +200% range of the associated standard. If area count is >200%, non-detected results are not qualified while positive results associated with the non-compliant internal standard are qualified "J," estimated. However, when an observed area count is <50%, positive results associated with the non-compliant are qualified "J," estimated, while non-detected results are rejected.

Internal standard area counts are within acceptance criteria for all samples.

SURROGATES

All samples are spiked with surrogate compounds prior to sample preparation and analyses to evaluate overall laboratory performance and efficiency of the analytical technique. The observed recovery must be within laboratory limits as outlined in the project specific validation guidance.

The reported sample analyses and method blank analyses had observed surrogate recoveries within the established acceptance limits in all cases.

COMPOUND IDENTIFICATION

Volatile

The project target analyte compounds are identified on the GC/MS by using the analytes relative retention time (RRT) and ion spectra. For the results to be a positive hit, the sample peak must be within $\pm$0.06 RRT units of the standard compound and have ion spectra which has a ratio of the primary and secondary ion intensities within 20% of that in the standard compound. In the cases where there is not an adequate ion spectrum match, the laboratory may have provided false positive identifications.

All samples were evaluated, and all identification criteria were met. Therefore, no analytes were qualified for compound identification.

Volatile Tentatively Identified Compounds

Tentatively Identified Compounds (TICs) were reported by the laboratory and reviewed for quality assurance. For all TIC results where there is presumptive evidence of a match, being greater than or equal to 85% match, the results are qualified “NJ,” tentatively identified. If the non-target compound is reported as an unknown, the result is qualified “J,” estimated. Likewise, if it is determined that the identification of a TIC is unacceptable, the tentative identification of the compound is changed to “unknown” and the result is qualified “J,” estimated.

Volatile TICs were not reported.

MATRIX SPIKE/MATRIX SPIKE DUPLICATE

The matrix spike and matrix spike duplicate (MS/MSD) are generated to determine the precision and accuracy of the analytical procedure in a given sample matrix.

No samples were submitted for MS/MSD evaluations in association with this SDG.

LABORATORY CONTROL SAMPLE/LABORATORY CONTROL SAMPLE DUPLICATE

The Laboratory Control Sample (LCS) is spiked with the same analytes at the same concentrations as the matrix spike. The LCS results are used to verify that the laboratory can perform the analysis in a clean matrix.

LCS evaluations were processed at the proper frequency. Upon evaluation of precision and accuracy criteria no issues were noted that would require qualification of sample results.

REPORTING

Dilutions, re-extractions, and other re-analyses were not present in the laboratory data package.

OTHER QUALITY CONTROL DATA OUT OF SPECIFICATION

None.

FIELD DUPLICATE

Field duplicates are two (or more) field samples collected at the same time in the same location. Each of the samples represents the same population and is carried through all steps of the sampling and analytical procedures in an identical manner. Field duplicate results are used to assess precision of the total method, including sampling, analysis, and site heterogeneity.

No samples were submitted as a field duplicate pair in association with this SDG.

SYSTEM PERFORMANCE AND OVERALL ASSESSMENT

Overall the laboratory data generated met the project goals and quality control criteria, with the exceptions identified in this report and as summarized in Table 1.

Table 1
Review Elements Summary

	Were acceptance criteria met?		
	Yes	No	
Volatiles		**Major**	**Minor**
Holding Time	x		
Method Blanks	x		
Storage Blanks	NA		
Trip Blanks	x		
Field Blanks	x		
Mass Spectrometer Tuning	x		
Calibration Response Factor	x		
Calibration Percent Relative Standard Deviation and Percent Difference			x
Internal Standards	x		
Surrogates	x		
Compound Identification - Volatile	x		
Tentatively Identified Compounds - Volatile	NA		
Matrix Spike/Matrix Spike Duplicate	NA		
Laboratory Control Sample/Laboratory Control Sample Duplicate	x		
Other Quality Control Data out of Specification	x		
Field Duplicate	NA		

Major= Major data quality issue identified resulting in rejection of data.
Minor= Minor data quality issue identified resulting in the qualification of data. Data qualification should be used to inform the data users of data limitations.
NA = Not applicable

Table 2
Data Validation Qualifiers

Data Qualifier	Definition
U	The analyte was analyzed for but was not detected above the level of the reported sample quantitation limit.
J	The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
J+	The result is an estimated quantity, but the result may be biased high.
J-	The result is an estimated quantity, but the result may be biased low.
NJ	The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.
UJ	The analyte was analyzed for but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.
R	The data are unusable. The sample results are rejected due to serious deficiencies in meeting Quality Control (QC) criteria. The analyte may or may not be present in the sample.

ENVIRONMENTAL DATA SERVICES, LTD.

DATA USABILITY SUMMARY REPORT FOR VOLATILES

PROJECT: Northrop Grumman

CLIENT: HDR

LABORATORY: Eurofins TestAmerica, Edison

SAMPLE DELIVERY GROUP: 460-243951-1

SAMPLE DATES: September 29, 2021

The above sample delivery group (SDG) consists of the following samples:

Sample Identification	Laboratory Identification
DECHCOS-VPB02-GW-825-827-0	460-243951-1
DECHCOS-TB20210928-0	460-243951-2

The samples described above were analyzed via USEPA SW-846 8260D to determine the concentrations of low/medium volatile organic analytes (VOAs).

Project specific quality assurance (QA) objectives, as well as the USEPA Region II SOP, Validating Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry SW-846 Method 8260B & 8260C, SOP NO. HW-24 Revision 4, September 2014 have been considered during validation of this data and its usability.

Table 1 provides a summary of major and minor data quality issues identified for this data set. All data are acceptable except those results which have been qualified with “R,” rejected. Data validation qualifiers along with associated descriptions are provided in Table 2. All data qualification related to this group of samples is detailed on the attached sheets.

Per USEPA Region 2 Validation Guidance, “All data users should note two facts. First, the "R" flag means that the associated value is unusable. In other words, due to significant quality control (QC) problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables even as a last resort. The second, no analyte concentration, even if it has passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data, but any value potentially contains error.”

HOLDING TIME/SAMPLE HANDLING

The amount of an analyte in a sample can change with time due to chemical instability, degradation, volatilization, etc. If the specified holding time is exceeded, the data may not be valid. Proper sample handling and preservation also play a role in the chemical stability of analytes in the sample matrix. If samples are not collected and stored using proper containers and/or preservatives, data may not be valid.

The samples in this delivery group were received by the laboratory within the proper temperature range as specified in the validation guidance.

The samples in this delivery group were prepared and analyzed within the holding time specified in the validation guidelines.

BLANK CONTAMINATION

Quality assurance blanks include method, storage, trip, field, or rinse blanks. Blanks are prepared to identify any contamination, which may have been introduced into the samples during preparation and analysis or field activity. Method and storage blanks measure laboratory contamination. Trip blanks measure cross contamination during shipment. Field and rinse blanks measure cross contamination during field operations.

Method Blanks

Method blanks were prepared and analyzed in association with the samples in this delivery group at the specified frequency. Upon examination of method blank data, no analyte was positively identified at a concentration equal to or above the method detection limit (MDL) in any associated method blank.

Storage Blanks

No storage blanks were submitted in association with this SDG.

Trip Blanks

Trip blank DECHC05-VPB02-TB0928202 was submitted in association with all samples in this SDG. No problems were found for this criterion.

Field Blanks

No samples were submitted as field blanks in association with this SDG.

MASS SPECTROMETER TUNING

Tuning and performance criteria are established to ensure adequate mass resolution, proper identification of compounds, and to some degree, sufficient instrument sensitivity. These criteria are not sample specific. Instrument performance is determined using standard materials. Therefore, these criteria should be met in all circumstances.

The tuning standard for volatiles is bromofluorobenzene (BFB).

All tunes associated with this SDG were fully compliant.

CALIBRATION

Satisfactory instrument calibration is established to ensure that the instrument is capable of producing acceptable quantitative results. The initial calibration curve demonstrates that the instrument is capable of giving acceptable performance at the beginning of an analytical sequence. The continuing calibration verifies that the instrument is continuing to provide satisfactory daily performance. Additionally, a continuing calibration is analyzed at the end of each 12-hour analytical sequence, denoted as a “closing” calibration verification, and ascertains acceptable performance at the conclusion of the analytical sequence.

Response Factor

The relative response factor (RRF) measures the instruments responses to specific chemical compounds. The RRFs for the VOA target compound list (TCL) compounds must be greater than the RRFs listed in Region II validation guidelines. A value less than the respective criteria indicates serious detection and quantitation problems. If the mean RRF of the initial calibration or the continuing calibration RRF is below the specified limit for any analyte, those analytes detected in environmental samples will be qualified as estimated. All non-detects for those analytes will be rejected.

The RRF values in all initial and continuing calibrations for method 8260D were found to be acceptable in all cases.

Percent Relative Standard Deviation and Percent Deviation

Percent relative standard deviation (%RSD) is calculated from the initial calibration and is used to indicate stability of a specific compound over the calibration range. Percent deviation (%D) compares the response factor of the continuing calibration with the mean response factor of the initial calibration. Therefore, %D is a measure of the instrument’s daily performance.

The following QC criteria have been applied for this project:

The %RSD of initial calibration must be ≤20%.

A %RSD value outside initial calibration limit indicates the potential for quantitation errors. For this reason, all positive results are qualified as estimated and non-detect results are qualified using professional judgement.

The %D for opening continuing calibration must be ≤30%.

A value outside these limits indicates the potential for detection and quantitation errors. For these reasons, all positive results are qualified as “J,” estimated, and non-detects are qualified with "UJ."

All initial calibration and continuing calibration %RSD and %D values were within defined QC criteria with the following exceptions. The continuing calibration associated with sample DECHCOS-TB20210928-0 exhibited non-compliant %Ds for chloromethane, carbon tetrachloride, and bromoform. The non-detected results reported for the impacted analytes in the associated samples have been qualified “UJ” on this basis.

Please note, the laboratory did not perform closing continuing calibration verifications. Therefore, those criteria were not evaluated during validation. No qualification was applied on this basis.

INTERNAL STANDARDS PERFORMANCE

Internal standard performance criteria are meant to ensure that the gas chromatography/mass spectrometry (GC/MS) sensitivity and response are stable during every experimental run.

The internal standard area count must not vary by more than a factor of two from the associated continuing calibration standard. The retention time of the internal standard must not vary by more than +/- 30 seconds from the associated continuing calibration standard. The area count must be within -50% to +200% range of the associated standard. If area count is >200%, non-detected results are not qualified while positive results associated with the non-compliant internal standard are qualified "J," estimated. However, when an observed area count is <50%, positive results associated with the non-compliant are qualified "J," estimated, while non-detected results are rejected.

Internal standard area counts are within acceptance criteria for all samples.

SURROGATES

All samples are spiked with surrogate compounds prior to sample preparation and analyses to evaluate overall laboratory performance and efficiency of the analytical technique. The observed recovery must be within laboratory limits as outlined in the project specific validation guidance.

The reported sample analyses and method blank analyses had observed surrogate recoveries within the established acceptance limits in all cases.

COMPOUND IDENTIFICATION

Volatile

The project target analyte compounds are identified on the GC/MS by using the analytes relative retention time (RRT) and ion spectra. For the results to be a positive hit, the sample peak must be within $\pm$0.06 RRT units of the standard compound and have ion spectra which has a ratio of the primary and secondary ion intensities within 20% of that in the standard compound. In the cases where there is not an adequate ion spectrum match, the laboratory may have provided false positive identifications.

All samples were evaluated, and all identification criteria were met. Therefore, no analytes were qualified for compound identification.

Volatile Tentatively Identified Compounds

Tentatively Identified Compounds (TICs) were reported by the laboratory and reviewed for quality assurance. For all TIC results where there is presumptive evidence of a match, being greater than or equal to 85% match, the results are qualified “NJ,” tentatively identified. If the non-target compound is reported as an unknown, the result is qualified “J,” estimated. Likewise, if it is determined that the identification of a TIC is unacceptable, the tentative identification of the compound is changed to “unknown” and the result is qualified “J,” estimated.

Volatile TICs were not reported.

MATRIX SPIKE/MATRIX SPIKE DUPLICATE

The matrix spike and matrix spike duplicate (MS/MSD) are generated to determine the precision and accuracy of the analytical procedure in a given sample matrix.

No samples were submitted for MS/MSD evaluations in association with this SDG.

LABORATORY CONTROL SAMPLE/LABORATORY CONTROL SAMPLE DUPLICATE

The Laboratory Control Sample (LCS) is spiked with the same analytes at the same concentrations as the matrix spike. The LCS results are used to verify that the laboratory can perform the analysis in a clean matrix.

LCS evaluations were processed at the proper frequency. Upon evaluation of precision and accuracy criteria no issues were noted that would require qualification of sample results with the following exceptions.

The observed recovery for 2-hexanone was lower than the lowest acceptance limit during both the LCS and LCS duplicate evaluations. Low bias is indicated and the non-detected 2-hexanone result reported for sample DECHC05-MW-01-IDW has been qualified “UJ” on this basis.

The observed recovery for trans-1,3-dichloropropene was higher than the highest acceptance limit during both the LCS and LCS duplicate evaluations. High bias is indicated. The non-detected trans-1,3-dichloropropene has been evaluated and did not require qualification on this basis.

REPORTING

Dilutions, re-extractions, and other re-analyses were not present in the laboratory data package.

OTHER QUALITY CONTROL DATA OUT OF SPECIFICATION

None.

FIELD DUPLICATE

Field duplicates are two (or more) field samples collected at the same time in the same location. Each of the samples represents the same population and is carried through all steps of the sampling and analytical procedures in an identical manner. Field duplicate results are used to assess precision of the total method, including sampling, analysis, and site heterogeneity.

No samples were submitted as a field duplicate pair in association with this SDG.

SYSTEM PERFORMANCE AND OVERALL ASSESSMENT

Overall the laboratory data generated met the project goals and quality control criteria, with the exceptions identified in this report and as summarized in Table 1.

Table 1
Review Elements Summary

	Were acceptance criteria met?		
	Yes	No	
Volatiles		**Major**	**Minor**
Holding Time	x		
Method Blanks	x		
Storage Blanks	NA		
Trip Blanks	x		
Field Blanks	x		
Mass Spectrometer Tuning	x		
Calibration Response Factor	x		
Calibration Percent Relative Standard Deviation and Percent Difference			x
Internal Standards	x		
Surrogates	x		
Compound Identification - Volatile	x		
Tentatively Identified Compounds - Volatile	NA		
Matrix Spike/Matrix Spike Duplicate	NA		
Laboratory Control Sample/Laboratory Control Sample Duplicate			x
Other Quality Control Data out of Specification	x		
Field Duplicate	NA		

Major= Major data quality issue identified resulting in rejection of data.
Minor= Minor data quality issue identified resulting in the qualification of data. Data qualification should be used to inform the data users of data limitations.
NA = Not applicable

Table 2
Data Validation Qualifiers

Data Qualifier	Definition
U	The analyte was analyzed for but was not detected above the level of the reported sample quantitation limit.
J	The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
J+	The result is an estimated quantity, but the result may be biased high.
J-	The result is an estimated quantity, but the result may be biased low.
NJ	The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.
UJ	The analyte was analyzed for but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.
R	The data are unusable. The sample results are rejected due to serious deficiencies in meeting Quality Control (QC) criteria. The analyte may or may not be present in the sample.

ENVIRONMENTAL DATA SERVICES, LTD.

DATA USABILITY SUMMARY REPORT FOR VOLATILES

PROJECT: Northrop Grumman

CLIENT: HDR

LABORATORY: Eurofins TestAmerica, Edison

SAMPLE DELIVERY GROUP: 460-244028-1

SAMPLE DATES: September 30, 2021

The above sample delivery group (SDG) consists of the following samples:

Sample Identification	Laboratory Identification
DECHC05-VPB02-GW-850-852-0	460-244028-1
DECHC05-TB20210930-0	460-244028-2

The samples described above were analyzed via USEPA SW-846 8260D to determine the concentrations of low/medium volatile organic analytes (VOAs).

Project specific quality assurance (QA) objectives, as well as the USEPA Region II SOP, Validating Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry SW-846 Method 8260B & 8260C, SOP NO. HW-24 Revision 4, September 2014 have been considered during validation of this data and its usability.

Table 1 provides a summary of major and minor data quality issues identified for this data set. All data are acceptable except those results which have been qualified with “R,” rejected. Data validation qualifiers along with associated descriptions are provided in Table 2. All data qualification related to this group of samples is detailed on the attached sheets.

Per USEPA Region 2 Validation Guidance, “All data users should note two facts. First, the "R" flag means that the associated value is unusable. In other words, due to significant quality control (QC) problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables even as a last resort. The second, no analyte concentration, even if it has passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data, but any value potentially contains error.”

HOLDING TIME/SAMPLE HANDLING

The amount of an analyte in a sample can change with time due to chemical instability, degradation, volatilization, etc. If the specified holding time is exceeded, the data may not be valid. Proper sample handling and preservation also play a role in the chemical stability of analytes in the sample matrix. If samples are not collected and stored using proper containers and/or preservatives, data may not be valid.

The samples in this delivery group were received by the laboratory within the proper temperature range as specified in the validation guidance.

The samples in this delivery group were prepared and analyzed within the holding time specified in the validation guidelines.

BLANK CONTAMINATION

Quality assurance blanks include method, storage, trip, field, or rinse blanks. Blanks are prepared to identify any contamination, which may have been introduced into the samples during preparation and analysis or field activity. Method and storage blanks measure laboratory contamination. Trip blanks measure cross contamination during shipment. Field and rinse blanks measure cross contamination during field operations.

Method Blanks

Method blanks were prepared and analyzed in association with the samples in this delivery group at the specified frequency. Upon examination of method blank data, no analyte was positively identified at a concentration equal to or above the method detection limit (MDL) in any associated method blank.

Storage Blanks

No storage blanks were submitted in association with this SDG.

Trip Blanks

Trip blank DECHC05-TB20210930-0 was submitted in association with all samples in this SDG. No problems were found for this criterion.

Field Blanks

No samples were submitted as field blanks in association with this SDG.

MASS SPECTROMETER TUNING

Tuning and performance criteria are established to ensure adequate mass resolution, proper identification of compounds, and to some degree, sufficient instrument sensitivity. These criteria are not sample specific. Instrument performance is determined using standard materials. Therefore, these criteria should be met in all circumstances.

The tuning standard for volatiles is bromofluorobenzene (BFB).

All tunes associated with this SDG were fully compliant.

CALIBRATION

Satisfactory instrument calibration is established to ensure that the instrument is capable of producing acceptable quantitative results. The initial calibration curve demonstrates that the instrument is capable of giving acceptable performance at the beginning of an analytical sequence. The continuing calibration verifies that the instrument is continuing to provide satisfactory daily performance. Additionally, a continuing calibration is analyzed at the end of each 12-hour analytical sequence, denoted as a “closing” calibration verification, and ascertains acceptable performance at the conclusion of the analytical sequence.

Response Factor

The relative response factor (RRF) measures the instruments responses to specific chemical compounds. The RRFs for the VOA target compound list (TCL) compounds must be greater than the RRFs listed in Region II validation guidelines. A value less than the respective criteria indicates serious detection and quantitation problems. If the mean RRF of the initial calibration or the continuing calibration RRF is below the specified limit for any analyte, those analytes detected in environmental samples will be qualified as estimated. All non-detects for those analytes will be rejected.

The RRF values in all initial and continuing calibrations for method 8260D were found to be acceptable in all cases.

Percent Relative Standard Deviation and Percent Deviation

Percent relative standard deviation (%RSD) is calculated from the initial calibration and is used to indicate stability of a specific compound over the calibration range. Percent deviation (%D) compares the response factor of the continuing calibration with the mean response factor of the initial calibration. Therefore, %D is a measure of the instrument’s daily performance.

The following QC criteria have been applied for this project:

The %RSD of initial calibration must be ≤20%.

A %RSD value outside initial calibration limit indicates the potential for quantitation errors. For this reason, all positive results are qualified as estimated and non-detect results are qualified using professional judgement.

The %D for opening continuing calibration must be ≤30%.

A value outside these limits indicates the potential for detection and quantitation errors. For these reasons, all positive results are qualified as “J,” estimated, and non-detects are qualified with "UJ."

All initial calibration and continuing calibration %RSD and %D values were within defined QC criteria with the following exceptions. The continuing calibration associated with all samples in this SDG exhibited a non-compliant %D for 1,1,2-trichloro-1,2,2,trifluoroethane. The non-detected results reported for 1,1,2-trichloro-1,2,2-trifluoroethane in the associated samples have been qualified “UJ” on this basis.

INTERNAL STANDARDS PERFORMANCE

Internal standard performance criteria are meant to ensure that the gas chromatography/mass spectrometry (GC/MS) sensitivity and response are stable during every experimental run.

The internal standard area count must not vary by more than a factor of two from the associated continuing calibration standard. The retention time of the internal standard must not vary by more than +/- 30 seconds from the associated continuing calibration standard. The area count must be within -50% to +200% range of the associated standard. If area count is >200%, non-detected results are not qualified while positive results associated with the non-compliant internal standard are qualified "J," estimated. However, when an observed area count is <50%, positive results associated with the non-compliant are qualified "J," estimated, while non-detected results are rejected.

Internal standard area counts are within acceptance criteria for all samples.

SURROGATES

All samples are spiked with surrogate compounds prior to sample preparation and analyses to evaluate overall laboratory performance and efficiency of the analytical technique. The observed recovery must be within laboratory limits as outlined in the project specific validation guidance.

The reported sample analyses and method blank analyses had observed surrogate recoveries within the established acceptance limits in all cases.

COMPOUND IDENTIFICATION

Volatile

The project target analyte compounds are identified on the GC/MS by using the analytes relative retention time (RRT) and ion spectra. For the results to be a positive hit, the sample peak must be within $\pm$0.06 RRT units of the standard compound and have ion spectra which has a ratio of the primary and secondary ion intensities within 20% of that in the standard compound. In the cases where there is not an adequate ion spectrum match, the laboratory may have provided false positive identifications.

All samples were evaluated, and all identification criteria were met. Therefore, no analytes were qualified for compound identification.

Volatile Tentatively Identified Compounds

Tentatively Identified Compounds (TICs) were reported by the laboratory and reviewed for quality assurance. For all TIC results where there is presumptive evidence of a match, being greater than or equal to 85% match, the results are qualified “NJ,” tentatively identified. If the non-target compound is reported as an unknown, the result is qualified “J,” estimated. Likewise, if it is determined that the identification of a TIC is unacceptable, the tentative identification of the compound is changed to “unknown” and the result is qualified “J,” estimated.

Volatile TICs were not reported.

MATRIX SPIKE/MATRIX SPIKE DUPLICATE

The matrix spike and matrix spike duplicate (MS/MSD) are generated to determine the precision and accuracy of the analytical procedure in a given sample matrix.

Sample DECHC05-VPB02-GW-850-852-0 was submitted for MS/MSD evaluations in association with this SDG. Upon evaluation all precision and accuracy indicators were favorable or did not require result qualification with the following exceptions. The analytes listed below exhibited recoveries lower than the lowest acceptance limit.

2-hexanone	cyclohexane
1,2,4-trichlorobenzene	methylcyclohexane

The non-detected results reported for the analytes listed above in the parent sample have been qualified “UJ” on this basis.

LABORATORY CONTROL SAMPLE/LABORATORY CONTROL SAMPLE DUPLICATE

The Laboratory Control Sample (LCS) is spiked with the same analytes at the same concentrations as the matrix spike. The LCS results are used to verify that the laboratory can perform the analysis in a clean matrix.

LCS evaluations were processed at the proper frequency. Upon evaluation of precision and accuracy criteria no issues were noted that would require qualification of sample results with the following exceptions.

The observed recovery for 2-hexanone was lower than the lowest acceptance limit during one LCS evaluation. Low bias is indicated and the non-detected 2-hexanone result reported for all samples in this SDG have been qualified “UJ” on this basis.

The observed recovery for trans-1,3-dichloropropene was higher than the highest acceptance limit during one LCS evaluation. The non-detected results reported did not require qualification based on validation guidance on this basis.

REPORTING

Dilutions, re-extractions, and other re-analyses were not present in the laboratory data package.

OTHER QUALITY CONTROL DATA OUT OF SPECIFICATION

None.

FIELD DUPLICATE

Field duplicates are two (or more) field samples collected at the same time in the same location. Each of the samples represents the same population and is carried through all steps of the sampling and analytical procedures in an identical manner. Field duplicate results are used to assess precision of the total method, including sampling, analysis, and site heterogeneity.

No samples were submitted as a field duplicate pair in association with this SDG.

SYSTEM PERFORMANCE AND OVERALL ASSESSMENT

Overall the laboratory data generated met the project goals and quality control criteria, with the exceptions identified in this report and as summarized in Table 1.

Table 1
Review Elements Summary

	Were acceptance criteria met?		
	Yes	No	
Volatiles		**Major**	**Minor**
Holding Time	x		
Method Blanks	x		
Storage Blanks	NA		
Trip Blanks	x		
Field Blanks	x		
Mass Spectrometer Tuning	x		
Calibration Response Factor	x		
Calibration Percent Relative Standard Deviation and Percent Difference			x
Internal Standards	x		
Surrogates	x		
Compound Identification - Volatile	x		
Tentatively Identified Compounds - Volatile	NA		
Matrix Spike/Matrix Spike Duplicate			x
Laboratory Control Sample/Laboratory Control Sample Duplicate			x
Other Quality Control Data out of Specification	x		
Field Duplicate	NA		

Major= Major data quality issue identified resulting in rejection of data.
Minor= Minor data quality issue identified resulting in the qualification of data. Data qualification should be used to inform the data users of data limitations.
NA = Not applicable

Table 2
Data Validation Qualifiers

Data Qualifier	Definition
U	The analyte was analyzed for but was not detected above the level of the reported sample quantitation limit.
J	The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
J+	The result is an estimated quantity, but the result may be biased high.
J-	The result is an estimated quantity, but the result may be biased low.
NJ	The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.
UJ	The analyte was analyzed for but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.
R	The data are unusable. The sample results are rejected due to serious deficiencies in meeting Quality Control (QC) criteria. The analyte may or may not be present in the sample.

ENVIRONMENTAL DATA SERVICES, LTD.

DATA USABILITY SUMMARY REPORT FOR VOLATILES

PROJECT: Northrop Grumman

CLIENT: HDR

LABORATORY: Eurofins TestAmerica, Edison

SAMPLE DELIVERY GROUP: 460-244142-1

SAMPLE DATES: September 30, 2021

The above sample delivery group (SDG) consists of the following samples:

Sample Identification	Laboratory Identification
DECHC05-VPB02-GW-860-862-0	460-244142-1
DECHC05-VPB02-GW-860-862-1	460-244142-2
DECHC05-TB20211001	460-244142-3

The samples described above were analyzed via USEPA SW-846 8260D to determine the concentrations of low/medium volatile organic analytes (VOAs).

Project specific quality assurance (QA) objectives, as well as the USEPA Region II SOP, Validating Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry SW-846 Method 8260B & 8260C, SOP NO. HW-24 Revision 4, September 2014 have been considered during validation of this data and its usability.

Table 1 provides a summary of major and minor data quality issues identified for this data set. All data are acceptable except those results which have been qualified with “R,” rejected. Data validation qualifiers along with associated descriptions are provided in Table 2. All data qualification related to this group of samples is detailed on the attached sheets.

Per USEPA Region 2 Validation Guidance, “All data users should note two facts. First, the "R" flag means that the associated value is unusable. In other words, due to significant quality control (QC) problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables even as a last resort. The second, no analyte concentration, even if it has passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data, but any value potentially contains error.”

HOLDING TIME/SAMPLE HANDLING

The amount of an analyte in a sample can change with time due to chemical instability, degradation, volatilization, etc. If the specified holding time is exceeded, the data may not be valid. Proper sample handling and preservation also play a role in the chemical stability of analytes in the sample matrix. If samples are not collected and stored using proper containers and/or preservatives, data may not be valid.

The samples in this delivery group were received by the laboratory within the proper temperature range as specified in the validation guidance.

The samples in this delivery group were prepared and analyzed within the holding time specified in the validation guidelines.

BLANK CONTAMINATION

Quality assurance blanks include method, storage, trip, field, or rinse blanks. Blanks are prepared to identify any contamination, which may have been introduced into the samples during preparation and analysis or field activity. Method and storage blanks measure laboratory contamination. Trip blanks measure cross contamination during shipment. Field and rinse blanks measure cross contamination during field operations.

Method Blanks

Method blanks were prepared and analyzed in association with the samples in this delivery group at the specified frequency. Upon examination of method blank data, no analyte was positively identified at a concentration equal to or above the method detection limit (MDL) in any associated method blank.

Storage Blanks

No storage blanks were submitted in association with this SDG.

Trip Blanks

Trip blank DECHC05-TB20211001 was submitted in association with all samples in this SDG. No problems were found for this criterion.

Field Blanks

No samples were submitted as field blanks in association with this SDG.

MASS SPECTROMETER TUNING

Tuning and performance criteria are established to ensure adequate mass resolution, proper identification of compounds, and to some degree, sufficient instrument sensitivity. These criteria are not sample specific. Instrument performance is determined using standard materials. Therefore, these criteria should be met in all circumstances.

The tuning standard for volatiles is bromofluorobenzene (BFB).

All tunes associated with this SDG were fully compliant.

CALIBRATION

Satisfactory instrument calibration is established to ensure that the instrument is capable of producing acceptable quantitative results. The initial calibration curve demonstrates that the instrument is capable of giving acceptable performance at the beginning of an analytical sequence. The continuing calibration verifies that the instrument is continuing to provide satisfactory daily performance. Additionally, a continuing calibration is analyzed at the end of each 12-hour analytical sequence, denoted as a “closing” calibration verification, and ascertains acceptable performance at the conclusion of the analytical sequence.

Response Factor

The relative response factor (RRF) measures the instruments responses to specific chemical compounds. The RRFs for the VOA target compound list (TCL) compounds must be greater than the RRFs listed in Region II validation guidelines. A value less than the respective criteria indicates serious detection and quantitation problems. If the mean RRF of the initial calibration or the continuing calibration RRF is below the specified limit for any analyte, those analytes detected in environmental samples will be qualified as estimated. All non-detects for those analytes will be rejected.

The RRF values in all initial and continuing calibrations for method 8260D were found to be acceptable in all cases.

Percent Relative Standard Deviation and Percent Deviation

Percent relative standard deviation (%RSD) is calculated from the initial calibration and is used to indicate stability of a specific compound over the calibration range. Percent deviation (%D) compares the response factor of the continuing calibration with the mean response factor of the initial calibration. Therefore, %D is a measure of the instrument’s daily performance.

The following QC criteria have been applied for this project:

The %RSD of initial calibration must be ≤20%.

A %RSD value outside initial calibration limit indicates the potential for quantitation errors. For this reason, all positive results are qualified as estimated and non-detect results are qualified using professional judgement.

The %D for opening continuing calibration must be ≤30%.

A value outside these limits indicates the potential for detection and quantitation errors. For these reasons, all positive results are qualified as “J,” estimated, and non-detects are qualified with "UJ."

All initial calibration and continuing calibration %RSD and %D values were within defined QC criteria.

INTERNAL STANDARDS PERFORMANCE

Internal standard performance criteria are meant to ensure that the gas chromatography/mass spectrometry (GC/MS) sensitivity and response are stable during every experimental run.

The internal standard area count must not vary by more than a factor of two from the associated continuing calibration standard. The retention time of the internal standard must not vary by more than +/- 30 seconds from the associated continuing calibration standard. The area count must be within -50% to +200% range of the associated standard. If area count is >200%, non-detected results are not qualified while positive results associated with the non-compliant internal standard are qualified "J," estimated. However, when an observed area count is <50%, positive results associated with the non-compliant are qualified "J," estimated, while non-detected results are rejected.

Internal standard area counts are within acceptance criteria for all samples.

SURROGATES

All samples are spiked with surrogate compounds prior to sample preparation and analyses to evaluate overall laboratory performance and efficiency of the analytical technique. The observed recovery must be within laboratory limits as outlined in the project specific validation guidance.

The reported sample analyses and method blank analyses had observed surrogate recoveries within the established acceptance limits in all cases.

COMPOUND IDENTIFICATION

Volatile

The project target analyte compounds are identified on the GC/MS by using the analytes relative retention time (RRT) and ion spectra. For the results to be a positive hit, the sample peak must be within $\pm$0.06 RRT units of the standard compound and have ion spectra which has a ratio of the primary and secondary ion intensities within 20% of that in the standard compound. In the cases where there is not an adequate ion spectrum match, the laboratory may have provided false positive identifications.

All samples were evaluated, and all identification criteria were met. Therefore, no analytes were qualified for compound identification.

Volatile Tentatively Identified Compounds

Tentatively Identified Compounds (TICs) were reported by the laboratory and reviewed for quality assurance. For all TIC results where there is presumptive evidence of a match, being greater than or equal to 85% match, the results are qualified “NJ,” tentatively identified. If the non-target compound is reported as an unknown, the result is qualified “J,” estimated. Likewise, if it is determined that the identification of a TIC is unacceptable, the tentative identification of the compound is changed to “unknown” and the result is qualified “J,” estimated.

Volatile TICs were not reported.

