Addendum To 2017 Annual Report

For

Radiological Groundwater Impacts

At

Naval Weapons Industrial Reserve Plant Bethpage, New York

APRIL 2018

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ACRONYMS AND ABBREVIATIONS

BWD	Bethpage Water District
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
FWD	Farmingdale Water District
HWD	Hicksville Water District
LWD	Levittown Water District
MCL	maximum contaminant level
mS/cm	Millisiemens per Centimeter
NDAA	National Defense Authorization Act
NWIRP	Naval Weapons Industrial Reserve Plant
NYSDEC	New York State Department of Environmental Conservation
PA/SI	Preliminary Assessment/Site Inspection
pCi/L	Picocurie per Liter
pCi/g	Picocurie per Gram
PWD	Plainview Water District
SU	Standard Unit
U.S. EPA	United States Environmental Protection Agency
USGS	United States Geological Survey
VOC	volatile organic compound
WIIN	Water Infrastructure Improvements for the Nation

1.0 INTRODUCTION

In June 2017, the Department of the Navy released its first annual report required by the Water Infrastructure Improvements for the Nation (WIIN) Act of 2016, Title VII, Subtitle E, Section 7502. This Addendum to the 2017 Annual Report for Groundwater Impacts at Naval Weapons Industrial Reserve Plant Bethpage, New York (2017 Annual Report) addresses potential releases by the Department of Defense of radium and radioactive material to groundwater near the former Navy-owned, Northrop Grumman-operated, Naval Weapons Industrial Reserve Plant (NWIRP) Bethpage and the separate former Northrop Grumman-owned and -operated industrial facility adjacent to the former NWIRP Bethpage (Figures 1-1, 1-2, and 1-3), as required by the 2018 National Defense Authorization Act (NDAA), which the President signed on December 12, 2017. This report provides documentation that the concentration of radium and other radioactive materials identified in groundwater in the vicinity of NWIRP Bethpage are consistent with naturally occurring levels and common geochemical factors normally found in the regional aquifer.

The Navy evaluated Department of Defense facilities located within a 75-mile radius of NWIRP Bethpage, where radium or other radioactive materials have been used over the past 80 years; however, none of these other facilities have a hydrogeologic connection to groundwater at the NWIRP Bethpage; and therefore, were eliminated from further consideration. This determination is supported by the location of the groundwater divide (i.e., the boundary that controls groundwater flow direction, [see Figure 3-1]) approximately 2.5 miles to the north of NWIRP Bethpage, with regional groundwater flow to the south from the divide. This Addendum will therefore focus on the available information regarding use, storage, and disposal of radium and related radioactive materials by DoD within the vicinity of the NWIRP Bethpage.

In addition, this Addendum provides information on naturally occurring radium and other radioactive materials, potential factors influencing radium behavior in groundwater, a summary of available radiological data, and additional actions to evaluate the potential for release of radium and other radioactive materials into groundwater within the vicinity of the NWIRP Bethpage.

2.0 SITE BACKGROUND

This section provides a summary of background information for the NWIRP Bethpage, the adjacent Northrop Grumman facility, and the surrounding area, as well as the radiological history available to the Navy. Additional site background is detailed in Section 2.0 of the 2017 Annual Report.

2.1 FACILITY INFORMATION

The NWIRP Bethpage was approximately 109 acres and was bordered by the Northrop Grumman facility, which was approximately 500 acres. These former facilities are located in Nassau County on Long Island, New York; approximately 30 miles east of New York City (Figure 1-2). In 1942, the Navy established the facility that would later become the NWIRP Bethpage for the research prototyping, testing, design engineering, fabrication, and primary assembly of military aircraft. Northrop Grumman activities in the area date to the 1930s and expanded in the 1940s. Northrop Grumman conducted daily operations at the government-owned NWIRP Bethpage facility until 1996 and at its adjacent Northrop Grumman facility until after 1996. After Northrop Grumman terminated operations at NWIRP Bethpage, the U.S. Congress passed special legislation under Section 2852 of the National Defense Authorization Act of 1998 (P.L.105-85, 111 Stat. 1629), permitting conveyance of the Navy real property at NWIRP Bethpage to Nassau County, New York for economic redevelopment.

When the NWIRP and Northrop Grumman facilities were first established at Bethpage, much of the surrounding land use was agricultural (Rogers, Golden, & Halpern, 1986). According to the Census of Agriculture, Nassau County contained 636 farms spanning 26,543 acres in 1940, representing farm land use of 13.8 percent (U.S. Department of Commerce, 1942). In the late 1950s and early 1960s, residential and commercial development occurred. In 2012, Nassau County reportedly contained 55 farms across 2,682 acres (U.S. Department of Commerce, 2014). Currently, the land surrounding the former NWIRP Bethpage and Northrop Grumman properties remains primarily a mixture of commercial and residential development.

The former NWIRP Bethpage and Northrop Grumman facilities are underlain by four distinct geologic units: Upper Glacial Formation; Magothy Formation; Raritan Clay; and Lloyd Sand Formations (McClymonds and Franke, 1972). The Magothy Formation consists primarily of quartz sands, silt and clay. In addition, iron sulfides such as pyrite and marcasite commonly occur with lignite in scattered nodules or thin solid layers throughout the Magothy Formation (Suter et al., 1949).

The aquifers underlying NWIRP Bethpage are part of the Northern Atlantic Coastal Plain aquifer system, which extends from Long Island to northeastern North Carolina (Masterson et al., 2015). The regional Magothy Aquifer is present on Long Island, New Jersey, Delaware, and Maryland, and is generally confined except on Long Island, where there is limited hydrogeologic distinction between the Upper Glacial Formation and the Magothy Formation (McClymonds and Franke, 1972; Masterson et al., 2015).

Most of Long Island is bisected by an east-west-trending regional groundwater divide (United States Geological Service [USGS], 2006). The former NWIRP Bethpage and Northrop Grumman facilities are located south of the divide where regional groundwater flows southward toward South Oyster Bay and the Atlantic Ocean (Figure 3-1). Based on water level measurements from 2010 to 2016, groundwater across NWIRP Bethpage and Northrop Grumman facilities flows to the south-southeast. The groundwater ultimately discharges to South Oyster Bay, which is at sea level, approximately seven miles south of the NWIRP Bethpage.

2.2 RADIOLOGICAL HISTORY

This section summarizes the radiological history of the former NWIRP Bethpage and the Northrop Grumman facilities based on the currently available information. While there is documentation that radium and radioactive materials were present at the facilities, there is no documentation of a release of radium or other radioactive materials at the facility.

Groundwater investigations into radiological activity in the vicinity of the former NWIRP Bethpage were prompted by the concentration of radium exceeding the Federal and State maximum contaminant level (MCL) of 5 picocuries per liter (pCi/L) in Bethpage Water District (BWD) water supply wells located at Plant 4 (Wells 4-1 and 4-2). In 2006, BWD Wells 4-1 and 4-2 were analyzed for radium during four events (February, May, July, and October). The radium concentration exceeded the MCL once in Well 4-1 (May 2006 at 5.55 pCi/L) and once in Well 4-2 (February 2006 at 5.69 pCi/L). The radium concentrations in these wells did not exceed the MCL in the fourth sampling event. Because the data available to the Navy is incomplete, MCL compliance during the other sampling events and the annual average radium concentration could not be determined. An additional MCL exceedance occurred for BWD Well 4-1 in September 2010 (7.03 pCi/L). MCL exceedances were not reported for radium in the August 2012, September 2012, and November 2012 sampling events for BWD Well 4-1 or 4-2. In 2013, the radium concentration exceeded the MCL in BWD Well 4-1 in two of four sampling events in January to April 2013, with a maximum concentration of 5.87 pCi/L, and an average concentration of 5.04 pCi/L. As a result, BWD Well 4-1 was shut down in 2013.

Because the BWD Plant 4 well is located southeast and side gradient of the former NWIRP Bethpage and potentially downgradient of a portion of the former Northrop Grumman facility, the Navy and Northrop Grumman conducted further examination of historical records and supported testing of groundwater to determine if there was evidence of a release of radium or other radioactive materials from the former NWIRP Bethpage or Northrop Grumman facilities which may be attributable to the MCL exceedance.

In 2013, the Navy conducted a comprehensive records search for materials and documentation regarding use, storage, and disposal of radium and related radioactive materials at NWIRP Bethpage. No records were found indicating a release of radium or other radioactive materials by the Navy or Northrop Grumman at or from the NWIRP Bethpage or the Northrop Grumman facilities. In addition, Northrop Grumman, the contractor that operated the NWIRP Bethpage, maintained the inventory records of all licensable

(regulated) quantities of radioactive materials used on Navy and Northrop Grumman properties (Navy, 2017).

In 2016, in response to a request from New York State Department of Environmental Conservation (NYSDEC), Northrop Grumman prepared a report to "complete and document a comprehensive description of any and all radioactive materials manufactured, handled or installed in any other products manufactured at the site during the period of operation" (Arcadis, 2016; and Sive Paget & Riesel, P.C., 2016). The findings of that report are summarized below.

The report was compiled based on files maintained by the Radiation Safety Officer at the Northrop Grumman Bethpage facility. This type of position existed since at least the 1960s. The Radiation Safety Officer's files reportedly contained all practicably identifiable and unique (non-duplicative) records regarding regulated radionuclides used at the Bethpage facility during its period of operations. However, the report indicates that if documents discussing radioactive materials were present at the facilities in Bethpage in earlier years (pre-1960s), a search of its records could not identify them. In preparing the report, Northrop Grumman also reviewed an index of 34,000 file listings of Northrop Grumman's archived materials to attempt to identify relevant pre-1962 documents, but none of the descriptions of the contents of the archived files in the index referenced the use of radioactive materials at the Bethpage facility.

Although Northrop Grumman's records that were reviewed did not address the period prior to the 1960s, the report concluded that it is reasonable to believe that radium-226-based luminescent dials may have been installed on aircraft manufactured by Northrop Grumman during this earlier time period, as such dials were commonly used in aircraft in the first half of the 20th Century. However, according to the report, there was no evidence that the fabrication of radium-226 dials, including the painting of the dials using radium-based luminescent paint, occurred at the Northrop Grumman-operated facilities, including the NWIRP Bethpage.

According to the Northrop Grumman report, the post-1962 documents indicate that during that period, Northrop Grumman used radioactive materials for testing and research and development purposes and for making quality-assurance and quality-control oriented measurements of manufactured products at the facilities it operated in Bethpage. Radioactive materials were also present in components that were installed in aircraft by Northrop Grumman. The authors of the report opined that the use, handling and disposal of radiological materials during the documented period were consistent with contemporaneous industry standards, and often performed at a level exceeding contemporaneous industry standards. The report also concluded that the Northrop Grumman files provided no reason to believe these operations could be a source of the radium-226 or radium-228 observed in groundwater in the vicinity of the Bethpage facility (Arcadis, 2016).

The Northrop Grumman report identified the following radionuclides as being present during the 1960s to 2015 time period: iron-55, zinc-65, tin-113, yttrium-88, mercury-203, technetium-99, nickel-63, iridium-192, ytterbium-169, europium-152, strontium-90, cobalt-60, tantalum-182, hydrogen-3, carbon-14, americium--

41, promethium-147, barium-133, radium-226, chromium-51, barium-140, thorium-232, calcium-45, cesium-137, polonium-210, polonium-218, bismuth-210, krypton-85, thallium-230, sodium-22, manganese-54, cobalt-57, titanium-204, rhodium-106, lead-210, californium-252, sulfur-35, uranium-238, uranium-235, uranium-234, depleted uranium, enriched uranium (apparent maximum uranium-235 was limited to 5 percent), uranium hexafluoride, plutonium-238, plutonium-239, plutonium-241, plutonium-244 (as a longer-lived decay product from californium-252), thorium nitrate, and 2 percent thorium alloy metal (Arcadis, 2016).

Of the radionuclides identified above, thorium-232 and uranium-238 are of interest because these isotopes decay into radium-228 and -226, respectively (Figure 2-1). While the remaining radionuclides have not been analyzed individually, cumulative concentrations are captured in gross alpha and gross beta activity tests. Available site groundwater data from 2006 to 2017 indicate that thorium, uranium, gross alpha activity, and gross beta activity have not exceeded MCLs.

The Navy has posted the available documents concerning radium and radiological material on the NWIRP Bethpage website homepage at the following location:

http://go.usa.gov/DyXF

In conclusion, although several types of radium or radioactive materials may have been present at the NWIRP Bethpage and Northrop Grumman facilities, there is no current documentation that any of these materials were released from the NWIRP Bethpage and Northrop Grumman facilities to the groundwater. The Navy is in the process of conducting a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Preliminary Assessment/Site Inspection (PA/SI), which includes employee interviews and on property sampling for radiological releases.

3.0 SOURCE AND ANALYTICAL DATA EVALUATION

This section discusses potential sources of radium and factors potentially controlling radium behavior in soil and groundwater, available groundwater data for radium, an evaluation of radium distribution over time, and data evaluation. Groundwater data supports the conclusion that the radium in groundwater is most likely of natural origin and is not due to a release of radium or other radioactive materials at the NWIRP Bethpage or Northrop Grumman facilities to the groundwater.

3.1 RADIUM SOURCES AND GEOCHEMICAL FACTORS

This section discusses how naturally occurring radium in the groundwater can become mobilized based on the geochemical conditions of the aquifer. Key factors that could influence the concentration of radium (a divalent cation) in groundwater include:

- Presence of naturally occurring radionuclides in the aquifer system, including the concentration, distribution, and solubility of parent compounds (thorium and uranium) and radium
- Rate of release of radium as influenced by residence time of the water and various geochemical factors (the availability of cation exchange sites, pH, dissolved oxygen, and dissolved solids)
- Presence and abundance of competing cations in the aquifer and application of competing cations at the ground surface

The following subsections provide further detail on these key factors as related to documented conditions in the local and regional aquifer system at Bethpage.

Naturally Occurring Radionuclides

Radioactive elements including uranium and thorium occur naturally in rocks, sediments, and groundwater, including that found on Long Island. Uranium and thorium decay slowly to other radioactive isotopes, including radium and radon (Figure 2-1). In groundwater, the most commonly occurring radionuclides are radon-222, radium-226, radium-228, uranium-238, and uranium-234 (Zapecza and Szabo, 1986).

The solubility of radionuclides, which varies with geochemical conditions, affects their mobility in groundwater. Information on the solubility of these chemicals is limited.

The groundwater underlying NWIRP Bethpage are part of the North Atlantic Coastal Plain aquifer system. A nationwide survey comprising 1,270 samples from 15 principal aquifer systems found that the North Atlantic Coastal Plain quartz sand aquifer system produced the maximum radium (radium-226 and radium-228) concentration in groundwater of 20.4 pCi/L (Szabo et al., 2012). More than one-fourth of the samples analyzed from the North Atlantic Coastal Plain surficial aquifer system exceeded the 5 pCi/L MCL for radium. Of the 15 principal aquifer systems evaluated in the nationwide survey, only one aquifer system (Midcontinent and Ozark Plateau Cambro-Ordovician) produced more samples exceeding the MCL than the North Atlantic Coastal Plain aquifer system (Szabo et al., 2012).

Due to the agricultural history at and in the vicinity of the former NWIRP Bethpage, fertilizers may be a contributing source of radium in groundwater. According to the United States Environmental Protection Agency (U.S. EPA), phosphate rock, which is used in the production of phosphate fertilizers, may contain significant quantities of naturally occurring radioactive materials. Phosphate fertilizers contain some of the naturally occurring radium-226) found in phosphate ores, ranging between 5 to 30 picocuries per gram (pCi/g), depending on the type of fertilizer blend and the origin of the phosphate rock. It was not until 1992, that the U.S. EPA issued a final rule amending 40 Code of Federal Regulations Part 61, Subpart R, because of concerns over elevated radionuclide concentrations in phosphogypsum, which was intended for agricultural use. Due to its relatively low solubility, radium associated with fertilizers can remain in soil for an extended period of time.

Rate of Release of Radium and Related Geochemical Factors

Transport in groundwater of cations such as radium is influenced by the presence and availability of cation exchange sites (e.g., clay minerals in the aquifer or materials coated with charged surfaces). The availability of exchange sites on clay minerals in the aquifer is fixed based on the chemical composition of the mineral. Most of the clay minerals present in the aquifer will often have some coating of iron or manganese oxides ("rust" coatings), which create a charged surface. Cation exchange sites on the surfaces of rust coatings can fluctuate as the surrounding groundwater composition changes. As the availability of cation exchange sites decreases, cations can go into groundwater.

Groundwater parameters that influence the availability of exchange sites on charged surfaces include pH, dissolved oxygen content, and dissolved solids concentration (e.g., calcium chloride). Water quality parameters, such as pH and dissolved oxygen, are influenced by the residence time of the groundwater and therefore also effect concentration of radium. The chlorine associated with chlorinated volatile organic compounds (VOCs) in the area groundwater is tightly bound into the VOC and is present at a relatively low level compared to the chlorides in dissolved salts; and therefore, would not affect the concentration of radium in groundwater.

As the pH in groundwater decreases, the availability of exchange sites associated with the rust coatings will decrease. Radium concentrations are generally higher in acidic (pH less than 7 standard units [SU]) groundwater, and the aquifers of the North Atlantic Coastal Plain are generally acidic due to the limited buffering capacity of the primary minerals, i.e., quartz (Denver et al., 2014). A representative group of groundwater samples collected from wells up to 4 miles of the NWIRP Bethpage exhibit generally acidic pH values ranging from 3.3 to 6.7 SU.

The concentration of dissolved oxygen affects the oxidation-reduction state, or redox state, of the aquifer. Reducing the oxygen content will cause iron and manganese oxide coatings to become more soluble and dissolve into groundwater. The result is fewer cation exchange sites. and increases in dissolved iron, manganese, and other cation concentrations. An increase in dissolved iron and manganese concentrations can affect the radium concentration in the groundwater. In a study conducted of the occurrence and distribution of radium, gross alpha-particle activity, and gross beta-particle activity in groundwater in the Magothy Formation and Upper Chesapeake Bay Area of Maryland, Bolton concluded that radium-226 and radium-228 may be mobilized when dissolved solids concentrations are high, especially in combination with low pH (Bolton, 2000).

