



# Alternate Source Demonstration for Lithium

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## CCR Surface Impoundment System

### James DeYoung Power Plant

### Holland Board of Public Works

Holland, Michigan

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January 28, 2021

NTH Project No. 73-160017-06

NTH Consultants, Ltd.  
41780 Six Mile Road, Suite 200  
Northville, MI 48168





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## **1.0 INTRODUCTION**

The Holland Board of Public Works (BPW) owns and operated the James DeYoung Power Plant (JDY or the plant) located in Holland, Michigan; on the eastern end of Lake Macatawa. JDY was initially built in 1939 with a generating capacity of 15 megawatts (MW). Between 1953 and 1968, three new boilers were added. From the late 1970's to the early 2000's, the plant consisted of three coal-fired boilers capable of producing up to 62.5 MW. On May 20, 2016, BPW discontinued the use of Unit 3; and on June 1, 2017, BPW officially shut down and retired all generation units at JDY. When Units 3 - 5 were operating on coal, bottom ash from these boiler units was sluiced to the first of three surface impoundments located to the south of the plant, as shown on **Figure 1, in Appendix A**. These surface impoundments were operated in accordance with NPDES permit No. MI0001473 and became subject to 40 CFR Part 257, Subpart D – Standards for the Disposal of Coal Combustion Residuals (CCR) in Landfills and Surface Impoundments upon promulgation on April 17, 2015. In June 2016, BPW initiated removal of CCR material from the CCR units and final closure of the CCR units was completed in May 2018. The site restoration activities were concluded in June 2018.

This Alternate Source Demonstration (ASD) has been prepared for the facility to show that lithium concentrations reported at one isolated monitoring well above the groundwater protection standards (GWPS), are the result of migration unto the property from an off-site source. As such, the facility has achieved clean closure and no additional groundwater monitoring activities are merited.

## **2.0 GROUNDWATER MONITORING PROGRAM**

### **2.1 Background**

Prior to promulgation of 40 CFR Part 257 and during 2009 and 2010, a limited hydrogeological investigation work plan was developed for the site that established a groundwater detection monitoring program to address the requirements of Michigan Administrative Code R 323.2237(4) of Michigan's Natural Resources and Environmental Protection Act, 1994 Public Act 451, as amended (Act 451). The work plan pre-dated the final federal CCR rules and had the purpose of satisfying a request by Michigan Department of Environmental Quality, now known as Department of Environment, Great Lakes and Energy (EGLE), to determine whether the presence of bottom ash lagoons (CCR units) may have affected groundwater quality in the surrounding area. The results of this investigation were inconclusive and



additional investigative activities were implemented between 2011 and 2015 according to the agency approved hydrogeologic workplans and NPDES permit requirements.

In October 2015, BPW completed a three-year investigation that included collection of groundwater elevation data and samples for the analysis of a subset of metals on a quarterly basis. The results of the investigation identified that certain metals were present in the groundwater above U.S. EPA's Safe Drinking Water Act's maximum contaminant level (MCL) established in 40 CFR §141.62 and showed that the groundwater quality in the surrounding area may have been affected by the historic use of the CCR units.

Based on the findings of the investigation, anticipated retirement of the plant, and future requirements of 40 CFR Part 257, Subpart D, BPW decided to close the CCR units through removal of CCR and decontamination of the CCR units, in accordance with 40 CFR §257.102. However, a formal detection monitoring program consistent with CCR rules was not conducted prior to closure.

BPW initiated closure of the CCR units through removal of CCR material in June 2017. During excavation of CCR materials, three of the existing monitoring wells installed in proximity to the CCR units as part of the previously conducted investigation activities were removed due to their location within the area where CCR residuals were being removed. Consequently, installation of a new monitoring network was necessary.

Removal of CCR residuals and final closure of the CCR units was completed in May 2018. The site restoration activities were completed in June 2018 in substantial conformance with 40 CFR §257.101, 40 CFR §257.103, and the written closure plan prepared by NTH Consultants, Ltd., (NTH) dated October 17, 2016.

## **2.2 CCR Groundwater Monitoring System**

Consistent with the requirements contained in 40 CFR §257.93, a Groundwater Sampling and Analysis Plan (SAP) was developed in October 2017 that described the methods to be used in evaluating background and downgradient groundwater quality within the JDY plant property (Site). The SAP was developed to document the procedures to be used when collecting the necessary information to comply with detection monitoring requirements of 40 CFR §257.94, assessment monitoring requirements of 40 CFR §257.95, and clean closure verification per 40 CFR §257.102(c). To comply with the requirements





contained in 40 CFR §257.91, NTH designed the groundwater monitoring system considered representative of groundwater affected by the CCR units.

A review of information regarding the hydrogeologic conditions of the site available at the time that the SAP was developed indicated that groundwater generally flows east-to-west across the site and discharges to Lake Macatawa. Based on this information, an existing piezometer (PZ-1) was located hydraulically upgradient of the former CCR bottom ash lagoons. Monitoring well PZ-1 was previously identified and sampled as monitoring well MW-7, and groundwater samples from this well were used to represent background groundwater quality that has not been affected by the CCR units. Three additional wells, MW-1, MW-2, and MW-3 were installed downgradient of the CCR units on November 27, 2017 at the facility boundary in the direction of potential contaminant migration. **Figure 2, in Appendix A,** provides the location of the monitoring wells comprising the groundwater monitoring system. Water level data obtained from the monitoring wells during the quarterly events were used to develop groundwater contour maps. The contour maps were consistent from one sampling event to the next and confirm groundwater flow direction.

As part of the monitoring program, NTH collected groundwater samples from the monitoring system on a quarterly basis during eight quarterly events during the period from January of 2018 to March 2020. Appendix III parameters (boron, calcium, chloride, fluoride, pH, sulfate, and total dissolved solids [TDS]) were analyzed to satisfy the requirements of the detection monitoring program contained in 40 CFR §257.94 given that a formal detection monitoring program was not completed at the site prior to the implementation of closure through removal of CCR. It should be noted that according to existing 40 CFR Part 257 CCR regulations, Appendix III constituents are not evaluated as part of the requirements for clean closure.

The groundwater samples were also analyzed for constituents listed in Appendix IV to 40 CFR Part 257, Subpart D. The data collected was evaluated as part of the assessment monitoring program and to verify clean closure as specified in 40 CFR §257.102(c). Specifically, data collected during these eight events was utilized to determine whether background concentrations of certain constituents were above the GWPS, as established in 40 CFR §257.95(h).

In July 2020, BPW installed two temporary wells (TW-1 and TW-2) on the plant's southern property line, in the vicinity of monitoring well MW-1, to evaluate the concentration gradient of lithium in groundwater



at the site and determine whether groundwater might be impacted by off-site sources. Additionally, BPW installed a monitoring well (identified as MW-3A) between the previous waste boundary and monitoring well MW-3, in the vicinity of the previous ash ponds. Groundwater samples collected from the temporary wells and MW-3A in July 2020 were analyzed for lithium.

Groundwater samples were also collected in August and November 2020 from the existing monitoring well network, including newly installed monitoring well MW-3A, and analyzed for the Appendix III and Appendix IV parameter list. In addition to the existing monitoring network for the site, samples were also collected from previously utilized monitoring well MW-4, located on the southeast portion of the site (bordered by a scrap metal recycling facility), during the most recent five quarterly events, and analyzed for the Appendix III and Appendix IV parameters. Data collected from this well will aid in understanding the potential source of lithium concentrations in groundwater at the site.

### **2.3 Groundwater Evaluation**

To verify clean closure, the analytical data from the eight background samples were analyzed for the Appendix IV constituents and compared to the applicable GWPS. The GWPS for each constituent contained in Appendix IV was established in accordance with 40 CFR §257.95(h). For constituents for which the background level is higher than the levels identified in 40 CFR §257.95(h)(1) and (h)(2), the statistically derived background concentration effectively becomes the GWPS. For all other constituents, the GWPS is the established MCL per 40 CFR §257.95(h)(1) or the value outlined in 40 CFR §257.95(h)(2).

For those Appendix IV constituents where the statistically developed background level was higher than the MCL, the GWPS was determined to be the statistically developed background concentration utilizing the data collected from monitoring well PZ-1. Background concentrations for each constituent were calculated using an appropriate statistical method based on the distribution of the background data, consistent with 40 CFR §257.93. The result of these evaluations was presented in the October 2020 Groundwater Detection Monitoring and Assessment Report (October 2020 Report).



### **3.0 DATA REVIEW**

As discussed previously, results of investigative activities conducted prior to the effective date of the CCR rules concluded that the groundwater quality in the surrounding area may have been affected by the historic use of the CCR units. Based on the findings of this investigation, BPW initiated an assessment of corrective measures, in substantial conformance with 40 CFR §257.96. Based on this assessment, BPW decided to close the CCR units through removal of CCR and decontamination of the CCR units, in accordance with 40 CFR §257.102. The data collected during the eight quarterly events for constituents listed in Appendix IV to 40 CFR §257.95 was evaluated as part of the assessment monitoring program to verify clean closure as specified in 40 CFR §257.102(c).

Pursuant to 40 CFR §257.102(c), closure is achieved when affected areas are decontaminated and groundwater monitoring concentrations do not exceed a GWPS established pursuant to 40 CFR §257.95(h) for constituents listed in Appendix IV to Part 257, Subpart D. According to 40 CFR 257(h)(3), for constituents where the background level is higher than the levels identified in 40 CFR §257.95(h)(1) and (h)(2), the statistically derived background concentration is the GWPS.

As presented in the October 2020 Report, the analytical data for Appendix IV constituents in the downgradient wells MW-1, MW-2 and MW-3 indicate that, in general, the concentrations were reported as non-detect and/or below the reporting limit for each constituent. Constituents reported above the laboratory reporting limit were compared to the GWPS established in 40 CFR §257.95 (h)(1), or the statistically developed GWPS developed in accordance with 40 CFR §257.91. As indicated in the October 2020 Report, groundwater monitoring concentrations do not exceed the established GWPS for constituents listed in Appendix IV of the rules, except for Lithium in monitoring well MW-1. The GWPS exceedance of Lithium in monitoring well MW-1 is believed to be the result of on-site migration from an adjacent property and BPW proceeded with additional investigative activities to determine whether this was the case and assist in a demonstration for clean closure. Per 40 CFR §257.95 (g)(3)(ii), if an Appendix IV constituent is detected above the GWPS, the facility may demonstrate that a source other than the CCR units caused the exceedance. Once clean closure is achieved, the facility is exempt from further groundwater monitoring and other post-closure requirements as stated in the Preamble to 40 CFR Part 257 and 40 CFR §257.104(2).



## 4.0 ALTERNATE SOURCE DEMONSTRATION

The findings of the additional investigative activities, and the additional activities conducted at the site, support BPW's conclusion of an on-site migration from an adjacent property, as demonstrated by the following lines of evidence.

### 4.1 Line of Evidence No. 1 – Concentration Gradient

As discussed in the previous section, in July 2020, two monitoring wells were installed in the vicinity of MW-1. Temporary well TW-1 was installed approximately 50 ft east of MW-1 and temporary well TW-2 was installed approximately 100 ft west of MW-1, on the plant's southern property line, which is bordered by a scrap metal recycling facility. What appear to be storm water retention ponds on the adjacent property are located on the opposite side of the fence in the southwest corner of the plant's property, (see photos 3 and 4 in the attached photo log).

Monitoring well MW-3A was also installed at a location between the previous waste boundary and monitoring well MW-3, in the vicinity of the previous ash ponds. **Figure 2 in Appendix A** presents the well locations. Groundwater samples collected during the July 2020 well installation were analyzed for total dissolved solids (TDS), and total and dissolved lithium. The laboratory results, corresponding analytical methods, and practical quantitation limits (PQL) for each constituent are provided in the analytical report from ALS Environmental Laboratory included in **Appendix B**.

A review of the data collected during the July 2020 installation event indicates that lithium in TW-1 and TW-2 was reported at 0.042 mg/L and 0.059 mg/L, respectively; whereas the concentration at MW-3A was reported as non-detect and below the reporting of 0.01 mg/L. Given that MW-3A is located at the boundary of the previous CCR ponds, and upgradient of MW-1 and the temporary wells, it would be expected that the concentrations of lithium at MW-3A would be higher than that of MW-1 (0.11 mg/L to 0.16 mg/L) and the temporary wells if the CCR units were the source of lithium in groundwater, which is not the case.

Furthermore, monitoring well MW-4, located side-gradient to the CCR units, reported lithium concentrations ranging from 0.016 mg/L to 0.035 mg/L, similar to the concentrations reported in MW-1 and the temporary wells. **Figure 3, in Appendix A** shows the lithium concentrations reported at the wells monitored. Historical lithium concentrations in all the wells is provided on



the graph in Figure 3A and shows that MW-1 and MW-4, wells located on the southern property boundary, adjacent to a scrap metal facility, have significantly higher concentrations of lithium than the other wells at the site. Figure 3B is a site map that illustrates the site's lithium concentration gradient. Note that Lithium was not detected at or above the laboratory PQL at MW-3A, which is located adjacent to the previous ash ponds. If the previous CCR units were the source of Lithium concentrations, it would be expected that the well located adjacent to the previous CCR ponds would show higher concentrations than the wells located further away, which is not the case at the site.

The information presented above supports the conclusion that lithium concentrations above the GWPS in MW-1 are likely attributed to on-site migration from the adjacent property. Further documentation is provided by site photos taken during the temporary well installation that documents run-off of wastewater and/or stormwater from the recycling facility onto the site. (see photos 1 to 4 in **Appendix C**).

#### 4.2 Line of Evidence No. 2 – Concentrations in Ash and Coal

In September of 2016 and during closure activities, BPW collected coal and bottom ash samples for analytical evaluation, including total concentrations and Synthetic Precipitation Leaching Procedure (SPLP) leaching extraction. The samples were analyzed for metals, chloride, fluoride, and sulfate; the table in **Appendix D** includes a summary of the total and leachable concentrations of lithium.

A review of the data collected from the four representative coal samples collected at the DeYoung Plant site indicate that total lithium concentrations from coal samples were below the reporting limits ( $<0.8$ ,  $<7.8$ ,  $<9.8$  and  $<9.8$  mg/Kg), and leachable concentrations from coal samples were non-detect and  $<0.01$  ug/L. Total concentrations reported for lithium in the ash samples were  $<10$ ,  $<11$ ,  $13$ , and  $25$  mg/Kg, and leachable concentrations from the four ash samples analyzed were reported as  $<0.01$ ,  $<0.01$ ,  $0.01$  and  $0.038$  mg/L, which is significantly lower than the concentrations reported in MW-1. The table in Appendix C includes a summary of the total and leachable concentrations of lithium. Considering the higher concentrations that would be expected from the extraction procedure and the lower concentrations reported in the ash and coal, it is unlikely that the CCR units are the source of lithium concentrations in groundwater along the southern property line of the Plant.



#### 4.3 Line of Evidence No. 3 - Known Lithium Use and Potential Lithium Source

As discussed previously, monitoring well MW-1 is located in the immediate vicinity of a scrap metal recycling facility and, as shown in the attached photographs, water run-off from the neighboring property has been identified migrating onto the site.

Lithium and lithium compounds have several industrial applications, including heat-resistant glass, lithium grease lubricants, and flux additives for iron, steel and aluminum production. Also, lubricating greases are commonly formulated as mixtures of an oil and a lithium soap. Some lithium greases resist moisture and are commonly used as lubricant in household products as well as in automotive applications.

It is likely that materials accepted at the scrap metal recycling facility for recycling (as stated on their website, [www.padnos.com](http://www.padnos.com)), including appliances, auto cores, auto bodies, circuit boards, electric motors, electronics, and e-waste, could be a source of lithium in the run-off unto the site and groundwater.

## **5.0 SUMMARY AND CONCLUSION**

Removal of CCR residuals and final closure of the CCR units was completed in May 2018. The site restoration activities were completed in June 2018 in substantial conformance with 40 CFR §257.101 and 40 CFR §257.103, and the written closure plan prepared by NTH Consultants, Ltd., (NTH) dated October 17, 2016.

A Groundwater Sampling and Analysis Plan (SAP) was developed in October 2017 to evaluate background and downgradient groundwater quality within the JDY plant property. Consistent with the SAP, samples collected from the monitoring well network complied with detection monitoring requirements contained in 40 CFR §257.94, assessment monitoring requirements contained in 40 CFR §257.95, and clean closure verification contained in 40 CFR §257.102(c).

The data collected from eight quarterly sampling events was used to evaluate groundwater quality at the site and assist with the development of site specific GWPS, as was the case for arsenic. A review of the data indicated that all Appendix IV constituents were below the GWPS, except for lithium in MW-1.





Additional investigative activities were conducted in July of 2020 to support an alternate source demonstration for the elevated concentration of lithium in monitoring well MW-1. Data collected from MW-3A installed in the vicinity of the CCR units, and temporary wells TW-1 and TW-2 installed in the vicinity of MW-1, along with data from existing monitoring well MW-4, was used to evaluate the lithium concentration gradient at the site. Concentrations reported for lithium in MW-3A were confirmed during a quarterly sampling event conducted in August and November of 2020.

Based on the results of the information presented in this report, we offer the following conclusions:

- CCR material, the potential source of elevated lithium in groundwater at the facility, was removed as part of the corrective measure conducted by BPW.
- The concentrations reported for lithium in MW-1 were higher than the total lithium concentrations reported for coal and the leachable concentrations from coal ash at the site.
- Monitoring wells MW-1 and MW-4, located on the southern property boundary, adjacent to the scrap metal facility, have significantly higher concentrations of lithium than the other wells at the site.
- The highest concentrations of lithium at the facility were reported at monitoring well MW-1, the well located at the property boundary, closest to the recycling facility.
- The concentration gradient of lithium illustrates higher concentrations in the location of the southern portion of the property toward the monitoring well located in the vicinity of the previous ash ponds, and at the property boundary in the direction of groundwater flow.
- The information contained herein, consistent with 40 CFR §257.95 (g)(3)(ii), and the various lines of evidence presented above, provide a successful alternate source demonstration for lithium concentrations reported above the GWPS in monitoring well MW-1, and support the site's determination of clean closure.




- Clean closure of the JDY CCR units has been achieved and the facility is exempt from further groundwater monitoring and other post-closure requirements contained in the Preamble to 40 CFR Part 257 and 40 CFR §257.104(2).



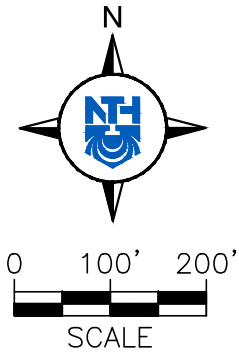
# **APPENDIX A**

## **FIGURES**



<b>NTH PROJECT No.:</b> <b>62-160017</b> <b>DESIGNED BY:</b> <b>SLG</b> <b>DRAWN BY:</b> <b>SLG</b> <b>CHECKED BY:</b> <b>DRL</b>	<b>CAD FILE NAME:</b> <b>160017-JDY</b> <b>PLOT DATE:</b> <b>9/28/2016</b> <b>DRAWING SCALE:</b> <b>1" = 200'</b> <b>INCEPTION DATE:</b> <b>9/7/2016</b>	 <b>NTH Consultants, Ltd.</b> Infrastructure Engineering and Environmental Services	<p><b>SITE LOCATION PLAN</b></p> <p><b>JAMES DEYOUNG POWER PLANT</b>  <b>HOLLAND, MI</b></p>	<b>FIGURE:</b> <div style="font-size: 48pt; text-align: center;">1</div>
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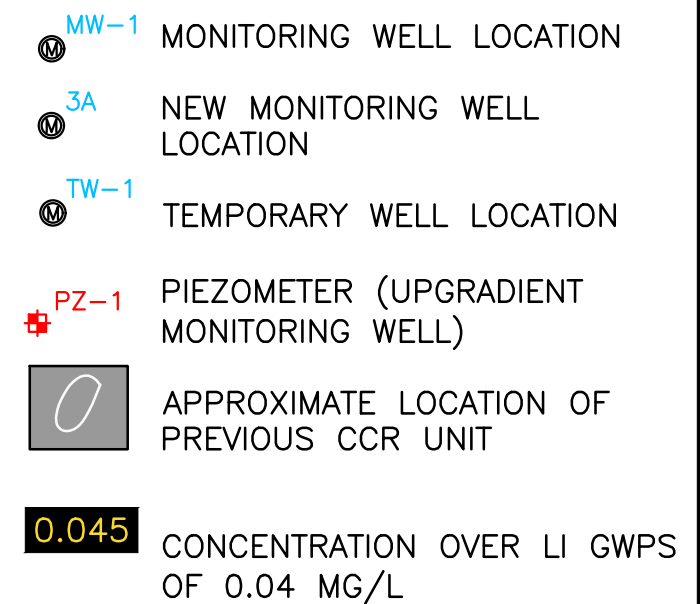
LEGEND

- MW-1 MONITORING WELL LOCATION
- 3A NEW MONITORING WELL LOCATION
- TW-1 TEMPORARY WELL LOCATION
- PZ-1 PIEZOMETER (UPGRADIENT MONITORING WELL)

MONITORING WELL LOCATION MAP		NTH PROJECT No.: 73-160017+000		CAD FILE NAME: 17-UPDATED AERIAL	
		DESIGNED BY: CRD	17-UPDATED AERIAL	PLOT DATE: 9/16/2020	INCEPTION DATE: 10/13/2017
JAMES DEYOUNG POWER PLANT HOLLAND, MICHIGAN		DRAWN BY: CRD	DRAWING SCALE: Custom	NTH Consultants, Ltd. Infrastructure Engineering and Environmental Services	
		CHECKED BY: KWO		NTH Infrastructure Engineering and Environmental Services	
FIGURE:		2			

NOTE: LOCATIONS AND DIMENSIONS ARE APPROXIMATE. NOT A LEGAL SURVEY.





NOTE: LOCATIONS AND DIMENSIONS ARE APPROXIMATE. NOT A LEGAL SURVEY.

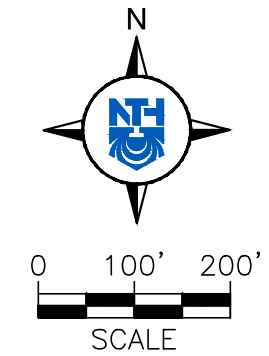
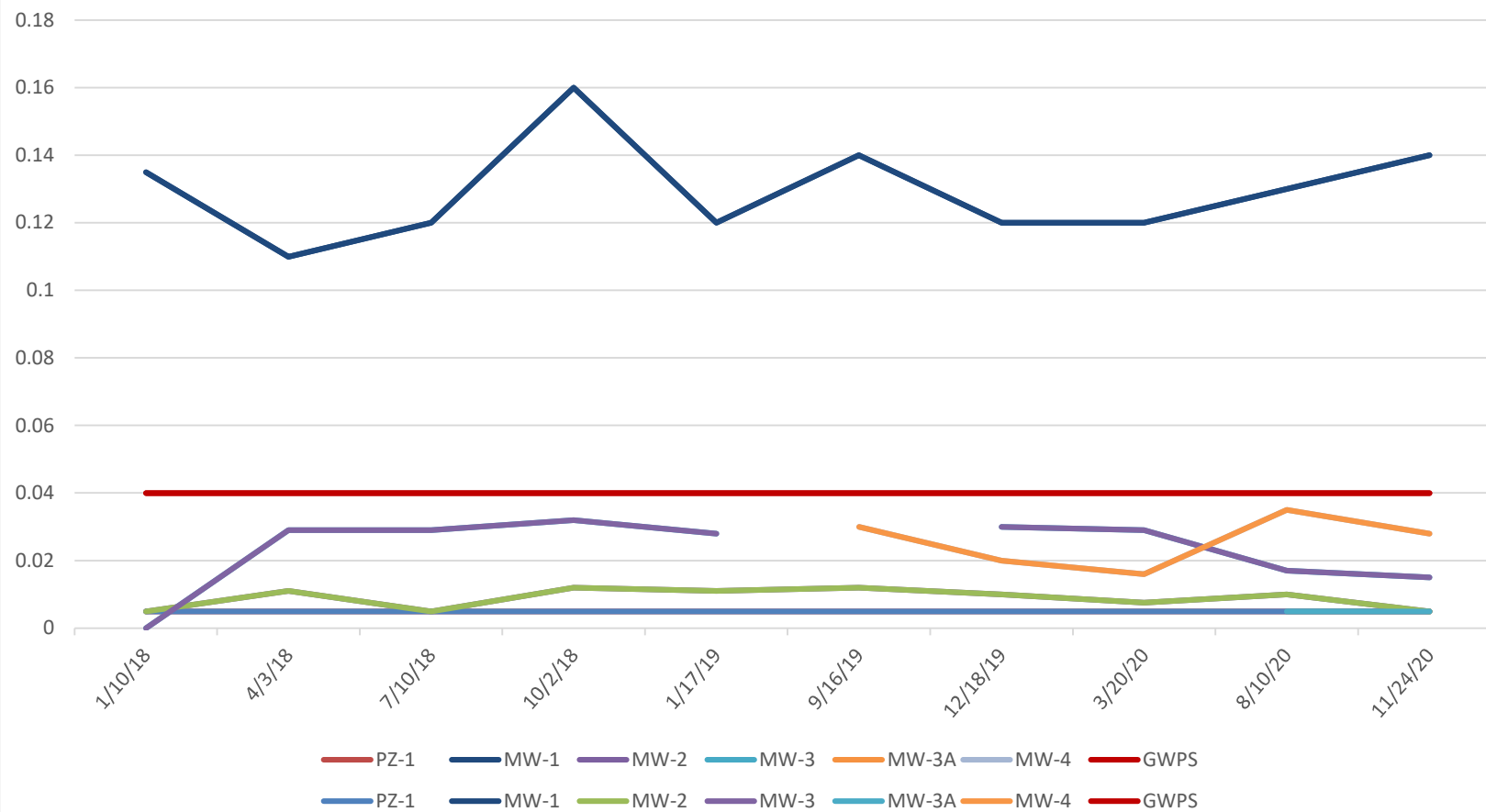


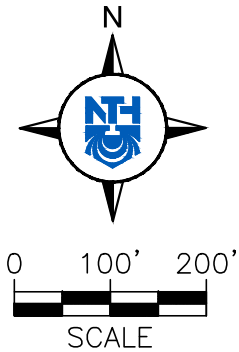


FIGURE 3A  
Lithium Concentrations vs. Time  
(mg/L)



MW-3 was not sample on September 2019 due to flooding

c:\users\bstachkunis.docs\desktop\160017-updated aerial - standard\160017- li concentration - isopleth 2.dwg Plotted: 1/26/2021 3:53 PM by bstachkunis



LEGEND

- MW-1 MONITORING WELL LOCATION
- 3A NEW MONITORING WELL LOCATION
- TW-1 TEMPORARY WELL LOCATION
- PZ-1 PIEZOMETER (UPGRADIENT MONITORING WELL)
- [1.0] CONCENTRATION LI MG/L FROM 08/10/2020
- CONTOUR OF EQUAL LI CONCENTRATION

NOTE: LOCATIONS AND DIMENSIONS ARE APPROXIMATE. NOT A LEGAL SURVEY.

ISOPLETH

NTH Consultants, Ltd.  
Infrastructure Engineering  
and Environmental Services

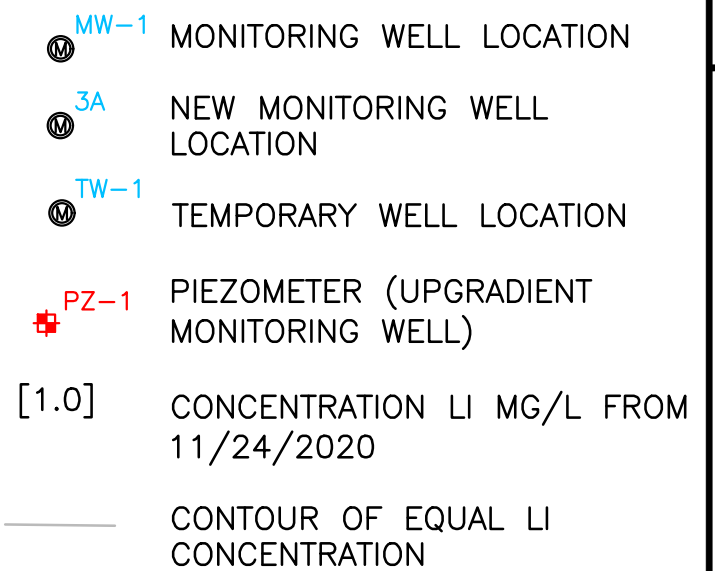
CAD FILE NAME:	CONCENTRATION
NTH PROJECT No.:	73-6000017-104
DESIGNED BY:	CRD
DRAWN BY:	CRD
CHECKED BY:	KWO
PLOT DATE:	1/06/2021
DRAWING SCALE:	Custom
INCEPTION DATE:	10/13/2017

LITHIUM CONCENTRATION GRADIENT MAP  
3RD QUARTER 2020

JAMES DEYOUNG POWER PLANT  
HOLLAND, MICHIGAN

FIGURE:  
3B







# **APPENDIX B**

## **LABORATORY ANALYTICAL RESULTS**



## **APPENDIX B-1**

### **July 2020 Groundwater Data**



23-Jul-2020

Karen Okonta  
NTH Consultants, Ltd.  
41780 Six Mile Road  
Northville, MI 48168

Re: **Holland Board of Public Works**

Work Order: **20070974**

Dear Karen,

ALS Environmental received 3 samples on 15-Jul-2020 08:00 AM for the analyses presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental - Holland and for only the analyses requested.

Sample results are compliant with industry accepted practices and Quality Control results achieved laboratory specifications. Any exceptions are noted in the Case Narrative, or noted with qualifiers in the report or QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained from ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

The total number of pages in this report is 12.

If you have any questions regarding this report, please feel free to contact me:

ADDRESS: 3352 128th Avenue, Holland, MI, USA  
PHONE: +1 (616) 399-6070 FAX: +1 (616) 399-6185

Sincerely,

A handwritten signature in black ink, appearing to read "Chad Whelton".

Electronically approved by: Chad Whelton

Chad Whelton  
Project Manager

## Report of Laboratory Analysis

Certificate No: MI: 0022

ALS GROUP USA, CORP Part of the ALS Laboratory Group A Campbell Brothers Limited Company

Environmental 

[www.alsglobal.com](http://www.alsglobal.com)

RIGHT SOLUTIONS RIGHT PARTNER



**Client:** NTH Consultants, Ltd.  
**Project:** Holland Board of Public Works  
**Work Order:** 20070974

## Work Order Sample Summary

<u>Lab Samp ID</u>	<u>Client Sample ID</u>	<u>Matrix</u>	<u>Tag Number</u>	<u>Collection Date</u>	<u>Date Received</u>	<u>Hold</u>
20070974-01	TW-1	Groundwater		7/14/2020 13:28	7/15/2020 08:00	<input type="checkbox"/>
20070974-02	TW-2	Groundwater		7/14/2020 14:29	7/15/2020 08:00	<input type="checkbox"/>
20070974-03	MW-3A	Groundwater		7/14/2020 15:40	7/15/2020 08:00	<input type="checkbox"/>

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**Client:** NTH Consultants, Ltd.  
**Project:** Holland Board of Public Works  
**Work Order:** 20070974

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**Case Narrative**

Samples for the above noted Work Order were received on 07/15/2020. The attached "Sample Receipt Checklist" documents the status of custody seals, container integrity, preservation, and temperature compliance.

Samples were analyzed according to the analytical methodology previously transmitted in the "Work Order Acknowledgement". Methodologies are also documented in the "Analytical Result" section for each sample. Quality control results are listed in the "QC Report" section. Sample association for the reported quality control is located at the end of each batch summary. If applicable, results are appropriately qualified in the Analytical Result and QC Report sections. The "Qualifiers" section documents the various qualifiers, units, and acronyms utilized in reporting. A copy of the laboratory's scope of accreditation is available upon request.

With the following exceptions, all sample analyses achieved analytical criteria.

**Metals:**

No other deviations or anomalies were noted.

**Wet Chemistry:**

No other deviations or anomalies were noted.

**Client:** NTH Consultants, Ltd.  
**Project:** Holland Board of Public Works  
**WorkOrder:** 20070974

## **QUALIFIERS, ACRONYMS, UNITS**

<b><u>Qualifier</u></b>	<b><u>Description</u></b>
*	Value exceeds Regulatory Limit
**	Estimated Value
a	Analyte is non-accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
Hr	BOD/CBOD - Sample was reset outside Hold Time, value should be considered estimated.
J	Analyte is present at an estimated concentration between the MDL and Report Limit
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL
X	Analyte was detected in the Method Blank between the MDL and Reporting Limit, sample results may exhibit background or reagent contamination at the observed level.

<b><u>Acronym</u></b>	<b><u>Description</u></b>
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LOD	Limit of Detection (see MDL)
LOQ	Limit of Quantitation (see PQL)
MBLK	Method Blank
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PQL	Practical Quantitation Limit
RPD	Relative Percent Difference
TDL	Target Detection Limit
TNTC	Too Numerous To Count
A	APHA Standard Methods
D	ASTM
E	EPA
SW	SW-846 Update III

<b><u>Units Reported</u></b>	<b><u>Description</u></b>
mg/L	Milligrams per Liter

**ALS Group, USA****Date:** 23-Jul-20**Client:** NTH Consultants, Ltd.**Project:** Holland Board of Public Works**Sample ID:** TW-1**Collection Date:** 7/14/2020 01:28 PM**Work Order:** 20070974**Lab ID:** 20070974-01**Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
<b>METALS BY ICP-MS</b>			<b>SW6020B</b>		Prep: SW3015A 7/21/20 11:19	Analyst: <b>STP</b>
Lithium	0.042		0.010	mg/L	1	7/21/2020 10:13 PM
<b>METALS BY ICP-MS (DISSOLVED)</b>			<b>SW6020B</b>			Analyst: <b>STP</b>
Lithium	0.039		0.010	mg/L	1	7/20/2020 08:00 PM
<b>TOTAL SUSPENDED SOLIDS</b>			<b>A2540 D-11</b>		Prep: FILTER 7/16/20 13:23	Analyst: <b>ERW</b>
Total Suspended Solids	121		4.00	mg/L	1	7/17/2020 12:24 PM

**Note:** See Qualifiers page for a list of qualifiers and their definitions.

**ALS Group, USA****Date:** 23-Jul-20**Client:** NTH Consultants, Ltd.**Project:** Holland Board of Public Works**Sample ID:** TW-2**Collection Date:** 7/14/2020 02:29 PM**Work Order:** 20070974**Lab ID:** 20070974-02**Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
<b>METALS BY ICP-MS</b>			<b>SW6020B</b>		Prep: SW3015A 7/21/20 11:19	Analyst: <b>STP</b>
Lithium	0.059		0.010	mg/L	1	7/21/2020 10:15 PM
<b>METALS BY ICP-MS (DISSOLVED)</b>			<b>SW6020B</b>			Analyst: <b>STP</b>
Lithium	0.044		0.010	mg/L	1	7/20/2020 08:05 PM
<b>TOTAL SUSPENDED SOLIDS</b>			<b>A2540 D-11</b>		Prep: FILTER 7/16/20 13:23	Analyst: <b>ERW</b>
Total Suspended Solids	824		24.0	mg/L	1	7/17/2020 12:24 PM

**Note:** See Qualifiers page for a list of qualifiers and their definitions.

**ALS Group, USA****Date:** 23-Jul-20**Client:** NTH Consultants, Ltd.**Project:** Holland Board of Public Works**Sample ID:** MW-3A**Collection Date:** 7/14/2020 03:40 PM**Work Order:** 20070974**Lab ID:** 20070974-03**Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
<b>METALS BY ICP-MS</b>			<b>SW6020B</b>		Prep: SW3015A 7/21/20 11:19	Analyst: <b>STP</b>
Lithium	ND		0.010	mg/L	1	7/21/2020 10:17 PM
<b>METALS BY ICP-MS (DISSOLVED)</b>			<b>SW6020B</b>			Analyst: <b>STP</b>
Lithium	ND		0.010	mg/L	1	7/20/2020 08:07 PM
<b>TOTAL SUSPENDED SOLIDS</b>			<b>A2540 D-11</b>		Prep: FILTER 7/16/20 13:23	Analyst: <b>ERW</b>
Total Suspended Solids	49.0		3.00	mg/L	1	7/17/2020 12:24 PM

**Note:** See Qualifiers page for a list of qualifiers and their definitions.



**Client:** NTH Consultants, Ltd.  
**Work Order:** 20070974  
**Project:** Holland Board of Public Works

# QC BATCH REPORT

Batch ID: **159373** Instrument ID **ICPMS4** Method: **SW6020B**

<b>MBLK</b>		Sample ID: <b>MBLK-159373-159373</b>				Units: <b>mg/L</b>		Analysis Date: <b>7/21/2020 09:36 PM</b>		
Client ID:		Run ID: <b>ICPMS4_200721A</b>				SeqNo: <b>6578764</b>		Prep Date: <b>7/21/2020</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Lithium	ND	0.010								

<b>LCS</b>		Sample ID: <b>LCS-159373-159373</b>				Units: <b>mg/L</b>		Analysis Date: <b>7/21/2020 09:37 PM</b>		
Client ID:		Run ID: <b>ICPMS4_200721A</b>				SeqNo: <b>6578765</b>		Prep Date: <b>7/21/2020</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Lithium	0.108	0.010	0.1	0	108	80-120	0			

<b>MS</b>		Sample ID: <b>20070808-02BMS</b>				Units: <b>mg/L</b>		Analysis Date: <b>7/21/2020 09:42 PM</b>		
Client ID:		Run ID: <b>ICPMS4_200721A</b>				SeqNo: <b>6578768</b>		Prep Date: <b>7/21/2020</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Lithium	0.1061	0.010	0.1	0.00169	104	75-125	0			

<b>MSD</b>		Sample ID: <b>20070808-02BMSD</b>				Units: <b>mg/L</b>		Analysis Date: <b>7/21/2020 09:44 PM</b>		
Client ID:		Run ID: <b>ICPMS4_200721A</b>				SeqNo: <b>6578769</b>		Prep Date: <b>7/21/2020</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Lithium	0.1135	0.010	0.1	0.00169	112	75-125	0.1061	6.7	20	

The following samples were analyzed in this batch:

20070974-01B	20070974-02B	20070974-03B
--------------	--------------	--------------

Client: NTH Consultants, Ltd.  
 Work Order: 20070974  
 Project: Holland Board of Public Works

# QC BATCH REPORT

Batch ID: **R293294A** Instrument ID **ICPMS3** Method: **SW6020B**

<b>MBLK</b>		Sample ID: <b>MBLK-R293294A-R293294A</b>				Units: <b>mg/L</b>		Analysis Date: <b>7/20/2020 07:59 PM</b>		
Client ID:		Run ID: <b>ICPMS3_200720A</b>				SeqNo: <b>6575834</b>		Prep Date:		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Lithium ND 0.010

<b>LCS</b>		Sample ID: <b>LCS-R293294A-R293294A</b>				Units: <b>mg/L</b>		Analysis Date: <b>7/20/2020 07:57 PM</b>		
Client ID:		Run ID: <b>ICPMS3_200720A</b>				SeqNo: <b>6575835</b>		Prep Date:		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Lithium 0.09954 0.010 0.1 0 99.5 80-120 0

<b>MS</b>		Sample ID: <b>20070974-01CMS</b>				Units: <b>mg/L</b>		Analysis Date: <b>7/20/2020 08:02 PM</b>		
Client ID: <b>TW-1</b>		Run ID: <b>ICPMS3_200720A</b>				SeqNo: <b>6575731</b>		Prep Date:		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Lithium 0.1469 0.010 0.1 0.03875 108 75-125 0

<b>MSD</b>		Sample ID: <b>20070974-01CMSD</b>				Units: <b>mg/L</b>		Analysis Date: <b>7/20/2020 08:04 PM</b>		
Client ID: <b>TW-1</b>		Run ID: <b>ICPMS3_200720A</b>				SeqNo: <b>6575732</b>		Prep Date:		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Lithium 0.1465 0.010 0.1 0.03875 108 75-125 0.1469 0.271 20

The following samples were analyzed in this batch:

20070974-01C	20070974-02C	20070974-03C
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Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: NTH Consultants, Ltd.  
 Work Order: 20070974  
 Project: Holland Board of Public Works

## QC BATCH REPORT

Batch ID: **159187** Instrument ID **TSS** Method: **A2540 D-11**

<b>MBLK</b>		Sample ID: <b>MBLK-159187-159187</b>				Units: <b>mg/L</b>		Analysis Date: <b>7/17/2020 12:24 PM</b>		
Client ID:		Run ID: <b>TSS_200717B</b>				SeqNo: <b>6570530</b>		Prep Date: <b>7/16/2020</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Suspended Solids	ND	0.60								

<b>LCS</b>		Sample ID: <b>LCS-159187-159187</b>				Units: <b>mg/L</b>		Analysis Date: <b>7/17/2020 12:24 PM</b>		
Client ID:		Run ID: <b>TSS_200717B</b>				SeqNo: <b>6570529</b>		Prep Date: <b>7/16/2020</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Suspended Solids	101	6.0	100	0	101	70-113	0			

<b>DUP</b>		Sample ID: <b>20070066-13A DUP</b>				Units: <b>mg/L</b>		Analysis Date: <b>7/17/2020 12:24 PM</b>		
Client ID:		Run ID: <b>TSS_200717B</b>				SeqNo: <b>6570508</b>		Prep Date: <b>7/16/2020</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Suspended Solids	152	4.8	0	0	0	0-0	151.2	0.528	10	

<b>DUP</b>		Sample ID: <b>20070974-01A DUP</b>				Units: <b>mg/L</b>		Analysis Date: <b>7/17/2020 12:24 PM</b>		
Client ID: <b>TW-1</b>		Run ID: <b>TSS_200717B</b>				SeqNo: <b>6570517</b>		Prep Date: <b>7/16/2020</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Suspended Solids	118	4.0	0	0	0	0-0	121.3	2.79	10	

The following samples were analyzed in this batch:

20070974-01A	20070974-02A	20070974-03A
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Note: See Qualifiers Page for a list of Qualifiers and their explanation.



Cincinnati, OH  
+1 513 733 5336

Fort Collins, CO  
+1 970 490 1511

Everett, WA  
+1 425 356 2600

Holland, MI  
+1 616 399 6070

# Chain of Custody Form

Houston, TX  
+1 281 530 5656

Spring City, PA  
+1 610 948 4903

Middletown, PA  
+1 717 944 5541

Salt Lake City, UT  
+1 801 266 7700

South Charleston, WV  
+1 304 356 3168

York, PA  
+1 717 505 5280

Page \_\_\_\_ of \_\_\_\_

COC ID: 223856

ALS Project Manager:

ALS Work Order #: 20070974

Customer Information		Project Information		Parameter/Method Request for Analysis	
Purchase Order		Project Name		A	TSS
Work Order		Project Number	62-16007-06	B	Total Lithium
Company Name	NTH Consultants, Ltd.	Bill To Company	Holland Board of Public Works	C	Dissolved Lithium
Send Report To	Karen Okonta	Invoice Attn	Accounts Payable	D	
Address	41780 Six Mile Road	Address	626 Hastings	E	
				F	
City/State/Zip	Northville, MI 48168	City/State/Zip	Holland, MI 49423	G	
Phone	(248) 682-2668	Phone	(616) 355-1210	H	
Fax	(248) 324-5305	Fax		I	
e-Mail Address		e-Mail Address		J	

No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1	TW-1	7-14-20	1:28	GW	4	3	X	X	X								
2	TW-2	7-14-20	2:29	GW	4	3	X	X	X								
3	MW-3A	7-14-20	3:40	GW	4	3	X	X	X								
4																	
5																	
6																	
7																	
8																	
9																	
10																	

Sampler(s) Please Print & Sign <i>Brittany Stachekunis</i>		Shipment Method drop-off		Required Turnaround Time: (Check Box) <input checked="" type="checkbox"/> Std 10 WK Days <input type="checkbox"/> 5 WK Days <input type="checkbox"/> Other <input type="checkbox"/> 2 WK Days <input type="checkbox"/> 24 Hour				Results Due Date:	
Relinquished by:	Date:	Time:	Received by:	Notes:					
Relinquished by:	Date: 7/15/20	Time: 8:00	Received by (Laboratory):	Cooler ID	Cooler Temp.	QC Package: (Check One Box Below)			
Logged by (Laboratory):	Date: 7/15/20	Time: 9:53	Checked by (Laboratory):		4.6°C	<input type="checkbox"/> Level II Std QG	<input type="checkbox"/> TRRP CheckList		
					511	<input type="checkbox"/> Level III Std QG/Raw Data	<input type="checkbox"/> TRRP Level IV		
					PH21	<input type="checkbox"/> Level IV SW846/CLP			
Preservative Key: 1-HCl 2-HNO <sub>3</sub> 3-H <sub>2</sub> SO <sub>4</sub> 4-NaOH 5-Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> 6-NaHSO <sub>4</sub> 7-Other 8-4°C 9-5035				<input type="checkbox"/> Other					

- Note: 1. Any changes must be made in writing once samples and COC Form have been submitted to ALS Environmental.  
 2. Unless otherwise agreed in a formal contract, services provided by ALS Environmental are expressly limited to the terms and conditions stated on the reverse.  
 3. The Chain of Custody is a legal document. All information must be completed accurately.

Copyright 2011 by ALS Environmental.

Sample Receipt Checklist

Client Name: **NTH - NORTHVILLE**

Date/Time Received: **15-Jul-20 08:00**

Work Order: **20070974**

Received by: **MJG**

Checklist completed by **Matthew Gaylord**

15-Jul-20

Reviewed by: **Chad Whelton**

15-Jul-20

eSignature

Date

eSignature

Date

Matrices: **Groundwater**

Carrier name: **Client**

Shipping container/cooler in good condition?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	Not Present <input type="checkbox"/>
Custody seals intact on shipping container/cooler?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Not Present <input checked="" type="checkbox"/>
Custody seals intact on sample bottles?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Not Present <input checked="" type="checkbox"/>
Chain of custody present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Chain of custody signed when relinquished and received?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Chain of custody agrees with sample labels?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Samples in proper container/bottle?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Sample containers intact?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Sufficient sample volume for indicated test?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
All samples received within holding time?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Container/Temp Blank temperature in compliance?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Sample(s) received on ice?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Temperature(s)/Thermometer(s):	<u>4.6/4.6C</u>		<u>SR1</u>
Cooler(s)/Kit(s):	<u></u>		
Date/Time sample(s) sent to storage:	<u>7/15/2020 9:55:59 AM</u>		
Water - VOA vials have zero headspace?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	No VOA vials submitted <input checked="" type="checkbox"/>
Water - pH acceptable upon receipt?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	N/A <input type="checkbox"/>
pH adjusted?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	N/A <input type="checkbox"/>
pH adjusted by:	<u>-</u>		

Login Notes:

-----

Client Contacted:

Date Contacted:

Person Contacted:

Contacted By:

Regarding:

Comments:

CorrectiveAction:



## **APPENDIX B-2**

### **August 2020 Groundwater Data**



04-Sep-2020

Karen Okonta  
NTH Consultants, Ltd.  
41780 Six Mile Road  
Northville, MI 48168

Re: **Holland Board of Public Works**

Work Order: **20080708**

Dear Karen,

ALS Environmental received 8 samples on 11-Aug-2020 08:00 AM for the analyses presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental - Holland and for only the analyses requested.