MATRIX SPIKE/MATRIX SPIKE DUPLICATE

The matrix spike and matrix spike duplicate (MS/MSD) are generated to determine the precision and accuracy of the analytical procedure in a given sample matrix.

No samples were submitted for MS/MSD evaluations in association with this SDG.

LABORATORY CONTROL SAMPLE/LABORATORY CONTROL SAMPLE DUPLICATE

The Laboratory Control Sample (LCS) is spiked with the same analytes at the same concentrations as the matrix spike. The LCS results are used to verify that the laboratory can perform the analysis in a clean matrix.

LCS evaluations were processed at the proper frequency. Upon evaluation of precision and accuracy criteria no issues were noted.

REPORTING

Dilutions, re-extractions, and other re-analyses were not present in the laboratory data package.

OTHER QUALITY CONTROL DATA OUT OF SPECIFICATION

None.

FIELD DUPLICATE

Field duplicates are two (or more) field samples collected at the same time in the same location. Each of the samples represents the same population and is carried through all steps of the sampling and analytical procedures in an identical manner. Field duplicate results are used to assess precision of the total method, including sampling, analysis, and site heterogeneity.

No samples were submitted as a field duplicate pair in association with this SDG.

SYSTEM PERFORMANCE AND OVERALL ASSESSMENT

Overall the laboratory data generated met the project goals and quality control criteria, with the exceptions identified in this report and as summarized in Table 1.

Table 1
Review Elements Summary

	Were acceptance criteria met?		
	Yes	No	
Volatiles		**Major**	**Minor**
Holding Time	x		
Method Blanks	x		
Storage Blanks	NA		
Trip Blanks	x		
Field Blanks	x		
Mass Spectrometer Tuning	x		
Calibration Response Factor	x		
Calibration Percent Relative Standard Deviation and Percent Difference	x		
Internal Standards	x		
Surrogates	x		
Compound Identification - Volatile	x		
Tentatively Identified Compounds - Volatile	NA		
Matrix Spike/Matrix Spike Duplicate	NA		
Laboratory Control Sample/Laboratory Control Sample Duplicate	x		
Other Quality Control Data out of Specification	x		
Field Duplicate	NA		

Major= Major data quality issue identified resulting in rejection of data.
Minor= Minor data quality issue identified resulting in the qualification of data. Data qualification should be used to inform the data users of data limitations.
NA = Not applicable

Table 2
Data Validation Qualifiers

Data Qualifier	Definition
U	The analyte was analyzed for but was not detected above the level of the reported sample quantitation limit.
J	The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
J+	The result is an estimated quantity, but the result may be biased high.
J-	The result is an estimated quantity, but the result may be biased low.
NJ	The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.
UJ	The analyte was analyzed for but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.
R	The data are unusable. The sample results are rejected due to serious deficiencies in meeting Quality Control (QC) criteria. The analyte may or may not be present in the sample.

ENVIRONMENTAL DATA SERVICES, LTD.

DATA USABILITY SUMMARY REPORT FOR VOLATILES

PROJECT: Northrop Grumman

CLIENT: HDR

LABORATORY: Eurofins TestAmerica, Edison

SAMPLE DELIVERY GROUP: 460-244449-1

SAMPLE DATES: October 5 and 6, 2021

The above sample delivery group (SDG) consists of the following samples:

Sample Identification	Laboratory Identification
DECHC05-VPB02-GW-900-902-1	460-244449-1
DECHC05-VPB02-GW-900-902-0	460-244449-2
DECHC05-VPB02-GW-920-922-0	460-244449-3
DECHC05-VPB02-GW-940-942-0	460-244449-4
DECHC05-VPB02-TB20211006	460-244449-5

The samples described above were analyzed via USEPA SW-846 8260D to determine the concentrations of low/medium volatile organic analytes (VOAs).

Project specific quality assurance (QA) objectives, as well as the USEPA Region II SOP, Validating Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry SW-846 Method 8260B & 8260C, SOP NO. HW-24 Revision 4, September 2014 have been considered during validation of this data and its usability.

Table 1 provides a summary of major and minor data quality issues identified for this data set. All data are acceptable except those results which have been qualified with “R,” rejected. Data validation qualifiers along with associated descriptions are provided in Table 2. All data qualification related to this group of samples is detailed on the attached sheets.

Per USEPA Region 2 Validation Guidance, “All data users should note two facts. First, the "R" flag means that the associated value is unusable. In other words, due to significant quality control (QC) problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables even as a last resort. The second, no analyte concentration, even if it has passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data, but any value potentially contains error.”

HOLDING TIME/SAMPLE HANDLING

The amount of an analyte in a sample can change with time due to chemical instability, degradation, volatilization, etc. If the specified holding time is exceeded, the data may not be valid. Proper sample handling and preservation also play a role in the chemical stability of analytes in the sample matrix. If samples are not collected and stored using proper containers and/or preservatives, data may not be valid.

The samples in this delivery group were received by the laboratory within the proper temperature range as specified in the validation guidance.

The samples in this delivery group were prepared and analyzed within the holding time specified in the validation guidelines.

BLANK CONTAMINATION

Quality assurance blanks include method, storage, trip, field, or rinse blanks. Blanks are prepared to identify any contamination, which may have been introduced into the samples during preparation and analysis or field activity. Method and storage blanks measure laboratory contamination. Trip blanks measure cross contamination during shipment. Field and rinse blanks measure cross contamination during field operations.

Method Blanks

Method blanks were prepared and analyzed in association with the samples in this delivery group at the specified frequency. Upon examination of method blank data, no analyte was positively identified at a concentration equal to or above the method detection limit (MDL) in any associated method blank.

Storage Blanks

No storage blanks were submitted in association with this SDG.

Trip Blanks

Trip blank DECHC05-VPB02-TB20211006 was submitted in association with all samples in this SDG. No problems were found for this criterion.

Field Blanks

No samples were submitted as field blanks in association with this SDG.

MASS SPECTROMETER TUNING

Tuning and performance criteria are established to ensure adequate mass resolution, proper identification of compounds, and to some degree, sufficient instrument sensitivity. These criteria are not sample specific. Instrument performance is determined using standard materials. Therefore, these criteria should be met in all circumstances.

The tuning standard for volatiles is bromofluorobenzene (BFB).

All tunes associated with this SDG were fully compliant.

CALIBRATION

Satisfactory instrument calibration is established to ensure that the instrument is capable of producing acceptable quantitative results. The initial calibration curve demonstrates that the instrument is capable of giving acceptable performance at the beginning of an analytical sequence. The continuing calibration verifies that the instrument is continuing to provide satisfactory daily performance. Additionally, a continuing calibration is analyzed at the end of each 12-hour analytical sequence, denoted as a “closing” calibration verification, and ascertains acceptable performance at the conclusion of the analytical sequence.

Response Factor

The relative response factor (RRF) measures the instruments responses to specific chemical compounds. The RRFs for the VOA target compound list (TCL) compounds must be greater than the RRFs listed in Region II validation guidelines. A value less than the respective criteria indicates serious detection and quantitation problems. If the mean RRF of the initial calibration or the continuing calibration RRF is below the specified limit for any analyte, those analytes detected in environmental samples will be qualified as estimated. All non-detects for those analytes will be rejected.

The RRF values in all initial and continuing calibrations for method 8260D were found to be acceptable in all cases.

Percent Relative Standard Deviation and Percent Deviation

Percent relative standard deviation (%RSD) is calculated from the initial calibration and is used to indicate stability of a specific compound over the calibration range. Percent deviation (%D) compares the response factor of the continuing calibration with the mean response factor of the initial calibration. Therefore, %D is a measure of the instrument’s daily performance.

The following QC criteria have been applied for this project:

The %RSD of initial calibration must be ≤20%.

A %RSD value outside initial calibration limit indicates the potential for quantitation errors. For this reason, all positive results are qualified as estimated and non-detect results are qualified using professional judgement.

The %D for opening continuing calibration must be ≤30%.

A value outside these limits indicates the potential for detection and quantitation errors. For these reasons, all positive results are qualified as “J,” estimated, and non-detects are qualified with "UJ."

All initial calibration and continuing calibration %RSD and %D values were within defined QC criteria.

INTERNAL STANDARDS PERFORMANCE

Internal standard performance criteria are meant to ensure that the gas chromatography/mass spectrometry (GC/MS) sensitivity and response are stable during every experimental run.

The internal standard area count must not vary by more than a factor of two from the associated continuing calibration standard. The retention time of the internal standard must not vary by more than +/- 30 seconds from the associated continuing calibration standard. The area count must be within -50% to +200% range of the associated standard. If area count is >200%, non-detected results are not qualified while positive results associated with the non-compliant internal standard are qualified "J," estimated. However, when an observed area count is <50%, positive results associated with the non-compliant are qualified "J," estimated, while non-detected results are rejected.

Internal standard area counts are within acceptance criteria for all samples.

SURROGATES

All samples are spiked with surrogate compounds prior to sample preparation and analyses to evaluate overall laboratory performance and efficiency of the analytical technique. The observed recovery must be within laboratory limits as outlined in the project specific validation guidance.

The reported sample analyses and method blank analyses had observed surrogate recoveries within the established acceptance limits in all cases.

COMPOUND IDENTIFICATION

Volatile

The project target analyte compounds are identified on the GC/MS by using the analytes relative retention time (RRT) and ion spectra. For the results to be a positive hit, the sample peak must be within $\pm$0.06 RRT units of the standard compound and have ion spectra which has a ratio of the primary and secondary ion intensities within 20% of that in the standard compound. In the cases where there is not an adequate ion spectrum match, the laboratory may have provided false positive identifications.

All samples were evaluated, and all identification criteria were met. Therefore, no analytes were qualified for compound identification.

Volatile Tentatively Identified Compounds

Tentatively Identified Compounds (TICs) were reported by the laboratory and reviewed for quality assurance. For all TIC results where there is presumptive evidence of a match, being greater than or equal to 85% match, the results are qualified “NJ,” tentatively identified. If the non-target compound is reported as an unknown, the result is qualified “J,” estimated. Likewise, if it is determined that the identification of a TIC is unacceptable, the tentative identification of the compound is changed to “unknown” and the result is qualified “J,” estimated.

Volatile TICs were not reported.

MATRIX SPIKE/MATRIX SPIKE DUPLICATE

The matrix spike and matrix spike duplicate (MS/MSD) are generated to determine the precision and accuracy of the analytical procedure in a given sample matrix.

No samples were submitted for MS/MSD evaluations in association with this SDG.

LABORATORY CONTROL SAMPLE/LABORATORY CONTROL SAMPLE DUPLICATE

The Laboratory Control Sample (LCS) is spiked with the same analytes at the same concentrations as the matrix spike. The LCS results are used to verify that the laboratory can perform the analysis in a clean matrix.

LCS evaluations were processed at the proper frequency. Upon evaluation of precision and accuracy criteria no issues were noted.

REPORTING

Dilutions, re-extractions, and other re-analyses were not present in the laboratory data package.

OTHER QUALITY CONTROL DATA OUT OF SPECIFICATION

None.

FIELD DUPLICATE

Field duplicates are two (or more) field samples collected at the same time in the same location. Each of the samples represents the same population and is carried through all steps of the sampling and analytical procedures in an identical manner. Field duplicate results are used to assess precision of the total method, including sampling, analysis, and site heterogeneity.

No samples were submitted as a field duplicate pair in association with this SDG.

SYSTEM PERFORMANCE AND OVERALL ASSESSMENT

Overall the laboratory data generated met the project goals and quality control criteria, with the exceptions identified in this report and as summarized in Table 1.

Table 1
Review Elements Summary

	Were acceptance criteria met?		
	Yes	No	
Volatiles		**Major**	**Minor**
Holding Time	x		
Method Blanks	x		
Storage Blanks	NA		
Trip Blanks	x		
Field Blanks	x		
Mass Spectrometer Tuning	x		
Calibration Response Factor	x		
Calibration Percent Relative Standard Deviation and Percent Difference	x		
Internal Standards	x		
Surrogates	x		
Compound Identification - Volatile	x		
Tentatively Identified Compounds - Volatile	NA		
Matrix Spike/Matrix Spike Duplicate	NA		
Laboratory Control Sample/Laboratory Control Sample Duplicate	x		
Other Quality Control Data out of Specification	x		
Field Duplicate	NA		

Major= Major data quality issue identified resulting in rejection of data.
Minor= Minor data quality issue identified resulting in the qualification of data. Data qualification should be used to inform the data users of data limitations.
NA = Not applicable

Table 2
Data Validation Qualifiers

Data Qualifier	Definition
U	The analyte was analyzed for but was not detected above the level of the reported sample quantitation limit.
J	The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
J+	The result is an estimated quantity, but the result may be biased high.
J-	The result is an estimated quantity, but the result may be biased low.
NJ	The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.
UJ	The analyte was analyzed for but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.
R	The data are unusable. The sample results are rejected due to serious deficiencies in meeting Quality Control (QC) criteria. The analyte may or may not be present in the sample.

ENVIRONMENTAL DATA SERVICES, LTD.

DATA USABILITY SUMMARY REPORT FOR VOLATILES

PROJECT: Northrop Grumman

CLIENT: HDR

LABORATORY: Eurofins TestAmerica, Edison

SAMPLE DELIVERY GROUP: 460-244662-1

SAMPLE DATES: October 8, 2021

The above sample delivery group (SDG) consists of the following samples:

Sample Identification	Laboratory Identification
DECHC05-VPB02-GW-980-982-0	460-244662-1
FB-20211008-1	460-244662-2
TB-20211008	460-244662-3

The samples described above were analyzed via USEPA SW-846 8260D to determine the concentrations of low/medium volatile organic analytes (VOAs).

Project specific quality assurance (QA) objectives, as well as the USEPA Region II SOP, Validating Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry SW-846 Method 8260B & 8260C, SOP NO. HW-24 Revision 4, September 2014 have been considered during validation of this data and its usability.

Table 1 provides a summary of major and minor data quality issues identified for this data set. All data are acceptable except those results which have been qualified with “R,” rejected. Data validation qualifiers along with associated descriptions are provided in Table 2. All data qualification related to this group of samples is detailed on the attached sheets.

Per USEPA Region 2 Validation Guidance, “All data users should note two facts. First, the "R" flag means that the associated value is unusable. In other words, due to significant quality control (QC) problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables even as a last resort. The second, no analyte concentration, even if it has passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data, but any value potentially contains error.”

HOLDING TIME/SAMPLE HANDLING

The amount of an analyte in a sample can change with time due to chemical instability, degradation, volatilization, etc. If the specified holding time is exceeded, the data may not be valid. Proper sample handling and preservation also play a role in the chemical stability of analytes in the sample matrix. If samples are not collected and stored using proper containers and/or preservatives, data may not be valid.

The samples in this delivery group were received by the laboratory within the proper temperature range as specified in the validation guidance.

The samples in this delivery group were prepared and analyzed within the holding time specified in the validation guidelines.

BLANK CONTAMINATION

Quality assurance blanks include method, storage, trip, field, or rinse blanks. Blanks are prepared to identify any contamination, which may have been introduced into the samples during preparation and analysis or field activity. Method and storage blanks measure laboratory contamination. Trip blanks measure cross contamination during shipment. Field and rinse blanks measure cross contamination during field operations.

Method Blanks

Method blanks were prepared and analyzed in association with the samples in this delivery group at the specified frequency. Upon examination of method blank data, no analyte was positively identified at a concentration equal to or above the method detection limit (MDL) in any associated method blank.

Storage Blanks

No storage blanks were submitted in association with this SDG.

Trip Blanks

Trip blank DECHC05-VPB02-TB20211006 was submitted in association with all samples in this SDG. No problems were found for this criterion.

Field Blanks

Sample FB-20211008-1 was submitted as a field blank in association with this SDG. No problems were found for this criterion.

MASS SPECTROMETER TUNING

Tuning and performance criteria are established to ensure adequate mass resolution, proper identification of compounds, and to some degree, sufficient instrument sensitivity. These criteria are not sample specific. Instrument performance is determined using standard materials. Therefore, these criteria should be met in all circumstances.

The tuning standard for volatiles is bromofluorobenzene (BFB).

All tunes associated with this SDG were fully compliant.

CALIBRATION

Satisfactory instrument calibration is established to ensure that the instrument is capable of producing acceptable quantitative results. The initial calibration curve demonstrates that the instrument is capable of giving acceptable performance at the beginning of an analytical sequence. The continuing calibration verifies that the instrument is continuing to provide satisfactory daily performance. Additionally, a continuing calibration is analyzed at the end of each 12-hour analytical sequence, denoted as a “closing” calibration verification, and ascertains acceptable performance at the conclusion of the analytical sequence.

Response Factor

The relative response factor (RRF) measures the instruments responses to specific chemical compounds. The RRFs for the VOA target compound list (TCL) compounds must be greater than the RRFs listed in Region II validation guidelines. A value less than the respective criteria indicates serious detection and quantitation problems. If the mean RRF of the initial calibration or the continuing calibration RRF is below the specified limit for any analyte, those analytes detected in environmental samples will be qualified as estimated. All non-detects for those analytes will be rejected.

The RRF values in all initial and continuing calibrations for method 8260D were found to be acceptable in all cases.

Percent Relative Standard Deviation and Percent Deviation

Percent relative standard deviation (%RSD) is calculated from the initial calibration and is used to indicate stability of a specific compound over the calibration range. Percent deviation (%D) compares the response factor of the continuing calibration with the mean response factor of the initial calibration. Therefore, %D is a measure of the instrument’s daily performance.

The following QC criteria have been applied for this project:

The %RSD of initial calibration must be ≤20%.

A %RSD value outside initial calibration limit indicates the potential for quantitation errors. For this reason, all positive results are qualified as estimated and non-detect results are qualified using professional judgement.

The %D for opening continuing calibration must be ≤30%.

A value outside these limits indicates the potential for detection and quantitation errors. For these reasons, all positive results are qualified as “J,” estimated, and non-detects are qualified with "UJ."

All initial calibration and continuing calibration %RSD and %D values were within defined QC criteria with the following exceptions. The continuing calibration associated with all samples in this SDG exhibited a non-compliant %D for dichlorodifluoromethane. The non-detected results reported for dichlorofluoromethane in the associated samples have been qualified “UJ” on this basis.

INTERNAL STANDARDS PERFORMANCE

Internal standard performance criteria are meant to ensure that the gas chromatography/mass spectrometry (GC/MS) sensitivity and response are stable during every experimental run.

The internal standard area count must not vary by more than a factor of two from the associated continuing calibration standard. The retention time of the internal standard must not vary by more than +/- 30 seconds from the associated continuing calibration standard. The area count must be within -50% to +200% range of the associated standard. If area count is >200%, non-detected results are not qualified while positive results associated with the non-compliant internal standard are qualified "J," estimated. However, when an observed area count is <50%, positive results associated with the non-compliant are qualified "J," estimated, while non-detected results are rejected.

Internal standard area counts are within acceptance criteria for all samples.

SURROGATES

All samples are spiked with surrogate compounds prior to sample preparation and analyses to evaluate overall laboratory performance and efficiency of the analytical technique. The observed recovery must be within laboratory limits as outlined in the project specific validation guidance.

The reported sample analyses and method blank analyses had observed surrogate recoveries within the established acceptance limits in all cases.

COMPOUND IDENTIFICATION

Volatile

The project target analyte compounds are identified on the GC/MS by using the analytes relative retention time (RRT) and ion spectra. For the results to be a positive hit, the sample peak must be within $\pm$0.06 RRT units of the standard compound and have ion spectra which has a ratio of the primary and secondary ion intensities within 20% of that in the standard compound. In the cases where there is not an adequate ion spectrum match, the laboratory may have provided false positive identifications.

All samples were evaluated, and all identification criteria were met. Therefore, no analytes were qualified for compound identification.

Volatile Tentatively Identified Compounds

Tentatively Identified Compounds (TICs) were reported by the laboratory and reviewed for quality assurance. For all TIC results where there is presumptive evidence of a match, being greater than or equal to 85% match, the results are qualified “NJ,” tentatively identified. If the non-target compound is reported as an unknown, the result is qualified “J,” estimated. Likewise, if it is determined that the identification of a TIC is unacceptable, the tentative identification of the compound is changed to “unknown” and the result is qualified “J,” estimated.

Volatile TICs were not reported.

MATRIX SPIKE/MATRIX SPIKE DUPLICATE

The matrix spike and matrix spike duplicate (MS/MSD) are generated to determine the precision and accuracy of the analytical procedure in a given sample matrix.

No samples were submitted for MS/MSD evaluations in association with this SDG.

LABORATORY CONTROL SAMPLE/LABORATORY CONTROL SAMPLE DUPLICATE

The Laboratory Control Sample (LCS) is spiked with the same analytes at the same concentrations as the matrix spike. The LCS results are used to verify that the laboratory can perform the analysis in a clean matrix.

LCS evaluations were processed at the proper frequency. Upon evaluation of precision and accuracy criteria no issues were noted with the following exceptions.

The observed recovery for bromomethane was higher than the highest acceptance limit during both the LCS and LCS duplicate evaluations. High bias is indicated. The non-detected bromomethane has been evaluated and did not require qualification on this basis.

REPORTING

Dilutions, re-extractions, and other re-analyses were not present in the laboratory data package.

OTHER QUALITY CONTROL DATA OUT OF SPECIFICATION

None.

FIELD DUPLICATE

Field duplicates are two (or more) field samples collected at the same time in the same location. Each of the samples represents the same population and is carried through all steps of the sampling and analytical procedures in an identical manner. Field duplicate results are used to assess precision of the total method, including sampling, analysis, and site heterogeneity.

No samples were submitted as a field duplicate pair in association with this SDG.

SYSTEM PERFORMANCE AND OVERALL ASSESSMENT

Overall the laboratory data generated met the project goals and quality control criteria, with the exceptions identified in this report and as summarized in Table 1.

Table 1
Review Elements Summary

	Were acceptance criteria met?		
	Yes	No	
Volatiles		**Major**	**Minor**
Holding Time	x		
Method Blanks	x		
Storage Blanks	NA		
Trip Blanks	x		
Field Blanks	x		
Mass Spectrometer Tuning	x		
Calibration Response Factor	x		
Calibration Percent Relative Standard Deviation and Percent Difference			x
Internal Standards	x		
Surrogates	x		
Compound Identification - Volatile	x		
Tentatively Identified Compounds - Volatile	NA		
Matrix Spike/Matrix Spike Duplicate	NA		
Laboratory Control Sample/Laboratory Control Sample Duplicate	x		
Other Quality Control Data out of Specification	x		
Field Duplicate	NA		

Major= Major data quality issue identified resulting in rejection of data.
Minor= Minor data quality issue identified resulting in the qualification of data. Data qualification should be used to inform the data users of data limitations.
NA = Not applicable

Table 2
Data Validation Qualifiers

Data Qualifier	Definition
U	The analyte was analyzed for but was not detected above the level of the reported sample quantitation limit.
J	The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
J+	The result is an estimated quantity, but the result may be biased high.
J-	The result is an estimated quantity, but the result may be biased low.
NJ	The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.
UJ	The analyte was analyzed for but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.
R	The data are unusable. The sample results are rejected due to serious deficiencies in meeting Quality Control (QC) criteria. The analyte may or may not be present in the sample.

ENVIRONMENTAL DATA SERVICES, LTD.

DATA USABILITY SUMMARY REPORT FOR VOLATILES

PROJECT: Northrop Grumman

CLIENT: HDR

LABORATORY: Eurofins TestAmerica, Edison

SAMPLE DELIVERY GROUP: 460-244901-1

SAMPLE DATES: October 6 and 7, 2021

The above sample delivery group (SDG) consists of the following samples:

Sample Identification	Laboratory Identification
EB20211006	460-244901-1
EB20211007	460-244901-2
FB20211007	460-244901-3
TB20211007	460-244901-4

The samples described above were analyzed via USEPA SW-846 8260D to determine the concentrations of low/medium volatile organic analytes (VOAs).

Project specific quality assurance (QA) objectives, as well as the USEPA Region II SOP, Validating Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry SW-846 Method 8260B & 8260C, SOP NO. HW-24 Revision 4, September 2014 have been considered during validation of this data and its usability.

Table 1 provides a summary of major and minor data quality issues identified for this data set. All data are acceptable except those results which have been qualified with “R,” rejected. Data validation qualifiers along with associated descriptions are provided in Table 2. All data qualification related to this group of samples is detailed on the attached sheets.

Per USEPA Region 2 Validation Guidance, “All data users should note two facts. First, the "R" flag means that the associated value is unusable. In other words, due to significant quality control (QC) problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables even as a last resort. The second, no analyte concentration, even if it has passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data, but any value potentially contains error.”

HOLDING TIME/SAMPLE HANDLING

The amount of an analyte in a sample can change with time due to chemical instability, degradation, volatilization, etc. If the specified holding time is exceeded, the data may not be valid. Proper sample handling and preservation also play a role in the chemical stability of analytes in the sample matrix. If samples are not collected and stored using proper containers and/or preservatives, data may not be valid.

The samples in this delivery group were received by the laboratory within the proper temperature range as specified in the validation guidance.

The samples in this delivery group were prepared and analyzed within the holding time specified in the validation guidelines.

BLANK CONTAMINATION

Quality assurance blanks include method, storage, trip, field, or rinse blanks. Blanks are prepared to identify any contamination, which may have been introduced into the samples during preparation and analysis or field activity. Method and storage blanks measure laboratory contamination. Trip blanks measure cross contamination during shipment. Field and rinse blanks measure cross contamination during field operations.

Method Blanks

Method blanks were prepared and analyzed in association with the samples in this delivery group at the specified frequency. Upon examination of method blank data, no analyte was positively identified at a concentration equal to or above the method detection limit (MDL) in any associated method blank.

Storage Blanks

No storage blanks were submitted in association with this SDG.

Trip Blanks

Trip blank TB20211007 was submitted in association with all samples in this SDG. No problems were found for this criterion.

Field Blanks

Samples EB20211006 and EB20211007 were submitted as equipment blanks in association with this SDG. No problems were found for this criterion.

Sample FB20211007 was submitted as a field blank in association with this SDG. No problems were found for this criterion.

MASS SPECTROMETER TUNING

Tuning and performance criteria are established to ensure adequate mass resolution, proper identification of compounds, and to some degree, sufficient instrument sensitivity. These criteria are not sample specific. Instrument performance is determined using standard materials. Therefore, these criteria should be met in all circumstances.

The tuning standard for volatiles is bromofluorobenzene (BFB).

All tunes associated with this SDG were fully compliant.

CALIBRATION

Satisfactory instrument calibration is established to ensure that the instrument is capable of producing acceptable quantitative results. The initial calibration curve demonstrates that the instrument is capable of giving acceptable performance at the beginning of an analytical sequence. The continuing calibration verifies that the instrument is continuing to provide satisfactory daily performance. Additionally, a continuing calibration is analyzed at the end of each 12-hour analytical sequence, denoted as a “closing” calibration verification, and ascertains acceptable performance at the conclusion of the analytical sequence.

Response Factor

The relative response factor (RRF) measures the instruments responses to specific chemical compounds. The RRFs for the VOA target compound list (TCL) compounds must be greater than the RRFs listed in Region II validation guidelines. A value less than the respective criteria indicates serious detection and quantitation problems. If the mean RRF of the initial calibration or the continuing calibration RRF is below the specified limit for any analyte, those analytes detected in environmental samples will be qualified as estimated. All non-detects for those analytes will be rejected.

The RRF values in all initial and continuing calibrations for method 8260D were found to be acceptable in all cases.

Percent Relative Standard Deviation and Percent Deviation

Percent relative standard deviation (%RSD) is calculated from the initial calibration and is used to indicate stability of a specific compound over the calibration range. Percent deviation (%D) compares the response factor of the continuing calibration with the mean response factor of the initial calibration. Therefore, %D is a measure of the instrument’s daily performance.

The following QC criteria have been applied for this project:

The %RSD of initial calibration must be ≤20%.

A %RSD value outside initial calibration limit indicates the potential for quantitation errors. For this reason, all positive results are qualified as estimated and non-detect results are qualified using professional judgement.

The %D for opening continuing calibration must be ≤30%.

A value outside these limits indicates the potential for detection and quantitation errors. For these reasons, all positive results are qualified as “J,” estimated, and non-detects are qualified with "UJ."

All initial calibration and continuing calibration %RSD and %D values were within defined QC criteria with the following exceptions. The continuing calibration associated with all samples in this SDG exhibited a non-compliant %D for chloromethane. The non-detected results reported for chloromethane in the associated samples have been qualified “UJ” on this basis.

INTERNAL STANDARDS PERFORMANCE

Internal standard performance criteria are meant to ensure that the gas chromatography/mass spectrometry (GC/MS) sensitivity and response are stable during every experimental run.

The internal standard area count must not vary by more than a factor of two from the associated continuing calibration standard. The retention time of the internal standard must not vary by more than +/- 30 seconds from the associated continuing calibration standard. The area count must be within -50% to +200% range of the associated standard. If area count is >200%, non-detected results are not qualified while positive results associated with the non-compliant internal standard are qualified "J," estimated. However, when an observed area count is <50%, positive results associated with the non-compliant are qualified "J," estimated, while non-detected results are rejected.

Internal standard area counts are within acceptance criteria for all samples.

SURROGATES

All samples are spiked with surrogate compounds prior to sample preparation and analyses to evaluate overall laboratory performance and efficiency of the analytical technique. The observed recovery must be within laboratory limits as outlined in the project specific validation guidance.

The reported sample analyses and method blank analyses had observed surrogate recoveries within the established acceptance limits in all cases with the exception of sample TB20211007. The observed surrogate recovery was outside of acceptance limits for DCA. The non-detected results reported for analytes in sample TB20211007 have been qualified “UJ” on this basis.

COMPOUND IDENTIFICATION

Volatile

The project target analyte compounds are identified on the GC/MS by using the analytes relative retention time (RRT) and ion spectra. For the results to be a positive hit, the sample peak must be within $\pm$0.06 RRT units of the standard compound and have ion spectra which has a ratio of the primary and secondary ion intensities within 20% of that in the standard compound. In the cases where there is not an adequate ion spectrum match, the laboratory may have provided false positive identifications.

All samples were evaluated, and all identification criteria were met. Therefore, no analytes were qualified for compound identification.

Volatile Tentatively Identified Compounds

Tentatively Identified Compounds (TICs) were reported by the laboratory and reviewed for quality assurance. For all TIC results where there is presumptive evidence of a match, being greater than or equal to 85% match, the results are qualified “NJ,” tentatively identified. If the non-target compound is reported as an unknown, the result is qualified “J,” estimated. Likewise, if it is determined that the identification of a TIC is unacceptable, the tentative identification of the compound is changed to “unknown” and the result is qualified “J,” estimated.

Volatile TICs were not reported.

MATRIX SPIKE/MATRIX SPIKE DUPLICATE

The matrix spike and matrix spike duplicate (MS/MSD) are generated to determine the precision and accuracy of the analytical procedure in a given sample matrix.

No samples were submitted for MS/MSD evaluations in association with this SDG.

LABORATORY CONTROL SAMPLE/LABORATORY CONTROL SAMPLE DUPLICATE

The Laboratory Control Sample (LCS) is spiked with the same analytes at the same concentrations as the matrix spike. The LCS results are used to verify that the laboratory can perform the analysis in a clean matrix.

LCS evaluations were processed at the proper frequency. Upon evaluation of precision and accuracy criteria no issues were noted with the following exceptions.

The observed recovery for 2-butanone was lower than the lowest acceptance limit during one LCS evaluation. Low bias is indicated and the non-detected 2-butanone result reported for all samples in this SDG have been qualified “UJ” on this basis.

REPORTING

Dilutions, re-extractions, and other re-analyses were not present in the laboratory data package.

OTHER QUALITY CONTROL DATA OUT OF SPECIFICATION

None.

FIELD DUPLICATE

Field duplicates are two (or more) field samples collected at the same time in the same location. Each of the samples represents the same population and is carried through all steps of the sampling and analytical procedures in an identical manner. Field duplicate results are used to assess precision of the total method, including sampling, analysis, and site heterogeneity.

No samples were submitted as a field duplicate pair in association with this SDG.

SYSTEM PERFORMANCE AND OVERALL ASSESSMENT

Overall the laboratory data generated met the project goals and quality control criteria, with the exceptions identified in this report and as summarized in Table 1.

Table 1
Review Elements Summary

	Were acceptance criteria met?		
	Yes	No	
Volatiles		**Major**	**Minor**
Holding Time	x		
Method Blanks	x		
Storage Blanks	NA		
Trip Blanks	x		
Field Blanks	x		
Mass Spectrometer Tuning	x		
Calibration Response Factor	x		
Calibration Percent Relative Standard Deviation and Percent Difference			x
Internal Standards	x		
Surrogates			x
Compound Identification - Volatile	x		
Tentatively Identified Compounds - Volatile	NA		
Matrix Spike/Matrix Spike Duplicate	NA		
Laboratory Control Sample/Laboratory Control Sample Duplicate			x
Other Quality Control Data out of Specification	x		
Field Duplicate	NA		

Major= Major data quality issue identified resulting in rejection of data.
Minor= Minor data quality issue identified resulting in the qualification of data. Data qualification should be used to inform the data users of data limitations.
NA = Not applicable

Table 2
Data Validation Qualifiers

Data Qualifier	Definition
U	The analyte was analyzed for but was not detected above the level of the reported sample quantitation limit.
J	The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
J+	The result is an estimated quantity, but the result may be biased high.
J-	The result is an estimated quantity, but the result may be biased low.
NJ	The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.
UJ	The analyte was analyzed for but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.
R	The data are unusable. The sample results are rejected due to serious deficiencies in meeting Quality Control (QC) criteria. The analyte may or may not be present in the sample.