Tricca et al., (2000) conducted a study of uranium and radium behavior in the unconfined Upper Glacial and Magothy aquifer on Long Island within the boundaries of the Department of Energy facility near Brookhaven, New York, 35 miles east of Bethpage. Although most of the groundwater samples were collected from monitoring wells screened in the Upper Glacial, only one sample was collected from the Magothy, and the authors concluded that the transport of radium was strongly associated with the presence of surface coatings on aquifer grains. They further observed that, in the Magothy sample, the slightly lowered oxygen concentration was accompanied by dissolution of these active surface coatings as evidenced by increases in dissolved iron and manganese.

Competing Cations

Transport in groundwater of radium is also influenced by the presence of other ion competitors. Commonly abundant (major) cations in groundwater, such as sodium, potassium, calcium, and magnesium, all compete among themselves and lower concentration (minor) cations, including, radium, for exchange sites. As the concentration of major cations increases, minor cations are replaced on exchange sites, causing them to enter groundwater. In addition to the presence of naturally occurring minerals in the aquifer, cation competitors may be introduced to the aquifer through application of road salt and/or fertilizer at the ground surface. In the 2000 Study, dissolved radium-226 and radium-228 concentrations were most strongly correlated with sodium and chloride concentrations (Bolton, 2000). The chlorine associated with chlorinated VOCs in the area groundwater is tightly bound into the VOC and is present at a relatively low level compared to the chlorides in dissolved salts; and therefore, would not affect the concentration of radium in groundwater.

3.2 SUMMARY OF AVAILABLE RADIUM DATA

All the reported radiological data available to the Navy as of March 6, 2018 is presented in Appendix A. Although there is uncertainty with sample collection techniques, handling, and data validation that may call into question the validity of some of the presented data, these data are nevertheless included in Appendix A for completeness and transparency. Water district data are from Bethpage Water District (2006, 2010, 2012, and 2015), Hempstead Water District (2015), Plainview Water District (2015), South Farmingdale Water District (2015), and Levittown Water District (2015). In addition, NYSDEC organized groundwater sampling events in 2013, 2015, 2016, and 2017 that were implemented by Navy, Northrop Grumman, and/or NYSDEC. Of these investigations, the 2015 sampling event was the most comprehensive, involving 31 water samples collected within approximately 4 miles of the NWIRP Bethpage. The 2015 sample event also included test locations to the north (hydraulically upgradient), east and west (hydraulically side-gradient) and south (hydraulically down-gradient) of the NWIRP Bethpage.

Maximum annual concentrations of radium are presented graphically in Figures 3-1 (0 to 100 Feet below ground surface [bgs]), 3-2 (100 to 300 Feet bgs), and 3-3 (Greater than 300 Feet bgs). The data are organized by depth to help distinguish local sources from remote (upgradient) sources. Concentrations of radium within the 0- to 100-foot bgs depth interval would represent radium that would enter the groundwater in close proximity to the well from either unsaturated soil located above the water table (approximately 50 feet bgs) and/or from saturated soil within the shallow-most groundwater. As groundwater moves to the south, it migrates downward in response to natural precipitation displacement and from deeper pumping activities. Radium in groundwater in the 100- to 300-foot bgs depth interval, and radium in groundwater greater than 300 feet bgs would represent radium from either shallow groundwater further north and/or radium dissolved from soil in that depth interval. The majority of the water supplies in the area are extracted from groundwater greater than 300 feet bgs.

The following sections provide detail on available radium-226 and -228 data in each of the three depth intervals. Radium was detected in most of the groundwater samples and all of the water supplies tested, which illustrates how common it is. Samples with radium concentrations exceeding the MCL (5 pCi/L) are shown with bold text.

3.2.1 Shallow Upper Glacial Aquifer and Upper Magothy Aquifer: 0 to 100 Feet bgs

Shallow wells (less than 100 feet bgs) are screened in the Upper Glacial and Magothy Formations. Groundwater data for radium in these wells are presented in Figure 3-1. Radium concentrations in these wells range from non-detect to 8.59 pCi/L. Of the 24 shallow monitoring wells tested, radium concentrations in groundwater from 2 wells (8.3 percent) exceeded the MCL. A review of the data indicates that there is no clear pattern in the distribution of radium in the shallow groundwater.

As discussed in Section 3.1, pH and specific conductivity affect the solubility of radium. Groundwater from wells screened less than 100 feet bgs have pH values ranging from 4.8 to 6.7 SU and specific conductivities ranging from 0.036 to 1.644 millisiemens per centimeter (mS/cm). These data are evaluated in Section 3.4.

3.2.2 Intermediate Magothy Aquifer: 100 to 300 Feet bgs

Intermediate wells (100 to 300 feet bgs) are screened in the Magothy Formation. Groundwater data for radium in these wells are summarized in Figure 3-2. Radium concentrations in these wells range from nondetect to 5.63 pCi/L. Of the 33 intermediate wells tested, radium concentrations in groundwater from 2 wells (6.1 percent) exceeded the MCL.

A review of the data indicates that there is no clear pattern in the distribution of radium in the intermediatedepth groundwater. There is very limited groundwater monitoring wells and data from east of the NWIRP Bethpage and Northrop Grumman facilities, an area which is hydraulically upgradient of Bethpage Water District Plant 4. Groundwater from wells screened between 100 and 300 feet bgs in the vicinity of the NWIRP Bethpage have pH values ranging from 4.5 to 6.5 SU and specific conductivities ranging from 0.030 to 0.346 mS/cm. These data are evaluated in Section 3.4.

3.2.3 Deep Magothy Aquifer: Greater than 300 Feet bgs

Deep wells (greater than 300 feet bgs) are screened in the Magothy Formation. Groundwater data for radium in these deep wells are summarized in Figure 3-3. Radium concentrations in these wells range from non-detect to 7.03 pCi/L. Of the 65 deep wells tested, groundwater from 3 wells (4.6 percent) exceeded the MCL. A review of the data indicates that there is no clear pattern in the concentration distribution of radium in the deeper groundwater.

The maximum concentrations of radium in BWD Plant 4, Well 4-1 water ranged from approximately 5.2 to 7.03 pCi/L, which are only slightly higher than the MCL of 5 pCi/L. Two other public water supply wells in the area that are hydraulically side gradient or upgradient of the NWIRP Bethpage have radium concentrations that are only slightly less than the MCL. Radium was detected at a concentration of 4.3 pCi/L in one public water supply well approximately 2.8 miles west of BWD Plant 4 and 2 miles southwest of NWIRP Bethpage (hydraulically side gradient). Radium was detected at a concentration of 4.6 pCi/L in the second public water well approximately 3.5 miles north of BWD Plant 4 and 2 miles north (hydraulically upgradient) of the NWIRP Bethpage.

Groundwater from wells screened greater than 300 feet bgs have pH values ranging from 3.3 to 6.2 SU and specific conductivities ranging from 0.0107 to 0.227 mS/cm. These data are evaluated in Section 3.4.

3.3 RADIUM DISTRIBUTION OVER TIME

Available radium data in the area is limited to groundwater samples from 2013 to 2017 using the existing VOC monitoring well network collected by the Navy, Northrop Grumman, and NYSDEC, and the water samples from 2006 to 2015 collected by public water supply districts and NYSDEC. This time span is insufficient to develop any trend analysis.

3.4 DATA EVALUATION

As discussed in Section 3.2, there are several natural water quality factors (i.e., pH, dissolved solids [measured as specific conductivity], and dissolved oxygen) that can impact the mobility and transport of radium in groundwater aquifers. Human activities on ground surface, such as the application of road salt or the release of biodegradable organics from common sources including septic systems and gasoline stations, can also alter these water quality parameters.

Figure 3-4 presents box and whisker plots of pH (SU) and specific conductivity for wells sampled for radium-226 and radium-228. There is a limited sample size (n=2; n=3) for samples collected with radium concentrations above the MCL of 5 pCi/L. In addition, not all pH and specific conductivity data are contemporaneous with radium results.





The box and whisker plots are used to evaluate effects from differences in geochemical conditions. Comparison of data from wells exhibiting radium concentrations less than and greater than the MCL suggests that:

- The measured pH across the wells in the data set is consistently acidic and differences in pH do not appear to predict well locations with increased radium activity
- Monitoring wells with increased dissolved salt content (i.e., higher specific conductivity) appear to exhibit higher radium activity

These comparisons, utilizing a very sparse data set, underscore the importance of understanding the driving forces for the distribution of radium concentrations. The limitations of currently available data include a limited areal distribution of wells to sample from and limited information on coinciding key geochemical parameters. Of particular note, the monitoring wells available for testing are locations used for evaluating VOCs in the area. The wells available for testing do not address the full capture zone of BWD Pant 4, and in particular, groundwater to the north and northeast of BWD Plant 4.

4.0 CURRENT AND FUTURE IMPACTS TO DRINKING WATER FACILITIES

Figures 3-1, 3-2, and 3-3 show the former NWIRP Bethpage and Northrop Grumman facilities, current understanding of the distribution of radium concentrations in groundwater, and the location of nearby public water supply wells that are south and hydraulically downgradient of the former NWIRP Bethpage and Northrop Grumman facilities.

Current impacts to drinking water facilities are based on the available radiological data collected between 2006 and 2017. Radium concentrations exceeding the MCL were documented at BWD Plant 4 wells (Well 4-1), which is located southeast of the NWIRP Bethpage and east of the former Northrop Grumman facilities. As illustrated in Figure 3-3, no other BWD wells show sustained radium levels exceeding the MCL, including BWD Plant 4, Well 4-2 which is located in close proximity to BWD Well 4-1.

The other water districts have radium levels less than the MCL. One water district located 2.5 miles southeast of NWIRP Bethpage and Northrop Grumman facilities is Farmingdale Water District (FWD)-11004, which had a radium concentration of 2.67 pCi/L. This water supply well is too far east to be considered downgradient of the NWIRP Bethpage and Northrop Grumman facilities. Hicksville Water District (HWD) Plant 9 is approximately 0.8 mile northwest of the NWIRP Bethpage and Northrop Grumman facilities. HWD Well 9-2 had a radium concentration of 2.88 pCi/L. HWD Plant 9 is hydraulically upgradient (northwest) of the former NWIRP Bethpage and Northrop Grumman facilities. Radium concentrations in groundwater from the four Plainview Water District (PWD) wells ranged from 2.66 to 4.64 pCi/L; those wells are located approximately 3 miles north (hydraulically upgradient) of Northrop Grumman and NWIRP Bethpage facilities. Levittown Water District (LWD) wells had radium concentrations ranging between 3.73 and 4.31 pCi/L; the LWD wells are located approximately 4 miles southwest (hydraulically side gradient) of NWIRP Bethpage and Northrop Grumman facilities.

Because the levels of radium and other radionuclides in groundwater are consistent with naturally occurring concentrations found in the regional aquifer, definitive future impacts to drinking water facilities, if any, cannot be determined. Further, the locations of radium concentrations appear to be randomly distributed in the Magothy aquifer groundwater.

5.0 SUMMARY

The concentration of radium and other radioactive materials identified in groundwater in the vicinity of NWIRP Bethpage is consistent with naturally occurring levels normally found in the regional aquifer.

Several radioactive materials, including radium, were reportedly used by Northrop Grumman in product testing, research, and development, and for making product quality assurance and quality control oriented measures at the NWIRP Bethpage and Northrop Grumman facilities. Research to date into the records for these facilities did not find evidence of a radium or other radioactive material release that could have an effect on water quality in the NWIRP Bethpage Area.

Radium is a naturally occurring radioactive material whose solubility in the groundwater can be altered by pH, dissolved oxygen, and/or dissolved salts. Changes in these primary factors can be either natural or influenced by human activities (e.g., road salt, septic systems, gasoline stations, and fertilizers) on or near the surface of the aquifer.

In a nationwide survey, radium was measured at concentrations greater than the MCL in more than 25 percent of samples analyzed from the North American Coastal Plain surficial aquifer system. It can also be found in phosphate rock, which is used in the production of phosphate fertilizers. The Bethpage area has an agricultural history.

Based on available NWIRP Bethpage area data assembled from testing conducted by the local water districts, Navy, Northrop Grumman, and NYSDEC between 2006 and 2017, radium was detected in 97.5 percent of the 122 groundwater and public water supply test locations, with a maximum concentration of 8.6 pCi/L in one well. The MCL for radium is 5 pCi/L. Of these test locations, groundwater from 7 wells (5.7 percent) had a radium concentration exceeding the MCL.

A review of the data indicates that there is no clear pattern in the concentration of the distribution of radium in the groundwater. Of note, there is no groundwater data from east (hydraulically side gradient) of the NWIRP Bethpage and Northrop Grumman facilities, in an area that is hydraulically upgradient of Bethpage Water District Plant 4, which is where the well with the highest concentration of radium is located.

Despite the absence of current report-based or environmental evidence that radium or other radioactive materials were released at the NWIRP Bethpage, the Navy is conducting a PA/SI for the NWIRP Bethpage. The Preliminary Assessment includes employee interviews and enhanced compilation of government records for the former NWIRP Bethpage. The Site Inspection will include on-property groundwater sampling and analysis for radium and other radiological materials. At the conclusion of the PA/SI process, the results will be evaluated to determine if further removal or remedial action is warranted.

REFERENCES

Arcadis, 2013. Arcadis Excel Sheet: 2013- MWD Split Radiological Data. June.

Arcadis, 2016. *Review of Files Containing Radiological Information for Northrop Grumman Bethpage, NY Operations.* Administrative File Record Number N90845.AR.002016. September.

Arcadis, 2017a. Table 3 Validated Analytical Results from Northrop Grumman Treated Effluent, Northrop Grumman Systems Corporation, Bethpage NY. August.

Arcadis, 2017b. Table 2 Validated Analytical Results for Radium from Northrop Grumman RW-21 Project Area, Northrop Grumman Systems Corporation, Bethpage NY. November.

Arcadis, 2017c. Validated Analytical Results for Radium from Northrop Grumman Remedial Wells, RW-21 Project Area, Northrop Grumman Systems Corporation, Bethpage, NY. November.

Bethpage Water District (BWD), 2012. 2006-2012 Excel Sample Summary Data Provided by BWD.

Bethpage Water District (BWD), 2013a. H2M Analytical Results for Radium GM38 Area. July

Bethpage Water District (BWD), 2013b. H2M Analytical Results for Radium BWD wells. September

Bolton, D. W. (2000). Occurrence and Distribution of Radium, Gross Alpha-particle Activity, and Gross Beta-particle Activity in Ground Water in the Magothy Formation and Potomac Group Aquifers, Upper Chesapeake Bay Area, Maryland. Department of Natural Resources, Resource Assessment Service, Maryland Geological Survey.

Denver et al., 2014, The quality of our Nation's waters—Water quality in the Northern Atlantic Coastal Plain surficial aquifer system, Delaware, Maryland, New Jersey, New York, North Carolina, and Virginia, 1988–2009: U.S. Geological Survey Circular 1353, 88 p., *https://dx.doi.org/10.3133/cir1353*.

Isbister, J., 1966. Geology and hydrology of Northeastern Nassau County, Long Island, New York. Water Supply paper 1925. U.S. Geological Survey.

J.C. Broderick & Associates, 2017. Volatile Vapor Intrusion (VVI) and Groundwater Analytical Report with Radon Testing Bethpage High School 10 Cherry Avenue Bethpage, New York. May.

Koman Government Solutions (KGS), 2017. *Quarterly Operation Report First Quarter 2017 Groundwater Treatment Plant GM-38 Area Groundwater Remediation NWIRP Bethpage, New York.* August

Masterson, J.P., Pope, J.P., Monti, Jack, Jr., Nardi, M.R., Finkelstein, J.S., and McCoy, K.J., 2015, Hydrogeology and Hydrologic Conditions of the Northern Atlantic Coastal Plain Aquifer System from Long Island, New York, to North Carolina (ver. 1.1, September 2015): U.S. Geological Survey Scientific Investigations Report 2013–5133, 76 p., <u>http://dx.doi.org/10.3133/sir20135133</u>.

Massapequa Water District (MWD), 2013. H2M Analytical Radium results from 6/27/2013. July

McClymonds, N., and Franke O., 1972. Water Transmitting Properties of Aquifers on Long Island, New York. U.S. Geological Survey Professional Paper 627-E.

Navy, 2017. Letter to Senator Schumer Regarding Elevated Levels of Radium Detected in Shallow Groundwater Monitoring Wells on the Bethpage High School Campus. June. Web <u>https://www.navfac.navy.mil/niris/MID_ATLANTIC/BETHPAGE_NWIRP/N90845_002031.pdf</u>

Northrop Grumman Corporation (NGC), 2013. E-mail Regarding Preliminary Split Sampling Lab Results for Radiological Parameters in Groundwater Monitoring Well Samples Collected 4 and 5 June 2013, Bethpage, NY, Admin Record N90845.AR.002014. June.

NWIRP Bethpage Administrative Record: <u>http://go.usa.gov/DyXF</u>

NYSDEC summary table results for Bethpage High School (HS) Broderick ESML results. Validation, location, and sample collection information is pending.

NYSDEC summary table results for Bethpage High School (HS), NYSDEC split of Broderick samples. Validation, location, and sample collection information is pending.

NYSDEC summary table results for Central Blvd. (CB) Broderick ESML results. Validation, location, and sample collection information is pending.

NYSDEC, 2016. April 2016 Radium Results Sample Summary. NOT YET PUBLISHED

NYSDEC, 2017. RW-21 Area - Northrop Grumman and NYSDEC Recovery Well Split Sampling Radium 226 and Radium 228 NYSDEC Sampling Results. November.

Resolution, 2016a. Combined Radium Data from 29 February 2016 for Up Gradient, Down Gradient, and Side Gradient Wells NWIRP Bethpage NY, Admin Record N90845.AR.002004. February.

Resolution, 2016b. Combined Radium Data from October 2015 and December 2015 for Northrop Grumman and NYSDEC Samples from Up Gradient, Side Gradient, and Down Gradient Wells, NWIRP Bethpage NY, Admin Record N90845.AR.002005. February.

Resolution, 2016c. Lab Results for April 14 through 20, 2016 Sample Event, Project #60266589 Phase FI.WS. SDG: 395851 and 395751. May. NOT YET PUBLISHED

Rogers, Golden, & Halpern, 1986. Initial Assessment Study of NWIRP Bethpage, NY and NWIRP Calverton, NY, Contract No. N62474-84-C-3386, UIC N96095/N90845. December.

Sive Paget & Riesel, P.C., 2016. Letter to NYSDEC prepared by Sive Paget & Riesel on behalf of Northrop Grumman Re: Investigation of Radioactive Materials at Northrop Grumman's Bethpage Facility. September.