Sample results are compliant with industry accepted practices and Quality Control results achieved laboratory specifications. Any exceptions are noted in the Case Narrative, or noted with qualifiers in the report or QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained from ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

The total number of pages in this report is 40.

If you have any questions regarding this report, please feel free to contact me:

ADDRESS: 3352 128th Avenue, Holland, MI, USA  
PHONE: +1 (616) 399-6070 FAX: +1 (616) 399-6185

Sincerely,

A handwritten signature in black ink, appearing to read "Chad Whelton".

Electronically approved by: Chad Whelton

Chad Whelton  
Project Manager

## Report of Laboratory Analysis

Certificate No: MN 026-999-449

ALS GROUP USA, CORP Part of the ALS Laboratory Group A Campbell Brothers Limited Company

Environmental 

[www.alsglobal.com](http://www.alsglobal.com)

RIGHT SOLUTIONS RIGHT PARTNER

**Client:** NTH Consultants, Ltd.  
**Project:** Holland Board of Public Works  
**Work Order:** 20080708

**Work Order Sample Summary**

<u>Lab Samp ID</u>	<u>Client Sample ID</u>	<u>Matrix</u>	<u>Tag Number</u>	<u>Collection Date</u>	<u>Date Received</u>	<u>Hold</u>
20080708-01	MW-1	Groundwater		8/10/2020 15:06	8/11/2020 08:00	<input type="checkbox"/>
20080708-02	MW-2	Groundwater		8/10/2020 13:51	8/11/2020 08:00	<input type="checkbox"/>
20080708-03	MW-3	Groundwater		8/10/2020 12:38	8/11/2020 08:00	<input type="checkbox"/>
20080708-04	MW-3A	Groundwater		8/10/2020 17:12	8/11/2020 08:00	<input type="checkbox"/>
20080708-05	Field Blank	Groundwater		8/10/2020 16:07	8/11/2020 08:00	<input type="checkbox"/>
20080708-06	Equipment Blank	Groundwater		8/10/2020 16:15	8/11/2020 08:00	<input type="checkbox"/>
20080708-07	DUP-1 (Field DUP)	Groundwater		8/10/2020	8/11/2020 08:00	<input type="checkbox"/>
20080708-08	PZ-1	Groundwater		8/10/2020 09:40	8/11/2020 08:00	<input type="checkbox"/>



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**Client:** NTH Consultants, Ltd.  
**Project:** Holland Board of Public Works  
**Work Order:** 20080708

---

**Case Narrative**

Samples for the above noted Work Order were received on 08/11/2020. The attached "Sample Receipt Checklist" documents the status of custody seals, container integrity, preservation, and temperature compliance.

Samples were analyzed according to the analytical methodology previously transmitted in the "Work Order Acknowledgement". Methodologies are also documented in the "Analytical Result" section for each sample. Quality control results are listed in the "QC Report" section. Sample association for the reported quality control is located at the end of each batch summary. If applicable, results are appropriately qualified in the Analytical Result and QC Report sections. The "Qualifiers" section documents the various qualifiers, units, and acronyms utilized in reporting. A copy of the laboratory's scope of accreditation is available upon request.

With the following exceptions, all sample analyses achieved analytical criteria.

**Metals:**

Batch 162899, Method ICP\_6020\_W, Sample 20080708-02A MSD: The MSD recovery was outside of the control limit for Calcium; however, the result in the parent sample is greater than 4x the spike amount. No qualification is required.

**Wet Chemistry:**

Batch R295823, Method IC\_300.0\_WW, Sample 20080708-02B: The reporting limit for Sulfate is elevated due to dilution for high concentrations of non-target analytes.

Batch R295863, Method PH\_4500\_W, Sample LCS-R295863: Sample was processed outside of holding time for pH, as the analysis is a field test and holding time is defined as 15 minutes.

Radium analysis performed by ALS Fort Collins laboratory.

<b><u>Qualifier</u></b>	<b><u>Description</u></b>
*	Value exceeds Regulatory Limit
**	Estimated Value
a	Analyte is non-accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
Hr	BOD/CBOD - Sample was reset outside Hold Time, value should be considered estimated.
J	Analyte is present at an estimated concentration between the MDL and Report Limit
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL
X	Analyte was detected in the Method Blank between the MDL and Reporting Limit, sample results may exhibit background or reagent contamination at the observed level.

<b><u>Acronym</u></b>	<b><u>Description</u></b>
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LOD	Limit of Detection (see MDL)
LOQ	Limit of Quantitation (see PQL)
MBLK	Method Blank
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PQL	Practical Quantitation Limit
RPD	Relative Percent Difference
TDL	Target Detection Limit
TNTC	Too Numerous To Count
A	APHA Standard Methods
D	ASTM
E	EPA
SW	SW-846 Update III

<b><u>Units Reported</u></b>	<b><u>Description</u></b>
°C	Degrees Celcius
as noted	
mg/L	Milligrams per Liter
s.u.	Standard Units

# ALS Group, USA

Date: 04-Sep-20

Client: NTH Consultants, Ltd.

Project: Holland Board of Public Works

Sample ID: MW-1

Collection Date: 8/10/2020 03:06 PM

Work Order: 20080708

Lab ID: 20080708-01

Matrix: GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
<b>MERCURY BY CVAA</b>						
			<b>SW7470A</b>		Prep: SW7470 8/12/20 12:32	Analyst: <b>MAC</b>
Mercury	ND		0.00020	mg/L	1	8/12/2020 01:43 PM
<b>METALS BY ICP-MS</b>						
			<b>SW6020B</b>		Prep: SW3015A 8/20/20 09:29	Analyst: <b>STP</b>
Antimony	ND		0.0050	mg/L	1	8/20/2020 03:10 PM
Arsenic	0.024		0.0050	mg/L	1	8/20/2020 03:10 PM
Barium	0.26		0.0050	mg/L	1	8/20/2020 03:10 PM
Beryllium	ND		0.0020	mg/L	1	8/21/2020 03:03 PM
Boron	1.6		0.020	mg/L	1	8/20/2020 03:10 PM
Cadmium	ND		0.0020	mg/L	1	8/20/2020 03:10 PM
Calcium	86		0.50	mg/L	1	8/20/2020 03:10 PM
Chromium	ND		0.0050	mg/L	1	8/20/2020 03:10 PM
Cobalt	ND		0.0050	mg/L	1	8/20/2020 03:10 PM
Lead	ND		0.0050	mg/L	1	8/20/2020 03:10 PM
Lithium	0.13		0.010	mg/L	1	8/20/2020 03:10 PM
Molybdenum	ND		0.0050	mg/L	1	8/20/2020 03:10 PM
Selenium	ND		0.0050	mg/L	1	8/20/2020 03:10 PM
Thallium	ND		0.0020	mg/L	1	8/20/2020 03:10 PM
<b>ANIONS BY ION CHROMATOGRAPHY</b>						
			<b>E300.0</b>			Analyst: <b>JDR</b>
Chloride	320		40	mg/L	40	8/11/2020 03:25 PM
Fluoride	1.1		0.10	mg/L	1	8/11/2020 01:10 PM
Sulfate	ND		1.0	mg/L	1	8/11/2020 01:10 PM
<b>PH (LABORATORY)</b>						
			<b>A4500-H B-11</b>			Analyst: <b>QTN</b>
pH (laboratory)	6.96	H	0.100	s.u.	1	8/12/2020 02:01 PM
Temperature	20.6	H	0.100	°C	1	8/12/2020 02:01 PM
<b>TOTAL DISSOLVED SOLIDS</b>						
			<b>A2540 C-11</b>		Prep: FILTER 8/12/20 13:12	Analyst: <b>ERW</b>
Total Dissolved Solids	930		150	mg/L	1	8/13/2020 02:15 PM
<b>SUBCONTRACTED ANALYSES</b>						
			<b>SUBCONTRACT</b>			Analyst: <b>ALS</b>
Subcontracted Analyses	See attached		as noted		1	9/4/2020

**Note:** See Qualifiers page for a list of qualifiers and their definitions.

# ALS Group, USA

Date: 04-Sep-20

Client: NTH Consultants, Ltd.

Project: Holland Board of Public Works

Sample ID: MW-2

Collection Date: 8/10/2020 01:51 PM

Work Order: 20080708

Lab ID: 20080708-02

Matrix: GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
<b>MERCURY BY CVAA</b>						
			<b>SW7470A</b>		Prep: SW7470 8/12/20 12:32	Analyst: <b>MAC</b>
Mercury	ND		0.00020	mg/L	1	8/12/2020 01:50 PM
<b>METALS BY ICP-MS</b>						
			<b>SW6020B</b>		Prep: SW3015A 8/20/20 09:29	Analyst: <b>STP</b>
Antimony	ND		0.0050	mg/L	1	8/20/2020 03:12 PM
Arsenic	ND		0.0050	mg/L	1	8/20/2020 03:12 PM
<b>Barium</b>	<b>0.21</b>		<b>0.0050</b>	<b>mg/L</b>	1	8/20/2020 03:12 PM
Beryllium	ND		0.0020	mg/L	1	8/21/2020 03:05 PM
<b>Boron</b>	<b>0.77</b>		<b>0.020</b>	<b>mg/L</b>	1	8/20/2020 03:12 PM
Cadmium	ND		0.0020	mg/L	1	8/20/2020 03:12 PM
<b>Calcium</b>	<b>75</b>		<b>0.50</b>	<b>mg/L</b>	1	8/20/2020 03:12 PM
Chromium	ND		0.0050	mg/L	1	8/20/2020 03:12 PM
Cobalt	ND		0.0050	mg/L	1	8/20/2020 03:12 PM
Lead	ND		0.0050	mg/L	1	8/20/2020 03:12 PM
<b>Lithium</b>	<b>0.010</b>		<b>0.010</b>	<b>mg/L</b>	1	8/20/2020 03:12 PM
Molybdenum	ND		0.0050	mg/L	1	8/20/2020 03:12 PM
Selenium	ND		0.0050	mg/L	1	8/20/2020 03:12 PM
Thallium	ND		0.0050	mg/L	1	8/20/2020 03:12 PM
<b>ANIONS BY ION CHROMATOGRAPHY</b>						
			<b>E300.0</b>			Analyst: <b>JDR</b>
<b>Chloride</b>	<b>680</b>		<b>80</b>	<b>mg/L</b>	80	8/11/2020 04:22 PM
<b>Fluoride</b>	<b>0.93</b>		<b>0.20</b>	<b>mg/L</b>	2	8/11/2020 01:30 PM
Sulfate	ND		2.0	mg/L	2	8/11/2020 01:30 PM
<b>PH (LABORATORY)</b>						
			<b>A4500-H B-11</b>			Analyst: <b>QTN</b>
pH (laboratory)	<b>6.90</b>	H	<b>0.100</b>	<b>s.u.</b>	1	8/12/2020 02:01 PM
Temperature	<b>20.8</b>	H	<b>0.100</b>	<b>°C</b>	1	8/12/2020 02:01 PM
<b>TOTAL DISSOLVED SOLIDS</b>						
			<b>A2540 C-11</b>		Prep: FILTER 8/12/20 13:12	Analyst: <b>ERW</b>
Total Dissolved Solids	<b>1,400</b>		<b>75</b>	<b>mg/L</b>	1	8/13/2020 02:15 PM
<b>SUBCONTRACTED ANALYSES</b>						
			<b>SUBCONTRACT</b>			Analyst: <b>ALS</b>
Subcontracted Analyses	See attached		as noted		1	9/4/2020

**Note:** See Qualifiers page for a list of qualifiers and their definitions.

# ALS Group, USA

Date: 04-Sep-20

Client: NTH Consultants, Ltd.

Project: Holland Board of Public Works

Sample ID: MW-3

Collection Date: 8/10/2020 12:38 PM

Work Order: 20080708

Lab ID: 20080708-03

Matrix: GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
<b>MERCURY BY CVAA</b>						
			<b>SW7470A</b>		Prep: SW7470 8/13/20 13:00	Analyst: <b>MAC</b>
Mercury	ND		0.00020	mg/L	1	8/13/2020 01:52 PM
<b>METALS BY ICP-MS</b>						
			<b>SW6020B</b>		Prep: SW3015A 8/20/20 09:29	Analyst: <b>STP</b>
Antimony	ND		0.0050	mg/L	1	8/20/2020 03:17 PM
Arsenic	ND		0.0050	mg/L	1	8/20/2020 03:17 PM
Barium	0.074		0.0050	mg/L	1	8/20/2020 03:17 PM
Beryllium	ND		0.0020	mg/L	1	8/21/2020 03:14 PM
Boron	0.48		0.020	mg/L	1	8/20/2020 03:17 PM
Cadmium	ND		0.0020	mg/L	1	8/20/2020 03:17 PM
Calcium	53		0.50	mg/L	1	8/20/2020 03:17 PM
Chromium	ND		0.0050	mg/L	1	8/20/2020 03:17 PM
Cobalt	ND		0.0050	mg/L	1	8/20/2020 03:17 PM
Lead	ND		0.0050	mg/L	1	8/20/2020 03:17 PM
Lithium	0.017		0.010	mg/L	1	8/20/2020 03:17 PM
Molybdenum	ND		0.0050	mg/L	1	8/20/2020 03:17 PM
Selenium	ND		0.0050	mg/L	1	8/20/2020 03:17 PM
Thallium	ND		0.0020	mg/L	1	8/20/2020 03:17 PM
<b>ANIONS BY ION CHROMATOGRAPHY</b>						
			<b>E300.0</b>			Analyst: <b>JDR</b>
Chloride	69		4.0	mg/L	4	8/11/2020 05:20 PM
Fluoride	ND		1.0	mg/L	1	8/11/2020 01:49 PM
Sulfate	41		8.0	mg/L	4	8/11/2020 05:20 PM
<b>PH (LABORATORY)</b>						
			<b>A4500-H B-11</b>			Analyst: <b>QTN</b>
pH (laboratory)	6.78	H	0.100	s.u.	1	8/12/2020 02:01 PM
Temperature	20.8	H	0.100	°C	1	8/12/2020 02:01 PM
<b>TOTAL DISSOLVED SOLIDS</b>						
			<b>A2540 C-11</b>		Prep: FILTER 8/12/20 13:12	Analyst: <b>ERW</b>
Total Dissolved Solids	410		150	mg/L	1	8/13/2020 02:15 PM
<b>SUBCONTRACTED ANALYSES</b>						
			<b>SUBCONTRACT</b>			Analyst: <b>ALS</b>
Subcontracted Analyses	See attached		as noted		1	9/4/2020

**Note:** See Qualifiers page for a list of qualifiers and their definitions.

# ALS Group, USA

Date: 04-Sep-20

Client: NTH Consultants, Ltd.

Project: Holland Board of Public Works

Sample ID: MW-3A

Collection Date: 8/10/2020 05:12 PM

Work Order: 20080708

Lab ID: 20080708-04

Matrix: GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
<b>MERCURY BY CVAA</b>						
			<b>SW7470A</b>		Prep: SW7470 8/13/20 13:00	Analyst: <b>MAC</b>
Mercury	ND		0.00020	mg/L	1	8/13/2020 01:53 PM
<b>METALS BY ICP-MS</b>						
			<b>SW6020B</b>		Prep: SW3015A 8/20/20 09:29	Analyst: <b>STP</b>
Antimony	ND		0.0050	mg/L	1	8/20/2020 03:18 PM
Arsenic	ND		0.0050	mg/L	1	8/20/2020 03:18 PM
<b>Barium</b>	<b>0.25</b>		<b>0.0050</b>	<b>mg/L</b>	1	8/20/2020 03:18 PM
Beryllium	ND		0.0020	mg/L	1	8/21/2020 03:16 PM
<b>Boron</b>	<b>0.63</b>		<b>0.020</b>	<b>mg/L</b>	1	8/20/2020 03:18 PM
Cadmium	ND		0.0020	mg/L	1	8/20/2020 03:18 PM
<b>Calcium</b>	<b>130</b>		<b>0.50</b>	<b>mg/L</b>	1	8/20/2020 03:18 PM
Chromium	ND		0.0050	mg/L	1	8/20/2020 03:18 PM
Cobalt	ND		0.0050	mg/L	1	8/20/2020 03:18 PM
Lead	ND		0.0050	mg/L	1	8/20/2020 03:18 PM
Lithium	ND		0.010	mg/L	1	8/20/2020 03:18 PM
Molybdenum	ND		0.0050	mg/L	1	8/20/2020 03:18 PM
Selenium	ND		0.0050	mg/L	1	8/20/2020 03:18 PM
Thallium	ND		0.0020	mg/L	1	8/20/2020 03:18 PM
<b>ANIONS BY ION CHROMATOGRAPHY</b>						
			<b>E300.0</b>			Analyst: <b>JDR</b>
<b>Chloride</b>	<b>110</b>		<b>16</b>	<b>mg/L</b>	16	8/11/2020 05:58 PM
Fluoride	ND		1.0	mg/L	1	8/11/2020 02:08 PM
Sulfate	ND		2.0	mg/L	1	8/11/2020 02:08 PM
<b>PH (LABORATORY)</b>						
			<b>A4500-H B-11</b>			Analyst: <b>QTN</b>
<b>pH (laboratory)</b>	<b>6.87</b>	H	<b>0.100</b>	<b>s.u.</b>	1	8/12/2020 02:01 PM
<b>Temperature</b>	<b>20.6</b>	H	<b>0.100</b>	<b>°C</b>	1	8/12/2020 02:01 PM
<b>TOTAL DISSOLVED SOLIDS</b>						
			<b>A2540 C-11</b>		Prep: FILTER 8/12/20 13:12	Analyst: <b>ERW</b>
<b>Total Dissolved Solids</b>	<b>610</b>		<b>50</b>	<b>mg/L</b>	1	8/13/2020 02:15 PM
<b>SUBCONTRACTED ANALYSES</b>						
			<b>SUBCONTRACT</b>			Analyst: <b>ALS</b>
<b>Subcontracted Analyses</b>	<b>See attached</b>		<b>as noted</b>		1	9/4/2020

**Note:** See Qualifiers page for a list of qualifiers and their definitions.

# ALS Group, USA

Date: 04-Sep-20

Client: NTH Consultants, Ltd.

Project: Holland Board of Public Works

Sample ID: Field Blank

Collection Date: 8/10/2020 04:07 PM

Work Order: 20080708

Lab ID: 20080708-05

Matrix: GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
<b>MERCURY BY CVAA</b>			<b>SW7470A</b>		Prep: SW7470 8/13/20 13:00	Analyst: <b>MAC</b>
Mercury	ND		0.00020	mg/L	1	8/13/2020 01:55 PM
<b>METALS BY ICP-MS</b>			<b>SW6020B</b>		Prep: SW3015A 8/20/20 09:29	Analyst: <b>STP</b>
Antimony	ND		0.0050	mg/L	1	8/20/2020 03:20 PM
Arsenic	ND		0.0050	mg/L	1	8/20/2020 03:20 PM
Barium	ND		0.0050	mg/L	1	8/20/2020 03:20 PM
Beryllium	ND		0.0020	mg/L	1	8/21/2020 03:17 PM
Boron	ND		0.020	mg/L	1	8/20/2020 03:20 PM
Cadmium	ND		0.0020	mg/L	1	8/20/2020 03:20 PM
Calcium	ND		0.50	mg/L	1	8/20/2020 03:20 PM
Chromium	ND		0.0050	mg/L	1	8/20/2020 03:20 PM
Cobalt	ND		0.0050	mg/L	1	8/20/2020 03:20 PM
Lead	ND		0.0050	mg/L	1	8/20/2020 03:20 PM
Lithium	ND		0.010	mg/L	1	8/20/2020 03:20 PM
Molybdenum	ND		0.0050	mg/L	1	8/20/2020 03:20 PM
Selenium	ND		0.0050	mg/L	1	8/20/2020 03:20 PM
Thallium	ND		0.0020	mg/L	1	8/20/2020 03:20 PM
<b>ANIONS BY ION CHROMATOGRAPHY</b>			<b>E300.0</b>			Analyst: <b>JDR</b>
Chloride	ND		1.0	mg/L	1	8/11/2020 12:32 PM
Fluoride	ND		1.0	mg/L	1	8/11/2020 12:32 PM
Sulfate	ND		2.0	mg/L	1	8/11/2020 12:32 PM
<b>PH (LABORATORY)</b>			<b>A4500-H B-11</b>			Analyst: <b>QTN</b>
pH (laboratory)	6.51	H	0.100	s.u.	1	8/12/2020 02:01 PM
Temperature	20.6	H	0.100	°C	1	8/12/2020 02:01 PM
<b>TOTAL DISSOLVED SOLIDS</b>			<b>A2540 C-11</b>		Prep: FILTER 8/12/20 13:12	Analyst: <b>ERW</b>
Total Dissolved Solids	ND		30	mg/L	1	8/13/2020 02:15 PM
<b>SUBCONTRACTED ANALYSES</b>			<b>SUBCONTRACT</b>			Analyst: <b>ALS</b>
Subcontracted Analyses	See attached		as noted		1	9/4/2020

**Note:** See Qualifiers page for a list of qualifiers and their definitions.

# ALS Group, USA

Date: 04-Sep-20

Client: NTH Consultants, Ltd.

Project: Holland Board of Public Works

Sample ID: Equipment Blank

Collection Date: 8/10/2020 04:15 PM

Work Order: 20080708

Lab ID: 20080708-06

Matrix: GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
<b>MERCURY BY CVAA</b>						
			<b>SW7470A</b>		Prep: SW7470 8/13/20 13:00	Analyst: <b>MAC</b>
Mercury	ND		0.00020	mg/L	1	8/13/2020 01:57 PM
<b>METALS BY ICP-MS</b>						
			<b>SW6020B</b>		Prep: SW3015A 8/20/20 09:29	Analyst: <b>STP</b>
Antimony	ND		0.0050	mg/L	1	8/20/2020 03:26 PM
Arsenic	ND		0.0050	mg/L	1	8/20/2020 03:26 PM
Barium	ND		0.0050	mg/L	1	8/20/2020 03:26 PM
Beryllium	ND		0.0020	mg/L	1	8/20/2020 03:26 PM
Boron	ND		0.020	mg/L	1	8/20/2020 03:26 PM
Cadmium	ND		0.0020	mg/L	1	8/20/2020 03:26 PM
Calcium	ND		0.50	mg/L	1	8/20/2020 03:26 PM
Chromium	ND		0.0050	mg/L	1	8/20/2020 03:26 PM
Cobalt	ND		0.0050	mg/L	1	8/20/2020 03:26 PM
Lead	ND		0.0050	mg/L	1	8/20/2020 03:26 PM
Lithium	ND		0.010	mg/L	1	8/20/2020 03:26 PM
Molybdenum	ND		0.0050	mg/L	1	8/20/2020 03:26 PM
Selenium	ND		0.0050	mg/L	1	8/20/2020 03:26 PM
Thallium	ND		0.0020	mg/L	1	8/20/2020 03:26 PM
<b>ANIONS BY ION CHROMATOGRAPHY</b>						
			<b>E300.0</b>			Analyst: <b>JDR</b>
Chloride	ND		1.0	mg/L	1	8/11/2020 12:51 PM
Fluoride	ND		1.0	mg/L	1	8/11/2020 12:51 PM
Sulfate	ND		2.0	mg/L	1	8/11/2020 12:51 PM
<b>PH (LABORATORY)</b>						
			<b>A4500-H B-11</b>			Analyst: <b>QTN</b>
pH (laboratory)	6.04	H	0.100	s.u.	1	8/12/2020 02:01 PM
Temperature	20.7	H	0.100	°C	1	8/12/2020 02:01 PM
<b>TOTAL DISSOLVED SOLIDS</b>						
			<b>A2540 C-11</b>		Prep: FILTER 8/12/20 13:12	Analyst: <b>ERW</b>
Total Dissolved Solids	ND		30	mg/L	1	8/13/2020 02:15 PM
<b>SUBCONTRACTED ANALYSES</b>						
			<b>SUBCONTRACT</b>			Analyst: <b>ALS</b>
Subcontracted Analyses	See attached		as noted		1	9/4/2020

**Note:** See Qualifiers page for a list of qualifiers and their definitions.



# ALS Group, USA

Date: 04-Sep-20

**Client:** NTH Consultants, Ltd.  
**Project:** Holland Board of Public Works  
**Sample ID:** DUP-1 (Field DUP)  
**Collection Date:** 8/10/2020

**Work Order:** 20080708  
**Lab ID:** 20080708-07  
**Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
<b>MERCURY BY CVAA</b>						
			<b>SW7470A</b>		Prep: SW7470 8/13/20 13:00	Analyst: <b>MAC</b>
Mercury	ND		0.00020	mg/L	1	8/13/2020 01:59 PM
<b>METALS BY ICP-MS</b>						
			<b>SW6020B</b>		Prep: SW3015A 8/20/20 09:29	Analyst: <b>STP</b>
Antimony	ND		0.0050	mg/L	1	8/20/2020 03:28 PM
Arsenic	ND		0.0050	mg/L	1	8/20/2020 03:28 PM
<b>Barium</b>	<b>0.25</b>		<b>0.0050</b>	<b>mg/L</b>	1	8/20/2020 03:28 PM
Beryllium	ND		0.0020	mg/L	1	8/20/2020 03:28 PM
<b>Boron</b>	<b>0.63</b>		<b>0.020</b>	<b>mg/L</b>	1	8/20/2020 03:28 PM
Cadmium	ND		0.0020	mg/L	1	8/20/2020 03:28 PM
<b>Calcium</b>	<b>130</b>		<b>0.50</b>	<b>mg/L</b>	1	8/20/2020 03:28 PM
Chromium	ND		0.0050	mg/L	1	8/20/2020 03:28 PM
Cobalt	ND		0.0050	mg/L	1	8/20/2020 03:28 PM
Lead	ND		0.0050	mg/L	1	8/20/2020 03:28 PM
Lithium	ND		0.010	mg/L	1	8/20/2020 03:28 PM
Molybdenum	ND		0.0050	mg/L	1	8/20/2020 03:28 PM
Selenium	ND		0.0050	mg/L	1	8/20/2020 03:28 PM
Thallium	ND		0.0020	mg/L	1	8/20/2020 03:28 PM
<b>ANIONS BY ION CHROMATOGRAPHY</b>						
			<b>E300.0</b>			Analyst: <b>JDR</b>
<b>Chloride</b>	<b>110</b>		<b>16</b>	<b>mg/L</b>	16	8/11/2020 06:17 PM
Fluoride	ND		1.0	mg/L	1	8/11/2020 02:27 PM
Sulfate	ND		2.0	mg/L	1	8/11/2020 02:27 PM
<b>PH (LABORATORY)</b>						
			<b>A4500-H B-11</b>			Analyst: <b>QTN</b>
<b>pH (laboratory)</b>	<b>6.90</b>	H	<b>0.100</b>	<b>s.u.</b>	1	8/12/2020 02:01 PM
<b>Temperature</b>	<b>20.8</b>	H	<b>0.100</b>	<b>°C</b>	1	8/12/2020 02:01 PM
<b>TOTAL DISSOLVED SOLIDS</b>						
			<b>A2540 C-11</b>		Prep: FILTER 8/12/20 13:12	Analyst: <b>ERW</b>
<b>Total Dissolved Solids</b>	<b>580</b>		<b>50</b>	<b>mg/L</b>	1	8/13/2020 02:15 PM
<b>SUBCONTRACTED ANALYSES</b>						
			<b>SUBCONTRACT</b>			Analyst: <b>ALS</b>
<b>Subcontracted Analyses</b>	<b>See attached</b>		<b>as noted</b>		1	9/4/2020

**Note:** See Qualifiers page for a list of qualifiers and their definitions.

# ALS Group, USA

Date: 04-Sep-20

Client: NTH Consultants, Ltd.

Project: Holland Board of Public Works

Sample ID: PZ-1

Collection Date: 8/10/2020 09:40 AM

Work Order: 20080708

Lab ID: 20080708-08

Matrix: GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
<b>MERCURY BY CVAA</b>						
			<b>SW7470A</b>		Prep: SW7470 8/13/20 13:00	Analyst: <b>MAC</b>
Mercury	ND		0.00020	mg/L	1	8/13/2020 02:00 PM
<b>METALS BY ICP-MS</b>						
			<b>SW6020B</b>		Prep: SW3015A 8/20/20 09:29	Analyst: <b>STP</b>
Antimony	ND		0.0050	mg/L	1	8/20/2020 03:29 PM
Arsenic	0.044		0.0050	mg/L	1	8/20/2020 03:29 PM
Barium	0.057		0.0050	mg/L	1	8/20/2020 03:29 PM
Beryllium	ND		0.0020	mg/L	1	8/20/2020 03:29 PM
Boron	0.49		0.020	mg/L	1	8/20/2020 03:29 PM
Cadmium	ND		0.0020	mg/L	1	8/20/2020 03:29 PM
Calcium	33		0.50	mg/L	1	8/20/2020 03:29 PM
Chromium	0.014		0.0050	mg/L	1	8/20/2020 03:29 PM
Cobalt	ND		0.0050	mg/L	1	8/20/2020 03:29 PM
Lead	0.051		0.0050	mg/L	1	8/20/2020 03:29 PM
Lithium	ND		0.010	mg/L	1	8/20/2020 03:29 PM
Molybdenum	0.061		0.0050	mg/L	1	8/20/2020 03:29 PM
Selenium	ND		0.0050	mg/L	1	8/20/2020 03:29 PM
Thallium	ND		0.0020	mg/L	1	8/20/2020 03:29 PM
<b>ANIONS BY ION CHROMATOGRAPHY</b>						
			<b>E300.0</b>			Analyst: <b>JDR</b>
Chloride	140		16	mg/L	16	8/11/2020 06:36 PM
Fluoride	1.1		1.0	mg/L	1	8/11/2020 02:46 PM
Sulfate	2.1		2.0	mg/L	1	8/11/2020 02:46 PM
<b>PH (LABORATORY)</b>						
			<b>A4500-H B-11</b>			Analyst: <b>QTN</b>
pH (laboratory)	8.54	H	0.100	s.u.	1	8/12/2020 02:01 PM
Temperature	21.0	H	0.100	°C	1	8/12/2020 02:01 PM
<b>TOTAL DISSOLVED SOLIDS</b>						
			<b>A2540 C-11</b>		Prep: FILTER 8/12/20 13:12	Analyst: <b>ERW</b>
Total Dissolved Solids	1,600		150	mg/L	1	8/13/2020 02:15 PM
<b>SUBCONTRACTED ANALYSES</b>						
			<b>SUBCONTRACT</b>			Analyst: <b>ALS</b>
Subcontracted Analyses	See attached		as noted		1	9/4/2020

**Note:** See Qualifiers page for a list of qualifiers and their definitions.

**Client:** NTH Consultants, Ltd.  
**Work Order:** 20080708  
**Project:** Holland Board of Public Works

**QC BATCH REPORT**

Batch ID: **161484** Instrument ID **HG4** Method: **SW7470A**

<b>MBLK</b>		Sample ID: <b>MBLK-161484-161484</b>				Units: <b>mg/L</b>		Analysis Date: <b>8/12/2020 01:28 PM</b>		
Client ID:		Run ID: <b>HG4_200812A</b>				SeqNo: <b>6630236</b>		Prep Date: <b>8/12/2020</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Mercury ND 0.00020

<b>LCS</b>		Sample ID: <b>LCS-161484-161484</b>				Units: <b>mg/L</b>		Analysis Date: <b>8/12/2020 01:30 PM</b>		
Client ID:		Run ID: <b>HG4_200812A</b>				SeqNo: <b>6630237</b>		Prep Date: <b>8/12/2020</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Mercury 0.002115 0.00020 0.002 0 106 80-120 0

<b>MS</b>		Sample ID: <b>20080708-02AMS</b>				Units: <b>mg/L</b>		Analysis Date: <b>8/12/2020 01:51 PM</b>		
Client ID: <b>MW-2</b>		Run ID: <b>HG4_200812A</b>				SeqNo: <b>6630249</b>		Prep Date: <b>8/12/2020</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Mercury 0.00207 0.00020 0.002 0.0000015 103 75-125 0

<b>MSD</b>		Sample ID: <b>20080708-02AMSD</b>				Units: <b>mg/L</b>		Analysis Date: <b>8/12/2020 01:53 PM</b>		
Client ID: <b>MW-2</b>		Run ID: <b>HG4_200812A</b>				SeqNo: <b>6630250</b>		Prep Date: <b>8/12/2020</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Mercury 0.002085 0.00020 0.002 0.0000015 104 75-125 0.00207 0.722 20

The following samples were analyzed in this batch:

20080708-01A 20080708-02A

Client: NTH Consultants, Ltd.  
 Work Order: 20080708  
 Project: Holland Board of Public Works

# QC BATCH REPORT

Batch ID: **161552** Instrument ID **HG4** Method: **SW7470A**

<b>MBLK</b>		Sample ID: <b>MBLK-161552-161552</b>				Units: <b>mg/L</b>		Analysis Date: <b>8/13/2020 01:46 PM</b>		
Client ID:		Run ID: <b>HG4_200813A</b>				SeqNo: <b>6634238</b>		Prep Date: <b>8/13/2020</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Mercury ND 0.00020

<b>LCS</b>		Sample ID: <b>LCS-161552-161552</b>				Units: <b>mg/L</b>		Analysis Date: <b>8/13/2020 01:48 PM</b>		
Client ID:		Run ID: <b>HG4_200813A</b>				SeqNo: <b>6634239</b>		Prep Date: <b>8/13/2020</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Mercury 0.00207 0.00020 0.002 0 104 80-120 0

<b>MS</b>		Sample ID: <b>20080781-03BMS</b>				Units: <b>mg/L</b>		Analysis Date: <b>8/13/2020 02:22 PM</b>		
Client ID:		Run ID: <b>HG4_200813A</b>				SeqNo: <b>6634258</b>		Prep Date: <b>8/13/2020</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Mercury 0.003885 0.00020 0.002 0.001755 106 75-125 0

<b>MSD</b>		Sample ID: <b>20080781-03BMSD</b>				Units: <b>mg/L</b>		Analysis Date: <b>8/13/2020 02:23 PM</b>		
Client ID:		Run ID: <b>HG4_200813A</b>				SeqNo: <b>6634259</b>		Prep Date: <b>8/13/2020</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Mercury 0.00387 0.00020 0.002 0.001755 106 75-125 0.003885 0.387 20

The following samples were analyzed in this batch:

20080708-03A	20080708-04A	20080708-05A
20080708-06A	20080708-07A	20080708-08A

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: NTH Consultants, Ltd.  
 Work Order: 20080708  
 Project: Holland Board of Public Works

## QC BATCH REPORT

Batch ID: **162899** Instrument ID **ICPMS3** Method: **SW6020B**

MBLK				Sample ID: MBLK-162899-162899				Units: mg/L		Analysis Date: 8/20/2020 03:07 PM		
Client ID:			Run ID: ICPMS3_200820A			SeqNo: 6649372		Prep Date: 8/20/2020		DF: 1		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual		
Antimony	ND	0.0050										
Arsenic	ND	0.0050										
Barium	ND	0.0050										
Boron	0.01528	0.020								J		
Cadmium	ND	0.0020										
Calcium	ND	0.50										
Chromium	ND	0.0050										
Cobalt	ND	0.0050										
Lead	ND	0.0050										
Lithium	ND	0.010										
Molybdenum	ND	0.0050										
Selenium	ND	0.0050										
Thallium	ND	0.0050										

MBLK		Sample ID: MBLK-162899-162899				Units: mg/L		Analysis Date: 8/21/2020 03:00 PM		
Client ID:		Run ID: ICPMS3_200821A				SeqNo: 6652422		Prep Date: 8/20/2020		DF: 1
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Beryllium	ND	0.0020								

LCS				Sample ID: LCS-162899-162899			Units: mg/L		Analysis Date: 8/20/2020 03:08 PM		
Client ID:		Run ID: ICPMS3_200820A			SeqNo: 6649373		Prep Date: 8/20/2020		DF: 1		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Antimony	0.1042	0.0050	0.1	0	104	80-120	0				
Arsenic	0.09688	0.0050	0.1	0	96.9	80-120	0				
Barium	0.09955	0.0050	0.1	0	99.6	80-120	0				
Boron	0.5054	0.020	0.5	0	101	80-120	0				
Cadmium	0.1037	0.0020	0.1	0	104	80-120	0				
Calcium	10.36	0.50	10	0	104	80-120	0				
Chromium	0.1021	0.0050	0.1	0	102	80-120	0				
Cobalt	0.1032	0.0050	0.1	0	103	80-120	0				
Lead	0.1015	0.0050	0.1	0	101	80-120	0				
Lithium	0.09334	0.010	0.1	0	93.3	80-120	0				
Molybdenum	0.09912	0.0050	0.1	0	99.1	80-120	0				
Selenium	0.09904	0.0050	0.1	0	99	80-120	0				
Thallium	0.09549	0.0050	0.1	0	95.5	80-120	0				

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

**Client:** NTH Consultants, Ltd.  
**Work Order:** 20080708  
**Project:** Holland Board of Public Works

## QC BATCH REPORT

Batch ID: **162899** Instrument ID **ICPMS3** Method: **SW6020B**

MS					Sample ID: 20080708-02AMS		Units: mg/L		Analysis Date: 8/20/2020 03:13 PM		
Client ID: MW-2			Run ID: ICPMS3_200820A			SeqNo: 6649376		Prep Date: 8/20/2020		DF: 1	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Antimony	0.1086	0.0050	0.1	0.0000528	109	75-125		0			
Arsenic	0.107	0.0050	0.1	0.002669	104	75-125		0			
Barium	0.3062	0.0050	0.1	0.2095	96.8	75-125		0			
Boron	1.239	0.020	0.5	0.7665	94.5	75-125		0			
Cadmium	0.1082	0.0020	0.1	-0.000033	108	75-125		0			
Calcium	82.55	0.50	10	75.02	75.3	75-125		0		O	
Chromium	0.1064	0.0050	0.1	0.001461	105	75-125		0			
Cobalt	0.1076	0.0050	0.1	0.0004807	107	75-125		0			
Lead	0.1088	0.0050	0.1	0.0001419	109	75-125		0			
Lithium	0.1073	0.010	0.1	0.01028	97	75-125		0			
Molybdenum	0.1055	0.0050	0.1	-0.0000033	106	75-125		0			
Selenium	0.1035	0.0050	0.1	0.0005764	103	75-125		0			
Thallium	0.1022	0.0050	0.1	0.0000154	102	75-125		0			

MS				Sample ID: 20080708-02AMS				Units: mg/L		Analysis Date: 8/21/2020 03:06 PM		
Client ID: MW-2				Run ID: ICPMS3_200821A				SeqNo: 6652426		Prep Date: 8/20/2020		DF: 1
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual		
Beryllium	0.1078	0.0020	0.1	0.0000286	108	75-125	0					

MSD					Sample ID: 20080708-02AMSD		Units: mg/L		Analysis Date: 8/20/2020 03:15 PM		
Client ID: MW-2			Run ID: ICPMS3_200820A			SeqNo: 6649377		Prep Date: 8/20/2020		DF: 1	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Antimony	0.1099	0.0050	0.1	0.0000528	110	75-125	0.1086	1.26	20		
Arsenic	0.1076	0.0050	0.1	0.002669	105	75-125	0.107	0.554	20		
Barium	0.3077	0.0050	0.1	0.2095	98.2	75-125	0.3062	0.465	20		
Boron	1.236	0.020	0.5	0.7665	94	75-125	1.239	0.195	20		
Cadmium	0.1091	0.0020	0.1	-0.000033	109	75-125	0.1082	0.835	20		
Calcium	81.86	0.50	10	75.02	68.4	75-125	82.55	0.84	20	SO	
Chromium	0.1073	0.0050	0.1	0.001461	106	75-125	0.1064	0.903	20		
Cobalt	0.1084	0.0050	0.1	0.0004807	108	75-125	0.1076	0.794	20		
Lead	0.1087	0.0050	0.1	0.0001419	109	75-125	0.1088	0.0607	20		
Lithium	0.1079	0.010	0.1	0.01028	97.6	75-125	0.1073	0.579	20		
Molybdenum	0.1074	0.0050	0.1	-0.0000033	107	75-125	0.1055	1.75	20		
Selenium	0.1016	0.0050	0.1	0.0005764	101	75-125	0.1035	1.81	20		
Thallium	0.1032	0.0050	0.1	0.0000154	103	75-125	0.1022	0.978	20		

**Note:** See Qualifiers Page for a list of Qualifiers and their explanation.

**Client:** NTH Consultants, Ltd.  
**Work Order:** 20080708  
**Project:** Holland Board of Public Works

## QC BATCH REPORT

Batch ID: **162899** Instrument ID **ICPMS3** Method: **SW6020B**

MSD				Sample ID: 20080708-02AMSD				Units: mg/L		Analysis Date: 8/21/2020 03:08 PM	
Client ID: MW-2			Run ID: ICPMS3_200821A			SeqNo: 6652427		Prep Date: 8/20/2020		DF: 1	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Beryllium	0.1112	0.0020	0.1	0.0000286	111	75-125	0.1078	3.11	20		

The following samples were analyzed in this batch:

20080708-01A	20080708-02A	20080708-03A
20080708-04A	20080708-05A	20080708-06A
20080708-07A	20080708-08A	

**Note:** See Qualifiers Page for a list of Qualifiers and their explanation.



Client: NTH Consultants, Ltd.  
 Work Order: 20080708  
 Project: Holland Board of Public Works

## QC BATCH REPORT

Batch ID: **161500** Instrument ID **TDS** Method: **A2540 C-11**

<b>MBLK</b>		Sample ID: <b>MBLK-161500-161500</b>				Units: <b>mg/L</b>		Analysis Date: <b>8/13/2020 02:15 PM</b>		
Client ID:		Run ID: <b>TDS_200813B</b>				SeqNo: <b>6632659</b>		Prep Date: <b>8/12/2020</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids	ND	30								

<b>LCS</b>		Sample ID: <b>LCS-161500-161500</b>				Units: <b>mg/L</b>		Analysis Date: <b>8/13/2020 02:15 PM</b>		
Client ID:		Run ID: <b>TDS_200813B</b>				SeqNo: <b>6632658</b>		Prep Date: <b>8/12/2020</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids	474	30	495	0	95.8	85-109	0			

<b>DUP</b>		Sample ID: <b>20080708-02B DUP</b>				Units: <b>mg/L</b>		Analysis Date: <b>8/13/2020 02:15 PM</b>		
Client ID: <b>MW-2</b>		Run ID: <b>TDS_200813B</b>				SeqNo: <b>6632642</b>		Prep Date: <b>8/12/2020</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids	1410	75	0	0	0	0-0	1385	1.79	10	

<b>DUP</b>		Sample ID: <b>20080746-01A DUP</b>				Units: <b>mg/L</b>		Analysis Date: <b>8/13/2020 02:15 PM</b>		
Client ID:		Run ID: <b>TDS_200813B</b>				SeqNo: <b>6632655</b>		Prep Date: <b>8/12/2020</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids	253.3	50	0	0	0	0-0	253.3	0	10	

The following samples were analyzed in this batch:

20080708-01B	20080708-02B	20080708-03B
20080708-04B	20080708-05B	20080708-06B
20080708-07B	20080708-08B	

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

**Client:** NTH Consultants, Ltd.  
**Work Order:** 20080708  
**Project:** Holland Board of Public Works

## QC BATCH REPORT

Batch ID: **R295823** Instrument ID **IC4** Method: **E300.0**

MBLK Sample ID: <b>CCB/MBLK-R295823</b>				Units: <b>mg/L</b>		Analysis Date: <b>8/11/2020 11:54 AM</b>				
Client ID:		Run ID: <b>IC4_200811A</b>		SeqNo: <b>6628065</b>		Prep Date:		DF: <b>1</b>		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	ND	1.0								
Fluoride	ND	0.10								
Sulfate	ND	1.0								

LCS Sample ID: <b>LCS-R295823</b>				Units: <b>mg/L</b>		Analysis Date: <b>8/11/2020 12:13 PM</b>				
Client ID:		Run ID: <b>IC4_200811A</b>		SeqNo: <b>6628067</b>		Prep Date:		DF: <b>1</b>		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	9.393	1.0	10	0	93.9	90-110	0			
Fluoride	1.857	0.10	2	0	92.9	90-110	0			
Sulfate	9.484	1.0	10	0	94.8	90-110	0			

MS Sample ID: <b>20080708-02B MS</b>				Units: <b>mg/L</b>		Analysis Date: <b>8/11/2020 04:41 PM</b>				
Client ID: <b>MW-2</b>		Run ID: <b>IC4_200811A</b>		SeqNo: <b>6628087</b>		Prep Date:		DF: <b>80</b>		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	1457	80	800	681.5	97	80-120	0			
Fluoride	170.5	8.0	160	0	107	80-120	0			
Sulfate	774.5	80	800	0	96.8	80-120	0			

MSD Sample ID: <b>20080708-02B MSD</b>				Units: <b>mg/L</b>		Analysis Date: <b>8/11/2020 05:01 PM</b>				
Client ID: <b>MW-2</b>		Run ID: <b>IC4_200811A</b>		SeqNo: <b>6628088</b>		Prep Date:		DF: <b>80</b>		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	1456	80	800	681.5	96.8	80-120	1457	0.122	20	
Fluoride	166.5	8.0	160	0	104	80-120	170.5	2.35	20	
Sulfate	772.9	80	800	0	96.6	80-120	774.5	0.207	20	

The following samples were analyzed in this batch:

20080708-01B	20080708-02B	20080708-03B
20080708-04B	20080708-05B	20080708-06B
20080708-07B	20080708-08B	

**Note:** See Qualifiers Page for a list of Qualifiers and their explanation.

Client: NTH Consultants, Ltd.  
 Work Order: 20080708  
 Project: Holland Board of Public Works

## QC BATCH REPORT

Batch ID: **R295863** Instrument ID **Titration 1** Method: **A4500-H B-11**

<b>LCS</b>		Sample ID: <b>LCS-R295863-R295863</b>				Units: <b>s.u.</b>		Analysis Date: <b>8/12/2020 02:01 PM</b>		
Client ID:		Run ID: <b>TITRATOR 1_200812B</b>				SeqNo: <b>6629470</b>		Prep Date:		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
pH (laboratory)	3.97	0.10	4	0	99.2	92-108	0			

<b>LCS</b>		Sample ID: <b>LCS-R295863-R295863</b>				Units: <b>s.u.</b>		Analysis Date: <b>8/12/2020 02:01 PM</b>		
Client ID:		Run ID: <b>TITRATOR 1_200812B</b>				SeqNo: <b>6629492</b>		Prep Date:		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
pH (laboratory)	3.97	0.10	4	0	99.2	92-108	0			

<b>DUP</b>		Sample ID: <b>20080708-02B DUP</b>				Units: <b>s.u.</b>		Analysis Date: <b>8/12/2020 02:01 PM</b>		
Client ID: <b>MW-2</b>		Run ID: <b>TITRATOR 1_200812B</b>				SeqNo: <b>6629473</b>		Prep Date:		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
pH (laboratory)	6.91	0.10	0	0	0	0-0	6.9	0.145	5	H
Temperature	20.89	0.10	0	0	0	0-0	20.78	0.528		H

<b>DUP</b>		Sample ID: <b>20080735-02A DUP</b>				Units: <b>s.u.</b>		Analysis Date: <b>8/12/2020 02:01 PM</b>		
Client ID:		Run ID: <b>TITRATOR 1_200812B</b>				SeqNo: <b>6629484</b>		Prep Date:		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
pH (laboratory)	8.16	0.10	0	0	0	0-0	8.1	0.738	5	H
Temperature	21.22	0.10	0	0	0	0-0	21.14	0.378		H

The following samples were analyzed in this batch:

20080708-01B	20080708-02B	20080708-03B
20080708-04B	20080708-05B	20080708-06B
20080708-07B	20080708-08B	

Note: See Qualifiers Page for a list of Qualifiers and their explanation.