DATA USABILITY SUMMARY REPORT

Northrop Grumman WA52
(December 2021 Sampling)

Chemical Analyses Performed by:

Eurofins TestAmerica, Edison, NJ

Prepared by

ENVIRONMENTAL DATA SERVICES, LTD.

Prepared for

HDR

Report Released January 24, 2022

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ENVIRONMENTAL DATA SERVICES, LTD.

DATA USABILITY SUMMARY REPORT FOR VOLATILES

PROJECT: Northrop Grumman

CLIENT: HDR

LABORATORY: Eurofins TestAmerica, Edison

SAMPLE DELIVERY GROUP: 460-248847-1

SAMPLE DATES: December 10, 2021

The above sample delivery group (SDG) consists of the following samples:

Sample Identification	Laboratory Identification
DECHCO5-VPB03-GW-840-842-0	460-248847-1
DECHCO5-VPB03-GW-820-822-0	460-248847-2
TB-20211210	460-248847-3

The samples described above were analyzed via USEPA SW-846 8260D to determine the concentrations of low/medium volatile organic analytes (VOAs).

Project specific quality assurance (QA) objectives, as well as the USEPA Region II SOP, Validating Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry SW-846 Method 8260B & 8260C, SOP NO. HW-24 Revision 4, September 2014 have been considered during validation of this data and its usability.

Table 1 provides a summary of major and minor data quality issues identified for this data set. All data are acceptable except those results which have been qualified with “R,” rejected. Data validation qualifiers along with associated descriptions are provided in Table 2. All data qualification related to this group of samples is detailed on the attached sheets.

Per USEPA Region 2 Validation Guidance, “All data users should note two facts. First, the "R" flag means that the associated value is unusable. In other words, due to significant quality control (QC) problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables even as a last resort. The second, no analyte concentration, even if it has passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data, but any value potentially contains error.”

HOLDING TIME/SAMPLE HANDLING

The amount of an analyte in a sample can change with time due to chemical instability, degradation, volatilization, etc. If the specified holding time is exceeded, the data may not be valid. Proper sample handling and preservation also play a role in the chemical stability of analytes in the sample matrix. If samples are not collected and stored using proper containers and/or preservatives, data may not be valid.

The samples in this delivery group were received by the laboratory within the proper temperature range as specified in the validation guidance.

The samples in this delivery group were prepared and analyzed within the holding time specified in the validation guidelines.

BLANK CONTAMINATION

Quality assurance blanks include method, storage, trip, field, or rinse blanks. Blanks are prepared to identify any contamination, which may have been introduced into the samples during preparation and analysis or field activity. Method and storage blanks measure laboratory contamination. Trip blanks measure cross contamination during shipment. Field and rinse blanks measure cross contamination during field operations.

Method Blanks

Method blanks were prepared and analyzed in association with the samples in this delivery group at the specified frequency. Upon examination of method blank data, no analyte was positively identified at a concentration equal to or above the method detection limit (MDL) in any associated method blank.

Storage Blanks

No storage blanks were submitted in association with this SDG.

Trip Blanks

Trip blank TB-20211210 was submitted in association with all samples in this SDG. No problems were found for this criterion.

Field Blanks

No samples were submitted as equipment blanks in association with this SDG. No problems were found for this criterion.

MASS SPECTROMETER TUNING

Tuning and performance criteria are established to ensure adequate mass resolution, proper identification of compounds, and to some degree, sufficient instrument sensitivity. These criteria are not sample specific. Instrument performance is determined using standard materials. Therefore, these criteria should be met in all circumstances.

The tuning standard for volatiles is bromofluorobenzene (BFB).

All tunes associated with this SDG were fully compliant.

CALIBRATION

Satisfactory instrument calibration is established to ensure that the instrument is capable of producing acceptable quantitative results. The initial calibration curve demonstrates that the instrument is capable of giving acceptable performance at the beginning of an analytical sequence. The continuing calibration verifies that the instrument is continuing to provide satisfactory daily performance. Additionally, a continuing calibration is analyzed at the end of each 12-hour analytical sequence, denoted as a “closing” calibration verification, and ascertains acceptable performance at the conclusion of the analytical sequence.

Response Factor

The relative response factor (RRF) measures the instruments responses to specific chemical compounds. The RRFs for the VOA target compound list (TCL) compounds must be greater than the RRFs listed in Region II validation guidelines. A value less than the respective criteria indicates serious detection and quantitation problems. If the mean RRF of the initial calibration or the continuing calibration RRF is below the specified limit for any analyte, those analytes detected in environmental samples will be qualified as estimated. All non-detects for those analytes will be rejected.

The RRF values in all initial and continuing calibrations for method 8260D were found to be acceptable in all cases.

Percent Relative Standard Deviation and Percent Deviation

Percent relative standard deviation (%RSD) is calculated from the initial calibration and is used to indicate stability of a specific compound over the calibration range. Percent deviation (%D) compares the response factor of the continuing calibration with the mean response factor of the initial calibration. Therefore, %D is a measure of the instrument’s daily performance.

The following QC criteria have been applied for this project:

The %RSD of initial calibration must be ≤20%.

A %RSD value outside initial calibration limit indicates the potential for quantitation errors. For this reason, all positive results are qualified as estimated and non-detect results are qualified using professional judgement.

The %D for opening continuing calibration must be ≤30%.

A value outside these limits indicates the potential for detection and quantitation errors. For these reasons, all positive results are qualified as “J,” estimated, and non-detects are qualified with "UJ."

All initial calibration and continuing calibration %RSD and %D values were within defined QC criteria.

INTERNAL STANDARDS PERFORMANCE

Internal standard performance criteria are meant to ensure that the gas chromatography/mass spectrometry (GC/MS) sensitivity and response are stable during every experimental run.

The internal standard area count must not vary by more than a factor of two from the associated continuing calibration standard. The retention time of the internal standard must not vary by more than +/- 30 seconds from the associated continuing calibration standard. The area count must be within -50% to +200% range of the associated standard. If area count is >200%, non-detected results are not qualified while positive results associated with the non-compliant internal standard are qualified "J," estimated. However, when an observed area count is <50%, positive results associated with the non-compliant are qualified "J," estimated, while non-detected results are rejected.

Internal standard area counts are within acceptance criteria for all samples.

SURROGATES

All samples are spiked with surrogate compounds prior to sample preparation and analyses to evaluate overall laboratory performance and efficiency of the analytical technique. The observed recovery must be within laboratory limits as outlined in the project specific validation guidance.

The reported sample analyses and method blank analyses had observed surrogate recoveries within the established acceptance limits in all cases.

COMPOUND IDENTIFICATION

Volatile

The project target analyte compounds are identified on the GC/MS by using the analytes relative retention time (RRT) and ion spectra. For the results to be a positive hit, the sample peak must be within $\pm$0.06 RRT units of the standard compound and have ion spectra which has a ratio of the primary and secondary ion intensities within 20% of that in the standard compound. In the cases where there is not an adequate ion spectrum match, the laboratory may have provided false positive identifications.

All samples were evaluated, and all identification criteria were met. Therefore, no analytes were qualified for compound identification.

Volatile Tentatively Identified Compounds

Tentatively Identified Compounds (TICs) were reported by the laboratory and reviewed for quality assurance. For all TIC results where there is presumptive evidence of a match, being greater than or equal to 85% match, the results are qualified “NJ,” tentatively identified. If the non-target compound is reported as an unknown, the result is qualified “J,” estimated. Likewise, if it is determined that the identification of a TIC is unacceptable, the tentative identification of the compound is changed to “unknown” and the result is qualified “J,” estimated.

Volatile TICs were not reported.

MATRIX SPIKE/MATRIX SPIKE DUPLICATE

The matrix spike and matrix spike duplicate (MS/MSD) are generated to determine the precision and accuracy of the analytical procedure in a given sample matrix.

No samples were submitted for MS/MSD evaluations in association with this SDG.

LABORATORY CONTROL SAMPLE/LABORATORY CONTROL SAMPLE DUPLICATE

The Laboratory Control Sample (LCS) is spiked with the same analytes at the same concentrations as the matrix spike. The LCS results are used to verify that the laboratory can perform the analysis in a clean matrix.

LCS evaluations were processed at the proper frequency. Upon evaluation of precision and accuracy criteria no issues were noted.

REPORTING

Dilutions, re-extractions, and other re-analyses were not present in the laboratory data package.

OTHER QUALITY CONTROL DATA OUT OF SPECIFICATION

None.

FIELD DUPLICATE

Field duplicates are two (or more) field samples collected at the same time in the same location. Each of the samples represents the same population and is carried through all steps of the sampling and analytical procedures in an identical manner. Field duplicate results are used to assess precision of the total method, including sampling, analysis, and site heterogeneity.

No samples were submitted as a field duplicate pair in association with this SDG.

SYSTEM PERFORMANCE AND OVERALL ASSESSMENT

Overall the laboratory data generated met the project goals and quality control criteria, with the exceptions identified in this report and as summarized in Table 1.

Table 1
Review Elements Summary

	Were acceptance criteria met?		
	Yes	No	
Volatiles		**Major**	**Minor**
Holding Time	x		
Method Blanks	x		
Storage Blanks	NA		
Trip Blanks	x		
Field Blanks	NA		
Mass Spectrometer Tuning	x		
Calibration Response Factor	x		
Calibration Percent Relative Standard Deviation and Percent Difference	x		
Internal Standards	x		
Surrogates	x		
Compound Identification - Volatile	x		
Tentatively Identified Compounds - Volatile	NA		
Matrix Spike/Matrix Spike Duplicate	NA		
Laboratory Control Sample/Laboratory Control Sample Duplicate	x		
Other Quality Control Data out of Specification	x		
Field Duplicate	NA		

Major= Major data quality issue identified resulting in rejection of data.
Minor= Minor data quality issue identified resulting in the qualification of data. Data qualification should be used to inform the data users of data limitations.
NA = Not applicable

Table 2
Data Validation Qualifiers

Data Qualifier	Definition
U	The analyte was analyzed for but was not detected above the level of the reported sample quantitation limit.
J	The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
J+	The result is an estimated quantity, but the result may be biased high.
J-	The result is an estimated quantity, but the result may be biased low.
NJ	The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.
UJ	The analyte was analyzed for but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.
R	The data are unusable. The sample results are rejected due to serious deficiencies in meeting Quality Control (QC) criteria. The analyte may or may not be present in the sample.

ENVIRONMENTAL DATA SERVICES, LTD.

DATA USABILITY SUMMARY REPORT FOR VOLATILES

PROJECT: Northrop Grumman

CLIENT: HDR

LABORATORY: Eurofins TestAmerica, Edison

SAMPLE DELIVERY GROUP: 460-249025-1

SAMPLE DATES: December 10 and 13, 2021

The above sample delivery group (SDG) consists of the following samples:

Sample Identification	Laboratory Identification
DECHC05-VPB03-GW-860-862	460-249025-1
TB-20211213	460-249025-2

The samples described above were analyzed via USEPA SW-846 8260D to determine the concentrations of low/medium volatile organic analytes (VOAs).

Project specific quality assurance (QA) objectives, as well as the USEPA Region II SOP, Validating Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry SW-846 Method 8260B & 8260C, SOP NO. HW-24 Revision 4, September 2014 have been considered during validation of this data and its usability.

Table 1 provides a summary of major and minor data quality issues identified for this data set. All data are acceptable except those results which have been qualified with “R,” rejected. Data validation qualifiers along with associated descriptions are provided in Table 2. All data qualification related to this group of samples is detailed on the attached sheets.

Per USEPA Region 2 Validation Guidance, “All data users should note two facts. First, the "R" flag means that the associated value is unusable. In other words, due to significant quality control (QC) problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables even as a last resort. The second, no analyte concentration, even if it has passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data, but any value potentially contains error.”

HOLDING TIME/SAMPLE HANDLING

The amount of an analyte in a sample can change with time due to chemical instability, degradation, volatilization, etc. If the specified holding time is exceeded, the data may not be valid. Proper sample handling and preservation also play a role in the chemical stability of analytes in the sample matrix. If samples are not collected and stored using proper containers and/or preservatives, data may not be valid.

The samples in this delivery group were received by the laboratory within the proper temperature range as specified in the validation guidance.

The samples in this delivery group were prepared and analyzed within the holding time specified in the validation guidelines.

BLANK CONTAMINATION

Quality assurance blanks include method, storage, trip, field, or rinse blanks. Blanks are prepared to identify any contamination, which may have been introduced into the samples during preparation and analysis or field activity. Method and storage blanks measure laboratory contamination. Trip blanks measure cross contamination during shipment. Field and rinse blanks measure cross contamination during field operations.

Method Blanks

Method blanks were prepared and analyzed in association with the samples in this delivery group at the specified frequency. Upon examination of method blank data, bromomethane was positively identified at a concentration equal to or above the method detection limit (MDL) in one method blank. Per validation guidance, no qualification was necessary on this basis.

Storage Blanks

No storage blanks were submitted in association with this SDG.

Trip Blanks

Trip blank TB-20211213 was submitted in association with all samples in this SDG. No problems were found for this criterion.

Field Blanks

No samples were submitted as equipment blanks in association with this SDG. No problems were found for this criterion.

MASS SPECTROMETER TUNING

Tuning and performance criteria are established to ensure adequate mass resolution, proper identification of compounds, and to some degree, sufficient instrument sensitivity. These criteria are not sample specific. Instrument performance is determined using standard materials. Therefore, these criteria should be met in all circumstances.

The tuning standard for volatiles is bromofluorobenzene (BFB).

All tunes associated with this SDG were fully compliant.

CALIBRATION

Satisfactory instrument calibration is established to ensure that the instrument is capable of producing acceptable quantitative results. The initial calibration curve demonstrates that the instrument is capable of giving acceptable performance at the beginning of an analytical sequence. The continuing calibration verifies that the instrument is continuing to provide satisfactory daily performance. Additionally, a continuing calibration is analyzed at the end of each 12-hour analytical sequence, denoted as a “closing” calibration verification, and ascertains acceptable performance at the conclusion of the analytical sequence.

Response Factor

The relative response factor (RRF) measures the instruments responses to specific chemical compounds. The RRFs for the VOA target compound list (TCL) compounds must be greater than the RRFs listed in Region II validation guidelines. A value less than the respective criteria indicates serious detection and quantitation problems. If the mean RRF of the initial calibration or the continuing calibration RRF is below the specified limit for any analyte, those analytes detected in environmental samples will be qualified as estimated. All non-detects for those analytes will be rejected.

The RRF values in all initial and continuing calibrations for method 8260D were found to be acceptable in all cases.

Percent Relative Standard Deviation and Percent Deviation

Percent relative standard deviation (%RSD) is calculated from the initial calibration and is used to indicate stability of a specific compound over the calibration range. Percent deviation (%D) compares the response factor of the continuing calibration with the mean response factor of the initial calibration. Therefore, %D is a measure of the instrument’s daily performance.

The following QC criteria have been applied for this project:

The %RSD of initial calibration must be ≤20%.

A %RSD value outside initial calibration limit indicates the potential for quantitation errors. For this reason, all positive results are qualified as estimated and non-detect results are qualified using professional judgement.

The %D for opening continuing calibration must be ≤30%.

A value outside these limits indicates the potential for detection and quantitation errors. For these reasons, all positive results are qualified as “J,” estimated, and non-detects are qualified with "UJ."

All initial calibration and continuing calibration %RSD and %D values were within defined QC criteria with the following exceptions. The continuing calibration associated with sample TB-20211213 in this SDG exhibited a non-compliant %D for chloromethane, chloroethane, and trichlorofluoromethane. The non-detected results reported for chloromethane, chloroethane, and trichlorofluoromethane in the associated sample has been qualified “UJ” on this basis.

The continuing calibration associated with sample DECHC05-VPB03-GW-860-862 in this SDG exhibited a non-compliant %D for bromomethane, chloroethane, and trichlorofluoromethane. The non-detected results reported for bromomethane, chloroethane, and trichlorofluoromethane in the associated sample has been qualified “UJ” on this basis.

INTERNAL STANDARDS PERFORMANCE

Internal standard performance criteria are meant to ensure that the gas chromatography/mass spectrometry (GC/MS) sensitivity and response are stable during every experimental run.

The internal standard area count must not vary by more than a factor of two from the associated continuing calibration standard. The retention time of the internal standard must not vary by more than +/- 30 seconds from the associated continuing calibration standard. The area count must be within -50% to +200% range of the associated standard. If area count is >200%, non-detected results are not qualified while positive results associated with the non-compliant internal standard are qualified "J," estimated. However, when an observed area count is <50%, positive results associated with the non-compliant are qualified "J," estimated, while non-detected results are rejected.

Internal standard area counts are within acceptance criteria for all samples.

SURROGATES

All samples are spiked with surrogate compounds prior to sample preparation and analyses to evaluate overall laboratory performance and efficiency of the analytical technique. The observed recovery must be within laboratory limits as outlined in the project specific validation guidance.

The reported sample analyses and method blank analyses had observed surrogate recoveries within the established acceptance limits in all cases.

COMPOUND IDENTIFICATION

Volatile

The project target analyte compounds are identified on the GC/MS by using the analytes relative retention time (RRT) and ion spectra. For the results to be a positive hit, the sample peak must be within $\pm$0.06 RRT units of the standard compound and have ion spectra which has a ratio of the primary and secondary ion intensities within 20% of that in the standard compound. In the cases where there is not an adequate ion spectrum match, the laboratory may have provided false positive identifications.

All samples were evaluated, and all identification criteria were met. Therefore, no analytes were qualified for compound identification.

Volatile Tentatively Identified Compounds

Tentatively Identified Compounds (TICs) were reported by the laboratory and reviewed for quality assurance. For all TIC results where there is presumptive evidence of a match, being greater than or equal to 85% match, the results are qualified “NJ,” tentatively identified. If the non-target compound is reported as an unknown, the result is qualified “J,” estimated. Likewise, if it is determined that the identification of a TIC is unacceptable, the tentative identification of the compound is changed to “unknown” and the result is qualified “J,” estimated.

Volatile TICs were not reported.

MATRIX SPIKE/MATRIX SPIKE DUPLICATE

The matrix spike and matrix spike duplicate (MS/MSD) are generated to determine the precision and accuracy of the analytical procedure in a given sample matrix.

No samples were submitted for MS/MSD evaluations in association with this SDG.

LABORATORY CONTROL SAMPLE/LABORATORY CONTROL SAMPLE DUPLICATE

The Laboratory Control Sample (LCS) is spiked with the same analytes at the same concentrations as the matrix spike. The LCS results are used to verify that the laboratory can perform the analysis in a clean matrix.

LCS evaluations were processed at the proper frequency. Upon evaluation of precision and accuracy criteria no issues were noted with the following exceptions.

The observed recovery for bromomethane was higher than the highest acceptance limit during both the LCS and LCS duplicate evaluations. High bias is indicated. The non-detected bromomethane has been evaluated and did not require qualification on this basis.

REPORTING

Dilutions, re-extractions, and other re-analyses were not present in the laboratory data package.

OTHER QUALITY CONTROL DATA OUT OF SPECIFICATION

None.

FIELD DUPLICATE

Field duplicates are two (or more) field samples collected at the same time in the same location. Each of the samples represents the same population and is carried through all steps of the sampling and analytical procedures in an identical manner. Field duplicate results are used to assess precision of the total method, including sampling, analysis, and site heterogeneity.

No samples were submitted as a field duplicate pair in association with this SDG.

SYSTEM PERFORMANCE AND OVERALL ASSESSMENT

Overall the laboratory data generated met the project goals and quality control criteria, with the exceptions identified in this report and as summarized in Table 1.

Table 1
Review Elements Summary

	Were acceptance criteria met?		
	Yes	No	
Volatiles		**Major**	**Minor**
Holding Time	x		
Method Blanks	x		
Storage Blanks	NA		
Trip Blanks	x		
Field Blanks	NA		
Mass Spectrometer Tuning	x		
Calibration Response Factor	x		
Calibration Percent Relative Standard Deviation and Percent Difference			x
Internal Standards	x		
Surrogates	x		
Compound Identification - Volatile	x		
Tentatively Identified Compounds - Volatile	NA		
Matrix Spike/Matrix Spike Duplicate	NA		
Laboratory Control Sample/Laboratory Control Sample Duplicate	x		
Other Quality Control Data out of Specification	x		
Field Duplicate	NA		

Major= Major data quality issue identified resulting in rejection of data.
Minor= Minor data quality issue identified resulting in the qualification of data. Data qualification should be used to inform the data users of data limitations.
NA = Not applicable

Table 2
Data Validation Qualifiers

Data Qualifier	Definition
U	The analyte was analyzed for but was not detected above the level of the reported sample quantitation limit.
J	The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
J+	The result is an estimated quantity, but the result may be biased high.
J-	The result is an estimated quantity, but the result may be biased low.
NJ	The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.
UJ	The analyte was analyzed for but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.
R	The data are unusable. The sample results are rejected due to serious deficiencies in meeting Quality Control (QC) criteria. The analyte may or may not be present in the sample.

ENVIRONMENTAL DATA SERVICES, LTD.

DATA USABILITY SUMMARY REPORT FOR VOLATILES

PROJECT: Northrop Grumman

CLIENT: HDR

LABORATORY: Eurofins TestAmerica, Edison

SAMPLE DELIVERY GROUP: 460-249099-1

SAMPLE DATES: December 13 and 14, 2021

The above sample delivery group (SDG) consists of the following samples:

Sample Identification	Laboratory Identification
DECHC05-VPB03-GW-890-892-0	460-249099-1
DECHC05-VPB03-GW-900-902-0	460-249099-2
DECHC05-VPB03-GW-940-942	460-249099-4
TB-20211214	460-249099-5

The samples described above were analyzed via USEPA SW-846 8260D to determine the concentrations of low/medium volatile organic analytes (VOAs).

Project specific quality assurance (QA) objectives, as well as the USEPA Region II SOP, Validating Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry SW-846 Method 8260B & 8260C, SOP NO. HW-24 Revision 4, September 2014 have been considered during validation of this data and its usability.

Table 1 provides a summary of major and minor data quality issues identified for this data set. All data are acceptable except those results which have been qualified with “R,” rejected. Data validation qualifiers along with associated descriptions are provided in Table 2. All data qualification related to this group of samples is detailed on the attached sheets.

Per USEPA Region 2 Validation Guidance, “All data users should note two facts. First, the "R" flag means that the associated value is unusable. In other words, due to significant quality control (QC) problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables even as a last resort. The second, no analyte concentration, even if it has passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data, but any value potentially contains error.”

HOLDING TIME/SAMPLE HANDLING

The amount of an analyte in a sample can change with time due to chemical instability, degradation, volatilization, etc. If the specified holding time is exceeded, the data may not be valid. Proper sample handling and preservation also play a role in the chemical stability of analytes in the sample matrix. If samples are not collected and stored using proper containers and/or preservatives, data may not be valid.

The samples in this delivery group were received by the laboratory within the proper temperature range as specified in the validation guidance.

The samples in this delivery group were prepared and analyzed within the holding time specified in the validation guidelines.

BLANK CONTAMINATION

Quality assurance blanks include method, storage, trip, field, or rinse blanks. Blanks are prepared to identify any contamination, which may have been introduced into the samples during preparation and analysis or field activity. Method and storage blanks measure laboratory contamination. Trip blanks measure cross contamination during shipment. Field and rinse blanks measure cross contamination during field operations.

Method Blanks

Method blanks were prepared and analyzed in association with the samples in this delivery group at the specified frequency. Upon examination of method blank data, no analytes were positively identified at a concentration equal to or above the method detection limit (MDL) in one method blank.

Storage Blanks

No storage blanks were submitted in association with this SDG.

Trip Blanks

Trip blank TB-20211213 was submitted in association with all samples in this SDG. No problems were found for this criterion.

Field Blanks

No samples were submitted as equipment blanks in association with this SDG. No problems were found for this criterion.

MASS SPECTROMETER TUNING

Tuning and performance criteria are established to ensure adequate mass resolution, proper identification of compounds, and to some degree, sufficient instrument sensitivity. These criteria are not sample specific. Instrument performance is determined using standard materials. Therefore, these criteria should be met in all circumstances.

The tuning standard for volatiles is bromofluorobenzene (BFB).

All tunes associated with this SDG were fully compliant.

CALIBRATION

Satisfactory instrument calibration is established to ensure that the instrument is capable of producing acceptable quantitative results. The initial calibration curve demonstrates that the instrument is capable of giving acceptable performance at the beginning of an analytical sequence. The continuing calibration verifies that the instrument is continuing to provide satisfactory daily performance. Additionally, a continuing calibration is analyzed at the end of each 12-hour analytical sequence, denoted as a “closing” calibration verification, and ascertains acceptable performance at the conclusion of the analytical sequence.

Response Factor

The relative response factor (RRF) measures the instruments responses to specific chemical compounds. The RRFs for the VOA target compound list (TCL) compounds must be greater than the RRFs listed in Region II validation guidelines. A value less than the respective criteria indicates serious detection and quantitation problems. If the mean RRF of the initial calibration or the continuing calibration RRF is below the specified limit for any analyte, those analytes detected in environmental samples will be qualified as estimated. All non-detects for those analytes will be rejected.

The RRF values in all initial and continuing calibrations for method 8260D were found to be acceptable in all cases.

Percent Relative Standard Deviation and Percent Deviation

Percent relative standard deviation (%RSD) is calculated from the initial calibration and is used to indicate stability of a specific compound over the calibration range. Percent deviation (%D) compares the response factor of the continuing calibration with the mean response factor of the initial calibration. Therefore, %D is a measure of the instrument’s daily performance.

The following QC criteria have been applied for this project:

The %RSD of initial calibration must be ≤20%.

A %RSD value outside initial calibration limit indicates the potential for quantitation errors. For this reason, all positive results are qualified as estimated and non-detect results are qualified using professional judgement.

The %D for opening continuing calibration must be ≤30%.

A value outside these limits indicates the potential for detection and quantitation errors. For these reasons, all positive results are qualified as “J,” estimated, and non-detects are qualified with "UJ."

All initial calibration and continuing calibration %RSD and %D values were within defined QC criteria with the following exceptions. The continuing calibration associated with all samples in this SDG exhibited a non-compliant %D for dichlorodifluoromethane. The non-detected results reported for dichlorodifluoromethane in all associated samples have been qualified “UJ” on this basis.

INTERNAL STANDARDS PERFORMANCE

Internal standard performance criteria are meant to ensure that the gas chromatography/mass spectrometry (GC/MS) sensitivity and response are stable during every experimental run.

The internal standard area count must not vary by more than a factor of two from the associated continuing calibration standard. The retention time of the internal standard must not vary by more than +/- 30 seconds from the associated continuing calibration standard. The area count must be within -50% to +200% range of the associated standard. If area count is >200%, non-detected results are not qualified while positive results associated with the non-compliant internal standard are qualified "J," estimated. However, when an observed area count is <50%, positive results associated with the non-compliant are qualified "J," estimated, while non-detected results are rejected.

Internal standard area counts are within acceptance criteria for all samples.

SURROGATES

All samples are spiked with surrogate compounds prior to sample preparation and analyses to evaluate overall laboratory performance and efficiency of the analytical technique. The observed recovery must be within laboratory limits as outlined in the project specific validation guidance.

The reported sample analyses and method blank analyses had observed surrogate recoveries within the established acceptance limits in all cases.

COMPOUND IDENTIFICATION

Volatile

The project target analyte compounds are identified on the GC/MS by using the analytes relative retention time (RRT) and ion spectra. For the results to be a positive hit, the sample peak must be within $\pm$0.06 RRT units of the standard compound and have ion spectra which has a ratio of the primary and secondary ion intensities within 20% of that in the standard compound. In the cases where there is not an adequate ion spectrum match, the laboratory may have provided false positive identifications.

All samples were evaluated, and all identification criteria were met. Therefore, no analytes were qualified for compound identification.

Volatile Tentatively Identified Compounds

Tentatively Identified Compounds (TICs) were reported by the laboratory and reviewed for quality assurance. For all TIC results where there is presumptive evidence of a match, being greater than or equal to 85% match, the results are qualified “NJ,” tentatively identified. If the non-target compound is reported as an unknown, the result is qualified “J,” estimated. Likewise, if it is determined that the identification of a TIC is unacceptable, the tentative identification of the compound is changed to “unknown” and the result is qualified “J,” estimated.

Volatile TICs were not reported.

MATRIX SPIKE/MATRIX SPIKE DUPLICATE

The matrix spike and matrix spike duplicate (MS/MSD) are generated to determine the precision and accuracy of the analytical procedure in a given sample matrix.

No samples were submitted for MS/MSD evaluations in association with this SDG.

LABORATORY CONTROL SAMPLE/LABORATORY CONTROL SAMPLE DUPLICATE

The Laboratory Control Sample (LCS) is spiked with the same analytes at the same concentrations as the matrix spike. The LCS results are used to verify that the laboratory can perform the analysis in a clean matrix.

LCS evaluations were processed at the proper frequency. Upon evaluation of precision and accuracy criteria no issues were noted.

REPORTING

Dilutions, re-extractions, and other re-analyses were not present in the laboratory data package.

OTHER QUALITY CONTROL DATA OUT OF SPECIFICATION

None.

FIELD DUPLICATE

Field duplicates are two (or more) field samples collected at the same time in the same location. Each of the samples represents the same population and is carried through all steps of the sampling and analytical procedures in an identical manner. Field duplicate results are used to assess precision of the total method, including sampling, analysis, and site heterogeneity.

No samples were submitted as a field duplicate pair in association with this SDG.

SYSTEM PERFORMANCE AND OVERALL ASSESSMENT

Overall the laboratory data generated met the project goals and quality control criteria, with the exceptions identified in this report and as summarized in Table 1.

Table 1
Review Elements Summary

	Were acceptance criteria met?		
	Yes	No	
Volatiles		**Major**	**Minor**
Holding Time	x		
Method Blanks	x		
Storage Blanks	NA		
Trip Blanks	x		
Field Blanks	NA		
Mass Spectrometer Tuning	x		
Calibration Response Factor	x		
Calibration Percent Relative Standard Deviation and Percent Difference			x
Internal Standards	x		
Surrogates	x		
Compound Identification - Volatile	x		
Tentatively Identified Compounds - Volatile	NA		
Matrix Spike/Matrix Spike Duplicate	NA		
Laboratory Control Sample/Laboratory Control Sample Duplicate	x		
Other Quality Control Data out of Specification	x		
Field Duplicate	NA		

Major= Major data quality issue identified resulting in rejection of data.
Minor= Minor data quality issue identified resulting in the qualification of data. Data qualification should be used to inform the data users of data limitations.
NA = Not applicable

Table 2
Data Validation Qualifiers

Data Qualifier	Definition
U	The analyte was analyzed for but was not detected above the level of the reported sample quantitation limit.
J	The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
J+	The result is an estimated quantity, but the result may be biased high.
J-	The result is an estimated quantity, but the result may be biased low.
NJ	The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.
UJ	The analyte was analyzed for but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.
R	The data are unusable. The sample results are rejected due to serious deficiencies in meeting Quality Control (QC) criteria. The analyte may or may not be present in the sample.

ENVIRONMENTAL DATA SERVICES, LTD.

DATA USABILITY SUMMARY REPORT FOR VOLATILES

PROJECT: Northrop Grumman

CLIENT: HDR

LABORATORY: Eurofins TestAmerica, Edison

SAMPLE DELIVERY GROUP: 460-249199-1

SAMPLE DATES: December 14 and 15, 2021

The above sample delivery group (SDG) consists of the following samples:

Sample Identification	Laboratory Identification
DECHC05-VPB03-GW-980-982-0	460-249199-2
TB-20211215	460-249199-3
EB-20211215	460-249199-4
FB-20211215	460-249199-5

The samples described above were analyzed via USEPA SW-846 8260D to determine the concentrations of low/medium volatile organic analytes (VOAs).

Project specific quality assurance (QA) objectives, as well as the USEPA Region II SOP, Validating Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry SW-846 Method 8260B & 8260C, SOP NO. HW-24 Revision 4, September 2014 have been considered during validation of this data and its usability.

Table 1 provides a summary of major and minor data quality issues identified for this data set. All data are acceptable except those results which have been qualified with “R,” rejected. Data validation qualifiers along with associated descriptions are provided in Table 2. All data qualification related to this group of samples is detailed on the attached sheets.

Per USEPA Region 2 Validation Guidance, “All data users should note two facts. First, the "R" flag means that the associated value is unusable. In other words, due to significant quality control (QC) problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables even as a last resort. The second, no analyte concentration, even if it has passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data, but any value potentially contains error.”

HOLDING TIME/SAMPLE HANDLING

The amount of an analyte in a sample can change with time due to chemical instability, degradation, volatilization, etc. If the specified holding time is exceeded, the data may not be valid. Proper sample handling and preservation also play a role in the chemical stability of analytes in the sample matrix. If samples are not collected and stored using proper containers and/or preservatives, data may not be valid.

The samples in this delivery group were received by the laboratory within the proper temperature range as specified in the validation guidance.