Suter, R., De Laguna, W., and Perlmutter, N.M., 1949. *Mapping of geologic formations and aquifers of Long Island, New York*. No. GW-18. New York State Water Power and Control Commission.

Szabo et al., 2012. Occurrence and geochemistry of radium in water from principal drinking-water aquifer systems of the United States, In Applied Geochemistry, Volume 27, Issue 3, Pages 729-752, ISSN 0883-2927, <u>https://doi.org/10.1016/j.apgeochem.2011.11.002.</u>

Tricca et al., 2000. The Transport of U- and Th-series nuclides in sandy unconfined aquifer In Geochimica et Cosmochimica Acta, Vol. 65, No. 8, pp. 1187-12710, 2001.

United States, 2017. National Defense Authorization Act for Fiscal Year 2018. 1st sess. Section 318. Web. 18 January 2018. <u>https://www.gpo.gov/fdsys/pkg/BILLS-115hr2810enr/pdf/BILLS-115hr2810enr.pdf</u>

United States Department of Commerce, 1942. Sixteenth Census of the United States: 1940, Agriculture, Volume I, First and Second Series State Reports Part 1 Statistics for Counties, New York County Table 1, Nassau County. February 9.

United States Department of Commerce, 2014. 2012 Census of Agriculture, New York State and County Data, Volume 1, Geographic Area Series, Part 32, AC-12-A-32, New York County Table 1, Nassau County. May.

United States Senate, 2017. Letter from Senator Charles Schumer to Navy Regarding Elevated Levels of Radium in Water Samples from Groundwater Monitoring Wells on the Bethpage High School Campus and Request for Disclosure of Documentation on Use, Storage, and Disposal of Radioactive Materials at NWIRP Bethpage and the Northrop Grumman Manufacturing Site, NWIRP Bethpage, NY. June. Web https://www.navfac.navy.mil/niris/MID_ATLANTIC/BETHPAGE_NWIRP/N90845_002030.pdf

U.S. EPA, 2017. TENORM: Fertilizer and Fertilizer Production Wastes. Web, last updated October 30. Accessed 18 January 2018. <u>https://www.epa.gov/radiation/tenorm-fertilizer-and-fertilizer-production-wastes#tab-1</u>

USGS, 2006. USGS Online Mapper for Water-Table Altitude, and Potentiometric Surface of the Magothy, Jameco, Lloyd, and North Shore Aquifers on Long Island, NY. Web. 18 January 2018. <u>https://ny.water.usgs.gov/maps/li-gc/</u>

Zapecza, O.S. and Z. Szabo, 1986. Natural Radioactivity in Ground Water - A Review, pp. 50 - 57 in National Water Summary 1986 - Hydrologic Events and Ground-Water Quality, Water-Supply Paper 2325, U.S. Geological Survey, Reston, VA.













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APPENDICES

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APPENDIX A CHEMICAL DATA TABLES This page is intentionally blank

Appendix A - Chemical Data Tables Radium Concentrations in the Vicinity of Former Northrop Grumman and NWIRP Bethpage Facilities Page 1 of 19

LOCATION	SAMPLE DEPTH (FT BGS)	SAMPLE DATE	RADIUM -226 (pCi/L)	RADIUM -228 (pCi/L)	COMBINED RAD-226 AND RAD- 228 (pCi/L)	DATA SOURCE
BWD-4-1	540-603	2/2/2006	NA	1.72	1.72	Bethpage Water District (BWD), 2012. 2006- 2012 Excel Sample Summary Data Provided by BWD.
BWD-4-2	556-606	2/2/2006	NA	1.69	1.69	Bethpage Water District (BWD), 2012. 2006- 2012 Excel Sample Summary Data Provided by BWD.
BWD-4-2	556-606	February 2006	NA	NA	5.69	Bethpage Water District v. Northrop Grumman Corporation, Northrop Grumman Systems Corporation, U.S. 30 (2017).
BWD-6-1	328-386	2/7/2006	NA	0.652	0.652	Bethpage Water District (BWD), 2012. 2006- 2012 Excel Sample Summary Data Provided by BWD.
BWD-6-2	710-770	2/7/2006	NA	0.819	0.819	Bethpage Water District (BWD), 2012. 2006- 2012 Excel Sample Summary Data Provided by BWD.
BWD-7	579-640	2/9/2006	NA	1	1	Bethpage Water District (BWD), 2012. 2006- 2012 Excel Sample Summary Data Provided by BWD.
BWD-8	605-678	2/9/2006	NA	0.212	0.212	Bethpage Water District (BWD), 2012. 2006- 2012 Excel Sample Summary Data Provided by BWD.
BWD-5-1	679-740	2/15/2006	NA	0.46	0.46	Bethpage Water District (BWD), 2012. 2006- 2012 Excel Sample Summary Data Provided by BWD.
BWD-1	616-682	2/23/2006	NA	0.766	0.766	Bethpage Water District (BWD), 2012. 2006- 2012 Excel Sample Summary Data Provided by BWD.
BWD-5-1	679-740	5/1/2006	NA	0.927	0.927	Bethpage Water District (BWD), 2012. 2006- 2012 Excel Sample Summary Data Provided by BWD.
BWD-4-1	540-603	5/9/2006	3.61	1.94	5.55	Bethpage Water District (BWD), 2012. 2006- 2012 Excel Sample Summary Data Provided by BWD.
BWD-4-1	540-603	May 2006	NA	NA	5.55	Bethpage Water District v. Northrop Grumman Corporation, Northrop Grumman Systems Corporation, U.S. 30 (2017).
BWD-4-2	556-606	5/9/2006	NA	1.46	1.46	Bethpage Water District (BWD), 2012. 2006- 2012 Excel Sample Summary Data Provided by BWD.
BWD-6-1	328-386	5/16/2006	NA	1.46	1.46	Bethpage Water District (BWD), 2012. 2006- 2012 Excel Sample Summary Data Provided by BWD.
BWD-6-2	710-770	5/16/2006	NA	0.947	0.947	Bethpage Water District (BWD), 2012. 2006- 2012 Excel Sample Summary Data Provided by BWD.
BWD-7	579-640	6/9/2006	NA	1.69	1.69	Bethpage Water District (BWD), 2012. 2006- 2012 Excel Sample Summary Data Provided by BWD.
BWD-8	605-678	6/9/2006	NA	1.93	1.93	Bethpage Water District (BWD), 2012. 2006- 2012 Excel Sample Summary Data Provided by BWD.
BWD-1	616-682	6/19/2006	NA	0.828	0.828	Bethpage Water District (BWD), 2012. 2006- 2012 Excel Sample Summary Data Provided by BWD.
BWD-1	616-682	7/27/2006	NA	0.838	0.838	Bethpage Water District (BWD), 2012. 2006- 2012 Excel Sample Summary Data Provided by BWD.
BWD-4-1	540-603	7/27/2006	NA	1.11	1.11	Bethpage Water District (BWD), 2012. 2006- 2012 Excel Sample Summary Data Provided by BWD.
BWD-4-2	556-606	7/27/2006	NA	0.839	0.839	Bethpage Water District (BWD), 2012. 2006- 2012 Excel Sample Summary Data Provided by BWD.

Appendix A - Chemical Data Tables Radium Concentrations in the Vicinity of Former Northrop Grumman and NWIRP Bethpage Facilities Page 2 of 19

LOCATION	SAMPLE DEPTH (FT BGS)	SAMPLE DATE	RADIUM -226 (pCi/L)	RADIUM -228 (pCi/L)	COMBINED RAD-226 AND RAD- 228 (pCi/L)	DATA SOURCE
BWD-5-1	679-740	7/27/2006	NA	0.743	0.743	Bethpage Water District (BWD), 2012. 2006- 2012 Excel Sample Summary Data Provided by BWD.
BWD-6-1	328-386	7/27/2006	NA	0.677	0.677	Bethpage Water District (BWD), 2012. 2006- 2012 Excel Sample Summary Data Provided by BWD.
BWD-6-2	710-770	7/27/2006	NA	0.955	0.955	Bethpage Water District (BWD), 2012. 2006- 2012 Excel Sample Summary Data Provided by BWD.
BWD-7	579-640	7/27/2006	NA	0.869	0.869	Bethpage Water District (BWD), 2012. 2006- 2012 Excel Sample Summary Data Provided by BWD.
BWD-8	605-678	7/27/2006	NA	0.831	0.831	Bethpage Water District (BWD), 2012. 2006- 2012 Excel Sample Summary Data Provided by BWD.
BWD-1	616-682	10/30/2006	NA	0.02	0.02	Bethpage Water District (BWD), 2012. 2006- 2012 Excel Sample Summary Data Provided by BWD.
BWD-4-1	540-603	10/30/2006	3.61	NA	3.61	Bethpage Water District (BWD), 2012. 2006- 2012 Excel Sample Summary Data Provided by BWD.
BWD-4-1	540-603	10/30/2006	NA	1.19	1.19	Bethpage Water District (BWD), 2012. 2006- 2012 Excel Sample Summary Data Provided by BWD.
BWD-4-2	556-606	10/30/2006	0.758	NA	0.758	Bethpage Water District (BWD), 2012. 2006- 2012 Excel Sample Summary Data Provided by BWD.
BWD-4-2	556-606	10/30/2006	NA	0.855	0.855	Bethpage Water District (BWD), 2012. 2006- 2012 Excel Sample Summary Data Provided by BWD.
BWD-5-1	679-740	10/30/2006	NA	0.011	0.011	Bethpage Water District (BWD), 2012. 2006- 2012 Excel Sample Summary Data Provided by BWD.
BWD-6-1	328-331	10/30/2006	NA	0.854	0.854	Bethpage Water District (BWD), 2012. 2006- 2012 Excel Sample Summary Data Provided by BWD.
BWD-6-2	710-770	10/30/2006	NA	0.36	0.36	Bethpage Water District (BWD), 2012. 2006- 2012 Excel Sample Summary Data Provided by BWD.
BWD-7	579-640	10/30/2006	NA	1.27	1.27	Bethpage Water District (BWD), 2012. 2006- 2012 Excel Sample Summary Data Provided by BWD.
BWD-8	605-678	10/30/2006	NA	0.653	0.653	Bethpage Water District (BWD), 2012. 2006- 2012 Excel Sample Summary Data Provided by BWD.
BWD-1	616-682	9/20/2010	NA	1.08	1.08	Bethpage Water District (BWD), 2012. 2006- 2012 Excel Sample Summary Data Provided by BWD.
BWD-4-1	540-603	9/20/2010	NA	2.1	2.1	Bethpage Water District (BWD), 2012. 2006- 2012 Excel Sample Summary Data Provided by BWD.
BWD-4-1	540-603	September 2010	NA	NA	7.03	Bethpage Water District v. Northrop Grumman Corporation, Northrop Grumman Systems Corporation, U.S. 30 (2017).
BWD-5-1	679-740	9/20/2010	NA	0.598	0.598	Bethpage Water District (BWD), 2012. 2006- 2012 Excel Sample Summary Data Provided by BWD.
BWD-6-1	328-386	9/20/2010	NA	0.361	0.361	Bethpage Water District (BWD), 2012. 2006- 2012 Excel Sample Summary Data Provided by BWD.
BWD-6-2	710-770	9/20/2010	NA	0.734	0.734	Bethpage Water District (BWD), 2012. 2006- 2012 Excel Sample Summary Data Provided by BWD.

Appendix A - Chemical Data Tables Radium Concentrations in the Vicinity of Former Northrop Grumman and NWIRP Bethpage Facilities Page 3 of 19

LOCATION	SAMPLE DEPTH (FT BGS)	SAMPLE DATE	RADIUM -226 (pCi/L)	RADIUM -228 (pCi/L)	COMBINED RAD-226 AND RAD- 228 (pCi/L)	DATA SOURCE
BWD-7	579-640	9/20/2010	NA	1.08	1.08	Bethpage Water District (BWD), 2012. 2006- 2012 Excel Sample Summary Data Provided by BWD.
BWD-8	605-678	9/20/2010	NA	1.64	1.64	Bethpage Water District (BWD), 2012. 2006- 2012 Excel Sample Summary Data Provided by BWD.
BWD-1	616-682	8/14/2012	0.186	0.637	0.823	Bethpage Water District (BWD), 2013b. H2M Analytical Results for Radium BWD wells. September
BWD-1 Resin Vessel	EFFLUENT	8/14/2012	0.125	0.725	0.85	Bethpage Water District (BWD), 2012. 2006- 2012 Excel Sample Summary Data Provided by BWD.
BWD-4-1	540-603	8/14/2012	3.1	1.62	4.72	Bethpage Water District (BWD), 2013b. H2M Analytical Results for Radium BWD wells. September
BWD-4-2	556-606	8/14/2012	1.76	1.59	3.35	Bethpage Water District (BWD), 2013b. H2M Analytical Results for Radium BWD wells. September
BWD-5-1	679-740	8/14/2012	0	0.583	0.583	Bethpage Water District (BWD), 2013b. H2M Analytical Results for Radium BWD wells. September
BWD-6-1	328-386	8/14/2012	0.063	0.824	0.887	Bethpage Water District (BWD), 2013b. H2M Analytical Results for Radium BWD wells. September
BWD-6-2	710-770	8/14/2012	0.126	0.153	0.279	Bethpage Water District (BWD), 2013b. H2M Analytical Results for Radium BWD wells. September
BWD-7	579-640	8/14/2012	0.313	0.61	0.923	Bethpage Water District (BWD), 2013b. H2M Analytical Results for Radium BWD wells. September
BWD-8	605-678	8/14/2012	0	0.892	0.892	Bethpage Water District (BWD), 2013b. H2M Analytical Results for Radium BWD wells. September
Plant 4 Air Stripper and GAC	EFFLUENT	8/14/2012	3.62	2.18	5.8	Bethpage Water District (BWD), 2012. 2006- 2012 Excel Sample Summary Data Provided by BWD.
Plant 5 Air Stripper	EFFLUENT	8/14/2012	0	0.64	0.64	Bethpage Water District (BWD), 2012. 2006- 2012 Excel Sample Summary Data Provided by BWD.
Plant 6 Air Stripper and GAC	EFFLUENT	8/14/2012	0.061	0.735	0.796	Bethpage Water District (BWD), 2012. 2006- 2012 Excel Sample Summary Data Provided by BWD.
WELL 7A/8A GAC	EFFLUENT	8/14/2012	0.217	0.596	0.813	Bethpage Water District (BWD), 2012. 2006- 2012 Excel Sample Summary Data Provided by BWD.
BWD-4-1	540-603	9/18/2012	2.25	2.13	4.38	Bethpage Water District (BWD), 2013b. H2M Analytical Results for Radium BWD wells. September
BWD-4-2	556-606	9/18/2012	2.41	2.13	4.54	Bethpage Water District (BWD), 2013b. H2M Analytical Results for Radium BWD wells. September
BWD-4-1	540-603	11/26/2012	2.38	1.32	3.7	Bethpage Water District (BWD), 2013b. H2M Analytical Results for Radium BWD wells. September
BWD-4-2	556-606	11/26/2012	2.09	1.11	3.2	Bethpage Water District (BWD), 2013b. H2M Analytical Results for Radium BWD wells. September
BWD-4-1	540-603	1/2/2013	4.06	1.81	5.87	Bethpage Water District (BWD), 2013b. H2M Analytical Results for Radium BWD wells. September
BWD-4-1	540-603	January 2013	NA	NA Page A-3	5.87	Bethpage Water District v. Northrop Grumman Corporation, Northrop Grumman Systems Corporation, U.S. 30 (2017).

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LOCATION	SAMPLE DEPTH (FT BGS)	SAMPLE DATE	RADIUM -226 (pCi/L)	RADIUM -228 (pCi/L)	COMBINED RAD-226 AND RAD- 228 (pCi/L)	DATA SOURCE
BWD-4-2	556-606	1/2/2013	1.55	0.985	2.535	Bethpage Water District (BWD), 2013b. H2M Analytical Results for Radium BWD wells. September
BWD-4-1	540-603	2/20/2013	1.86	1.8	3.66	Bethpage Water District (BWD), 2013b. H2M Analytical Results for Radium BWD wells. September
BWD-4-2	556-606	2/20/2013	1.95	1.1	3.05	Bethpage Water District (BWD), 2013b. H2M Analytical Results for Radium BWD wells. September
BWD-4-1	540-603	3/11/2013	2.92	2.89	5.81	Bethpage Water District (BWD), 2013b. H2M Analytical Results for Radium BWD wells. September
BWD-4-2	556-606	3/11/2013	2.54	1.39	3.93	Bethpage Water District (BWD), 2013b. H2M Analytical Results for Radium BWD wells. September
BWD-4-2	556-606	3/11/2013	3.93	0.89	4.82	Bethpage Water District (BWD), 2013b. H2M Analytical Results for Radium BWD wells. September
BWD-4-1	540-603	4/12/2013	3.93	0.89	4.82	Bethpage Water District (BWD), 2013b. H2M Analytical Results for Radium BWD wells. September
BWD-4-2	556-606	4/12/2013	2	0.809	2.809	Bethpage Water District (BWD), 2013b. H2M Analytical Results for Radium BWD wells. September
MW-116-5	570-590	6/4/2013	1.06	0.421	1.481	Northrop Grumman Corporation (NGC), 2013. Email Regarding Preliminary Split Sampling Lab Results for Radiological Parameters in Groundwater Monitoring Well Samples Collected 4 and 5 June 2013, Bethpage, NY, Admin Record N90845.AR.002014. June.
GM-37D2	370-390	6/5/2013	1	0.963	1.963	Northrop Grumman Corporation (NGC), 2013. Email Regarding Preliminary Split Sampling Lab Results for Radiological Parameters in Groundwater Monitoring Well Samples Collected 4 and 5 June 2013, Bethpage, NY, Admin Record N90845.AR.002014. June.
GM-71D2	444-464	6/5/2013	2.28	1.14	3.42	Northrop Grumman Corporation (NGC), 2013. Email Regarding Preliminary Split Sampling Lab Results for Radiological Parameters in Groundwater Monitoring Well Samples Collected 4 and 5 June 2013, Bethpage, NY, Admin Record N90845.AR.002014. June.
GM38-RW03	392-504	6/17/2013	1.22	0.488U	1.22	Koman Government Solutions (KGS), 2017. Quarterly Operation Report First Quarter 2017 Groundwater Treatment Plant GM-38 Area Groundwater Remediaton NWIRP Bethpage, New York. August
RW2-MW1	470-510	6/17/2013	3.99	2.81	6.8	Koman Government Solutions (KGS), 2017. Quarterly Operation Report First Quarter 2017 Groundwater Treatment Plant GM-38 Area Groundwater Remediaton NWIRP Bethpage, New York. August
RW2-MW1	470-510	6/17/2013	3.99	2.88	6.87	Bethpage Water District (BWD), 2013a. H2M Analytical Results for Radium GM38 Area. July
RW2-MW2	470-510	6/17/2013	0.829	0.296U	0.829	Koman Government Solutions (KGS), 2017. Quarterly Operation Report First Quarter 2017 Groundwater Treatment Plant GM-38 Area Groundwater Remediaton NWIRP Bethpage, New York. August