Cincinnati, OH  
+1 513 733 5336

Fort Collins, CO  
+1 970 490 1511

Everett, WA  
+1 425 356 2600

Holland, MI  
+1 616 399 6070

# Chain of Custody Form

Houston, TX  
+1 281 530 5656

Spring City, PA  
+1 610 948 4903

Middletown, PA  
+1 717 944 5541

Salt Lake City, UT  
+1 801 266 7700

South Charleston, WV  
+1 304 356 3168

York, PA  
+1 717 505 5280

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COC ID: 223285

Customer Information		Project Information		Parameter/Method Request for Analysis																
Purchase Order		Project Name	HBPW James Deyang PP	A	Metals including Hg															
Work Order		Project Number	73-160017-06	B	Chloride, Fluoride, Sulfate															
Company Name	NTH Consultants, Ltd.	Bill To Company	Holland Board of Public Works	C	pH															
Send Report To	Karen Okonta	Invoice Attn	Accounts Payable	D	TDS															
Address	41780 Six Mile Road	Address	625 Hastings	E	Radium 226 & 228															
				F																
City/State/Zip	Northville, MI 48168	City/State/Zip	Holland, MI 49423	G																
Phone	(248) 662-2668	Phone	(616) 355-1210	H																
Fax	(248) 324-6305	Fax		I																
e-Mail Address		e-Mail Address		J																

No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1	MW-1	8-10-2020	3:06pm	GW	2												
2	MW-2	8-10-2020	1:51pm	GW	2												
3	MW-3	8-10-2020	12:38pm	GW	2												
4	MW-3A	8-10-2020	5:12pm	GW	2												
5	MS-MW-2	8-10-2020	1:51pm	GW	2												
6	MSD-MW-2	8-10-2020	1:51pm	GW	2												
7	Field blank	8-10-2020	4:07pm	GW	2												
8	equipment blank	8-10-2020	4:15pm	GW	2												
9	Dup-1 (field dup)	8-10-2020	-	GW	2												
10	P2-1	8-10-2020	9:40am	GW	2												

Sampler(s) Please Print & Sign Brittany Stachkuns		Shipment Method drop-off		Required Turnaround Time: (Check Box) <input checked="" type="checkbox"/> Std 10 Wk Days <input type="checkbox"/> 5 Wk Days <input type="checkbox"/> Other <input type="checkbox"/> 2 Wk Days <input type="checkbox"/> 24 Hour				Results Due Date:	
Relinquished by:	Date:	Time:	Received by:	Notes:					
Relinquished by:	Date: 8/11/20	Time: 0800	Received by (Laboratory):	Cooler ID: IR3 Cooler Temp: 1.8°C					
Logged by (Laboratory):	Date:	Time:	Checked by (Laboratory):	QC Package: (Check One Box Below) <input type="checkbox"/> Level II Std QC <input type="checkbox"/> TRRP CheckList <input type="checkbox"/> Level III Std QC/Raw Data <input type="checkbox"/> TRRP Level IV <input type="checkbox"/> Level IV SW846/CLP <input type="checkbox"/> Other					
Preservative Key: 1-HCl 2-HNO <sub>3</sub> 3-H <sub>2</sub> SO <sub>4</sub> 4-NaOH 5-Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> 6-NaHSO <sub>4</sub> 7-Other 8-4°C 9-5035									

Note: 1. Any changes must be made in writing once samples and COC Form have been submitted to ALS Environmental.  
2. Unless otherwise agreed in a formal contract, services provided by ALS Environmental are expressly limited to the terms and conditions stated on the reverse.  
3. The Chain of Custody is a legal document. All information must be completed accurately.

Copyright 2011 by ALS Environmental.

Sample Receipt Checklist

Client Name: **NTH - NORTHVILLE**

Date/Time Received: **11-Aug-20 08:00**

Work Order: **20080708**

Received by: **KRW**

Checklist completed by **Keith Wierenga**

11-Aug-20

Reviewed by: **Chad Whelton**

11-Aug-20

eSignature

Date

eSignature

Date

Matrices: **Water**

Carrier name: **Client**

Shipping container/cooler in good condition?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	Not Present <input type="checkbox"/>
Custody seals intact on shipping container/cooler?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Not Present <input checked="" type="checkbox"/>
Custody seals intact on sample bottles?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Not Present <input checked="" type="checkbox"/>
Chain of custody present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Chain of custody signed when relinquished and received?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	
Chain of custody agrees with sample labels?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Samples in proper container/bottle?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Sample containers intact?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Sufficient sample volume for indicated test?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
All samples received within holding time?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Container/Temp Blank temperature in compliance?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Sample(s) received on ice?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Temperature(s)/Thermometer(s):	<u>1.8/2.8, 1.7/2.7, 1.4/2.4 C</u>		<u>IR3</u>
Cooler(s)/Kit(s):	<u></u>		
Date/Time sample(s) sent to storage:	<u>8/11/2020 9:38:31 AM</u>		
Water - VOA vials have zero headspace?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	No VOA vials submitted <input checked="" type="checkbox"/>
Water - pH acceptable upon receipt?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	N/A <input type="checkbox"/>
pH adjusted?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	N/A <input type="checkbox"/>
pH adjusted by:	<u>-</u>		

Login Notes: **Three Coolers**

Client Contacted:

Date Contacted:

Person Contacted:

Contacted By:

Regarding:

Comments:

CorrectiveAction:



Friday, September 04, 2020

Chad Whelton  
ALS Environmental  
3352 128th Avenue  
Holland, MI 49424

Re: ALS Workorder: 2008277  
Project Name:  
Project Number: 20080708

Dear Mr. Whelton:

Eight water samples were received from ALS Environmental, on 8/12/2020. The samples were scheduled for the following analyses:

Radium-226

Radium-228

The results for these analyses are contained in the enclosed reports.

The data contained in the following report have been reviewed and approved by the personnel listed below. In addition, ALS certifies that the analyses reported herein are true, complete and correct within the limits of the methods employed. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained from ALS Environmental.

Thank you for your confidence in ALS Environmental. Should you have any questions, please call.

Sincerely,



ALS Environmental  
Jeff R. Kujawa  
Project Manager

ALS Environmental – Fort Collins is accredited by the following accreditation bodies for various testing scopes in accordance with requirements of each accreditation body. All testing is performed under the laboratory management system, which is maintained to meet these requirement and regulations. Please contact the laboratory or accreditation body for the current scope testing parameters.

ALS Environmental – Fort Collins	
Accreditation Body	License or Certification Number
AIHA	214884
Alaska (AK)	UST-086
Alaska (AK)	CO01099
Arizona (AZ)	AZ0742
California (CA)	06251CA
Colorado (CO)	CO01099
Florida (FL)	E87914
Idaho (ID)	CO01099
Kansas (KS)	E-10381
Kentucky (KY)	90137
PJ-LA (DoD ELAP/ISO 170250)	95377
Louisiana (LA)	05057
Maryland (MD)	285
Missouri (MO)	175
Nebraska(NE)	NE-OS-24-13
Nevada (NV)	CO000782008A
New York (NY)	12036
North Dakota (ND)	R-057
Oklahoma (OK)	1301
Pennsylvania (PA)	68-03116
Tennessee (TN)	2976
Texas (TX)	T104704241
Utah (UT)	CO01099
Washington (WA)	C1280





**2008277**

**Radium-228:**

The samples were analyzed for the presence of  $^{228}\text{Ra}$  by low background gas flow proportional counting of  $^{228}\text{Ac}$ , which is the ingrown progeny of  $^{228}\text{Ra}$ , according to the current revision of SOP 724.

All acceptance criteria were met.

**Radium-226:**

The samples were prepared and analyzed according to the current revision of SOP 783.

All acceptance criteria were met.

# ALS -- Fort Collins

## Sample Number(s) Cross-Reference Table

---

**OrderNum:** 2008277

**Client Name:** ALS Environmental

**Client Project Name:**

**Client Project Number:** 20080708

**Client PO Number:** 20-122019844

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Client Sample Number	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
MW-1	2008277-1		WATER	10-Aug-20	15:06
MW-3	2008277-2		WATER	10-Aug-20	12:38
MW-3A	2008277-3		WATER	10-Aug-20	17:12
Field Blank	2008277-4		WATER	10-Aug-20	16:07
Equipment Blank	2008277-5		WATER	10-Aug-20	16:15
DUP-1 (Field Dup)	2008277-6		WATER	10-Aug-20	
PZ-1	2008277-7		WATER	10-Aug-20	9:40
MW-2	2008277-8		WATER	10-Aug-20	13:51

**Subcontractor:**

ALS Environmental, Fort Collins  
225 Commerce Dr.

TEL: (800) 443-1511

FAX:

Fort Collins, CO 80524

Acct #:

**CHAIN-OF-CUSTODY RECORD**

Page 1 of 1

Date: **11-Aug-20**

COC ID: **14448**

Due Date: **01-Sep-20**

**#2008277 #**

Salesperson **ALSHN Account**

Customer Information		Project Information		Parameter/Method Request for Analysis	
Purchase Order		Project Name	20080708	A Subcontracted Analyses (SUBCONTRACT) <i>Radium 226/228</i>	
Work Order		Project Number		B <i>MS/MSD</i>	
Company Name	ALS Group USA, Corp	Bill To Company	ALS Group USA, Corp	C	
Send Report To	Chad Whelton	Inv Attn	Accounts Payable	D	
Address	3352 128th Ave	Address	3352 128th Ave	E	
				F	
City/State/Zip	Holland, Michigan 49424	City/State/Zip	Holland, Michigan 49424	G	
Phone	(616) 399-6070	Phone	(616) 399-6070	H	
Fax	(616) 399-6185	Fax	(616) 399-6185	I	
eMail Address	chad.whelton@alsglobal.com	eMail CC		J	

ALS Sample ID	Client Sample ID	Matrix	Collection Date 24hr	Bottle	A	B	C	D	E	F	G	H	I	J
1 20080708-01C	MW-1	Groundwater	10/Aug/2020 15:06	(2) 1LPHNO3	X									
2 20080708-03C	MW-3	Groundwater	10/Aug/2020 12:38	(2) 1LPHNO3	X									
3 20080708-04C	MW-3A	Groundwater	10/Aug/2020 17:12	(2) 1LPHNO3	X									
4 20080708-05C	Field Blank	Groundwater	10/Aug/2020 16:07	(2) 1LPHNO3	X									
5 20080708-06C	Equipment Blank	Groundwater	10/Aug/2020 16:15	(2) 1LPHNO3	X									
6 20080708-07C	DUP-1 (Field DUP)	Groundwater	10/Aug/2020	(2) 1LPHNO3	X									
7 20080708-08C	PZ-1	Groundwater	10/Aug/2020 9:40	(2) 1LPHNO3	X									
8 20080708-02C	MW-2	Groundwater	10/Aug/2020 13:51	(6) 1LPHNO3	X	X								

**Comments:**

Please analyze these samples per our instructions and indicated turnaround requirements. Please include all QC with data. The samples do not need to be returned and can be disposed after 30 days.

Relinquished by:

Date/Time

*8-11-20 1430*

Received by:

*EMILY LYONS*

Date/Time

*AUG 12 2020 1000*

Cooler IDs

Report/QC Level

**Std**

Relinquished by:

Date/Time

Received by:

Date/Time



ALS Environmental - Fort Collins  
CONDITION OF SAMPLE UPON RECEIPT FORM

Client Name/ID:

ALS\_MI

Workorder No:

2008277

Project Manager:

JRK

Initials:

ERL

Date:

08.13.20

1. Are airbills / shipping documents present and/or removable?	<input type="checkbox"/> Drop Off	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
2. Are custody seals on shipping containers intact?	<input checked="" type="checkbox"/> NONE	<input type="checkbox"/> YES	<input type="checkbox"/> NO*
3. Are custody seals on sample containers intact?	<input checked="" type="checkbox"/> NONE	<input type="checkbox"/> YES	<input type="checkbox"/> NO*
4. Is there a COC (chain-of-custody) present?	<input checked="" type="checkbox"/>	<input type="checkbox"/> YES	<input type="checkbox"/> NO*
5. Is the COC in agreement with samples received? (IDs, dates, times, # of samples, # of containers, matrix, requested analyses, etc.)	<input checked="" type="checkbox"/>	<input type="checkbox"/> YES	<input type="checkbox"/> NO*
6. Are short-hold samples present?	<input type="checkbox"/>	<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO
7. Are all samples within holding times for the requested analyses?	<input checked="" type="checkbox"/>	<input type="checkbox"/> YES	<input type="checkbox"/> NO*
8. Were all sample containers received intact? (not broken or leaking)	<input checked="" type="checkbox"/>	<input type="checkbox"/> YES	<input type="checkbox"/> NO*
9. Is there sufficient sample for the requested analyses?	<input checked="" type="checkbox"/>	<input type="checkbox"/> YES	<input type="checkbox"/> NO*
10. Are samples in proper containers for requested analyses? (form 250, Sample Handling Guidelines)	<input checked="" type="checkbox"/>	<input type="checkbox"/> YES	<input type="checkbox"/> NO*
11. Are all aqueous samples preserved correctly, if required?	<input type="checkbox"/> N/A	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO*
12. Were unpreserved samples pH checked, if required?	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> YES	<input type="checkbox"/> NO
13. Are all samples requiring no headspace (VOC, GRO, RSK/MEE, radon) free of bubbles > 6 mm in diameter?	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> YES	<input type="checkbox"/> NO
14. Were the samples shipped on ice?	<input type="checkbox"/>	<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO
15. Were cooler temperatures measured at 0.1 - 6.0°C?	IR gun used: <input type="checkbox"/> #3 <input type="checkbox"/> #5	<input checked="" type="checkbox"/> Rad Only	<input type="checkbox"/> YES <input type="checkbox"/> NO

Cooler #:	1	2
Temperature (°C):	Amb	Amb
# of custody seals on cooler:	0	0
External mR/hr reading:	9	10
Background mR/hr reading:	11	
Were external mR/hr readings ≤ two times background and within DOT acceptance criteria? (If no, see Form 008)		
<input checked="" type="checkbox"/> N/A <input type="checkbox"/> YES <input type="checkbox"/> NO		

\* Please provide details below for 'NO' responses in gray boxes above - for 2 thru 5 & 7 thru 12, notify PM & continue w/ login.

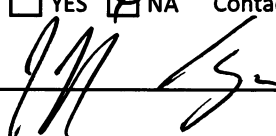
All client bottle ID's vs ALS lab ID's double-checked by: ERL

If applicable, was the client contacted? ☐ YES ☒ NA

Contact Name:

Date:

Project Manager Signature / Date:

 8-13-20



Client: ALS Environmental

Date: 04-Sep-20

Project: 20080708

Work Order: 2008277

Sample ID: MW-1

Lab ID: 2008277-1

Legal Location:

Matrix: WATER

Collection Date: 8/10/2020 15:06

Percent Moisture:

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
<b>Radium-226 by Radon Emanation - Method 903.1</b>						
<b>Ra-226</b>	<b>0.33 (+/- 0.21)</b>		<b>SOP 783</b>		Prep Date: <b>8/19/2020</b>	PrepBy: <b>TRW</b>
<i>Carr: BARIUM</i>	<i>90.9</i>		<i>0.19</i>	<i>pCi/l</i>	NA	8/31/2020 11:32
			<i>40-110</i>	<i>%REC</i>	DL = NA	8/31/2020 11:32
<b>Radium-228 Analysis by GFPC</b>						
<b>Ra-228</b>	<b>ND (+/- 0.44)</b>	<b>U</b>	<b>SOP 724</b>		Prep Date: <b>8/27/2020</b>	PrepBy: <b>RGS</b>
<i>Carr: BARIUM</i>	<i>73.1</i>		<i>0.92</i>	<i>pCi/l</i>	NA	9/3/2020 08:16
			<i>40-110</i>	<i>%REC</i>	DL = NA	9/3/2020 08:16

Client: ALS Environmental

Date: 04-Sep-20

Project: 20080708

Work Order: 2008277

Sample ID: MW-3

Lab ID: 2008277-2

Legal Location:

Matrix: WATER

Collection Date: 8/10/2020 12:38

Percent Moisture:

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
<b>Radium-226 by Radon Emanation - Method 903.1</b>						
			<b>SOP 783</b>		Prep Date: <b>8/19/2020</b>	PrepBy: <b>TRW</b>
Ra-226	ND (+/- 0.14)	U	0.26	pCi/l	NA	8/31/2020 11:32
Carr: BARIUM	98.1		40-110	%REC	DL = NA	8/31/2020 11:32
<b>Radium-228 Analysis by GFPC</b>						
			<b>SOP 724</b>		Prep Date: <b>8/27/2020</b>	PrepBy: <b>RGS</b>
Ra-228	ND (+/- 0.33)	U	0.72	pCi/l	NA	9/3/2020 08:16
Carr: BARIUM	96.7		40-110	%REC	DL = NA	9/3/2020 08:16



Client: ALS Environmental

Date: 04-Sep-20

Project: 20080708

Work Order: 2008277

Sample ID: MW-3A

Lab ID: 2008277-3

Legal Location:

Matrix: WATER

Collection Date: 8/10/2020 17:12

Percent Moisture:

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
<b>Radium-226 by Radon Emanation - Method 903.1</b>						
			<b>SOP 783</b>	Prep Date: <b>8/19/2020</b>		PrepBy: <b>TRW</b>
Ra-226	ND (+/- 0.18)	U	0.31	pCi/l	NA	8/31/2020 11:32
Carr: <i>BARIUM</i>	98.4		40-110	%REC	DL = NA	8/31/2020 11:32
<b>Radium-228 Analysis by GFPC</b>						
			<b>SOP 724</b>	Prep Date: <b>8/27/2020</b>		PrepBy: <b>RGS</b>
Ra-228	ND (+/- 0.35)	U	0.68	pCi/l	NA	9/3/2020 08:16
Carr: <i>BARIUM</i>	95.9		40-110	%REC	DL = NA	9/3/2020 08:16

Client: ALS Environmental

Date: 04-Sep-20

Project: 20080708

Work Order: 2008277

Sample ID: Field Blank

Lab ID: 2008277-4

Legal Location:

Matrix: WATER

Collection Date: 8/10/2020 16:07

Percent Moisture:

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
<b>Radium-226 by Radon Emanation - Method 903.1</b>						
			<b>SOP 783</b>		Prep Date: <b>8/19/2020</b>	PrepBy: <b>TRW</b>
Ra-226	ND (+/- 0.29)	U	0.48	pCi/l	NA	8/31/2020 11:32
Carr: BARIUM	95.3		40-110	%REC	DL = NA	8/31/2020 11:32
<b>Radium-228 Analysis by GFPC</b>						
			<b>SOP 724</b>		Prep Date: <b>8/27/2020</b>	PrepBy: <b>RGS</b>
Ra-228	ND (+/- 0.42)	U	0.98	pCi/l	NA	9/3/2020 08:16
Carr: BARIUM	97.7		40-110	%REC	DL = NA	9/3/2020 08:16

Client: ALS Environmental

Date: 04-Sep-20

Project: 20080708

Work Order: 2008277

Sample ID: Equipment Blank

Lab ID: 2008277-5

Legal Location:

Matrix: WATER

Collection Date: 8/10/2020 16:15

Percent Moisture:

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
<b>Radium-226 by Radon Emanation - Method 903.1</b>						
			<b>SOP 783</b>	Prep Date: <b>8/19/2020</b>		PrepBy: <b>TRW</b>
Ra-226	ND (+/- 0.17)	U	0.38	pCi/l	NA	8/31/2020 11:32
Carr: BARIUM	98.1		40-110	%REC	DL = NA	8/31/2020 11:32
<b>Radium-228 Analysis by GFPC</b>						
			<b>SOP 724</b>	Prep Date: <b>8/27/2020</b>		PrepBy: <b>RGS</b>
Ra-228	ND (+/- 0.52)	U,M	1.18	pCi/l	NA	9/3/2020 08:16
Carr: BARIUM	97		40-110	%REC	DL = NA	9/3/2020 08:16

Client: ALS Environmental

Date: 04-Sep-20

Project: 20080708

Work Order: 2008277

Sample ID: DUP-1 (Field Dup)

Lab ID: 2008277-6

Legal Location:

Matrix: WATER

Collection Date: 8/10/2020

Percent Moisture:

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
<b>Radium-226 by Radon Emanation - Method 903.1</b>						
			<b>SOP 783</b>		Prep Date: <b>8/19/2020</b>	PrepBy: <b>TRW</b>
Ra-226	ND (+/- 0.28)	Y1,U	0.39	pCi/l	NA	8/31/2020 11:50
Carr: BARIUM	100	Y1	40-110	%REC	DL = NA	8/31/2020 11:50
<b>Radium-228 Analysis by GFPC</b>						
			<b>SOP 724</b>		Prep Date: <b>8/27/2020</b>	PrepBy: <b>RGS</b>
Ra-228	0.93 (+/- 0.43)		0.73	pCi/l	NA	9/3/2020 08:16
Carr: BARIUM	97.1		40-110	%REC	DL = NA	9/3/2020 08:16

Client: ALS Environmental

Date: 04-Sep-20

Project: 20080708

Work Order: 2008277

Sample ID: PZ-1

Lab ID: 2008277-7

Legal Location:

Matrix: WATER

Collection Date: 8/10/2020 09:40

Percent Moisture:

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
<b>Radium-226 by Radon Emanation - Method 903.1</b>						
Ra-226	ND (+/- 0.22)	U	0.33	pCi/l	NA	8/31/2020 11:50
Carr: BARIUM	95.2		40-110	%REC	DL = NA	8/31/2020 11:50
<b>Radium-228 Analysis by GFPC</b>						
Ra-228	0.83 (+/- 0.45)		0.8	pCi/l	NA	9/3/2020 08:16
Carr: BARIUM	85		40-110	%REC	DL = NA	9/3/2020 08:16

Client: ALS Environmental

Date: 04-Sep-20

Project: 20080708

Work Order: 2008277

Sample ID: MW-2

Lab ID: 2008277-8

Legal Location:

Matrix: WATER

Collection Date: 8/10/2020 13:51

Percent Moisture:

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
<b>Radium-226 by Radon Emanation - Method 903.1</b>						
			<b>SOP 783</b>		Prep Date: <b>8/19/2020</b>	PrepBy: <b>TRW</b>
Ra-226	0.46 (+/- 0.27)	Y1	0.28	pCi/l	NA	8/31/2020 11:50
Carr: BARIUM	101	Y1	40-110	%REC	DL = NA	8/31/2020 11:50
<b>Radium-228 Analysis by GFPC</b>						
			<b>SOP 724</b>		Prep Date: <b>8/27/2020</b>	PrepBy: <b>RGS</b>
Ra-228	ND (+/- 0.39)	U	0.72	pCi/l	NA	9/3/2020 08:16
Carr: BARIUM	96.6		40-110	%REC	DL = NA	9/3/2020 08:16

Client: ALS Environmental

Date: 04-Sep-20

Project: 20080708

Work Order: 2008277

Sample ID: MW-2

Lab ID: 2008277-8

Legal Location:

Matrix: WATER

Collection Date: 8/10/2020 13:51

Percent Moisture:

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
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**Explanation of Qualifiers****Radiochemistry:**

- "Report Limit" is the MDC

U or ND - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative yield is assumed.

Y2 - Chemical Yield outside default limits.

W - DER is greater than Warning Limit of 1.42

\* - Aliquot Basis is 'As Received' while the Report Basis is 'Dry Weight'.

# - Aliquot Basis is 'Dry Weight' while the Report Basis is 'As Received'.

G - Sample density differs by more than 15% of LCS density.

D - DER is greater than Control Limit

M - Requested MDC not met.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

L - LCS Recovery below lower control limit.

H - LCS Recovery above upper control limit.

P - LCS, Matrix Spike Recovery within control limits.

N - Matrix Spike Recovery outside control limits

NC - Not Calculated for duplicate results less than 5 times MDC

B - Analyte concentration greater than MDC.

B3 - Analyte concentration greater than MDC but less than Requested MDC.

**Inorganics:**

B - Result is less than the requested reporting limit but greater than the instrument method detection limit (MDL).

U or ND - Indicates that the compound was analyzed for but not detected.

E - The reported value is estimated because of the presence of interference. An explanatory note may be included in the narrative.

M - Duplicate injection precision was not met.

N - Spiked sample recovery not within control limits. A post spike is analyzed for all ICP analyses when the matrix spike and or spike duplicate fail and the native sample concentration is less than four times the spike added concentration.

Z - Spiked recovery not within control limits. An explanatory note may be included in the narrative.

\* - Duplicate analysis (relative percent difference) not within control limits.

S - SAR value is estimated as one or more analytes used in the calculation were not detected above the detection limit.

**Organics:**

U or ND - Indicates that the compound was analyzed for but not detected.

B - Analyte is detected in the associated method blank as well as in the sample. It indicates probable blank contamination and warns the data user.

E - Analyte concentration exceeds the upper level of the calibration range.

J - Estimated value. The result is less than the reporting limit but greater than the instrument method detection limit (MDL).

A - A tentatively identified compound is a suspected aldol-condensation product.

X - The analyte was diluted below an accurate quantitation level.

\* - The spike recovery is equal to or outside the control criteria used.

+ - The relative percent difference (RPD) equals or exceeds the control criteria.

G - A pattern resembling gasoline was detected in this sample.

D - A pattern resembling diesel was detected in this sample.

M - A pattern resembling motor oil was detected in this sample.

C - A pattern resembling crude oil was detected in this sample.

4 - A pattern resembling JP-4 was detected in this sample.

5 - A pattern resembling JP-5 was detected in this sample.

H - Indicates that the fuel pattern was in the heavier end of the retention time window for the analyte of interest.

L - Indicates that the fuel pattern was in the lighter end of the retention time window for the analyte of interest.

Z - This flag indicates that a significant fraction of the reported result did not resemble the patterns of any of the following petroleum hydrocarbon products:

- gasoline
- JP-8
- diesel
- mineral spirits
- motor oil
- Stoddard solvent
- bunker C



## ALS -- Fort Collins

Date: 9/4/2020 9:54:4

Client: ALS Environmental

## QC BATCH REPORT

Work Order: 2008277

Project: 20080708

Batch ID: RE200819-2-2

Instrument ID Alpha Scin

Method: Radium-226 by Radon Emanation

DUP	Sample ID: 2008277-8				Units: pCi/l		Analysis Date: 8/31/2020 11:50				
Client ID: MW-2		Run ID: RE200819-2A				Prep Date: 8/19/2020			DF: NA		
Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226	0.3 (+/- 0.22)	0.28						0.46	0.4	2.1	Y1
Carr: BARIUM	15790		15750		100	40-110		15850			Y1

LCS	Sample ID: RE200819-2				Units: pCi/l		Analysis Date: 8/31/2020 11:50				
Client ID:	Run ID: RE200819-2A				Prep Date: 8/19/2020			DF: NA			
Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226	44 (+/- 11)	1	46.46		94.9	67-120					P,Y1
Carr: BARIUM	15900		15530		102	40-110					Y1

MB	Sample ID: RE200819-2				Units: pCi/l			Analysis Date: 8/31/2020 12:05			
Client ID:	Run ID: RE200819-2A				Prep Date: 8/19/2020			DF: NA			
Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226	ND	0.24									Y1,U
Carr: BARIUM	15910		15530		102	40-110					Y1

The following samples were analyzed in this batch:

2008277-1	2008277-2	2008277-3
2008277-4	2008277-5	2008277-6
2008277-7	2008277-8	

Client: ALS Environmental  
Work Order: 2008277  
Project: 20080708

## QC BATCH REPORT

Batch ID: RA200827-1-3 Instrument ID LB4100-C Method: Radium-228 Analysis by GFPC

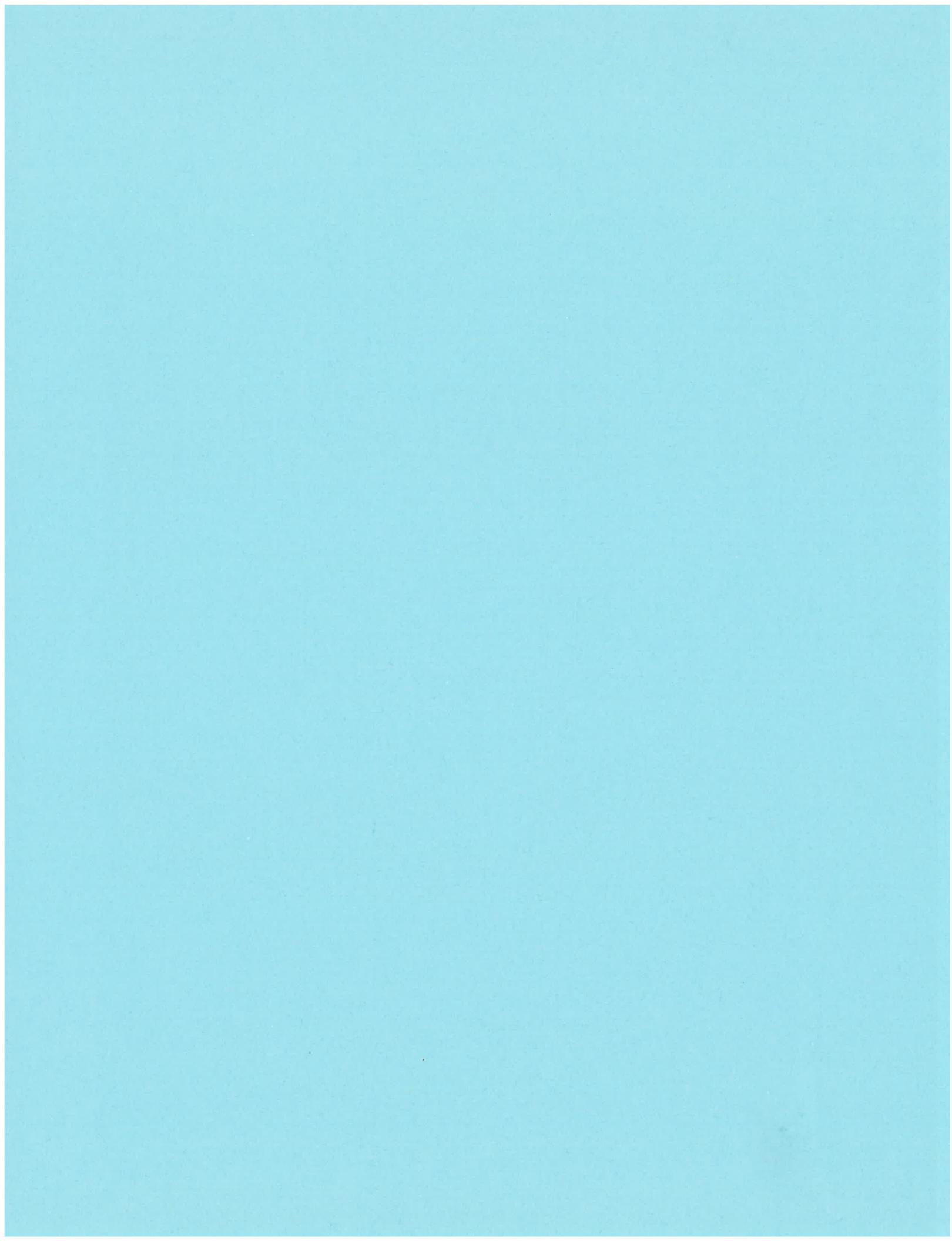
DUP	Sample ID: 2008277-8				Units: pCi/l		Analysis Date: 9/3/2020 08:16				
Client ID: MW-2		Run ID: RA200827-1A				Prep Date: 8/27/2020			DF: NA		
Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-228	1.17 (+/- 0.46)	0.71						0.63	0.9	2.1	
Carr: BARIUM	32830		33700		97.4	40-110		32520			

LCS	Sample ID: RA200827-1				Units: pCi/l		Analysis Date: 9/3/2020 08:16				
Client ID:		Run ID: RA200827-1A				Prep Date: 8/27/2020			DF: NA		
Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-228	24.3 (+/- 5.7)	0.7	23.9		102	70-130					P
Carr: BARIUM	32160		33430		96.2	40-110					

MB	Sample ID: RA200827-1				Units: pCi/l			Analysis Date: 9/3/2020 08:16			
Client ID:	Run ID: RA200827-1A				Prep Date: 8/27/2020			DF: NA			
Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-228	ND	0.7									U
Carr: BARIUM	32030		33430		95.8	40-110					

The following samples were analyzed in this batch:

2008277-1	2008277-2	2008277-3
2008277-4	2008277-5	2008277-6
2008277-7	2008277-8	





04-Sep-2020

Karen Okonta  
NTH Consultants, Ltd.  
41780 Six Mile Road  
Northville, MI 48168

Re: **Holland Board of Public Works**

Work Order: **20080710**

Dear Karen,

ALS Environmental received 1 sample on 11-Aug-2020 08:00 AM for the analyses presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental - Holland and for only the analyses requested.

Sample results are compliant with industry accepted practices and Quality Control results achieved laboratory specifications. Any exceptions are noted in the Case Narrative, or noted with qualifiers in the report or QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained from ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

The total number of pages in this report is 24.

If you have any questions regarding this report, please feel free to contact me:

ADDRESS: 3352 128th Avenue, Holland, MI, USA  
PHONE: +1 (616) 399-6070 FAX: +1 (616) 399-6185

Sincerely,

A handwritten signature in black ink, appearing to read "Chad Whelton".

Electronically approved by: Chad Whelton

Chad Whelton  
Project Manager

## Report of Laboratory Analysis

Certificate No: MN 026-999-449

ALS GROUP USA, CORP Part of the ALS Laboratory Group A Campbell Brothers Limited Company

Environmental 

[www.alsglobal.com](http://www.alsglobal.com)

RIGHT SOLUTIONS RIGHT PARTNER

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**Client:** NTH Consultants, Ltd.  
**Project:** Holland Board of Public Works  
**Work Order:** 20080710

**Work Order Sample Summary**

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<u>Lab Samp ID</u>	<u>Client Sample ID</u>	<u>Matrix</u>	<u>Tag Number</u>	<u>Collection Date</u>	<u>Date Received</u>	<u>Hold</u>
20080710-01	MW-4	Groundwater		8/10/2020 11:07	8/11/2020 08:00	<input type="checkbox"/>

---

**Client:** NTH Consultants, Ltd.  
**Project:** Holland Board of Public Works  
**Work Order:** 20080710

---

**Case Narrative**

Samples for the above noted Work Order were received on 08/11/2020. The attached "Sample Receipt Checklist" documents the status of custody seals, container integrity, preservation, and temperature compliance.

Samples were analyzed according to the analytical methodology previously transmitted in the "Work Order Acknowledgement". Methodologies are also documented in the "Analytical Result" section for each sample. Quality control results are listed in the "QC Report" section. Sample association for the reported quality control is located at the end of each batch summary. If applicable, results are appropriately qualified in the Analytical Result and QC Report sections. The "Qualifiers" section documents the various qualifiers, units, and acronyms utilized in reporting. A copy of the laboratory's scope of accreditation is available upon request.

With the following exceptions, all sample analyses achieved analytical criteria.

**Metals:**

Batch 162826, Method ICP\_6020\_W, Sample 20080710-01A MS: The MS recoveries were outside of the control limits for Barium and Calcium; however, the results in the parent sample are greater than 4x the spike amount. No qualification is required.

**Wet Chemistry:**

Batch R295823, Method IC\_300.0\_WW, Sample 20080710-01B: The reporting limit for Sulfate is elevated due to dilution for high concentrations of non-target analytes.

Batch R295863, Method PH\_4500\_W, Sample LCS-R295863: Sample was processed outside of holding time for pH, as the analysis is a field test and holding time is defined as 15 minutes.

Radium analysis performed by ALS Fort Collins laboratory.

<b><u>Qualifier</u></b>	<b><u>Description</u></b>
*	Value exceeds Regulatory Limit
**	Estimated Value
a	Analyte is non-accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
Hr	BOD/CBOD - Sample was reset outside Hold Time, value should be considered estimated.
J	Analyte is present at an estimated concentration between the MDL and Report Limit
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL
X	Analyte was detected in the Method Blank between the MDL and Reporting Limit, sample results may exhibit background or reagent contamination at the observed level.

<b><u>Acronym</u></b>	<b><u>Description</u></b>
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LOD	Limit of Detection (see MDL)
LOQ	Limit of Quantitation (see PQL)
MBLK	Method Blank
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PQL	Practical Quantitation Limit
RPD	Relative Percent Difference
TDL	Target Detection Limit
TNTC	Too Numerous To Count
A	APHA Standard Methods
D	ASTM
E	EPA
SW	SW-846 Update III

<b><u>Units Reported</u></b>	<b><u>Description</u></b>
°C	Degrees Celcius
as noted	
mg/L	Milligrams per Liter
s.u.	Standard Units

# ALS Group, USA

Date: 04-Sep-20

**Client:** NTH Consultants, Ltd.  
**Project:** Holland Board of Public Works  
**Sample ID:** MW-4  
**Collection Date:** 8/10/2020 11:07 AM

**Work Order:** 20080710  
**Lab ID:** 20080710-01  
**Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
<b>MERCURY BY CVAA</b>						
			<b>SW7470A</b>		Prep: SW7470 8/13/20 13:00	Analyst: <b>MAC</b>
Mercury	ND		0.00020	mg/L	1	8/13/2020 02:02 PM
<b>METALS BY ICP-MS</b>						
			<b>SW6020B</b>		Prep: SW3005A 8/19/20 10:35	Analyst: <b>STP</b>
Antimony	ND		0.0050	mg/L	1	8/19/2020 06:55 PM
<b>Arsenic</b>	<b>0.0055</b>		<b>0.0050</b>	<b>mg/L</b>	1	8/19/2020 06:55 PM
<b>Barium</b>	<b>0.96</b>		<b>0.0050</b>	<b>mg/L</b>	1	8/19/2020 06:55 PM
Beryllium	ND		0.0020	mg/L	1	8/19/2020 06:55 PM
<b>Boron</b>	<b>0.98</b>		<b>0.020</b>	<b>mg/L</b>	1	8/19/2020 06:55 PM
Cadmium	ND		0.0020	mg/L	1	8/19/2020 06:55 PM
<b>Calcium</b>	<b>150</b>		<b>0.50</b>	<b>mg/L</b>	1	8/19/2020 06:55 PM
Chromium	ND		0.0050	mg/L	1	8/19/2020 06:55 PM
Cobalt	ND		0.0050	mg/L	1	8/19/2020 06:55 PM
Lead	ND		0.0050	mg/L	1	8/19/2020 06:55 PM
<b>Lithium</b>	<b>0.035</b>		<b>0.010</b>	<b>mg/L</b>	1	8/19/2020 06:55 PM
Molybdenum	ND		0.0050	mg/L	1	8/19/2020 06:55 PM
Selenium	ND		0.0050	mg/L	1	8/19/2020 06:55 PM
Thallium	ND		0.0050	mg/L	1	8/19/2020 06:55 PM
<b>ANIONS BY ION CHROMATOGRAPHY</b>						
			<b>E300.0</b>			Analyst: <b>JDR</b>
<b>Chloride</b>	<b>650</b>		<b>80</b>	<b>mg/L</b>	80	8/11/2020 06:56 PM
<b>Fluoride</b>	<b>0.52</b>		<b>0.20</b>	<b>mg/L</b>	2	8/11/2020 03:05 PM
Sulfate	ND		2.0	mg/L	2	8/11/2020 03:05 PM
<b>PH (LABORATORY)</b>						
			<b>A4500-H B-11</b>			Analyst: <b>QTN</b>
pH (laboratory)	<b>6.91</b>	H	<b>0.100</b>	<b>s.u.</b>	1	8/12/2020 02:01 PM
Temperature	<b>20.9</b>	H	<b>0.100</b>	<b>°C</b>	1	8/12/2020 02:01 PM
<b>TOTAL DISSOLVED SOLIDS</b>						
			<b>A2540 C-11</b>		Prep: FILTER 8/12/20 13:12	Analyst: <b>ERW</b>
Total Dissolved Solids	<b>1,700</b>		<b>150</b>	<b>mg/L</b>	1	8/13/2020 02:15 PM
<b>SUBCONTRACTED ANALYSES</b>						
			<b>SUBCONTRACT</b>			Analyst: <b>ALS</b>
Subcontracted Analyses	See attached		as noted		1	9/2/2020

**Note:** See Qualifiers page for a list of qualifiers and their definitions.



**Client:** NTH Consultants, Ltd.  
**Work Order:** 20080710  
**Project:** Holland Board of Public Works

## QC BATCH REPORT

Batch ID: **161552** Instrument ID **HG4** Method: **SW7470A**

<b>MBLK</b>		Sample ID: <b>MBLK-161552-161552</b>				Units: <b>mg/L</b>		Analysis Date: <b>8/13/2020 01:46 PM</b>		
Client ID:		Run ID: <b>HG4_200813A</b>				SeqNo: <b>6634238</b>		Prep Date: <b>8/13/2020</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Mercury ND 0.00020

<b>LCS</b>		Sample ID: <b>LCS-161552-161552</b>				Units: <b>mg/L</b>		Analysis Date: <b>8/13/2020 01:48 PM</b>		
Client ID:		Run ID: <b>HG4_200813A</b>				SeqNo: <b>6634239</b>		Prep Date: <b>8/13/2020</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Mercury 0.00207 0.00020 0.002 0 104 80-120 0

<b>MS</b>		Sample ID: <b>20080781-03BMS</b>				Units: <b>mg/L</b>		Analysis Date: <b>8/13/2020 02:22 PM</b>		
Client ID:		Run ID: <b>HG4_200813A</b>				SeqNo: <b>6634258</b>		Prep Date: <b>8/13/2020</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Mercury 0.003885 0.00020 0.002 0.001755 106 75-125 0

<b>MSD</b>		Sample ID: <b>20080781-03BMSD</b>				Units: <b>mg/L</b>		Analysis Date: <b>8/13/2020 02:23 PM</b>		
Client ID:		Run ID: <b>HG4_200813A</b>				SeqNo: <b>6634259</b>		Prep Date: <b>8/13/2020</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Mercury 0.00387 0.00020 0.002 0.001755 106 75-125 0.003885 0.387 20

The following samples were analyzed in this batch:

20080710-01A

**Client:** NTH Consultants, Ltd.  
**Work Order:** 20080710  
**Project:** Holland Board of Public Works

## QC BATCH REPORT

Batch ID: **162826** Instrument ID **ICPMS3** Method: **SW6020B**

Sample ID: <b>MBLK-162826-162826</b>				Units: <b>mg/L</b>		Analysis Date: <b>8/19/2020 06:49 PM</b>				
Client ID:		Run ID: <b>ICPMS3_200819A</b>			SeqNo: <b>6646898</b>		Prep Date: <b>8/19/2020</b>		DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	ND	0.0050								
Arsenic	ND	0.0050								
Barium	ND	0.0050								
Beryllium	ND	0.0020								
Boron	ND	0.020								
Cadmium	ND	0.0020								
Calcium	ND	0.50								
Chromium	ND	0.0050								
Cobalt	ND	0.0050								
Lead	ND	0.0050								
Lithium	ND	0.010								
Molybdenum	ND	0.0050								
Selenium	ND	0.0050								
Thallium	ND	0.0050								

LCS				Sample ID: LCS-162826-162826			Units: mg/L		Analysis Date: 8/19/2020 06:50 PM		
Client ID:			Run ID: ICPMS3_200819A			SeqNo: 6646899		Prep Date: 8/19/2020		DF: 1	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Antimony	0.1009	0.0050	0.1	0	101	80-120	0				
Arsenic	0.1042	0.0050	0.1	0	104	80-120	0				
Barium	0.105	0.0050	0.1	0	105	80-120	0				
Beryllium	0.1067	0.0020	0.1	0	107	80-120	0				
Boron	0.4933	0.020	0.5	0	98.7	80-120	0				
Cadmium	0.1052	0.0020	0.1	0	105	80-120	0				
Calcium	10.58	0.50	10	0	106	80-120	0				
Chromium	0.1039	0.0050	0.1	0	104	80-120	0				
Cobalt	0.1063	0.0050	0.1	0	106	80-120	0				
Lead	0.1048	0.0050	0.1	0	105	80-120	0				
Lithium	0.1063	0.010	0.1	0	106	80-120	0				
Molybdenum	0.1025	0.0050	0.1	0	102	80-120	0				
Selenium	0.1078	0.0050	0.1	0	108	80-120	0				
Thallium	0.1007	0.0050	0.1	0	101	80-120	0				

**Note:** See Qualifiers Page for a list of Qualifiers and their explanation.

Client: NTH Consultants, Ltd.  
 Work Order: 20080710  
 Project: Holland Board of Public Works

## QC BATCH REPORT

Batch ID: 162826 Instrument ID ICPMS3 Method: SW6020B

MS				Sample ID: 20080710-01AMS			Units: mg/L		Analysis Date: 8/19/2020 06:57 PM		
Client ID: MW-4			Run ID: ICPMS3_200819A			SeqNo: 6646903		Prep Date: 8/19/2020		DF: 1	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Antimony	0.1021	0.0050	0.1	0.000189	102	75-125	0				
Arsenic	0.1127	0.0050	0.1	0.005451	107	75-125	0				
Barium	1.085	0.0050	0.1	0.9585	127	75-125	0			SO	
Beryllium	0.1081	0.0020	0.1	0.000052	108	75-125	0				
Boron	1.434	0.020	0.5	0.9815	90.5	75-125	0				
Cadmium	0.1004	0.0020	0.1	0.000017	100	75-125	0				
Calcium	166.6	0.50	10	154	126	75-125	0			SO	
Chromium	0.1069	0.0050	0.1	0.000691	106	75-125	0				
Cobalt	0.1059	0.0050	0.1	0.001226	105	75-125	0				
Lead	0.108	0.0050	0.1	0.00048	108	75-125	0				
Lithium	0.1441	0.010	0.1	0.03516	109	75-125	0				
Molybdenum	0.1051	0.0050	0.1	0.000705	104	75-125	0				
Selenium	0.1068	0.0050	0.1	0.000366	106	75-125	0				
Thallium	0.1038	0.0050	0.1	0.000062	104	75-125	0				