The samples in this delivery group were prepared and analyzed within the holding time specified in the validation guidelines.

BLANK CONTAMINATION

Quality assurance blanks include method, storage, trip, field, or rinse blanks. Blanks are prepared to identify any contamination, which may have been introduced into the samples during preparation and analysis or field activity. Method and storage blanks measure laboratory contamination. Trip blanks measure cross contamination during shipment. Field and rinse blanks measure cross contamination during field operations.

Method Blanks

Method blanks were prepared and analyzed in association with the samples in this delivery group at the specified frequency. Upon examination of method blank data, no analytes were positively identified at a concentration equal to or above the method detection limit (MDL) in one method blank.

Storage Blanks

No storage blanks were submitted in association with this SDG.

Trip Blanks

Trip blank TB-20211215 was submitted in association with all samples in this SDG. No problems were found for this criterion.

Field Blanks

Samples EB-20211215 and FB-20211215 were submitted as equipment/field blanks in association with this SDG. No problems were found for this criterion.

MASS SPECTROMETER TUNING

Tuning and performance criteria are established to ensure adequate mass resolution, proper identification of compounds, and to some degree, sufficient instrument sensitivity. These criteria are not sample specific. Instrument performance is determined using standard materials. Therefore, these criteria should be met in all circumstances.

The tuning standard for volatiles is bromofluorobenzene (BFB).

All tunes associated with this SDG were fully compliant.

CALIBRATION

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The RRF values in all initial and continuing calibrations for method 8260D were found to be acceptable in all cases.

Percent Relative Standard Deviation and Percent Deviation

Percent relative standard deviation (%RSD) is calculated from the initial calibration and is used to indicate stability of a specific compound over the calibration range. Percent deviation (%D) compares the response factor of the continuing calibration with the mean response factor of the initial calibration. Therefore, %D is a measure of the instrument’s daily performance.

The following QC criteria have been applied for this project:

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Volatile TICs were not reported.

MATRIX SPIKE/MATRIX SPIKE DUPLICATE

The matrix spike and matrix spike duplicate (MS/MSD) are generated to determine the precision and accuracy of the analytical procedure in a given sample matrix.

No samples were submitted for MS/MSD evaluations in association with this SDG.

LABORATORY CONTROL SAMPLE/LABORATORY CONTROL SAMPLE DUPLICATE

The Laboratory Control Sample (LCS) is spiked with the same analytes at the same concentrations as the matrix spike. The LCS results are used to verify that the laboratory can perform the analysis in a clean matrix.

LCS evaluations were processed at the proper frequency. Upon evaluation of precision and accuracy criteria no issues were noted.

REPORTING

Dilutions, re-extractions, and other re-analyses were not present in the laboratory data package.

OTHER QUALITY CONTROL DATA OUT OF SPECIFICATION

None.

FIELD DUPLICATE

Field duplicates are two (or more) field samples collected at the same time in the same location. Each of the samples represents the same population and is carried through all steps of the sampling and analytical procedures in an identical manner. Field duplicate results are used to assess precision of the total method, including sampling, analysis, and site heterogeneity.

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Overall the laboratory data generated met the project goals and quality control criteria, with the exceptions identified in this report and as summarized in Table 1.

Table 1
Review Elements Summary

	Were acceptance criteria met?		
	Yes	No	
Volatiles		**Major**	**Minor**
Holding Time	x		
Method Blanks	x		
Storage Blanks	NA		
Trip Blanks	x		
Field Blanks	x		
Mass Spectrometer Tuning	x		
Calibration Response Factor	x		
Calibration Percent Relative Standard Deviation and Percent Difference	x		
Internal Standards	x		
Surrogates	x		
Compound Identification - Volatile	x		
Tentatively Identified Compounds - Volatile	NA		
Matrix Spike/Matrix Spike Duplicate	NA		
Laboratory Control Sample/Laboratory Control Sample Duplicate	x		
Other Quality Control Data out of Specification	x		
Field Duplicate	NA		

Major= Major data quality issue identified resulting in rejection of data.
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R	The data are unusable. The sample results are rejected due to serious deficiencies in meeting Quality Control (QC) criteria. The analyte may or may not be present in the sample.

ATTACHMENT 6

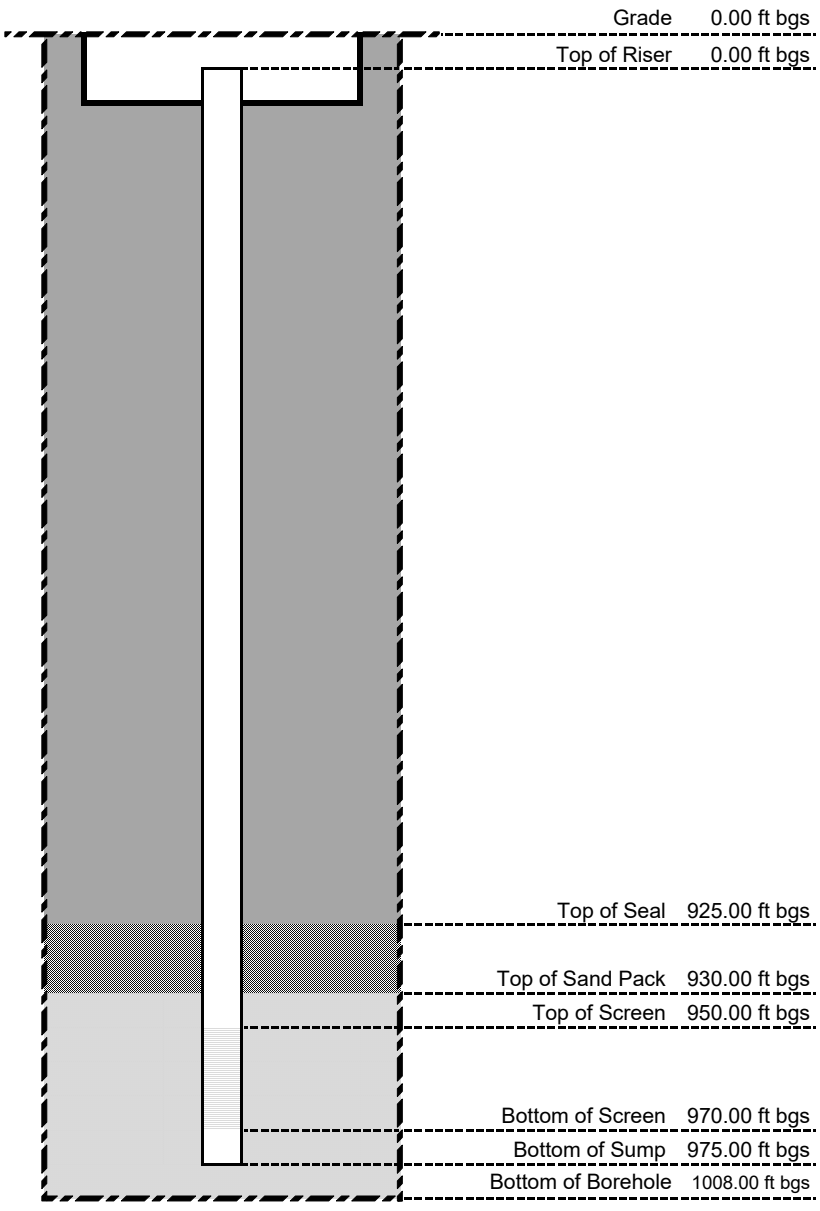
Monitoring Well Construction Logs

Project: DECHC-05 Area PDI
Subject: Monitoring Well Construction Log

Well ID:	DECHC05-MW-01	**Project:**	DECHC-05 Area PDI
Location:	Bethpage, NY	**Client:**	NYSDEC
Drilling Contractor:	Delta Well & Pump	**Project Number:**	10199876
Date Drilled:		**Drilling Rig:**	Mud Rotary
Date Completed:		**Drilling Method:**	Mud Rotary
Cover Type:	Manhole Cover	**Development Method:**	Airlift & Pump
Grade Elevation:		**Key ID or Socket Size:**	
Total Drilled Depth:	1008 feet	**Coordinate System:**	NAD 1983 (2011) StatePlane NY LI FIPS 3104
Borehole Dia.:	9-inch	**X:**	**Y:**

General Well Information	
Well ID:	DECHC05-MW-01
Start Date:	May 26, 2021
End Date:	Jun 02, 2021
Static Water Level:	
SWL Date:	
Measuring Point:	TOC
Well Depth (ft):	975 ft bgs
Riser Pipe(s)	
Interval (ft bgs):	0-950
Material:	Sch. 80 PVC
Diameter (in):	4
Joint Type:	Coupled
Surface Casing	
Interval (ft bgs):	0-50
Material:	Steel
Diameter (in):	12
Joint Type:	Flush
Screen(s)	
Interval (ft bgs):	950-970
Diameter (in):	4
Material:	Sch. 80 PVC
Slot Size:	20
Filter Pack(s)	
Interval (ft):	930-1008
Sand:	#1
Gravel:	
Natural:	
Amount:	
Sump(s)	
Interval (ft bgs):	970-975
Material:	Sch. 80 PVC
Diameter (in):	4
Joint Type:	Coupled
Seal(s) / QTY(s)	
Grout (Cement-Bentonite):	0-925
Concrete Mix:	
Bentonite Slurry:	
Bentonite Pellets:	
Other:	#00 Sand 925-930

** NOT TO SCALE*

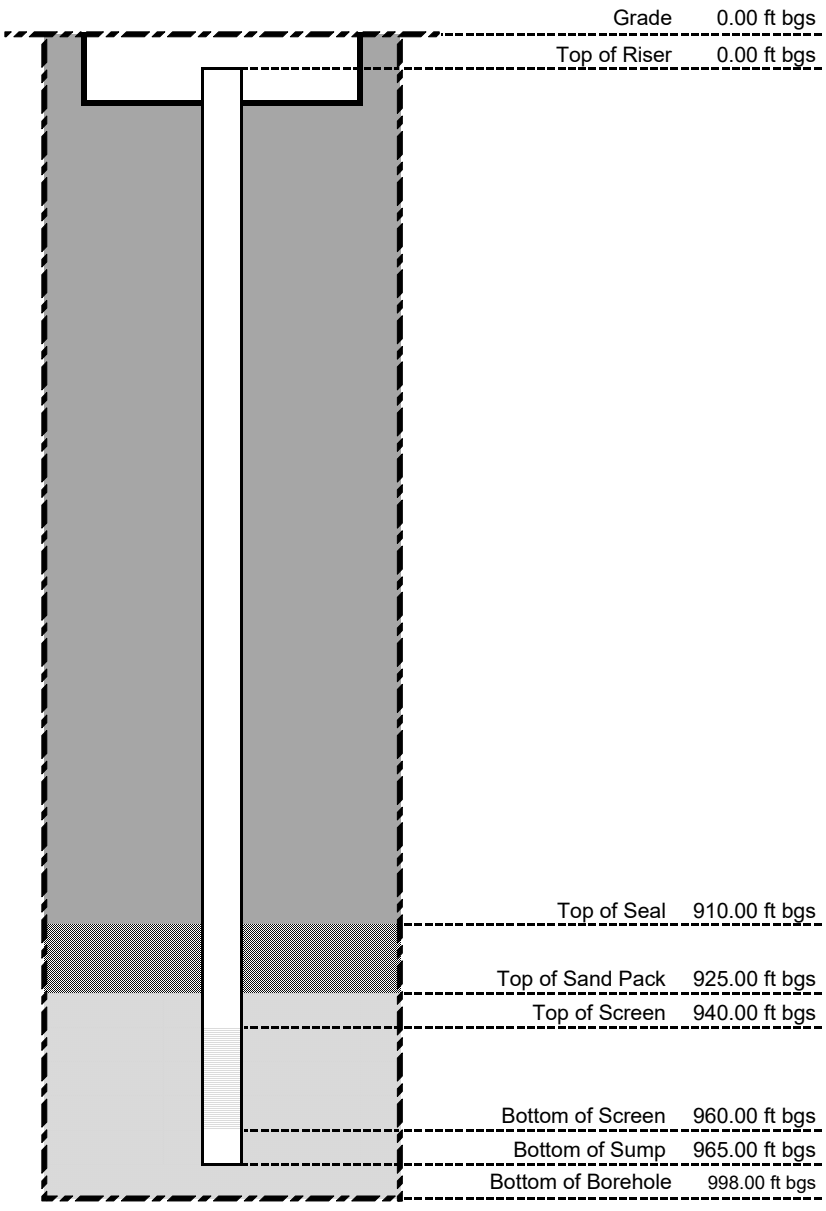


Project: DECHC-05 Area PDI
Subject: Monitoring Well Construction Log

Well ID:	DECHC05-MW-02	**Project:**	DECHC-05 Area PDI
Location:	Bethpage, NY	**Client:**	NYSDEC
Drilling Contractor:	Delta Well & Pump	**Project Number:**	10199876
Date Drilled:		**Drilling Rig:**	Mud Rotary
Date Completed:		**Drilling Method:**	Mud Rotary
Cover Type:	Manhole Cover	**Development Method:**	Airlift & Pump
Grade Elevation:		**Key ID or Socket Size:**	
Total Drilled Depth:	994 ftbgs	**Coordinate System:**	NAD 1983 (2011) StatePlane NY LI FIPS 3104
Borehole Dia.:	9-inch	**X:**	**Y:**

General Well Information	
Well ID:	DECHC05-MW-02
Start Date:	Aug 19, 2021
End Date:	Oct 26, 2021
Static Water Level:	
SWL Date:	
Measuring Point:	TOC
Well Depth (ft):	965 ft bgs
Riser Pipe(s)	
Interval (ft bgs):	0-940
Material:	Sch. 80 PVC
Diameter (in):	4
Joint Type:	Coupled
Surface Casing	
Interval (ft bgs):	0-50
Material:	Steel
Diameter (in):	12
Joint Type:	Flush
Screen(s)	
Interval (ft bgs):	940-960
Diameter (in):	4
Material:	Sch. 80 PVC
Slot Size:	20
Filter Pack(s)	
Interval (ft):	925-998
Sand:	#1
Gravel:	
Natural:	
Amount:	
Sump(s)	
Interval (ft bgs):	960-965
Material:	Sch. 80 PVC
Diameter (in):	4
Joint Type:	Coupled
Seal(s) / QTY(s)	
Grout (Cement-Bentonite):	0-910
Concrete Mix:	
Bentonite Slurry:	
Bentonite Pellets:	
Other:	#00 Sand 910-925

** NOT TO SCALE*

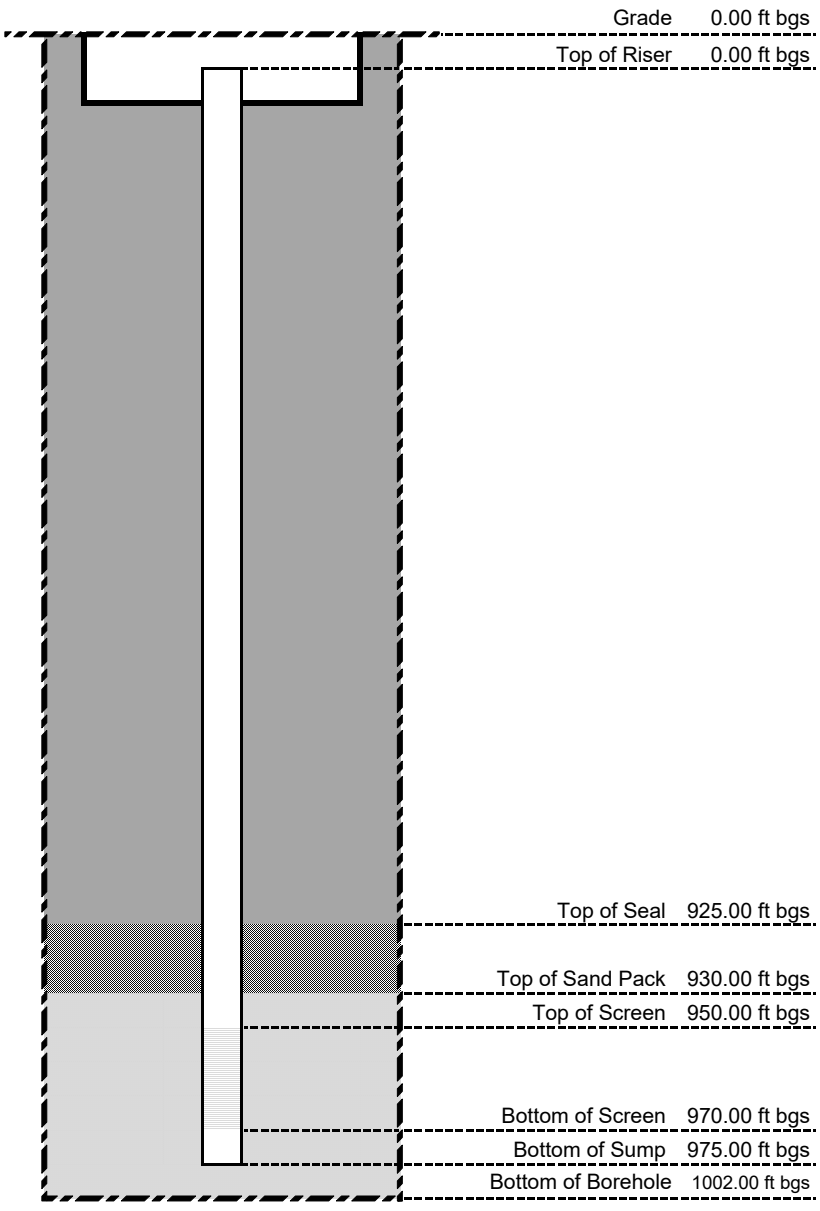


Project: DECHC-05 Area PDI
Subject: Monitoring Well Construction Log

Well ID:	DECHC05-MW-03	**Project:**	DECHC-05 Area PDI
Location:	Bethpage, NY	**Client:**	NYSDEC
Drilling Contractor:	Delta Well & Pump	**Project Number:**	10199876
Date Drilled:		**Drilling Rig:**	Mud Rotary
Date Completed:		**Drilling Method:**	Mud Rotary
Cover Type:	Manhole Cover	**Development Method:**	Airlift & Pump
Grade Elevation:		**Key ID or Socket Size:**	
Total Drilled Depth:	1000 feet	**Coordinate System:**	NAD 1983 (2011) StatePlane NY LI FIPS 3104
Borehole Dia.:	9-inch	**X:**	**Y:**

General Well Information	
Well ID:	DECHC05-MW-03
Start Date:	Nov 23, 2021
End Date:	Dec 23, 2021
Static Water Level:	
SWL Date:	
Measuring Point:	TOC
Well Depth (ft):	975 ft bgs
Riser Pipe(s)	
Interval (ft bgs):	0-950
Material:	Sch. 80 PVC
Diameter (in):	4
Joint Type:	Coupled
Surface Casing	
Interval (ft bgs):	0-50
Material:	Steel
Diameter (in):	12
Joint Type:	Flush
Screen(s)	
Interval (ft bgs):	950-970
Diameter (in):	4
Material:	Sch. 80 PVC
Slot Size:	20
Filter Pack(s)	
Interval (ft):	930-1002
Sand:	#1
Gravel:	
Natural:	
Amount:	
Sump(s)	
Interval (ft bgs):	970-975
Material:	Sch. 80 PVC
Diameter (in):	4
Joint Type:	Coupled
Seal(s) / QTY(s)	
Grout (Cement-Bentonite):	0-925
Concrete Mix:	
Bentonite Slurry:	
Bentonite Pellets:	
Other:	#00 Sand 925-930

** NOT TO SCALE*



ATTACHMENT 7

Monitoring Well Development Logs

Monitoring Well	Air Development		Pump Development			Approximate Total Development Volume (gal)	Final Turbidity (NTUs)
	Date	Approximate Volume (gals)	Date	Final Pump Depth (ft bgs)	Approximate Volume (gals)		
DECHC05-MW-01	11/2/2021	5,000	11/3/2021 to 11/4/2021	970	7,000	12,000	50
DECHC05-MW-02	6/7/2021 and 6/8/2021	12,000	6/16/2021 to 6/17/2021	960	6,600	18,000	48
DECHC05-MW-03	1/13/2021	6,000	1/14/21 tot 1/18/2021	970	15,000	21,000	130

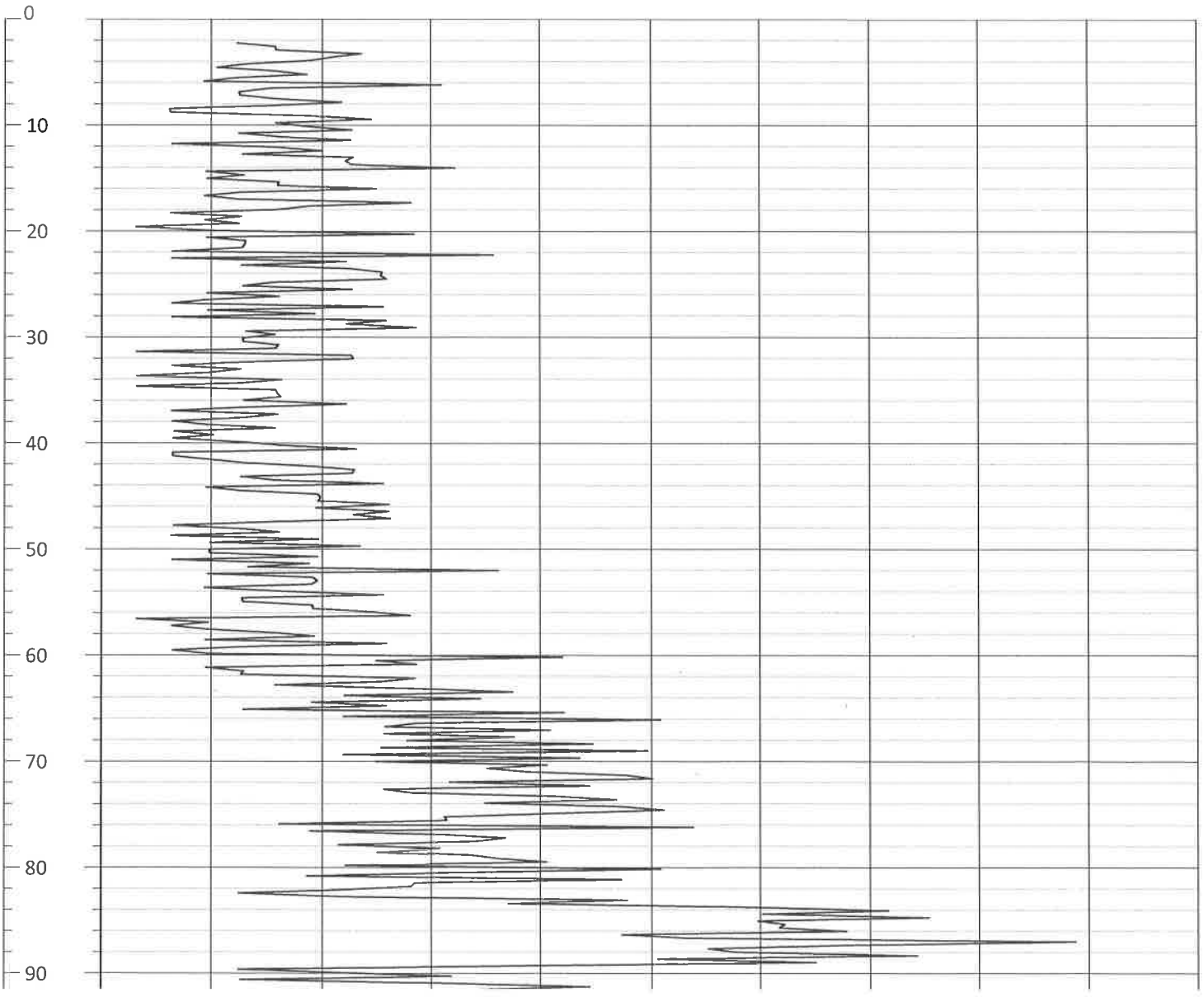
ATTACHMENT 8

Geophysical Logs

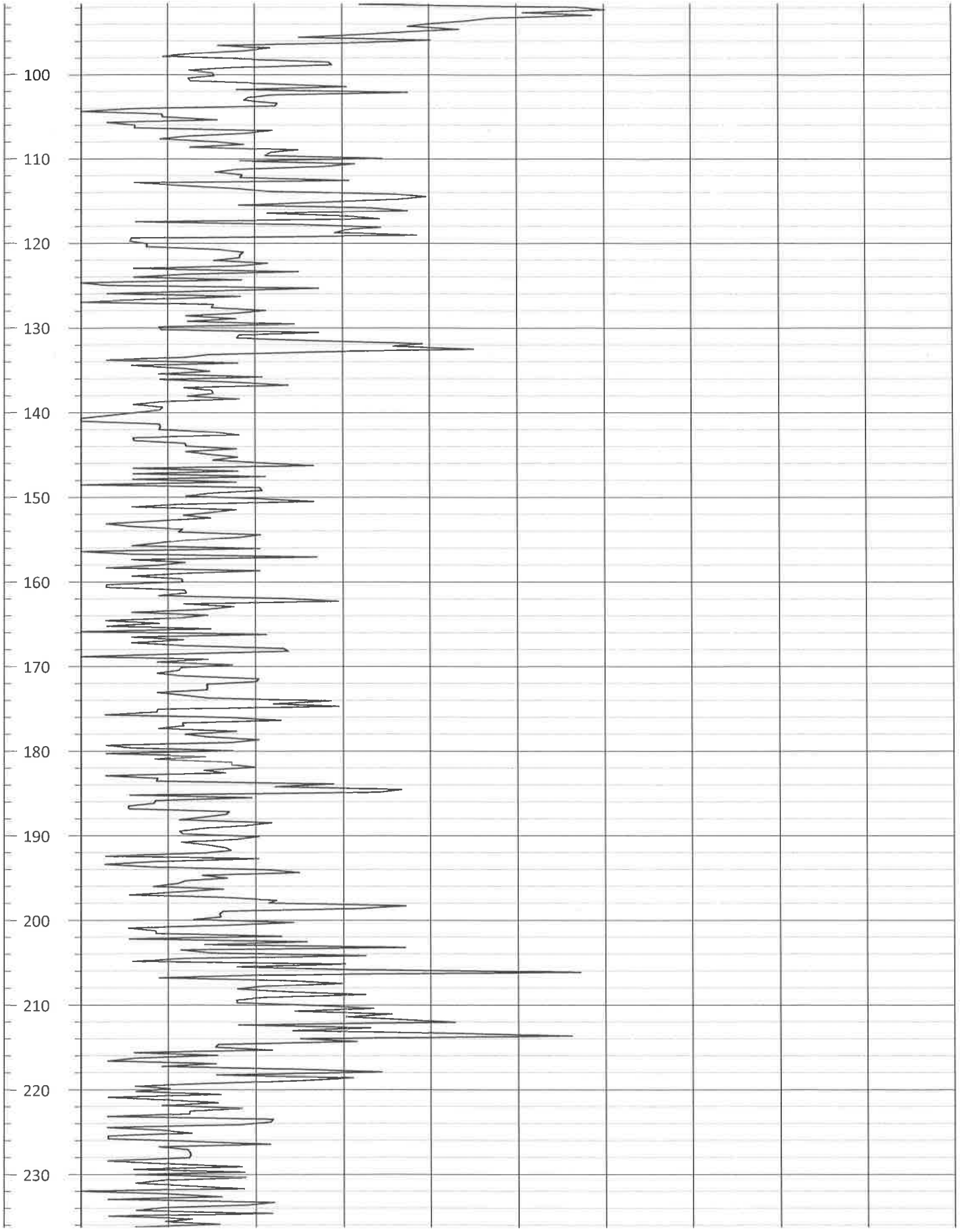
UP

COMPANY: DELTA WELL & PUMP CO., INC.	
LOCATION: WEEKS AVE	
Well: DECHC05-VPB01	Depth Driller:
	Depth Logger:
Date: 05-13-21 Time:	Logged by: CMO
File Name: 775	Witness: DEREK