Appendix A - Chemical Data Tables Radium Concentrations in the Vicinity of Former Northrop Grumman and NWIRP Bethpage Facilities Page 5 of 19

LOCATION	SAMPLE DEPTH (FT BGS)	SAMPLE DATE	RADIUM -226 (pCi/L)	RADIUM -228 (pCi/L)	COMBINED RAD-226 AND RAD- 228 (pCi/L)	DATA SOURCE
TP-1	450-470	6/17/2013	0.452	0.613U	0.452	Koman Government Solutions (KGS), 2017. Quarterly Operation Report First Quarter 2017 Groundwater Treatment Plant GM-38 Area Groundwater Remediaton NWIRP Bethpage, New York. August
IW1-MW1	130-150	6/18/2013	0.769	0.635U	0.769	Koman Government Solutions (KGS), 2017. Quarterly Operation Report First Quarter 2017 Groundwater Treatment Plant GM-38 Area Groundwater Remediaton NWIRP Bethpage, New York. August
RW1-MW2	395-435	6/18/2013	1.74	0.733U	1.74	Koman Government Solutions (KGS), 2017. Quarterly Operation Report First Quarter 2017 Groundwater Treatment Plant GM-38 Area Groundwater Remediaton NWIRP Bethpage, New York. August
RW2-MW3	470-510	6/18/2013	3.49	1.74	5.23	Koman Government Solutions (KGS), 2017. Quarterly Operation Report First Quarter 2017 Groundwater Treatment Plant GM-38 Area Groundwater Remediaton NWIRP Bethpage, New York. August
RW1-MW1	395-435	6/19/2013	2.43	0.0924U	2.43	Koman Government Solutions (KGS), 2017. Quarterly Operation Report First Quarter 2017 Groundwater Treatment Plant GM-38 Area Groundwater Remediaton NWIRP Bethpage, New York. August
RW1-MW1	395-435	6/19/2013	1.43	1.72	3.15	Bethpage Water District (BWD), 2013a. H2M Analytical Results for Radium GM38 Area. July
RW1-MW3	395-435	6/19/2013	1.07	1.79	2.86	Koman Government Solutions (KGS), 2017. Quarterly Operation Report First Quarter 2017 Groundwater Treatment Plant GM-38 Area Groundwater Remediaton NWIRP Bethpage, New York. August
RW1-MW3	395-435	6/19/2013	1.52	1.37	2.89	Bethpage Water District (BWD), 2013a. H2M Analytical Results for Radium GM38 Area. July
GM38-RW01	335-430	6/20/2013	1.13	1.38	2.51	Koman Government Solutions (KGS), 2017. Quarterly Operation Report First Quarter 2017 Groundwater Treatment Plant GM-38 Area Groundwater Remediaton NWIRP Bethpage, New York. August
RW3-MW1	475-495	6/20/2013	1.11	0.957U	1.11	Koman Government Solutions (KGS), 2017. Quarterly Operation Report First Quarter 2017 Groundwater Treatment Plant GM-38 Area Groundwater Remediaton NWIRP Bethpage, New York. August
RW3-MW1	475-495	6/20/2013	0.6	0.969	1.569	Bethpage Water District (BWD), 2013a. H2M Analytical Results for Radium GM38 Area. July
RW3-MW1 (DUP)	475-495	6/20/2013	1.02	1.35	2.37	Koman Government Solutions (KGS), 2017. Quarterly Operation Report First Quarter 2017 Groundwater Treatment Plant GM-38 Area Groundwater Remediaton NWIRP Bethpage, New York. August
RW3-MW2	330-350	6/20/2013	0.772	0.539U	0.772	Koman Government Solutions (KGS), 2017. Quarterly Operation Report First Quarter 2017 Groundwater Treatment Plant GM-38 Area Groundwater Remediaton NWIRP Bethpage, New York. August
RW3-MW2	330-350	6/20/2013	0.345	0.426	0.771	Bethpage Water District (BWD), 2013a. H2M Analytical Results for Radium GM38 Area. July

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LOCATION	SAMPLE DEPTH (FT BGS)	SAMPLE	RADIUM -226 (pCi/L)	RADIUM -228 (pCi/L)	COMBINED RAD-226 AND RAD- 228 (pCi/L)	DATA SOURCE
RW3-MW3	320-340	6/21/2013	1.4	1.58	2.98	Koman Government Solutions (KGS), 2017. Quarterly Operation Report First Quarter 2017 Groundwater Treatment Plant GM-38 Area Groundwater Remediaton NWIRP Bethpage, New York. August
RW3-MW3	320-340	6/21/2013	0.87	1.3	2.17	Bethpage Water District (BWD), 2013a. H2M Analytical Results for Radium GM38 Area. July
RW3-MW4	475-495	6/21/2013	2.17	2.81	4.98	Koman Government Solutions (KGS), 2017. Quarterly Operation Report First Quarter 2017 Groundwater Treatment Plant GM-38 Area Groundwater Remediaton NWIRP Bethpage, New York. August
RW3-MW4	475-495	6/21/2013	2.48	1.08	3.56	Bethpage Water District (BWD), 2013a. H2M Analytical Results for Radium GM38 Area. July
TT-102D	560-600	6/27/2013	0.384	0.968	1.352	Arcadis, 2013. Arcadis Excel Sheet: 2013- MWD Split Radiological Data. June
TT-102D	560-600	6/27/2013	0.52	1.56	2.08	Massapequa Water District (MWD), 2013. H2M Analytical Radium results from 6/27/2013 . July
TT-102D2	740-770	6/27/2013	0.93	0.759	1.689	Arcadis, 2013. Arcadis Excel Sheet: 2013- MWD Split Radiological Data. June
TT-102D2	740-770	6/27/2013	0.181	0.653	0.834	Massapequa Water District (MWD), 2013. H2M Analytical Radium results from 6/27/2013 . July
MW309D	252-262	9/25/2015	0.63	0.5	1.13	Resolution, 2016a. Combined Radium Data from 29 February 2016 for Up Gradient, Down Gradient, and Side Gradient Wells NWIRP Bethpage NY, Admin Record N90845.AR.002004. February.
MW309I	160-170	9/25/2015	0.46	0.69	1.15	Resolution, 2016a. Combined Radium Data from 29 February 2016 for Up Gradient, Down Gradient, and Side Gradient Wells NWIRP Bethpage NY, Admin Record N90845.AR.002004. February.
MW309S	53-63	9/25/2015	0.16	0.72	0.88	Resolution, 2016a. Combined Radium Data from 29 February 2016 for Up Gradient, Down Gradient, and Side Gradient Wells NWIRP Bethpage NY, Admin Record N90845.AR.002004. February.
RE104D1	350-370	9/25/2015	0.27	0.38	0.65	Resolution, 2016a. Combined Radium Data from 29 February 2016 for Up Gradient, Down Gradient, and Side Gradient Wells NWIRP Bethpage NY, Admin Record N90845.AR.002004. February.
RE104D2	710-730	9/25/2015	1.09	-0.15	0.94	Resolution, 2016a. Combined Radium Data from 29 February 2016 for Up Gradient, Down Gradient, and Side Gradient Wells NWIRP Bethpage NY, Admin Record N90845.AR.002004. February.
RE104D3	760-780	9/25/2015	0.52	0.32	0.84	Resolution, 2016a. Combined Radium Data from 29 February 2016 for Up Gradient, Down Gradient, and Side Gradient Wells NWIRP Bethpage NY, Admin Record N90845.AR.002004. February.
BPOW 2-1	356-396	9/28/2015	0.51	0.33	0.84	Resolution, 2016a. Combined Radium Data from 29 February 2016 for Up Gradient, Down Gradient, and Side Gradient Wells NWIRP Bethpage NY, Admin Record N90845.AR.002004. February.

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LOCATION	SAMPLE DEPTH (FT BGS)	SAMPLE	RADIUM -226 (pCi/L)	RADIUM -228 (pCi/L)	COMBINED RAD-226 AND RAD- 228 (pCi/L)	DATA SOURCE
BPOW 2-2	455-495	9/28/2015	0.21	0.79	1	Resolution, 2016a. Combined Radium Data from 29 February 2016 for Up Gradient, Down Gradient, and Side Gradient Wells NWIRP Bethpage NY, Admin Record N90845.AR.002004. February.
BPOW 2-3	564-594	9/28/2015	0.25	0.67	0.92	Resolution, 2016a. Combined Radium Data from 29 February 2016 for Up Gradient, Down Gradient, and Side Gradient Wells NWIRP Bethpage NY, Admin Record N90845.AR.002004. February.
RE108D1	530-550	9/28/2015	1.45	0.1	1.55	Resolution, 2016a. Combined Radium Data from 29 February 2016 for Up Gradient, Down Gradient, and Side Gradient Wells NWIRP Bethpage NY, Admin Record N90845.AR.002004. February.
RE108D2	630-650	9/28/2015	0.5	0.69	1.19	Resolution, 2016a. Combined Radium Data from 29 February 2016 for Up Gradient, Down Gradient, and Side Gradient Wells NWIRP Bethpage NY, Admin Record N90845.AR.002004. February.
TT-102D	560-600	9/30/2015	1.2	2.38	3.58	Resolution, 2016a. Combined Radium Data from 29 February 2016 for Up Gradient, Down Gradient, and Side Gradient Wells NWIRP Bethpage NY, Admin Record N90845.AR.002004. February.
TT-102D2	740-770	9/30/2015	0.2	0.38	0.58	Resolution, 2016a. Combined Radium Data from 29 February 2016 for Up Gradient, Down Gradient, and Side Gradient Wells NWIRP Bethpage NY, Admin Record N90845.AR.002004. February.
MW-100-1	55-65	10/1/2015	1.02	2.04	3.06	Resolution, 2016a. Combined Radium Data from 29 February 2016 for Up Gradient, Down Gradient, and Side Gradient Wells NWIRP Bethpage NY, Admin Record N90845.AR.002004. February.
MW-100-1	55-65	10/1/2015	-0.22	0.56	0.34	Resolution, 2016b. Combined Radium Data from October 2015 and December 2015 for Northrop Grumman and NYSDEC Samples from Up Gradient, Side Gradient, and Down Gradient Wells, NWIRP Bethpage NY, Admin Record N90845.AR.002005. February.
MW-100-2	145-155	10/1/2015	0.62	0.75	1.37	Resolution, 2016a. Combined Radium Data from 29 February 2016 for Up Gradient, Down Gradient, and Side Gradient Wells NWIRP Bethpage NY, Admin Record N90845.AR.002004. February.
MW-100-2	145-155	10/1/2015	0.82	1.48	2.3	Resolution, 2016b. Combined Radium Data from October 2015 and December 2015 for Northrop Grumman and NYSDEC Samples from Up Gradient, Side Gradient, and Down Gradient Wells, NWIRP Bethpage NY, Admin Record N90845.AR.002005. February.
MW-100-3	237-247	10/1/2015	0.14	1.31	1.45	Resolution, 2016a. Combined Radium Data from 29 February 2016 for Up Gradient, Down Gradient, and Side Gradient Wells NWIRP Bethpage NY, Admin Record N90845.AR.002004. February.

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LOCATION	SAMPLE DEPTH (FT BGS)	SAMPLE	RADIUM -226 (pCi/L)	RADIUM -228 (pCi/L)	COMBINED RAD-226 AND RAD- 228 (pCi/L)	DATA SOURCE
MW-100-3	237-247	10/1/2015	1.32	2.27	3.59	Resolution, 2016b. Combined Radium Data from October 2015 and December 2015 for Northrop Grumman and NYSDEC Samples from Up Gradient, Side Gradient, and Down Gradient Wells, NWIRP Bethpage NY, Admin Record N90845.AR.002005. February.
GM-17D	278-298	10/2/2015	0.64	0.65	1.29	Resolution, 2016a. Combined Radium Data from 29 February 2016 for Up Gradient, Down Gradient, and Side Gradient Wells NWIRP Bethpage NY, Admin Record N90845.AR.002004. February.
GM-17D	278-298	10/2/2015	0.68	1.09	1.77	Resolution, 2016b. Combined Radium Data from October 2015 and December 2015 for Northrop Grumman and NYSDEC Samples from Up Gradient, Side Gradient, and Down Gradient Wells, NWIRP Bethpage NY, Admin Record N90845.AR.002005. February.
GM-17I	100-120	10/2/2015	0.22	0.06	0.28	Resolution, 2016a. Combined Radium Data from 29 February 2016 for Up Gradient, Down Gradient, and Side Gradient Wells NWIRP Bethpage NY, Admin Record N90845.AR.002004. February.
GM-17I	100-120	10/2/2015	0.61	-0.06	0.55	Resolution, 2016b. Combined Radium Data from October 2015 and December 2015 for Northrop Grumman and NYSDEC Samples from Up Gradient, Side Gradient, and Down Gradient Wells, NWIRP Bethpage NY, Admin Record N90845.AR.002005. February.
GM-15D	332-342	10/5/2015	0.92	2.93	3.85	Resolution, 2016a. Combined Radium Data from 29 February 2016 for Up Gradient, Down Gradient, and Side Gradient Wells NWIRP Bethpage NY, Admin Record N90845.AR.002004. February.
GM-15D	332-342	10/5/2015	1.25	3.07	4.32	Resolution, 2016b. Combined Radium Data from October 2015 and December 2015 for Northrop Grumman and NYSDEC Samples from Up Gradient, Side Gradient, and Down Gradient Wells, NWIRP Bethpage NY, Admin Record N90845.AR.002005. February.
GM-15I	95-105	10/5/2015	1.42	1.62	3.04	Resolution, 2016a. Combined Radium Data from 29 February 2016 for Up Gradient, Down Gradient, and Side Gradient Wells NWIRP Bethpage NY, Admin Record N90845.AR.002004. February.
GM-15I	95-105	10/5/2015	2.78	0.71	3.49	Resolution, 2016b. Combined Radium Data from October 2015 and December 2015 for Northrop Grumman and NYSDEC Samples from Up Gradient, Side Gradient, and Down Gradient Wells, NWIRP Bethpage NY, Admin Record N90845.AR.002005. February.
GM-15S	63-67	10/5/2015	5.31	3.28	8.59	Resolution, 2016a. Combined Radium Data from 29 February 2016 for Up Gradient, Down Gradient, and Side Gradient Wells NWIRP Bethpage NY, Admin Record N90845.AR.002004. February.

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LOCATION	SAMPLE DEPTH (FT BGS)	SAMPLE DATE	RADIUM -226 (pCi/L)	RADIUM -228 (pCi/L)	COMBINED RAD-226 AND RAD- 228 (pCi/L)	DATA SOURCE
GM-15S	63-67	10/5/2015	4.71	3.1	7.81	Resolution, 2016b. Combined Radium Data from October 2015 and December 2015 for Northrop Grumman and NYSDEC Samples from Up Gradient, Side Gradient, and Down Gradient Wells, NWIRP Bethpage NY, Admin Record N90845.AR.002005. February.
GM-17S	60-70	10/5/2015	0.06	-0.16	-0.1	Resolution, 2016a. Combined Radium Data from 29 February 2016 for Up Gradient, Down Gradient, and Side Gradient Wells NWIRP Bethpage NY, Admin Record N90845.AR.002004. February.
GM-17S	60-70	10/5/2015	0.84	0.09	0.93	Resolution, 2016b. Combined Radium Data from October 2015 and December 2015 for Northrop Grumman and NYSDEC Samples from Up Gradient, Side Gradient, and Down Gradient Wells, NWIRP Bethpage NY, Admin Record N90845.AR.002005. February.
GM-13D	200-210	10/6/2015	0.1	0.55	0.65	Resolution, 2016a. Combined Radium Data from 29 February 2016 for Up Gradient, Down Gradient, and Side Gradient Wells NWIRP Bethpage NY, Admin Record N90845.AR.002004. February.
GM-13D	200-210	10/6/2015	0.44	0.13	0.57	Resolution, 2016b. Combined Radium Data from October 2015 and December 2015 for Northrop Grumman and NYSDEC Samples from Up Gradient, Side Gradient, and Down Gradient Wells, NWIRP Bethpage NY, Admin Record N90845.AR.002005. February.
GM-13D (DUP)	200-210	10/6/2015	0.24	0.95	1.19	Resolution, 2016a. Combined Radium Data from 29 February 2016 for Up Gradient, Down Gradient, and Side Gradient Wells NWIRP Bethpage NY, Admin Record N90845.AR.002004. February.
GM-13D (DUP)	200-210	10/6/2015	0.29	0.5	0.79	Resolution, 2016b. Combined Radium Data from October 2015 and December 2015 for Northrop Grumman and NYSDEC Samples from Up Gradient, Side Gradient, and Down Gradient Wells, NWIRP Bethpage NY, Admin Record N90845.AR.002005. February.
GM-23I	110-120	10/6/2015	1.7	0.71	2.41	Resolution, 2016a. Combined Radium Data from 29 February 2016 for Up Gradient, Down Gradient, and Side Gradient Wells NWIRP Bethpage NY, Admin Record N90845.AR.002004. February.
GM-23I	110-120	10/6/2015	2.16	1.13	3.29	Resolution, 2016b. Combined Radium Data from October 2015 and December 2015 for Northrop Grumman and NYSDEC Samples from Up Gradient, Side Gradient, and Down Gradient Wells, NWIRP Bethpage NY, Admin Record N90845.AR.002005. February.
GM-23S	46-56	10/6/2015	0.69	0.69	1.38	Resolution, 2016a. Combined Radium Data from 29 February 2016 for Up Gradient, Down Gradient, and Side Gradient Wells NWIRP Bethpage NY, Admin Record N90845.AR.002004. February.
GM-23S	46-56	10/6/2015	0.65	0.56 Page A-9	1.21	Resolution, 2016b. Combined Radium Data from October 2015 and December 2015 for Northrop Grumman and NYSDEC Samples from Up Gradient, Side Gradient, and Down Gradient Wells, NWIRP Bethpage NY, Admin Record N90845.AR.002005. February.