MSD				Sample ID: 20080710-01AMSD			Units: mg/L		Analysis Date: 8/19/2020 06:58 PM		
Client ID: MW-4			Run ID: ICPMS3_200819A			SeqNo: 6646904		Prep Date: 8/19/2020		DF: 1	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Antimony	0.1013	0.0050	0.1	0.000189	101	75-125	0.1021	0.833	20		
Arsenic	0.1135	0.0050	0.1	0.005451	108	75-125	0.1127	0.762	20		
Barium	1.069	0.0050	0.1	0.9585	111	75-125	1.085	1.45	20	O	
Beryllium	0.1066	0.0020	0.1	0.000052	107	75-125	0.1081	1.37	20		
Boron	1.409	0.020	0.5	0.9815	85.6	75-125	1.434	1.73	20		
Cadmium	0.0997	0.0020	0.1	0.000017	99.7	75-125	0.1004	0.719	20		
Calcium	164.9	0.50	10	154	110	75-125	166.6	1.02	20	O	
Chromium	0.106	0.0050	0.1	0.000691	105	75-125	0.1069	0.89	20		
Cobalt	0.1053	0.0050	0.1	0.001226	104	75-125	0.1059	0.587	20		
Lead	0.1067	0.0050	0.1	0.00048	106	75-125	0.108	1.21	20		
Lithium	0.1422	0.010	0.1	0.03516	107	75-125	0.1441	1.36	20		
Molybdenum	0.1053	0.0050	0.1	0.000705	105	75-125	0.1051	0.137	20		
Selenium	0.1134	0.0050	0.1	0.000366	113	75-125	0.1068	5.97	20		
Thallium	0.1034	0.0050	0.1	0.000062	103	75-125	0.1038	0.424	20		

The following samples were analyzed in this batch:

20080710-01A

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: NTH Consultants, Ltd.  
 Work Order: 20080710  
 Project: Holland Board of Public Works

# QC BATCH REPORT

Batch ID: **161500** Instrument ID **TDS** Method: **A2540 C-11**

<b>MBLK</b>		Sample ID: <b>MBLK-161500-161500</b>				Units: <b>mg/L</b>		Analysis Date: <b>8/13/2020 02:15 PM</b>		
Client ID:		Run ID: <b>TDS_200813B</b>				SeqNo: <b>6632659</b>		Prep Date: <b>8/12/2020</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids	ND	30								

<b>LCS</b>		Sample ID: <b>LCS-161500-161500</b>				Units: <b>mg/L</b>		Analysis Date: <b>8/13/2020 02:15 PM</b>		
Client ID:		Run ID: <b>TDS_200813B</b>				SeqNo: <b>6632658</b>		Prep Date: <b>8/12/2020</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids	474	30	495	0	95.8	85-109	0			

<b>DUP</b>		Sample ID: <b>20080708-02B DUP</b>				Units: <b>mg/L</b>		Analysis Date: <b>8/13/2020 02:15 PM</b>		
Client ID:		Run ID: <b>TDS_200813B</b>				SeqNo: <b>6632642</b>		Prep Date: <b>8/12/2020</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids	1410	75	0	0	0	0-0	1385	1.79	10	

<b>DUP</b>		Sample ID: <b>20080746-01A DUP</b>				Units: <b>mg/L</b>		Analysis Date: <b>8/13/2020 02:15 PM</b>		
Client ID:		Run ID: <b>TDS_200813B</b>				SeqNo: <b>6632655</b>		Prep Date: <b>8/12/2020</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids	253.3	50	0	0	0	0-0	253.3	0	10	

The following samples were analyzed in this batch:

20080710-01B

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: NTH Consultants, Ltd.  
 Work Order: 20080710  
 Project: Holland Board of Public Works

## QC BATCH REPORT

Batch ID: **R295823** Instrument ID **IC4** Method: **E300.0**

MBLK				Sample ID: <b>CCB/MBLK-R295823</b>		Units: <b>mg/L</b>		Analysis Date: <b>8/11/2020 11:54 AM</b>		
Client ID:		Run ID: <b>IC4_200811A</b>		SeqNo: <b>6628065</b>		Prep Date:		DF: <b>1</b>		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	ND	1.0								
Fluoride	ND	0.10								
Sulfate	ND	1.0								

LCS				Sample ID: <b>LCS-R295823</b>		Units: <b>mg/L</b>		Analysis Date: <b>8/11/2020 12:13 PM</b>		
Client ID:		Run ID: <b>IC4_200811A</b>		SeqNo: <b>6628067</b>		Prep Date:		DF: <b>1</b>		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	9.393	1.0	10	0	93.9	90-110	0			
Fluoride	1.857	0.10	2	0	92.9	90-110	0			
Sulfate	9.484	1.0	10	0	94.8	90-110	0			

MS				Sample ID: <b>20080708-02B MS</b>		Units: <b>mg/L</b>		Analysis Date: <b>8/11/2020 04:41 PM</b>		
Client ID:		Run ID: <b>IC4_200811A</b>		SeqNo: <b>6628087</b>		Prep Date:		DF: <b>80</b>		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	1457	80	800	681.5	97	80-120	0			
Fluoride	170.5	8.0	160	0	107	80-120	0			
Sulfate	774.5	80	800	0	96.8	80-120	0			

MSD				Sample ID: <b>20080708-02B MSD</b>		Units: <b>mg/L</b>		Analysis Date: <b>8/11/2020 05:01 PM</b>		
Client ID:		Run ID: <b>IC4_200811A</b>		SeqNo: <b>6628088</b>		Prep Date:		DF: <b>80</b>		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	1456	80	800	681.5	96.8	80-120	1457	0.122	20	
Fluoride	166.5	8.0	160	0	104	80-120	170.5	2.35	20	
Sulfate	772.9	80	800	0	96.6	80-120	774.5	0.207	20	

The following samples were analyzed in this batch:

20080710-01B

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: NTH Consultants, Ltd.  
 Work Order: 20080710  
 Project: Holland Board of Public Works

## QC BATCH REPORT

Batch ID: **R295863** Instrument ID **Titration 1** Method: **A4500-H B-11**

<b>LCS</b>		Sample ID: <b>LCS-R295863-R295863</b>				Units: <b>s.u.</b>		Analysis Date: <b>8/12/2020 02:01 PM</b>		
Client ID:		Run ID: <b>TITRATOR 1_200812B</b>				SeqNo: <b>6629470</b>		Prep Date:		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
pH (laboratory)	3.97	0.10	4	0	99.2	92-108	0			

<b>LCS</b>		Sample ID: <b>LCS-R295863-R295863</b>				Units: <b>s.u.</b>		Analysis Date: <b>8/12/2020 02:01 PM</b>		
Client ID:		Run ID: <b>TITRATOR 1_200812B</b>				SeqNo: <b>6629492</b>		Prep Date:		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
pH (laboratory)	3.97	0.10	4	0	99.2	92-108	0			

<b>DUP</b>		Sample ID: <b>20080708-02B DUP</b>				Units: <b>s.u.</b>		Analysis Date: <b>8/12/2020 02:01 PM</b>		
Client ID:		Run ID: <b>TITRATOR 1_200812B</b>				SeqNo: <b>6629473</b>		Prep Date:		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
pH (laboratory)	6.91	0.10	0	0	0	0-0	6.9	0.145	5	H
Temperature	20.89	0.10	0	0	0	0-0	20.78	0.528		H

<b>DUP</b>		Sample ID: <b>20080735-02A DUP</b>				Units: <b>s.u.</b>		Analysis Date: <b>8/12/2020 02:01 PM</b>		
Client ID:		Run ID: <b>TITRATOR 1_200812B</b>				SeqNo: <b>6629484</b>		Prep Date:		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
pH (laboratory)	8.16	0.10	0	0	0	0-0	8.1	0.738	5	H
Temperature	21.22	0.10	0	0	0	0-0	21.14	0.378		H

The following samples were analyzed in this batch:

20080710-01B

Note: See Qualifiers Page for a list of Qualifiers and their explanation.



Cincinnati, OH  
+1 513 733 5336

Everett, WA  
+1 425 356 2600

Fort Collins, CO  
+1 970 490 1511

Holland, MI  
+1 616 399 6070

# Chain of Custody Form

Page \_\_\_\_ of \_\_\_\_

COC ID: 223283

Houston, TX  
+1 281 530 5656

Middletown, PA  
+1 717 944 5541

Spring City, PA  
+1 610 948 4903

Salt Lake City, UT  
+1 801 266 7700

South Charleston, WV  
+1 304 356 3168

York, PA  
+1 717 505 5280

Customer Information		Project Information		Parameter/Method Request for Analysis																
Purchase Order		Project Name	HBPW - James DeYang AP	A	Metals including Hg															
Work Order		Project Number	7300-160017-06	B	Chloride, Fluoride, Sulfate															
Company Name	NTH Consultants, Ltd.	Bill To Company	Holland Board of Public Works	C	pH															
Send Report To	Karen Okonta	Invoice Attn	Accounts Payable	D	TDS															
Address	41780 Six Mile Road	Address	625 Hastings	E	Radium 226 & 228															
				F																
City/State/Zip	Northville, MI 48168	City/State/Zip	Holland, MI 49423	G																
Phone	(248) 662-2668	Phone	(616) 363-1210	H																
Fax	(248) 324-5305	Fax		I																
e-Mail Address		e-Mail Address		J																

No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1	MW-4	8/10/2020	11:07	GW	2	4	X	X	X	X	X						
2																	
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10																	

Sampler(s) Please Print & Sign Brittany Stachurski		Shipment Method drop-off		Required Turnaround Time: (Check Box) <input checked="" type="checkbox"/> Std 10 WK Days <input type="checkbox"/> 5 WK Days <input type="checkbox"/> Other <input type="checkbox"/> 2 WK Days <input type="checkbox"/> 24 Hour				Results Due Date:	
Relinquished by:	Date:	Time:	Received by:	Notes:					
Relinquished by:	Date: 8/11/20	Time: 0800	Received by (Laboratory):	Cooler ID	Cooler Temp.	QC Package: (Check One Box Below)			
Logged by (Laboratory):	Date:	Time:	Checked by (Laboratory):	1R3	1.8°C	<input type="checkbox"/> Level II Std QC <input type="checkbox"/> TPRP CheckList			
				PH21	1.7°C	<input type="checkbox"/> Level III Std QC/Raw Data <input type="checkbox"/> TPRP Level IV			
					1.4°C	<input type="checkbox"/> Level IV SW846/CLP <input type="checkbox"/> Other			
Preservative Key: 1-HCl 2-HNO <sub>3</sub> 3-H <sub>2</sub> SO <sub>4</sub> 4-NaOH 5-Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> 6-NaHSO <sub>4</sub> 7-Other 8-4°C 9-5035									

Note: 1. Any changes must be made in writing once samples and COC Form have been submitted to ALS Environmental.  
2. Unless otherwise agreed in a formal contract, services provided by ALS Environmental are expressly limited to the terms and conditions stated on the reverse.  
3. The Chain of Custody is a legal document. All information must be completed accurately.

Copyright 2011 by ALS Environmental.

Sample Receipt Checklist

Client Name: **NTH - NORTHVILLE**

Date/Time Received: **11-Aug-20 08:00**

Work Order: **20080710**

Received by: **KRW**

Checklist completed by **Keith Wierenga**

11-Aug-20

Reviewed by: **Chad Whelton**

11-Aug-20

eSignature

Date

eSignature

Date

Matrices: **Water**

Carrier name: **Client**

Shipping container/cooler in good condition?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	Not Present <input type="checkbox"/>
Custody seals intact on shipping container/cooler?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Not Present <input checked="" type="checkbox"/>
Custody seals intact on sample bottles?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Not Present <input checked="" type="checkbox"/>
Chain of custody present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Chain of custody signed when relinquished and received?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	
Chain of custody agrees with sample labels?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Samples in proper container/bottle?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Sample containers intact?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Sufficient sample volume for indicated test?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
All samples received within holding time?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Container/Temp Blank temperature in compliance?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Sample(s) received on ice?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Temperature(s)/Thermometer(s):	<u>1.8/2.8, 1.7/2.7, 1.4/2.4 C</u>		<u>IR3</u>
Cooler(s)/Kit(s):	<u></u>		
Date/Time sample(s) sent to storage:	<u>8/11/2020 10:06:54 AM</u>		
Water - VOA vials have zero headspace?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	No VOA vials submitted <input checked="" type="checkbox"/>
Water - pH acceptable upon receipt?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	N/A <input type="checkbox"/>
pH adjusted?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	N/A <input type="checkbox"/>
pH adjusted by:	<u>-</u>		

Login Notes:

-----

Client Contacted:

Date Contacted:

Person Contacted:

Contacted By:

Regarding:

Comments:

CorrectiveAction:





Monday, August 31, 2020

Chad Whelton  
ALS Environmental  
3352 128th Avenue  
Holland, MI 49424

Re: ALS Workorder: 2008278  
Project Name:  
Project Number: 20080710

Dear Mr. Whelton:

One water sample was received from ALS Environmental, on 8/12/2020. The sample was scheduled for the following analyses:

Radium-226

Radium-228

The results for these analyses are contained in the enclosed reports.

The data contained in the following report have been reviewed and approved by the personnel listed below. In addition, ALS certifies that the analyses reported herein are true, complete and correct within the limits of the methods employed. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained from ALS Environmental.

Thank you for your confidence in ALS Environmental. Should you have any questions, please call.

Sincerely,



ALS Environmental  
Jeff R. Kujawa  
Project Manager

ALS Environmental – Fort Collins is accredited by the following accreditation bodies for various testing scopes in accordance with requirements of each accreditation body. All testing is performed under the laboratory management system, which is maintained to meet these requirement and regulations. Please contact the laboratory or accreditation body for the current scope testing parameters.

ALS Environmental – Fort Collins	
Accreditation Body	License or Certification Number
AIHA	214884
Alaska (AK)	UST-086
Alaska (AK)	CO01099
Arizona (AZ)	AZ0742
California (CA)	06251CA
Colorado (CO)	CO01099
Florida (FL)	E87914
Idaho (ID)	CO01099
Kansas (KS)	E-10381
Kentucky (KY)	90137
PJ-LA (DoD ELAP/ISO 170250)	95377
Louisiana (LA)	05057
Maryland (MD)	285
Missouri (MO)	175
Nebraska(NE)	NE-OS-24-13
Nevada (NV)	CO000782008A
New York (NY)	12036
North Dakota (ND)	R-057
Oklahoma (OK)	1301
Pennsylvania (PA)	68-03116
Tennessee (TN)	2976
Texas (TX)	T104704241
Utah (UT)	CO01099
Washington (WA)	C1280



## 2008278

### **Radium-228:**

The sample was analyzed for the presence of  $^{228}\text{Ra}$  by low background gas flow proportional counting of  $^{228}\text{Ac}$ , which is the ingrown progeny of  $^{228}\text{Ra}$ , according to the current revision of SOP 724.

All acceptance criteria were met.

### **Radium-226:**

The sample was prepared and analyzed according to the current revision of SOP 783.

All acceptance criteria were met.

# ALS -- Fort Collins

## Sample Number(s) Cross-Reference Table

---

**OrderNum:** 2008278

**Client Name:** ALS Environmental

**Client Project Name:**

**Client Project Number:** 20080710

**Client PO Number:** 20-122019844

---

Client Sample Number	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
MW-4	2008278-1		WATER	10-Aug-20	11:07

**Subcontractor:**

ALS Environmental, Fort Collins  
225 Commerce Dr.

TEL: (800) 443-1511

FAX:

Fort Collins, CO 80524

Acct #:

**CHAIN-OF-CUSTODY RECORD**

Page 1 of 1

Date: **11-Aug-20**

COC ID: **14447**

Due Date: **01-Sep-20**

**#2008278 #**

Salesperson

ALSHN Account

Customer Information		Project Information		Parameter/Method Request for Analysis													
Purchase Order		Project Name	20080710	A	Subcontracted Analyses (SUBCONTRACT) <i>Radium 226/228</i>												
Work Order		Project Number		B													
Company Name	ALS Group USA, Corp	Bill To Company	ALS Group USA, Corp	C													
Send Report To	Chad Whelton	Inv Attn	Accounts Payable	D													
Address	3352 128th Ave	Address	3352 128th Ave	E													
				F													
City/State/Zip	Holland, Michigan 49424	City/State/Zip	Holland, Michigan 49424	G													
Phone	(616) 399-6070	Phone	(616) 399-6070	H													
Fax	(616) 399-6185	Fax	(616) 399-6185	I													
eMail Address	chad.whelton@alsglobal.com	eMail CC		J													
ALS Sample ID	Client Sample ID	Matrix	Collection Date 24hr	Bottle	A	B	C	D	E	F	G	H	I	J			
20080710-01C	MW-4	Groundwater	10/Aug/2020 11:07	(2) 1LPHNO3	X												

**Comments:**

Please analyze these samples per our instructions and indicated turnaround requirements. Please include all QC with data. The samples do not need to be returned and can be disposed after 30 days.

Relinquished by:	Date/Time	Received by:	Date/Time	Cooler IDs	Report/QC Level
<i>Chad Whelton</i>	8-11-20 1430	EMILY LYONS <i>EL</i>	AUG 12 2020 1000		Std
Relinquished by:	Date/Time	Received by:	Date/Time		

**ALS Environmental - Fort Collins**  
**CONDITION OF SAMPLE UPON RECEIPT FORM**

**Client Name/ID:**

**ALS\_MI**

**Workorder No:**

**2008278**

**Project Manager:**

**JRK**

**Initials:**

**ERL**

Date: 08.13.20

1. Are airbills / shipping documents present and/or removable?	<input type="checkbox"/> Drop Off	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
2. Are custody seals on shipping containers intact?	<input checked="" type="checkbox"/>	NONE	<input type="checkbox"/> YES <input type="checkbox"/> NO*
3. Are custody seals on sample containers intact?	<input checked="" type="checkbox"/>	NONE	<input type="checkbox"/> YES <input type="checkbox"/> NO*
4. Is there a COC (chain-of-custody) present?	<input checked="" type="checkbox"/>	YES	<input type="checkbox"/> NO*
5. Is the COC in agreement with samples received? (IDs, dates, times, # of samples, # of containers, matrix, requested analyses, etc.)	<input checked="" type="checkbox"/>	YES	<input type="checkbox"/> NO*
6. Are short-hold samples present?	<input type="checkbox"/>	YES	<input checked="" type="checkbox"/> NO
7. Are all samples within holding times for the requested analyses?	<input checked="" type="checkbox"/>	YES	<input type="checkbox"/> NO*
8. Were all sample containers received intact? (not broken or leaking)	<input checked="" type="checkbox"/>	YES	<input type="checkbox"/> NO*
9. Is there sufficient sample for the requested analyses?	<input checked="" type="checkbox"/>	YES	<input type="checkbox"/> NO*
10. Are samples in proper containers for requested analyses? (form 250, Sample Handling Guidelines)	<input checked="" type="checkbox"/>	YES	<input type="checkbox"/> NO*
11. Are all aqueous samples preserved correctly, if required?	<input type="checkbox"/> N/A	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO*
12. Were unpreserved samples pH checked, if required?	<input checked="" type="checkbox"/>	N/A	<input type="checkbox"/> YES <input type="checkbox"/> NO
13. Are all samples requiring no headspace (VOC, GRO, RSK/MEE, radon) free of bubbles > 6 mm in diameter?	<input checked="" type="checkbox"/>	N/A	<input type="checkbox"/> YES <input type="checkbox"/> NO
14. Were the samples shipped on ice?	<input type="checkbox"/>	YES	<input checked="" type="checkbox"/> NO
15. Were cooler temperatures measured at 0.1 - 6.0°C?	IR gun used*: <input type="checkbox"/> #3 <input type="checkbox"/> #5	<input checked="" type="checkbox"/> Rad Only	<input type="checkbox"/> YES <input type="checkbox"/> NO
Cooler #: 1      2			
Temperature (°C): Amb    Amb			
# of custody seals on cooler: 0      0			
External mR/hr reading: 9      10			
Background mR/hr reading: 11	Were external mR/hr readings ≤ two times background and within DOT acceptance criteria? (If no, see Form 008)		
	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> YES	<input type="checkbox"/> NO
* Please provide details below for 'NO' responses in gray boxes above - for 2 thru 5 & 7 thru 12, notify PM & continue w/ login.			
All client bottle ID's vs ALS lab ID's double-checked by:			ERL
If applicable, was the client contacted?	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NA	Contact Name:	Date:
Project Manager Signature / Date:		8-13-20	

Ref: Date: 11Aug20 SHIPPING: 0.00  
Dep: Wgt: 36.85 LBS SPECIAL: 0.00  
DV: 0.00 HANDLING: 0.00  
TOTAL: 0.00

Svcs: PRIORITY OVERNIGHT Master 1668 7922 8721  
TRCK: 1668 7922 8721

ORIGIN ID: GRRR (616) 399-6070  
ALS ENVIRONMENTAL  
ALS ENVIRONMENTAL  
3352 128TH AVENUE

SHIP DATE: 11AUG20  
ACTWGT: 36.85 LB  
CAD: 0122071/CAFE3311

HOLLAND, MI 494249263  
UNITED STATES US

BILL THIRD PARTY

TO SAMPLE RECEIVING  
ALS ENVIRONMENTAL  
225 COMMERCE DR

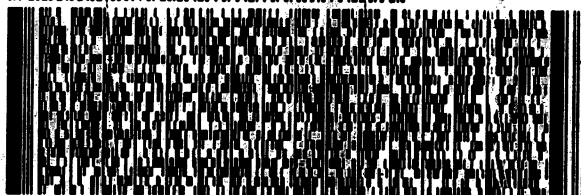
FORT COLLINS CO 80524

(970) 490-1511

REF:

INU:

DEPT:



FedEx  
Express



1 of 2  
TRK# 1668 7922 8721  
0201  
## MASTER ##

NA FTCA

WED - 12 AUG 10:30A  
PRIORITY OVERNIGHT

80524

CO-US DEN



Ref: Date: 11Aug20 SHIPPING: 0.00  
Dep: Wgt: 29.35 LBS SPECIAL: 0.00  
DV: 0.00 HANDLING: 0.00  
TOTAL: 0.00

Svcs: PRIORITY OVERNIGHT Master 1668 7922 8721  
TRCK: 1668 7922 8732

ORIGIN ID: GRRR (616) 399-6070  
ALS ENVIRONMENTAL  
ALS ENVIRONMENTAL  
3352 128TH AVENUE

SHIP DATE: 11AUG20  
ACTWGT: 29.35 LB  
CAD: 0122071/CAFE3311

HOLLAND, MI 494249263  
UNITED STATES US

BILL THIRD PARTY

TO SAMPLE RECEIVING  
ALS ENVIRONMENTAL  
225 COMMERCE DR

FORT COLLINS CO 80524

(970) 490-1511

REF:

INU:

DEPT:



FedEx  
Express



2 of 2  
MPS# 1668 7922 8732  
0263  
Mstr# 1668 7922 8721\*

NA FTCA

WED - 12 AUG 10:30A  
PRIORITY OVERNIGHT

80524

CO-US DEN



Client: ALS Environmental

Date: 31-Aug-20

Project: 20080710

Work Order: 2008278

Sample ID: MW-4

Lab ID: 2008278-1

Legal Location:

Matrix: WATER

Collection Date: 8/10/2020 11:07

Percent Moisture:

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
<b>Radium-226 by Radon Emanation - Method 903.1</b>						
			<b>SOP 783</b>	Prep Date: 8/19/2020		PrepBy: TRW
Ra-226	ND (+/- 0.3)	Y1,U	0.43	pCi/l	NA	8/31/2020 11:50
Carr: BARIUM	100	Y1	40-110	%REC	DL = NA	8/31/2020 11:50
<b>Radium-228 Analysis by GFPC</b>						
			<b>SOP 724</b>	Prep Date: 8/19/2020		PrepBy: RGS
Ra-228	1.24 (+/- 0.51)		0.79	pCi/l	NA	8/28/2020 10:43
Carr: BARIUM	86.7		40-110	%REC	DL = NA	8/28/2020 10:43



Client: ALS Environmental

Date: 31-Aug-20

Project: 20080710

Work Order: 2008278

Sample ID: MW-4

Lab ID: 2008278-1

Legal Location:

Matrix: WATER

Collection Date: 8/10/2020 11:07

Percent Moisture:

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
----------	--------	------	--------------	-------	-----------------	---------------

**Explanation of Qualifiers****Radiochemistry:**

- "Report Limit" is the MDC

U or ND - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative yield is assumed.

Y2 - Chemical Yield outside default limits.

W - DER is greater than Warning Limit of 1.42

\* - Aliquot Basis is 'As Received' while the Report Basis is 'Dry Weight'.

# - Aliquot Basis is 'Dry Weight' while the Report Basis is 'As Received'.

G - Sample density differs by more than 15% of LCS density.

D - DER is greater than Control Limit

M - Requested MDC not met.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

L - LCS Recovery below lower control limit.

H - LCS Recovery above upper control limit.

P - LCS, Matrix Spike Recovery within control limits.

N - Matrix Spike Recovery outside control limits

NC - Not Calculated for duplicate results less than 5 times MDC

B - Analyte concentration greater than MDC.

B3 - Analyte concentration greater than MDC but less than Requested MDC.

**Inorganics:**

B - Result is less than the requested reporting limit but greater than the instrument method detection limit (MDL).

U or ND - Indicates that the compound was analyzed for but not detected.

E - The reported value is estimated because of the presence of interference. An explanatory note may be included in the narrative.

M - Duplicate injection precision was not met.

N - Spiked sample recovery not within control limits. A post spike is analyzed for all ICP analyses when the matrix spike and or spike duplicate fail and the native sample concentration is less than four times the spike added concentration.

Z - Spiked recovery not within control limits. An explanatory note may be included in the narrative.

\* - Duplicate analysis (relative percent difference) not within control limits.

S - SAR value is estimated as one or more analytes used in the calculation were not detected above the detection limit.

**Organics:**

U or ND - Indicates that the compound was analyzed for but not detected.

B - Analyte is detected in the associated method blank as well as in the sample. It indicates probable blank contamination and warns the data user.

E - Analyte concentration exceeds the upper level of the calibration range.

J - Estimated value. The result is less than the reporting limit but greater than the instrument method detection limit (MDL).

A - A tentatively identified compound is a suspected aldol-condensation product.

X - The analyte was diluted below an accurate quantitation level.

\* - The spike recovery is equal to or outside the control criteria used.

+ - The relative percent difference (RPD) equals or exceeds the control criteria.

G - A pattern resembling gasoline was detected in this sample.

D - A pattern resembling diesel was detected in this sample.

M - A pattern resembling motor oil was detected in this sample.

C - A pattern resembling crude oil was detected in this sample.

4 - A pattern resembling JP-4 was detected in this sample.

5 - A pattern resembling JP-5 was detected in this sample.

H - Indicates that the fuel pattern was in the heavier end of the retention time window for the analyte of interest.

L - Indicates that the fuel pattern was in the lighter end of the retention time window for the analyte of interest.

Z - This flag indicates that a significant fraction of the reported result did not resemble the patterns of any of the following petroleum hydrocarbon products:

- gasoline
- JP-8
- diesel
- mineral spirits
- motor oil
- Stoddard solvent
- bunker C

## ALS -- Fort Collins

Date: 8/31/2020 2:04:

Client: ALS Environmental

Work Order: 2008278

Project: 20080710

## QC BATCH REPORT

Batch ID: RE200819-2-2

Instrument ID Alpha Scin

Method: Radium-226 by Radon Emanation

LCS	Sample ID: RE200819-2				Units: pCi/l		Analysis Date: 8/31/2020 11:50				
Client ID:	Run ID: RE200819-2A				Prep Date: 8/19/2020			DF: NA			
Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226	44 (+/- 11)	1	46.46		94.9	67-120					P,Y1
Carr: BARIUM	15900		15530		102	40-110					Y1

MB	Sample ID: RE200819-2				Units: pCi/l			Analysis Date: 8/31/2020 12:05				
Client ID:		Run ID: RE200819-2A				Prep Date: 8/19/2020			DF: NA			
Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual	
Ra-226	ND	0.24									Y1,U	
Carr: BARIUM	15910		15530		102	40-110					Y1	

The following samples were analyzed in this batch:

2008278-1

Client: ALS Environmental  
Work Order: 2008278  
Project: 20080710

## QC BATCH REPORT

Batch ID: RA200819-1-4 Instrument ID LB4100-C Method: Radium-228 Analysis by GFPC

LCS	Sample ID: RA200819-1				Units: pCi/l		Analysis Date: 8/28/2020 10:43				
Client ID:	Run ID: RA200819-1A				Prep Date: 8/19/2020			DF: NA			
Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-228	24.1 (+/- 5.6)	0.8	23.94		101	70-130					P
Carr: BARIUM	27430		32570		84.2	40-110					

LCSD	Sample ID: RA200819-1				Units: pCi/l		Analysis Date: 8/28/2020 10:43				
Client ID:		Run ID: RA200819-1A				Prep Date: 8/19/2020			DF: NA		
Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-228	30.3 (+/- 7.1)	0.9	23.94		126	70-130		24.1	0.7	2.1	P
Carr: BARIUM	26360		32570		80.9	40-110		27430			

MB	Sample ID: RA200819-1				Units: pCi/l			Analysis Date: 8/28/2020 10:43			
Client ID:	Run ID: RA200819-1A				Prep Date: 8/19/2020			DF: NA			
Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-228	ND	0.66									Y1,U
Carr: BARIUM	32590		32570		100	40-110					Y1

The following samples were analyzed in this batch:

2008278-1



## **APPENDIX B-3**

### **November 2020 Groundwater Data**



29-Dec-2020

Karen Okonta  
NTH Consultants, Ltd.  
41780 Six Mile Road  
Northville, MI 48168

Re: **Holland Board of Public Works**

Work Order: **20112217**

Dear Karen,

ALS Environmental received 9 samples on 24-Nov-2020 06:00 PM for the analyses presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental - Holland and for only the analyses requested.

Sample results are compliant with industry accepted practices and Quality Control results achieved laboratory specifications. Any exceptions are noted in the Case Narrative, or noted with qualifiers in the report or QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained from ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

The total number of pages in this report is 42.

If you have any questions regarding this report, please feel free to contact me:

ADDRESS: 3352 128th Avenue, Holland, MI, USA  
PHONE: +1 (616) 399-6070 FAX: +1 (616) 399-6185

Sincerely,

A handwritten signature in black ink, appearing to read "Chad Whelton".

Electronically approved by: Chad Whelton

Chad Whelton  
Project Manager

## Report of Laboratory Analysis

Certificate No: MI: 0022

ALS GROUP USA, CORP Part of the ALS Laboratory Group A Campbell Brothers Limited Company

Environmental 

[www.alsglobal.com](http://www.alsglobal.com)

RIGHT SOLUTIONS RIGHT PARTNER

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**Client:** NTH Consultants, Ltd.  
**Project:** Holland Board of Public Works  
**Work Order:** 20112217

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**Work Order Sample Summary**

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<u>Lab Samp ID</u>	<u>Client Sample ID</u>	<u>Matrix</u>	<u>Tag Number</u>	<u>Collection Date</u>	<u>Date Received</u>	<u>Hold</u>
20112217-01	PZ-1	Groundwater		11/24/2020 10:30	11/24/2020 18:00	<input type="checkbox"/>
20112217-02	MW-1	Groundwater		11/24/2020 13:15	11/24/2020 18:00	<input type="checkbox"/>
20112217-03	MW-2	Groundwater		11/24/2020 14:50	11/24/2020 18:00	<input type="checkbox"/>
20112217-04	MW-3	Groundwater		11/24/2020 16:35	11/24/2020 18:00	<input type="checkbox"/>
20112217-05	MW-3A	Groundwater		11/24/2020 17:55	11/24/2020 18:00	<input type="checkbox"/>
20112217-06	Field Duplicate	Groundwater		11/24/2020	11/24/2020 18:00	<input type="checkbox"/>
20112217-07	Field Blank	Water		11/24/2020 17:30	11/24/2020 18:00	<input type="checkbox"/>
20112217-08	Equipment Blank	Water		11/24/2020 17:30	11/24/2020 18:00	<input type="checkbox"/>

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**Client:** NTH Consultants, Ltd.  
**Project:** Holland Board of Public Works  
**Work Order:** 20112217

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**Case Narrative**

Samples for the above noted Work Order were received on 11/24/2020. The attached "Sample Receipt Checklist" documents the status of custody seals, container integrity, preservation, and temperature compliance.

Samples were analyzed according to the analytical methodology previously transmitted in the "Work Order Acknowledgement". Methodologies are also documented in the "Analytical Result" section for each sample. Quality control results are listed in the "QC Report" section. Sample association for the reported quality control is located at the end of each batch summary. If applicable, results are appropriately qualified in the Analytical Result and QC Report sections. The "Qualifiers" section documents the various qualifiers, units, and acronyms utilized in reporting. A copy of the laboratory's scope of accreditation is available upon request.

With the following exceptions, all sample analyses achieved analytical criteria.

**Metals:**

Batch 168869, Method SW6020B, Sample 20112217-04A MS/MSD: The MS/MSD recovery was outside of the control limit for calcium; however, the result in the parent sample is greater than 4x the spike amount. No qualification is required.

**Wet Chemistry:**

Batch R305153, Method A4500-H B-11: pH is considered a "field test" and, as such, the recommended sample holding time expired prior to sample receipt. Results should be considered estimated.

Batch R305326, Method E300.0, Sample MW-2 (20112217-03B): The reporting limits for fluoride and sulfate are elevated due to dilution for high concentrations of non-target analytes.

Batch R305326, Method E300.0, Sample MW-4 (20112217-09B): The reporting limits for fluoride and sulfate are elevated due to dilution for high concentrations of non-target analytes.

Batch R305326, Method E300.0, Sample 20112217-04B MS/MSD: The MS/MSD recovery was below the lower control limit for fluoride. The corresponding result in the parent sample may be biased low for this analyte.

Radium analysis performed by ALS Fort Collins laboratory.

<b><u>Qualifier</u></b>	<b><u>Description</u></b>
*	Value exceeds Regulatory Limit
**	Estimated Value
a	Analyte is non-accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
Hr	BOD/CBOD - Sample was reset outside Hold Time, value should be considered estimated.
J	Analyte is present at an estimated concentration between the MDL and Report Limit
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL
X	Analyte was detected in the Method Blank between the MDL and Reporting Limit, sample results may exhibit background or reagent contamination at the observed level.

<b><u>Acronym</u></b>	<b><u>Description</u></b>
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LOD	Limit of Detection (see MDL)
LOQ	Limit of Quantitation (see PQL)
MBLK	Method Blank
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PQL	Practical Quantitation Limit
RPD	Relative Percent Difference
TDL	Target Detection Limit
TNTC	Too Numerous To Count
A	APHA Standard Methods
D	ASTM
E	EPA
SW	SW-846 Update III

<b><u>Units Reported</u></b>	<b><u>Description</u></b>
°C	Degrees Celcius
as noted	
mg/L	Milligrams per Liter
s.u.	Standard Units



# ALS Group, USA

Date: 29-Dec-20

Client: NTH Consultants, Ltd.

Project: Holland Board of Public Works

Sample ID: PZ-1

Collection Date: 11/24/2020 10:30 AM

Work Order: 20112217

Lab ID: 20112217-01

Matrix: GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
<b>MERCURY BY CVAA</b>						
Mercury	0.00033		SW7470A 0.00020	mg/L	Prep: SW7470 12/8/20 12:13 1	Analyst: MAC 12/8/2020 02:24 PM
<b>METALS BY ICP-MS</b>						
Antimony	ND		SW6020B 0.0050	mg/L	Prep: SW3015A 12/8/20 14:23 1	Analyst: STP 12/8/2020 03:56 PM
Arsenic	0.043		0.0050	mg/L	1	12/8/2020 03:56 PM
Barium	0.043		0.0050	mg/L	1	12/8/2020 03:56 PM
Beryllium	ND		0.0020	mg/L	1	12/8/2020 03:56 PM
Boron	0.47		0.020	mg/L	1	12/8/2020 03:56 PM
Cadmium	ND		0.0020	mg/L	1	12/8/2020 03:56 PM
Calcium	27		0.50	mg/L	1	12/8/2020 03:56 PM
Chromium	0.013		0.0050	mg/L	1	12/8/2020 03:56 PM
Cobalt	ND		0.0050	mg/L	1	12/8/2020 03:56 PM
Lead	0.040		0.0050	mg/L	1	12/8/2020 03:56 PM
Lithium	ND		0.010	mg/L	1	12/8/2020 03:56 PM
Molybdenum	0.036		0.0050	mg/L	1	12/8/2020 03:56 PM
Selenium	ND		0.0050	mg/L	1	12/8/2020 03:56 PM
Thallium	ND		0.0020	mg/L	1	12/8/2020 03:56 PM
<b>ANIONS BY ION CHROMATOGRAPHY</b>						
Chloride	140		E300.0 16	mg/L	16	Analyst: JDR 12/8/2020 04:03 PM
Fluoride	ND		1.0	mg/L	1	12/8/2020 03:44 PM
Sulfate	6.3		2.0	mg/L	1	12/8/2020 03:44 PM
<b>PH (LABORATORY)</b>						
pH (laboratory)	8.20	H	A4500-H B-11 0.100	s.u.	1	Analyst: JB 12/7/2020 12:54 PM
Temperature	21.1	H	0.100	°C	1	12/7/2020 12:54 PM
<b>TOTAL DISSOLVED SOLIDS</b>						
Total Dissolved Solids	1,200		A2540 C-11 300	mg/L	Prep: FILTER 11/30/20 18:59 1	Analyst: ERW 12/2/2020 03:48 PM
<b>SUBCONTRACTED ANALYSES</b>						
Subcontracted Analyses	See attached		SUBCONTRACT as noted		1	Analyst: ALS 12/29/2020

Note: See Qualifiers page for a list of qualifiers and their definitions.

# ALS Group, USA

Date: 29-Dec-20

Client: NTH Consultants, Ltd.

Project: Holland Board of Public Works

Sample ID: MW-1

Collection Date: 11/24/2020 01:15 PM

Work Order: 20112217

Lab ID: 20112217-02

Matrix: GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
<b>MERCURY BY CVAA</b>						
			<b>SW7470A</b>		Prep: SW7470 12/8/20 12:13	Analyst: <b>MAC</b>
Mercury	ND		0.00020	mg/L	1	12/8/2020 02:25 PM
<b>METALS BY ICP-MS</b>						
			<b>SW6020B</b>		Prep: SW3015A 12/8/20 14:23	Analyst: <b>STP</b>
Antimony	ND		0.0050	mg/L	1	12/8/2020 03:58 PM
Arsenic	0.029		0.0050	mg/L	1	12/8/2020 03:58 PM
Barium	0.30		0.0050	mg/L	1	12/8/2020 03:58 PM
Beryllium	ND		0.0020	mg/L	1	12/8/2020 03:58 PM
Boron	1.6		0.020	mg/L	1	12/8/2020 03:58 PM
Cadmium	ND		0.0020	mg/L	1	12/8/2020 03:58 PM
Calcium	100		0.50	mg/L	1	12/8/2020 03:58 PM
Chromium	ND		0.0050	mg/L	1	12/8/2020 03:58 PM
Cobalt	ND		0.0050	mg/L	1	12/8/2020 03:58 PM
Lead	ND		0.0050	mg/L	1	12/8/2020 03:58 PM
Lithium	0.14		0.010	mg/L	1	12/8/2020 03:58 PM
Molybdenum	ND		0.0050	mg/L	1	12/8/2020 03:58 PM
Selenium	ND		0.0050	mg/L	1	12/8/2020 03:58 PM
Thallium	ND		0.0020	mg/L	1	12/8/2020 03:58 PM
<b>ANIONS BY ION CHROMATOGRAPHY</b>						
			<b>E300.0</b>			Analyst: <b>JDR</b>
Chloride	300		40	mg/L	40	12/8/2020 04:42 PM
Fluoride	ND		1.0	mg/L	1	12/8/2020 04:22 PM
Sulfate	11		2.0	mg/L	1	12/8/2020 04:22 PM
<b>PH (LABORATORY)</b>						
			<b>A4500-H B-11</b>			Analyst: <b>JB</b>
pH (laboratory)	6.88	H	0.100	s.u.	1	12/7/2020 12:54 PM
Temperature	21.0	H	0.100	°C	1	12/7/2020 12:54 PM
<b>TOTAL DISSOLVED SOLIDS</b>						
			<b>A2540 C-11</b>		Prep: FILTER 11/30/20 18:59	Analyst: <b>ERW</b>
Total Dissolved Solids	1,100		300	mg/L	1	12/2/2020 03:48 PM
<b>SUBCONTRACTED ANALYSES</b>						
			<b>SUBCONTRACT</b>			Analyst: <b>ALS</b>
Subcontracted Analyses	See attached		as noted		1	12/29/2020

**Note:** See Qualifiers page for a list of qualifiers and their definitions.

# ALS Group, USA

Date: 29-Dec-20

Client: NTH Consultants, Ltd.