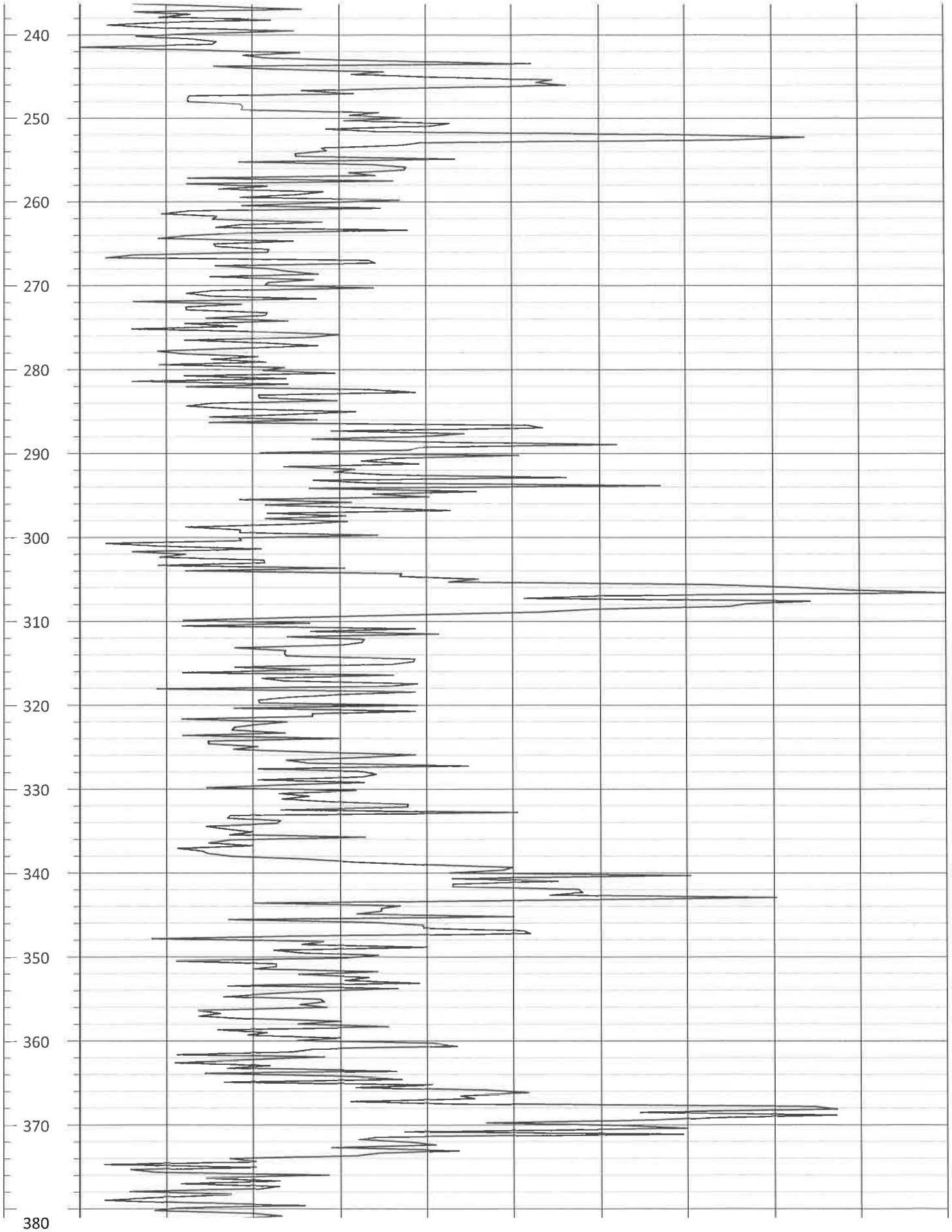
Depth (ft.) 0.0 GAMMA (cps) 100.0



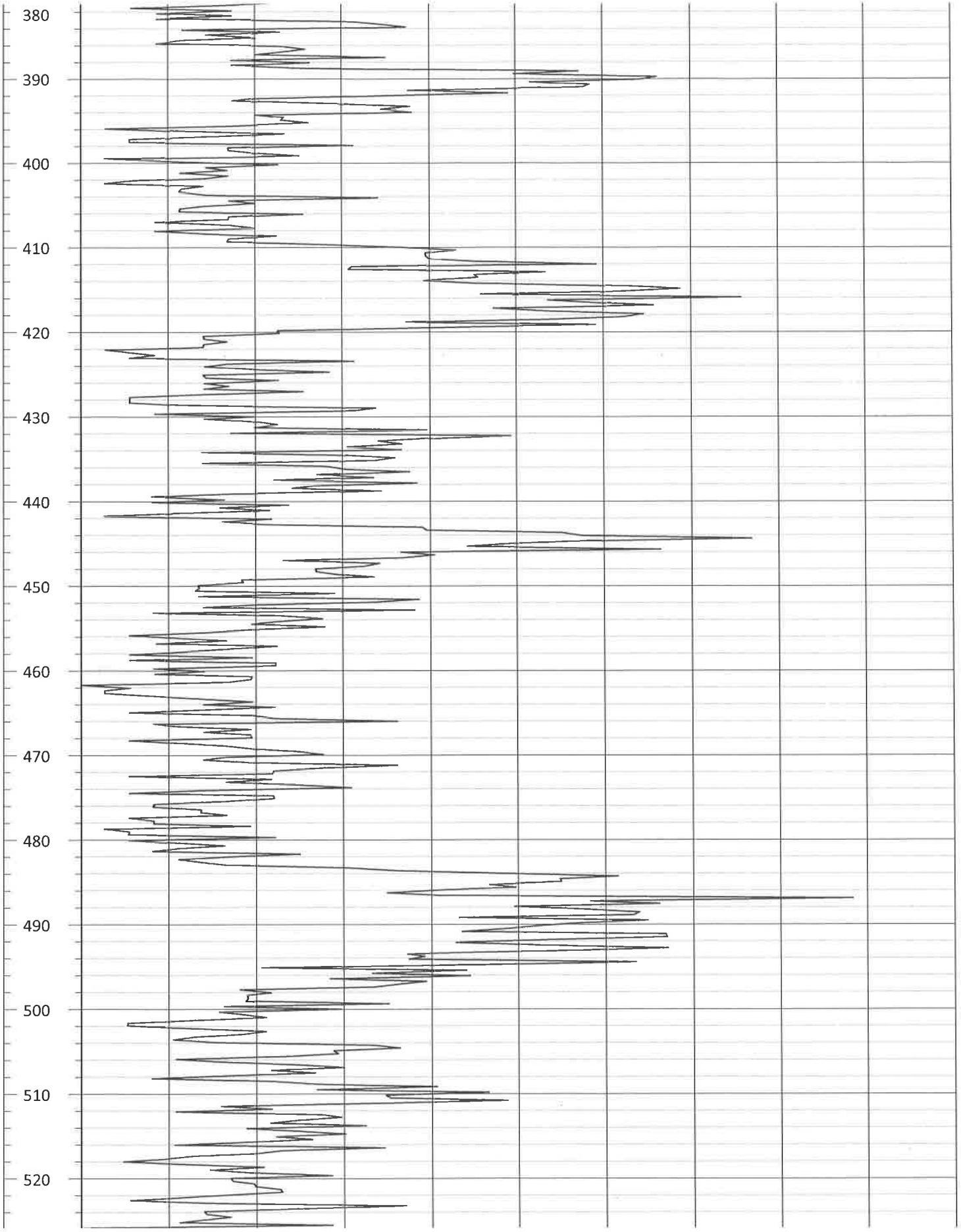
Depth (ft.) 0.0 GAMMA (cps) 100.0



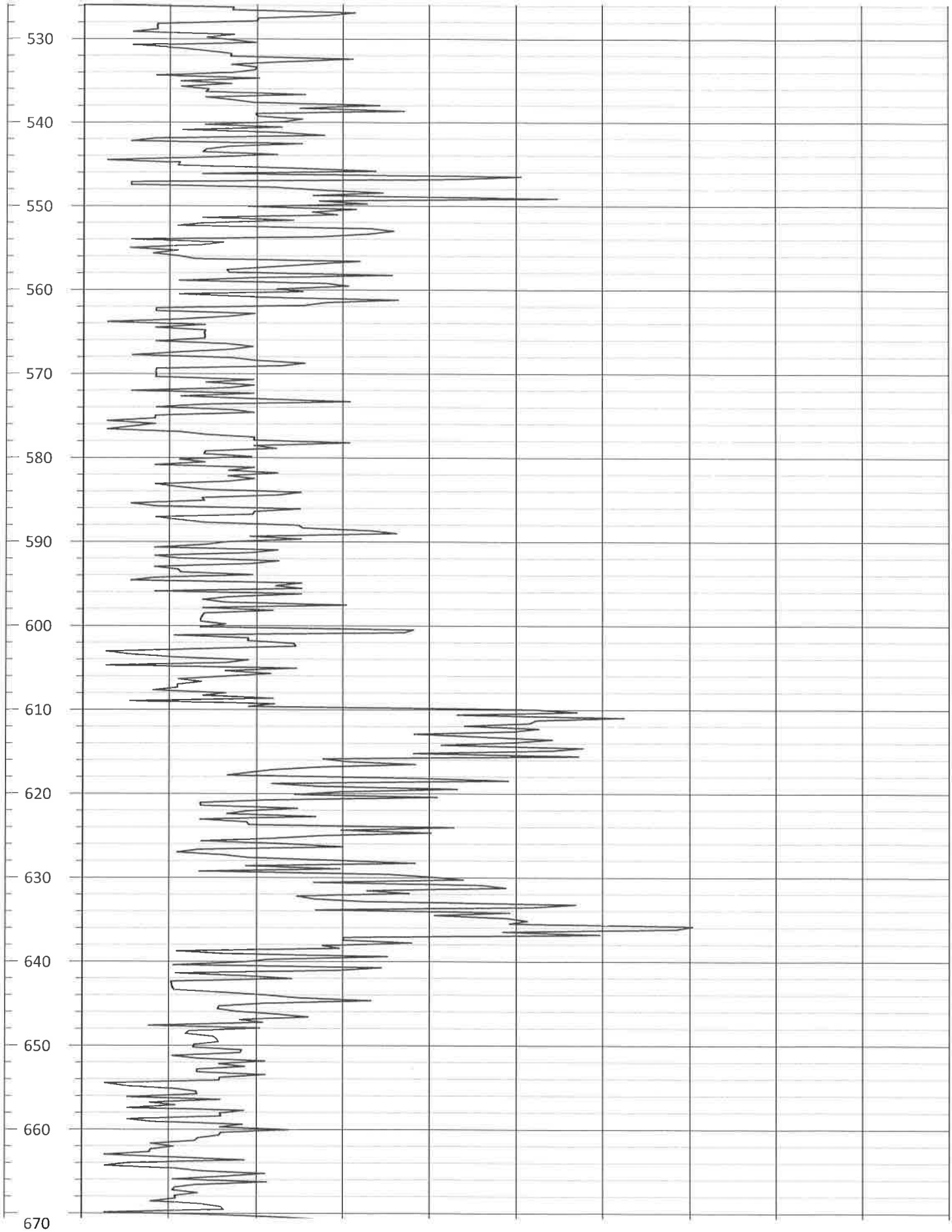
Depth (ft.)	0.0	GAMMA (cps)	100.0



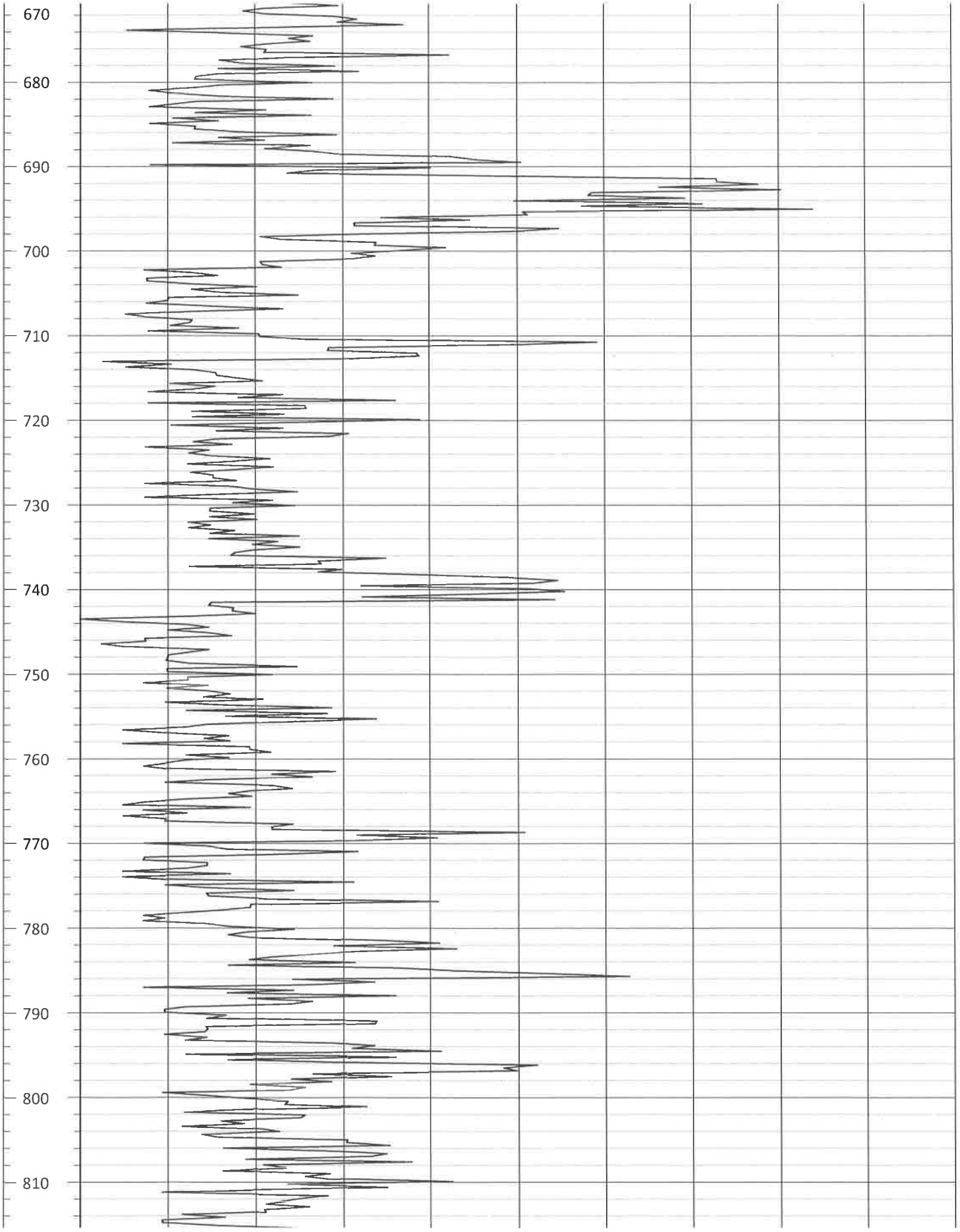
Depth (ft.)	0.0	GAMMA (cps)	100.0



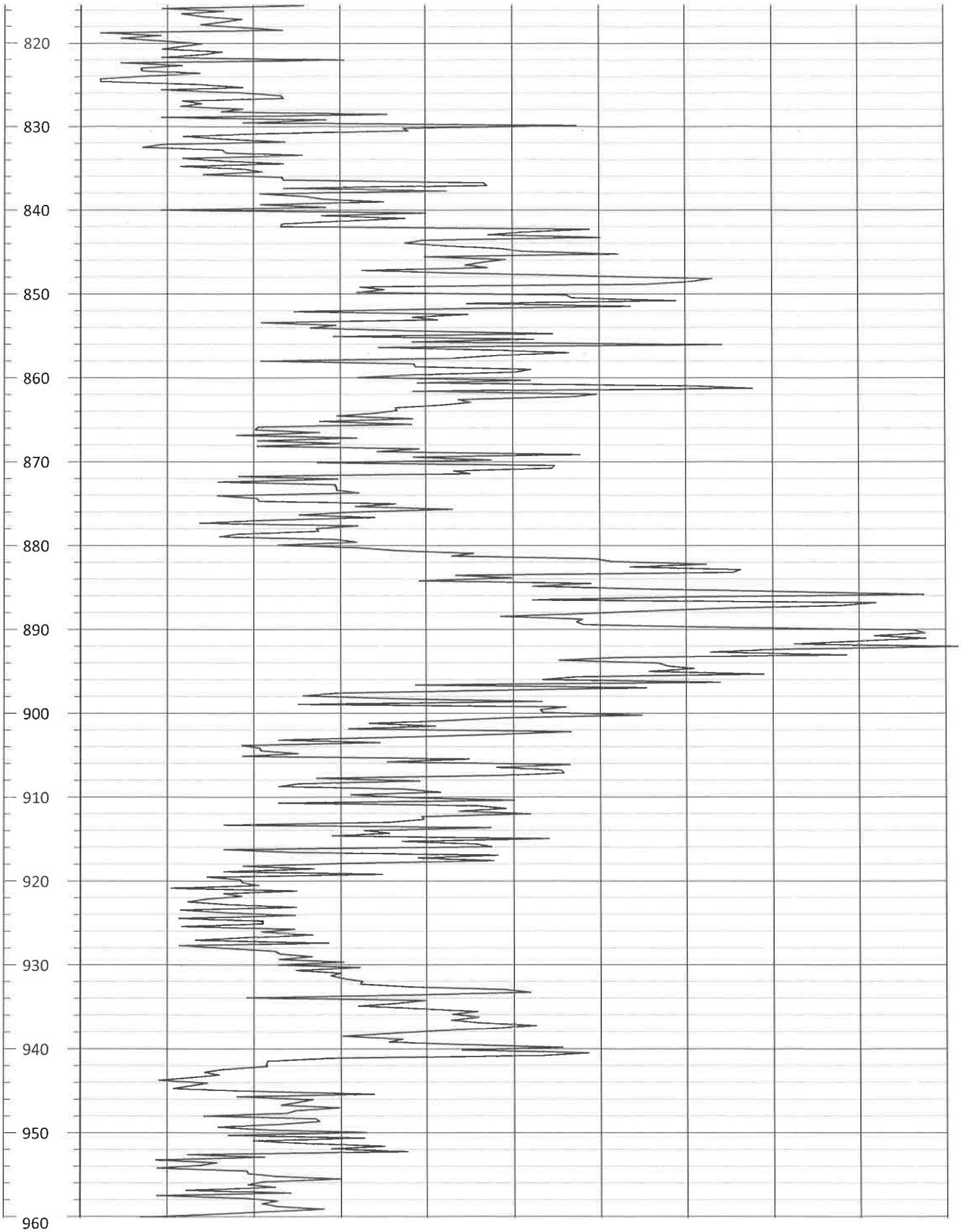
Depth (ft.)	0.0	GAMMA (cps)	100.0



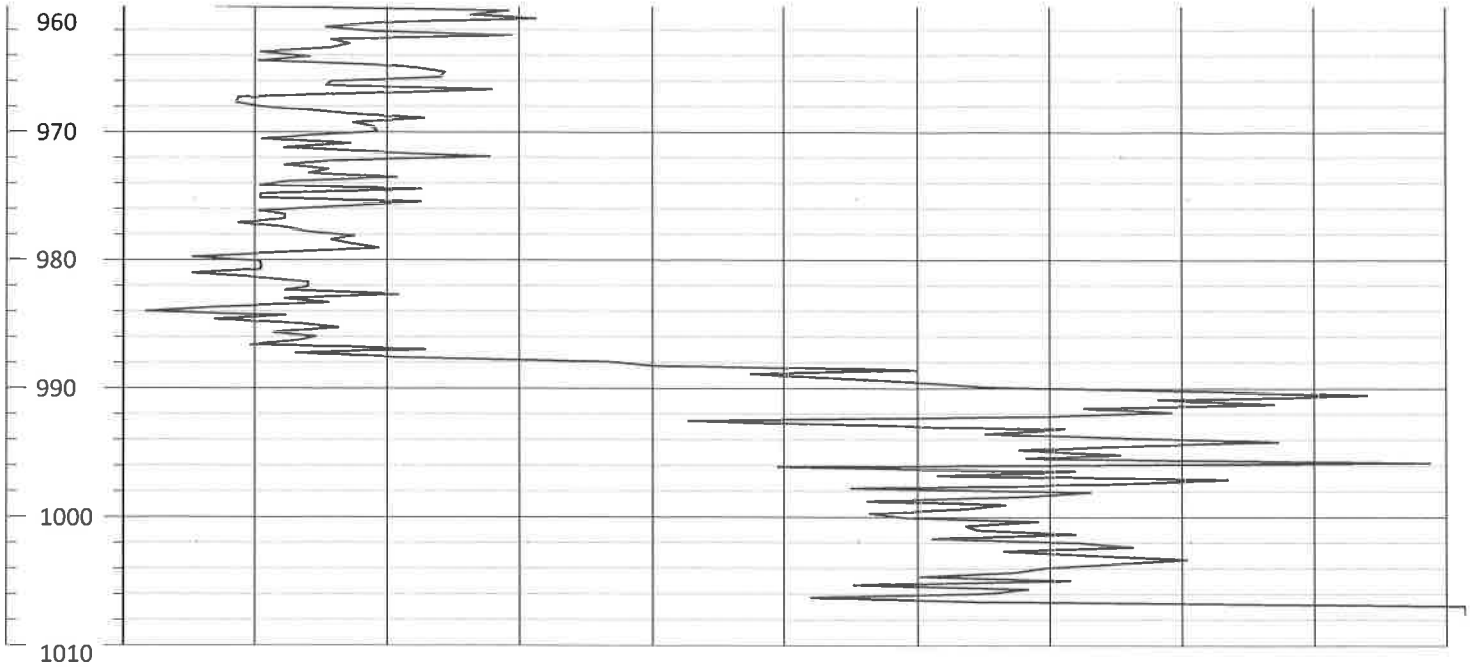
Depth (ft.)	0.0	GAMMA (cps)	100.0



Depth (ft.)	0.0	GAMMA (cps)	100.0



Depth (ft.)	0.0	GAMMA (cps)	100.0



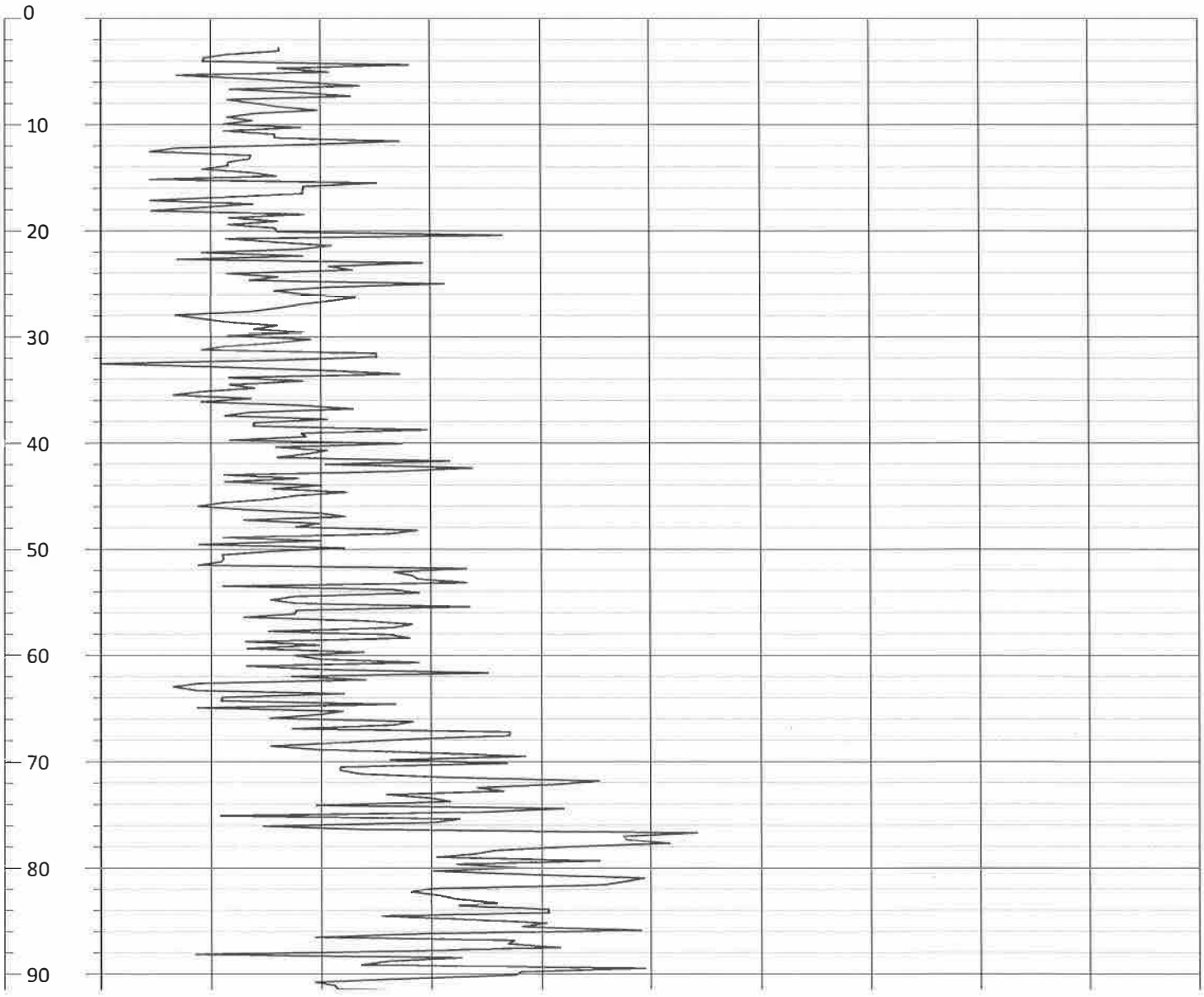
Depth (ft.)	0.0	GAMMA (cps)	100.0

UP

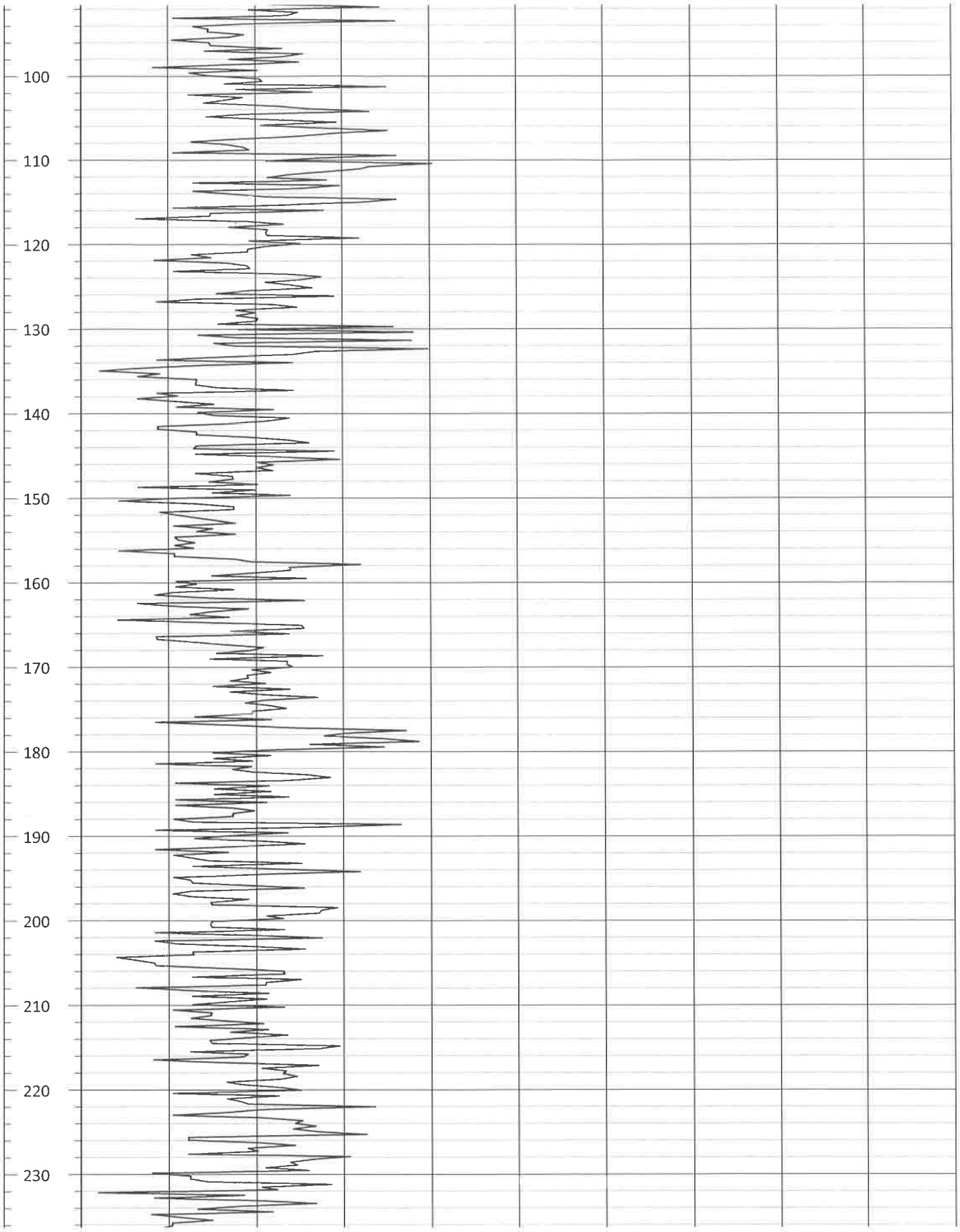
COMPANY:	DELTA WELL & PUMP CO., INC.
LOCATION:	NYSDEC ALKEN AVE

Well: DECHC05-VPB-02		Depth Driller:
		Depth Logger:
Date: 10-12-2021	Time:	Logged by: CMO
File Name: 775		Witness: DERRICK