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LOCATION	SAMPLE DEPTH (FT BGS)	SAMPLE DATE	RADIUM -226 (pCi/L)	RADIUM -228 (pCi/L)	COMBINED RAD-226 AND RAD- 228 (pCi/L)	DATA SOURCE
N-9920	>300	10/7/2015	0.66	0.53	1.19	Resolution, 2016a. Combined Radium Data from 29 February 2016 for Up Gradient, Down Gradient, and Side Gradient Wells NWIRP Bethpage NY, Admin Record N90845.AR.002004. February.
N-9920	>300	10/7/2015	0.5	0.17	0.67	Resolution, 2016b. Combined Radium Data from October 2015 and December 2015 for Northrop Grumman and NYSDEC Samples from Up Gradient, Side Gradient, and Down Gradient Wells, NWIRP Bethpage NY, Admin Record N90845.AR.002005. February.
N-9920 (DUP)	>300	10/7/2015	0.5	0.54	1.04	Resolution, 2016a. Combined Radium Data from 29 February 2016 for Up Gradient, Down Gradient, and Side Gradient Wells NWIRP Bethpage NY, Admin Record N90845.AR.002004. February.
N-9920 (DUP)	>300	10/7/2015	-0.04	0.4	0.36	Resolution, 2016b. Combined Radium Data from October 2015 and December 2015 for Northrop Grumman and NYSDEC Samples from Up Gradient, Side Gradient, and Down Gradient Wells, NWIRP Bethpage NY, Admin Record N90845.AR.002005. February.
BCPMW-4-1	45-65	10/8/2015	0.5	1.32	1.82	Resolution, 2016a. Combined Radium Data from 29 February 2016 for Up Gradient, Down Gradient, and Side Gradient Wells NWIRP Bethpage NY, Admin Record N90845.AR.002004. February.
BCPMW-4-1	45-65	10/8/2015	-0.24	0.61	0.37	Resolution, 2016b. Combined Radium Data from October 2015 and December 2015 for Northrop Grumman and NYSDEC Samples from Up Gradient, Side Gradient, and Down Gradient Wells, NWIRP Bethpage NY, Admin Record N90845.AR.002005. February.
BCPMW-4-2	68.5-83.5	10/8/2015	0.52	0.28	0.8	Resolution, 2016a. Combined Radium Data from 29 February 2016 for Up Gradient, Down Gradient, and Side Gradient Wells NWIRP Bethpage NY, Admin Record N90845.AR.002004. February.
BCPMW-4-2	68.5-83.5	10/8/2015	0.06	0.51	0.57	Resolution, 2016b. Combined Radium Data from October 2015 and December 2015 for Northrop Grumman and NYSDEC Samples from Up Gradient, Side Gradient, and Down Gradient Wells, NWIRP Bethpage NY, Admin Record N90845.AR.002005. February.
BCPMW-4-3	115-125	10/8/2015	0.7	0.45	1.15	Resolution, 2016b. Combined Radium Data from October 2015 and December 2015 for Northrop Grumman and NYSDEC Samples from Up Gradient, Side Gradient, and Down Gradient Wells, NWIRP Bethpage NY, Admin Record N90845.AR.002005. February.
BCPMW-4-3	115-125	10/9/2015	0	0.54	0.54	Resolution, 2016a. Combined Radium Data from 29 February 2016 for Up Gradient, Down Gradient, and Side Gradient Wells NWIRP Bethpage NY, Admin Record N90845.AR.002004. February.
BWD-4-1	540-603	12/7/2015	3.16	2.05 Page A-10	5.21	Resolution, 2016a. Combined Radium Data from 29 February 2016 for Up Gradient, Down Gradient, and Side Gradient Wells NWIRP Bethpage NY, Admin Record N90845, AR.002004, February.

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	SAMPLE DEPTH (FT BGS)	SAMPLE	RADIUM -226 (pCi/l)	RADIUM -228 (nCi/L)	COMBINED RAD-226 AND RAD- 228 (pCi/L)	DATA SOURCE
BWD-4-1	540-603	12/7/2015	4.49	1.43	5.92	Resolution, 2016b. Combined Radium Data from October 2015 and December 2015 for Northrop Grumman and NYSDEC Samples from Up Gradient, Side Gradient, and Down Gradient Wells, NWIRP Bethpage NY, Admin Record N90845.AR.002005. February.
BWD-4-1 (DUP)	540-603	12/7/2015	3.69	1.86	5.55	Resolution, 2016a. Combined Radium Data from 29 February 2016 for Up Gradient, Down Gradient, and Side Gradient Wells NWIRP Bethpage NY, Admin Record N90845.AR.002004. February.
BWD-4-1 (DUP)	540-603	12/7/2015	3.01	1.6	4.61	Resolution, 2016b. Combined Radium Data from October 2015 and December 2015 for Northrop Grumman and NYSDEC Samples from Up Gradient, Side Gradient, and Down Gradient Wells, NWIRP Bethpage NY, Admin Record N90845.AR.002005. February.
BWD-4-2	556-606	12/7/2015	2.5	1.42	3.92	Resolution, 2016a. Combined Radium Data from 29 February 2016 for Up Gradient, Down Gradient, and Side Gradient Wells NWIRP Bethpage NY, Admin Record N90845.AR.002004. February.
BWD-4-2	556-606	12/7/2015	0.1	0.96	1.06	Resolution, 2016b. Combined Radium Data from October 2015 and December 2015 for Northrop Grumman and NYSDEC Samples from Up Gradient, Side Gradient, and Down Gradient Wells, NWIRP Bethpage NY, Admin Record N90845.AR.002005. February.
BWD-7	579-640	12/7/2015	1.27	0.75	2.02	Resolution, 2016a. Combined Radium Data from 29 February 2016 for Up Gradient, Down Gradient, and Side Gradient Wells NWIRP Bethpage NY, Admin Record N90845.AR.002004. February.
BWD-7	579-640	12/7/2015	0.57	0.85	1.42	Resolution, 2016b. Combined Radium Data from October 2015 and December 2015 for Northrop Grumman and NYSDEC Samples from Up Gradient, Side Gradient, and Down Gradient Wells, NWIRP Bethpage NY, Admin Record N90845.AR.002005. February.
HWD-11	608-693	12/8/2015	0.06	0.93	0.99	Resolution, 2016a. Combined Radium Data from 29 February 2016 for Up Gradient, Down Gradient, and Side Gradient Wells NWIRP Bethpage NY, Admin Record N90845.AR.002004. February.
HWD-11	608-693	12/8/2015	0.11	1.08	1.19	Resolution, 2016b. Combined Radium Data from October 2015 and December 2015 for Northrop Grumman and NYSDEC Samples from Up Gradient, Side Gradient, and Down Gradient Wells, NWIRP Bethpage NY, Admin Record N90845.AR.002005. February.
HWD-9-1	529-590	12/8/2015	0.36	1.32	1.68	Resolution, 2016a. Combined Radium Data from 29 February 2016 for Up Gradient, Down Gradient, and Side Gradient Wells NWIRP Bethpage NY, Admin Record N90845.AR.002004. February.

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LOCATION	SAMPLE DEPTH (FT BGS)	SAMPLE DATE	RADIUM -226 (pCi/L)	RADIUM -228 (pCi/L)	COMBINED RAD-226 AND RAD- 228 (pCi/L)	DATA SOURCE
HWD-9-1	529-590	12/8/2015	0.22	0.83	1.05	Resolution, 2016b. Combined Radium Data from October 2015 and December 2015 for Northrop Grumman and NYSDEC Samples from Up Gradient, Side Gradient, and Down Gradient Wells, NWIRP Bethpage NY, Admin Record N90845.AR.002005. February.
HWD-9-2	384-445	12/8/2015	1.15	1.73	2.88	Resolution, 2016a. Combined Radium Data from 29 February 2016 for Up Gradient, Down Gradient, and Side Gradient Wells NWIRP Bethpage NY, Admin Record N90845.AR.002004. February.
HWD-9-2	384-445	12/8/2015	0.47	1.36	1.83	Resolution, 2016b. Combined Radium Data from October 2015 and December 2015 for Northrop Grumman and NYSDEC Samples from Up Gradient, Side Gradient, and Down Gradient Wells, NWIRP Bethpage NY, Admin Record N90845.AR.002005. February.
HWD-9-3	432-509	12/8/2015	0.3	0.76	1.06	Resolution, 2016a. Combined Radium Data from 29 February 2016 for Up Gradient, Down Gradient, and Side Gradient Wells NWIRP Bethpage NY, Admin Record N90845.AR.002004. February.
HWD-9-3	432-509	12/8/2015	0.44	0.8	1.24	Resolution, 2016b. Combined Radium Data from October 2015 and December 2015 for Northrop Grumman and NYSDEC Samples from Up Gradient, Side Gradient, and Down Gradient Wells, NWIRP Bethpage NY, Admin Record N90845.AR.002005. February.
HWD-13097	>300	12/9/2015	0.06	0.75	0.81	Resolution, 2016b. Combined Radium Data from October 2015 and December 2015 for Northrop Grumman and NYSDEC Samples from Up Gradient, Side Gradient, and Down Gradient Wells, NWIRP Bethpage NY, Admin Record N90845.AR.002005. February.
HWD-3878	>300	12/9/2015	1.12	1.37	2.49	Resolution, 2016b. Combined Radium Data from October 2015 and December 2015 for Northrop Grumman and NYSDEC Samples from Up Gradient, Side Gradient, and Down Gradient Wells, NWIRP Bethpage NY, Admin Record N90845.AR.002005. February.
HWD-7562	455-540	12/9/2015	0.67	1.71	2.38	Resolution, 2016b. Combined Radium Data from October 2015 and December 2015 for Northrop Grumman and NYSDEC Samples from Up Gradient, Side Gradient, and Down Gradient Wells, NWIRP Bethpage NY, Admin Record N90845.AR.002005. February.
HWD-9488	518-568	12/9/2015	0.29	0.8	1.09	Resolution, 2016b. Combined Radium Data from October 2015 and December 2015 for Northrop Grumman and NYSDEC Samples from Up Gradient, Side Gradient, and Down Gradient Wells, NWIRP Bethpage NY, Admin Record N90845.AR.002005. February.

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LOCATION	SAMPLE DEPTH (FT BGS)	SAMPLE DATE	RADIUM -226 (pCi/L)	RADIUM -228 (pCi/L)	COMBINED RAD-226 AND RAD- 228 (pCi/L)	DATA SOURCE
HWD-4-2	520-601	12/10/2015	1.35	0.57	1.92	Resolution, 2016b. Combined Radium Data from October 2015 and December 2015 for Northrop Grumman and NYSDEC Samples from Up Gradient, Side Gradient, and Down Gradient Wells, NWIRP Bethpage NY, Admin Record N90845.AR.002005. February.
HWD-8-1	545-630	12/10/2015	0.98	1.17	2.15	Resolution, 2016b. Combined Radium Data from October 2015 and December 2015 for Northrop Grumman and NYSDEC Samples from Up Gradient, Side Gradient, and Down Gradient Wells, NWIRP Bethpage NY, Admin Record N90845.AR.002005. February.
HWD-9212	>300	12/10/2015	0.77	1.72	2.49	Resolution, 2016b. Combined Radium Data from October 2015 and December 2015 for Northrop Grumman and NYSDEC Samples from Up Gradient, Side Gradient, and Down Gradient Wells, NWIRP Bethpage NY, Admin Record N90845.AR.002005. February.
LWD-2A	574-674	12/15/2015	0.92	2.81	3.73	Resolution, 2016b. Combined Radium Data from October 2015 and December 2015 for Northrop Grumman and NYSDEC Samples from Up Gradient, Side Gradient, and Down Gradient Wells, NWIRP Bethpage NY, Admin Record N90845.AR.002005. February.
LWD-6B	530-630	12/15/2015	1.48	1.39	2.87	Resolution, 2016b. Combined Radium Data from October 2015 and December 2015 for Northrop Grumman and NYSDEC Samples from Up Gradient, Side Gradient, and Down Gradient Wells, NWIRP Bethpage NY, Admin Record N90845.AR.002005. February.
LWD-6B (DUP)	530-630	12/15/2015	3.15	1.16	4.31	Resolution, 2016b. Combined Radium Data from October 2015 and December 2015 for Northrop Grumman and NYSDEC Samples from Up Gradient, Side Gradient, and Down Gradient Wells, NWIRP Bethpage NY, Admin Record N90845.AR.002005. February.
SFWD-5-2	493-589	12/15/2015	0.89	0.25	1.14	Resolution, 2016b. Combined Radium Data from October 2015 and December 2015 for Northrop Grumman and NYSDEC Samples from Up Gradient, Side Gradient, and Down Gradient Wells, NWIRP Bethpage NY, Admin Record N90845.AR.002005. February.
FWD-11004	260-347	12/17/2015	1.27	1.4	2.67	Resolution, 2016b. Combined Radium Data from October 2015 and December 2015 for Northrop Grumman and NYSDEC Samples from Up Gradient, Side Gradient, and Down Gradient Wells, NWIRP Bethpage NY, Admin Record N90845.AR.002005. February.
PWD-12535	553-613	12/17/2015	0.28	1.75	2.03	Resolution, 2016b. Combined Radium Data from October 2015 and December 2015 for Northrop Grumman and NYSDEC Samples from Up Gradient, Side Gradient, and Down Gradient Wells, NWIRP Bethpage NY, Admin Record N90845.AR.002005. February.

Appendix A - Chemical Data Tables Radium Concentrations in the Vicinity of Former Northrop Grumman and NWIRP Bethpage Facilities Page 14 of 19

LOCATION	SAMPLE DEPTH (FT BGS)	SAMPLE DATE	RADIUM -226 (pCi/L)	RADIUM -228 (pCi/L)	COMBINED RAD-226 AND RAD- 228 (pCi/L)	DATA SOURCE
PWD-6077	395-495	12/17/2015	1.38	3.26	4.64	Resolution, 2016b. Combined Radium Data from October 2015 and December 2015 for Northrop Grumman and NYSDEC Samples from Up Gradient, Side Gradient, and Down Gradient Wells, NWIRP Bethpage NY, Admin Record N90845.AR.002005. February.
PWD-6580	531-591	12/17/2015	0.92	2.27	3.19	Resolution, 2016b. Combined Radium Data from October 2015 and December 2015 for Northrop Grumman and NYSDEC Samples from Up Gradient, Side Gradient, and Down Gradient Wells, NWIRP Bethpage NY, Admin Record N90845.AR.002005. February.
PWD-8595	>300	12/17/2015	0.75	1.91	2.66	Resolution, 2016b. Combined Radium Data from October 2015 and December 2015 for Northrop Grumman and NYSDEC Samples from Up Gradient, Side Gradient, and Down Gradient Wells, NWIRP Bethpage NY, Admin Record N90845.AR.002005. February.
GM-74D2	542-562	4/12/2016	0.7	1.19	1.89	NYSDEC, 2016. April 2016 Radium Results Sample Summary. NOT YET PUBLISHED
MW-109-3	233-243	4/12/2016	1.25	1.57	2.82	NYSDEC, 2016. April 2016 Radium Results Sample Summary. NOT YET PUBLISHED
MW-111-4	448-468	4/12/2016	0.32	1.25	1.57	NYSDEC, 2016. April 2016 Radium Results Sample Summary. NOT YET PUBLISHED
MW-116-5	570-590	4/12/2016	0.77	0.8	1.57	NYSDEC, 2016. April 2016 Radium Results Sample Summary. NOT YET PUBLISHED
Well 19	465-617	4/12/2016	0.22	0.79	1.01	NYSDEC, 2016. April 2016 Radium Results Sample Summary. NOT YET PUBLISHED
GM-15D2	536-556	4/13/2016	0.07	0.9	0.97	NYSDEC, 2016. April 2016 Radium Results Sample Summary. NOT YET PUBLISHED
GM-15S	63-67	4/13/2016	2.26	2.57	4.83	NYSDEC, 2016. April 2016 Radium Results Sample Summary. NOT YET PUBLISHED
GM-71D2	444-464	4/13/2016	2.98	1.46	4.44	NYSDEC, 2016. April 2016 Radium Results Sample Summary. NOT YET PUBLISHED
GM-74D	295-305	4/13/2016	1.5	1.01	2.51	NYSDEC, 2016. April 2016 Radium Results Sample Summary. NOT YET PUBLISHED
GM-74I	94-114	4/13/2016	0.26	0.52	0.78	NYSDEC, 2016. April 2016 Radium Results Sample Summary. NOT YET PUBLISHED
GM-79D	280-290	4/13/2016	1.52	1.15	2.67	NYSDEC, 2016. April 2016 Radium Results Sample Summary. NOT YET PUBLISHED
GM-79I	170-180	4/13/2016	0.58	0.8	1.38	NYSDEC, 2016. April 2016 Radium Results Sample Summary. NOT YET PUBLISHED
GM-79I (DUP)	170-180	4/13/2016	1.91	0.57	2.48	NYSDEC, 2016. April 2016 Radium Results Sample Summary. NOT YET PUBLISHED
HN-40D	>100	4/13/2016	3.56	2.03	5.59	NYSDEC, 2016. April 2016 Radium Results Sample Summary. NOT YET PUBLISHED
HN-40I	108-118	4/13/2016	3.08	1.58	4.66	NYSDEC, 2016. April 2016 Radium Results Sample Summary. NOT YET PUBLISHED
RW-21_MW-7	580-590	4/13/2016	0.72	1.27	1.99	NYSDEC, 2016. April 2016 Radium Results Sample Summary. NOT YET PUBLISHED
GM-19I	125-140	4/14/2016	0.62	1.08	1.7	NYSDEC, 2016. April 2016 Radium Results Sample Summary. NOT YET PUBLISHED
GM-19S	33-53	4/14/2016	0.06	1.89	1.95	NYSDEC, 2016. April 2016 Radium Results Sample Summary. NOT YET PUBLISHED
GM-37D	242-262	4/14/2016	2.49	3.14	5.63	NYSDEC, 2016. April 2016 Radium Results Sample Summary. NOT YET PUBLISHED
GM-37D2	370-390	4/14/2016	0.49	0.59	1.08	NYSDEC, 2016. April 2016 Radium Results Sample Summary. NOT YET PUBLISHED