Project: Holland Board of Public Works

Sample ID: MW-2

Collection Date: 11/24/2020 02:50 PM

Work Order: 20112217

Lab ID: 20112217-03

Matrix: GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
<b>MERCURY BY CVAA</b>						
			<b>SW7470A</b>		Prep: SW7470 12/8/20 12:13	Analyst: <b>MAC</b>
Mercury	ND		0.00020	mg/L	1	12/8/2020 02:27 PM
<b>METALS BY ICP-MS</b>						
			<b>SW6020B</b>		Prep: SW3015A 12/8/20 14:23	Analyst: <b>STP</b>
Antimony	ND		0.0050	mg/L	1	12/8/2020 03:59 PM
Arsenic	ND		0.0050	mg/L	1	12/8/2020 03:59 PM
<b>Barium</b>	<b>0.23</b>		<b>0.0050</b>	<b>mg/L</b>	1	12/8/2020 03:59 PM
Beryllium	ND		0.0020	mg/L	1	12/8/2020 03:59 PM
<b>Boron</b>	<b>0.82</b>		<b>0.020</b>	<b>mg/L</b>	1	12/8/2020 03:59 PM
Cadmium	ND		0.0020	mg/L	1	12/8/2020 03:59 PM
<b>Calcium</b>	<b>80</b>		<b>0.50</b>	<b>mg/L</b>	1	12/8/2020 03:59 PM
Chromium	ND		0.0050	mg/L	1	12/8/2020 03:59 PM
Cobalt	ND		0.0050	mg/L	1	12/8/2020 03:59 PM
Lead	ND		0.0050	mg/L	1	12/8/2020 03:59 PM
Lithium	ND		0.010	mg/L	1	12/8/2020 03:59 PM
Molybdenum	ND		0.0050	mg/L	1	12/8/2020 03:59 PM
Selenium	ND		0.0050	mg/L	1	12/8/2020 03:59 PM
Thallium	ND		0.0020	mg/L	1	12/8/2020 03:59 PM
<b>ANIONS BY ION CHROMATOGRAPHY</b>						
			<b>E300.0</b>			Analyst: <b>JDR</b>
<b>Chloride</b>	<b>660</b>		<b>80</b>	<b>mg/L</b>	80	12/8/2020 05:20 PM
Fluoride	ND		2.0	mg/L	2	12/8/2020 05:01 PM
Sulfate	ND		4.0	mg/L	2	12/8/2020 05:01 PM
<b>PH (LABORATORY)</b>						
			<b>A4500-H B-11</b>			Analyst: <b>JB</b>
<b>pH (laboratory)</b>	<b>6.88</b>	H	<b>0.100</b>	<b>s.u.</b>	1	12/7/2020 12:54 PM
<b>Temperature</b>	<b>21.1</b>	H	<b>0.100</b>	<b>°C</b>	1	12/7/2020 12:54 PM
<b>TOTAL DISSOLVED SOLIDS</b>						
			<b>A2540 C-11</b>		Prep: FILTER 11/30/20 18:59	Analyst: <b>ERW</b>
<b>Total Dissolved Solids</b>	<b>1,500</b>		<b>500</b>	<b>mg/L</b>	1	12/2/2020 03:48 PM
<b>SUBCONTRACTED ANALYSES</b>						
			<b>SUBCONTRACT</b>			Analyst: <b>ALS</b>
<b>Subcontracted Analyses</b>	<b>See attached</b>		<b>as noted</b>		1	12/29/2020

**Note:** See Qualifiers page for a list of qualifiers and their definitions.

# ALS Group, USA

Date: 29-Dec-20

**Client:** NTH Consultants, Ltd.  
**Project:** Holland Board of Public Works  
**Sample ID:** MW-3  
**Collection Date:** 11/24/2020 04:35 PM

**Work Order:** 20112217  
**Lab ID:** 20112217-04  
**Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
<b>MERCURY BY CVAA</b>						
			<b>SW7470A</b>		Prep: SW7470 12/8/20 12:13	Analyst: <b>MAC</b>
Mercury	ND		0.00020	mg/L	1	12/8/2020 02:29 PM
<b>METALS BY ICP-MS</b>						
			<b>SW6020B</b>		Prep: SW3015A 12/8/20 14:23	Analyst: <b>STP</b>
Antimony	ND		0.0050	mg/L	1	12/8/2020 04:01 PM
Arsenic	ND		0.0050	mg/L	1	12/8/2020 04:01 PM
<b>Barium</b>	<b>0.11</b>		<b>0.0050</b>	<b>mg/L</b>	1	12/8/2020 04:01 PM
Beryllium	ND		0.0020	mg/L	1	12/8/2020 04:01 PM
<b>Boron</b>	<b>0.47</b>		<b>0.020</b>	<b>mg/L</b>	1	12/8/2020 04:01 PM
Cadmium	ND		0.0020	mg/L	1	12/8/2020 04:01 PM
<b>Calcium</b>	<b>95</b>		<b>0.50</b>	<b>mg/L</b>	1	12/8/2020 04:01 PM
Chromium	ND		0.0050	mg/L	1	12/8/2020 04:01 PM
Cobalt	ND		0.0050	mg/L	1	12/8/2020 04:01 PM
Lead	ND		0.0050	mg/L	1	12/8/2020 04:01 PM
<b>Lithium</b>	<b>0.015</b>		<b>0.010</b>	<b>mg/L</b>	1	12/8/2020 04:01 PM
Molybdenum	ND		0.0050	mg/L	1	12/8/2020 04:01 PM
Selenium	ND		0.0050	mg/L	1	12/8/2020 04:01 PM
Thallium	ND		0.0020	mg/L	1	12/8/2020 04:01 PM
<b>ANIONS BY ION CHROMATOGRAPHY</b>						
			<b>E300.0</b>			Analyst: <b>JDR</b>
<b>Chloride</b>	<b>73</b>		<b>8.0</b>	<b>mg/L</b>	8	12/8/2020 06:37 PM
Fluoride	ND		1.0	mg/L	1	12/8/2020 06:18 PM
<b>Sulfate</b>	<b>100</b>		<b>16</b>	<b>mg/L</b>	8	12/8/2020 06:37 PM
<b>PH (LABORATORY)</b>						
			<b>A4500-H B-11</b>			Analyst: <b>JB</b>
pH (laboratory)	<b>6.70</b>	H	<b>0.100</b>	<b>s.u.</b>	1	12/7/2020 12:54 PM
Temperature	<b>20.9</b>	H	<b>0.100</b>	<b>°C</b>	1	12/7/2020 12:54 PM
<b>TOTAL DISSOLVED SOLIDS</b>						
			<b>A2540 C-11</b>		Prep: FILTER 11/30/20 18:59	Analyst: <b>ERW</b>
Total Dissolved Solids	<b>530</b>		<b>50</b>	<b>mg/L</b>	1	12/2/2020 03:48 PM
<b>SUBCONTRACTED ANALYSES</b>						
			<b>SUBCONTRACT</b>			Analyst: <b>ALS</b>
Subcontracted Analyses	See attached		as noted		1	12/29/2020

**Note:** See Qualifiers page for a list of qualifiers and their definitions.

# ALS Group, USA

Date: 29-Dec-20

**Client:** NTH Consultants, Ltd.  
**Project:** Holland Board of Public Works  
**Sample ID:** MW-3A  
**Collection Date:** 11/24/2020 05:55 PM

**Work Order:** 20112217  
**Lab ID:** 20112217-05  
**Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
<b>MERCURY BY CVAA</b>						
<b>Mercury</b>	<b>0.00024</b>		<b>SW7470A</b> <b>0.00020</b>	<b>mg/L</b>	Prep: SW7470 12/8/20 12:13 1	Analyst: <b>MAC</b> 12/8/2020 02:34 PM
<b>METALS BY ICP-MS</b>						
<b>Antimony</b>	ND		<b>SW6020B</b> 0.0050	mg/L	Prep: SW3015A 12/8/20 14:23 1	Analyst: <b>STP</b> 12/8/2020 04:06 PM
<b>Arsenic</b>	ND		0.0050	mg/L	1	12/8/2020 04:06 PM
<b>Barium</b>	<b>0.28</b>		<b>0.0050</b>	<b>mg/L</b>	1	12/8/2020 04:06 PM
<b>Beryllium</b>	ND		0.0020	mg/L	1	12/8/2020 04:06 PM
<b>Boron</b>	<b>0.68</b>		<b>0.020</b>	<b>mg/L</b>	1	12/8/2020 04:06 PM
<b>Cadmium</b>	ND		0.0020	mg/L	1	12/8/2020 04:06 PM
<b>Calcium</b>	<b>140</b>		<b>0.50</b>	<b>mg/L</b>	1	12/8/2020 04:06 PM
<b>Chromium</b>	ND		0.0050	mg/L	1	12/8/2020 04:06 PM
<b>Cobalt</b>	ND		0.0050	mg/L	1	12/8/2020 04:06 PM
<b>Lead</b>	ND		0.0050	mg/L	1	12/8/2020 04:06 PM
<b>Lithium</b>	ND		0.010	mg/L	1	12/8/2020 04:06 PM
<b>Molybdenum</b>	ND		0.0050	mg/L	1	12/8/2020 04:06 PM
<b>Selenium</b>	ND		0.0050	mg/L	1	12/8/2020 04:06 PM
<b>Thallium</b>	ND		0.0020	mg/L	1	12/8/2020 04:06 PM
<b>ANIONS BY ION CHROMATOGRAPHY</b>						
<b>Chloride</b>	<b>120</b>		<b>E300.0</b> <b>8.0</b>	<b>mg/L</b>		Analyst: <b>JDR</b> 12/8/2020 08:14 PM
<b>Fluoride</b>	ND		1.0	mg/L	1	12/8/2020 07:55 PM
<b>Sulfate</b>	<b>2.8</b>		<b>2.0</b>	<b>mg/L</b>	1	12/8/2020 07:55 PM
<b>PH (LABORATORY)</b>						
<b>pH (laboratory)</b>	<b>6.77</b>	H	<b>A4500-H B-11</b> <b>0.100</b>	<b>s.u.</b>	1	Analyst: <b>JB</b> 12/7/2020 12:54 PM
<b>Temperature</b>	<b>20.7</b>	H	<b>0.100</b>	<b>°C</b>	1	12/7/2020 12:54 PM
<b>TOTAL DISSOLVED SOLIDS</b>						
<b>Total Dissolved Solids</b>	<b>560</b>		<b>A2540 C-11</b> <b>100</b>	<b>mg/L</b>	Prep: FILTER 12/1/20 17:59 1	Analyst: <b>ERW</b> 12/3/2020 02:30 PM
<b>SUBCONTRACTED ANALYSES</b>						
<b>Subcontracted Analyses</b>	<b>See attached</b>		<b>SUBCONTRACT</b> <b>as noted</b>		1	Analyst: <b>ALS</b> 12/29/2020

**Note:** See Qualifiers page for a list of qualifiers and their definitions.

# ALS Group, USA

Date: 29-Dec-20

**Client:** NTH Consultants, Ltd.  
**Project:** Holland Board of Public Works  
**Sample ID:** Field Duplicate  
**Collection Date:** 11/24/2020

**Work Order:** 20112217  
**Lab ID:** 20112217-06  
**Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
<b>MERCURY BY CVAA</b>						
<b>Mercury</b>	<b>0.00025</b>		<b>SW7470A</b> <b>0.00020</b>	<b>mg/L</b>	Prep: SW7470 12/8/20 12:13 1	Analyst: <b>MAC</b> 12/8/2020 02:36 PM
<b>METALS BY ICP-MS</b>						
<b>Antimony</b>	ND		<b>SW6020B</b> 0.0050	mg/L	Prep: SW3015A 12/8/20 14:23 1	Analyst: <b>STP</b> 12/8/2020 04:08 PM
<b>Arsenic</b>	<b>0.029</b>		<b>0.0050</b>	<b>mg/L</b>	1	12/8/2020 04:08 PM
<b>Barium</b>	<b>0.29</b>		<b>0.0050</b>	<b>mg/L</b>	1	12/8/2020 04:08 PM
Beryllium	ND		0.0020	mg/L	1	12/8/2020 04:08 PM
<b>Boron</b>	<b>1.6</b>		<b>0.020</b>	<b>mg/L</b>	1	12/8/2020 04:08 PM
Cadmium	ND		0.0020	mg/L	1	12/8/2020 04:08 PM
<b>Calcium</b>	<b>100</b>		<b>0.50</b>	<b>mg/L</b>	1	12/8/2020 04:08 PM
Chromium	ND		0.0050	mg/L	1	12/8/2020 04:08 PM
Cobalt	ND		0.0050	mg/L	1	12/8/2020 04:08 PM
Lead	ND		0.0050	mg/L	1	12/8/2020 04:08 PM
<b>Lithium</b>	<b>0.14</b>		<b>0.010</b>	<b>mg/L</b>	1	12/8/2020 04:08 PM
Molybdenum	ND		0.0050	mg/L	1	12/8/2020 04:08 PM
Selenium	ND		0.0050	mg/L	1	12/8/2020 04:08 PM
Thallium	ND		0.0020	mg/L	1	12/8/2020 04:08 PM
<b>ANIONS BY ION CHROMATOGRAPHY</b>						
<b>Chloride</b>	<b>290</b>		<b>E300.0</b> <b>40</b>	<b>mg/L</b>	40	Analyst: <b>JDR</b> 12/8/2020 08:52 PM
Fluoride	ND		1.0	mg/L	1	12/8/2020 08:33 PM
<b>Sulfate</b>	<b>9.7</b>		<b>2.0</b>	<b>mg/L</b>	1	12/8/2020 08:33 PM
<b>PH (LABORATORY)</b>						
<b>pH (laboratory)</b>	<b>6.87</b>	H	<b>A4500-H B-11</b> <b>0.100</b>	<b>s.u.</b>	1	Analyst: <b>JB</b> 12/7/2020 12:54 PM
<b>Temperature</b>	<b>21.0</b>	H	<b>0.100</b>	<b>°C</b>	1	12/7/2020 12:54 PM
<b>TOTAL DISSOLVED SOLIDS</b>						
<b>Total Dissolved Solids</b>	<b>1,000</b>		<b>A2540 C-11</b> <b>300</b>	<b>mg/L</b>	Prep: FILTER 12/1/20 17:59 1	Analyst: <b>ERW</b> 12/3/2020 02:30 PM
<b>SUBCONTRACTED ANALYSES</b>						
<b>Subcontracted Analyses</b>	<b>See attached</b>		<b>SUBCONTRACT</b> <b>as noted</b>		1	Analyst: <b>ALS</b> 12/29/2020

**Note:** See Qualifiers page for a list of qualifiers and their definitions.

# ALS Group, USA

Date: 29-Dec-20

**Client:** NTH Consultants, Ltd.  
**Project:** Holland Board of Public Works  
**Sample ID:** Field Blank  
**Collection Date:** 11/24/2020 05:30 PM

**Work Order:** 20112217  
**Lab ID:** 20112217-07  
**Matrix:** WATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
<b>MERCURY BY CVAA</b>						
<b>Mercury</b>	<b>0.00023</b>		<b>SW7470A</b> <b>0.00020</b>	<b>mg/L</b>	Prep: SW7470 12/8/20 12:13 1	Analyst: <b>MAC</b> 12/8/2020 02:38 PM
<b>METALS BY ICP-MS</b>						
			<b>SW6020B</b>		Prep: SW3015A 12/8/20 14:23	Analyst: <b>STP</b>
Antimony	ND		0.0050	mg/L	1	12/8/2020 04:16 PM
Arsenic	ND		0.0050	mg/L	1	12/8/2020 04:16 PM
Barium	ND		0.0050	mg/L	1	12/8/2020 04:16 PM
Beryllium	ND		0.0020	mg/L	1	12/8/2020 04:16 PM
Boron	ND		0.020	mg/L	1	12/8/2020 04:16 PM
Cadmium	ND		0.0020	mg/L	1	12/8/2020 04:16 PM
Calcium	ND		0.50	mg/L	1	12/8/2020 04:16 PM
Chromium	ND		0.0050	mg/L	1	12/8/2020 04:16 PM
Cobalt	ND		0.0050	mg/L	1	12/8/2020 04:16 PM
Lead	ND		0.0050	mg/L	1	12/8/2020 04:16 PM
Lithium	ND		0.010	mg/L	1	12/8/2020 04:16 PM
Molybdenum	ND		0.0050	mg/L	1	12/8/2020 04:16 PM
Selenium	ND		0.0050	mg/L	1	12/8/2020 04:16 PM
Thallium	ND		0.0020	mg/L	1	12/8/2020 04:16 PM
<b>ANIONS BY ION CHROMATOGRAPHY</b>						
			<b>E300.0</b>			Analyst: <b>JDR</b>
Chloride	ND		1.0	mg/L	1	12/8/2020 03:05 PM
Fluoride	ND		1.0	mg/L	1	12/8/2020 03:05 PM
Sulfate	ND		2.0	mg/L	1	12/8/2020 03:05 PM
<b>PH (LABORATORY)</b>						
			<b>A4500-H B-11</b>			Analyst: <b>JB</b>
pH (laboratory)	<b>6.37</b>	H	<b>0.100</b>	<b>s.u.</b>	1	12/7/2020 12:54 PM
Temperature	<b>21.0</b>	H	<b>0.100</b>	<b>°C</b>	1	12/7/2020 12:54 PM
<b>TOTAL DISSOLVED SOLIDS</b>						
			<b>A2540 C-11</b>		Prep: FILTER 12/1/20 17:59	Analyst: <b>ERW</b>
Total Dissolved Solids	ND		30	mg/L	1	12/3/2020 02:30 PM
<b>SUBCONTRACTED ANALYSES</b>						
			<b>SUBCONTRACT</b>			Analyst: <b>ALS</b>
Subcontracted Analyses	See attached		as noted		1	12/29/2020

**Note:** See Qualifiers page for a list of qualifiers and their definitions.

# ALS Group, USA

Date: 29-Dec-20

**Client:** NTH Consultants, Ltd.  
**Project:** Holland Board of Public Works  
**Sample ID:** Equipment Blank  
**Collection Date:** 11/24/2020 05:30 PM

**Work Order:** 20112217  
**Lab ID:** 20112217-08  
**Matrix:** WATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
<b>MERCURY BY CVAA</b>						
<b>Mercury</b>	<b>0.00022</b>		<b>SW7470A</b> <b>0.00020</b>	<b>mg/L</b>	Prep: SW7470 12/8/20 12:13 1	Analyst: <b>MAC</b> 12/8/2020 02:40 PM
<b>METALS BY ICP-MS</b>						
			<b>SW6020B</b>		Prep: SW3015A 12/8/20 14:23	Analyst: <b>STP</b>
Antimony	ND		0.0050	mg/L	1	12/8/2020 04:18 PM
Arsenic	ND		0.0050	mg/L	1	12/8/2020 04:18 PM
Barium	ND		0.0050	mg/L	1	12/8/2020 04:18 PM
Beryllium	ND		0.0020	mg/L	1	12/8/2020 04:18 PM
Boron	ND		0.020	mg/L	1	12/8/2020 04:18 PM
Cadmium	ND		0.0020	mg/L	1	12/8/2020 04:18 PM
Calcium	ND		0.50	mg/L	1	12/8/2020 04:18 PM
Chromium	ND		0.0050	mg/L	1	12/8/2020 04:18 PM
Cobalt	ND		0.0050	mg/L	1	12/8/2020 04:18 PM
Lead	ND		0.0050	mg/L	1	12/8/2020 04:18 PM
Lithium	ND		0.010	mg/L	1	12/8/2020 04:18 PM
Molybdenum	ND		0.0050	mg/L	1	12/8/2020 04:18 PM
Selenium	ND		0.0050	mg/L	1	12/8/2020 04:18 PM
Thallium	ND		0.0020	mg/L	1	12/8/2020 04:18 PM
<b>ANIONS BY ION CHROMATOGRAPHY</b>						
			<b>E300.0</b>			Analyst: <b>JDR</b>
Chloride	ND		1.0	mg/L	1	12/8/2020 03:25 PM
Fluoride	ND		1.0	mg/L	1	12/8/2020 03:25 PM
Sulfate	ND		2.0	mg/L	1	12/8/2020 03:25 PM
<b>PH (LABORATORY)</b>						
<b>pH (laboratory)</b>	<b>5.85</b>	H	<b>A4500-H B-11</b> <b>0.100</b>	<b>s.u.</b>	1	Analyst: <b>JB</b> 12/7/2020 12:54 PM
<b>Temperature</b>	<b>21.0</b>	H	<b>0.100</b>	<b>°C</b>	1	12/7/2020 12:54 PM
<b>TOTAL DISSOLVED SOLIDS</b>						
Total Dissolved Solids	ND		<b>A2540 C-11</b> 30	mg/L	Prep: FILTER 12/1/20 17:59 1	Analyst: <b>ERW</b> 12/3/2020 02:30 PM
<b>SUBCONTRACTED ANALYSES</b>						
<b>Subcontracted Analyses</b>	<b>See attached</b>		<b>SUBCONTRACT</b> <b>as noted</b>		1	Analyst: <b>ALS</b> 12/29/2020

**Note:** See Qualifiers page for a list of qualifiers and their definitions.



**Client:** NTH Consultants, Ltd.  
**Work Order:** 20112217  
**Project:** Holland Board of Public Works

**QC BATCH REPORT**

Batch ID: **168861** Instrument ID **HG4** Method: **SW7470A**

<b>MBLK</b>		Sample ID: <b>MBLK-168861-168861</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/9/2020 08:40 AM</b>		
Client ID:		Run ID: <b>HG4_201209A</b>				SeqNo: <b>6971362</b>		Prep Date: <b>12/8/2020</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Mercury ND 0.00020

<b>LCS</b>		Sample ID: <b>LCS-168861-168861</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/8/2020 01:57 PM</b>		
Client ID:		Run ID: <b>HG4_201208A</b>				SeqNo: <b>6969850</b>		Prep Date: <b>12/8/2020</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Mercury 0.002055 0.00020 0.002 0 103 80-120 0

<b>MS</b>		Sample ID: <b>20112217-04AMS</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/8/2020 02:31 PM</b>		
Client ID: <b>MW-3</b>		Run ID: <b>HG4_201208A</b>				SeqNo: <b>6969864</b>		Prep Date: <b>12/8/2020</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Mercury 0.00192 0.00020 0.002 -0.0000435 98.2 75-125 0

<b>MSD</b>		Sample ID: <b>20112217-04AMSD</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/8/2020 02:32 PM</b>		
Client ID: <b>MW-3</b>		Run ID: <b>HG4_201208A</b>				SeqNo: <b>6969865</b>		Prep Date: <b>12/8/2020</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Mercury 0.001845 0.00020 0.002 -0.0000435 94.4 75-125 0.00192 3.98 20

The following samples were analyzed in this batch:

20112217-01A	20112217-02A	20112217-03A
20112217-04A	20112217-05A	20112217-06A
20112217-07A	20112217-08A	

Client: NTH Consultants, Ltd.  
 Work Order: 20112217  
 Project: Holland Board of Public Works

## QC BATCH REPORT

Batch ID: **168869** Instrument ID **ICPMS3** Method: **SW6020B**

MBLK		Sample ID: <b>MBLK-168869-168869</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/8/2020 03:44 PM</b>		
Client ID:		Run ID: <b>ICPMS3_201208A</b>				SeqNo: <b>6969146</b>		Prep Date: <b>12/8/2020</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	ND	0.0050								
Arsenic	ND	0.0050								
Barium	ND	0.0050								
Beryllium	ND	0.0020								
Boron	ND	0.020								
Cadmium	ND	0.0020								
Calcium	ND	0.50								
Chromium	ND	0.0050								
Cobalt	ND	0.0050								
Lead	ND	0.0050								
Lithium	ND	0.010								
Molybdenum	ND	0.0050								
Selenium	ND	0.0050								
Thallium	ND	0.0050								

LCS		Sample ID: <b>LCS-168869-168869</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/8/2020 03:46 PM</b>		
Client ID:		Run ID: <b>ICPMS3_201208A</b>				SeqNo: <b>6969147</b>		Prep Date: <b>12/8/2020</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.09792	0.0050	0.1	0	97.9	80-120	0			
Arsenic	0.1003	0.0050	0.1	0	100	80-120	0			
Barium	0.1008	0.0050	0.1	0	101	80-120	0			
Beryllium	0.1047	0.0020	0.1	0	105	80-120	0			
Boron	0.5338	0.020	0.5	0	107	80-120	0			
Cadmium	0.1028	0.0020	0.1	0	103	80-120	0			
Calcium	10.29	0.50	10	0	103	80-120	0			
Chromium	0.1038	0.0050	0.1	0	104	80-120	0			
Cobalt	0.1047	0.0050	0.1	0	105	80-120	0			
Lead	0.1015	0.0050	0.1	0	101	80-120	0			
Lithium	0.09842	0.010	0.1	0	98.4	80-120	0			
Molybdenum	0.1027	0.0050	0.1	0	103	80-120	0			
Selenium	0.1006	0.0050	0.1	0	101	80-120	0			
Thallium	0.09517	0.0050	0.1	0	95.2	80-120	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: NTH Consultants, Ltd.  
 Work Order: 20112217  
 Project: Holland Board of Public Works

## QC BATCH REPORT

Batch ID: **168869** Instrument ID **ICPMS3** Method: **SW6020B**

MS				Sample ID: <b>20112217-04AMS</b>			Units: <b>mg/L</b>		Analysis Date: <b>12/8/2020 04:03 PM</b>	
Client ID: <b>MW-3</b>				Run ID: <b>ICPMS3_201208A</b>			SeqNo: <b>6969433</b>		Prep Date: <b>12/8/2020</b>	
									DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.09679	0.0050	0.1	0.0001199	96.7	75-125	0			
Arsenic	0.09873	0.0050	0.1	0.0006677	98.1	75-125	0			
Barium	0.2085	0.0050	0.1	0.1104	98.1	75-125	0			
Beryllium	0.103	0.0020	0.1	0.0000528	103	75-125	0			
Boron	0.9917	0.020	0.5	0.4697	104	75-125	0			
Cadmium	0.1006	0.0020	0.1	0	101	75-125	0			
Calcium	101.4	0.50	10	95.26	61.2	75-125	0			SO
Chromium	0.1024	0.0050	0.1	0.0007051	102	75-125	0			
Cobalt	0.1024	0.0050	0.1	0.0002629	102	75-125	0			
Lead	0.1014	0.0050	0.1	0.0002156	101	75-125	0			
Lithium	0.112	0.010	0.1	0.01535	96.7	75-125	0			
Molybdenum	0.1028	0.0050	0.1	0.0007359	102	75-125	0			
Selenium	0.09924	0.0050	0.1	-0.0003245	99.6	75-125	0			
Thallium	0.09504	0.0050	0.1	-0.0000231	95.1	75-125	0			

MSD				Sample ID: <b>20112217-04AMSD</b>			Units: <b>mg/L</b>		Analysis Date: <b>12/8/2020 04:05 PM</b>	
Client ID: <b>MW-3</b>				Run ID: <b>ICPMS3_201208A</b>			SeqNo: <b>6969434</b>		Prep Date: <b>12/8/2020</b>	
									DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.09862	0.0050	0.1	0.0001199	98.5	75-125	0.09679	1.87	20	
Arsenic	0.1015	0.0050	0.1	0.0006677	101	75-125	0.09873	2.8	20	
Barium	0.208	0.0050	0.1	0.1104	97.6	75-125	0.2085	0.248	20	
Beryllium	0.1051	0.0020	0.1	0.0000528	105	75-125	0.103	2.01	20	
Boron	1.011	0.020	0.5	0.4697	108	75-125	0.9917	1.98	20	
Cadmium	0.1037	0.0020	0.1	0	104	75-125	0.1006	3.01	20	
Calcium	101	0.50	10	95.26	57.2	75-125	101.4	0.394	20	SO
Chromium	0.1025	0.0050	0.1	0.0007051	102	75-125	0.1024	0.129	20	
Cobalt	0.1041	0.0050	0.1	0.0002629	104	75-125	0.1024	1.63	20	
Lead	0.1049	0.0050	0.1	0.0002156	105	75-125	0.1014	3.34	20	
Lithium	0.1132	0.010	0.1	0.01535	97.8	75-125	0.112	0.983	20	
Molybdenum	0.1071	0.0050	0.1	0.0007359	106	75-125	0.1028	4.11	20	
Selenium	0.1027	0.0050	0.1	-0.0003245	103	75-125	0.09924	3.38	20	
Thallium	0.09767	0.0050	0.1	-0.0000231	97.7	75-125	0.09504	2.72	20	

The following samples were analyzed in this batch:

20112217-01A	20112217-02A	20112217-03A
20112217-04A	20112217-05A	20112217-06A
20112217-07A	20112217-08A	

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: NTH Consultants, Ltd.  
 Work Order: 20112217  
 Project: Holland Board of Public Works

## QC BATCH REPORT

Batch ID: **168457** Instrument ID **TDS** Method: **A2540 C-11**

<b>MBLK</b>		Sample ID: <b>MBLK-168457-168457</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/2/2020 03:48 PM</b>		
Client ID:		Run ID: <b>TDS_201202C</b>				SeqNo: <b>6952481</b>		Prep Date: <b>11/30/2020</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Total Dissolved Solids ND 30

<b>LCS</b>		Sample ID: <b>LCS-168457-168457</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/2/2020 03:48 PM</b>		
Client ID:		Run ID: <b>TDS_201202C</b>				SeqNo: <b>6952480</b>		Prep Date: <b>11/30/2020</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Total Dissolved Solids 486 30 495 0 98.2 85-109 0

<b>DUP</b>		Sample ID: <b>20112115-01C DUP</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/2/2020 03:48 PM</b>		
Client ID:		Run ID: <b>TDS_201202C</b>				SeqNo: <b>6952459</b>		Prep Date: <b>11/30/2020</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Total Dissolved Solids 366.7 50 0 0 0 0-0 383.3 4.44 10

<b>DUP</b>		Sample ID: <b>20112217-04B DUP</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/2/2020 03:48 PM</b>		
Client ID: <b>MW-3</b>		Run ID: <b>TDS_201202C</b>				SeqNo: <b>6952477</b>		Prep Date: <b>11/30/2020</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Total Dissolved Solids 566.7 50 0 0 0 0-0 530 6.69 10

The following samples were analyzed in this batch:

20112217-01B	20112217-02B	20112217-03B
20112217-04B		

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: NTH Consultants, Ltd.  
 Work Order: 20112217  
 Project: Holland Board of Public Works

# QC BATCH REPORT

Batch ID: **168553** Instrument ID **TDS** Method: **A2540 C-11**

<b>MBLK</b>		Sample ID: <b>MBLK-168553-168553</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/3/2020 02:30 PM</b>		
Client ID:		Run ID: <b>TDS_201203D</b>				SeqNo: <b>6956231</b>		Prep Date: <b>12/1/2020</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids	ND	30								

<b>LCS</b>		Sample ID: <b>LCS-168553-168553</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/3/2020 02:30 PM</b>		
Client ID:		Run ID: <b>TDS_201203D</b>				SeqNo: <b>6956230</b>		Prep Date: <b>12/1/2020</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids	490	30	495	0	99	85-109	0			

<b>DUP</b>		Sample ID: <b>20112217-05B DUP</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/3/2020 02:30 PM</b>		
Client ID: <b>MW-3A</b>		Run ID: <b>TDS_201203D</b>				SeqNo: <b>6956225</b>		Prep Date: <b>12/1/2020</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids	566.7	100	0	0	0	0-0	560	1.18	10	

The following samples were analyzed in this batch:

20112217-05B	20112217-06B	20112217-07B
20112217-08B		

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

**Client:** NTH Consultants, Ltd.  
**Work Order:** 20112217  
**Project:** Holland Board of Public Works

# QC BATCH REPORT

Batch ID: **R305153** Instrument ID **Titration 1** Method: **A4500-H B-11**

<b>LCS</b>		Sample ID: <b>LCS-R305153-R305153</b>				Units: <b>s.u.</b>		Analysis Date: <b>12/7/2020 12:54 PM</b>		
Client ID:		Run ID: <b>TITRATOR 1_201207B</b>				SeqNo: <b>6963900</b>		Prep Date:		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
pH (laboratory)	3.95	0.10	4	0	98.8	92-108	0			

<b>DUP</b>		Sample ID: <b>20112217-01B DUP</b>				Units: <b>s.u.</b>		Analysis Date: <b>12/7/2020 12:54 PM</b>		
Client ID: <b>PZ-1</b>		Run ID: <b>TITRATOR 1_201207B</b>				SeqNo: <b>6963902</b>		Prep Date:		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
pH (laboratory)	8.46	0.10	0	0	0	0-0	8.2	3.12	5	H
Temperature	21.03	0.10	0	0	0	0-0	21.08	0.237		H

<b>DUP</b>		Sample ID: <b>20112328-01A DUP</b>				Units: <b>s.u.</b>		Analysis Date: <b>12/7/2020 12:54 PM</b>		
Client ID:		Run ID: <b>TITRATOR 1_201207B</b>				SeqNo: <b>6963913</b>		Prep Date:		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
pH (laboratory)	7.53	0.10	0	0	0	0-0	7.39	1.88	5	H
Temperature	21.08	0.10	0	0	0	0-0	21.15	0.332		H

**The following samples were analyzed in this batch:**

20112217-01B	20112217-02B	20112217-03B
20112217-04B	20112217-05B	20112217-06B
20112217-07B	20112217-08B	

**Note:** See Qualifiers Page for a list of Qualifiers and their explanation.

Client: NTH Consultants, Ltd.  
 Work Order: 20112217  
 Project: Holland Board of Public Works

## QC BATCH REPORT

Batch ID: **R305326** Instrument ID **IC3** Method: **E300.0**

MBLK Sample ID: <b>MBLK-R305326</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/8/2020 01:29 PM</b>				
Client ID:		Run ID: <b>IC3_201208A</b>		SeqNo: <b>6971195</b>		Prep Date:		DF: <b>1</b>		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	ND	1.0								
Fluoride	ND	0.10								
Sulfate	ND	1.0								

MBLK Sample ID: <b>MBLK-R305326</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/8/2020 09:12 PM</b>				
Client ID:		Run ID: <b>IC3_201208A</b>		SeqNo: <b>6971219</b>		Prep Date:		DF: <b>1</b>		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	ND	1.0								
Fluoride	ND	0.10								
Sulfate	ND	1.0								

MBLK Sample ID: <b>MBLK-R305326</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/9/2020 02:39 AM</b>				
Client ID:		Run ID: <b>IC3_201208A</b>		SeqNo: <b>6971236</b>		Prep Date:		DF: <b>1</b>		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	ND	1.0								
Fluoride	ND	0.10								
Sulfate	ND	1.0								

LCS Sample ID: <b>LCS-R305326</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/8/2020 01:48 PM</b>				
Client ID:		Run ID: <b>IC3_201208A</b>		SeqNo: <b>6971196</b>		Prep Date:		DF: <b>1</b>		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	9.372	1.0	10	0	93.7	90-110	0			
Fluoride	1.808	0.10	2	0	90.4	90-110	0			
Sulfate	9.738	1.0	10	0	97.4	90-110	0			

LCS Sample ID: <b>LCS-R305326</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/8/2020 09:31 PM</b>				
Client ID:		Run ID: <b>IC3_201208A</b>		SeqNo: <b>6971220</b>		Prep Date:		DF: <b>1</b>		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	9.405	1.0	10	0	94	90-110	0			
Fluoride	1.915	0.10	2	0	95.7	90-110	0			
Sulfate	9.659	1.0	10	0	96.6	90-110	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: NTH Consultants, Ltd.  
 Work Order: 20112217  
 Project: Holland Board of Public Works

## QC BATCH REPORT

Batch ID: **R305326** Instrument ID **IC3** Method: **E300.0**

LCS				Sample ID: LCS-R305326			Units: mg/L		Analysis Date: 12/9/2020 02:58 AM		
Client ID:			Run ID: IC3_201208A			SeqNo: 6971237		Prep Date:		DF: 1	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Chloride	9.418	1.0	10	0	94.2	90-110	0				
Fluoride	1.96	0.10	2	0	98	90-110	0				
Sulfate	9.756	1.0	10	0	97.6	90-110	0				

MS				Sample ID: 20112217-04B MS				Units: mg/L		Analysis Date: 12/8/2020 07:16 PM		
Client ID: MW-3				Run ID: IC3_201208A				SeqNo: 6971213		Prep Date:		DF: 20
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual		
Chloride	263	20	200	71.93	95.6	80-120	0					
Fluoride	31.67	2.0	40	0	79.2	80-120	0			S		
Sulfate	285.7	20	200	98.95	93.4	80-120	0					

MS				Sample ID: 20120200-08D MS				Units: mg/L		Analysis Date: 12/9/2020 02:00 AM		
Client ID:			Run ID: IC3_201208A			SeqNo: 6971234		Prep Date:		DF: 40		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual		
Chloride	615.3	40	400	245.7	92.4	80-120		0				
Fluoride	72.29	4.0	80	0	90.4	80-120		0				
Sulfate	377.7	40	400	7.804	92.5	80-120		0				

MS				Sample ID: 20120200-13D MS				Units: mg/L		Analysis Date: 12/9/2020 04:54 AM		
Client ID:			Run ID: IC3_201208A			SeqNo: 6971243		Prep Date:		DF: 20		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual		
Chloride	441.2	20	200	239.1	101	80-120	0			E		
Fluoride	36.21	2.0	40	0	90.5	80-120	0					
Sulfate	244.3	20	200	57.51	93.4	80-120	0					

MSD				Sample ID: 20112217-04B MSD			Units: mg/L		Analysis Date: 12/8/2020 07:35 PM		
Client ID: MW-3			Run ID: IC3_201208A			SeqNo: 6971214		Prep Date:		DF: 20	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Chloride	262.6	20	200	71.93	95.4	80-120	263	0.15	20		
Fluoride	31.48	2.0	40	0	78.7	80-120	31.67	0.621	20	S	
Sulfate	285.4	20	200	98.95	93.2	80-120	285.7	0.114	20		

Note: See Qualifiers Page for a list of Qualifiers and their explanation.



**Client:** NTH Consultants, Ltd.  
**Work Order:** 20112217  
**Project:** Holland Board of Public Works

# QC BATCH REPORT

Batch ID: **R305326** Instrument ID **IC3** Method: **E300.0**

MSD				Sample ID: <b>20120200-08D MSD</b>			Units: <b>mg/L</b>		Analysis Date: <b>12/9/2020 02:20 AM</b>	
Client ID:				Run ID: <b>IC3_201208A</b>			SeqNo: <b>6971235</b>		Prep Date:	
									DF: <b>40</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	613.3	40	400	245.7	91.9	80-120	615.3	0.325	20	
Fluoride	73.46	4.0	80	0	91.8	80-120	72.29	1.6	20	
Sulfate	374.6	40	400	7.804	91.7	80-120	377.7	0.824	20	

MSD				Sample ID: <b>20120200-13D MSD</b>			Units: <b>mg/L</b>		Analysis Date: <b>12/9/2020 05:13 AM</b>	
Client ID:				Run ID: <b>IC3_201208A</b>			SeqNo: <b>6971244</b>		Prep Date:	
									DF: <b>20</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	441.1	20	200	239.1	101	80-120	441.2	0.019	20	E
Fluoride	36.47	2.0	40	0	91.2	80-120	36.21	0.737	20	
Sulfate	243.8	20	200	57.51	93.1	80-120	244.3	0.204	20	

The following samples were analyzed in this batch:

20112217-01B	20112217-02B	20112217-03B
20112217-04B	20112217-05B	20112217-06B
20112217-07B	20112217-08B	

**Note:** See Qualifiers Page for a list of Qualifiers and their explanation.



Cincinnati, OH  
+1 513 733 5336

Everett, WA  
+1 425 356 2600

Fort Collins, CO  
+1 970 490 1511

Holland, MI  
+1 616 399 6070

# Chain of Custody Form

Page \_\_\_\_ of \_\_\_\_

COC ID: 189585

Houston, TX  
+1 281 530 5656

Middletown, PA  
+1 717 944 5541

Spring City, PA  
+1 610 948 4903

Salt Lake City, UT  
+1 801 266 7700

South Charleston, WV  
+1 304 356 3168

York, PA  
+1 717 505 5280

Customer Information		Project Information		ALS Project Manager: _____ ALS Work Order #: 20112217																
Parameter/Method Request for Analysis																				
Purchase Order		Project Name	Holland Bpw James pp	A	Metals including Hg															
Work Order		Project Number	73-166017	B	Chloride, Fluoride, Sulfate															
Company Name	NTH Consultants, Ltd.	Bill To Company	Holland Board of Public Works	C	pH															
Send Report To	Karen Okonta	Invoice Attn	Accounts Payable	D	TDS															
Address	41780 Six Mile Road	Address	625 Hastings	E	Radium 226 & 228															
				F																
City/State/Zip	Northville, MI 48168	City/State/Zip	Holland, MI 49423	G																
Phone	(248) 662-2668	Phone	(616) 355-1210	H																
Fax	(248) 324-3305	Fax		I																
e-Mail Address		e-Mail Address		J																

No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1	PZ-1	11-24-20	10:30a	GW	2	4	X	X	X	X	X						
2	MW-1	11-24-20	1:15p	GW	2	4	X	X	X	X	X						
3	MW-2	11-24-20	2:50p	GW	2	4	X	X	X	X	X						
4	MW-3	11-24-20	4:35p	GW	2	4	X	X	X	X	X						
5	MW-3A	11-24-20	4:35p	GW	2	4	X	X	X	X	X						
6	MW-3-MS	11-24-20	4:35p	GW	2	4	X	X	X	X	X						
7	MW-3-MSD	11-24-20	4:35p	GW	2	4	X	X	X	X	X						
8	Field Duplicate	11-24-20	N/A	GW	2	4	X	X	X	X	X						
9	Field Blank	11-24-20	5:30p	GW	2	4	X	X	X	X	X						
10	Equipment Blank	11-24-20	5:30p	GW	2	4	X	X	X	X	X						

Sampler(s) Please Print & Sign Brittany Stachurski		Shipment Method Drop-off		Required Turnaround Time: (Check Box) <input checked="" type="checkbox"/> Std 10 WK Days <input type="checkbox"/> 5 WK Days <input type="checkbox"/> Other <input type="checkbox"/> 2 WK Days <input type="checkbox"/> 24 Hour				Results Due Date:	
Relinquished by:	Date:	Time:	Received by:	Notes:					
Relinquished by:	Date: 11/24/20	Time: 1900	Received by (Laboratory):	Cooler ID: 123 PH23					
Logged by (Laboratory):	Date: 11/25/20	Time: 1035	Checked by (Laboratory):	Cooler Temp: 2.4° 4.9° 3.9° 3.7° 4.8°					
Preservative Key: 1-HCl 2-HNO <sub>3</sub> 3-H <sub>2</sub> SO <sub>4</sub> 4-NaOH 5-Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> 6-NaHSO <sub>4</sub> 7-Other 8-4°C 9-5035				QC Package: (Check One Box Below) <input type="checkbox"/> Level II Std QC <input type="checkbox"/> TRRP Checklist <input type="checkbox"/> Level III Std QC/Raw Data <input type="checkbox"/> TRRP Level IV <input type="checkbox"/> Level IV SW846/CLP <input type="checkbox"/> Other					

Note: 1. Any changes must be made in writing once samples and COC Form have been submitted to ALS Environmental.  
 2. Unless otherwise agreed in a formal contract, services provided by ALS Environmental are expressly limited to the terms and conditions stated on the reverse.  
 3. The Chain of Custody is a legal document. All information must be completed accurately.

Copyright 2011 by ALS Environmental.

Sample Receipt Checklist

Client Name: **NTH - NORTHVILLE**

Date/Time Received: **24-Nov-20 18:00**

Work Order: **20112217**

Received by: **KRW**

Checklist completed by **Keith Wierenga**

25-Nov-20

Reviewed by: **Chad Whelton**

30-Nov-20

eSignature

Date

eSignature

Date

Matrices: **Water**

Carrier name: **FedEx**

Shipping container/cooler in good condition?

Yes ☒

No ☐

Not Present ☐

Custody seals intact on shipping container/cooler?

Yes ☐

No ☐

Not Present ☒

Custody seals intact on sample bottles?

Yes ☐

No ☐

Not Present ☒

Chain of custody present?

Yes ☒

No ☐

Chain of custody signed when relinquished and received?

Yes ☐

No ☒

Chain of custody agrees with sample labels?

Yes ☒

No ☐

Samples in proper container/bottle?

Yes ☒

No ☐

Sample containers intact?

Yes ☒

No ☐

Sufficient sample volume for indicated test?

Yes ☒

No ☐

All samples received within holding time?

Yes ☒

No ☐

Container/Temp Blank temperature in compliance?

Yes ☒

No ☐

Sample(s) received on ice?

Yes ☒

No ☐

Temperature(s)/Thermometer(s):

2.4, 3.8, 4.8, 4.9, 3.7 C

IR3

Cooler(s)/Kit(s):

Date/Time sample(s) sent to storage:

11/25/2020 10:42:39 AM

Water - VOA vials have zero headspace?

Yes ☐

No ☐

No VOA vials submitted ☒

Water - pH acceptable upon receipt?

Yes ☒

No ☐

N/A ☐

pH adjusted?

Yes ☐

No ☒

N/A ☐

pH adjusted by:

-

Login Notes:

Client Contacted:

Date Contacted:

Person Contacted:

Contacted By:

Regarding:

Comments:

CorrectiveAction:



Monday, December 28, 2020

Chad Whelton  
ALS Environmental  
3352 128th Avenue  
Holland, MI 49424

Re: ALS Workorder: 2012004  
Project Name:  
Project Number: 20112217

Dear Mr. Whelton:

Eight water samples were received from ALS Environmental, on 12/1/2020. The samples were scheduled for the following analyses:

Radium-226

Radium-228

The results for these analyses are contained in the enclosed reports.

The data contained in the following report have been reviewed and approved by the personnel listed below. In addition, ALS certifies that the analyses reported herein are true, complete and correct within the limits of the methods employed. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained from ALS Environmental.

Thank you for your confidence in ALS Environmental. Should you have any questions, please call.

Sincerely,

ALS Environmental  
Julie Ellingson  
Project Manager

ALS Environmental – Fort Collins is accredited by the following accreditation bodies for various testing scopes in accordance with requirements of each accreditation body. All testing is performed under the laboratory management system, which is maintained to meet these requirement and regulations. Please contact the laboratory or accreditation body for the current scope testing parameters.

ALS Environmental – Fort Collins	
Accreditation Body	License or Certification Number
Alaska (AK)	17-003
Arizona (AZ)	AZ0742
California (CA)	2926
Colorado (CO)	CO01099
Florida (FL)	E87914
Idaho (ID)	CO01099
Kansas (KS)	E-10381
Kentucky (KY)	90137
PJ-LA (DoD ELAP/ISO 170250)	95377
Maryland (MD)	285
Missouri (MO)	175
Nebraska(NE)	NE-OS-24-13
Nevada (NV)	CO010992018-1
New York (NY)	12036
North Dakota (ND)	R-057
Oklahoma (OK)	1301
Pennsylvania (PA)	68-03116
Tennessee (TN)	TN02976
Texas (TX)	T104704241
Utah (UT)	CO01099
Washington (WA)	C1280



## 2012004

### **Radium-228:**

The samples were analyzed for the presence of  $^{228}\text{Ra}$  by low background gas flow proportional counting of  $^{228}\text{Ac}$ , which is the ingrown progeny of  $^{228}\text{Ra}$ , according to the current revision of SOP 724.

All acceptance criteria were met.

### **Radium-226:**

The samples were analyzed for the presence of  $^{226}\text{Ra}$  according to the current revision of SOP 724.

All acceptance criteria were met.

# ALS -- Fort Collins

## Sample Number(s) Cross-Reference Table

---

**OrderNum:** 2012004

**Client Name:** ALS Environmental

**Client Project Name:**

**Client Project Number:** 20112217

**Client PO Number:** 20-122020059

---

Client Sample Number	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
PZ-1	2012004-1		WATER	24-Nov-20	10:30
MW-1	2012004-2		WATER	24-Nov-20	13:15
MW-2	2012004-3		WATER	24-Nov-20	14:50
MW-3A	2012004-4		WATER	24-Nov-20	17:55
Field Duplicate	2012004-5		WATER	24-Nov-20	
Field Blank	2012004-6		WATER	24-Nov-20	17:30
Equipment Blank	2012004-7		WATER	24-Nov-20	17:30
MW-3	2012004-8		WATER	24-Nov-20	16:35

**Subcontractor:**

ALS Environmental, Fort Collins  
225 Commerce Dr.

TEL: (800) 443-1511

FAX:

Acct #:

Fort Collins, CO 80524

**CHAIN-OF-CUSTODY RECORD**

Page 1 of 1

Date: **30-Nov-20**

COC ID: **15283**

Due Date: **15-Dec-20**

Salesperson

ALSHN Account

Customer Information		Project Information		Parameter/Method Request for Analysis											
Purchase Order		Project Name	20112217	A Subcontracted Analyses (SUBCONTRACT)											
Work Order		Project Number		B <i>MS/MSD</i>											
Company Name	ALS Group USA, Corp	Bill To Company	ALS Group USA, Corp	C											
Send Report To	Chad Whelton	Inv Attn	Accounts Payable	D											
Address	3352 128th Ave	Address	3352 128th Ave	E											
				F											
City/State/Zip	Holland, Michigan 49424	City/State/Zip	Holland, Michigan 49424	G											
Phone	(616) 399-6070	Phone	(616) 399-6070	H											
Fax	(616) 399-6185	Fax	(616) 399-6185	I											
eMail Address	chad.whelton@alsglobal.com	eMail CC		J											

ALS Sample ID	Client Sample ID	Matrix	Collection Date 24hr	Bottle	A	B	C	D	E	F	G	H	I	J
1 20112217-01C	PZ-1	Groundwater	24/Nov/2020 10:30	(2) 1LPHNO3	X									
2 20112217-02C	MW-1	Groundwater	24/Nov/2020 13:15	(2) 1LPHNO3	X									
3 20112217-03C	MW-2	Groundwater	24/Nov/2020 14:50	(2) 1LPHNO3	X									
4 20112217-05C	MW-3A	Groundwater	24/Nov/2020 17:55	(2) 1LPHNO3	X									
5 20112217-06C	Field Duplicate	Groundwater	24/Nov/2020	(2) 1LPHNO3	X									
6 20112217-07C	Field Blank	Water	24/Nov/2020 17:30	(2) 1LPHNO3	X									
7 20112217-08C	Equipment Blank	Water	24/Nov/2020 17:30	(2) 1LPHNO3	X									
20112217-09C	MW-4	Groundwater	24/Nov/2020 12:16	(2) 1LPHNO3	X									
8 20112217-04C	MW-3	Groundwater	24/Nov/2020 16:35	(6) 1LPHNO3	X	X								

**Comments:**

Please analyze these samples per our instructions and indicated turnaround requirements. Please include all QC with data. The samples do not need to be returned and can be disposed after 30 days. Report MW-4 separately.

Relinquished by:	Date/Time: 11-30-20 1200	Received by:	Date/Time: 12-01-20 1030	Cooler IDs	Report/QC Level
Relinquished by:	Date/Time:	Received by:	Date/Time:		Std





ALS Environmental - Fort Collins  
CONDITION OF SAMPLE UPON RECEIPT FORM

Client Name/ID:

Holland

Workorder No:

2012004

Project Manager:

JME

Initials:

RGA

Date: 12/01/2020

1. Are airbills / shipping documents present and/or removable?	<input type="checkbox"/> Drop Off	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
2. Are custody seals on shipping containers intact?	<input checked="" type="checkbox"/> NONE	<input type="checkbox"/> YES	<input type="checkbox"/> NO*
3. Are custody seals on sample containers intact?	<input checked="" type="checkbox"/> NONE	<input type="checkbox"/> YES	<input type="checkbox"/> NO*
4. Is there a COC (chain-of-custody) present?		<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO*
5. Is the COC in agreement with samples received? (IDs, dates, times, # of samples, # of containers, matrix, requested analyses, etc.)		<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO*
6. Are short-hold samples present?		<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO
7. Are all samples within holding times for the requested analyses?		<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO*
8. Were all sample containers received intact? (not broken or leaking)		<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO*
9. Is there sufficient sample for the requested analyses?		<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO*
10. Are samples in proper containers for requested analyses? (form 250, Sample Handling Guidelines)		<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO*
11. Are all aqueous samples preserved correctly, if required?	<input type="checkbox"/> N/A	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO*
12. Were unpreserved samples pH checked, if required?	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> YES	<input type="checkbox"/> NO
13. Are all samples requiring no headspace (VOC, GRO, RSK/MEE, radon) free of bubbles > 6 mm in diameter?	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> YES	<input type="checkbox"/> NO
14. Were the samples shipped on ice?		<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO
15. Were cooler temperatures measured at 0.1 - 6.0°C?	IR gun used: <input type="checkbox"/> #3 <input type="checkbox"/> #5	<input checked="" type="checkbox"/> Rad Only	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO

Cooler #: 1 2

Temperature (°C): amb amb

# of custody seals on cooler: 0 0

External mR/hr reading: 11 11

Background mR/hr reading: 9

Were external mR/hr readings ≤ two times background and within DOT acceptance criteria? (If no, see Form 008)

☐ N/A ☒ YES ☐ NO

\* Please provide details below for 'NO' responses in gray boxes above - for 2 thru 5 & 7 thru 12, notify PM & continue w/ login.