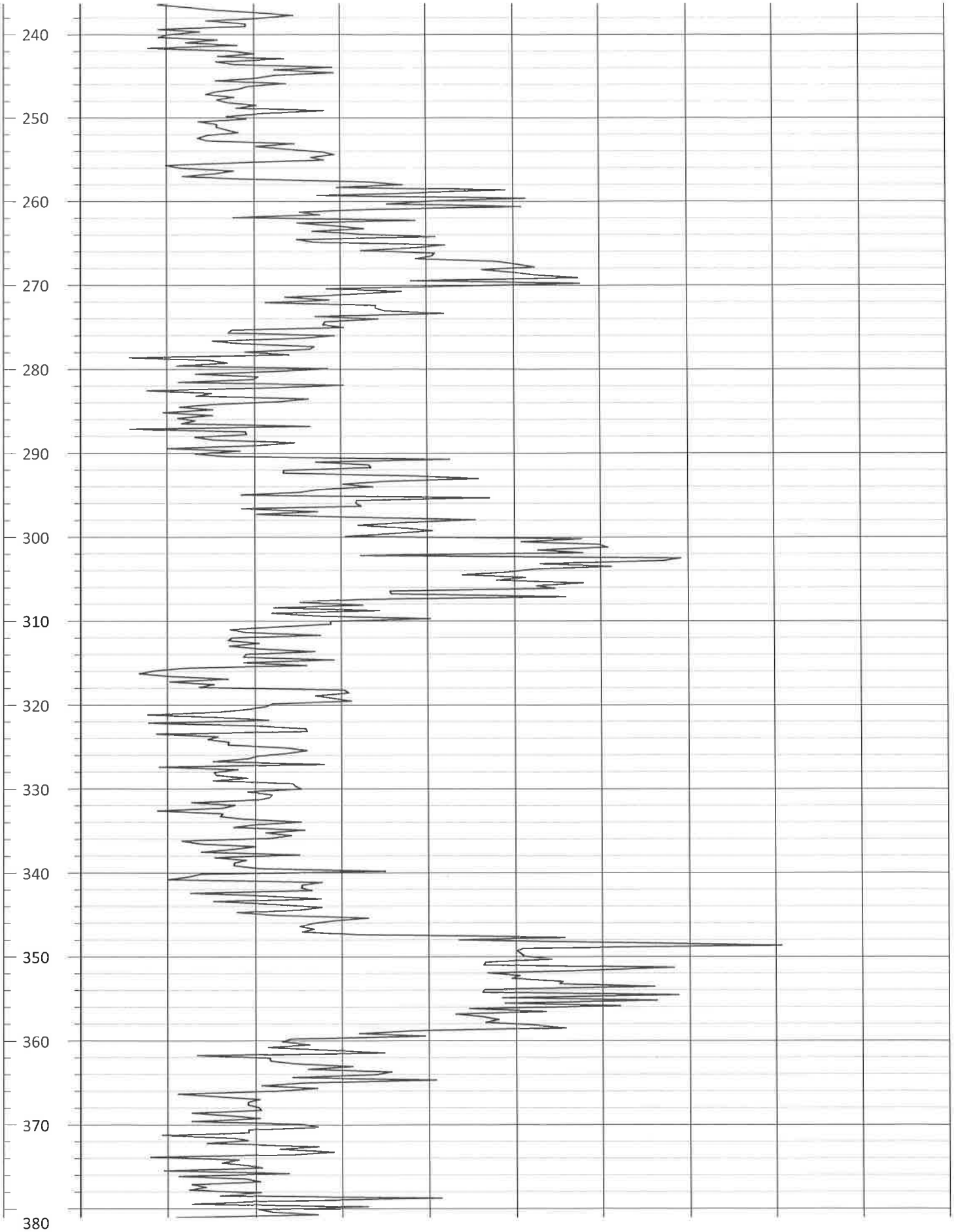
Depth (ft.)	0.0	GAMMA (cps)	100.0



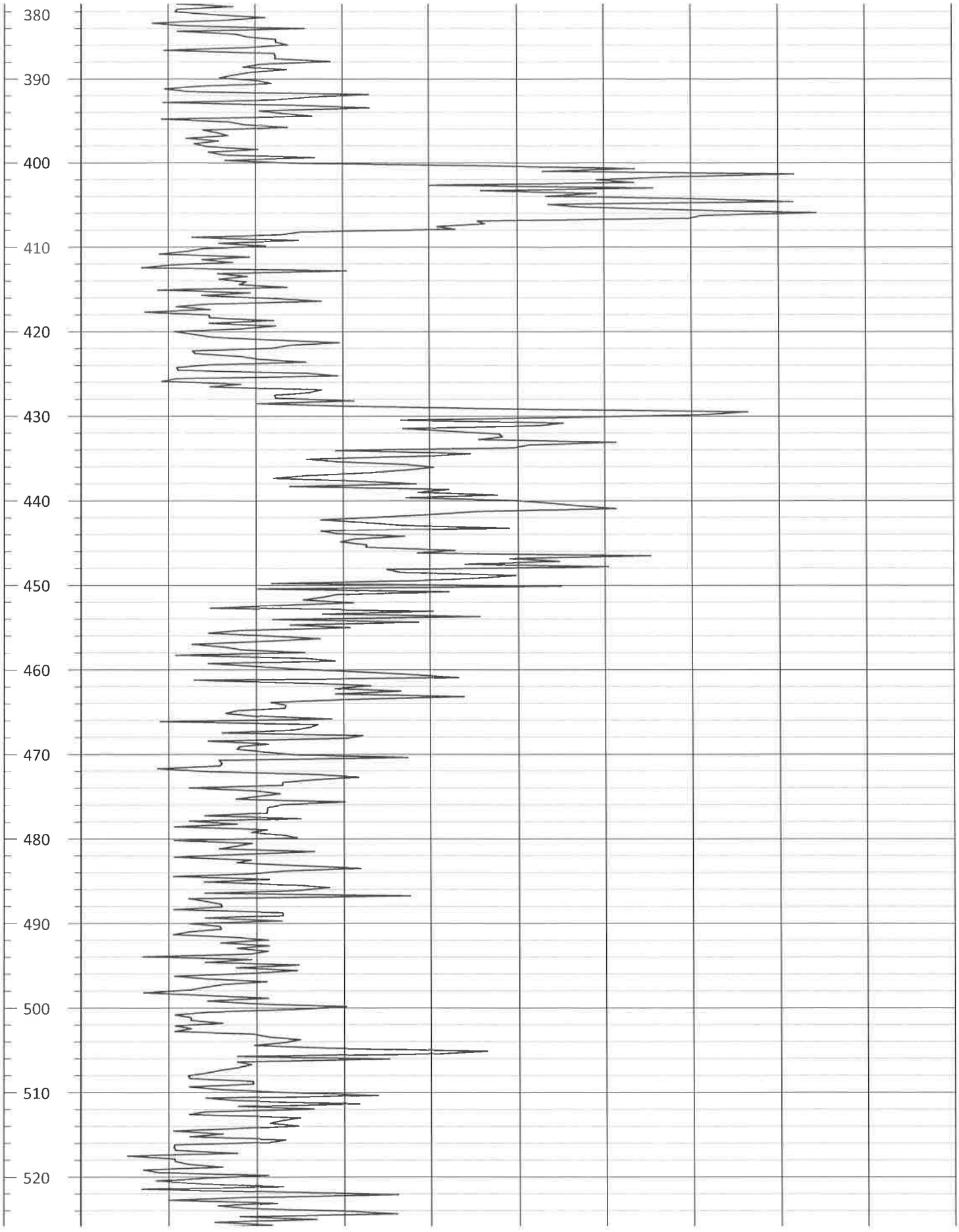
Depth (ft.)	0.0	GAM MA (cp s)	100.0



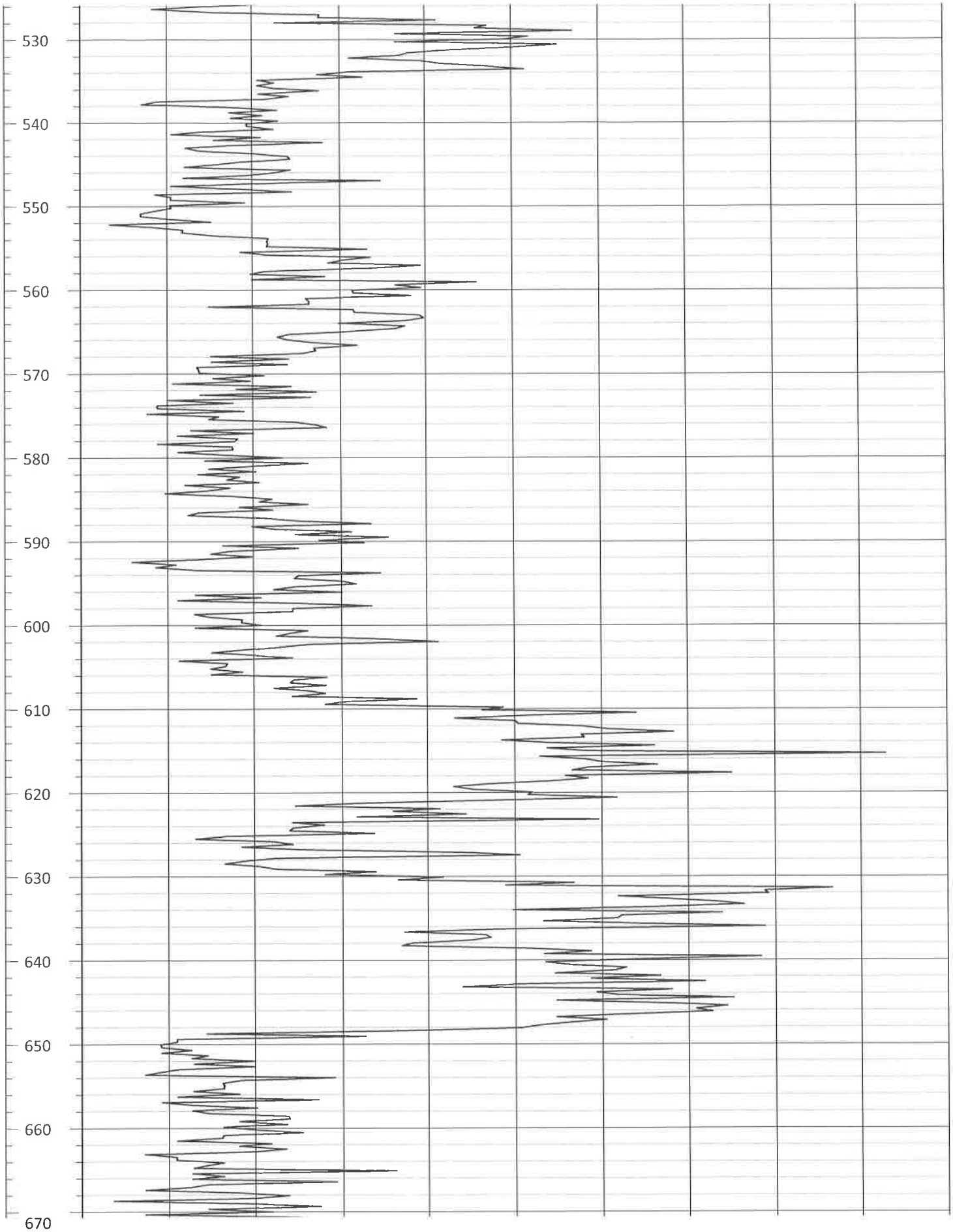
Depth (ft.)	0.0	GAMMA (cps)	100.0



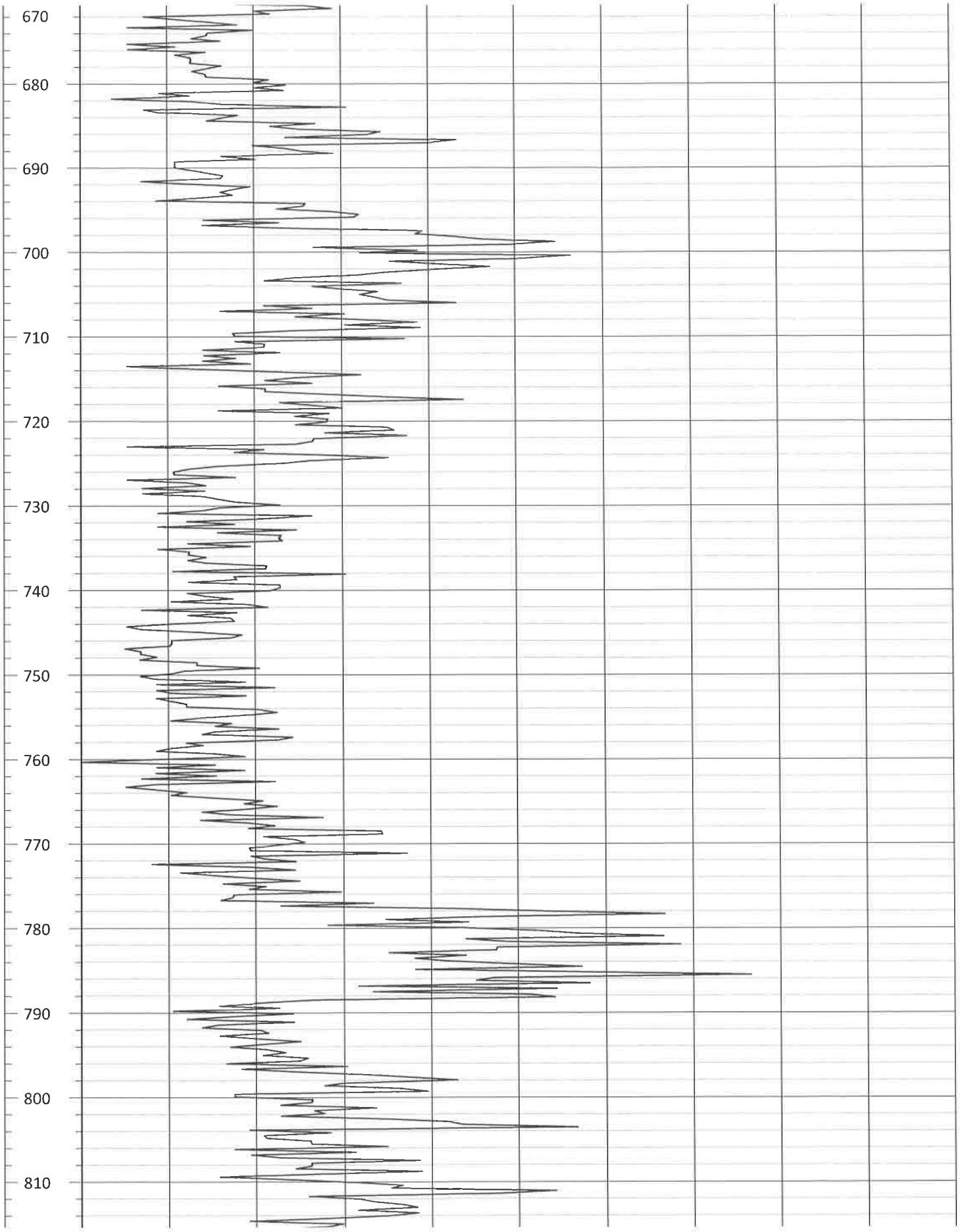
Depth (ft.)	0.0	GAMMA (cps)	100.0



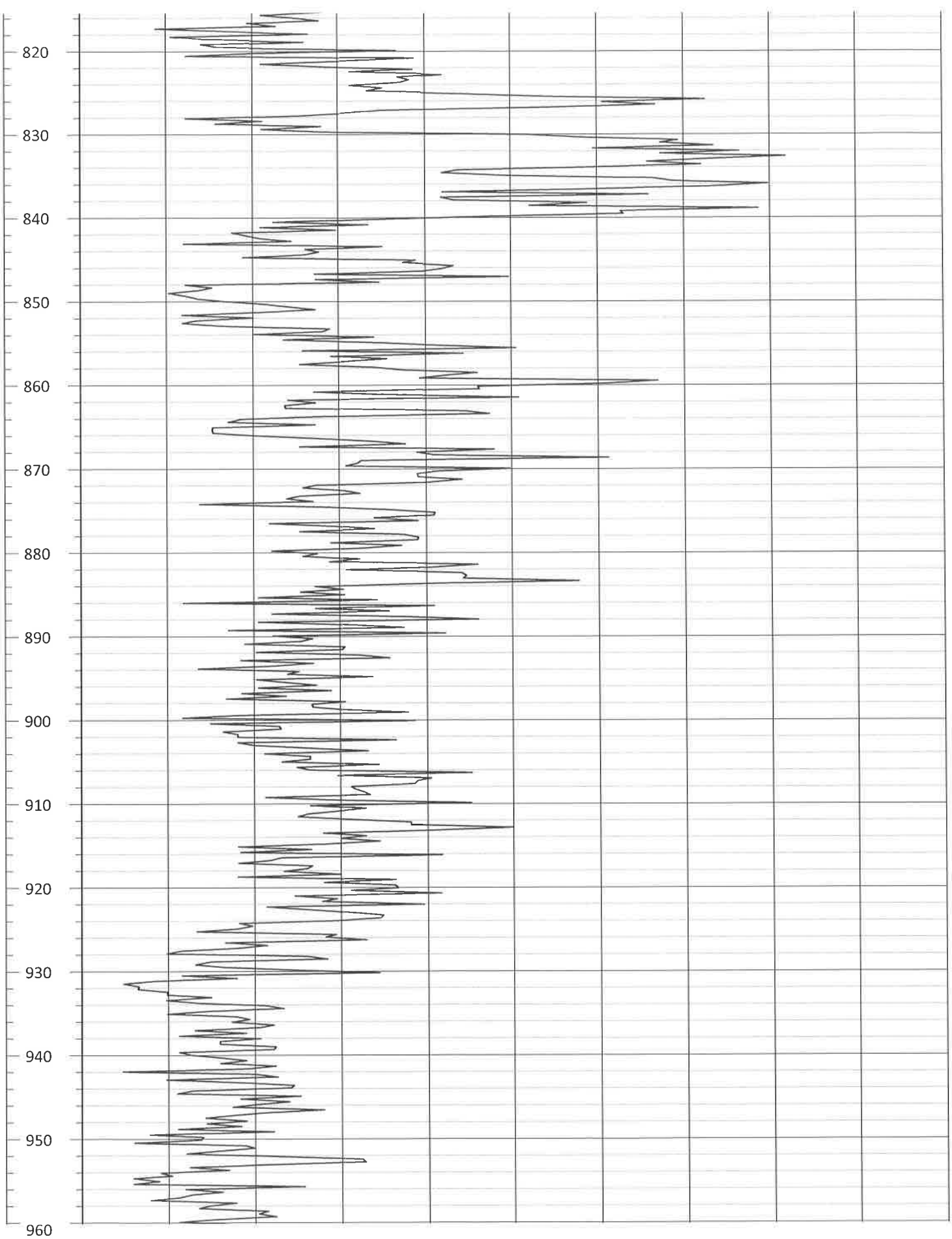
Depth (ft.)	0.0	GAMMA (cps)	100.0



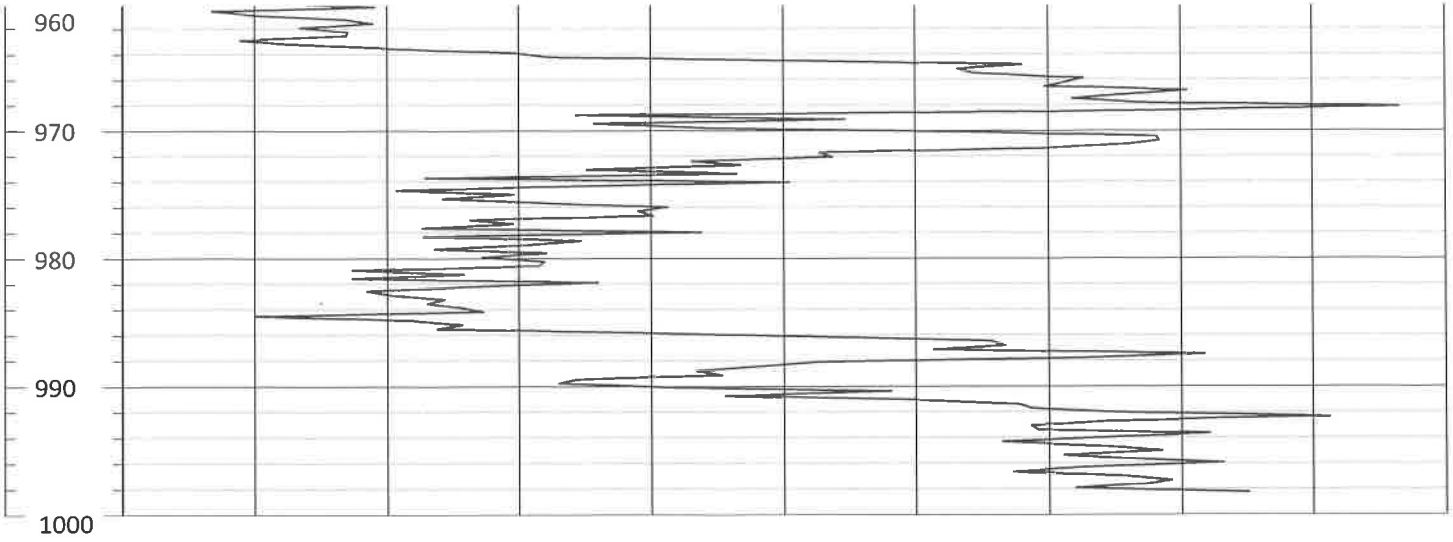
Depth (ft.)	0.0	GAMMA (cps)	100.0



Depth (ft.)	0.0	GAMMA (cps)	100.0



Depth (ft.)	0.0	GAMMA (cps)	100.0

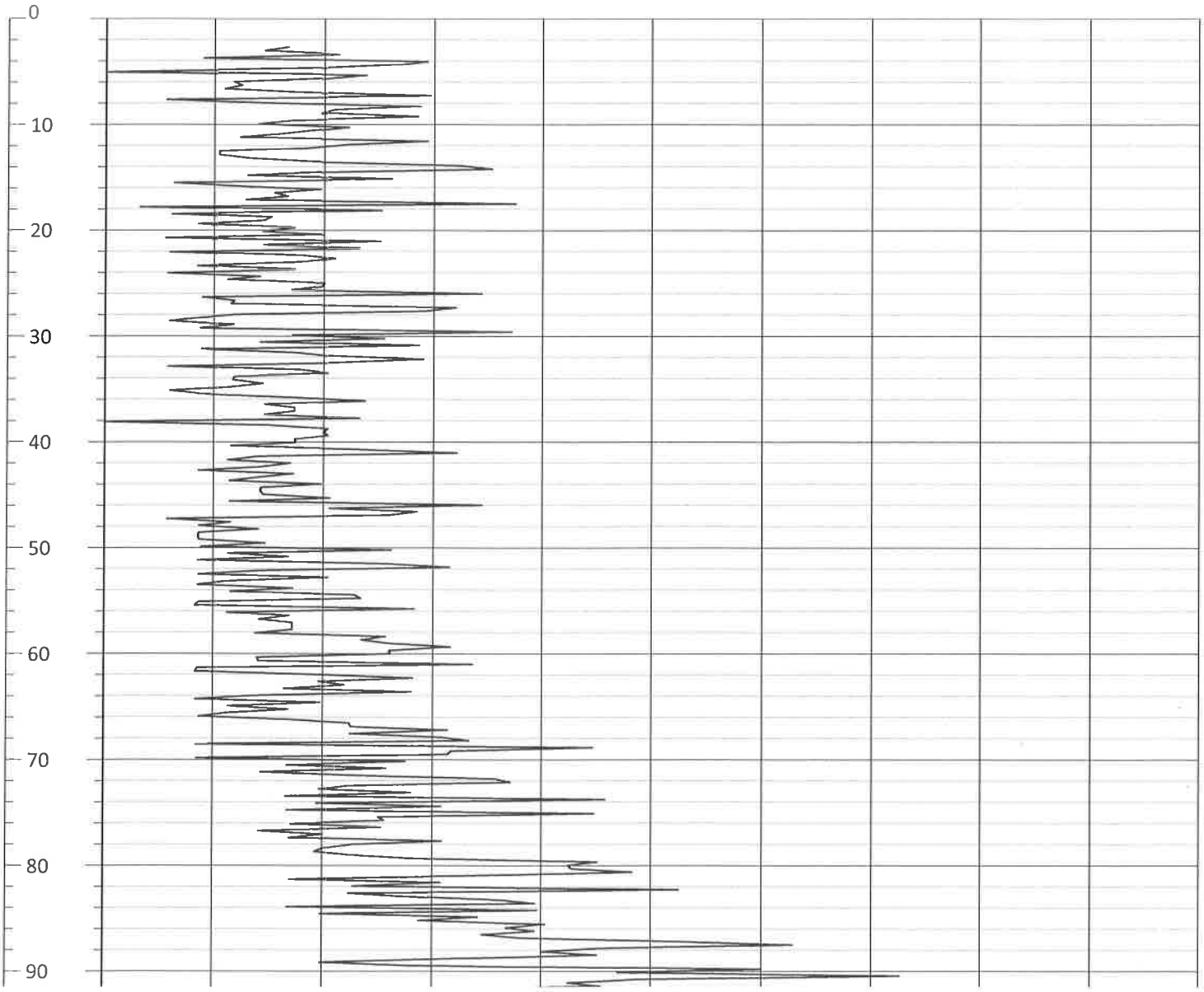


Depth (ft.)	GAMMA (cps)	
	0.0	100.0

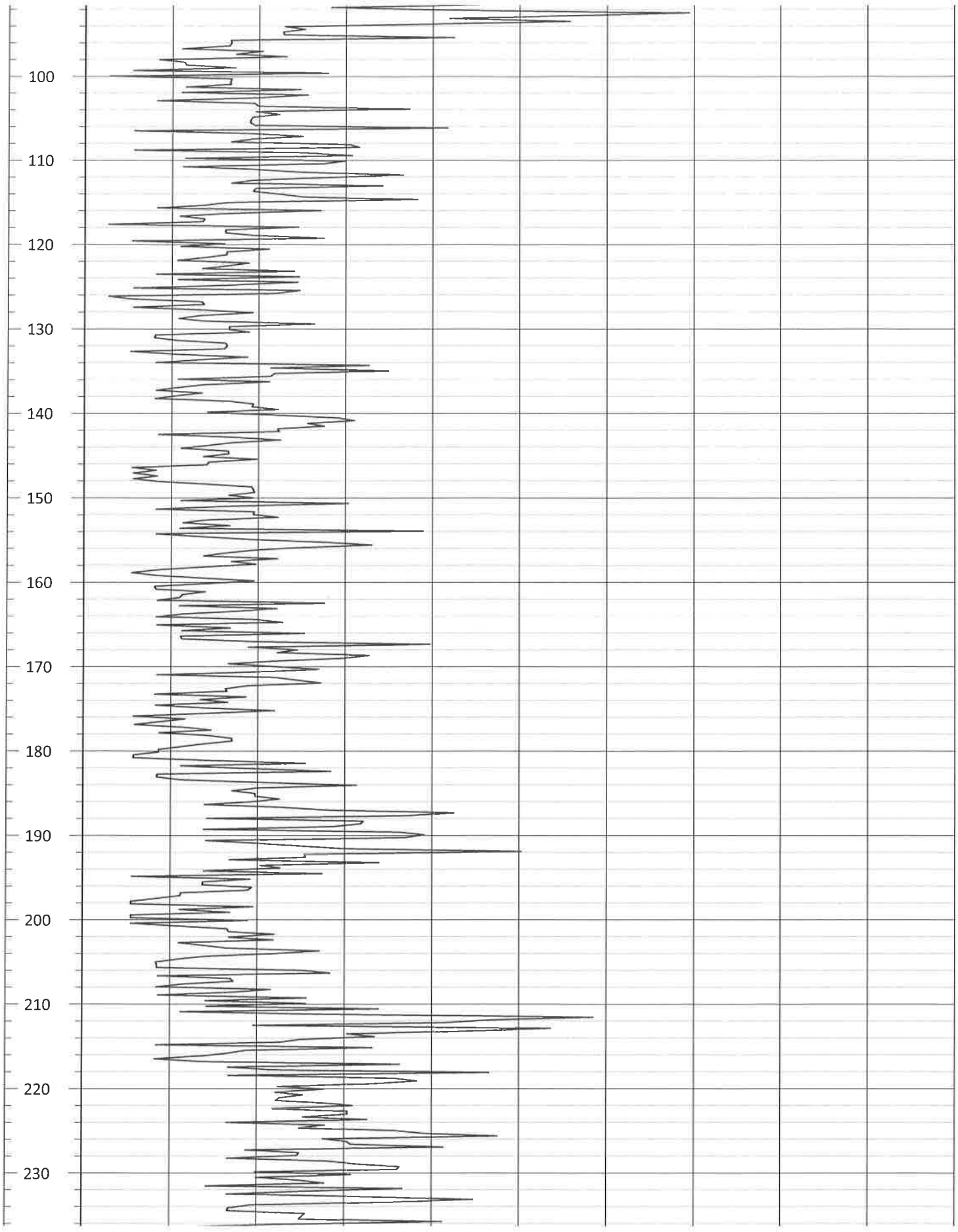
DOWN

COMPANY: DELTA WELL & PUMP CO., INC.	
LOCATION: Wicks Avenue	
Well: VPB-03	Depth Driller:
	Depth Logger:
Date: 12-15-21 Time:	Logged by: CMO
File Name: 775	Witness: Derek