Appendix A - Chemical Data Tables Radium Concentrations in the Vicinity of Former Northrop Grumman and NWIRP Bethpage Facilities Page 15 of 19

	SAMPLE DEPTH (FT BGS)	SAMPLE	RADIUM -226 (pCi/l)	RADIUM -228 (nCi/L)	COMBINED RAD-226 AND RAD- 228 (nCi/L)	DATA SOURCE
MW-06	52-62	4/14/2016	1.01	0.155U	1.01	Resolution, 2016c. Lab Results for April 14 through 20, 2016 Sample Event, Project #60266589 Phase FI.WS. SDG: 395851 and 395751. May. NOT YET PUBLISHED
MW-102-1	137-147	4/14/2016	1.86	1.88	3.74	NYSDEC, 2016. April 2016 Radium Results Sample Summary. NOT YET PUBLISHED
MW-107-1	78-88	4/14/2016	0.44	0.37	0.81	NYSDEC, 2016. April 2016 Radium Results Sample Summary. NOT YET PUBLISHED
MW307I	188-198	4/14/2016	0.44	0.463U	0.44	Resolution, 2016c. Lab Results for April 14 through 20, 2016 Sample Event, Project #60266589 Phase FI.WS. SDG: 395851 and 395751. May. NOT YET PUBLISHED
MW307I	188-198	4/14/2016	0.34	0.46	0.8	NYSDEC, 2016. April 2016 Radium Results Sample Summary. NOT YET PUBLISHED
MW307S	40.5-50.5	4/14/2016	0.79	0.182U	0.79	Resolution, 2016c. Lab Results for April 14 through 20, 2016 Sample Event, Project #60266589 Phase FI.WS. SDG: 395851 and 395751. May. NOT YET PUBLISHED
MW307S	40.5-50.5	4/14/2016	0.51	2.21	2.72	NYSDEC, 2016. April 2016 Radium Results Sample Summary. NOT YET PUBLISHED
MW-06	52-62	4/15/2016	1.04	0.66	1.7	NYSDEC, 2016. April 2016 Radium Results Sample Summary. NOT YET PUBLISHED
MW-07	52-62	4/15/2016	0.29	1.3	1.59	Resolution, 2016c. Lab Results for April 14 through 20, 2016 Sample Event, Project #60266589 Phase FI.WS. SDG: 395851 and 395751. May. NOT YET PUBLISHED
MW-07	52-62	4/15/2016	0.95	2.02	2.97	NYSDEC, 2016. April 2016 Radium Results Sample Summary. NOT YET PUBLISHED
MW-10	49-59	4/15/2016	0.442	0.617	1.059	Resolution, 2016c. Lab Results for April 14 through 20, 2016 Sample Event, Project #60266589 Phase FI.WS. SDG: 395851 and 395751. May. NOT YET PUBLISHED
MW-10	49-59	4/15/2016	0.56	0.51	1.07	NYSDEC, 2016. April 2016 Radium Results Sample Summary. NOT YET PUBLISHED
MW304D	180-190	4/15/2016	0.492	0.655	1.147	Resolution, 2016c. Lab Results for April 14 through 20, 2016 Sample Event, Project #60266589 Phase FI.WS. SDG: 395851 and 395751. May. NOT YET PUBLISHED
MW304D	180-190	4/15/2016	0.83	0.21	1.04	NYSDEC, 2016. April 2016 Radium Results Sample Summary. NOT YET PUBLISHED
MW304I1	102-112	4/15/2016	0.42	0.0326U	0.42	Resolution, 2016c. Lab Results for April 14 through 20, 2016 Sample Event, Project #60266589 Phase FI.WS. SDG: 395851 and 395751. May. NOT YET PUBLISHED
MW304I1	102-112	4/15/2016	0.83	0.2	1.03	NYSDEC, 2016. April 2016 Radium Results Sample Summary. NOT YET PUBLISHED
MW304I2	140-150	4/15/2016	0.18	1.19	1.37	Resolution, 2016c. Lab Results for April 14 through 20, 2016 Sample Event, Project #60266589 Phase FI.WS. SDG: 395851 and 395751. May. NOT YET PUBLISHED
MW304I2	140-150	4/15/2016	0.13	0.85	0.98	NYSDEC, 2016. April 2016 Radium Results Sample Summary. NOT YET PUBLISHED
MW304S	43-53	4/15/2016	0.53	0.572U	0.53	Resolution, 2016c. Lab Results for April 14 through 20, 2016 Sample Event, Project #60266589 Phase FI.WS. SDG: 395851 and 395751. May. NOT YET PUBLISHED
MW304S	43-53	4/15/2016	0.1	0.74	0.84	NYSDEC, 2016. April 2016 Radium Results Sample Summary. NOT YET PUBLISHED
MW307D	276-286	4/15/2016	0.194U	0.261U	ND	Resolution, 2016c. Lab Results for April 14 through 20, 2016 Sample Event, Project #60266589 Phase FI.WS. SDG: 395851 and 395751. May. NOT YET PUBLISHED

Appendix A - Chemical Data Tables Radium Concentrations in the Vicinity of Former Northrop Grumman and NWIRP Bethpage Facilities Page 16 of 19

LOCATION	SAMPLE DEPTH (FT BGS)	SAMPLE DATE	RADIUM -226 (pCi/L)	RADIUM -228 (pCi/L)	COMBINED RAD-226 AND RAD- 228 (pCi/L)	DATA SOURCE
MW307D	276-286	4/15/2016	0.33	0.31	0.64	NYSDEC, 2016. April 2016 Radium Results Sample Summary. NOT YET PUBLISHED
MW305D	286-296	4/18/2016	1.32	1.26	2.58	Resolution, 2016c. Lab Results for April 14 through 20, 2016 Sample Event, Project #60266589 Phase FI.WS. SDG: 395851 and 395751. May. NOT YET PUBLISHED
MW306D	284-294	4/18/2016	0.81	1.43	2.24	Resolution, 2016c. Lab Results for April 14 through 20, 2016 Sample Event, Project #60266589 Phase FI.WS. SDG: 395851 and 395751. May. NOT YET PUBLISHED
MW306I	189-199	4/18/2016	0.306	0.999	1.305	Resolution, 2016c. Lab Results for April 14 through 20, 2016 Sample Event, Project #60266589 Phase FI.WS. SDG: 395851 and 395751. May. NOT YET PUBLISHED
MW306S	50-60	4/18/2016	0.605	1.18	1.785	Resolution, 2016c. Lab Results for April 14 through 20, 2016 Sample Event, Project #60266589 Phase FI.WS. SDG: 395851 and 395751. May. NOT YET PUBLISHED
MW312I	160-170	4/18/2016	0.478	0.400U	0.478	Resolution, 2016c. Lab Results for April 14 through 20, 2016 Sample Event, Project #60266589 Phase FI.WS. SDG: 395851 and 395751. May. NOT YET PUBLISHED
MW312S	53-63	4/18/2016	0.068U	0.281U	ND	Resolution, 2016c. Lab Results for April 14 through 20, 2016 Sample Event, Project #60266589 Phase FI.WS. SDG: 395851 and 395751. May. NOT YET PUBLISHED
MW3051	190-200	4/19/2016	1.8	1.14	2.94	Resolution, 2016c. Lab Results for April 14 through 20, 2016 Sample Event, Project #60266589 Phase FI.WS. SDG: 395851 and 395751. May. NOT YET PUBLISHED
MW305S	40-50	4/19/2016	4.61	1.57	6.18	Resolution, 2016c. Lab Results for April 14 through 20, 2016 Sample Event, Project #60266589 Phase FI.WS. SDG: 395851 and 395751. May. NOT YET PUBLISHED
MW311I	160-170	4/19/2016	2.05	1.93	3.98	Resolution, 2016c. Lab Results for April 14 through 20, 2016 Sample Event, Project #60266589 Phase FI.WS. SDG: 395851 and 395751. May. NOT YET PUBLISHED
MW311S	55-65	4/19/2016	2.12	1.47	3.59	Resolution, 2016c. Lab Results for April 14 through 20, 2016 Sample Event, Project #60266589 Phase FI.WS. SDG: 395851 and 395751. May. NOT YET PUBLISHED
GM38-RW01	335-430	4/20/2016	0.815	2.19	3.005	Resolution, 2016c. Lab Results for April 14 through 20, 2016 Sample Event, Project #60266589 Phase FI.WS. SDG: 395851 and 395751. May. NOT YET PUBLISHED
HN-24I	148-158	4/20/2016	2.99	1.63	4.62	Resolution, 2016c. Lab Results for April 14 through 20, 2016 Sample Event, Project #60266589 Phase FI.WS. SDG: 395851 and 395751. May. NOT YET PUBLISHED
HN-24S	48.6-58.6	4/20/2016	0.89	0.941	1.831	Resolution, 2016c. Lab Results for April 14 through 20, 2016 Sample Event, Project #60266589 Phase FI.WS. SDG: 395851 and 395751. May. NOT YET PUBLISHED
MW310S	57.5-67.5	4/20/2016	0.987	2.39	3.377	Resolution, 2016c. Lab Results for April 14 through 20, 2016 Sample Event, Project #60266589 Phase FI.WS. SDG: 395851 and 395751. May. NOT YET PUBLISHED
MW313S	53-63	4/20/2016	0.215	0.279	0.494	Resolution, 2016c. Lab Results for April 14 through 20, 2016 Sample Event, Project #60266589 Phase FI.WS. SDG: 395851 and 395751. May. NOT YET PUBLISHED

Appendix A - Chemical Data Tables Radium Concentrations in the Vicinity of Former Northrop Grumman and NWIRP Bethpage Facilities Page 17 of 19

LOCATION	SAMPLE DEPTH (FT BGS)	SAMPLE	RADIUM -226 (pCi/L)	RADIUM -228 (pCi/L)	COMBINED RAD-226 AND RAD- 228 (pCi/L)	DATA SOURCE
MW314I	144-154	4/20/2016	0.363	1.15	1.513	Resolution, 2016c. Lab Results for April 14 through 20, 2016 Sample Event, Project #60266589 Phase FI.WS. SDG: 395851 and 395751. May. NOT YET PUBLISHED
MW314S	55-65	4/20/2016	0.0612U	0.225U	ND	Resolution, 2016c. Lab Results for April 14 through 20, 2016 Sample Event, Project #60266589 Phase FI.WS. SDG: 395851 and 395751. May. NOT YET PUBLISHED
HSMW-1	60-64	2/24/2017	5.29	10.43	15.72	J.C. Broderick & Associates, 2017. Volatile Vapor Intrusion (VVI) and Groundwater Analytical Report with Radon Testing Bethpage High School 10 Cherry Avenue Bethpage, New York. May. Samples were collected via temporary well points adjacent to the monitoring well ¹ .
HSMW-2	60-64	2/24/2017	7.52	17.22	24.74	J.C. Broderick & Associates, 2017. Volatile Vapor Intrusion (VVI) and Groundwater Analytical Report with Radon Testing Bethpage High School 10 Cherry Avenue Bethpage, New York. May. Samples were collected via temporary well points adjacent to the monitoring well ¹ .
HSMW-3	60-64	2/24/2017	3.73	6.73	10.46	J.C. Broderick & Associates, 2017. Volatile Vapor Intrusion (VVI) and Groundwater Analytical Report with Radon Testing Bethpage High School 10 Cherry Avenue Bethpage, New York. May. Samples were collected via temporary well points adjacent to the monitoring well ¹ .
GM38-RW01	335-430	3/1/2017	1.19	1.19 U	1.19	Koman Government Solutions (KGS), 2017. Quarterly Operation Report First Quarter 2017 Groundwater Treatment Plant GM-38 Area Groundwater Remediaton NWIRP Bethpage, New York. August
WSP-7	EFFLUENT	8/16/2017	1.26	0.789	2.049	Arcadis, 2017a. Table 3 Validated Analytical Results from Northrop Grumman Treated Effluent, Northrop Grumman Systems Corporation,Bethpage NY. August.
T-102	EFFLUENT	8/25/2017	0.847	1.33	2.177	Arcadis, 2017a. Table 3 Validated Analytical Results from Northrop Grumman Treated Effluent, Northrop Grumman Systems Corporation,Bethpage NY. August.
T-96	EFFLUENT	8/25/2017	1.26	1.12	2.38	Arcadis, 2017a. Table 3 Validated Analytical Results from Northrop Grumman Treated Effluent, Northrop Grumman Systems Corporation,Bethpage NY. August.
RW-20	TBD	8/28/2017	1.51	0.733	2.243	Arcadis, 2017c. Validated Analytical Results for Radium from Northrop Grumman Remedial Wells, RW-21 Project Area, Northrop Grumman Systems Corporation, Bethpage, NY. November.
RW-20	TBD	8/28/2017	0.968	1.52	2.488	NYSDEC, 2017. RW-21 Area - Northrop Grumman and NYSDEC Recovery Well Split Sampling Radium 226 and Radium 228 NYSDEC Sampling Results. November.
RW-21	TBD	8/29/2017	0.553	0.63	1.183	Arcadis, 2017c. Validated Analytical Results for Radium from Northrop Grumman Remedial Wells, RW-21 Project Area, Northrop Grumman Systems Corporation, Bethpage, NY. November.

Appendix A - Chemical Data Tables Radium Concentrations in the Vicinity of Former Northrop Grumman and NWIRP Bethpage Facilities Page 18 of 19

LOCATION	SAMPLE DEPTH (FT BGS)	SAMPLE DATE	RADIUM -226 (pCi/L)	RADIUM -228 (pCi/L)	COMBINED RAD-226 AND RAD- 228 (pCi/L)	DATA SOURCE
RW-21	TBD	8/29/2017	0.702	0.474	1.176	NYSDEC, 2017. RW-21 Area - Northrop Grumman and NYSDEC Recovery Well Split Sampling Radium 226 and Radium 228 NYSDEC Sampling Results. November.
RW-22	TBD	8/30/2017	1.3	0.767	2.067	Arcadis, 2017c. Validated Analytical Results for Radium from Northrop Grumman Remedial Wells, RW-21 Project Area, Northrop Grumman Systems Corporation, Bethpage, NY. November.
RW-22	TBD	8/30/2017	1.35	0.669	2.019	NYSDEC, 2017. RW-21 Area - Northrop Grumman and NYSDEC Recovery Well Split Sampling Radium 226 and Radium 228 NYSDEC Sampling Results. November.
RW-21_MW-9	630-640	8/31/2017	1.28	1.2	2.48	Arcadis, 2017b. Table 2 Validated Analytical Results for Radium from Northrop Grumman RW-21 Project Area, Northrop Grumman Systems Corporation, Bethpage NY. November.
RW-21_MW-1	615-625	9/1/2017	0.372	0.563	0.935	Arcadis, 2017b. Table 2 Validated Analytical Results for Radium from Northrop Grumman RW-21 Project Area, Northrop Grumman Systems Corporation, Bethpage NY. November.
RW-21_MW-14	TBD	9/1/2017	0.367	0.837	1.204	Arcadis, 2017b. Table 2 Validated Analytical Results for Radium from Northrop Grumman RW-21 Project Area, Northrop Grumman Systems Corporation, Bethpage NY. November.
RW-21_MW-14	TBD	9/1/2017	0.502	0.463	0.965	Arcadis, 2017b. Table 2 Validated Analytical Results for Radium from Northrop Grumman RW-21 Project Area, Northrop Grumman Systems Corporation, Bethpage NY. November.
CB-MW-1	43-50	8/18/2017	19.4	4.2	23.6	J.C. Broderick & Associates, 2017. Investigation Summary Report Central Boulevard Elementary School 60 Central Boulevard Bethpage, New York 11714. September.
CB-MW-2	43-50	8/18/2017	10.24	1.95	12.19	J.C. Broderick & Associates, 2017. Investigation Summary Report Central Boulevard Elementary School 60 Central Boulevard Bethpage, New York 11714. September.
CB-MW-3	43-50	8/18/2017	25.3	6.85	32.15	J.C. Broderick & Associates, 2017. Investigation Summary Report Central Boulevard Elementary School 60 Central Boulevard Bethpage, New York 11714. September.
CB-MW-1	TBD	TBD	11	7.16	18.16	NYSDEC summary table results for Central Blvd.(CB) Broderick ESML results. Validation, location, and sample collection information is pending ¹ .
CB-MW-2	TBD	TBD	5.28	4.4	9.68	NYSDEC summary table results for Central Blvd.(CB) Broderick ESML results. Validation, location, and sample collection information is pending ¹ .
CB-MW-3	TBD	TBD	16.2	9.27	25.47	NYSDEC summary table results for Central Blvd.(CB) Broderick ESML results. Validation, location, and sample collection information is pending ¹ .

Appendix A - Chemical Data Tables Radium Concentrations in the Vicinity of Former Northrop Grumman and NWIRP Bethpage Facilities Page 19 of 19

LOCATION	SAMPLE DEPTH (FT BGS)	SAMPLE DATE	RADIUM -226 (pCi/L)	RADIUM -228 (pCi/L)	COMBINED RAD-226 AND RAD- 228 (pCi/L)	DATA SOURCE
HS-MW-5	TBD	TBD	9.29	3.27	12.56	NYSDEC summary table results for Bethpage High School (HS) Broderick ESML results. Validation, location, and sample collection information is pending ¹ .
HS-MW-6	TBD	TBD	17.31	6.64	23.95	NYSDEC summary table results for Bethpage High School (HS) Broderick ESML results. Validation, location, and sample collection information is pending ¹ .
HS-MW-7	TBD	TBD	15.24	4.08	19.32	NYSDEC summary table results for Bethpage High School (HS) Broderick ESML results. Validation, location, and sample collection information is pending ¹ .
HS-MW-5	TBD	TBD	1.6	4.88	6.48	NYSDEC summary table results for Bethpage High School (HS), NYSDEC split of Broderick samples. Validation, location, and sample collection information is pending ¹ .
HS-MW-6	TBD	TBD	10.5	17.2	27.7	NYSDEC summary table results for Bethpage High School (HS), NYSDEC split of Broderick samples. Validation, location, and sample collection information is pending ¹ .
HS-MW-7	TBD	TBD	2.16	5.68	7.84	NYSDEC summary table results for Bethpage High School (HS), NYSDEC split of Broderick samples. Validation, location, and sample collection information is pending ¹ .

1. Critical information regarding sample collection technique, sample handling, and data validation are missing. As a result, the reported results are of uncertain quality; and therefore, other than the Appendices, not presented or discussed in this report. In particular, sample turbidity indicative of natural formation material could artifically inflate the reported radium concentration.