All client bottle ID's vs ALS lab ID's double-checked by: RGA

If applicable, was the client contacted? ☐ YES ☐ N/A Contact Name

Date:

Project Manager Signature / Date:

 12/1/20

Ref: Date: 30Nov20  
Dep: Wgt: 21.05 LBS  
DV: 0.00

SHIPPING: 0.00  
SPECIAL: 0.00  
HANDLING: 0.00  
TOTAL: 0.00

Svc: PRIORITY OVERNIGHT Master 1668 7926 2290  
TRACK: 1668 7926 2304

ORIGIN ID: GRRA (616) 399-6070  
ALS ENVIRONMENTAL  
ALS ENVIRONMENTAL  
3352 128TH AVENUE

HOLLAND, MI 494249263  
UNITED STATES US

SHIP-DATE: 30NOV20  
ACTWGT: 21.05 LB  
CAD: 0122071/CAFE3311

BILL THIRD PARTY

TO SAMPLE RECEIVING  
ALS ENVIRONMENTAL  
225 COMMERCE DR

FORT COLLINS CO 80524

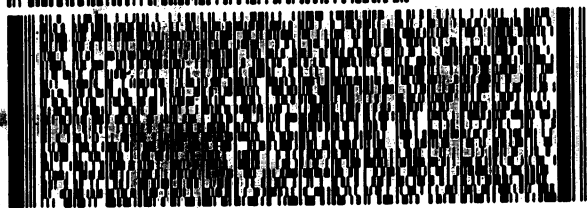
(970) 490-1511

REF:

INV:

PO:

DEPT:



FedEx  
Express



2 of 2

MPS# 1668 7926-2304

Mstr# 1668 7926 2290

|0201|

NA FTCA

TUE - 01 DEC 10:30A  
PRIORITY OVERNIGHT

80524

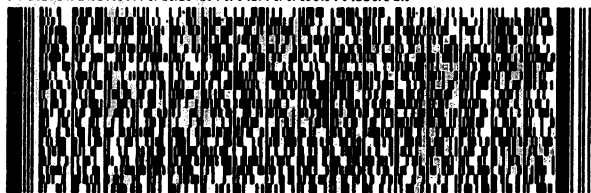
CO-US DEN



0.0  
0.0  
0.0  
0.0

BILL THIRD PARTY

DEPT:



**FedEx**  
Express



**TUE - 01 DEC 10:30A**  
**PRIORITY OVERNIGHT**

# NA FTCA

80524

CO-US DEN



Client: ALS Environmental

Date: 28-Dec-20

Project: 20112217

Work Order: 2012004

Sample ID: PZ-1

Lab ID: 2012004-1

Legal Location:

Matrix: WATER

Collection Date: 11/24/2020 10:30

Percent Moisture:

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
<b>Radium-226 by Radon Emanation - Method 903.1</b>						
Ra-226	ND (+/- 0.28)	U	0.54	pCi/l	NA	12/19/2020 11:25
Carr: BARIUM	61.8		40-110	%REC	DL = NA	12/19/2020 11:25
<b>Radium-228 Analysis by GFPC</b>						
Ra-228	ND (+/- 0.49)	U	0.93	pCi/l	NA	12/22/2020 10:43
Carr: BARIUM	72.8		40-110	%REC	DL = NA	12/22/2020 10:43

Client: ALS Environmental

Date: 28-Dec-20

Project: 20112217

Work Order: 2012004

Sample ID: MW-1

Lab ID: 2012004-2

Legal Location:

Matrix: WATER

Collection Date: 11/24/2020 13:15

Percent Moisture:

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
<b>Radium-226 by Radon Emanation - Method 903.1</b>						
<b>Ra-226</b>	<b>0.8 (+/- 0.6)</b>		<b>SOP 783</b>		Prep Date: <b>12/9/2020</b>	PrepBy: <b>TRB</b>
<i>Carr: BARIUM</i>	95.3		<b>0.72</b>	<b>pCi/l</b>	NA	12/19/2020 11:25
			<b>40-110</b>	<b>%REC</b>	DL = NA	12/19/2020 11:25
<b>Radium-228 Analysis by GFPC</b>						
<b>Ra-228</b>	<b>1.73 (+/- 0.64)</b>		<b>SOP 724</b>		Prep Date: <b>12/15/2020</b>	PrepBy: <b>RGS</b>
<i>Carr: BARIUM</i>	78		<b>0.92</b>	<b>pCi/l</b>	NA	12/22/2020 10:43
			<b>40-110</b>	<b>%REC</b>	DL = NA	12/22/2020 10:43

Client: ALS Environmental

Date: 28-Dec-20

Project: 20112217

Work Order: 2012004

Sample ID: MW-2

Lab ID: 2012004-3

Legal Location:

Matrix: WATER

Collection Date: 11/24/2020 14:50

Percent Moisture:

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
<b>Radium-226 by Radon Emanation - Method 903.1</b>						
Ra-226	ND (+/- 0.23)	U	0.32	pCi/l	NA	12/19/2020 11:25
Carr: BARIUM	95.1		40-110	%REC	DL = NA	12/19/2020 11:25
<b>Radium-228 Analysis by GFPC</b>						
Ra-228	1.33 (+/- 0.51)		0.78	pCi/l	NA	12/22/2020 10:43
Carr: BARIUM	91.5		40-110	%REC	DL = NA	12/22/2020 10:43

Client: ALS Environmental

Date: 28-Dec-20

Project: 20112217

Work Order: 2012004

Sample ID: MW-3A

Lab ID: 2012004-4

Legal Location:

Matrix: WATER

Collection Date: 11/24/2020 17:55

Percent Moisture:

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
<b>Radium-226 by Radon Emanation - Method 903.1</b>						
Ra-226	ND (+/- 0.23)	U	0.35	pCi/l	NA	12/19/2020 11:55
Carr: BARIUM	94.8		40-110	%REC	DL = NA	12/19/2020 11:55
<b>Radium-228 Analysis by GFPC</b>						
Ra-228	0.79 (+/- 0.4)		0.71	pCi/l	NA	12/22/2020 10:43
Carr: BARIUM	93.6		40-110	%REC	DL = NA	12/22/2020 10:43

Client: ALS Environmental

Date: 28-Dec-20

Project: 20112217

Work Order: 2012004

Sample ID: Field Duplicate

Lab ID: 2012004-5

Legal Location:

Matrix: WATER

Collection Date: 11/24/2020

Percent Moisture:

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
<b>Radium-226 by Radon Emanation - Method 903.1</b>						
Ra-226	ND (+/- 0.28)	U	0.37	pCi/l	NA	12/19/2020 11:55
Carr: BARIUM	98.8		40-110	%REC	DL = NA	12/19/2020 11:55
<b>Radium-228 Analysis by GFPC</b>						
Ra-228	1.42 (+/- 0.58)		0.9	pCi/l	NA	12/22/2020 10:43
Carr: BARIUM	79.6		40-110	%REC	DL = NA	12/22/2020 10:43



Client: ALS Environmental

Date: 28-Dec-20

Project: 20112217

Work Order: 2012004

Sample ID: Field Blank

Lab ID: 2012004-6

Legal Location:

Matrix: WATER

Collection Date: 11/24/2020 17:30

Percent Moisture:

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
<b>Radium-226 by Radon Emanation - Method 903.1</b>						
			<b>SOP 783</b>		Prep Date: <b>12/9/2020</b>	PrepBy: <b>TRB</b>
Ra-226	ND (+/- 0.23)	U	0.37	pCi/l	NA	12/19/2020 11:55
Carr: BARIUM	97.9		40-110	%REC	DL = NA	12/19/2020 11:55
<b>Radium-228 Analysis by GFPC</b>						
			<b>SOP 724</b>		Prep Date: <b>12/15/2020</b>	PrepBy: <b>RGS</b>
Ra-228	ND (+/- 0.5)	U	0.96	pCi/l	NA	12/22/2020 10:43
Carr: BARIUM	94.4		40-110	%REC	DL = NA	12/22/2020 10:43

**Client:** ALS Environmental  
**Project:** 20112217  
**Sample ID:** Equipment Blank  
**Legal Location:**  
**Collection Date:** 11/24/2020 17:30

**Date:** 28-Dec-20  
**Work Order:** 2012004  
**Lab ID:** 2012004-7  
**Matrix:** WATER  
**Percent Moisture:**

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
<b>Radium-226 by Radon Emanation - Method 903.1</b>						
			<b>SOP 783</b>	Prep Date: <b>12/9/2020</b>		PrepBy: <b>TRB</b>
Ra-226	ND (+/- 0.37)	U	0.82	pCi/l	NA	12/19/2020 11:55
Carr: BARIUM	89.3		40-110	%REC	DL = NA	12/19/2020 11:55
<b>Radium-228 Analysis by GFPC</b>						
			<b>SOP 724</b>	Prep Date: <b>12/15/2020</b>		PrepBy: <b>RGS</b>
Ra-228	ND (+/- 0.47)	U	0.9	pCi/l	NA	12/22/2020 10:43
Carr: BARIUM	96.3		40-110	%REC	DL = NA	12/22/2020 10:43

Client: ALS Environmental

Date: 28-Dec-20

Project: 20112217

Work Order: 2012004

Sample ID: MW-3

Lab ID: 2012004-8

Legal Location:

Matrix: WATER

Collection Date: 11/24/2020 16:35

Percent Moisture:

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
<b>Radium-226 by Radon Emanation - Method 903.1</b>						
Ra-226	ND (+/- 0.18)	U	0.32	pCi/l	NA	12/19/2020 11:55
Carr: BARIUM	94.1		40-110	%REC	DL = NA	12/19/2020 11:55
<b>Radium-228 Analysis by GFPC</b>						
Ra-228	0.8 (+/- 0.42)		0.76	pCi/l	NA	12/22/2020 10:43
Carr: BARIUM	94.8		40-110	%REC	DL = NA	12/22/2020 10:43

**Client:** ALS Environmental  
**Project:** 20112217  
**Sample ID:** MW-3  
**Legal Location:**  
**Collection Date:** 11/24/2020 16:35

**Date:** 28-Dec-20  
**Work Order:** 2012004  
**Lab ID:** 2012004-8  
**Matrix:** WATER  
**Percent Moisture:**

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
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### Explanation of Qualifiers

#### Radiochemistry:

- "Report Limit" is the MDC  
 U or ND - Result is less than the sample specific MDC.  
 Y1 - Chemical Yield is in control at 100-110%. Quantitative yield is assumed.  
 Y2 - Chemical Yield outside default limits.  
 W - DER is greater than Warning Limit of 1.42  
 \* - Aliquot Basis is 'As Received' while the Report Basis is 'Dry Weight'.  
 # - Aliquot Basis is 'Dry Weight' while the Report Basis is 'As Received'.  
 G - Sample density differs by more than 15% of LCS density.  
 D - DER is greater than Control Limit  
 M - Requested MDC not met.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.  
 L - LCS Recovery below lower control limit.  
 H - LCS Recovery above upper control limit.  
 P - LCS, Matrix Spike Recovery within control limits.  
 N - Matrix Spike Recovery outside control limits  
 NC - Not Calculated for duplicate results less than 5 times MDC  
 B - Analyte concentration greater than MDC.  
 B3 - Analyte concentration greater than MDC but less than Requested MDC.

#### Inorganics:

B - Result is less than the requested reporting limit but greater than the instrument method detection limit (MDL).  
 U or ND - Indicates that the compound was analyzed for but not detected.  
 E - The reported value is estimated because of the presence of interference. An explanatory note may be included in the narrative.  
 M - Duplicate injection precision was not met.  
 N - Spiked sample recovery not within control limits. A post spike is analyzed for all ICP analyses when the matrix spike and or spike duplicate fail and the native sample concentration is less than four times the spike added concentration.  
 Z - Spiked recovery not within control limits. An explanatory note may be included in the narrative.  
 \* - Duplicate analysis (relative percent difference) not within control limits.  
 S - SAR value is estimated as one or more analytes used in the calculation were not detected above the detection limit.

#### Organics:

U or ND - Indicates that the compound was analyzed for but not detected.  
 B - Analyte is detected in the associated method blank as well as in the sample. It indicates probable blank contamination and warns the data user.  
 E - Analyte concentration exceeds the upper level of the calibration range.  
 J - Estimated value. The result is less than the reporting limit but greater than the instrument method detection limit (MDL).  
 A - A tentatively identified compound is a suspected aldol-condensation product.  
 X - The analyte was diluted below an accurate quantitation level.  
 \* - The spike recovery is equal to or outside the control criteria used.  
 + - The relative percent difference (RPD) equals or exceeds the control criteria.  
 G - A pattern resembling gasoline was detected in this sample.  
 D - A pattern resembling diesel was detected in this sample.  
 M - A pattern resembling motor oil was detected in this sample.  
 C - A pattern resembling crude oil was detected in this sample.  
 4 - A pattern resembling JP-4 was detected in this sample.  
 5 - A pattern resembling JP-5 was detected in this sample.  
 H - Indicates that the fuel pattern was in the heavier end of the retention time window for the analyte of interest.  
 L - Indicates that the fuel pattern was in the lighter end of the retention time window for the analyte of interest.  
 Z - This flag indicates that a significant fraction of the reported result did not resemble the patterns of any of the following petroleum hydrocarbon products:  
 - gasoline  
 - JP-8  
 - diesel  
 - mineral spirits  
 - motor oil  
 - Stoddard solvent  
 - bunker C

## ALS -- Fort Collins

Date: 12/28/2020 9:09:

Client: ALS Environmental

## QC BATCH REPORT

Work Order: 2012004

Project: 20112217

Batch ID: RE201209-1-1

Instrument ID: Alpha Scin

Method: Radium-226 by Radon Emanation

DUP	Sample ID: 2012004-8			Units: pCi/l			Analysis Date: 12/19/2020 11:55				
Client ID: MW-3		Run ID: RE201209-1B			Prep Date: 12/9/2020			DF: NA			
Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref Value	DER	DER Limit	Qual
Ra-226	ND	0.46						0.09	0.41	2.13	U
Carr: BARIUM	15700		15880		98.9	40-110		14930			

LCS	Sample ID: RE201209-1			Units: pCi/l		Analysis Date: 12/19/2020 12:13					
Client ID:	Run ID: RE201209-1B					Prep Date: 12/9/2020			DF: NA		
Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref Value	DER	DER Limit	Qual
Ra-226	55 (+/- 14)	0	46.8		117	67-120					P
Carr: BARIUM	12770		15760		81	40-110					

LCSD	Sample ID: RE201209-1			Units: pCi/l		Analysis Date: 12/19/2020 12:13					
Client ID:	Run ID: RE201209-1B					Prep Date: 12/9/2020			DF: NA		
Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref Value	DER	DER Limit	Qual
Ra-226	36.4 (+/- 9.1)	0.2	46.8		77.9	67-120		55	1.11	2.13	P
Carr: BARIUM	15250		15760		96.7	40-110		12770			

MB	Sample ID: RE201209-1				Units: pCi/l		Analysis Date: 12/19/2020 12:13				
Client ID:	Run ID: RE201209-1B				Prep Date: 12/9/2020			DF: NA			
Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref Value	DER	DER Limit	Qual
Ra-226	ND	0.3									Y1,U
Carr: BARIUM	16820		15760		107	40-110					Y1

The following samples were analyzed in this batch:

2012004-1	2012004-2	2012004-3
2012004-4	2012004-5	2012004-6
2012004-7	2012004-8	

Client: ALS Environmental  
 Work Order: 2012004  
 Project: 20112217

## QC BATCH REPORT

Batch ID: RA201215-3-2 Instrument ID: LB4100-C Method: Radium-228 Analysis by GFPC

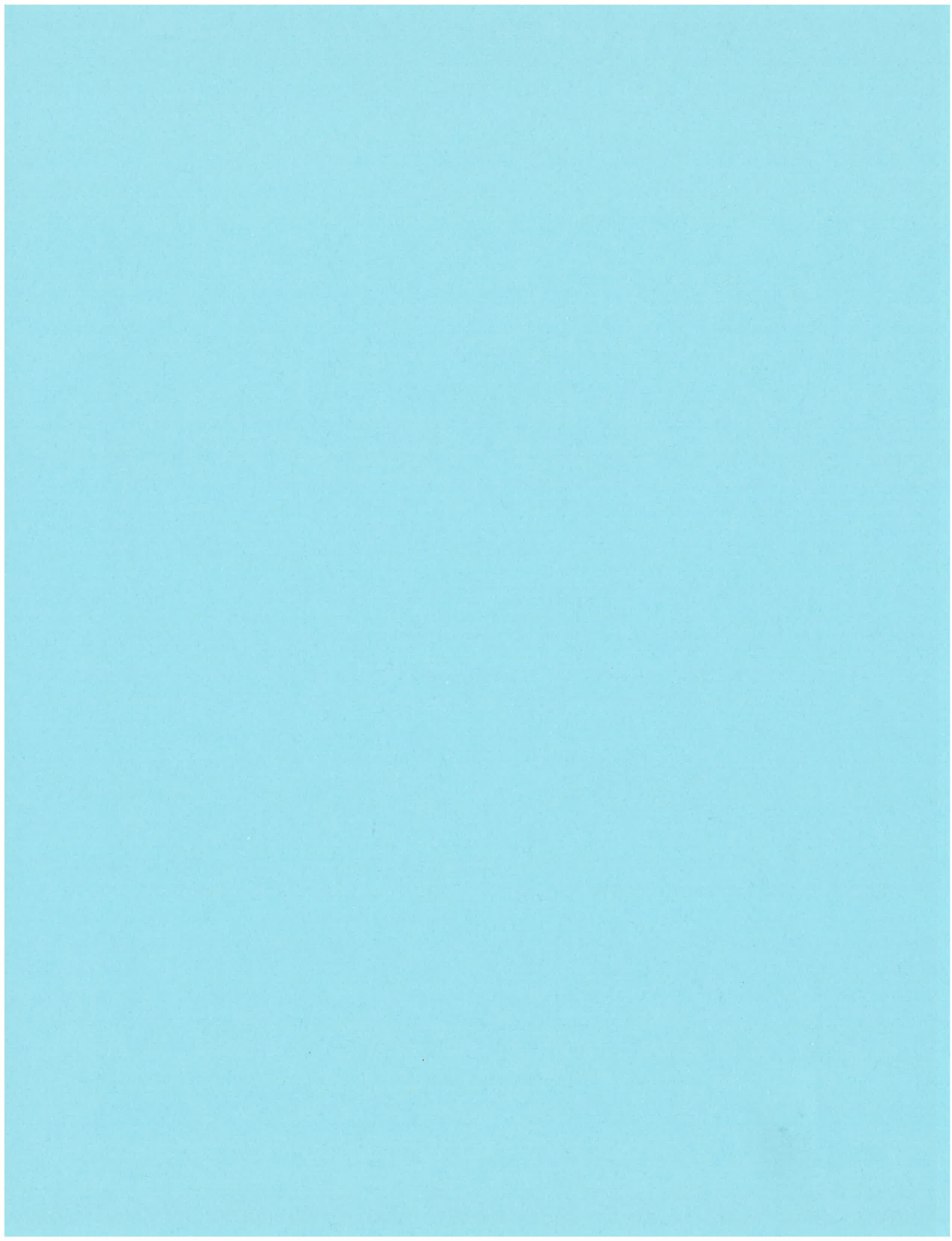
DUP	Sample ID: 2012004-8				Units: pCi/l		Analysis Date: 12/22/2020 10:43				
Client ID: MW-3		Run ID: RA201215-3A				Prep Date: 12/15/2020			DF: NA		
Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref Value	DER	DER Limit	Qual
Ra-228	ND	0.79						0.8	0.46	2.13	U
Carr: BARIUM	30640		33760		90.8	40-110		31990			

LCS	Sample ID: RA201215-3				Units: pCi/l		Analysis Date: 12/22/2020 10:43				
Client ID:	Run ID: RA201215-3A				Prep Date: 12/15/2020			DF: NA			
Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref Value	DER	DER Limit	Qual
Ra-228	19.9 (+/- 4.7)	0.7	23.04		86.5	70-130					P
Carr: BARIUM	32190		33650		95.7	40-110					

MB	Sample ID: RA201215-3				Units: pCi/l			Analysis Date: 12/22/2020 10:43			
Client ID:	Run ID: RA201215-3A				Prep Date: 12/15/2020			DF: NA			
Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref Value	DER	DER Limit	Qual
Ra-228	ND	0.76									U
Carr: BARIUM	32510		33650		96.6	40-110					

The following samples were analyzed in this batch:

2012004-1	2012004-2	2012004-3
2012004-4	2012004-5	2012004-6
2012004-7	2012004-8	





29-Dec-2020

Karen Okonta  
NTH Consultants, Ltd.  
41780 Six Mile Road  
Northville, MI 48168

Re: **Holland Board of Public Works**

Work Order: **20112217**

Dear Karen,

ALS Environmental received 9 samples on 24-Nov-2020 06:00 PM for the analyses presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental - Holland and for only the analyses requested.

Sample results are compliant with industry accepted practices and Quality Control results achieved laboratory specifications. Any exceptions are noted in the Case Narrative, or noted with qualifiers in the report or QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained from ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

The total number of pages in this report is 28.

If you have any questions regarding this report, please feel free to contact me:

ADDRESS: 3352 128th Avenue, Holland, MI, USA  
PHONE: +1 (616) 399-6070 FAX: +1 (616) 399-6185

Sincerely,

A handwritten signature in black ink, appearing to read "Chad Whelton".

Electronically approved by: Chad Whelton

Chad Whelton  
Project Manager

## Report of Laboratory Analysis

Certificate No: MI: 0022

ALS GROUP USA, CORP Part of the ALS Laboratory Group A Campbell Brothers Limited Company

Environmental 

[www.alsglobal.com](http://www.alsglobal.com)

RIGHT SOLUTIONS RIGHT PARTNER



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**Client:** NTH Consultants, Ltd.  
**Project:** Holland Board of Public Works  
**Work Order:** 20112217

**Work Order Sample Summary**

---

<u>Lab Samp ID</u>	<u>Client Sample ID</u>	<u>Matrix</u>	<u>Tag Number</u>	<u>Collection Date</u>	<u>Date Received</u>	<u>Hold</u>
20112217-09	MW-4	Groundwater		11/24/2020 12:16	11/24/2020 18:00	<input type="checkbox"/>

---

**Client:** NTH Consultants, Ltd.  
**Project:** Holland Board of Public Works  
**Work Order:** 20112217

---

**Case Narrative**

Samples for the above noted Work Order were received on 11/24/2020. The attached "Sample Receipt Checklist" documents the status of custody seals, container integrity, preservation, and temperature compliance.

Samples were analyzed according to the analytical methodology previously transmitted in the "Work Order Acknowledgement". Methodologies are also documented in the "Analytical Result" section for each sample. Quality control results are listed in the "QC Report" section. Sample association for the reported quality control is located at the end of each batch summary. If applicable, results are appropriately qualified in the Analytical Result and QC Report sections. The "Qualifiers" section documents the various qualifiers, units, and acronyms utilized in reporting. A copy of the laboratory's scope of accreditation is available upon request.

With the following exceptions, all sample analyses achieved analytical criteria.

**Metals:**

Batch 168869, Method SW6020B, Sample 20112217-04A MS/MSD: The MS/MSD recovery was outside of the control limit for calcium; however, the result in the parent sample is greater than 4x the spike amount. No qualification is required.

**Wet Chemistry:**

Batch R305153, Method A4500-H B-11: pH is considered a "field test" and, as such, the recommended sample holding time expired prior to sample receipt. Results should be considered estimated.

Batch R305326, Method E300.0, Sample MW-2 (20112217-03B): The reporting limits for fluoride and sulfate are elevated due to dilution for high concentrations of non-target analytes.

Batch R305326, Method E300.0, Sample MW-4 (20112217-09B): The reporting limits for fluoride and sulfate are elevated due to dilution for high concentrations of non-target analytes.

Batch R305326, Method E300.0, Sample 20112217-04B MS/MSD: The MS/MSD recovery was below the lower control limit for fluoride. The corresponding result in the parent sample may be biased low for this analyte.

Radium analysis performed by ALS Fort Collins laboratory.

<b><u>Qualifier</u></b>	<b><u>Description</u></b>
*	Value exceeds Regulatory Limit
**	Estimated Value
a	Analyte is non-accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
Hr	BOD/CBOD - Sample was reset outside Hold Time, value should be considered estimated.
J	Analyte is present at an estimated concentration between the MDL and Report Limit
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL
X	Analyte was detected in the Method Blank between the MDL and Reporting Limit, sample results may exhibit background or reagent contamination at the observed level.

<b><u>Acronym</u></b>	<b><u>Description</u></b>
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LOD	Limit of Detection (see MDL)
LOQ	Limit of Quantitation (see PQL)
MBLK	Method Blank
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PQL	Practical Quantitation Limit
RPD	Relative Percent Difference
TDL	Target Detection Limit
TNTC	Too Numerous To Count
A	APHA Standard Methods
D	ASTM
E	EPA
SW	SW-846 Update III

<b><u>Units Reported</u></b>	<b><u>Description</u></b>
°C	Degrees Celcius
as noted	
mg/L	Milligrams per Liter
s.u.	Standard Units

# ALS Group, USA

Date: 29-Dec-20

**Client:** NTH Consultants, Ltd.  
**Project:** Holland Board of Public Works  
**Sample ID:** MW-4  
**Collection Date:** 11/24/2020 12:16 PM

**Work Order:** 20112217  
**Lab ID:** 20112217-09  
**Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
<b>MERCURY BY CVAA</b>						
<b>Mercury</b>	<b>0.00023</b>		<b>SW7470A</b> <b>0.00020</b>	<b>mg/L</b>	Prep: SW7470 12/8/20 12:13 1	Analyst: <b>MAC</b> 12/8/2020 02:47 PM
<b>METALS BY ICP-MS</b>						
<b>Antimony</b>	ND		<b>SW6020B</b> 0.0050	mg/L	Prep: SW3015A 12/8/20 14:23 1	Analyst: <b>STP</b> 12/8/2020 04:19 PM
<b>Arsenic</b>	<b>0.0071</b>		<b>0.0050</b>	<b>mg/L</b>	1	12/8/2020 04:19 PM
<b>Barium</b>	<b>1.2</b>		<b>0.0050</b>	<b>mg/L</b>	1	12/8/2020 04:19 PM
Beryllium	ND		0.0020	mg/L	1	12/8/2020 04:19 PM
<b>Boron</b>	<b>0.94</b>		<b>0.020</b>	<b>mg/L</b>	1	12/8/2020 04:19 PM
Cadmium	ND		0.0020	mg/L	1	12/8/2020 04:19 PM
<b>Calcium</b>	<b>180</b>		<b>0.50</b>	<b>mg/L</b>	1	12/8/2020 04:19 PM
Chromium	ND		0.0050	mg/L	1	12/8/2020 04:19 PM
Cobalt	ND		0.0050	mg/L	1	12/8/2020 04:19 PM
Lead	ND		0.0050	mg/L	1	12/8/2020 04:19 PM
<b>Lithium</b>	<b>0.028</b>		<b>0.010</b>	<b>mg/L</b>	1	12/8/2020 04:19 PM
<b>Molybdenum</b>	<b>0.0069</b>		<b>0.0050</b>	<b>mg/L</b>	1	12/8/2020 04:19 PM
Selenium	ND		0.0050	mg/L	1	12/8/2020 04:19 PM
Thallium	ND		0.0020	mg/L	1	12/8/2020 04:19 PM
<b>ANIONS BY ION CHROMATOGRAPHY</b>						
<b>Chloride</b>	<b>890</b>		<b>E300.0</b> <b>80</b>	<b>mg/L</b>	80	Analyst: <b>JDR</b> 12/8/2020 10:09 PM
Fluoride	ND		2.0	mg/L	2	12/8/2020 09:50 PM
Sulfate	ND		4.0	mg/L	2	12/8/2020 09:50 PM
<b>PH (LABORATORY)</b>						
<b>pH (laboratory)</b>	<b>6.89</b>	H	<b>A4500-H B-11</b> <b>0.100</b>	<b>s.u.</b>	1	Analyst: <b>JB</b> 12/7/2020 12:54 PM
<b>Temperature</b>	<b>21.1</b>	H	<b>0.100</b>	<b>°C</b>	1	12/7/2020 12:54 PM
<b>TOTAL DISSOLVED SOLIDS</b>						
<b>Total Dissolved Solids</b>	<b>3,000</b>		<b>A2540 C-11</b> <b>1,500</b>	<b>mg/L</b>	Prep: FILTER 12/1/20 17:59 1	Analyst: <b>ERW</b> 12/3/2020 02:30 PM
<b>SUBCONTRACTED ANALYSES</b>						
<b>Subcontracted Analyses</b>	<b>See attached</b>		<b>SUBCONTRACT</b> <b>as noted</b>		1	Analyst: <b>ALS</b> 12/29/2020

**Note:** See Qualifiers page for a list of qualifiers and their definitions.

**Client:** NTH Consultants, Ltd.  
**Work Order:** 20112217  
**Project:** Holland Board of Public Works

**QC BATCH REPORT**

Batch ID: <b>168861</b>	Instrument ID <b>HG4</b>	Method: <b>SW7470A</b>
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<b>MBLK</b>	Sample ID: <b>MBLK-168861-168861</b>					Units: <b>mg/L</b>	Analysis Date: <b>12/9/2020 08:40 AM</b>			
Client ID:	Run ID: <b>HG4_201209A</b>					SeqNo: <b>6971362</b>	Prep Date: <b>12/8/2020</b>	DF: <b>1</b>		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	ND	0.00020								

<b>LCS</b>	Sample ID: <b>LCS-168861-168861</b>					Units: <b>mg/L</b>	Analysis Date: <b>12/8/2020 01:57 PM</b>			
Client ID:	Run ID: <b>HG4_201208A</b>					SeqNo: <b>6969850</b>	Prep Date: <b>12/8/2020</b>	DF: <b>1</b>		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.002055	0.00020	0.002	0	103	80-120	0			

<b>MS</b>	Sample ID: <b>20112217-04AMS</b>					Units: <b>mg/L</b>	Analysis Date: <b>12/8/2020 02:31 PM</b>			
Client ID: <b>MW-3</b>	Run ID: <b>HG4_201208A</b>					SeqNo: <b>6969864</b>	Prep Date: <b>12/8/2020</b>	DF: <b>1</b>		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00192	0.00020	0.002	-0.0000435	98.2	75-125	0			

<b>MSD</b>	Sample ID: <b>20112217-04AMSD</b>					Units: <b>mg/L</b>	Analysis Date: <b>12/8/2020 02:32 PM</b>			
Client ID: <b>MW-3</b>	Run ID: <b>HG4_201208A</b>					SeqNo: <b>6969865</b>	Prep Date: <b>12/8/2020</b>	DF: <b>1</b>		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.001845	0.00020	0.002	-0.0000435	94.4	75-125	0.00192	3.98	20	

The following samples were analyzed in this batch:

Client: NTH Consultants, Ltd.  
 Work Order: 20112217  
 Project: Holland Board of Public Works

## QC BATCH REPORT

Batch ID: **168869** Instrument ID **ICPMS3** Method: **SW6020B**

MBLK		Sample ID: <b>MBLK-168869-168869</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/8/2020 03:44 PM</b>		
Client ID:		Run ID: <b>ICPMS3_201208A</b>				SeqNo: <b>6969146</b>		Prep Date: <b>12/8/2020</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	ND	0.0050								
Arsenic	ND	0.0050								
Barium	ND	0.0050								
Beryllium	ND	0.0020								
Boron	ND	0.020								
Cadmium	ND	0.0020								
Calcium	ND	0.50								
Chromium	ND	0.0050								
Cobalt	ND	0.0050								
Lead	ND	0.0050								
Lithium	ND	0.010								
Molybdenum	ND	0.0050								
Selenium	ND	0.0050								
Thallium	ND	0.0050								

LCS		Sample ID: <b>LCS-168869-168869</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/8/2020 03:46 PM</b>		
Client ID:		Run ID: <b>ICPMS3_201208A</b>				SeqNo: <b>6969147</b>		Prep Date: <b>12/8/2020</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.09792	0.0050	0.1	0	97.9	80-120	0			
Arsenic	0.1003	0.0050	0.1	0	100	80-120	0			
Barium	0.1008	0.0050	0.1	0	101	80-120	0			
Beryllium	0.1047	0.0020	0.1	0	105	80-120	0			
Boron	0.5338	0.020	0.5	0	107	80-120	0			
Cadmium	0.1028	0.0020	0.1	0	103	80-120	0			
Calcium	10.29	0.50	10	0	103	80-120	0			
Chromium	0.1038	0.0050	0.1	0	104	80-120	0			
Cobalt	0.1047	0.0050	0.1	0	105	80-120	0			
Lead	0.1015	0.0050	0.1	0	101	80-120	0			
Lithium	0.09842	0.010	0.1	0	98.4	80-120	0			
Molybdenum	0.1027	0.0050	0.1	0	103	80-120	0			
Selenium	0.1006	0.0050	0.1	0	101	80-120	0			
Thallium	0.09517	0.0050	0.1	0	95.2	80-120	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: NTH Consultants, Ltd.  
 Work Order: 20112217  
 Project: Holland Board of Public Works

## QC BATCH REPORT

Batch ID: **168869** Instrument ID **ICPMS3** Method: **SW6020B**

MS				Sample ID: <b>20112217-04AMS</b>		Units: <b>mg/L</b>		Analysis Date: <b>12/8/2020 04:03 PM</b>		
Client ID: <b>MW-3</b>				Run ID: <b>ICPMS3_201208A</b>		SeqNo: <b>6969433</b>		Prep Date: <b>12/8/2020</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.09679	0.0050	0.1	0.0001199	96.7	75-125	0			
Arsenic	0.09873	0.0050	0.1	0.0006677	98.1	75-125	0			
Barium	0.2085	0.0050	0.1	0.1104	98.1	75-125	0			
Beryllium	0.103	0.0020	0.1	0.0000528	103	75-125	0			
Boron	0.9917	0.020	0.5	0.4697	104	75-125	0			
Cadmium	0.1006	0.0020	0.1	0	101	75-125	0			
Calcium	101.4	0.50	10	95.26	61.2	75-125	0			SO
Chromium	0.1024	0.0050	0.1	0.0007051	102	75-125	0			
Cobalt	0.1024	0.0050	0.1	0.0002629	102	75-125	0			
Lead	0.1014	0.0050	0.1	0.0002156	101	75-125	0			
Lithium	0.112	0.010	0.1	0.01535	96.7	75-125	0			
Molybdenum	0.1028	0.0050	0.1	0.0007359	102	75-125	0			
Selenium	0.09924	0.0050	0.1	-0.0003245	99.6	75-125	0			
Thallium	0.09504	0.0050	0.1	-0.0000231	95.1	75-125	0			

MSD				Sample ID: <b>20112217-04AMSD</b>		Units: <b>mg/L</b>		Analysis Date: <b>12/8/2020 04:05 PM</b>		
Client ID: <b>MW-3</b>				Run ID: <b>ICPMS3_201208A</b>		SeqNo: <b>6969434</b>		Prep Date: <b>12/8/2020</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.09862	0.0050	0.1	0.0001199	98.5	75-125	0.09679	1.87	20	
Arsenic	0.1015	0.0050	0.1	0.0006677	101	75-125	0.09873	2.8	20	
Barium	0.208	0.0050	0.1	0.1104	97.6	75-125	0.2085	0.248	20	
Beryllium	0.1051	0.0020	0.1	0.0000528	105	75-125	0.103	2.01	20	
Boron	1.011	0.020	0.5	0.4697	108	75-125	0.9917	1.98	20	
Cadmium	0.1037	0.0020	0.1	0	104	75-125	0.1006	3.01	20	
Calcium	101	0.50	10	95.26	57.2	75-125	101.4	0.394	20	SO
Chromium	0.1025	0.0050	0.1	0.0007051	102	75-125	0.1024	0.129	20	
Cobalt	0.1041	0.0050	0.1	0.0002629	104	75-125	0.1024	1.63	20	
Lead	0.1049	0.0050	0.1	0.0002156	105	75-125	0.1014	3.34	20	
Lithium	0.1132	0.010	0.1	0.01535	97.8	75-125	0.112	0.983	20	
Molybdenum	0.1071	0.0050	0.1	0.0007359	106	75-125	0.1028	4.11	20	
Selenium	0.1027	0.0050	0.1	-0.0003245	103	75-125	0.09924	3.38	20	
Thallium	0.09767	0.0050	0.1	-0.0000231	97.7	75-125	0.09504	2.72	20	

The following samples were analyzed in this batch:

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

**Client:** NTH Consultants, Ltd.  
**Work Order:** 20112217  
**Project:** Holland Board of Public Works

## QC BATCH REPORT

Batch ID: **168457** Instrument ID **TDS** Method: **A2540 C-11**

<b>MBLK</b>		Sample ID: <b>MBLK-168457-168457</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/2/2020 03:48 PM</b>		
Client ID:		Run ID: <b>TDS_201202C</b>				SeqNo: <b>6952481</b>		Prep Date: <b>11/30/2020</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Total Dissolved Solids ND 30

<b>LCS</b>		Sample ID: <b>LCS-168457-168457</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/2/2020 03:48 PM</b>		
Client ID:		Run ID: <b>TDS_201202C</b>				SeqNo: <b>6952480</b>		Prep Date: <b>11/30/2020</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Total Dissolved Solids 486 30 495 0 98.2 85-109 0

<b>DUP</b>		Sample ID: <b>20112115-01C DUP</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/2/2020 03:48 PM</b>		
Client ID:		Run ID: <b>TDS_201202C</b>				SeqNo: <b>6952459</b>		Prep Date: <b>11/30/2020</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Total Dissolved Solids 366.7 50 0 0 0 0-0 383.3 4.44 10

<b>DUP</b>		Sample ID: <b>20112217-04B DUP</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/2/2020 03:48 PM</b>		
Client ID: <b>MW-3</b>		Run ID: <b>TDS_201202C</b>				SeqNo: <b>6952477</b>		Prep Date: <b>11/30/2020</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Total Dissolved Solids 566.7 50 0 0 0 0-0 530 6.69 10

The following samples were analyzed in this batch:

**Note:** See Qualifiers Page for a list of Qualifiers and their explanation.



**Client:** NTH Consultants, Ltd.  
**Work Order:** 20112217  
**Project:** Holland Board of Public Works

## QC BATCH REPORT

Batch ID: **168553** Instrument ID **TDS** Method: **A2540 C-11**

<b>MBLK</b>		Sample ID: <b>MBLK-168553-168553</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/3/2020 02:30 PM</b>		
Client ID:		Run ID: <b>TDS_201203D</b>				SeqNo: <b>6956231</b>		Prep Date: <b>12/1/2020</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids	ND	30								

<b>LCS</b>		Sample ID: <b>LCS-168553-168553</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/3/2020 02:30 PM</b>		
Client ID:		Run ID: <b>TDS_201203D</b>				SeqNo: <b>6956230</b>		Prep Date: <b>12/1/2020</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids	490	30	495	0	99	85-109	0			

<b>DUP</b>		Sample ID: <b>20112217-05B DUP</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/3/2020 02:30 PM</b>		
Client ID: <b>MW-3A</b>		Run ID: <b>TDS_201203D</b>				SeqNo: <b>6956225</b>		Prep Date: <b>12/1/2020</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids	566.7	100	0	0	0	0-0	560	1.18	10	

The following samples were analyzed in this batch:

**Note:** See Qualifiers Page for a list of Qualifiers and their explanation.

**Client:** NTH Consultants, Ltd.  
**Work Order:** 20112217  
**Project:** Holland Board of Public Works

## QC BATCH REPORT

Batch ID: **R305153** Instrument ID **Titration 1** Method: **A4500-H B-11**

<b>LCS</b>		Sample ID: <b>LCS-R305153-R305153</b>				Units: <b>s.u.</b>		Analysis Date: <b>12/7/2020 12:54 PM</b>		
Client ID:		Run ID: <b>TITRATOR 1_201207B</b>				SeqNo: <b>6963900</b>		Prep Date:		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

pH (laboratory) 3.95 0.10 4 0 98.8 92-108 0

<b>DUP</b>		Sample ID: <b>20112217-01B DUP</b>				Units: <b>s.u.</b>		Analysis Date: <b>12/7/2020 12:54 PM</b>		
Client ID: <b>PZ-1</b>		Run ID: <b>TITRATOR 1_201207B</b>				SeqNo: <b>6963902</b>		Prep Date:		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

pH (laboratory) 8.46 0.10 0 0 0 0-0 8.2 3.12 5 H

Temperature 21.03 0.10 0 0 0 0-0 21.08 0.237 H

<b>DUP</b>		Sample ID: <b>20112328-01A DUP</b>				Units: <b>s.u.</b>		Analysis Date: <b>12/7/2020 12:54 PM</b>		
Client ID:		Run ID: <b>TITRATOR 1_201207B</b>				SeqNo: <b>6963913</b>		Prep Date:		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

pH (laboratory) 7.53 0.10 0 0 0 0-0 7.39 1.88 5 H

Temperature 21.08 0.10 0 0 0 0-0 21.15 0.332 H

The following samples were analyzed in this batch:

**Note:** See Qualifiers Page for a list of Qualifiers and their explanation.

Client: NTH Consultants, Ltd.  
 Work Order: 20112217  
 Project: Holland Board of Public Works

## QC BATCH REPORT

Batch ID: **R305326** Instrument ID **IC3** Method: **E300.0**

<b>MBLK</b>		Sample ID: <b>MBLK-R305326</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/8/2020 01:29 PM</b>		
Client ID:		Run ID: <b>IC3_201208A</b>				SeqNo: <b>6971195</b>		Prep Date:		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	ND	1.0								
Fluoride	ND	0.10								
Sulfate	ND	1.0								

<b>MBLK</b>		Sample ID: <b>MBLK-R305326</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/8/2020 09:12 PM</b>		
Client ID:		Run ID: <b>IC3_201208A</b>				SeqNo: <b>6971219</b>		Prep Date:		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	ND	1.0								
Fluoride	ND	0.10								
Sulfate	ND	1.0								

<b>MBLK</b>		Sample ID: <b>MBLK-R305326</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/9/2020 02:39 AM</b>		
Client ID:		Run ID: <b>IC3_201208A</b>				SeqNo: <b>6971236</b>		Prep Date:		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	ND	1.0								
Fluoride	ND	0.10								
Sulfate	ND	1.0								

<b>LCS</b>		Sample ID: <b>LCS-R305326</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/8/2020 01:48 PM</b>		
Client ID:		Run ID: <b>IC3_201208A</b>				SeqNo: <b>6971196</b>		Prep Date:		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	9.372	1.0	10	0	93.7	90-110	0			
Fluoride	1.808	0.10	2	0	90.4	90-110	0			
Sulfate	9.738	1.0	10	0	97.4	90-110	0			

<b>LCS</b>		Sample ID: <b>LCS-R305326</b>				Units: <b>mg/L</b>		Analysis Date: <b>12/8/2020 09:31 PM</b>		
Client ID:		Run ID: <b>IC3_201208A</b>				SeqNo: <b>6971220</b>		Prep Date:		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	9.405	1.0	10	0	94	90-110	0			
Fluoride	1.915	0.10	2	0	95.7	90-110	0			
Sulfate	9.659	1.0	10	0	96.6	90-110	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

**Client:** NTH Consultants, Ltd.  
**Work Order:** 20112217  
**Project:** Holland Board of Public Works

## QC BATCH REPORT

Batch ID: **R305326** Instrument ID **IC3** Method: **E300.0**

LCS				Sample ID: LCS-R305326			Units: mg/L		Analysis Date: 12/9/2020 02:58 AM		
Client ID:			Run ID: IC3_201208A			SeqNo: 6971237		Prep Date:		DF: 1	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Chloride	9.418	1.0	10	0	94.2	90-110	0				
Fluoride	1.96	0.10	2	0	98	90-110	0				
Sulfate	9.756	1.0	10	0	97.6	90-110	0				

MS				Sample ID: 20112217-04B MS			Units: mg/L		Analysis Date: 12/8/2020 07:16 PM		
Client ID: MW-3			Run ID: IC3_201208A			SeqNo: 6971213		Prep Date:		DF: 20	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Chloride	263	20	200	71.93	95.6	80-120	0				
Fluoride	31.67	2.0	40	0	79.2	80-120	0			S	
Sulfate	285.7	20	200	98.95	93.4	80-120	0				

MS				Sample ID: 20120200-08D MS				Units: mg/L		Analysis Date: 12/9/2020 02:00 AM		
Client ID:			Run ID: IC3_201208A			SeqNo: 6971234		Prep Date:		DF: 40		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual		
Chloride	615.3	40	400	245.7	92.4	80-120		0				
Fluoride	72.29	4.0	80	0	90.4	80-120		0				
Sulfate	377.7	40	400	7.804	92.5	80-120		0				

MS					Sample ID: 20120200-13D MS		Units: mg/L		Analysis Date: 12/9/2020 04:54 AM		
Client ID:			Run ID: IC3_201208A			SeqNo: 6971243		Prep Date:		DF: 20	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Chloride	441.2	20	200	239.1	101	80-120	0			E	
Fluoride	36.21	2.0	40	0	90.5	80-120	0				
Sulfate	244.3	20	200	57.51	93.4	80-120	0				

MSD				Sample ID: 20112217-04B MSD			Units: mg/L		Analysis Date: 12/8/2020 07:35 PM		
Client ID: MW-3			Run ID: IC3_201208A			SeqNo: 6971214		Prep Date:		DF: 20	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Chloride	262.6	20	200	71.93	95.4	80-120	263	0.15	20		
Fluoride	31.48	2.0	40	0	78.7	80-120	31.67	0.621	20	S	
Sulfate	285.4	20	200	98.95	93.2	80-120	285.7	0.114	20		

**Note:** See Qualifiers Page for a list of Qualifiers and their explanation.

**Client:** NTH Consultants, Ltd.  
**Work Order:** 20112217  
**Project:** Holland Board of Public Works

## QC BATCH REPORT

Batch ID: **R305326** Instrument ID **IC3** Method: **E300.0**

MSD				Sample ID: 20120200-08D MSD			Units: mg/L		Analysis Date: 12/9/2020 02:20 AM		
Client ID:			Run ID: IC3_201208A			SeqNo: 6971235		Prep Date:		DF: 40	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Chloride	613.3	40	400	245.7	91.9	80-120	615.3	0.325	20		
Fluoride	73.46	4.0	80	0	91.8	80-120	72.29	1.6	20		
Sulfate	374.6	40	400	7.804	91.7	80-120	377.7	0.824	20		

MSD				Sample ID: 20120200-13D MSD				Units: mg/L		Analysis Date: 12/9/2020 05:13 AM		
Client ID:			Run ID: IC3_201208A			SeqNo: 6971244		Prep Date:		DF: 20		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual		
Chloride	441.1	20	200	239.1	101	80-120	441.2	0.019	20	E		
Fluoride	36.47	2.0	40	0	91.2	80-120	36.21	0.737	20			
Sulfate	243.8	20	200	57.51	93.1	80-120	244.3	0.204	20			

The following samples were analyzed in this batch:

**Note:** See Qualifiers Page for a list of Qualifiers and their explanation.



Cincinnati, OH  
+1 513 733 5336

Everett, WA  
+1 425 356 2600

Fort Collins, CO  
+1 970 490 1511

Holland, MI  
+1 616 399 6070

# Chain of Custody Form

Page \_\_\_\_ of \_\_\_\_

COC ID: 189586

Houston, TX  
+1 281 530 5656

Middletown, PA  
+1 717 944 5541

Spring City, PA  
+1 610 948 4903

Salt Lake City, UT  
+1 801 266 7700

South Charleston, WV  
+1 304 356 3168

York, PA  
+1 717 505 5280

Customer Information			Project Information			ALS Project Manager: <span style="float: right;">ALS Work Order #: 20112217</span>													
Parameter/Method Request for Analysis																			
Purchase Order		Project Name	Holland BPH James			A	Metals including Hg												
Work Order		Project Number	73-160017			B	Chloride, Fluoride, Sulfate												
Company Name	NTH Consultants, Ltd.	Bill To Company	Holland Board of Public Works			C	pH												
Send Report To	Karen Okonta	Invoice Attn	Accounts Payable			D	TDS												
Address	41780 Six Mile Road	Address	635 Hastings	E	Radium 226 & 228														
				F															
City/State/Zip	Northville, MI 48168	City/State/Zip	Holland, MI 49423			G													
Phone	(248) 662-2666	Phone	(616) 355-1210			H													
Fax	(248) 324-5305	Fax				I													
e-Mail Address		e-Mail Address				J													

No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1	MW-4	11-24-20	12:16p	GW	2	4	X	X	X	X	X						
2																	
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10																	

Sampler(s) Please Print & Sign <i>Brittany Stachurski</i>		Shipment Method Drop-off		Required Turnaround Time: (Check Box) <input checked="" type="checkbox"/> Std 10 WK Days <input type="checkbox"/> 5 WK Days <input type="checkbox"/> Other <input type="checkbox"/> 2 WK Days <input type="checkbox"/> 24 Hour				Results Due Date:	
Relinquished by:	Date:	Time:	Received by:	Notes:					
Relinquished by:	Date: 11/24/20	Time: 1800	Received by (Laboratory):	Cooler ID	Cooler Temp.	QC Package: (Check One Box Below)			
Logged by (Laboratory):	Date: 11/25/20	Time: 1035	Checked by (Laboratory):			<input type="checkbox"/> Level II Std QC <input type="checkbox"/> TRRP Checklist			
						<input type="checkbox"/> Level III Std QC/Raw Data <input type="checkbox"/> TRRP Level IV			
						<input type="checkbox"/> Level IV SW846/CLP			
						<input type="checkbox"/> Other			

Preservative Key:	1-HCl	2-HNO <sub>3</sub>	3-H <sub>2</sub> SO <sub>4</sub>	4-NaOH	5-Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub>	6-NaHSO <sub>4</sub>	7-Other	8-4°C	9-5035
-------------------	-------	--------------------	----------------------------------	--------	---	----------------------	---------	-------	--------

Note: 1. Any changes must be made in writing once samples and COC Form have been submitted to ALS Environmental.  
2. Unless otherwise agreed in a formal contract, services provided by ALS Environmental are expressly limited to the terms and conditions stated on the reverse.  
3. The Chain of Custody is a legal document. All information must be completed accurately.