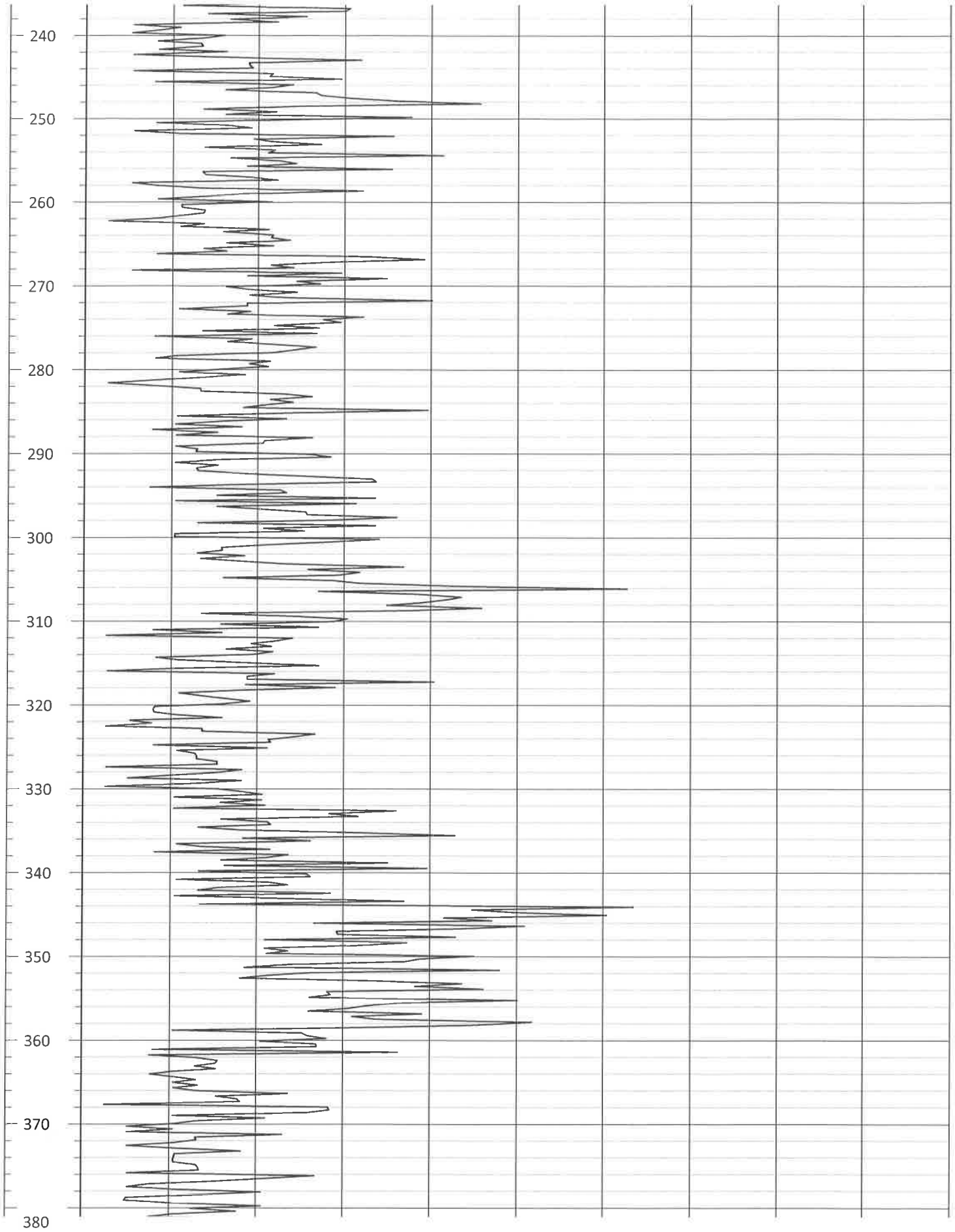
Depth (ft.)	GAMMA (cps)	
0.0		100.0



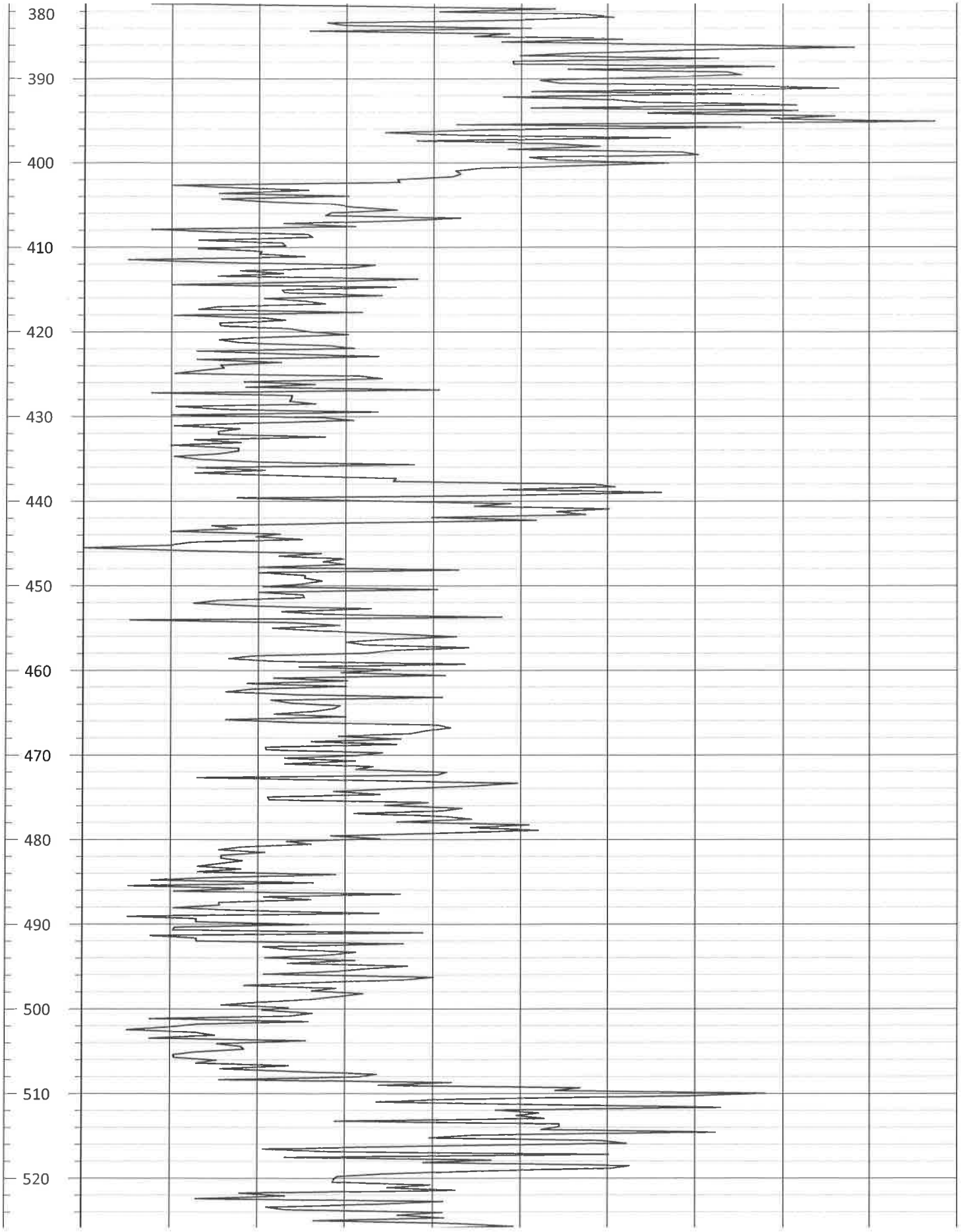
Depth (ft.)	GAMMA (cps)	
0.0		100.0



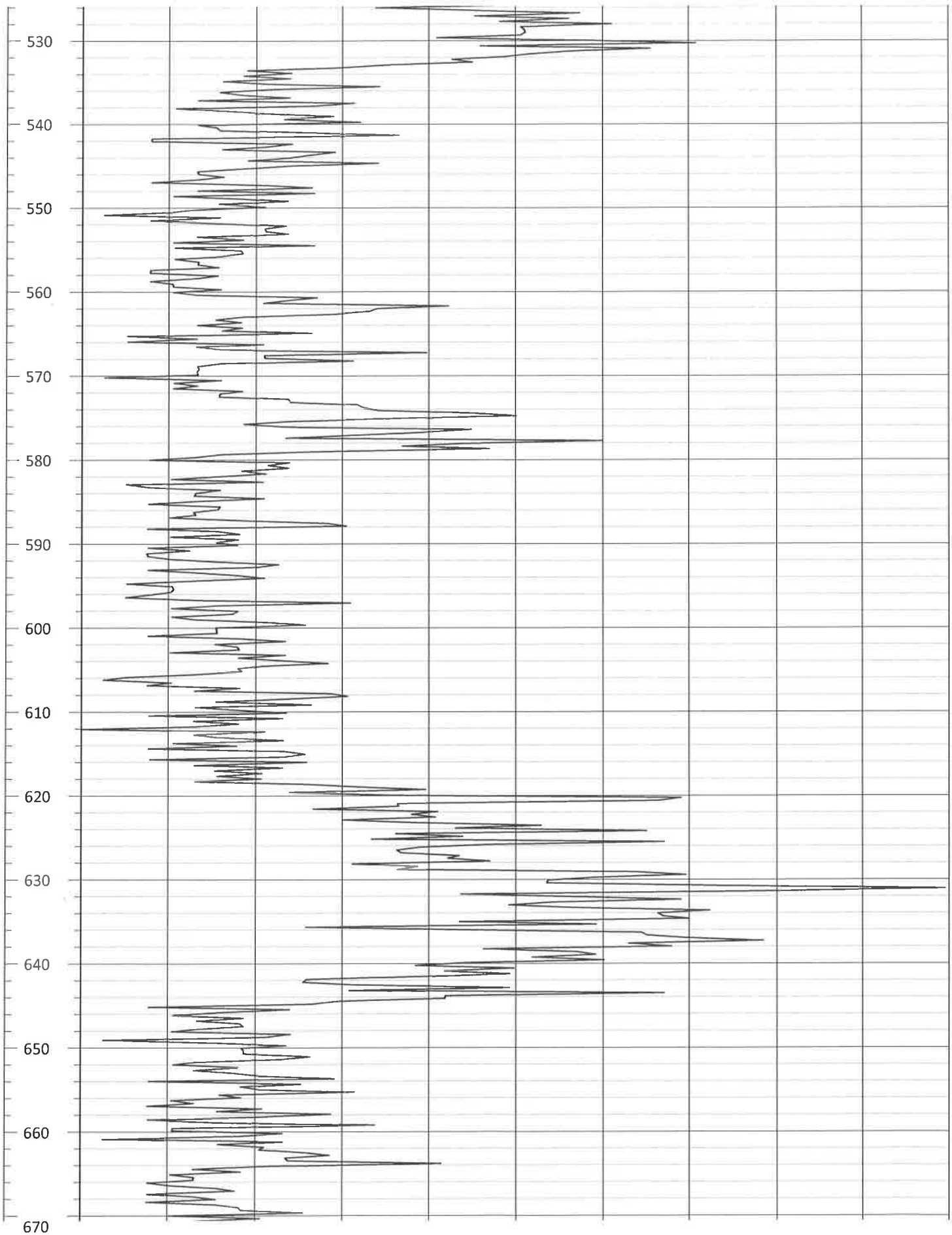
Depth (ft.)	0.0	GAMMA (cps)	100.0



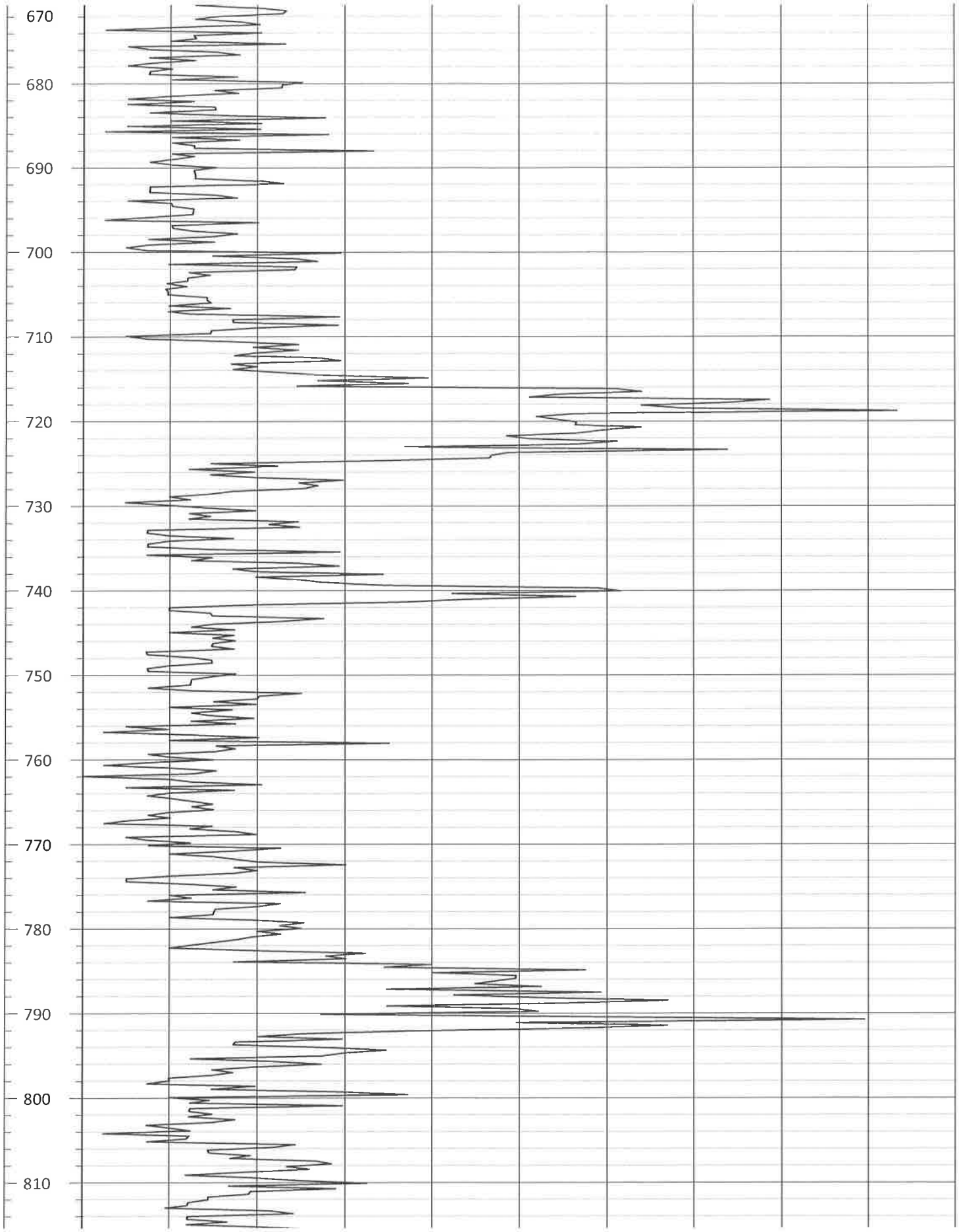
Depth (ft.)	0.0	GAMMA (cps)	100.0



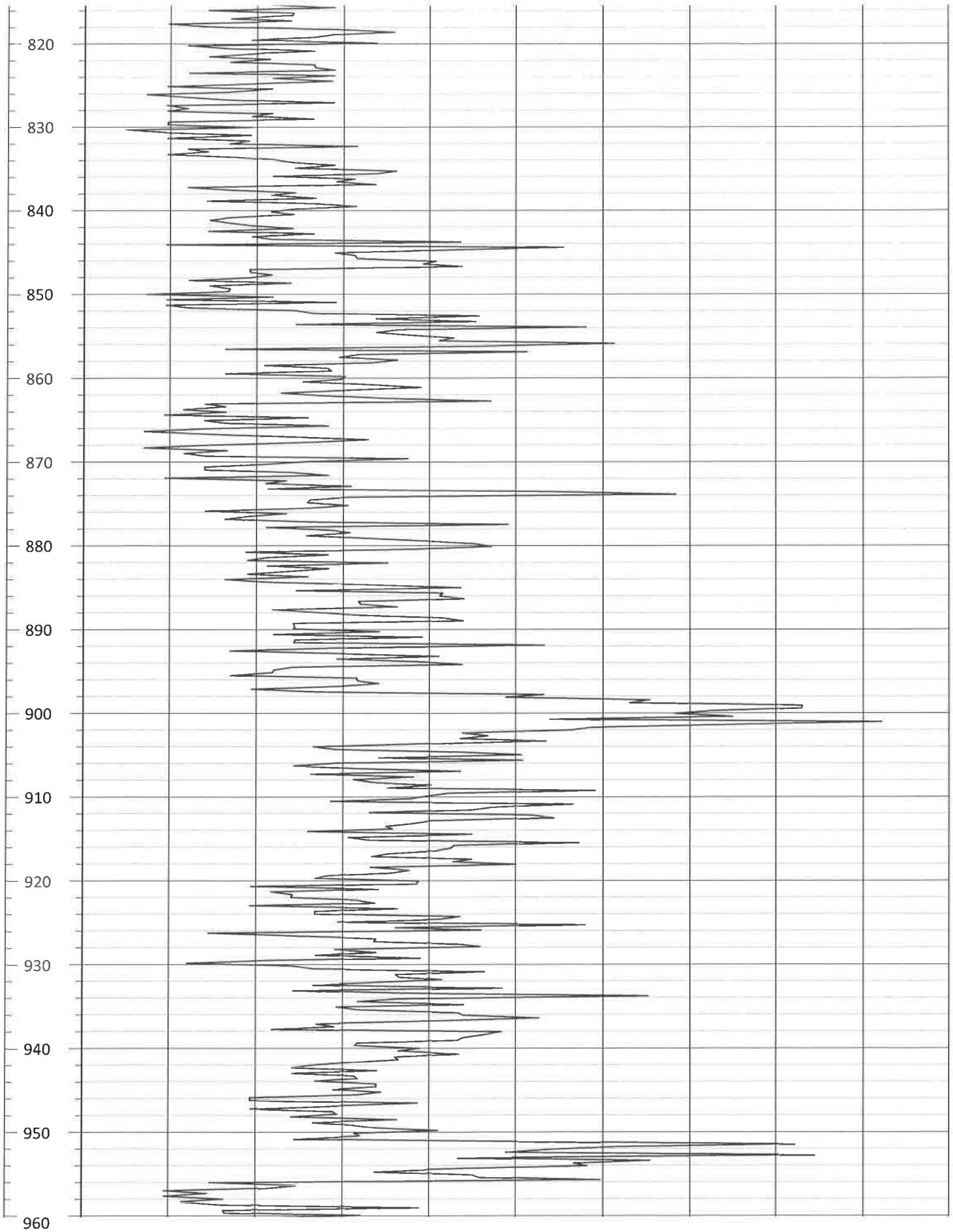
Depth (ft.)	0.0	GAMMA (cps)	100.0



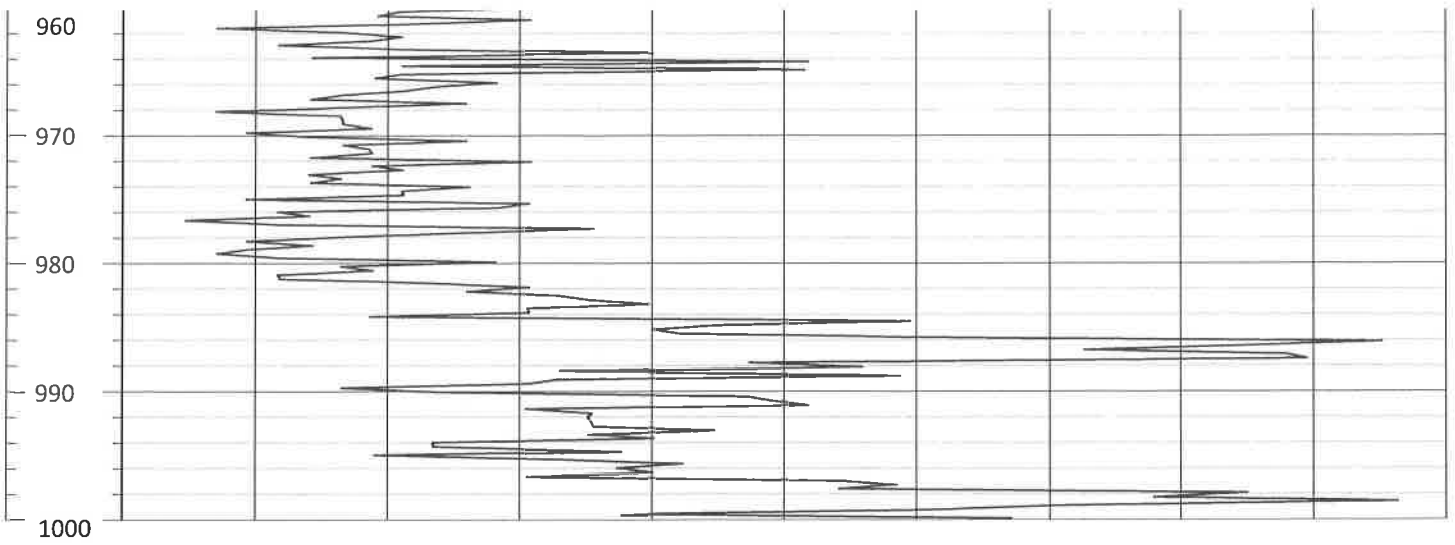
Depth (ft.)	0.0	GAMMA (cps)	100.0



Depth (ft.)	0.0	GAMMA (cps)	100.0



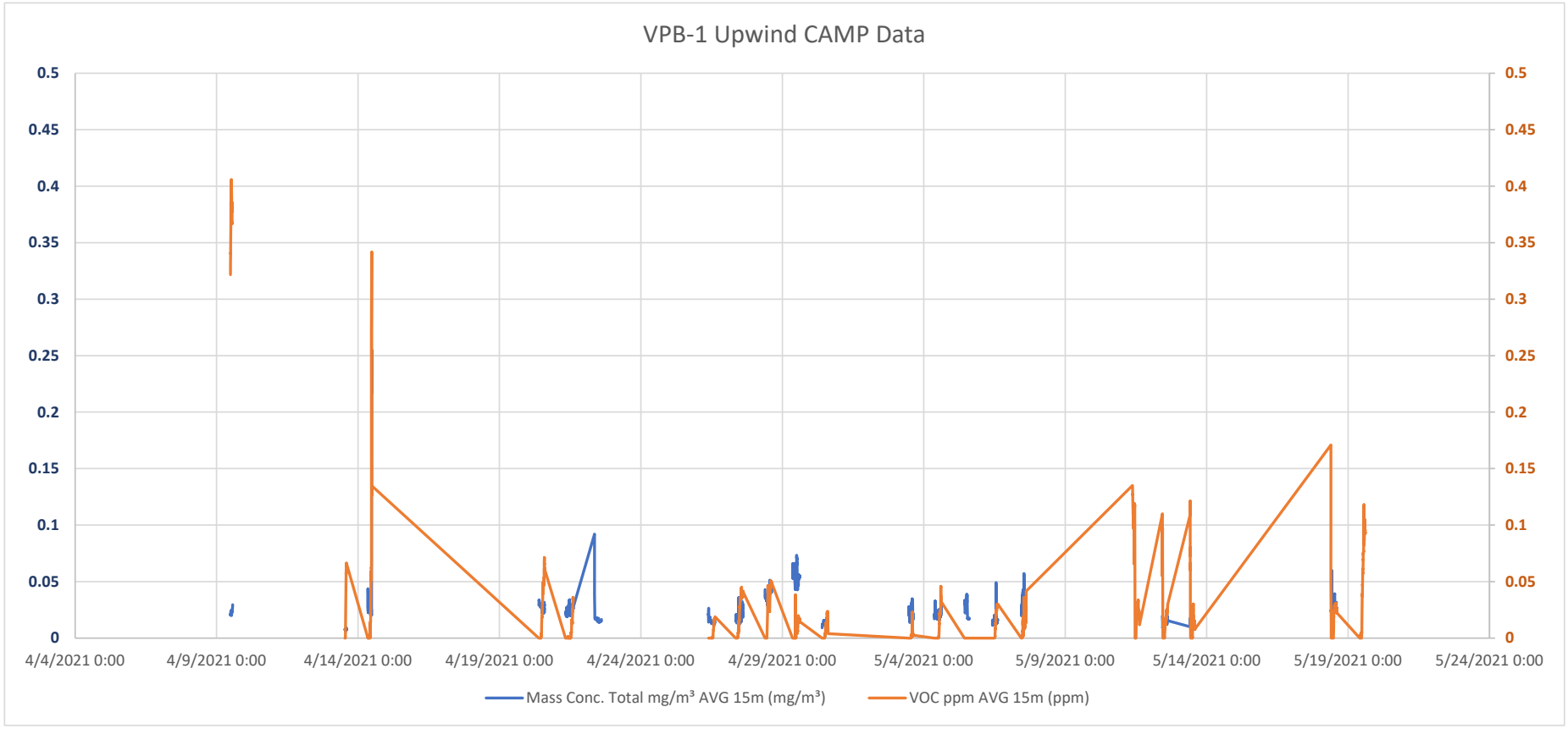
Depth (ft.)	0.0	GAMMA (cps)	100.0

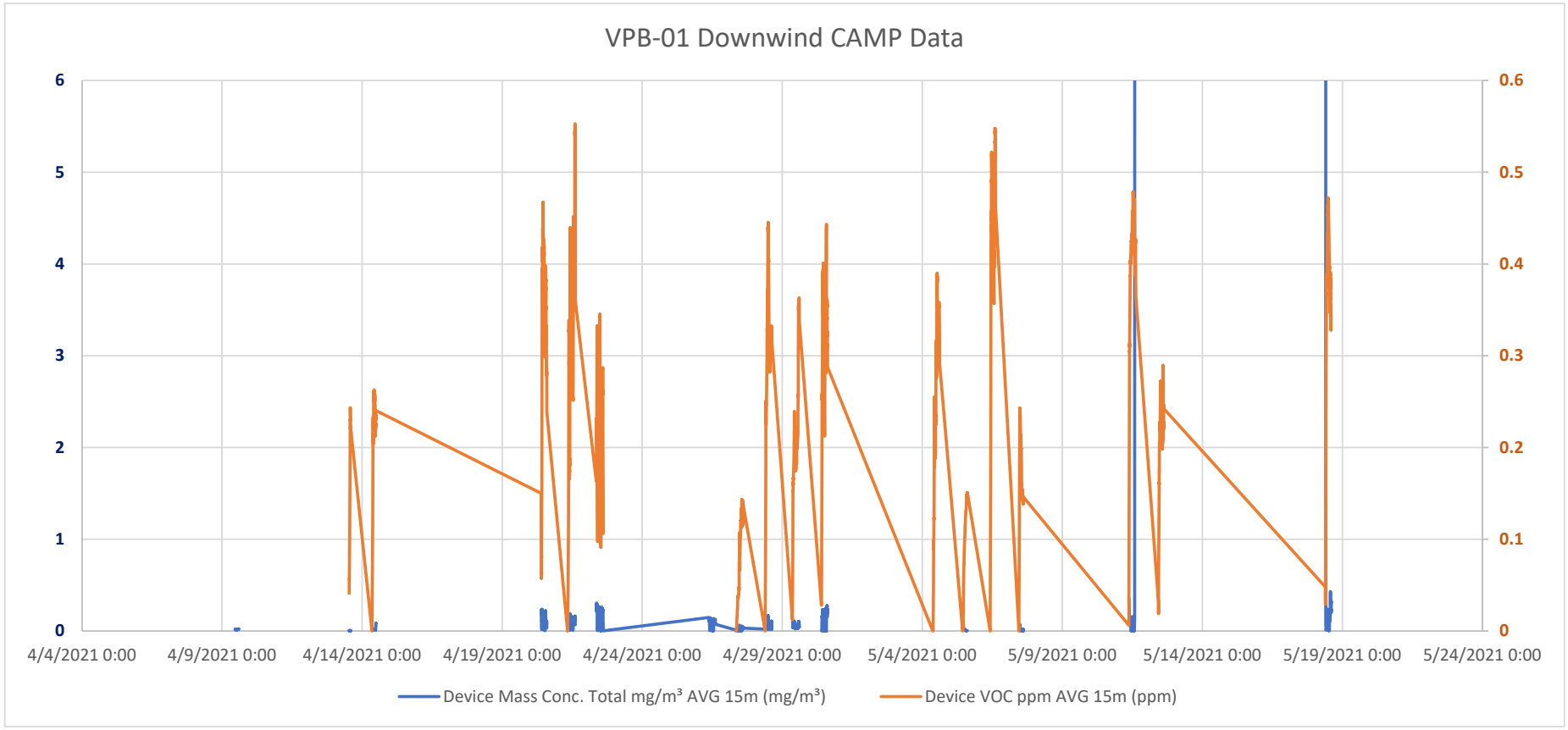


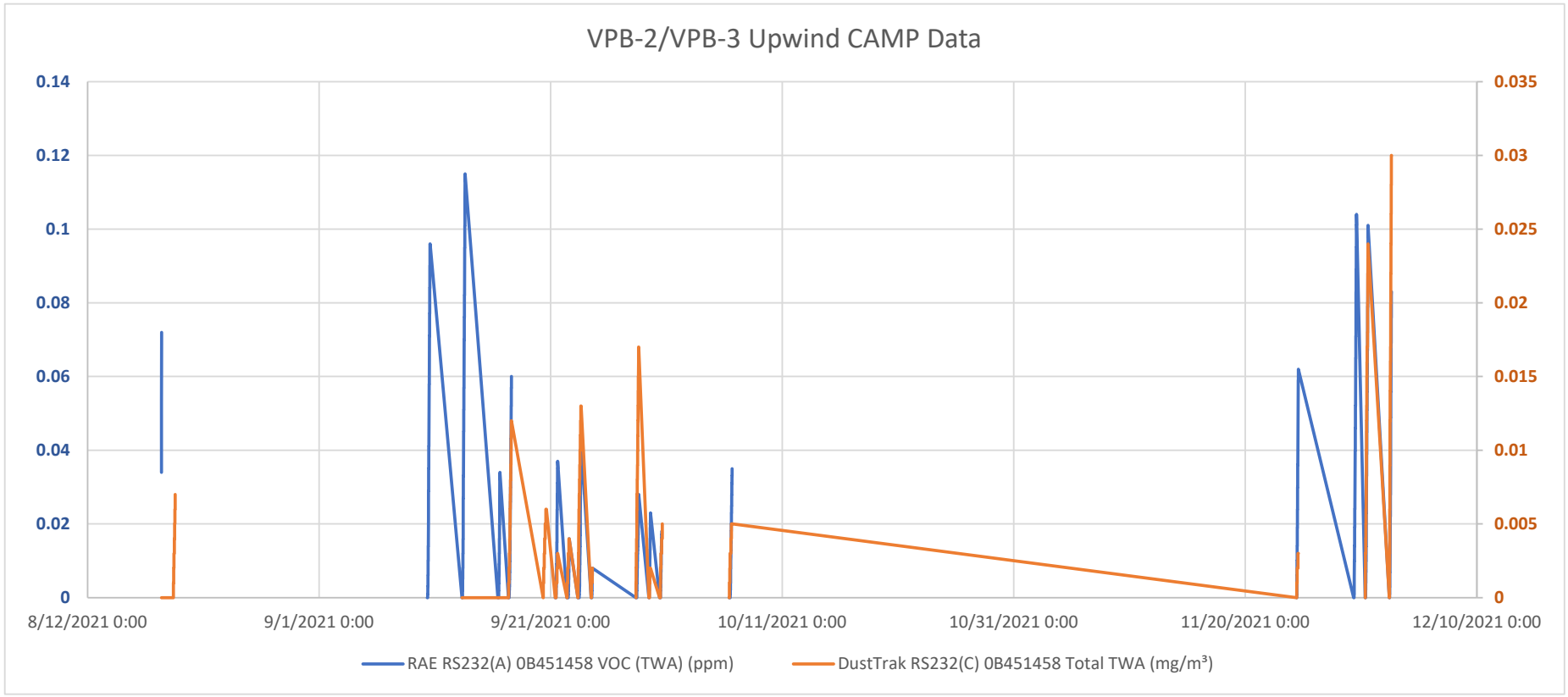
Depth (ft.)	0.0	GAMMA (cps)	100.0

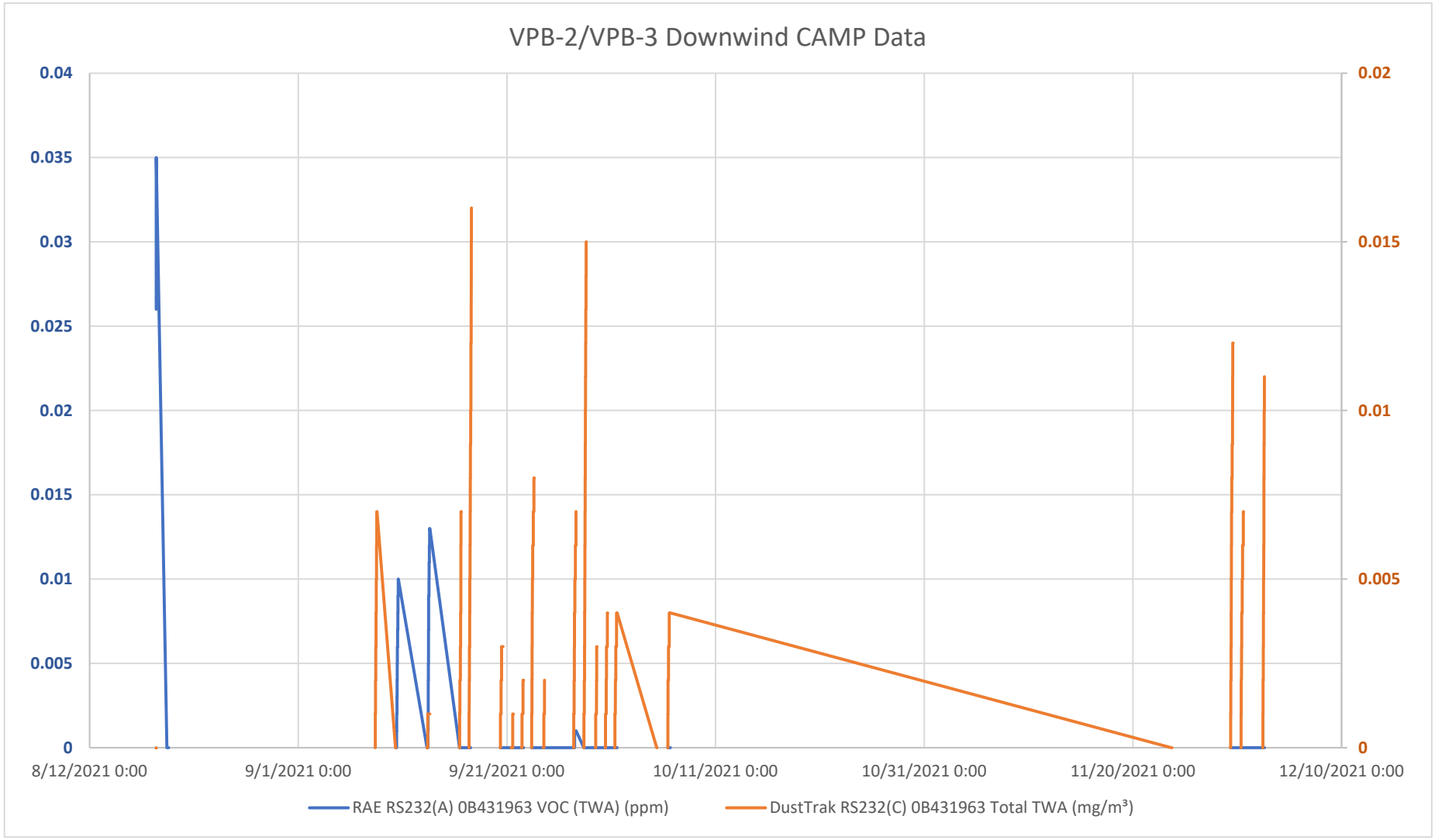
ATTACHMENT 9

Community Air Monitoring Data


VPB-1 Upwind CAMP Data
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
4/4/2021 0:00
4/9/2021 0:00
4/14/2021 0:00
4/19/2021 0:00
4/24/2021 0:00
4/29/2021 0:00
5/4/2021 0:00
5/9/2021 0:00
5/14/2021 0:00
5/19/2021 0:00
5/24/2021 0:00
Mass Conc. Total mg/m³ AVG 15m (mg/m³)
VOC ppm AVG 15m (ppm)


VPB-01 Downwind CAMP Data
6
5
4
3
2
1
0
0.6
0.5
0.4
0.3
0.2
0.1
0
4/4/2021 0:00
4/9/2021 0:00
4/14/2021 0:00
4/19/2021 0:00
4/24/2021 0:00
4/29/2021 0:00
5/4/2021 0:00
5/9/2021 0:00
5/14/2021 0:00
5/19/2021 0:00
5/24/2021 0:00
Device Mass Conc. Total mg/m³ AVG 15m (mg/m³)
Device VOC ppm AVG 15m (ppm)


VPB-2/VPB-3 Upwind CAMP Data
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
8/12/2021 0:00
9/1/2021 0:00
9/21/2021 0:00
10/11/2021 0:00
10/31/2021 0:00
11/20/2021 0:00
12/10/2021 0:00
RAE RS232(A) 0B451458 VOC (TWA) (ppm)
DustTrak RS232(C) 0B451458 Total TWA (mg/m³)


VPB-2/VPB-3 Downwind CAMP Data
0.04
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
0.02
0.015
0.01
0.005
0
8/12/2021 0:00
9/1/2021 0:00
9/21/2021 0:00
10/11/2021 0:00
10/31/2021 0:00
11/20/2021 0:00
12/10/2021 0:00
RAE RS232(A) 0B431963 VOC (TWA) (ppm)
DustTrak RS232(C) 0B431963 Total TWA (mg/m³)

ATTACHMENT 10

IDW Disposal Documents

Frac Tank Discharge Table

Date	Start	Flow	End	Total (estimated)	total time	Minutes	
6/16/2021	9:30	86	13:15	19,247	3:45	225.00	
Water Quality Measurements							
Time	Temp	pH	ORP	mS/cm	NTU	mg/L DO	TDS
855	20.15	5.92	135	0.257	934	5.69	0.167
1015	22.46	5.06	79	0.261	1000	11.7	0.17
1220	23.95	5.32	65	0.266	697	22.31	0.173

Date	Start	Flow	End	Total (estimated)	total time	Minutes	
11/5/2021	9:45	84	13:30	20,160	4:00	240.00	
Water Quality Measurements							
Time	Temp	pH	ORP	mS/cm	NTU	mg/L DO	TDS
900	17.63	5.83	105	0.045	56.3	9.69	0.16
1230	20.19	5.48	177	0.069	50.1	16.61	0.17
1300	22.14	5.32	68	0.285	150	21.3	0.174

Date	Start	Flow	End	Total (estimated)	total time	Minutes	
1/19/2021	8:00	55	2:10	20,350	6:10	370.00	
Water Quality Measurements							
Time	Temp	pH	ORP	mS/cm	NTU	mg/L DO	TDS
900	2.49	5.97	124	0.032	684	9.71	0.16
1200	3.11	6.8	154	0.056	625	8.51	0.165
1300	4.04	6.7	132	0.047	541	7.32	0.167

EDWARD P. MANGANO
COUNTY EXECUTIVE

SHILA SHAH-GAVNOUDIAS, P.E.
COMMISSIONER

COUNTY OF NASSAU
DEPARTMENT OF PUBLIC WORKS
1194 PROSPECT AVENUE
WESTBURY, NEW YORK 11590-2723

November 2, 2017

Mr. Michael Lehtinen, P.G.
HDR Architecture and Engineering, P.C.
16 Corporate Woods Boulevard
Albany, NY 12211-2527

Re: Disposal of Monitoring Well Development and Purge Water
Grumman Bethpage/NWIRP Groundwater Plume
NYSDEC Site Number: 130003
Approval for Discharge to Sanitary Sewer System

Dear Mr. Lehtinen,

The Industrial Waste Control Unit has reviewed the request made in your correspondence of October 31, 2017, for the approval of the discharge of monitoring well development and purge water, that will emanate from a frac tank located at the NYSDOT Maintenance Yard abutting the Seaford-Oyster Bay Expressway in Wantagh, to the Nassau County sanitary sewer.

Approval for the subject discharge is granted, at a maximum rate of 100 gallons per minute to the referenced sanitary sewer manhole on Tollgate Lane, contingent upon compliance with the effluent parameter limitations of the Nassau County Sewer Ordinance, No. 266-1985. The submitted analytical results used to support your request indicated that the tested aliquot had a pH of 9.45. Please note that the mandated pH range is 5.5 to 9.5 SU. Accordingly, during the disposal of the frac tank contents, hourly measurements of pH are to be obtained and recorded. If the pH is outside of the approved range the discharge is to be halted until such time as the pH condition is rectified.

In accordance with Departmental requirements a disposal fee of $150.00 is being accessed. The Department's Administrative unit will issue an invoice for the subject remuneration.

Should you have any questions or comments concerning the above, please contact me at (516) 571-6889.

Very truly yours,

Richard Cotugno.
Superintendent of Sewage Plants
Unit Head, Environmental Operations

c: Pasquale Assalone

110 Sand Company
136 Spagnoli Road
Melville, NY 11747

Business Office:
170 Cabot Street
West Babylon NY, 11704

Ticket #: 684410
Date: 1/20/2022 12:56 PM
Phone: (631) 249-4108
Fax: (631) 249-4126

Customer: 16709
EASTERN ENVIRONMENTAL SOLUTION
258 LINE ROAD
MANORVILLE NY, 11949

Manifest #:
PO #:
Job #:

Order Number: 20
DEC APPROVED FILL - HOWARD AVE
SEAFORD
Tons: 38.480
Loads: 4

781 - EASTERN ENV# E48 - R/O - 68850PC
DFG - Daniel Gaspar Lic.#606738
110 Sand Co - Suffolk
Remarks:

Material	Location Address	Quantity	Price	Misc $	Tax $	Line Total $
950 NYS DEC APPROVED...		3.93 tn				

Gross	Tare	Net	Time IN	Time OUT
21.55 Tn	17.62 Tn	3.93 Tn	12:28 PM	12:56 PM
43,100 Lb	35,240 lb	7,860 Lb		

Driver

110-SAND

NON-HAZARDOUS WASTE MANIFEST	1. Generator ID Number	2. Page 1 of 1	3. Emergency Response Phone 631-727-2700	4. Waste Tracking Number 2022-01-012

5. Generator's Name and Mailing Address
HDR c/o NYSDEC
3935 HOWARD AVENUE, SEAFORD NY
Generator's Phone:

Generator's Site Address (if different than mailing address)

6. Transporter 1 Company Name: EASTERN ENVIRONMENTAL SOLUTIONS INC. — U.S. EPA ID Number: NYR000135624

7. Transporter 2 Company Name — U.S. EPA ID Number

8. Designated Facility Name and Site Address
110 SAND COMPANY
136 SPAGNOLI ROAD, MELVILLE NY 11747
Facility's Phone: 631-694-2822
U.S. EPA ID Number

	9. Waste Shipping Name and Description	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	
1.	NON RCRA, NON DOT REGULATED (DRILL CUTTINGS)	XX1	CM	10	Y	
2.						
3.						
4.						

13. Special Handling Instructions and Additional Information
9.1) NYSDEC APPROVED MATERIAL
INVOICE: EASTERN ENVIRONMENTAL SOLUTIONS, INC.

14. GENERATOR'S CERTIFICATION: I certify the materials described above on this manifest are not subject to federal regulations for reporting proper disposal of Hazardous Waste.
Generator's/Offeror's Printed/Typed Name: Brian Smith — "ON THE BEHALF OF" — Signature — Month 1 Day 20 Year 22

INT'L
15. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:
Transporter Signature (for exports only): Date leaving U.S.:

TRANSPORTER
16. Transporter Acknowledgment of Receipt of Materials
Transporter 1 Printed/Typed Name: Brian Smith — Signature — Month 1 Day 20 Year 22
Transporter 2 Printed/Typed Name — Signature — Month Day Year

DESIGNATED FACILITY
17. Discrepancy
17a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection
Manifest Reference Number:
17b. Alternate Facility (or Generator) — U.S. EPA ID Number
Facility's Phone:
17c. Signature of Alternate Facility (or Generator) — Month Day Year

18. Designated Facility Owner or Operator: Certification of receipt of materials covered by the manifest except as noted in Item 17a
Printed/Typed Name: Dunlop — Signature — Month 1 Day 20 Year 22

Print/Intelligent Elite USA, Inc. 800-999-4899

DESIGNATED FACILITY TO GENERATOR

Reorder Part# MANIFEST-GENERIC 1-800-867-3363

11

110 Sand Company
136 Spagnoli Road
Melville, NY 11747

Business Office:
170 Cabot Street
West Babylon NY, 11704

Ticket #: 683567
Date: 1/12/2022 11:34 AM
Phone: (631) 249-4108
Fax: (631) 249-4126

Customer: 16709
EASTERN ENVIRONMENTAL SOLUTION
258 LINE ROAD
MANORVILLE NY, 11949

Manifest #:
PO #:
Job #:

Order Number: 20
DEC APPROVED FILL - HOWARD AVE
SEAFORD
Tons: 34.550
Loads: 3

5339 - EASTERN#E42-R/O - 25339PC
DFG - Daniel Gaspar Lic.#606738
110 Sand Co - Suffolk
Remarks:

CUSTOMER

Material	Location Address	Quantity	Price	Misc $	Tax $	Line Total $
950 NYS DEC APPROVED...		8.93 tn				

Gross	Tare	Net	Time IN	Time OUT
30.59 Tn	21.66 Tn	8.93 Tn	10:58 AM	11:34 AM
61,180 Lb	43,320 lb	17,860 Lb		

Driver

NON-HAZARDOUS WASTE MANIFEST

1. Generator ID Number: EXEMPT
2. Page 1 of: 1
3. Emergency Response Phone: 631-727-2700
4. Waste Tracking Number: 2022-01-029 (TB)

GENERATOR

5. Generator's Name and Mailing Address: HDR c/o NYSDEC, 3935 HOWARD AVENUE, SEAFORD, N.Y.
Generator's Site Address (if different than mailing address):
Generator's Phone:

6. Transporter 1 Company Name: EASTERN ENVIRONMENTAL SOLUTIONS, INC.
U.S. EPA ID Number: NYR000135624

7. Transporter 2 Company Name:
U.S. EPA ID Number:

8. Designated Facility Name and Site Address: 110 SAND COMPANY, 136 SPAGNOLI ROAD, MELVILLE NY 11747
U.S. EPA ID Number:
Facility's Phone: 631-694-2822

	9. Waste Shipping Name and Description	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	
1.	NON RCRA, NON DOT REGULATED (DRILL CUTTINGS)	XX1	CM	10	Y	
2.						
3.						
4.						