FT - BGSFeet below ground surface.pCi/LpicaCuries per liter.TBDTo be determined.NANot available.NYSDECNew York State Department of Envionmental Conservation.

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Arcadis, 2013. Arcadis Excel Sheet: 2013- MWD Split Radiological Data. June.

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ARCADIS

Location ID: Sample ID: Sample Date: Constituent Name	Units	TT-102D TT-102D1 ⁽¹⁾ 6/27/2013	TT-102D2 TT-102D2 6/27/2013
Gross Alpha		3.03	1 1 4
Gross Beta	pCi/L pCi/L	3.24	0.470
Radium-226	pCi/L	0.384	0.930
Radium-228	pCi/L	0.968	0.759
Total Uranium	ug/L	0.101	0.224

Table 1. Validated Concentrations of Radiological Parameters in Groundwater Samples Collected from Monitoring We

Notes and Abbreviations:

(1) TT-102D was mislabeled during sampling and reported as TT-102D1 in laboratory report.

Radium 226 was analyzed by EPA Method 903.1.

Radium 228 was analyzed by EPA Method 904.0.

Gross Alpha and Gross Beta were analyzed by EPA Method 900.0m.

Total Uranium was analyzed by ASTM D 5174.97.

Data were reviewed in accordance with USEPA National Functional Guidelines of July 2002 and Multi-Agency Radiological Laboratory Analytical Protocols (MARLAP) Manual of July 2004.

Bold value indicates a detection.

- pCi/L Picocuries per liter
- ug/L Micrograms per liter
- USEPA United States Environmental Protection Agency

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Bethpage Water District (BWD), 2013a. H2M Analytical Results for Radium GM38 Area. July

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labs

575 Broad Hollow Rd. , Melville, NY 11747 TEL: (631) 694-3040 FAX: (631) 420-8436 NYSDOH ID#10478

LABORATORY RESULTS

Results for the samples and analytes requested The lab is not directly responsible for the integrity of the sample before receipt at the lab and is responsible only for the certified tests requested.

Sample Information: Type : Potable Water

Origin: Raw Well Special

Bethpage Water District 25 Adams Ave. Bethpage, NY 11714 Attn To : Michael Boufis Federal ID : 2902817 Collected : 06/21/2013 10:45 AM Point No: Received : 06/21/2013 10:45 AM Location: Collected By : PS99

<u>Analyst:</u> Sub Analytical Method: E900.0 : <u>Limit</u> Container: Analyzed: Parameter(s) Results Qualifier <u>D.F</u> Units 07/05/2013 Container-01 of 04 pCi/L 15 Gross Alpha (See Attached) 1 1.93 Analyst: Sub Analytical Method: E900.0 : <u>Limit</u> Analyzed: Container: D.F. Parameter(s) Results Qualifier <u>Units</u> 07/05/2013 Container-01 of 04 Gross Beta (See Attached) 1.53 1 pCi/L Sub Analyst: Analytical Method: E903.1 : U<u>nits</u> <u>Limit</u> Analyzed: Container: Parameter(s) Results Qualifier D.F. 1 pCi/L 07/08/2013 Container-01 of 04 0.870 Radium-226 (See Attached) Analyst: Sub Analytical Method: E904.0 : <u>Limit</u> Results Qualifier Analyzed: Container: Parameter(s) D.F. Units 07/08/2013 Container-01 of 04 1 30 1 pCi/L Radium-228 (See Attached) Sub <u>Analyst:</u> Analytical Method: ASTM D5174 : <u>Limit</u> Container: Parameter(s) Results Qualifier D.F Units Analyzed: Container-01 of 04 07/19/2013 1 µg/L Total Uranium (see attached) 0.111

Lab No. : 1306C33-001

Client Sample ID. : R.W.#3M.W.#3

Qualifiers: E = Value above quantitation range. Value estimated. B = Found in Blank D.F. = Dilution Factor D = Results for Dilution H = Received/analyzed outside of analytical holding time

+ = ELAP / NELAC does not offer certification for this analyte

c = Calibration acceptability criteria exceeded for this analyte

r = Reporting limit > MDL and < LOQ, Value estimated.

J = Estimated value - below calibration range

S = Recovery exceeded control limits for this analyte

N = Indicates presumptive evidence of compound

Result(s) reported meet(s) NYS Regulatory Limit(s).

Result(s) flagged with * Exceed NYS Regulatory Limit(s). Limit noted.

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Test results meet the requirements of NELAC unless otherwise noted.

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labs

575 Broad Hollow Rd. , Melville, NY 11747 TEL: (631) 694-3040 FAX: (631) 420-8436 NYSDOH ID#10478

LABORATORY RESULTS

Results for the samples and analytes requested The lab is not directly responsible for the integrity of the sample before receipt at the lab and is responsible only for the certified tests requested. Sample Information:

Type : Potable Water Origin: Raw Well Special

Bethpage Water District25 Adams Ave.Bethpage, NY 11714Attn To : Michael BoufisFederal ID : 2902817Collected : 06/21/2013 9:20 AM Point No:Received : 06/21/2013 10:23 AM Location:Collected By : PS99

Analytical Method: E900.0 : Analyst: Sub <u>Limit</u> Parameter(s) Container: Results Qualifier <u>D.F.</u> <u>Units</u> Analyzed: 07/05/2013 15 Container-01 of 04 Gross Alpha (See Attached) 4.05 1 pCi/L Analytical Method: E900.0 : Analyst: Sub <u>Limit</u> Analyzed: Container: Parameter(s) Results Qualifier <u>D.F</u> <u>Units</u> 07/05/2013 Container-01 of 04 pCi/L Gross Beta (See Attached) 3.01 1 Analytical Method: E903.1 : Analyst: Sub Parameter(s) <u>Limit</u> Container: <u>D.F</u> Analyzed: Results Qualifier <u>Units</u> 07/08/2013 Container-01 of 04 Radium-226 (See Attached) 1 pCi/L 2.48 Analyst: Sub Analytical Method: E904.0 : <u>Limit</u> **Results** Analyzed: Container: Parameter(s) Qualifier D.F <u>Units</u> pCi/L 07/08/2013 Container-01 of 04 Radium-228 (See Attached) 1.08 1 Analytical Method: ASTM D5174 : Analyst: Sub <u>Limit</u> Parameter(s) Analyzed: Container: Results Qualifier <u>D.F</u> Units 07/19/2013 Container-01 of 04 Total Uranium (see attached) 0.239 1 µg/L

Lab No. : 1306C05-001

Client Sample ID. : RW#3MW#4

Qualifiers: E = Value above quantitation range, Value estimated.

- B = Found in Blank
- D.F. = Dilution Factor D = Results for Dilution
- H = Received/analyzed outside of analytical holding time
- + = ELAP / NELAC does not offer certification for this analyte

c = Calibration acceptability criteria exceeded for this analyte

r = Reporting limit > MDL and < LOQ, Value estimated.

J = Estimated value - below calibration range

S = Recovery exceeded control limits for this analyte

N = Indicates presumptive evidence of compound

Result(s) reported meet(s) NYS Regulatory Limit(s).

Result(s) flagged with * Exceed NYS Regulatory Limit(s). Limit noted.

Page A-28

otherwise noted.

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Laboratory Manager


575 Broad Hollow Rd. , Melville, NY 11747 TEL: (631) 694-3040 FAX: (631) 420-8436 NYSDOH ID#10478

LABORATORY RESULTS

Results for the samples and analytes requested The lab is not directly responsible for the integrity of the sample before receipt at the lab and is responsible only for the certified tests requested. Sample Information:

Type : Potable Water Origin: Raw Well Special

Bethpage Water District25 Adams Ave.Bethpage, NY 11714Attn To :Michael BoufisFederal ID :2902817Collected :06/20/2013 11:35 AM Point No:Received :06/20/2013 1:13 PM Location:

Collected By : PS99

Analytical Method: E900.0 :		A				A	<u>Analyst:</u> Sub
Parameter(s)	<u>Results</u>	<u>Qualifier</u>	<u>D.F.</u>	Units		<u>Analyzeo:</u>	Container:
Gross Alpha (See Attached)	1.10		1	pCi/L	15	06/28/2013	Container-01 of 04
Analytical Method: E900.0 :							Analyst: Sub
Parameter(s)	<u>Results</u>	<u>Qualifier</u>	<u>D.F.</u>	<u>Units</u>	Limit	Analyzed:	Container:
Gross Beta (See Attached)	1.86		1	pCi/L		06/28/2013	Container-01 of 04
Analytical Method: E903.1 :				-			Analyst: Sub
Parameter(s)	<u>Results</u>	Qualifier	<u>D.F.</u>	<u>Units</u>	Limit	Analyzed:	<u>Container:</u>
Radium-226 (See Attached)	0.600		1	pCi/L		07/02/2013	Container-01 of 04
Analytical Method: E904.0 :							Analyst: Sub
Parameter(s)	<u>Results</u>	<u>Qualifier</u>	<u>D.F.</u>	<u>Units</u>	Limit	Analyzed:	<u>Container:</u>
Radium-228 (See Attached)	0.969		1	pCi/L		06/28/2013	Container-01 of 04
Analytical Method: ASTM D5	174 :						Analyst: Sub
Parameter(s)	<u>Results</u>	Qualifier	<u>D.F.</u>	<u>Units</u>	Limit	Analyzed:	<u>Container:</u>
Total Uranium (see attached)	0.091	+	1	µg/L		07/16/2013	Container-01 of 04

Lab No. : 1306B36-001

Client Sample ID. : RW#3MW#1

Qualifiers: E = Value above quantitation range, Value estimated.

- B = Found in Blank
- D.F. = Dilution Factor D = Results for Dilution
- H = Received/analyzed outside of analytical holding time
- + = ELAP / NELAC does not offer certification for this analyte
- c = Calibration acceptability criteria exceeded for this analyte
- r = Reporting limit > MDL and < LOQ, Value estimated.
- J = Estimated value below calibration range
- S = Recovery exceeded control limits for this analyte
- N = Indicates presumptive evidence of compound
- Result(s) reported meet(s) NYS Regulatory Limit(s).

Result(s) flagged with 🙀 Exceed NYS Regulatory Limit(s). Limit noted.

otherwise noted.

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Test results meet the requirements of NELAC unless

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Laboratory Manager



575 Broad Hollow Rd. , Melville, NY 11747 TEL: (631) 694-3040 FAX: (631) 420-8436 NYSDOH ID#10478

LABORATORY RESULTS

Results for the samples and analytes requested The lab is not directly responsible for the integrity of the sample before receipt at the lab and is responsible only for the certified tests requested. Sample Information:

Type : Potable Water Origin: Raw Well Special

Bethpage Water District 25 Adams Ave. Bethpage, NY 11714 Attn To: Michael Boufis Federal ID: 2902817 Collected : 06/20/2013 11:35 AM Point No: Received : 06/20/2013 1:13 PM Location: Collected By : PS99

Analytical Method: E900.0 : Analyst: Sub Limit Parameter(s) Results Qualifier D.F <u>Units</u> Analyzed: Container: 06/28/2013 Gross Alpha (See Attached) 1.27 1 pCi/L 15 Container-01 of 04 Analytical Method: E900.0 : Analyst: Sub Limit Parameter(s) Results Qualifier <u>D.F</u> <u>Units</u> Analyzed: Container: 06/28/2013 pCi/L Container-01 of 04 Gross Beta (See Attached) 1.18 1 Analytical Method: E903.1 : Analyst: Sub Parameter(s) Limit Container: Analyzed: Results Qualifier <u>D.F</u> <u>Units</u> Radium-226 (See Attached) 1 07/02/2013 Container-01 of 04 0.345 pCi/L Analytical Method: E904.0 : Analyst: Sub <u>Limit</u> Parameter(s) Results Qualifier Analyzed: Container: <u>D.F</u> Units 06/28/2013 Container-01 of 04 Radium-228 (See Attached) 0.426 1 pCi/L Analytical Method: ASTM D5174 : Analyst: Sub <u>Limit</u> Parameter(s) Results Qualifier Analyzed: Container: <u>D.F</u> <u>Units</u> Total Uranium (see attached) 0.093 1 07/16/2013 Container-01 of 04 µg/L +

Lab No. : 1306B37-001

Client Sample ID. : RW#3MW#2

Qualifiers: E = Value above quantitation range, Value estimated.

- B = Found in Blank
- D.F. = Dilution Factor D = Results for Dilution
- H = Received/analyzed outside of analytical holding time
- + = ELAP / NELAC does not offer certification for this analyte

c = Calibration acceptability criteria exceeded for this analyte

- r = Reporting limit > MDL and < LOQ, Value estimated.
- J = Estimated value below calibration range

S = Recovery exceeded control limits for this analyte

N = Indicates presumptive evidence of compound

Result(s) reported meet(s) NYS Regulatory Limit(s).

Result(s) flagged with 🙀 Exceed NYS Regulatory Limit(s). Limit noted.

Page A-30

otherwise noted.

Test results meet the requirements of NELAC unless

Laboratory Manager

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LABORATORY RESULTS

Results for the samples and analytes requested The lab is not directly responsible for the integrity of the sample before receipt at the lab and is responsible only for the certified tests requested. Sample Information:

Type : Potable Water Origin: Raw Well Special

Bethpage Water District 25 Adams Ave. Bethpage, NY 11714 Client Sample ID. : RW#1MW#1 Attn To : Michael Boufis Federal ID : 2902817 Collected : 06/19/2013 5:00 PM Point No: Received : 06/19/2013 6:20 PM Location: Collected By : PS99

Analytical Method: E900.0 : Analyst: Sub Parameter(s) Results Qualifier D.F. <u>Units</u> Limit Analyzed: Container: Gross Alpha (See Attached) pCi/L 1.87 1 15 06/28/2013 Container-01 of 04 Analytical Method: E900.0 : Analyst: Sub Parameter(s) <u>Limit</u> Results Qualifier D.F Units Analyzed: Container: Gross Beta (See Attached) 1.68 1 pCi/L 06/28/2013 Container-01 of 04 Analytical Method: E903.1 : Analyst: Sub Parameter(s) Results Qualifier D.F Units <u>Limit</u> Analyzed: Container: Radium-226 (See Attached) 07/02/2013 1.43 1 pCi/L Container-01 of 04 Analytical Method: E904.0 : Analyst: Sub Parameter(s) Results Qualifier <u>Limit</u> D.F. <u>Units</u> Analyzed: Container: Radium-228 (See Attached) 06/28/2013 Container-01 of 04 1.72 1 pCi/L Analytical Method: ASTM D5174 : Analyst: Sub Parameter(s) Results Qualifier D.F. <u>Limit</u> Analyzed: <u>Units</u> Container: Total Uranium (see attached) 0.115 07/16/2013 Container-01 of 04 1 µg/L

Lab No. : 1306B19-001

Qualifiers: E = Value above quantitation range, Value estimated.

- B = Found in Blank
- D.F. = Dilution Factor D = Results for Dilution
- H = Received/analyzed outside of analytical holding time
- + = ELAP / NELAC does not offer certification for this analyte
- c = Calibration acceptability criteria exceeded for this analyte
- r = Reporting limit > MDL and < LOQ, Value estimated.
- J = Estimated value below calibration range
- S = Recovery exceeded control limits for this analyte

N = Indicates presumptive evidence of compound

Result(s) reported meet(s) NYS Regulatory Limit(s).

Result(s) flagged with 🛛 🗶 Exceed NYS Regulatory Limit(s). Limit noted.

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Laboratory Manager

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LABORATORY RESULTS

Results for the samples and analytes requested The lab is not directly responsible for the integrity of the sample before receipt at the lab and is responsible only for the certified tests requested. Sample Information:

Type : Potable Water Origin: Raw Well Special

Bethpage Water District 25 Adams Ave. Bethpage, NY 11714 Attn To: Michael Boufis Federal ID: 2902817 Collected : 06/19/2013 11:45 AM Point No: Received : 06/19/2013 12:56 PM Location: Collected By : PS99

Analytical Method: E900.0 : Analyst: Sub Parameter(s) Limit Results Qualifier D.F. <u>Units</u> Analyzed: Container: Gross Alpha (See Attached) 2.90 1 pCi/L 15 06/28/2013 Container-01 of 04 Analytical Method: E900.0 : Analyst: Sub Parameter(s) Limit Results Qualifier <u>D.F</u> <u>Units</u> Analyzed: Container: 06/28/2013 Gross Beta (See Attached) 0.721 1 pCi/L Container-01 of 04 Analytical Method: E903.1 : Analyst: Sub Limit Parameter(s) Analyzed; Container: Results Qualifier <u>D.F</u> <u>Units</u> Radium-226 (See Attached) 1 pCi/L 07/01/2013 Container-01 of 04 1.52 Analytical Method: E904.0 : Analyst: Sub Parameter(s) <u>Qualifier</u> <u>Limit</u> <u>Results</u> <u>D.F</u> <u>Units</u> Analyzed: Container: Container-01 of 04 Radium-228 (See Attached) 06/28/2013 1 37 1 pCi/L Analytical Method: ASTM D5174 : Analyst: Sub <u>Limit</u> Parameter(s) Results Qualifier <u>D.F</u> Analyzed Container: <u>Units</u> Total Uranium (see attached) 0.108 1 µg/L 07/15/2013 Container-01 of 04

Lab No. : 1306A55-001

Client Sample ID. : RW#1MW#3

Qualifiers: E = Value above quantitation range, Value estimated.

- B = Found in Blank
- D.F. = Dilution Factor D = Results for Dilution
- H = Received/analyzed outside of analytical holding time
- + = ELAP / NELAC does not offer certification for this analyte
- c = Calibration acceptability criteria exceeded for this analyte
- r = Reporting limit > MDL and < LOQ, Value estimated.
- J = Estimated value below calibration range

S = Recovery exceeded control limits for this analyte

N = Indicates presumptive evidence of compound

Result(s) reported meet(s) NYS Regulatory Limit(s). Result(s) flagged with 🖌 Exceed NYS Regulatory Limit(s). Limit noted.

Date Reported : 7/17/2013

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Laboratory Manager

Test results meet the requirements of NELAC unless otherwise noted.

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LABORATORY RESULTS

Results for the samples and analytes requested The lab is not directly responsible for the integrity of the sample before receipt at the lab and is responsible only for the certified tests requested.

Sample Information: Type : Groundwater Origin: Raw Well Special

Bethpage Water District 25 Adams Ave.