Copyright 2011 by ALS Environmental.

Sample Receipt Checklist

Client Name: **NTH - NORTHVILLE**

Date/Time Received: **24-Nov-20 18:00**

Work Order: **20112217**

Received by: **KRW**

Checklist completed by **Keith Wierenga**

25-Nov-20

Reviewed by: **Chad Whelton**

30-Nov-20

eSignature

Date

eSignature

Date

Matrices: **Water**

Carrier name: **FedEx**

Shipping container/cooler in good condition? Yes ☒ No ☐ Not Present ☐

Custody seals intact on shipping container/cooler? Yes ☐ No ☐ Not Present ☒

Custody seals intact on sample bottles? Yes ☐ No ☐ Not Present ☒

Chain of custody present? Yes ☒ No ☐

Chain of custody signed when relinquished and received? Yes ☐ No ☒

Chain of custody agrees with sample labels? Yes ☒ No ☐

Samples in proper container/bottle? Yes ☒ No ☐

Sample containers intact? Yes ☒ No ☐

Sufficient sample volume for indicated test? Yes ☒ No ☐

All samples received within holding time? Yes ☒ No ☐

Container/Temp Blank temperature in compliance? Yes ☒ No ☐

Sample(s) received on ice? Yes ☒ No ☐

Temperature(s)/Thermometer(s): **2.4, 3.8, 4.8, 4.9, 3.7 C** **IR3**

Cooler(s)/Kit(s):

Date/Time sample(s) sent to storage: **11/25/2020 10:42:39 AM**

Water - VOA vials have zero headspace? Yes ☐ No ☐ No VOA vials submitted ☒

Water - pH acceptable upon receipt? Yes ☒ No ☐ N/A ☐

pH adjusted? Yes ☐ No ☒ N/A ☐

pH adjusted by:

Login Notes:

-----

Client Contacted:

Date Contacted:

Person Contacted:

Contacted By:

Regarding:

Comments:

CorrectiveAction:



Wednesday, December 23, 2020

Chad Whelton  
ALS Environmental  
3352 128th Avenue  
Holland, MI 49424

Re: ALS Workorder: 2012005  
Project Name:  
Project Number: 20112217

Dear Mr. Whelton:

One water sample was received from ALS Environmental, on 12/1/2020. The sample was scheduled for the following analyses:

Radium-226

Radium-228

The results for these analyses are contained in the enclosed reports.

The data contained in the following report have been reviewed and approved by the personnel listed below. In addition, ALS certifies that the analyses reported herein are true, complete and correct within the limits of the methods employed. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained from ALS Environmental.

Thank you for your confidence in ALS Environmental. Should you have any questions, please call.

Sincerely,

ALS Environmental  
Julie Ellingson  
Project Manager



ALS Environmental – Fort Collins is accredited by the following accreditation bodies for various testing scopes in accordance with requirements of each accreditation body. All testing is performed under the laboratory management system, which is maintained to meet these requirement and regulations. Please contact the laboratory or accreditation body for the current scope testing parameters.

ALS Environmental – Fort Collins	
Accreditation Body	License or Certification Number
Alaska (AK)	17-003
Arizona (AZ)	AZ0742
California (CA)	2926
Colorado (CO)	CO01099
Florida (FL)	E87914
Idaho (ID)	CO01099
Kansas (KS)	E-10381
Kentucky (KY)	90137
PJ-LA (DoD ELAP/ISO 170250)	95377
Maryland (MD)	285
Missouri (MO)	175
Nebraska(NE)	NE-OS-24-13
Nevada (NV)	CO010992018-1
New York (NY)	12036
North Dakota (ND)	R-057
Oklahoma (OK)	1301
Pennsylvania (PA)	68-03116
Tennessee (TN)	TN02976
Texas (TX)	T104704241
Utah (UT)	CO01099
Washington (WA)	C1280



## 2012005

### **Radium-228:**

The sample was analyzed for the presence of  $^{228}\text{Ra}$  by low background gas flow proportional counting of  $^{228}\text{Ac}$ , which is the ingrown progeny of  $^{228}\text{Ra}$ , according to the current revision of SOP 724.

**Ra-228** activity is reported in the associated method blank above the minimum detectable concentration value. The measured blank activity is below the requested MDC. Results are acceptable according to the current revision of SOP 715, and are submitted without further qualification.

All remaining acceptance criteria were met.

### **Radium-226:**

The sample was prepared and analyzed according to the current revision of SOP 783.

All acceptance criteria were met.

# ALS -- Fort Collins

## Sample Number(s) Cross-Reference Table

---

**OrderNum:** 2012005

**Client Name:** ALS Environmental

**Client Project Name:**

**Client Project Number:** 20112217

**Client PO Number:** 20-122020059

---

Client Sample Number	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
MW-4	2012005-1		WATER	24-Nov-20	12:16

**Subcontractor:**

ALS Environmental, Fort Collins

225 Commerce Dr.

Fort Collins, CO 80524

TEL: (800) 443-1511

FAX:

Acct #:

**CHAIN-OF-CUSTODY RECORD**

Page 1 of 1

Date: 30-Nov-20COC ID: 15283Due Date: 15-Dec-20

Salesperson

ALSHN Account

Customer Information		Project Information		Parameter/Method Request for Analysis	
Purchase Order		Project Name	20112217	A Subcontracted Analyses (SUBCONTRACT)	
Work Order		Project Number		B <i>MS/MSD</i>	
Company Name	ALS Group USA, Corp	Bill To Company	ALS Group USA, Corp	C	
Send Report To	Chad Whelton	Inv Attn	Accounts Payable	D	
Address	3352 128th Ave	Address	3352 128th Ave	E	
				F	
City/State/Zip	Holland, Michigan 49424	City/State/Zip	Holland, Michigan 49424	G	
Phone	(616) 399-6070	Phone	(616) 399-6070	H	
Fax	(616) 399-6185	Fax	(616) 399-6185	I	
eMail Address	chad.whelton@alsglobal.com	eMail CC		J	

ALS Sample ID	Client Sample ID	Matrix	Collection Date 24hr	Bottle	A	B	C	D	E	F	G	H	I	J
20112217-01C	PZ-1	Groundwater	24/Nov/2020 10:30	(2) 1LPHNO3	X									
20112217-02C	MW-1	Groundwater	24/Nov/2020 13:15	(2) 1LPHNO3	X									
20112217-03C	MW-2	Groundwater	24/Nov/2020 14:50	(2) 1LPHNO3	X									
20112217-05C	MW-3A	Groundwater	24/Nov/2020 17:55	(2) 1LPHNO3	X									
20112217-06C	Field Duplicate	Groundwater	24/Nov/2020	(2) 1LPHNO3	X									
20112217-07C	Field Blank	Water	24/Nov/2020 17:30	(2) 1LPHNO3	X									
20112217-08C	Equipment Blank	Water	24/Nov/2020 17:30	(2) 1LPHNO3	X									
20112217-09C	MW-4	Groundwater	24/Nov/2020 12:16	(2) 1LPHNO3	X									
20112217-04C	MW-3	Groundwater	24/Nov/2020 16:35	(6) 1LPHNO3	X	X								

**Comments:**

Please analyze these samples per our instructions and indicated turnaround requirements. Please include all QC with data. The samples do not need to be returned and can be disposed after 30 days. Report MW-4 separately.

Relinquished by:

Date/Time

11-30-20 1200

Received by:

Date/Time

12-01-20 1030

Cooler IDs

Report/QC Level

Std

Relinquished by:

Date/Time

Received by:

Date/Time



ALS Environmental - Fort Collins  
CONDITION OF SAMPLE UPON RECEIPT FORM

Client Name/ID:

Holland

Workorder No:

2012005

Project Manager:

JME

Initials:

RGA

Date: 12/01/2020

1. Are airbills / shipping documents present and/or removable?	<input type="checkbox"/> Drop Off	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
2. Are custody seals on shipping containers intact?	<input checked="" type="checkbox"/> NONE	<input type="checkbox"/> YES	<input type="checkbox"/> NO*
3. Are custody seals on sample containers intact?	<input checked="" type="checkbox"/> NONE	<input type="checkbox"/> YES	<input type="checkbox"/> NO*
4. Is there a COC (chain-of-custody) present?		<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO*
5. Is the COC in agreement with samples received? (IDs, dates, times, # of samples, # of containers, matrix, requested analyses, etc.)		<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO*
6. Are short-hold samples present?		<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO
7. Are all samples within holding times for the requested analyses?		<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO*
8. Were all sample containers received intact? (not broken or leaking)		<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO*
9. Is there sufficient sample for the requested analyses?		<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO*
10. Are samples in proper containers for requested analyses? (form 250, Sample Handling Guidelines)		<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO*
11. Are all aqueous samples preserved correctly, if required?	<input type="checkbox"/> N/A	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO*
12. Were unpreserved samples pH checked, if required?	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> YES	<input type="checkbox"/> NO
13. Are all samples requiring no headspace (VOC, GRO, RSK/MEE, radon) free of bubbles > 6 mm in diameter?	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> YES	<input type="checkbox"/> NO
14. Were the samples shipped on ice?		<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO
15. Were cooler temperatures measured at 0.1 - 6.0°C?	IR gun used: <input type="checkbox"/> #3 <input type="checkbox"/> #5	<input checked="" type="checkbox"/> Rad Only	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO

Cooler #: 1 2

Temperature (°C): amb amb

# of custody seals on cooler: 0 0

External mR/hr reading: 11 11

Background mR/hr reading: 9

Were external mR/hr readings ≤ two times background and within DOT acceptance criteria? (If no, see Form 008)

☐ N/A ☒ YES ☐ NO

\* Please provide details below for 'NO' responses in gray boxes above - for 2 thru 5 & 7 thru 12, notify PM & continue w/ login.

All client bottle ID's vs ALS lab ID's double-checked by: RGA

If applicable, was the client contacted? ☐ YES ☐ N/A Contact Name

Date:

Project Manager Signature / Date:

*[Signature]* 12/1/20

Ref: Date: 30Nov20  
Dep: Wgt: 21.05 LBS  
DV: 0.00

SHIPPING: 0.00  
SPECIAL: 0.00  
HANDLING: 0.00  
TOTAL: 0.00

Svcs: PRIORITY OVERNIGHT Master 1668 7926 2290  
TRACK: 1668 7926 2304

ORIGIN ID:GRRR (616) 399-6070  
ALS ENVIRONMENTAL  
ALS ENVIRONMENTAL  
3352 128TH AVENUE

HOLLAND, MI 494249263  
UNITED STATES US

SHIP DATE: 30NOV20  
ACTWGT: 21.05 LB  
CAD: 0122071/CAFE3311

BILL THIRD PARTY

TO SAMPLE RECEIVING  
ALS ENVIRONMENTAL  
225 COMMERCE DR

FORT COLLINS CO 80524

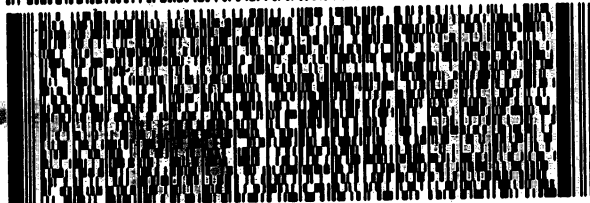
(970) 490-1511

REF:

INV:

DEPT:

11-0  
amb



FedEx  
Express



2 of 2

MPS# 1668 7926-2304

Mstr# 1668 7926 2290

|0201|

TUE - 01 DEC 10:30A  
PRIORITY OVERNIGHT

NA FTCA

80524

CO-US DEN



8 of 12

Client: ALS Environmental

Date: 23-Dec-20

Project: 20112217

Work Order: 2012005

Sample ID: MW-4

Lab ID: 2012005-1

Legal Location:

Matrix: WATER

Collection Date: 11/24/2020 12:16

Percent Moisture:

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
<b>Radium-226 by Radon Emanation - Method 903.1</b>						
<b>Ra-226</b>	<b>0.82 (+/- 0.39)</b>		<b>SOP 783</b>		Prep Date: <b>12/9/2020</b>	PrepBy: <b>TRB</b>
<i>Carr: BARIUM</i>	<i>93.4</i>		<b>0.28</b>	<b>pCi/l</b>	NA	12/19/2020 12:13
			<i>40-110</i>	<i>%REC</i>	DL = NA	12/19/2020 12:13
<b>Radium-228 Analysis by GFPC</b>						
<b>Ra-228</b>	<b>4.4 (+/- 1.2)</b>		<b>SOP 724</b>		Prep Date: <b>12/11/2020</b>	PrepBy: <b>RGS</b>
<i>Carr: BARIUM</i>	<i>93.9</i>		<b>0.9</b>	<b>pCi/l</b>	NA	12/21/2020 07:37
			<i>40-110</i>	<i>%REC</i>	DL = NA	12/21/2020 07:37



**Client:** ALS Environmental  
**Project:** 20112217  
**Sample ID:** MW-4  
**Legal Location:**  
**Collection Date:** 11/24/2020 12:16

**Date:** 23-Dec-20  
**Work Order:** 2012005  
**Lab ID:** 2012005-1  
**Matrix:** WATER  
**Percent Moisture:**

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
----------	--------	------	--------------	-------	-----------------	---------------

### Explanation of Qualifiers

#### Radiochemistry:

- "Report Limit" is the MDC  
 U or ND - Result is less than the sample specific MDC.  
 Y1 - Chemical Yield is in control at 100-110%. Quantitative yield is assumed.  
 Y2 - Chemical Yield outside default limits.  
 W - DER is greater than Warning Limit of 1.42  
 \* - Aliquot Basis is 'As Received' while the Report Basis is 'Dry Weight'.  
 # - Aliquot Basis is 'Dry Weight' while the Report Basis is 'As Received'.  
 G - Sample density differs by more than 15% of LCS density.  
 D - DER is greater than Control Limit  
 M - Requested MDC not met.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.  
 L - LCS Recovery below lower control limit.  
 H - LCS Recovery above upper control limit.  
 P - LCS, Matrix Spike Recovery within control limits.  
 N - Matrix Spike Recovery outside control limits  
 NC - Not Calculated for duplicate results less than 5 times MDC  
 B - Analyte concentration greater than MDC.  
 B3 - Analyte concentration greater than MDC but less than Requested MDC.

#### Inorganics:

B - Result is less than the requested reporting limit but greater than the instrument method detection limit (MDL).  
 U or ND - Indicates that the compound was analyzed for but not detected.  
 E - The reported value is estimated because of the presence of interference. An explanatory note may be included in the narrative.  
 M - Duplicate injection precision was not met.  
 N - Spiked sample recovery not within control limits. A post spike is analyzed for all ICP analyses when the matrix spike and or spike duplicate fail and the native sample concentration is less than four times the spike added concentration.  
 Z - Spiked recovery not within control limits. An explanatory note may be included in the narrative.  
 \* - Duplicate analysis (relative percent difference) not within control limits.  
 S - SAR value is estimated as one or more analytes used in the calculation were not detected above the detection limit.

#### Organics:

U or ND - Indicates that the compound was analyzed for but not detected.  
 B - Analyte is detected in the associated method blank as well as in the sample. It indicates probable blank contamination and warns the data user.  
 E - Analyte concentration exceeds the upper level of the calibration range.  
 J - Estimated value. The result is less than the reporting limit but greater than the instrument method detection limit (MDL).  
 A - A tentatively identified compound is a suspected aldol-condensation product.  
 X - The analyte was diluted below an accurate quantitation level.  
 \* - The spike recovery is equal to or outside the control criteria used.  
 + - The relative percent difference (RPD) equals or exceeds the control criteria.  
 G - A pattern resembling gasoline was detected in this sample.  
 D - A pattern resembling diesel was detected in this sample.  
 M - A pattern resembling motor oil was detected in this sample.  
 C - A pattern resembling crude oil was detected in this sample.  
 4 - A pattern resembling JP-4 was detected in this sample.  
 5 - A pattern resembling JP-5 was detected in this sample.  
 H - Indicates that the fuel pattern was in the heavier end of the retention time window for the analyte of interest.  
 L - Indicates that the fuel pattern was in the lighter end of the retention time window for the analyte of interest.  
 Z - This flag indicates that a significant fraction of the reported result did not resemble the patterns of any of the following petroleum hydrocarbon products:  
 - gasoline  
 - JP-8  
 - diesel  
 - mineral spirits  
 - motor oil  
 - Stoddard solvent  
 - bunker C

## ALS -- Fort Collins

Date: 12/23/2020 11:5

Client: ALS Environmental

## QC BATCH REPORT

Work Order: 2012005

Project: 20112217

Batch ID: RE201209-1-1

Instrument ID: Alpha Scin

Method: Radium-226 by Radon Emanation

LCS	Sample ID: RE201209-1				Units: pCi/l		Analysis Date: 12/19/2020 12:13				
Client ID:	Run ID: RE201209-1B				Prep Date: 12/9/2020			DF: NA			
Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref Value	DER	DER Limit	Qual
Ra-226	55 (+/- 14)	0	46.8		117	67-120					P
Carr: BARIUM	12770		15760		81	40-110					

LCSD	Sample ID: RE201209-1				Units: pCi/l		Analysis Date: 12/19/2020 12:13				
Client ID:	Run ID: RE201209-1B				Prep Date: 12/9/2020			DF: NA			
Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref Value	DER	DER Limit	Qual
Ra-226	36.4 (+/- 9.1)	0.2	46.8		77.9	67-120		55	1.11	2.13	P
Carr: BARIUM	15250		15760		96.7	40-110		12770			

MB	Sample ID: RE201209-1				Units: pCi/l			Analysis Date: 12/19/2020 12:13			
Client ID:	Run ID: RE201209-1B				Prep Date: 12/9/2020			DF: NA			
Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref Value	DER	DER Limit	Qual
Ra-226	ND	0.3									Y1,U
Carr: BARIUM	16820		15760		107	40-110					Y1

The following samples were analyzed in this batch:

2012005-1

Client: ALS Environmental  
 Work Order: 2012005  
 Project: 20112217

## QC BATCH REPORT

Batch ID: RA201211-1-1 Instrument ID: LB4100-C Method: Radium-228 Analysis by GFPC

LCS	Sample ID: RA201211-1				Units: pCi/l		Analysis Date: 12/21/2020 07:37				
Client ID:		Run ID: RA201211-1A				Prep Date: 12/11/2020			DF: NA		
Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref Value	DER	DER Limit	Qual
Ra-228	21 (+/- 4.9)	0.7	23.05		91.3	70-130					P
Carr: BARIUM	32330		33380		96.9	40-110					

LCSD	Sample ID: RA201211-1				Units: pCi/l		Analysis Date: 12/21/2020 07:37				
Client ID:	Run ID: RA201211-1A				Prep Date: 12/11/2020			DF: NA			
Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref Value	DER	DER Limit	Qual
Ra-228	24.6 (+/- 5.7)	0.7	23.05		107	70-130		21	0.48	2.13	P
Carr: BARIUM	32690		33390		97.9	40-110		32330			

MB		Sample ID: RA201211-1				Units: pCi/l		Analysis Date: 12/21/2020 07:37				
Client ID:		Run ID: RA201211-1A				Prep Date: 12/11/2020			DF: NA			
Analyte		Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref Value	DER	DER Limit	Qual
Ra-228		0.8 (+/- 0.42)	0.74									B3
Carr: BARIUM		32480		33380		97.3	40-110					

The following samples were analyzed in this batch:

2012005-1



## **APPENDIX B-4**

### **September 2016 Coal and Ash Data**



12-Oct-2016

Judy Visscher  
Holland Board of Public Works  
625 Hastings  
Holland, MI 49423

Re: **HBPW Coal Yard**

Work Order: **16091814**

Dear Judy,

ALS Environmental received 16 samples on 30-Sep-2016 03:30 PM for the analyses presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested.

Sample results are compliant with NELAP standard requirements and QC results achieved laboratory specifications. Any exceptions are noted in the Case Narrative, or noted with qualifiers in the report or QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained from ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

The total number of pages in this report is 39.

If you have any questions regarding this report, please feel free to contact me.

Sincerely,

A handwritten signature in black ink, appearing to read "Bill Carey".

Electronically approved by: Bill Carey

Bill Carey  
Project Manager



Certificate No: MN 998501

### Report of Laboratory Analysis

ADDRESS 3352 128th Avenue Holland, Michigan 49424-9263 | PHONE (616) 399-6070 | FAX (616) 399-6185

ALS GROUP USA, CORP Part of the ALS Laboratory Group A Campbell Brothers Limited Company

Environmental 

[www.alsglobal.com](http://www.alsglobal.com)

RIGHT SOLUTIONS RIGHT PARTNER

**Client:** Holland Board of Public Works  
**Project:** HBPW Coal Yard  
**WorkOrder:** 16091814

## **QUALIFIERS, ACRONYMS, UNITS**

<b><u>Qualifier</u></b>	<b><u>Description</u></b>
*	Value exceeds Regulatory Limit
a	Not accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
J	Analyte is present at an estimated concentration between the MDL and Report Limit
n	Not offered for accreditation
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL
X	Analyte was detected in the Method Blank between the MDL and Reporting Limit, sample results may exhibit background or reagent contamination at the observed level.

<b><u>Acronym</u></b>	<b><u>Description</u></b>
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LOD	Limit of Detection (see MDL)
LOQ	Limit of Quantitation (see PQL)
MBLK	Method Blank
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PQL	Practical Quantitation Limit
RPD	Relative Percent Difference
TDL	Target Detection Limit
TNTC	Too Numerous To Count
A	APHA Standard Methods
D	ASTM
E	EPA
SW	SW-846 Update III

<b><u>Units Reported</u></b>	<b><u>Description</u></b>
% of sample	Percent of Sample
µg/Kg-dry	Micrograms per Kilogram Dry Weight
µg/L	Micrograms per Liter
s.u.	Standard Units

# ALS Group USA, Corp

Date: 12-Oct-16

**Client:** Holland Board of Public Works  
**Project:** HBPW Coal Yard  
**Sample ID:** Ash #1  
**Collection Date:** 9/30/2016 01:45 PM

**Work Order:** 16091814  
**Lab ID:** 16091814-01  
**Matrix:** ASH

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
<b>MERCURY BY CVAA</b>						
Mercury	160		SW7471B 19	µg/Kg-dry	Prep: SW7471 / 10/6/16 1	Analyst: LR 10/7/2016 11:51 AM
<b>METALS ANALYSIS BY ICP</b>						
Aluminum	8,200,000		SW846 6010C 11,000	µg/Kg-dry	Prep: SW3050B / 10/4/16 10	Analyst: JEC 10/5/2016 06:28 PM
Antimony	ND		5,300	µg/Kg-dry	10	10/5/2016 06:28 PM
Arsenic	38,000		5,300	µg/Kg-dry	10	10/5/2016 06:28 PM
Barium	410,000		5,300	µg/Kg-dry	10	10/5/2016 06:28 PM
Beryllium	3,000		2,100	µg/Kg-dry	10	10/5/2016 06:28 PM
Boron	ND		21,000	µg/Kg-dry	10	10/5/2016 06:28 PM
Cadmium	ND		11,000	µg/Kg-dry	10	10/5/2016 06:28 PM
Calcium	5,100,000		530,000	µg/Kg-dry	10	10/5/2016 06:28 PM
Chromium	16,000		5,300	µg/Kg-dry	10	10/5/2016 06:28 PM
Cobalt	12,000		5,300	µg/Kg-dry	10	10/5/2016 06:28 PM
Copper	51,000		11,000	µg/Kg-dry	10	10/5/2016 06:28 PM
Iron	13,000,000		84,000	µg/Kg-dry	10	10/5/2016 06:28 PM
Lead	17,000		5,300	µg/Kg-dry	10	10/5/2016 06:28 PM
Lithium	13,000		11,000	µg/Kg-dry	10	10/5/2016 06:28 PM
Manganese	130,000		5,300	µg/Kg-dry	10	10/5/2016 06:28 PM
Molybdenum	ND		5,300	µg/Kg-dry	10	10/5/2016 06:28 PM
Nickel	25,000		5,300	µg/Kg-dry	10	10/5/2016 06:28 PM
Selenium	ND		11,000	µg/Kg-dry	10	10/5/2016 06:28 PM
Silver	ND		5,300	µg/Kg-dry	10	10/5/2016 06:28 PM
Thallium	ND		11,000	µg/Kg-dry	10	10/5/2016 06:28 PM
Zinc	32,000		11,000	µg/Kg-dry	10	10/5/2016 06:28 PM
<b>ANIONS BY ION CHROMATOGRAPHY</b>						
Chloride	ND		SW9056A 13,000	ug/Kg-dry	Prep: EXTRACT / 10/6/16 1	Analyst: EE 10/11/2016 12:46 AM
Fluoride	1,800		1,300	ug/Kg-dry	1	10/11/2016 12:46 AM
Sulfate	21,000		13,000	ug/Kg-dry	1	10/11/2016 12:46 AM
<b>MOISTURE</b>						
Moisture	22		SW3550C 0.050	% of sample	1	Analyst: EDL 10/3/2016 12:10 PM
<b>PH</b>						
pH	7.8		SW9045D	s.u.	Prep: EXTRACT / 10/4/16 1	Analyst: JB 10/4/2016 03:30 PM
<b>TOTAL SOLIDS</b>						
Total Solids	78		A2540 G 0.050	% of sample	1	Analyst: EDL 10/3/2016 12:10 PM

**Note:** See Qualifiers page for a list of qualifiers and their definitions.

# ALS Group USA, Corp

Date: 12-Oct-16

**Client:** Holland Board of Public Works  
**Project:** HBPW Coal Yard  
**Sample ID:** Ash #2  
**Collection Date:** 9/30/2016 01:55 PM

**Work Order:** 16091814  
**Lab ID:** 16091814-02  
**Matrix:** ASH

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
<b>MERCURY BY CVAA</b>						
<b>Mercury</b>	<b>76</b>		<b>SW7471B</b> <b>20</b>	<b>ug/Kg-dry</b>	Prep: SW7471 / 10/6/16 1	Analyst: <b>LR</b> 10/7/2016 11:53 AM
<b>METALS ANALYSIS BY ICP</b>						
<b>Aluminum</b>	<b>4,600,000</b>		<b>SW846 6010C</b> <b>10,000</b>	<b>µg/Kg-dry</b>	Prep: SW3050B / 10/4/16 10	Analyst: <b>JEC</b> 10/5/2016 06:33 PM
Antimony	ND		5,100	µg/Kg-dry	10	10/5/2016 06:33 PM
<b>Arsenic</b>	<b>22,000</b>		<b>5,100</b>	<b>µg/Kg-dry</b>	10	10/5/2016 06:33 PM
<b>Barium</b>	<b>290,000</b>		<b>5,100</b>	<b>µg/Kg-dry</b>	10	10/5/2016 06:33 PM
Beryllium	ND		2,000	µg/Kg-dry	10	10/5/2016 06:33 PM
Boron	ND		20,000	µg/Kg-dry	10	10/5/2016 06:33 PM
Cadmium	ND		10,000	µg/Kg-dry	10	10/5/2016 06:33 PM
<b>Calcium</b>	<b>3,000,000</b>		<b>510,000</b>	<b>µg/Kg-dry</b>	10	10/5/2016 06:33 PM
<b>Chromium</b>	<b>11,000</b>		<b>5,100</b>	<b>µg/Kg-dry</b>	10	10/5/2016 06:33 PM
<b>Cobalt</b>	<b>7,700</b>		<b>5,100</b>	<b>µg/Kg-dry</b>	10	10/5/2016 06:33 PM
<b>Copper</b>	<b>34,000</b>		<b>10,000</b>	<b>µg/Kg-dry</b>	10	10/5/2016 06:33 PM
<b>Iron</b>	<b>9,800,000</b>		<b>82,000</b>	<b>µg/Kg-dry</b>	10	10/5/2016 06:33 PM
<b>Lead</b>	<b>10,000</b>		<b>5,100</b>	<b>µg/Kg-dry</b>	10	10/5/2016 06:33 PM
Lithium	ND		10,000	µg/Kg-dry	10	10/5/2016 06:33 PM
<b>Manganese</b>	<b>110,000</b>		<b>5,100</b>	<b>µg/Kg-dry</b>	10	10/5/2016 06:33 PM
Molybdenum	ND		5,100	µg/Kg-dry	10	10/5/2016 06:33 PM
<b>Nickel</b>	<b>16,000</b>		<b>5,100</b>	<b>µg/Kg-dry</b>	10	10/5/2016 06:33 PM
Selenium	ND		10,000	µg/Kg-dry	10	10/5/2016 06:33 PM
Silver	ND		5,100	µg/Kg-dry	10	10/5/2016 06:33 PM
Thallium	ND		10,000	µg/Kg-dry	10	10/5/2016 06:33 PM
<b>Zinc</b>	<b>23,000</b>		<b>10,000</b>	<b>µg/Kg-dry</b>	10	10/5/2016 06:33 PM
<b>ANIONS BY ION CHROMATOGRAPHY</b>						
<b>Chloride</b>	<b>ND</b>		<b>SW9056A</b> <b>13,000</b>	<b>ug/Kg-dry</b>	Prep: EXTRACT / 10/6/16 1	Analyst: <b>EE</b> 10/11/2016 01:47 AM
<b>Fluoride</b>	<b>3,400</b>		<b>1,300</b>	<b>ug/Kg-dry</b>	1	10/11/2016 01:47 AM
<b>Sulfate</b>	<b>61,000</b>		<b>13,000</b>	<b>ug/Kg-dry</b>	1	10/11/2016 01:47 AM
<b>MOISTURE</b>						
<b>Moisture</b>	<b>22</b>		<b>SW3550C</b> <b>0.050</b>	<b>% of sample</b>	Prep: EXTRACT / 10/4/16 1	Analyst: <b>EDL</b> 10/3/2016 12:10 PM
<b>PH</b>						
<b>pH</b>	<b>7.3</b>		<b>SW9045D</b> <b>s.u.</b>	<b>s.u.</b>	Prep: EXTRACT / 10/4/16 1	Analyst: <b>JB</b> 10/4/2016 03:30 PM
<b>TOTAL SOLIDS</b>						
<b>Total Solids</b>	<b>78</b>		<b>A2540 G</b> <b>0.050</b>	<b>% of sample</b>	Prep: EXTRACT / 10/4/16 1	Analyst: <b>EDL</b> 10/3/2016 12:10 PM

**Note:** See Qualifiers page for a list of qualifiers and their definitions.



# ALS Group USA, Corp

Date: 12-Oct-16

**Client:** Holland Board of Public Works  
**Project:** HBPW Coal Yard  
**Sample ID:** Ash #3  
**Collection Date:** 9/30/2016 02:10 PM

**Work Order:** 16091814  
**Lab ID:** 16091814-03  
**Matrix:** ASH

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
<b>MERCURY BY CVAA</b>						
Mercury	51		SW7471B 19	ug/Kg-dry	Prep: SW7471 / 10/6/16 1	Analyst: LR 10/7/2016 11:56 AM
<b>METALS ANALYSIS BY ICP</b>						
Aluminum	5,700,000		SW846 6010C 11,000	µg/Kg-dry	Prep: SW3050B / 10/4/16 10	Analyst: JEC 10/5/2016 06:38 PM
Antimony	ND		5,300	µg/Kg-dry	10	10/5/2016 06:38 PM
Arsenic	15,000		5,300	µg/Kg-dry	10	10/5/2016 06:38 PM
Barium	220,000		5,300	µg/Kg-dry	10	10/5/2016 06:38 PM
Beryllium	ND		2,100	µg/Kg-dry	10	10/5/2016 06:38 PM
Boron	ND		21,000	µg/Kg-dry	10	10/5/2016 06:38 PM
Cadmium	ND		11,000	µg/Kg-dry	10	10/5/2016 06:38 PM
Calcium	5,800,000		530,000	µg/Kg-dry	10	10/5/2016 06:38 PM
Chromium	10,000		5,300	µg/Kg-dry	10	10/5/2016 06:38 PM
Cobalt	ND		5,300	µg/Kg-dry	10	10/5/2016 06:38 PM
Copper	19,000		11,000	µg/Kg-dry	10	10/5/2016 06:38 PM
Iron	8,100,000		85,000	µg/Kg-dry	10	10/5/2016 06:38 PM
Lead	6,300		5,300	µg/Kg-dry	10	10/5/2016 06:38 PM
Lithium	ND		11,000	µg/Kg-dry	10	10/5/2016 06:38 PM
Manganese	76,000		5,300	µg/Kg-dry	10	10/5/2016 06:38 PM
Molybdenum	ND		5,300	µg/Kg-dry	10	10/5/2016 06:38 PM
Nickel	13,000		5,300	µg/Kg-dry	10	10/5/2016 06:38 PM
Selenium	ND		11,000	µg/Kg-dry	10	10/5/2016 06:38 PM
Silver	ND		5,300	µg/Kg-dry	10	10/5/2016 06:38 PM
Thallium	ND		11,000	µg/Kg-dry	10	10/5/2016 06:38 PM
Zinc	19,000		11,000	µg/Kg-dry	10	10/5/2016 06:38 PM
<b>ANIONS BY ION CHROMATOGRAPHY</b>						
Chloride	45,000		SW9056A 13,000	ug/Kg-dry	Prep: EXTRACT / 10/6/16 1	Analyst: EE 10/11/2016 02:07 AM
Fluoride	1,400		1,300	ug/Kg-dry	1	10/11/2016 02:07 AM
Sulfate	140,000		13,000	ug/Kg-dry	1	10/11/2016 02:07 AM
<b>MOISTURE</b>						
Moisture	28		SW3550C 0.050	% of sample	1	Analyst: EDL 10/3/2016 12:10 PM
<b>PH</b>						
pH	8.0		SW9045D	s.u.	Prep: EXTRACT / 10/4/16 1	Analyst: JB 10/4/2016 03:30 PM
<b>TOTAL SOLIDS</b>						
Total Solids	72		A2540 G 0.050	% of sample	1	Analyst: EDL 10/3/2016 12:10 PM

**Note:** See Qualifiers page for a list of qualifiers and their definitions.

# ALS Group USA, Corp

Date: 12-Oct-16

**Client:** Holland Board of Public Works  
**Project:** HBPW Coal Yard  
**Sample ID:** Ash #4  
**Collection Date:** 9/30/2016 02:30 PM

**Work Order:** 16091814  
**Lab ID:** 16091814-04  
**Matrix:** ASH

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
<b>MERCURY BY CVAA</b>						
Mercury	400		SW7471B 44	µg/Kg-dry	Prep: SW7471 / 10/6/16 2	Analyst: LR 10/7/2016 01:48 PM
<b>METALS ANALYSIS BY ICP</b>						
Aluminum	24,000,000		SW846 6010C 13,000	µg/Kg-dry	Prep: SW3050B / 10/4/16 10	Analyst: JEC 10/5/2016 06:44 PM
Antimony	ND		6,300	µg/Kg-dry	10	10/5/2016 06:44 PM
Arsenic	11,000		6,300	µg/Kg-dry	10	10/5/2016 06:44 PM
Barium	1,300,000		6,300	µg/Kg-dry	10	10/5/2016 06:44 PM
Beryllium	ND		2,500	µg/Kg-dry	10	10/5/2016 06:44 PM
Boron	280,000		25,000	µg/Kg-dry	10	10/5/2016 06:44 PM
Cadmium	ND		13,000	µg/Kg-dry	10	10/5/2016 06:44 PM
Calcium	43,000,000		630,000	µg/Kg-dry	10	10/5/2016 06:44 PM
Chromium	14,000		6,300	µg/Kg-dry	10	10/5/2016 06:44 PM
Cobalt	6,900		6,300	µg/Kg-dry	10	10/5/2016 06:44 PM
Copper	29,000		13,000	µg/Kg-dry	10	10/5/2016 06:44 PM
Iron	21,000,000		100,000	µg/Kg-dry	10	10/5/2016 06:44 PM
Lead	13,000		6,300	µg/Kg-dry	10	10/5/2016 06:44 PM
Lithium	25,000		13,000	µg/Kg-dry	10	10/5/2016 06:44 PM
Manganese	160,000		6,300	µg/Kg-dry	10	10/5/2016 06:44 PM
Molybdenum	ND		6,300	µg/Kg-dry	10	10/5/2016 06:44 PM
Nickel	14,000		6,300	µg/Kg-dry	10	10/5/2016 06:44 PM
Selenium	ND		13,000	µg/Kg-dry	10	10/5/2016 06:44 PM
Silver	ND		6,300	µg/Kg-dry	10	10/5/2016 06:44 PM
Thallium	ND		13,000	µg/Kg-dry	10	10/5/2016 06:44 PM
Zinc	22,000		13,000	µg/Kg-dry	10	10/5/2016 06:44 PM
<b>ANIONS BY ION CHROMATOGRAPHY</b>						
Chloride	63,000		SW9056A 17,000	µg/Kg-dry	Prep: EXTRACT / 10/6/16 1	Analyst: EE 10/11/2016 02:27 AM
Fluoride	14,000		1,700	µg/Kg-dry	1	10/11/2016 02:27 AM
Sulfate	890,000		85,000	µg/Kg-dry	5	10/11/2016 09:47 AM
<b>MOISTURE</b>						
Moisture	41		SW3550C 0.050	% of sample	1	Analyst: EDL 10/3/2016 12:10 PM
<b>PH</b>						
pH	7.7		SW9045D	s.u.	Prep: EXTRACT / 10/4/16 1	Analyst: JB 10/4/2016 03:30 PM
<b>TOTAL SOLIDS</b>						
Total Solids	59		A2540 G 0.050	% of sample	1	Analyst: EDL 10/3/2016 12:10 PM

**Note:** See Qualifiers page for a list of qualifiers and their definitions.

# ALS Group USA, Corp

Date: 12-Oct-16

**Client:** Holland Board of Public Works  
**Project:** HBPW Coal Yard  
**Sample ID:** Ash #1  
**Collection Date:** 9/30/2016 01:45 PM

**Work Order:** 16091814  
**Lab ID:** 16091814-09  
**Matrix:** SPLP EXTRACT

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
<b>MERCURY BY CVAA</b>			<b>SW7470A</b>		Prep: SW7470 / 10/4/16	Analyst: <b>LR</b>
Mercury	ND		0.20	µg/L	1	10/5/2016 06:25 PM
<b>METALS BY ICP-MS</b>			<b>SW6020A</b>		Prep: SW3005A / 10/5/16	Analyst: <b>RH</b>
<b>Aluminum</b>	<b>2,000</b>		<b>10</b>	<b>µg/L</b>	1	10/6/2016 02:23 PM
Antimony	ND		2.0	µg/L	1	10/6/2016 02:23 PM
<b>Arsenic</b>	<b>30</b>		<b>5.0</b>	<b>µg/L</b>	1	10/6/2016 02:23 PM
<b>Barium</b>	<b>71</b>		<b>5.0</b>	<b>µg/L</b>	1	10/6/2016 02:23 PM
Beryllium	ND		1.0	µg/L	1	10/6/2016 02:23 PM
<b>Boron</b>	<b>93</b>		<b>20</b>	<b>µg/L</b>	1	10/6/2016 02:23 PM
Cadmium	ND		2.0	µg/L	1	10/6/2016 02:23 PM
<b>Calcium</b>	<b>4,900</b>		<b>500</b>	<b>µg/L</b>	1	10/6/2016 02:23 PM
Chromium	ND		5.0	µg/L	1	10/6/2016 02:23 PM
Cobalt	ND		5.0	µg/L	1	10/6/2016 02:23 PM
<b>Copper</b>	<b>11</b>		<b>5.0</b>	<b>µg/L</b>	1	10/6/2016 02:23 PM
<b>Iron</b>	<b>1,100</b>		<b>80</b>	<b>µg/L</b>	1	10/6/2016 02:23 PM
<b>Lead</b>	<b>5.2</b>		<b>5.0</b>	<b>µg/L</b>	1	10/6/2016 02:23 PM
Lithium	ND		10	µg/L	1	10/6/2016 02:23 PM
<b>Manganese</b>	<b>12</b>		<b>5.0</b>	<b>µg/L</b>	1	10/6/2016 02:23 PM
Molybdenum	ND		5.0	µg/L	1	10/6/2016 02:23 PM
<b>Nickel</b>	<b>5.5</b>		<b>5.0</b>	<b>µg/L</b>	1	10/6/2016 02:23 PM
Selenium	ND		5.0	µg/L	1	10/6/2016 02:23 PM
Silver	ND		5.0	µg/L	1	10/6/2016 02:23 PM
Thallium	ND		2.0	µg/L	1	10/6/2016 02:23 PM
<b>Zinc</b>	<b>12</b>		<b>10</b>	<b>µg/L</b>	1	10/6/2016 02:23 PM
<b>ANIONS BY ION CHROMATOGRAPHY</b>			<b>SW9056A</b>			Analyst: <b>EE</b>
Chloride	ND		1,000	µg/L	1	10/7/2016 10:01 AM
<b>Fluoride</b>	<b>400</b>		<b>100</b>	<b>µg/L</b>	1	10/7/2016 10:01 AM
<b>Sulfate</b>	<b>3,800</b>		<b>1,000</b>	<b>µg/L</b>	1	10/7/2016 10:01 AM

**Note:** See Qualifiers page for a list of qualifiers and their definitions.

# ALS Group USA, Corp

Date: 12-Oct-16

**Client:** Holland Board of Public Works  
**Project:** HBPW Coal Yard  
**Sample ID:** Ash #2  
**Collection Date:** 9/30/2016 01:55 PM

**Work Order:** 16091814  
**Lab ID:** 16091814-10  
**Matrix:** SPLP EXTRACT

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
<b>MERCURY BY CVAA</b>						
Mercury	ND		0.20	µg/L	1	10/5/2016 06:28 PM
<b>METALS BY ICP-MS</b>						
Aluminum	390		10	µg/L	1	10/6/2016 02:29 PM
Antimony	ND		2.0	µg/L	1	10/6/2016 02:29 PM
Arsenic	5.1		5.0	µg/L	1	10/6/2016 02:29 PM
Barium	29		5.0	µg/L	1	10/6/2016 02:29 PM
Beryllium	ND		1.0	µg/L	1	10/6/2016 02:29 PM
Boron	91		20	µg/L	1	10/6/2016 02:29 PM
Cadmium	ND		2.0	µg/L	1	10/6/2016 02:29 PM
Calcium	5,100		500	µg/L	1	10/6/2016 02:29 PM
Chromium	ND		5.0	µg/L	1	10/6/2016 02:29 PM
Cobalt	ND		5.0	µg/L	1	10/6/2016 02:29 PM
Copper	ND		5.0	µg/L	1	10/6/2016 02:29 PM
Iron	410		80	µg/L	1	10/6/2016 02:29 PM
Lead	ND		5.0	µg/L	1	10/6/2016 02:29 PM
Lithium	ND		10	µg/L	1	10/6/2016 02:29 PM
Manganese	ND		5.0	µg/L	1	10/6/2016 02:29 PM
Molybdenum	6.0		5.0	µg/L	1	10/6/2016 02:29 PM
Nickel	ND		5.0	µg/L	1	10/6/2016 02:29 PM
Selenium	ND		5.0	µg/L	1	10/6/2016 02:29 PM
Silver	ND		5.0	µg/L	1	10/6/2016 02:29 PM
Thallium	ND		2.0	µg/L	1	10/6/2016 02:29 PM
Zinc	ND		10	µg/L	1	10/6/2016 02:29 PM
<b>ANIONS BY ION CHROMATOGRAPHY</b>						
Chloride	ND		1,000	µg/L	1	10/7/2016 10:21 AM
Fluoride	760		100	µg/L	1	10/7/2016 10:21 AM
Sulfate	8,700		1,000	µg/L	1	10/7/2016 10:21 AM

**Note:** See Qualifiers page for a list of qualifiers and their definitions.

# ALS Group USA, Corp

Date: 12-Oct-16

**Client:** Holland Board of Public Works  
**Project:** HBPW Coal Yard  
**Sample ID:** Ash #3  
**Collection Date:** 9/30/2016 02:10 PM