13. Special Handling Instructions and Additional Information
9.1) NYSDEC APPROVED MATERIAL
INVOICE = EASTERN ENVIRONMENTAL SOLUTIONS, INC.
BOX # 32

14. GENERATOR'S CERTIFICATION: I certify the materials described above on this manifest are not subject to federal regulations for reporting proper disposal of Hazardous Waste.
Generator's/Offeror's Printed/Typed Name:
Signature: on behalf
Month: 1 Day: 12 Year: 22

INT'L

15. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:
Transporter Signature (for exports only): Date leaving U.S.:

TRANSPORTER

16. Transporter Acknowledgment of Receipt of Materials
Transporter 1 Printed/Typed Name:
Signature:
Month: 1 Day: 12 Year: 22
Transporter 2 Printed/Typed Name:
Signature:
Month: Day: Year:

DESIGNATED FACILITY

17. Discrepancy
17a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection
Manifest Reference Number:
17b. Alternate Facility (or Generator)
U.S. EPA ID Number:
Facility's Phone:
17c. Signature of Alternate Facility (or Generator)
Month: Day: Year:

18. Designated Facility Owner or Operator: Certification of receipt of materials covered by the manifest except as noted in item 17a
Printed/Typed Name:
Signature:
Month: 1 Day: 12 Year: 22

Primary Exit: Fax A Copy To OCC Duty Officer 1-800-339-7299

DESIGNATED FACILITY TO GENERATOR

Reorder Parts: MANIFEST.COM 513-527-8866

110 Sand Company
136 Spagnoli Road
Melville, NY 11747

Business Office:
170 Cabot Street
West Babylon NY, 11704

Ticket #: 653322
Date: 4/27/2021 8:01 AM
Phone: (631) 249-4108
Fax: (631) 249-4126

Customer: 16709
EASTERN ENVIRONMENTAL SOLUTION
258 LINE ROAD
MANORVILLE NY, 11949

Manifest #: 2021-04-001
PO #:
Job #:

Order Number: 17
DEC APPROVED FILL - 3977 WICKS AVE, SEAFORD
Tons: 12.180
Loads: 1

5339 - EASTERN#E42-R/O - 25339PC
MTF - Michael Fritz License#602339
110 Sand Co - Suffolk
Remarks: 20 CYD BOX

CUSTOMER

Material	Location Address	Quantity	Price	Misc $	Tax $	Line Total $
950 NYS DEC APPROVED...		12.18 tn				

Gross	Tare	Net	Time IN	Time OUT
31 Tn	18 Tn	12.00 Tn	7:31 AM	8:00 AM
61,080 Lb	36,720 lb	24,360 Lb		

3385

Driver

110 SAND CO.

NON-HAZARDOUS WASTE MANIFEST	1. Generator ID Number	2. Page 1 of	3. Emergency Response Phone	4. Waste Tracking Number
	N/A	1	631-727-2700	2021-04-001

GENERATOR

5. Generator's Name and Mailing Address
HDR c/o NYSDEC
3977 WICKS AVENUE, SEAFORD, NY
Generator's Phone: 518-937-9502

Generator's Site Address (if different than mailing address)

6. Transporter 1 Company Name: EASTERN ENVIRONMENTAL SOLUTIONS INC.
U.S. EPA ID Number: NYR000135624

7. Transporter 2 Company Name
U.S. EPA ID Number

8. Designated Facility Name and Site Address
110 SAND COMPANY
136 SPAGNOLI ROAD, MELVILLE NY 11747
Facility's Phone: 631-694-2822
U.S. EPA ID Number

	9. Waste Shipping Name and Description	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	
1.	NON RCRA, NON DOT REGULATED (DRILL CUTTINGS)	XXI	CM	12	Y	
2.						
3.						
4.						

13. Special Handling Instructions and Additional Information
9.1) NYSDEC APPROVED MATERIAL
*INVOICE: EASTERN ENVIRONMENTAL SOLUTIONS, INC.

14. GENERATOR'S CERTIFICATION: I certify the materials described above on this manifest are not subject to federal regulations for reporting proper disposal of Hazardous Waste.
Generator's/Offeror's Printed/Typed Name: As an Agent of the NYSDEC Robert Matuszewski
Signature: As Agent of the NYSDEC
Month 04 Day 27 Year 21

INT'L

15. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:
Transporter Signature (for exports only): Date leaving U.S.:

TRANSPORTER

16. Transporter Acknowledgment of Receipt of Materials
Transporter 1 Printed/Typed Name: BRIAN Welsh
Signature: Brian P Welsh
Month 04 Day 27 Year 21

Transporter 2 Printed/Typed Name
Signature
Month Day Year

DESIGNATED FACILITY

17. Discrepancy
17a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection

17b. Alternate Facility (or Generator)
Facility's Phone:
17c. Signature of Alternate Facility (or Generator)

18. Designated Facility Owner or Operator: Certification of receipt of materials covered by the manifest e
Printed/Typed Name: Michael Fritz

110 Sand Co – Melville, NY
Michael Fritz License#602339 Qty: 12.18 tn
Ticket No. 653322 Man # : 2021-04-001 Date: 4/27/2021

110 Sand Company
136 Spagnoli Road
Melville, NY 11747

Business Office:
170 Cabot Street
West Babylon NY, 11704

Ticket #: 655163
Date: 5/13/2021 10:51 AM
Phone: (631) 249-4108
Fax: (631) 249-4126

Customer: 16709
EASTERN ENVIRONMENTAL SOLUTION
258 LINE ROAD
MANORVILLE NY, 11949

Manifest #: 202105001
PO #:
Job #

Order Number: 17
DEC APPROVED FILL - 3977 WICKS AVE, SEAFORD
Tons: 20.730
Loads: 2

781 - EASTERN ENV# E48 - R/O - 68850PC
MTF - Michael Fritz License#602339
110 Sand Co - Suffolk

Remarks:

CUSTOMER

Material	Location Address	Quantity	Price	Misc $	Tax $	Line Total $
950 NYS DEC APPROVED...		8.55 tn				

Gross	Tare	Net	Time IN	Time OUT
27 Tn 53,560 Lb	18 Tn 36,460 lb	9.00 Tn 17,100 Lb	10:23 AM	10:50 AM

33313

Driver

110 Sand Ct.

NON-HAZARDOUS WASTE MANIFEST

1. Generator ID Number	2. Page 1 of	3. Emergency Response Phone	4. Waste Tracking Number
		631 272 2700	2021-05-001

GENERATOR

5. Generator's Name and Mailing Address: NDR c/o NYDEC, 3907 Wicks Ave, Seaford NY — Generator's Site Address (if different than mailing address)

Generator's Phone: 5185733952

6. Transporter 1 Company Name: Eastern Environmental Solutions Inc — U.S. EPA ID Number: NYR000135624

7. Transporter 2 Company Name — U.S. EPA ID Number

8. Designated Facility Name and Site Address: 110 Sand, 136 Spagnoli rd, Melville NY, 11747 — U.S. EPA ID Number

Facility's Phone: 631 694 2822

	9. Waste Shipping Name and Description	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	
1.	non RCRA, non DOT Regulated (Drill Cutting)	001	CM	12	Y	
2.						
3.						
4.						

13. Special Handling Instructions and Additional Information

14. GENERATOR'S/OFFEROR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations.

Generator's/Offeror's Printed/Typed Name: As an Agent for the NYSDEC — Signature — Month 5 Day 13 Year 21

INT'L

15. International Shipments ☐ Import to U.S. ☐ Export from U.S. — Port of entry/exit: — Date leaving U.S.:

Transporter Signature (for exports only):

TRANSPORTER

16. Transporter Acknowledgment of Receipt of Materials

Transporter 1 Printed/Typed Name: Robert — Signature — Month 5 Day 13 Year 21

Transporter 2 Printed/Typed Name — Signature — Month Day Year

DESIGNATED FACILITY

17. Discrepancy

17a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection

Manifest Reference Number:

17b. Alternate Facility (or Generator) — U.S. EPA ID Number

Facility's Phone:

17c. Signature of Alternate Facility (or Generator)

18. Designated Facility Owner or Operator: Certification of receipt of materials covered by the manifest ex

Printed/Typed Name

110 Sand Co – Melville, NY

Michael Fritz License#602339 — Qty: 8.55 tn

Ticket No. 855163 — Man #: 202105001 — Date: 5/13/2021

DESIGNATED FACILIT

110 Sand Company
136 Spagnoli Road
Melville, NY 11747

Business Office:
170 Cabot Street
West Babylon NY, 11704

Ticket #: 657224
Date: 6/2/2021 11:35 AM
Phone: (631) 249-4108
Fax: (631) 249-4126

Customer: 16709
EASTERN ENVIRONMENTAL SOLUTION
258 LINE ROAD
MANORVILLE NY, 11949

Mani. #: 2021-06-001
PO #:
Job #

Order Number: 17
DEC APPROVED FILL - 3977 WICKS AVE, SEAFORD
Tons: 29.580
Loads: 3

5339 - EASTERN#E42-R/O - 25339PC
MTF - Michael Fritz License#602339
110 Sand Co - Suffolk
Remarks: 20 CYD BOX

Material	Location Address	Quantity	Price	Misc $	Tax $	Line Total $
950 NYS DEC APPROVED...		8.85 tn				

Gross	Tare	Net	Time IN	Time OUT
26.77 Tn	17.92 Tn	8.85 Tn	11:06 AM	11:35 AM
53,540 Lb	35,840 lb	17,700 Lb		

I hereby certify that the material listed above is the material I am disposing of at 110 Sand Company

Driver

NON-HAZARDOUS WASTE MANIFEST

1. Generator ID Number	2. Page 1 of	3. Emergency Response Phone	4. Waste Tracking Number
	1	631-727-2700	2021-06-001

GENERATOR

5. Generator's Name and Mailing Address
HDR c/o NYSDEC
3977 Wicks Ave., Seaford, N.Y.
Generator's Phone:

Generator's Site Address (if different than mailing address)

6. Transporter 1 Company Name: EASTERN Enviromental Solutions Inc. — U.S. EPA ID Number: NYR000135624

7. Transporter 2 Company Name — U.S. EPA ID Number:

8. Designated Facility Name and Site Address
110 SAND Company
136 Spagnoli Road Melville N.Y. 11747
Facility's Phone: 631-694-2822
U.S. EPA ID Number:

	9. Waste Shipping Name and Description	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	
1.	NON RCA, NON DOT Regulated (DRill Cuttings)	XX1	CM	10	4	
2.						
3.						
4.						

13. Special Handling Instructions and Additional Information
9.1) NYSDEC Approved MATERIAL
INVOICE: EASTERN Enviromental Solutions Inc.

14. GENERATOR'S/OFFEROR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations.

Generator's/Offeror's Printed/Typed Name: As An Agent For the NYSDEC Dena Moterzewski — Signature: [signature] — Month 6 Day 2 Year 21

INT'L

15. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:
Transporter Signature (for exports only): Date leaving U.S.:

TRANSPORTER

16. Transporter Acknowledgment of Receipt of Materials

Transporter 1 Printed/Typed Name: BRIAN Welsh — Signature: Brian P. Welsh — Month 6 Day 2 Year 21

Transporter 2 Printed/Typed Name — Signature — Month Day Year

DESIGNATED FACILITY

17. Discrepancy

17a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection

17b. Alternate Facility (or Generator)
Facility's Phone:

17c. Signature of Alternate Facility (or Generator)

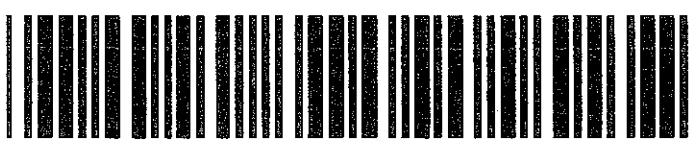
18. Designated Facility Owner or Operator: Certification of receipt of materials covered by the manifest
Printed/Typed Name

Manifest Reference Number:

110 Sand Co – Melville, NY

Michael Fritz License#602339 Qty: 8.85 tn

Ticket No. 657224 Man # : 2021-06-001 Date: 6/2/2021



DESIGNATED FACIL... TO GENERATOR

110 Sand Company
136 Spagnoli Road
Melville, NY 11747

Business Office:
170 Cabot Street
West Babylon NY, 11704

Ticket #: 669843
Date: 9/20/2021 10:15 AM
Phone: (631) 249-4108
Fax: (631) 249-4126

Customer: 16709
EASTERN ENVIRONMENTAL SOLUTION
258 LINE ROAD
MANORVILLE NY, 11949

Manifest #:
PO #:
Job #

Order Number: 19
DEC APPROVED FILL - ALKEN AVE
SEAFORD
Tons: 12.400
Loads: 1

781 - EASTERN ENV# E48 - R/O - 68850PC
DFG - Daniel Gaspar Lic.#606738
110 Sand Co - Suffolk
Remarks: 20 YD BOX

Material	Location Address	Quantity	Price	Misc $	Tax $	Line Total $
950 NYS DEC APPROVED...		12.4 tn				

Gross	Tare	Net	Time IN	Time OUT
30.01 Tn 60,020 Lb	17.61 Tn 35,220 lb	12.40 Tn 24,800 Lb	9:29 AM	10:14 AM

Driver

INSPECTION

110 SAND

NON-HAZARDOUS WASTE MANIFEST	1. Generator ID Number	2. Page 1 of	3. Emergency Response Phone	4. Waste Tracking Number
	N/A	1	6317272700	

5. Generator's Name and Mailing Address
HDR c/o NYSDEC
Alden Area Seaford NY
Generator's Phone: 518 937 9502

Generator's Site Address (if different than mailing address)

6. Transporter 1 Company Name
Eastern Environmental Solutions Inc.
U.S. EPA ID Number 2021-6 NYR000135624

7. Transporter 2 Company Name
U.S. EPA ID Number

8. Designated Facility Name and Site Address
110 SAND Company
136 Spagnoli Road Melville NY 11747
Facility's Phone: 631 694 2822
U.S. EPA ID Number

	9. Waste Shipping Name and Description	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	
1.	Non-RCRA Non Dot Regulated (Drill cuttings)	39	CM	12	Y	
2.						
3.						
4.						

13. Special Handling Instructions and Additional Information
9.1) NYSDec Approved Material
* Invoice Eastern Environmental Solutions Inc.

14. GENERATOR'S CERTIFICATION: I certify the materials described above on this manifest are not subject to federal regulations for reporting proper disposal of Hazardous Waste.
Generator's/Offeror's Printed/Typed Name: As an agent of the NYSDEC — Doch Mastrazzo
Signature
Month 9 Day 20 Year 21

15. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:
Transporter Signature (for exports only): Date leaving U.S.:

16. Transporter Acknowledgment of Receipt of Materials
Transporter 1 Printed/Typed Name: Ernesto Santiago
Signature
Month 9 Day 20 Year 21
Transporter 2 Printed/Typed Name
Signature
Month Day Year

17. Discrepancy
17a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection
Manifest Reference Number:
17b. Alternate Facility (or Generator)
U.S. EPA ID Number
Facility's Phone:
17c. Signature of Alternate Facility (or Generator)
Month Day Year

18. Designated Facility Owner or Operator: Certification of receipt of materials covered by the manifest except as noted in Item 17a
Printed/Typed Name: Dan Caughey
Signature
Month 9 Day 20 Year 21

GENERATOR — INT'L — TRANSPORTER — DESIGNATED FACILITY

110 Sand Company
136 Spagnoli Road
Melville, NY 11747

Business Office:
170 Cabot Street
West Babylon NY, 11704

Ticket #: 671457
Date: 10/1/2021 8:17 AM
Phone: (631) 249-4108
Fax: (631) 249-4126

Customer: 16709
EASTERN ENVIRONMENTAL SOLUTION
258 LINE ROAD
MANORVILLE NY, 11949

Manifest #:
PO #:
Job #:

Order Number: 19
DEC APPROVED FILL - ALKEN AVE
SEAFORD
Tons: 26.920
Loads: 2

781 - EASTERN ENV# E48 - R/O - 68850PC
DFG - Daniel Gaspar Lic.#606738
110 Sand Co - Suffolk
Remarks: 20 YD BOX

CUSTOMER

Material	Location Address	Quantity	Price	Misc $	Tax $	Line Total $
950 NYS DEC APPROVED...		14.52 tn				

Gross	Tare	Net	Time IN	Time OUT
32.38 Tn 64,760 Lb	17.86 Tn 35,720 lb	14.52 Tn 29,040 Lb	7:38 AM	8:17 AM

Driver

34249

NON-HAZARDOUS WASTE MANIFEST

1. Generator ID Number

2. Page 1 of 1

3. Emergency Response Phone 631-727-2700

4. Waste Tracking Number

5. Generator's Name and Mailing Address NYDR/NYDEC Aiken Ave Seaford NY

Generator's Site Address (if different than mailing address)

Generator's Phone: 631 727-2700

6. Transporter 1 Company Name Eastern Environmental Solutions Inc

U.S. EPA ID Number NYRQ00135624

7. Transporter 2 Company Name

U.S. EPA ID Number

8. Designated Facility Name and Site Address 110 Sand 136 Spagnoli Rd Melville NY

U.S. EPA ID Number

Facility's Phone:

	9. Waste Shipping Name and Description	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	
1.	NON RCRA Non DOT Regulated Drill Cuttings/Solidified Mud	001	DT	15	CY	
2.						
3.						
4.						

13. Special Handling Instructions and Additional Information

9-1 NYSDEC Approved Material

14. GENERATOR'S CERTIFICATION: I certify the materials described above on this manifest are not subject to federal regulations for reporting proper disposal of Hazardous Waste.

Generator's/Offeror's Printed/Typed Name As Agent For — Signature As Agent Dave Schoonbeam — Month 10 Day 01 Year 21

15. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:

Transporter Signature (for exports only): Date leaving U.S.:

16. Transporter Acknowledgment of Receipt of Materials

Transporter 1 Printed/Typed Name Dave Schoonbeam — Signature — Month 10 Day 01 Year 21

Transporter 2 Printed/Typed Name — Signature — Month Day Year

17. Discrepancy

17a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection

Manifest Reference Number:

17b. Alternate Facility (or Generator) U.S. EPA ID Number

Facility's Phone:

17c. Signature of Alternate Facility (or Generator) Month Day Year

18. Designated Facility Owner or Operator: Certification of receipt of materials covered by the manifest except as noted in item 17a

Printed/Typed Name — Signature — Month 10 Day 1 Year 21

GENERATOR

INT'L

TRANSPORTER

DESIGNATED FACILITY

110 Sand Company
136 Spagnoli Road
Melville, NY 11747

Business Office:
170 Cabot Street
West Babylon NY, 11704

Ticket #: 673398
Date: 10/14/2021 8:18 AM
Phone: (631) 249-4108
Fax: (631) 249-4126

Customer: 16709
EASTERN ENVIRONMENTAL SOLUTION
258 LINE ROAD
MANORVILLE NY, 11949

Manifest #:
PO #:
Job #

Order Number: 19
DEC APPROVED FILL - ALKEN AVE
SEAFORD
Tons: 37.540
Loads: 3

781 - EASTERN ENV# E48 - R/O - 68850PC
DFG - Daniel Gaspar Lic.#606738
110 Sand Co - Suffolk
Remarks: 20 YD BOX

Material	Location Address	Quantity	Price	Misc $	Tax $	Line Total $
950 NYS DEC APPROVED...		10.62 tn				

Gross	Tare	Net	Time IN	Time OUT
28.36 Tn 56,720 Lb	17.74 Tn 35,480 lb	10.62 Tn 21,240 Lb	7:47 AM	8:18 AM

Driver

INSPECTION

110 - SAND

NON-HAZARDOUS WASTE MANIFEST	1. Generator ID Number	2. Page 1 of	3. Emergency Response Phone	4. Waste Tracking Number
	N/A	1	631.727.2700	

5. Generator's Name and Mailing Address
HDR/NYSDEC
ALKEN AVENUE, SEAFORD NY
Generator's Phone: 518-937-9502

Generator's Site Address (if different than mailing address)

6. Transporter 1 Company Name: EASTERN ENVIRONMENTAL SOLUTIONS, INC.
U.S. EPA ID Number: NYR000135624

7. Transporter 2 Company Name
U.S. EPA ID Number

8. Designated Facility Name and Site Address
110 SAND COMPANY
136 SPAGNOLI ROAD, MELVILLE, NY 11747
Facility's Phone: 631-694-2822
U.S. EPA ID Number

	9. Waste Shipping Name and Description	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	
	1. NON RCRA, NON DOT REGULATED (DRILL CUTTINGS/SOLIDIFIED MUD)	XX1	DT	15	Y	
	2.					
	3.					
	4.					

13. Special Handling Instructions and Additional Information
9.1) NYSDEC APPROVED MATERIAL
* INVOICE EASTERN ENVIRONMENTAL SOLUTIONS

14. GENERATOR'S CERTIFICATION: I certify the materials described above on this manifest are not subject to federal regulations for reporting proper disposal of Hazardous Waste.
Generator's/Offeror's Printed/Typed Name: Stephen Neff
Signature:
Month: 10 Day: 14 Year: 21

15. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:
Transporter Signature (for exports only): Date leaving U.S.:

16. Transporter Acknowledgment of Receipt of Materials
Transporter 1 Printed/Typed Name: JOHN ZINSKI
Signature:
Month: 10 Day: 14 Year: 21
Transporter 2 Printed/Typed Name
Signature
Month Day Year

17. Discrepancy
17a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection
Manifest Reference Number:
17b. Alternate Facility (or Generator)
U.S. EPA ID Number
Facility's Phone:
17c. Signature of Alternate Facility (or Generator)
Month Day Year

18. Designated Facility Owner or Operator: Certification of receipt of materials covered by the manifest except as noted in Item 17a
Printed/Typed Name: Dan Rispoli
Signature:
Month: 10 Day: 14 Year: 21

GENERATOR | INT'L | TRANSPORTER | DESIGNATED FACILITY

110 Sand Company
136 Spagnoli Road
Melville, NY 11747

Business Office:
170 Cabot Street
West Babylon NY, 11704

Ticket #: 677095
Date: 11/10/2021 2:34 PM
Phone: (631) 249-4108
Fax: (631) 249-4126

Customer: 16709
EASTERN ENVIRONMENTAL SOLUTION
258 LINE ROAD
MANORVILLE NY, 11949

Manifest #:
PO #:
Job #:

Order Number: 19
DEC APPROVED FILL - ALKEN AVE
SEAFORD
Tons: 42.580
Loads: 4

5339 - EASTERN#E42-R/O - 25339PC
DFG - Daniel Gaspar Lic.#606738
110 Sand Co - Suffolk
Remarks:

Material	Location Address	Quantity	Price	Misc $	Tax $	Line Total $
950 NYS DEC APPROVED...		5.04 tn				

Gross	Tare	Net	Time IN	Time OUT
23.04 Tn 46,080 Lb	18.00 Tn 36,000 lb	5.04 Tn 10,080 Lb	2:00 PM	2:34 PM

Driver

110-SAND

NON-HAZARDOUS WASTE MANIFEST	1. Generator ID Number	2. Page 1 of 1	3. Emergency Response Phone 631.727.2700	4. Waste Tracking Number 2021-11-021

5. Generator's Name and Mailing Address
HDR c/o NYSDEC
ALKEN AVENUE, SEAFORD NY

Generator's Site Address (if different than mailing address)

Generator's Phone:

6. Transporter 1 Company Name
EASTERN ENVIRONMENTAL SOLUTIONS INC.

U.S. EPA ID Number
NYR000135624

7. Transporter 2 Company Name

U.S. EPA ID Number

8. Designated Facility Name and Site Address
110 SAND COMPANY
136 SPAGNOLI ROAD, MELVILLE NY 11747

U.S. EPA ID Number

Facility's Phone: 631-694-2822

	9. Waste Shipping Name and Description	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	
1.	NON RCRA, NON DOT REGULATED (DRILL CUTTINGS)	XX1	CM	10	YDS	
2.						
3.						
4.						

13. Special Handling Instructions and Additional Information
9.1) NYSDEC APPROVED MATERIAL
INVOICE: EASTERN ENVIRONMENTAL SOLUTIONS INC.

14. GENERATOR'S CERTIFICATION: I certify the materials described above on this manifest are not subject to federal regulations for reporting proper disposal of Hazardous Waste.

Generator's/Offeror's Printed/Typed Name: Derek Mattiacci AS AN Agent of the NYSDEC Signature: [signature] Month: 11 Day: 10 Year: 21

15. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:
Transporter Signature (for exports only): Date leaving U.S.:

16. Transporter Acknowledgment of Receipt of Materials

Transporter 1 Printed/Typed Name: Michael Kidd Signature: [signature] Month: 11 Day: 10 Year: 21

Transporter 2 Printed/Typed Name Signature Month Day Year

17. Discrepancy

17a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection

Manifest Reference Number:

17b. Alternate Facility (or Generator) U.S. EPA ID Number

Facility's Phone:

17c. Signature of Alternate Facility (or Generator) Month Day Year

18. Designated Facility Owner or Operator: Certification of receipt of materials covered by the manifest except as noted in Item 17a

Printed/Typed Name: Dan Cooper Signature: [signature] Month: 11 Day: 10 Year: 21

GENERATOR

INT'L

TRANSPORTER

DESIGNATED FACILITY

Printed in USA by Pat Labels 1.800.692.8966

DESIGNATED FACILITY TO GENERATOR

Reorder Part # MANIFEST-NW 1.800.692.8966

10 Sand Company
[illegible] Spagnoli Road
Melville, NY 11747

Business Office:
170 Cabot Street
West Babylon NY, 11704

Ticket #: 679363
Date: 12/1/2021 10:33 AM
Phone: (631) 249-4108
Fax: (631) 249-4126

Customer: 16709
EASTERN ENVIRONMENTAL SOLUTION
258 LINE ROAD
MANORVILLE NY, 11949

Manifest #:
PO #:
Job #

Order Number: 20
DEC APPROVED FILL - HOWARD AVE SEAFORD
Tons: 15.020
Loads: 1

5339 - EASTERN#E42-R/O - 25339PC
DFG - Daniel Gaspar Lic.#606738
110 Sand Co - Suffolk

Remarks:

Material	Location Address	Quantity	Price	Misc $	Tax $	Line Total $
950 NYS DEC APPROVED...		15.02 tn				

Gross	Tare	Net	Time IN	Time OUT
32.75 Tn 65,500 Lb	17.73 Tn 35,460 lb	15.02 Tn 30,040 Lb	9:54 AM	10:33 AM

Driver

INSPECTION

NON-HAZARDOUS WASTE MANIFEST

1. Generator ID Number	2. Page 1 of	3. Emergency Response Phone	4. Waste Tracking Number

GENERATOR

5. Generator's Name and Mailing Address: HOR c/o NSDEC, 3235 Howard Ave, Seaford NY
Generator's Site Address (if different than mailing address)
Generator's Phone:

6. Transporter 1 Company Name: eastern environmental solutions inc
U.S. EPA ID Number: NYR000563624

7. Transporter 2 Company Name
U.S. EPA ID Number

8. Designated Facility Name and Site Address: 110 South 236 Spagnoli rd Melville NY
U.S. EPA ID Number
Facility's Phone:

	9. Waste Shipping Name and Description	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	
1.	non Haz Solely non RCRA non DOT		cm		Y	
2.						
3.						
4.						

13. Special Handling Instructions and Additional Information

14. **GENERATOR'S CERTIFICATION:** I certify the materials described above on this manifest are not subject to federal regulations for reporting proper disposal of Hazardous Waste.
Generator's/Offeror's Printed/Typed Name: Brian Welischar
Signature
Month 12 Day 21 Year 21

INT'L

15. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:
Transporter Signature (for exports only): Date leaving U.S.:

TRANSPORTER

16. Transporter Acknowledgment of Receipt of Materials
Transporter 1 Printed/Typed Name: Robert Hauck
Signature
Month 12 Day 01 Year 21
Transporter 2 Printed/Typed Name
Signature
Month Day Year

DESIGNATED FACILITY

17. Discrepancy
17a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection
Manifest Reference Number:
17b. Alternate Facility (or Generator)
U.S. EPA ID Number
Facility's Phone:
17c. Signature of Alternate Facility (or Generator)
Month Day Year

18. Designated Facility Owner or Operator: Certification of receipt of materials covered by the manifest except as noted in Item 17a
Printed/Typed Name: Dan Corpus
Signature
Month 12 Day 1 Year 21

110 Sand Company
136 Spagnoli Road
Melville, NY 11747

Business Office:
170 Cabot Street
West Babylon NY, 11704

Ticket #: 680443
Date: 12/9/2021 9:05 AM
Phone: (631) 249-4108
Fax: (631) 249-4126

Customer: 16709
EASTERN ENVIRONMENTAL SOLUTION
258 LINE ROAD
MANORVILLE NY, 11949

Manifest #:
PO #:
Job #

Order Number: 20
DEC APPROVED FILL - HOWARD AVE
SEAFORD
Tons: 25.620
Loads: 2

5339 - EASTERN#E42-R/O - 25339PC
DFG - Daniel Gaspar Lic.#606738
110 Sand Co - Suffolk

Remarks:

Material	Location Address	Quantity	Price	Misc $	Tax $	Line Total $
950 NYS DEC APPROVED...		10.6 tn				

Gross	Tare	Net	Time IN	Time OUT
28.43 Tn 56,860 Lb	17.83 Tn 35,660 lb	10.60 Tn 21,200 Lb	8:33 AM	9:05 AM

Driver

INSPECTION

NON-HAZARDOUS WASTE MANIFEST

1. Generator ID Number

2. Page 1 of 1

3. Emergency Response Phone 631.727.2700

4. Waste Tracking Number 2021-12-09

5. Generator's Name and Mailing Address
HDR c/o NYSDEC
3935 HOWARD AVENUE, SEAFORD
Generator's Phone:

Generator's Site Address (if different than mailing address)

6. Transporter 1 Company Name
EASTERN ENVIRONMENTAL SOLUTIONS INC,

U.S. EPA ID Number NYR000135624

7. Transporter 2 Company Name

U.S. EPA ID Number

8. Designated Facility Name and Site Address
110 SAND COMPANY
136 SPAGNOLI ROAD, MELVILLE NY
Facility's Phone: 631-694-2822

U.S. EPA ID Number

	9. Waste Shipping Name and Description	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	
1.	NON RCRA, NON DOT REGULATED (DRILL CUTTINGS)	XX1	CM	15	Y	
2.						
3.						
4.						

13. Special Handling Instructions and Additional Information
9.1) NYSDEC APPROVED MATERIAL

14. GENERATOR'S CERTIFICATION: I certify the materials described above on this manifest are not subject to federal regulations for reporting proper disposal of Hazardous Waste.
Generator's/Offeror's Printed/Typed Name: CONRAD STREBEL
Signature:
Month 12 Day 9 Year 21

INT'L

15. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:
Transporter Signature (for exports only): Date leaving U.S.:

TRANSPORTER

16. Transporter Acknowledgment of Receipt of Materials
Transporter 1 Printed/Typed Name: MICHAEL KIDD
Signature:
Month 12 Day 9 Year 21
Transporter 2 Printed/Typed Name
Signature
Month Day Year

DESIGNATED FACILITY

17. Discrepancy
17a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection
Manifest Reference Number:
17b. Alternate Facility (or Generator)
U.S. EPA ID Number
Facility's Phone:
17c. Signature of Alternate Facility (or Generator)
Month Day Year

18. Designated Facility Owner or Operator: Certification of receipt of materials covered by the manifest except as noted in Item 17a
Printed/Typed Name:
Signature:
Month 12 Day 9 Year 21

Printed on Rite-in-the-Rain® No-OCR Labels
1-800-822-8966

DESIGNATED FACILITY TO GENERATOR

Reorder Part# MANIFEST-COMBO
1-715-845-9539