**Work Order:** 16091814  
**Lab ID:** 16091814-11  
**Matrix:** SPLP EXTRACT

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
<b>MERCURY BY CVAA</b>						
Mercury	ND		0.20	µg/L	1	10/5/2016 06:38 PM
<b>METALS BY ICP-MS</b>						
Aluminum	640		10	µg/L	1	10/6/2016 02:50 PM
Antimony	ND		2.0	µg/L	1	10/6/2016 02:50 PM
Arsenic	17		5.0	µg/L	1	10/6/2016 02:50 PM
Barium	25		5.0	µg/L	1	10/6/2016 02:50 PM
Beryllium	ND		1.0	µg/L	1	10/6/2016 02:50 PM
Boron	240		20	µg/L	1	10/6/2016 02:50 PM
Cadmium	ND		2.0	µg/L	1	10/6/2016 02:50 PM
Calcium	8,500		500	µg/L	1	10/6/2016 02:50 PM
Chromium	ND		5.0	µg/L	1	10/6/2016 02:50 PM
Cobalt	ND		5.0	µg/L	1	10/6/2016 02:50 PM
Copper	ND		5.0	µg/L	1	10/6/2016 02:50 PM
Iron	300		80	µg/L	1	10/6/2016 02:50 PM
Lead	ND		5.0	µg/L	1	10/6/2016 02:50 PM
Lithium	10		10	µg/L	1	10/6/2016 02:50 PM
Manganese	ND		5.0	µg/L	1	10/6/2016 02:50 PM
Molybdenum	ND		5.0	µg/L	1	10/6/2016 02:50 PM
Nickel	ND		5.0	µg/L	1	10/6/2016 02:50 PM
Selenium	ND		5.0	µg/L	1	10/6/2016 02:50 PM
Silver	ND		5.0	µg/L	1	10/6/2016 02:50 PM
Thallium	ND		2.0	µg/L	1	10/6/2016 02:50 PM
Zinc	ND		10	µg/L	1	10/6/2016 02:50 PM
<b>ANIONS BY ION CHROMATOGRAPHY</b>						
Chloride	1,700		1,000	µg/L	1	10/7/2016 10:41 AM
Fluoride	460		100	µg/L	1	10/7/2016 10:41 AM
Sulfate	11,000		1,000	µg/L	1	10/7/2016 10:41 AM

**Note:** See Qualifiers page for a list of qualifiers and their definitions.

# ALS Group USA, Corp

Date: 12-Oct-16

**Client:** Holland Board of Public Works  
**Project:** HBPW Coal Yard  
**Sample ID:** Ash #4  
**Collection Date:** 9/30/2016 02:30 PM

**Work Order:** 16091814  
**Lab ID:** 16091814-12  
**Matrix:** SPLP EXTRACT

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
<b>MERCURY BY CVAA</b>						
Mercury	ND		0.20	µg/L	1	10/5/2016 06:41 PM
<b>METALS BY ICP-MS</b>						
Aluminum	120		10	µg/L	1	10/6/2016 02:55 PM
Antimony	ND		2.0	µg/L	1	10/6/2016 02:55 PM
Arsenic	ND		5.0	µg/L	1	10/6/2016 02:55 PM
Barium	250		5.0	µg/L	1	10/6/2016 02:55 PM
Beryllium	ND		1.0	µg/L	1	10/6/2016 02:55 PM
Boron	1,400		20	µg/L	1	10/6/2016 02:55 PM
Cadmium	ND		2.0	µg/L	1	10/6/2016 02:55 PM
Calcium	20,000		500	µg/L	1	10/6/2016 02:55 PM
Chromium	ND		5.0	µg/L	1	10/6/2016 02:55 PM
Cobalt	ND		5.0	µg/L	1	10/6/2016 02:55 PM
Copper	ND		5.0	µg/L	1	10/6/2016 02:55 PM
Iron	ND		80	µg/L	1	10/6/2016 02:55 PM
Lead	ND		5.0	µg/L	1	10/6/2016 02:55 PM
Lithium	38		10	µg/L	1	10/6/2016 02:55 PM
Manganese	ND		5.0	µg/L	1	10/6/2016 02:55 PM
Molybdenum	8.5		5.0	µg/L	1	10/6/2016 02:55 PM
Nickel	ND		5.0	µg/L	1	10/6/2016 02:55 PM
Selenium	20		5.0	µg/L	1	10/6/2016 02:55 PM
Silver	ND		5.0	µg/L	1	10/6/2016 02:55 PM
Thallium	ND		2.0	µg/L	1	10/6/2016 02:55 PM
Zinc	ND		10	µg/L	1	10/6/2016 02:55 PM
<b>ANIONS BY ION CHROMATOGRAPHY</b>						
Chloride	1,700		1,000	µg/L	1	10/7/2016 11:07 AM
Fluoride	1,400		100	µg/L	1	10/7/2016 11:07 AM
Sulfate	34,000		5,000	µg/L	5	10/7/2016 03:30 PM

**Note:** See Qualifiers page for a list of qualifiers and their definitions.

**Client:** Holland Board of Public Works  
**Work Order:** 16091814  
**Project:** HBPW Coal Yard

## QC BATCH REPORT

Batch ID: **92389** Instrument ID **HG1** Method: **SW7470A**

<b>MBLK</b>		Sample ID: <b>MBLK-92389-92389</b>				Units: <b>mg/L</b>		Analysis Date: <b>10/5/2016 06:10 PM</b>		
Client ID:		Run ID: <b>HG1_161005B</b>				SeqNo: <b>4069431</b>		Prep Date: <b>10/4/2016</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Mercury ND 0.00020

<b>LCS</b>		Sample ID: <b>LCS-92389-92389</b>				Units: <b>mg/L</b>		Analysis Date: <b>10/5/2016 06:13 PM</b>		
Client ID:		Run ID: <b>HG1_161005B</b>				SeqNo: <b>4069432</b>		Prep Date: <b>10/4/2016</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Mercury 0.00208 0.00020 0.002 0 104 80-120 0

<b>MS</b>		Sample ID: <b>1610041-01DMS</b>				Units: <b>mg/L</b>		Analysis Date: <b>10/5/2016 07:01 PM</b>		
Client ID:		Run ID: <b>HG1_161005B</b>				SeqNo: <b>4069453</b>		Prep Date: <b>10/4/2016</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Mercury 0.00223 0.00020 0.002 0.000031 110 75-125 0

<b>MSD</b>		Sample ID: <b>1610041-01DMSD</b>				Units: <b>mg/L</b>		Analysis Date: <b>10/5/2016 07:11 PM</b>		
Client ID:		Run ID: <b>HG1_161005B</b>				SeqNo: <b>4069459</b>		Prep Date: <b>10/4/2016</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Mercury 0.00223 0.00020 0.002 0.000031 110 75-125 0.00223 0 20

The following samples were analyzed in this batch:

16091814-09A	16091814-10A	16091814-11A
16091814-12A	16091814-13A	16091814-14A
16091814-15A	16091814-16A	

**Client:** Holland Board of Public Works  
**Work Order:** 16091814  
**Project:** HBPW Coal Yard

## QC BATCH REPORT

Batch ID: **92516**      Instrument ID **HG1**      Method: **SW7471B**

<b>MBLK</b>		Sample ID: <b>MBLK-92516-92516</b>				Units: <b>mg/Kg</b>		Analysis Date: <b>10/7/2016 11:46 AM</b>		
Client ID:		Run ID: <b>HG1_161007A</b>				SeqNo: <b>4072772</b>		Prep Date: <b>10/6/2016</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Mercury      ND      0.020

<b>LCS</b>		Sample ID: <b>LCS-92516-92516</b>				Units: <b>mg/Kg</b>		Analysis Date: <b>10/7/2016 11:48 AM</b>		
Client ID:		Run ID: <b>HG1_161007A</b>				SeqNo: <b>4072773</b>		Prep Date: <b>10/6/2016</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Mercury      0.1808      0.020      0.1665      0      109      80-120      0

<b>MS</b>		Sample ID: <b>1610046-01CMS</b>				Units: <b>mg/Kg</b>		Analysis Date: <b>10/7/2016 12:24 PM</b>		
Client ID:		Run ID: <b>HG1_161007A</b>				SeqNo: <b>4072787</b>		Prep Date: <b>10/6/2016</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Mercury      0.1326      0.014      0.1152      0.01083      106      75-125      0

<b>MSD</b>		Sample ID: <b>1610046-01CMSD</b>				Units: <b>mg/Kg</b>		Analysis Date: <b>10/7/2016 12:27 PM</b>		
Client ID:		Run ID: <b>HG1_161007A</b>				SeqNo: <b>4072788</b>		Prep Date: <b>10/6/2016</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Mercury      0.1385      0.014      0.1182      0.01083      108      75-125      0.1326      4.29      35

The following samples were analyzed in this batch:

16091814-01A	16091814-02A	16091814-03A
16091814-04A	16091814-05A	16091814-06A
16091814-07A	16091814-08A	

**Note:** See Qualifiers Page for a list of Qualifiers and their explanation.



**Client:** Holland Board of Public Works  
**Work Order:** 16091814  
**Project:** HBPW Coal Yard

## QC BATCH REPORT

Batch ID: **92364**      Instrument ID **ICP2**      Method: **SW846 6010C**

MBLK		Sample ID: <b>MBLK-92364-92364</b>				Units: <b>mg/Kg</b>		Analysis Date: <b>10/5/2016 06:11 PM</b>		
Client ID:		Run ID: <b>ICP2_161005B</b>				SeqNo: <b>4068784</b>		Prep Date: <b>10/4/2016</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Aluminum	0.2251	0.50								J
Antimony	0.1585	0.25								J
Arsenic	ND	0.25								
Barium	ND	0.25								
Beryllium	ND	0.10								
Boron	ND	1.0								
Cadmium	0.02855	0.50								J
Calcium	ND	25								
Chromium	0.02788	0.25								J
Cobalt	ND	0.25								
Copper	ND	0.50								
Iron	0.668	4.0								J
Lead	ND	0.25								
Lithium	ND	0.50								
Manganese	ND	0.25								
Molybdenum	ND	0.25								
Nickel	ND	0.25								
Selenium	ND	0.50								
Silver	ND	0.25								
Thallium	ND	0.50								
Zinc	0.08663	0.50								J

**Note:** See Qualifiers Page for a list of Qualifiers and their explanation.

**Client:** Holland Board of Public Works  
**Work Order:** 16091814  
**Project:** HBPW Coal Yard

## QC BATCH REPORT

Batch ID: **92364**

Instrument ID **ICP2**

Method: **SW846 6010C**

LCS		Sample ID: <b>LCS-92364-92364</b>				Units: <b>mg/Kg</b>		Analysis Date: <b>10/5/2016 06:17 PM</b>		
Client ID:		Run ID: <b>ICP2_161005B</b>				SeqNo: <b>4068785</b>		Prep Date: <b>10/4/2016</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Aluminum	5.181	0.50	5	0	104	80-120	0			
Antimony	5.341	0.25	5	0	107	80-120	0			
Arsenic	5.332	0.25	5	0	107	80-120	0			
Barium	5.121	0.25	5	0	102	80-120	0			
Beryllium	4.969	0.10	5	0	99.4	80-120	0			
Boron	24.4	1.0	25	0	97.6	80-120	0			
Cadmium	5.206	0.50	5	0	104	80-120	0			
Calcium	504	25	500	0	101	80-120	0			
Chromium	5.359	0.25	5	0	107	80-120	0			
Cobalt	5.452	0.25	5	0	109	80-120	0			
Copper	5.291	0.50	5	0	106	80-120	0			
Iron	513.8	4.0	500	0	103	80-120	0			
Lead	5.12	0.25	5	0	102	80-120	0			
Lithium	5.103	0.50	5	0	102	80-120	0			
Manganese	5.097	0.25	5	0	102	80-120	0			
Molybdenum	5.538	0.25	5	0	111	80-120	0			
Nickel	5.22	0.25	5	0	104	80-120	0			
Selenium	5.066	0.50	5	0	101	80-120	0			
Silver	4.363	0.25	5	0	87.3	80-120	0			
Thallium	5.262	0.50	5	0	105	80-120	0			
Zinc	5.329	0.50	5	0	107	80-120	0			

**Note:** See Qualifiers Page for a list of Qualifiers and their explanation.

**Client:** Holland Board of Public Works  
**Work Order:** 16091814  
**Project:** HBPW Coal Yard

## QC BATCH REPORT

Batch ID: **92364**

Instrument ID **ICP2**

Method: **SW846 6010C**

LCS		Sample ID: <b>LCS-92364-92364</b>				Units: <b>mg/Kg</b>		Analysis Date: <b>10/6/2016 11:24 AM</b>		
Client ID:		Run ID: <b>ICP2_161006A</b>				SeqNo: <b>4070606</b>		Prep Date: <b>10/4/2016</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Aluminum	5.496	0.50	5	0	110	80-120	0			
Antimony	5.361	0.25	5	0	107	80-120	0			
Arsenic	5.254	0.25	5	0	105	80-120	0			
Barium	5.044	0.25	5	0	101	80-120	0			
Beryllium	4.867	0.10	5	0	97.3	80-120	0			
Boron	24.07	1.0	25	0	96.3	80-120	0			
Cadmium	5.208	0.50	5	0	104	80-120	0			
Calcium	503.3	25	500	0	101	80-120	0			
Chromium	5.291	0.25	5	0	106	80-120	0			
Cobalt	5.456	0.25	5	0	109	80-120	0			
Copper	5.288	0.50	5	0	106	80-120	0			
Iron	502.1	4.0	500	0	100	80-120	0			
Lead	5.043	0.25	5	0	101	80-120	0			
Lithium	5.228	0.50	5	0	105	80-120	0			
Manganese	5.051	0.25	5	0	101	80-120	0			
Molybdenum	5.455	0.25	5	0	109	80-120	0			
Nickel	5.161	0.25	5	0	103	80-120	0			
Selenium	5.017	0.50	5	0	100	80-120	0			
Silver	4.055	0.25	5	0	81.1	80-120	0			
Thallium	5.256	0.50	5	0	105	80-120	0			
Zinc	5.351	0.50	5	0	107	80-120	0			

**Note:** See Qualifiers Page for a list of Qualifiers and their explanation.

**Client:** Holland Board of Public Works  
**Work Order:** 16091814  
**Project:** HBPW Coal Yard

## QC BATCH REPORT

Batch ID: **92364**      Instrument ID **ICP2**      Method: **SW846 6010C**

MS				Sample ID: 1610098-01BMS			Units: mg/Kg		Analysis Date: 10/5/2016 07:39 PM		
Client ID:			Run ID: ICP2_161005B			SeqNo: 4068800		Prep Date: 10/4/2016		DF: 1	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Aluminum	20450	0.66	6.605	14560	89300	75-125		0		SO	
Antimony	2.529	0.33	6.605	-2.211	71.8	75-125		0		S	
Arsenic	14.25	0.33	6.605	6.581	116	75-125		0			
Barium	447	0.33	6.605	405	635	75-125		0		SO	
Beryllium	6.758	0.13	6.605	0.2357	98.7	75-125		0			
Boron	ND	1.3	33.03	-29.92	90.6	75-125		0			
Cadmium	6.985	0.66	6.605	-0.03791	106	75-125		0			
Calcium	3735	33	660.5	3284	68.2	75-125		0		SO	
Chromium	39.97	0.33	6.605	28.9	168	75-125		0		SO	
Cobalt	15.73	0.33	6.605	10.67	76.6	75-125		0			
Copper	17.22	0.66	6.605	9.462	117	75-125		0			
Iron	19110	5.3	660.5	15950	479	75-125		0		SEO	
Lead	17.4	0.33	6.605	10.82	99.6	75-125		0			
Lithium	31.2	0.66	6.605	19.45	178	75-125		0		S	
Manganese	387.8	0.33	6.605	455.9	-1030	75-125		0		SO	
Molybdenum	7.4	0.33	6.605	0.3442	107	75-125		0			
Nickel	27.77	0.33	6.605	19.46	126	75-125		0		S	
Selenium	5.964	0.66	6.605	-0.2409	93.9	75-125		0			
Thallium	6.059	0.66	6.605	-0.06077	92.6	75-125		0			
Zinc	49.96	0.66	6.605	37.31	192	75-125		0		SO	

MS				Sample ID: 1610098-01BMS				Units: mg/Kg		Analysis Date: 10/6/2016 11:57 AM	
Client ID:			Run ID: ICP2_161006A			SeqNo: 4070613		Prep Date: 10/4/2016		DF: 1	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Silver	5.082	0.33	6.605	0	76.9	75-125	0				

**Note:** See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Holland Board of Public Works  
 Work Order: 16091814  
 Project: HBPW Coal Yard

## QC BATCH REPORT

Batch ID: 92364

Instrument ID ICP2

Method: SW846 6010C

MSD				Sample ID: 1610098-01BMSD			Units: mg/Kg		Analysis Date: 10/5/2016 07:45 PM		
Client ID:			Run ID: ICP2_161005B			SeqNo: 4068801		Prep Date: 10/4/2016		DF: 1	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Aluminum	18030	0.67	6.658	14560	52200	75-125	20450	12.6	20	SO	
Antimony	2.848	0.33	6.658	-2.211	76	75-125	2.529	11.9	20		
Arsenic	13.52	0.33	6.658	6.581	104	75-125	14.25	5.29	20		
Barium	434.8	0.33	6.658	405	448	75-125	447	2.76	20	SO	
Beryllium	6.531	0.13	6.658	0.2357	94.6	75-125	6.758	3.42	20		
Boron	ND	1.3	33.29	-29.92	89.9	75-125	-2.857	0	20		
Cadmium	6.794	0.67	6.658	-0.03791	103	75-125	6.985	2.77	20		
Calcium	5361	33	665.8	3284	312	75-125	3735	35.8	20	SRO	
Chromium	37.26	0.33	6.658	28.9	126	75-125	39.97	7.01	20	SO	
Cobalt	14.59	0.33	6.658	10.67	59	75-125	15.73	7.47	20	S	
Copper	16.12	0.67	6.658	9.462	100	75-125	17.22	6.59	20		
Iron	17360	5.3	665.8	15950	213	75-125	19110	9.59	20	SEO	
Lead	15.84	0.33	6.658	10.82	75.3	75-125	17.4	9.39	20		
Lithium	29.27	0.67	6.658	19.45	148	75-125	31.2	6.36	20	S	
Manganese	307.6	0.33	6.658	455.9	-2230	75-125	387.8	23.1	20	SRO	
Molybdenum	7.158	0.33	6.658	0.3442	102	75-125	7.4	3.32	20		
Nickel	24.97	0.33	6.658	19.46	82.8	75-125	27.77	10.6	20		
Selenium	6.11	0.67	6.658	-0.2409	95.4	75-125	5.964	2.43	20		
Thallium	5.898	0.67	6.658	-0.06077	89.5	75-125	6.059	2.69	20		
Zinc	47.14	0.67	6.658	37.31	148	75-125	49.96	5.81	20	SO	

MSD				Sample ID: 1610098-01BMSD				Units: mg/Kg		Analysis Date: 10/6/2016 12:03 PM	
Client ID:			Run ID: ICP2_161006A			SeqNo: 4070614		Prep Date: 10/4/2016		DF: 1	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Silver	5.139	0.33	6.658	5.082	0.849	75-125	0			S	

The following samples were analyzed in this batch:

16091814-01A	16091814-02A	16091814-03A
16091814-04A	16091814-05A	16091814-06A
16091814-07A	16091814-08A	

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

**Client:** Holland Board of Public Works  
**Work Order:** 16091814  
**Project:** HBPW Coal Yard

## QC BATCH REPORT

Batch ID: **92416** Instrument ID **ICPMS2** Method: **SW6020A**

<b>MBLK</b>		Sample ID: <b>MBLK-92416-92416</b>				Units: <b>mg/L</b>		Analysis Date: <b>10/6/2016 01:01 PM</b>		
Client ID:		Run ID: <b>ICPMS2_161006A</b>				SeqNo: <b>4070261</b>		Prep Date: <b>10/5/2016</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Aluminum	ND	0.010								
Antimony	ND	0.0050								
Arsenic	ND	0.0050								
Barium	ND	0.0050								
Beryllium	ND	0.0020								
Boron	ND	0.020								
Cadmium	ND	0.0020								
Calcium	ND	0.50								
Chromium	ND	0.0050								
Cobalt	ND	0.0050								
Copper	ND	0.0050								
Iron	ND	0.080								
Lead	ND	0.0050								
Lithium	ND	0.010								
Manganese	ND	0.0050								
Molybdenum	ND	0.0050								
Nickel	ND	0.0050								
Selenium	ND	0.0050								
Silver	ND	0.0050								
Thallium	ND	0.0050								
Zinc	ND	0.010								

**Note:** See Qualifiers Page for a list of Qualifiers and their explanation.

**Client:** Holland Board of Public Works

**Work Order:** 16091814

**Project:** HBPW Coal Yard

## QC BATCH REPORT

Batch ID: **92416**

Instrument ID **ICPMS2**

Method: **SW6020A**

LCS		Sample ID: <b>LCS-92416-92416</b>				Units: <b>mg/L</b>		Analysis Date: <b>10/6/2016 01:06 PM</b>		
Client ID:		Run ID: <b>ICPMS2_161006A</b>				SeqNo: <b>4070262</b>		Prep Date: <b>10/5/2016</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Aluminum	0.0976	0.010	0.1	0	97.6	80-120	0			
Antimony	0.09717	0.0050	0.1	0	97.2	80-120	0			
Arsenic	0.09791	0.0050	0.1	0	97.9	80-120	0			
Barium	0.09531	0.0050	0.1	0	95.3	80-120	0			
Beryllium	0.09643	0.0020	0.1	0	96.4	80-120	0			
Boron	0.4829	0.020	0.5	0	96.6	80-120	0			
Cadmium	0.09666	0.0020	0.1	0	96.7	80-120	0			
Calcium	9.989	0.50	10	0	99.9	80-120	0			
Chromium	0.09433	0.0050	0.1	0	94.3	80-120	0			
Cobalt	0.09622	0.0050	0.1	0	96.2	80-120	0			
Copper	0.09842	0.0050	0.1	0	98.4	80-120	0			
Iron	9.68	0.080	10	0	96.8	80-120	0			
Lead	0.09541	0.0050	0.1	0	95.4	80-120	0			
Lithium	0.0998	0.010	0.1	0	99.8	80-120	0			
Manganese	0.09093	0.0050	0.1	0	90.9	80-120	0			
Molybdenum	0.09649	0.0050	0.1	0	96.5	80-120	0			
Nickel	0.09696	0.0050	0.1	0	97	80-120	0			
Selenium	0.09308	0.0050	0.1	0	93.1	80-120	0			
Silver	0.09622	0.0050	0.1	0	96.2	80-120	0			
Thallium	0.0967	0.0050	0.1	0	96.7	80-120	0			
Zinc	0.09662	0.010	0.1	0	96.6	80-120	0			

**Note:** See Qualifiers Page for a list of Qualifiers and their explanation.

**Client:** Holland Board of Public Works  
**Work Order:** 16091814  
**Project:** HBPW Coal Yard

## QC BATCH REPORT

Batch ID: **92416** Instrument ID **ICPMS2** Method: **SW6020A**

MS		Sample ID: <b>16091398-03AMS</b>				Units: <b>mg/L</b>		Analysis Date: <b>10/6/2016 01:16 PM</b>		
Client ID:		Run ID: <b>ICPMS2_161006A</b>				SeqNo: <b>4070264</b>		Prep Date: <b>10/5/2016</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Aluminum	6.01	0.010	0.1	3.938	2070	75-125	0			SO
Antimony	0.09765	0.0050	0.1	0.0009947	96.7	75-125	0			
Arsenic	0.1018	0.0050	0.1	0.001871	99.9	75-125	0			
Barium	0.1429	0.0050	0.1	0.04211	101	75-125	0			
Beryllium	0.0868	0.0020	0.1	0.0002276	86.6	75-125	0			
Boron	0.5398	0.020	0.5	0.09004	90	75-125	0			
Cadmium	0.09769	0.0020	0.1	-4.249E-06	97.7	75-125	0			
Calcium	19.08	0.50	10	9.238	98.4	75-125	0			
Chromium	0.1019	0.0050	0.1	0.00538	96.5	75-125	0			
Cobalt	0.09619	0.0050	0.1	0.001253	94.9	75-125	0			
Copper	0.1064	0.0050	0.1	0.009687	96.7	75-125	0			
Iron	12.58	0.080	10	2.534	100	75-125	0			
Lead	0.09902	0.0050	0.1	0.003806	95.2	75-125	0			
Lithium	0.1005	0.010	0.1	0.005579	94.9	75-125	0			
Manganese	0.1024	0.0050	0.1	0.01149	90.9	75-125	0			
Molybdenum	0.122	0.0050	0.1	0.02613	95.9	75-125	0			
Nickel	0.1013	0.0050	0.1	0.00564	95.7	75-125	0			
Selenium	0.09415	0.0050	0.1	0.0009475	93.2	75-125	0			
Silver	0.09509	0.0050	0.1	0.00001277	95.1	75-125	0			
Thallium	0.0977	0.0050	0.1	0.0002888	97.4	75-125	0			
Zinc	0.1088	0.010	0.1	0.01059	98.2	75-125	0			

**Note:** See Qualifiers Page for a list of Qualifiers and their explanation.



**Client:** Holland Board of Public Works  
**Work Order:** 16091814  
**Project:** HBPW Coal Yard

## QC BATCH REPORT

Batch ID: **92416**      Instrument ID **ICPMS2**      Method: **SW6020A**

MSD		Sample ID: <b>16091398-03AMSD</b>				Units: <b>mg/L</b>		Analysis Date: <b>10/6/2016 01:37 PM</b>		
Client ID:		Run ID: <b>ICPMS2_161006A</b>				SeqNo: <b>4070268</b>		Prep Date: <b>10/5/2016</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Aluminum	5.747	0.010	0.1	3.938	1810	75-125	6.01	4.47	20	SO
Antimony	0.09539	0.0050	0.1	0.0009947	94.4	75-125	0.09765	2.34	20	
Arsenic	0.09957	0.0050	0.1	0.001871	97.7	75-125	0.1018	2.21	20	
Barium	0.1464	0.0050	0.1	0.04211	104	75-125	0.1429	2.42	20	
Beryllium	0.08707	0.0020	0.1	0.0002276	86.8	75-125	0.0868	0.311	20	
Boron	0.5232	0.020	0.5	0.09004	86.6	75-125	0.5398	3.12	20	
Cadmium	0.09608	0.0020	0.1	-4.249E-06	96.1	75-125	0.09769	1.66	20	
Calcium	19.97	0.50	10	9.238	107	75-125	19.08	4.56	20	
Chromium	0.09946	0.0050	0.1	0.00538	94.1	75-125	0.1019	2.42	20	
Cobalt	0.09595	0.0050	0.1	0.001253	94.7	75-125	0.09619	0.25	20	
Copper	0.1077	0.0050	0.1	0.009687	98	75-125	0.1064	1.21	20	
Iron	12.04	0.080	10	2.534	95.1	75-125	12.58	4.39	20	
Lead	0.09861	0.0050	0.1	0.003806	94.8	75-125	0.09902	0.415	20	
Lithium	0.1	0.010	0.1	0.005579	94.4	75-125	0.1005	0.499	20	
Manganese	0.09975	0.0050	0.1	0.01149	88.3	75-125	0.1024	2.62	20	
Molybdenum	0.1225	0.0050	0.1	0.02613	96.4	75-125	0.122	0.409	20	
Nickel	0.1008	0.0050	0.1	0.00564	95.2	75-125	0.1013	0.495	20	
Selenium	0.09448	0.0050	0.1	0.0009475	93.5	75-125	0.09415	0.35	20	
Silver	0.09243	0.0050	0.1	0.00001277	92.4	75-125	0.09509	2.84	20	
Thallium	0.09688	0.0050	0.1	0.0002888	96.6	75-125	0.0977	0.843	20	
Zinc	0.107	0.010	0.1	0.01059	96.4	75-125	0.1088	1.67	20	

The following samples were analyzed in this batch:

16091814-09A	16091814-10A	16091814-11A
16091814-12A	16091814-13A	16091814-14A
16091814-15A	16091814-16A	

**Note:** See Qualifiers Page for a list of Qualifiers and their explanation.

**Client:** Holland Board of Public Works  
**Work Order:** 16091814  
**Project:** HBPW Coal Yard

## QC BATCH REPORT

Batch ID: **92371** Instrument ID **WETCHEM** Method: **SW9045D**

<b>LCS</b>		Sample ID: <b>LCS-92371-92371</b>				Units: <b>s.u.</b>		Analysis Date: <b>10/4/2016 03:30 PM</b>		
Client ID:		Run ID: <b>WETCHEM_161004N</b>		SeqNo: <b>4064916</b>		Prep Date: <b>10/4/2016</b>		DF: <b>1</b>		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

pH 4.05 0 4 0 101 90-110 0

<b>DUP</b>		Sample ID: <b>16091773-01B DUP</b>				Units: <b>s.u.</b>		Analysis Date: <b>10/4/2016 03:30 PM</b>		
Client ID:		Run ID: <b>WETCHEM_161004N</b>		SeqNo: <b>4064918</b>		Prep Date: <b>10/4/2016</b>		DF: <b>1</b>		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

pH 8.05 0 0 0 0 0-0 8.1 0.619 20

<b>DUP</b>		Sample ID: <b>16091814-01A DUP</b>				Units: <b>s.u.</b>		Analysis Date: <b>10/4/2016 03:30 PM</b>		
Client ID: <b>Ash #1</b>		Run ID: <b>WETCHEM_161004N</b>		SeqNo: <b>4064920</b>		Prep Date: <b>10/4/2016</b>		DF: <b>1</b>		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

pH 7.84 0 0 0 0 0-0 7.82 0.255 20

The following samples were analyzed in this batch:

16091814-01A	16091814-02A	16091814-03A
16091814-04A	16091814-05A	16091814-06A
16091814-07A	16091814-08A	

**Note:** See Qualifiers Page for a list of Qualifiers and their explanation.

**Client:** Holland Board of Public Works  
**Work Order:** 16091814  
**Project:** HBPW Coal Yard

## QC BATCH REPORT

Batch ID: **92720**      Instrument ID **IC4**      Method: **SW9056A**

<b>MBLK</b>		Sample ID: <b>MBLK-92720-92720</b>				Units: <b>mg/Kg</b>		Analysis Date: <b>10/11/2016 12:06 A</b>		
Client ID:		Run ID: <b>IC4_161010B</b>				SeqNo: <b>4078176</b>		Prep Date: <b>10/6/2016</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	ND	10								
Fluoride	ND	1.0								
Sulfate	ND	10								

<b>LCS</b>		Sample ID: <b>LCS-92720-92720</b>				Units: <b>mg/Kg</b>		Analysis Date: <b>10/11/2016 12:26 A</b>		
Client ID:		Run ID: <b>IC4_161010B</b>				SeqNo: <b>4078177</b>		Prep Date: <b>10/6/2016</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	99.14	10	100	0	99.1	80-120	0			
Fluoride	19.22	1.0	20	0	96.1	80-120	0			
Sulfate	96.82	10	100	0	96.8	80-120	0			

<b>MS</b>		Sample ID: <b>16091814-01A MS</b>				Units: <b>mg/Kg</b>		Analysis Date: <b>10/11/2016 01:06 A</b>		
Client ID: <b>Ash #1</b>		Run ID: <b>IC4_161010B</b>				SeqNo: <b>4078179</b>		Prep Date: <b>10/6/2016</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	98.08	9.8	97.66	0	100	75-125	0			
Fluoride	17.86	0.98	19.53	0	91.4	75-125	0			
Sulfate	108.4	9.8	97.66	0	111	75-125	0			

<b>MSD</b>		Sample ID: <b>16091814-01A MSD</b>				Units: <b>mg/Kg</b>		Analysis Date: <b>10/11/2016 01:26 A</b>		
Client ID: <b>Ash #1</b>		Run ID: <b>IC4_161010B</b>				SeqNo: <b>4078180</b>		Prep Date: <b>10/6/2016</b>		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	99.6	9.8	98.23	5.797	95.5	75-125	0			
Fluoride	18.54	0.98	19.65	1.441	87	75-125	0			
Sulfate	110.9	9.8	98.23	16.49	96.2	75-125	0			

The following samples were analyzed in this batch:

16091814-01A	16091814-02A	16091814-03A
16091814-04A	16091814-05A	16091814-06A
16091814-07A	16091814-08A	

**Note:** See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Holland Board of Public Works  
 Work Order: 16091814  
 Project: HBPW Coal Yard

## QC BATCH REPORT

Batch ID: **R197180** Instrument ID **WETCHEM** Method: **E160.3**

<b>MBLK</b>	Sample ID: <b>MB-R197180-R197180</b>					Units: % of sample		Analysis Date: <b>10/3/2016 12:10 PM</b>		
Client ID:	Run ID: <b>WETCHEM_161001D</b>				SeqNo: <b>4061918</b>		Prep Date:		DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Total Solids ND 0.050

<b>MBLK</b>	Sample ID: <b>MB-R197180-R197180</b>					Units: % of sample		Analysis Date: <b>10/3/2016 12:10 PM</b>		
Client ID:	Run ID: <b>WETCHEM_161001D</b>				SeqNo: <b>4061921</b>		Prep Date:		DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Total Solids ND 0.050

<b>MBLK</b>	Sample ID: <b>MB-R197180-R197180</b>					Units: % of sample		Analysis Date: <b>10/3/2016 12:10 PM</b>		
Client ID:	Run ID: <b>WETCHEM_161001D</b>				SeqNo: <b>4061948</b>		Prep Date:		DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Moisture ND 0.050

<b>LCS</b>	Sample ID: <b>LCS-R197180-R197180</b>					Units: % of sample		Analysis Date: <b>10/3/2016 12:10 PM</b>		
Client ID:	Run ID: <b>WETCHEM_161001D</b>				SeqNo: <b>4061949</b>		Prep Date:		DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Moisture 100 0.050 100 0 100 99.5-100.5 0

<b>DUP</b>	Sample ID: <b>16091725-02A DUP</b>					Units: % of sample		Analysis Date: <b>10/3/2016 12:10 PM</b>		
Client ID:	Run ID: <b>WETCHEM_161001D</b>				SeqNo: <b>4061920</b>		Prep Date:		DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Total Solids 31.1 0.050 0 0 0 0-0 31.42 1.02 20

<b>DUP</b>	Sample ID: <b>16091807-01A DUP</b>					Units: % of sample		Analysis Date: <b>10/3/2016 12:10 PM</b>		
Client ID:	Run ID: <b>WETCHEM_161001D</b>				SeqNo: <b>4061924</b>		Prep Date:		DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Total Solids 8.14 0.050 0 0 0 0-0 8.15 0.123 20

<b>DUP</b>	Sample ID: <b>16091807-01A DUP</b>					Units: % of sample		Analysis Date: <b>10/3/2016 12:10 PM</b>		
Client ID:	Run ID: <b>WETCHEM_161001D</b>				SeqNo: <b>4061952</b>		Prep Date:		DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Moisture 91.86 0.050 0 0 0 91.85 0.0109 20

**Note:** See Qualifiers Page for a list of Qualifiers and their explanation.

**Client:** Holland Board of Public Works  
**Work Order:** 16091814  
**Project:** HBPW Coal Yard

**QC BATCH REPORT**

Batch ID: **R197180**      Instrument ID **WETCHEM**      Method: **E160.3**

The following samples were analyzed in this batch:

16091814-01A	16091814-02A	16091814-03A
16091814-04A	16091814-05A	16091814-06A
16091814-07A	16091814-08A	

**Note:** See Qualifiers Page for a list of Qualifiers and their explanation.

**Client:** Holland Board of Public Works  
**Work Order:** 16091814  
**Project:** HBPW Coal Yard

## QC BATCH REPORT

Batch ID: **R197703** Instrument ID **IC4** Method: **SW9056A**

<b>MBLK</b>		Sample ID: <b>CCB/MBLK-R197703</b>				Units: <b>mg/L</b>		Analysis Date: <b>10/7/2016 07:45 AM</b>		
Client ID:		Run ID: <b>IC4_161007A</b>				SeqNo: <b>4074927</b>		Prep Date:		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Chloride	ND	1.0								
Fluoride	ND	0.10								
Sulfate	ND	1.0								

<b>LCS</b>		Sample ID: <b>MLCCV/LCS-R197703</b>				Units: <b>mg/L</b>		Analysis Date: <b>10/7/2016 01:49 PM</b>		
Client ID:		Run ID: <b>IC4_161007A</b>				SeqNo: <b>4074940</b>		Prep Date:		DF: <b>1</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Chloride	9.382	1.0	10	0	93.8	88-110	0			
Fluoride	2.186	0.10	2	0	109	86-111	0			
Sulfate	10.28	1.0	10	0	103	85-110	0			

<b>MS</b>		Sample ID: <b>16091814-09A MS</b>				Units: <b>mg/L</b>		Analysis Date: <b>10/7/2016 12:48 PM</b>		
Client ID: <b>Ash #1</b>		Run ID: <b>IC4_161007A</b>				SeqNo: <b>4074937</b>		Prep Date:		DF: <b>2</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Chloride	19.29	2.0	20	0.4424	94.2	75-125	0			
Fluoride	4.609	0.20	4	0.3965	105	75-125	0			
Sulfate	23.77	2.0	20	3.815	99.8	75-125	0			

<b>MS</b>		Sample ID: <b>1610032-10B MS</b>				Units: <b>mg/L</b>		Analysis Date: <b>10/7/2016 05:11 PM</b>		
Client ID:		Run ID: <b>IC4_161007A</b>				SeqNo: <b>4074950</b>		Prep Date:		DF: <b>10</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Chloride	117	10	100	21.64	95.4	75-125	0			
Sulfate	140.8	10	100	40.98	99.8	75-125	0			

<b>MSD</b>		Sample ID: <b>16091814-09A MSD</b>				Units: <b>mg/L</b>		Analysis Date: <b>10/7/2016 01:08 PM</b>		
Client ID: <b>Ash #1</b>		Run ID: <b>IC4_161007A</b>				SeqNo: <b>4074938</b>		Prep Date:		DF: <b>2</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Chloride	21.17	2.0	20	0.4424	104	75-125	19.29	9.3	20	
Fluoride	5.006	0.20	4	0.3965	115	75-125	4.609	8.26	20	
Sulfate	26.2	2.0	20	3.815	112	75-125	23.77	9.72	20	

**Note:** See Qualifiers Page for a list of Qualifiers and their explanation.

**Client:** Holland Board of Public Works  
**Work Order:** 16091814  
**Project:** HBPW Coal Yard

## QC BATCH REPORT

Batch ID: **R197703** Instrument ID **IC4** Method: **SW9056A**

<b>MSD</b>		Sample ID: <b>1610032-10B MSD</b>				Units: <b>mg/L</b>		Analysis Date: <b>10/7/2016 05:31 PM</b>		
Client ID:		Run ID: <b>IC4_161007A</b>				SeqNo: <b>4074951</b>		Prep Date:		DF: <b>10</b>
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	115.8	10	100	21.64	94.2	75-125	117	0.99	20	
Sulfate	138.7	10	100	40.98	97.7	75-125	140.8	1.47	20	

The following samples were analyzed in this batch:

16091814-09A	16091814-10A	16091814-11A
16091814-12A	16091814-13A	16091814-14A
16091814-15A	16091814-16A	

**Note:** See Qualifiers Page for a list of Qualifiers and their explanation.



Cincinnati, OH  
+1 513 733 5336

Everett, WA  
+1 425 356 2600

Fort Collins, CO  
+1 970 490 1511

Holland, MI  
+1 616 399 6070

# Chain of Custody Form

Page \_\_\_\_ of \_\_\_\_

COC ID: 40547

Houston, TX  
+1 281 530 5656

Middletown, PA  
+1 717 944 5541

Spring City, PA  
+1 610 948 4903

Salt Lake City, UT  
+1 801 266 7700

South Charleston, WV  
+1 304 356 3168

York, PA  
+1 717 505 5280

## Environmental

Customer Information		Project Information		Parameter/Method Request for Analysis														
Purchase Order		Project Name	HBPW Coal Yard	A	See Attached List													
Work Order		Project Number		B														
Company Name	Holland Board of Public Works	Bill To Company	Holland Board of Public Works	C														
Send Report To	Jug N Visscher	Invoice Attn	Accounts Payable	D														
Address	625 Hastings	Address	625 Hastings	E														
				F														
City/State/Zip	Holland, MI 49423	City/State/Zip	Holland, MI 49423	G														
Phone	(616) 355-1255	Phone	(616) 355-1520	H														
Fax		Fax		I														
e-Mail Address	jvisscher@hollandbpu.com	e-Mail Address	jvisscher@hollandbpu.com	J														

No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1	Ash #1	9-30-16	1:45	Ash		1	X										
2	Ash #2		1:55														
3	Ash #3		2:10														
4	Ash #4		2:30														
5	Coal #1		2:40	Coal													
6	Coal #2		2:45														
7	Coal #3		2:50														
8	Coal #4		3:00														
9																	
10																	

Sampler(s) Please Print & Sign		Shipment Method		Turnaround Time in Business Days (BD)				Results Due Date:	
Kurt Van Appledorn KAV				<input checked="" type="checkbox"/> 10 BD <input type="checkbox"/> 5 BD <input type="checkbox"/> 3 BD <input type="checkbox"/> 2 BD <input type="checkbox"/> 1 BD					
Relinquished by:	Date:	Time:	Received by:	Notes:					
KAV	9-30-16	3:15	[Signature]						
Relinquished by:	Date:	Time:	Received by (Laboratory):	Cooler ID	Cooler Temp	QC Package: (Check One Box Below)			
[Signature]	9-30-16	3:30 P.M.	[Signature]		4.6	<input type="checkbox"/> Level II Std QC <input type="checkbox"/> TRRP Checklist <input type="checkbox"/> Level III Std QC/Raw Data <input type="checkbox"/> TRRP Level IV <input type="checkbox"/> Level IV SW846/CLP <input type="checkbox"/> Other			
Logged by (Laboratory):	Date:	Time:	Checked by (Laboratory):						
MB	9/30/16	1710	[Signature]						
Preservative Key: 1-HCl    2-HNO <sub>3</sub> 3-H <sub>2</sub> SO <sub>4</sub> 4-NaOH    5-Na <sub>2</sub> S <sub>2</sub> O <sub>5</sub> 6-NaHSO <sub>4</sub> 7-Other    8-4°C    9-5035									

Note: 1. Any changes must be made in writing once samples and COC Form have been submitted to ALS Environmental.  
 2. Unless otherwise agreed in a formal contract, services provided by ALS Environmental are expressly limited to the terms and conditions stated on the reverse.  
 3. The Chain of Custody is a legal document. All information must be completed accurately.

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# CCR Coal parameter list for inertness consideration

	Target detection levels Total concentrations ash/coal/soil samples (ug/kg)	Target Detection levels SPLP Leachate samples (ug/L)
Aluminum	1,000	50
Antimony	1,000	2
Arsenic	2,000	5.0/1.0
Barium	1,000	100/5.0
Beryllium	500	1
Boron	8,000	300/20
Cadmium	200	1/0.2
Chromium	1,000	10
Cobalt	500	20
Copper	1,000	4.0/1.0
Iron	5,000	200/20
Lead	10,000	3.0/1.0
Lithium	400	10
Manganese	1,000	50/5.0
Mercury	50	0
Molybdenum	1,000	50/25
Nickel	1,000	20/5.0
Selenium	200	5.0/1.0
Silver	100	0
Thallium	500	2
Zinc	1,000	10
calcium	NT	none specified by RRD
chloride	NT	10,000
fluoride	NT	1,000
pH	NT	
sulfate	NT	1,000
TDS	NT	

Sample Receipt Checklist

Client Name: **HBPW**

Date/Time Received: **30-Sep-16 15:30**

Work Order: **16091814**

Received by: **MBB**

Checklist completed by Meghan Broadbent  
eSignature

30-Sep-16  
Date

Reviewed by: Bill Carey  
eSignature

12-Oct-16  
Date

Matrices: ash, coal

Carrier name: Client

Shipping container/cooler in good condition?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	Not Present <input type="checkbox"/>
Custody seals intact on shipping container/cooler?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Not Present <input checked="" type="checkbox"/>
Custody seals intact on sample bottles?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Not Present <input checked="" type="checkbox"/>
Chain of custody present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Chain of custody signed when relinquished and received?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Chain of custody agrees with sample labels?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Samples in proper container/bottle?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Sample containers intact?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Sufficient sample volume for indicated test?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
All samples received within holding time?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Container/Temp Blank temperature in compliance?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Sample(s) received on ice?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Temperature(s)/Thermometer(s):	<u>4.6/4.6</u>		<u>SR2</u>
Cooler(s)/Kit(s):	<u></u>		
Date/Time sample(s) sent to storage:	<u>9/30/2016 5:16:53 PM</u>		
Water - VOA vials have zero headspace?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	No VOA vials submitted <input checked="" type="checkbox"/>
Water - pH acceptable upon receipt?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	N/A <input checked="" type="checkbox"/>
pH adjusted?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	N/A <input checked="" type="checkbox"/>
pH adjusted by:	<u>-</u>		

Login Notes:

-----

Client Contacted:

Date Contacted:

Person Contacted:

Contacted By:

Regarding:

Comments:

CorrectiveAction:



## **APPENDIX C**

### **PHOTO LOG**

**PHOTO LOG**  
**NTH Project No. 73-160017-06**  
**Holland Board of Public Works**  
**James DeYoung Power Plant**  
**Site Photos Taken July 14, 2020**

Photo 1 – View from JDY MW-1 towards Adjacent Property



Photo 2 - View from JDY MW-1 towards Adjacent Property





**PHOTO LOG**  
**NTH Project No. 73-160017-06**  
**Holland Board of Public Works**  
**James DeYoung Power Plant**  
**Site Photos Taken July 14, 2020**

Photo 3 – Runoff from Adjacent Property unto JDY MW-1 Area



Photo 4 – Runoff from Adjacent Property unto JDY MW-1 Area





## **APPENDIX D**

### **TABLE**

**Total and Leachable Concentrations of Lithium in Samples of Coal and Bottom Ash**  
**DeYoung Power Plant**

<b>Analyte</b>	<b>CAS</b>	<b>Matrix</b>	<b>Units</b>	<b>16091814-05 Coal #1 9/30/2016</b>	<b>16091814-06 Coal # 2 9/30/2016</b>	<b>16091814-07 Coal # 3 9/30/2016</b>	<b>16091814-07 Coal # 4 9/30/2016</b>
Lithium	7439-93-2	Total Conc.	mg/Kg	< 0.8	< 7.8	< 9.8	< 9.8
Lithium	7439-93-2	SPLP Extract	mg/L	< 0.010	< 0.010	< 0.010	< 0.010
<b>Analyte</b>	<b>CAS</b>	<b>Matrix</b>	<b>Units</b>	<b>16091814-05 Ash #1 9/30/2016</b>	<b>16091814-06 Ash # 2 9/30/2016</b>	<b>16091814-07 Ash # 3 9/30/2016</b>	<b>16091814-07 Ash # 4 9/30/2016</b>
Lithium	7439-93-2	Total Conc.	mg/Kg	13	< 10	< 11	25
Lithium	7439-93-2	SPLP Extract	mg/L	< 0.01	< 0.01	< 0.01	0.038