Lab No. : 1306841-001

Client Sample ID. : RW 2 MW 1

Bethpage, NY 11714 Attn To: Michael Boufis Federal ID : 2902817 Collected : 06/17/2013 10:40 AM Point No Received : 06/17/2013 12:35 PM Location:

Collected By: PS99

Analytical Method:	E549.2 : S		Prep Method:	E54	9.1		Prep Dat	<u>e:</u> 6/19/2013 9:19:52 AM	<u>Analyst:</u> MJM
Parameter(s)		<u>Results</u>	Qualifier	<u>D.F.</u>	Units			Analyzed:	
Diquat		<0.40	r	1	µg/L	:	20	06/22/2013 1:34 PM	Container-01 of 01
Analytical Method:	SM2320B	: IOC							<u>Analyst:</u> HT
Parameter(s)		<u>Results</u>	Qualifier	<u>D.F.</u>	<u>Units</u>		<u>Limit</u>	Analyzed:	Container:
Alkalinity, Total (As CaCO3	3)	33.0		1	mg/L			06/20/2013 1:00 PM	Container-01 of 01
Analytical Method:	E300.0 : 10	C							<u>Analyst:</u> bka
Parameter(s)		<u>Results</u>	<u>Qualifier</u>	<u>D.F.</u>	<u>Units</u>		<u>Limit</u>	Analyzed:	Container:
Chloride		19.1		1	mg/L	:	250	06/19/2013 10:11 PM	Container-01 of 01
Fluoride		< 0.10		1	mg/L	;	2.2	06/19/2013 10:11 PM	Container-01 of 01
Sulfate		< 5.00		1	mg/L	:	250	06/19/2013 10:11 PM	Container-01 of 01
Analytical Method:	E200.7 : I	<u>эс</u>							Analyst: JA
Parameter(s)		Results	<u>Qualifier</u>	<u>D.F.</u>	<u>Units</u>		<u>Limit</u>	Analyzed:	<u>Container:</u>
Hardness, Calcium (As Ca	CO3)	22.1		1	mg/L			06/18/2013 3:14 PM	Container-01 of 01
Analytical Method:	SM4500-0	N E : IO							Analyst: HT
Parameter(s)		Results	<u>Qualifier</u>	<u>D.F.</u>	<u>Units</u>		<u>Limit</u>	Analyzed:	Container:
Free Cyanide		< 10.0		1	µg/L	-	200	06/20/2013 12:50 PM	Container-01 of 01
Analytical Method:	SM2120B	: IOC							Analyst: EM
Parameter(s)		<u>Results</u>	<u>Qualifier</u>	<u>D.F.</u>	<u>Units</u>		<u>Limit</u>	Analyzed:	Container:
Color	*	25	*	1	units		15	06/18/2013 8:17 AM	Container-01 of 01
Analytical Method:	E1613 : S	oc							Analyst: Sub
Parameter(s)		<u>Results</u>	<u>Qualifier</u>	<u>D.F.</u>	<u>Units</u>		<u>Limit</u>	Analyzed:	<u>Container:</u>
Dioxin (See Attached)		< 5.0		1	Pg/L	:	30	07/03/2013	Container-01 of 02
Analytical Method:	E900.0:								Analyst: Sub
Parameter(s)		<u>Results</u>	<u>Qualifier</u>	<u>D.F.</u>	<u>Units</u>		<u>Limit</u>	<u>Analyzed:</u>	Container:
Gross Alpha (See Attached	d)	5.79		1	pCi/L		15	06/28/2013	Container-01 of 04
Analytical Method:	E900.0 :		· ·						<u>Analyst:</u> Sub
Parameter(s)		<u>Results</u>	<u>Qualifier</u>	<u>D.F.</u>	<u>Units</u>		<u>Limit</u>	<u>Analyzed:</u>	Container:
Gross Beta (See Attached))	3.47		1	pCi/L			06/28/2013	Container-01 of 04
Analytical Method:	M2340 B	IOC							<u>Analyst:</u> JA
Parameter(s)		<u>Results</u>	<u>Qualifier</u>	<u>D.F.</u>	<u>Units</u>		<u>Limit</u>	Analyzed:	<u>Container:</u>
Total Hardness (As CaCO	3)	36.9	-	1	mg/L			06/18/2013 3:14 PM	Container-01 of 01
Qualifiers: E = Value above B = Found in Bla D.F. = Dilution F	quantitati ink actor D =	on range, = Results	Value estim	ated.			Jo	ann M. Slavin	

H = Received/analyzed outside of analytical holding time

+ = ELAP / NELAC does not offer certification for this analyte

c = Calibration acceptability criteria exceeded for this analyte

r = Reporting limit > MDL and < LOQ, Value estimated.

J = Estimated value - below calibration range

S = Recovery exceeded control limits for this analyte

N = Indicates presumptive evidence of compound

Result(s) reported meet(s) NYS Regulatory Limit(s).

Result(s) flagged with 🙀 Exceed NYS Regulatory Limit(s). Limit noted.

Page 6 of 9

Laboratory Manager

Test results meet the requirements of NELAC

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575 Broad Hollow Rd. Melville, NY 11747 TEL: (631) 694-3040 FAX: (631) 420-8436 NYSDOH ID#10478

LABORATORY RESULTS

Results for the samples and analytes requested The lab is not directly responsible for the integrity of the sample before receipt at the lab and is responsible only for the certified tests requested.

Sample Information: Type : Groundwater Origin: Raw Well Special

Bethpage Water District 25 Adams Ave.

Lab No. : 1306841-001

Client Sample ID. : RW 2 MW 1

Bethpage, NY 11714 Attn To : Michael Boufis Federal ID : 2902817 Collected : 06/17/2013 10:40 AM Point No Received : 06/17/2013 12:35 PM Location: Collected By : PS99

Analytical Method:	SM2330 L	SI : IOC						Analyst: Calc
Parameter(s)		<u>Results</u>	<u>Qualifier</u>	<u>D.F.</u>	<u>Units</u>	Limit	<u>Analyzed:</u>	<u>Container:</u>
LSI		-3.01		1	SI		06/24/2013	Container-01 of 01
Analytical Method:	SM5540C	: IOC						<u>Analyst:</u> EM
Parameter(s)		Results	<u>Qualifier</u>	<u>D.F.</u>	<u>Units</u>	<u>Limit</u>	Analyzed:	<u>Container:</u>
MBAS		< 0.08		1	mg/L		06/18/2013 8:02 AM	Container-01 of 01
Analytical Method:	SM4500-N	IH3 H : I						<u>Analyst:</u> bka
Parameter(s)		<u>Results</u>	<u>Qualifier</u>	<u>D.F.</u>	<u>Units</u>	Limit	Analyzed:	Container:
Nitrogen, Ammonia (As N)		0.32	+	1	mg/L		06/20/2013 1:36 PM	Container-01 of 01
Analytical Method:	E353.2 : I	00						<u>Analyst:</u> EM
Parameter(s)		<u>Results</u>	<u>Qualifier</u>	<u>D.F.</u>	<u>Units</u>	Limit	Analyzed:	Container:
Nitrite as N	*	1.09	*	1	mg/L	1	06/18/2013 6:46 AM	Container-01 of 01
Analytical Method:	E353.2 : K	00						<u>Analyst:</u> EM
Parameter(s)		<u>Results</u>	Qualifier	<u>D.F.</u>	<u>Units</u>	Limit	Analyzed:	Container:
Nitrate as N	*	9.00	*D	20	mg/L	10	06/18/2013 12:39 PM	Container-01 of 01
Analytical Method:	SM2150B	: 100						Analyst: EM
Parameter(s)		<u>Results</u>	<u>Qualifier</u>	<u>D.F.</u>	<u>Units</u>	<u>Limit</u>	Analyzed:	Container:
Odor at 60°C		2		1	units	3	06/18/2013 8:25 AM	Container-01 of 01
Analytical Method:	E314.0 : K	DC						<u>Analyst:</u> bka
Parameter(s)		<u>Results</u>	Qualifier	<u>D.F.</u>	<u>Units</u>	Limit	Analyzed:	Container:
Perchlorate		< 1.0		1	µg/L	18	06/20/2013 3:00 PM	Container-01 of 01
Analytical Method:	SM4500-F	B : IOC						Analyst: Client
Parameter(s)		<u>Results</u>	Qualifier	<u>D.F.</u>	<u>Units</u>	Limit	Analyzed:	Container:
PH (FIELD)		6.0	+	1	pH Units		06/17/2013 10:40 AM	Container-01 of 01
Analytical Method:	E903.1 :							<u>Analyst:</u> Sub
Parameter(s)		<u>Results</u>	<u>Qualifier</u>	<u>D.F.</u>	<u>Units</u>	Limit	Analyzed:	Container:
Radium-226 (See Attached	i)	3.99		1	pCi/L		07/02/2013	Container-01 of 04
Analytical Method:	E904.0 :							Analyst: Sub
Parameter(s)		<u>Results</u>	Qualifier	<u>D.F.</u>	<u>Units</u>	Limit	Analyzed:	<u>Container:</u>
Radium-228 (See Attached	d)	2.88		1	pCi/L		06/28/2013	Container-01 of 04

Qualifiers: E = Value above quantitation range, Value estimated.

B = Found in Blank

D.F. = Dilution Factor D = Results for Dilution

H = Received/analyzed outside of analytical holding time

+ = ELAP / NELAC does not offer certification for this analyte

c = Calibration acceptability criteria exceeded for this analyte

r = Reporting limit > MDL and < LOQ, Value estimated.

J = Estimated value - below calibration range

S = Recovery exceeded control limits for this analyte

N = Indicates presumptive evidence of compound

Result(s) reported meet(s) NYS Regulatory Limit(s).

Result(s) flagged with * Exceed NYS Regulatory Limit(s). Limit noted.

Page 7 of 9

Joann M. Slavin

Test results meet the requirements of NELAC

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Laboratory Manager



575 Broad Hollow Rd. , Melville, NY 11747 TEL: (631) 694-3040 FAX: (631) 420-8436 NYSDOH ID#10478

LABORATORY RESULTS

Results for the samples and analytes requested The lab is not directly responsible for the integrity of the sample before receipt at the lab and is responsible only for the certified tests requested.

Sample Information: Type : Groundwater Origin: Raw Well Special

Bethpage Water District 25 Adams Ave.

Lab No. : 1306841-001

Client Sample ID. : RW 2 MW 1

Bethpage, NY 11714 Attn To: Michael Boufis Federal ID : 2902817 Collected : 06/17/2013 10:40 AM Point No Received : 06/17/2013 12:35 PM Location: Collected By: PS99

Analytical Method:	SM2540C	: IOC						<u>Analyst:</u> EM
Parameter(s)		Results	<u>Qualifier</u>	<u>D.F.</u>	<u>Units</u>	Limit	t <u>Analyzed:</u>	Container:
Total Dissolved Solids		150		1	mg/L		06/18/2013 1:06 PM	Container-01 of 01
Analytical Method:	E180.1 : I) C						<u>Analyst:</u> EM
Parameter(s)		<u>Results</u>	<u>Qualifier</u>	<u>D.F.</u>	<u>Units</u>	<u>Limit</u>	<u>Analyzed:</u>	Container:
Turbidity	*	13	*D	2	NTU	5	06/18/2013 8:47 AM	Container-01 of 01
Analytical Method:	ASTM D5	174 :						<u>Analyst:</u> Sub
Parameter(s)		<u>Results</u>	<u>Qualifier</u>	<u>D.F.</u>	<u>Units</u>	<u>Limit</u>	t <u>Analyzed;</u>	Container:
Total Uranium (see attache	ed)	0.130	-	+ 1	µg/L		07/16/2013	Container-01 of 04

Qualifiers: E = Value above quantitation range, Value estimated. B = Found in Blank D.F. = Dilution Factor D = Results for Dilution

H = Received/analyzed outside of analytical holding time

+ = ELAP / NELAC does not offer certification for this analyte

c = Calibration acceptability criteria exceeded for this analyte

r = Reporting limit > MDL and < LOQ, Value estimated.

J = Estimated value - below calibration range

S = Recovery exceeded control limits for this analyte

N = Indicates presumptive evidence of compound

Result(s) reported meet(s) NYS Regulatory Limit(s). Result(s) flagged with 🖌 Exceed NYS Regulatory Limit(s). Limit noted.

Page 8 of 9

Joann M. Slavin

Test results meet the requirements of NELAC

without the written approval of the laboratory.

This report shall not be reproduced except in full,

unless otherwise noted.

Laboratory Manager

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Bethpage Water District (BWD), 2013b. H2M Analytical Results for Radium BWD wells. September

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labs 575 Broad Hollow Road, Melville, NY

TEL: (631) 694-3040 FAX: (631) 420-8436

NYSDOH ID#10478

LABORATORY RESULTS

Results for the samples and analytes requested

Sample Information... Type: Potable Water Origin: Raw Well Special

Bethpage Water District 25 Adams Ave.

Lab No. : 1208683-001

Bethpage, NY 11714

Client Sample ID. : N-08004

Michael Boufis Attn To :

Federal ID 2902817 Collected :8/14/2012 9:45:00 AM Point No: N-08004

Received :8/14/2012 12:20:00 PM Location: Well 5-1

Collected By PS99

Parameter(s)	Results	Qualifier	D.F.	Units	Limit	Method Number	Analyzed
Gross Alpha (See Attached)	1.17		1	pCi/L	15	E900.0	08/27/2012
Gross Beta (See Attached)	0.0470		1	pCi/L		E900.0	08/27/2012
Radium-226 (See Attached)	0.000		1	pCi/L		E903.1	08/30/2012
Radium-228 (See Attached)	0.583		1	pCi/L		E904.0	08/29/2012
Total Uranium (see attached)	0.122		1	µg/L		ASTM D5174	09/06/2012

Qualifiers: E = Value above quantitation range

- B = Found in Blank
- D.F. = Dilution Factor D = Results for Dilution
- H = Received/analyzed outside of analytical holding time
- + = ELAP / NELAC does not offer certification for this analyte
- c = Calibration acceptability criteria exceeded for this analyte
- r = Reporting limit below calibration range
- J = Estimated value below calibration range
- s = Recovery exceeded control limits for this analyte
- N = Indicates presumptive evidence of compound

Result(s) reported meet(s) NYS Regulatory Limit(s). Result(s) flagged with 🙀 Exceed NYS Regulatory Limit(s). Limit noted.

Joann M. Slavin Laboratory Manager



575 Broad Hollow Road, Melville, NY

TEL: (631) 694-3040 FAX: (631) 420-8436

LABORATORY RESULTS

Results for the samples and analytes requested

Sample Information... Type : Potable Water Origin: Raw Well Special

NYSDOH ID#10478

Bethpage Water District 25 Adams Ave.

Bethpage, NY 11714

Lab No. : 1208683-011

Attn To : Michael Boufis

Client Sample ID. : N-03876

Federal ID 2902817

Collected :8/14/2012 10:00:00 AM Point No: N-03876

Received :8/14/2012 12:20:00 PM Location: Well 6-1

Collected By PS99

Parameter(s)	Results	Qualifier	D.F.	Units	Limit	Method Number	Analyzed
Gross Alpha (See Attached)	0.373		1	pCi/L	15	E900.0	08/27/2012
Gross Beta (See Attached)	1.23		1	pCi/L		E900.0	08/27/2012
Radium-226 (See Attached)	0.0628		1	pCi/L		E903.1	08/30/2012
Radium-228 (See Attached)	0.824		1	pCi/L		E904.0	08/29/2012
Total Uranium (see attached)	0.119		1	µg/L		ASTM D5174	09/06/2012

Qualifiers: E = Value above quantitation range

- B = Found in Blank
- D.F. = Dilution Factor D = Results for Dilution
- H = Received/analyzed outside of analytical holding time
- + = ELAP / NELAC does not offer certification for this analyte
- c = Calibration acceptability criteria exceeded for this analyte
- r = Reporting limit below calibration range
- J = Estimated value below calibration range
- s = Recovery exceeded control limits for this analyte
- N = Indicates presumptive evidence of compound
- Result(s) reported meet(s) NYS Regulatory Limit(s).

Result(s) flagged with * Exceed NYS Regulatory Limit(s). Limit noted.

Joann M. Slavin Laboratory Manager

Page 11 of 14



labs 575 Broad Hollow Road, Melville, NY

TEL: (631) 694-3040 FAX: (631) 420-8436

NYSDOH ID#10478

LABORATORY RESULTS

Results for the samples and analytes requested

Sample Information... Type : Potable Water Origin: Raw Well Special

Bethpage Water District 25 Adams Ave.

Bethpage, NY 11714

Lab No. : 1208683-012

Attn To : Michael Boufis

Client Sample ID. : N-08941

Federal ID 2902817

Collected :8/14/2012 10:00:00 AM Point No: N-08941

Received :8/14/2012 12:20:00 PM Location: Well 6-2

Collected By PS99

Parameter(s)	Results	Qualifier	D.F.	Units	Limit	Method Number	Analyzed
Gross Alpha (See Attached)	-1.449		1	pCi/L	15	E900.0	08/28/2012
Gross Beta (See Attached)	0.619		1	pCi/L		E900.0	08/28/2012
Radium-226 (See Attached)	0.126		1	pCi/L		E903.1	08/30/2012
Radium-228 (See Attached)	0.153		1	pCi/L		E904.0	09/04/2012
Total Uranium (see attached)	0.101		1	µg/L		ASTM D5174	09/07/2012

Qualifiers: E = Value above quantitation range B = Found in Blank D.F. = Dilution Factor D = Results for Dilution H = Received/analyzed outside of analytical holding time Laboratory Manager + = ELAP / NELAC does not offer certification for this analyte c = Calibration acceptability criteria exceeded for this analyte r = Reporting limit below calibration range J = Estimated value - below calibration range s = Recovery exceeded control limits for this analyte N = Indicates presumptive evidence of compound Result(s) reported meet(s) NYS Regulatory Limit(s). Result(s) flagged with * Exceed NYS Regulatory Limit(s). Limit noted.

Joann M. Slavin



labs 575 Broad Hollow Road, Melville, NY

TEL: (631) 694-3040 FAX: (631) 420-8436

NYSDOH ID#10478

LABORATORY RESULTS

Results for the samples and analytes requested

Sample Information... Type : Potable Water Origin: Raw Well Special

Bethpage Water District 25 Adams Ave.

Bethpage, NY 11714

Lab No. : 1208683-008

Client Sample ID. : N-08767

Attn To : Michael Boufis

Federal ID 2902817

:8/14/2012 10:20:00 AM Point No: N-08767 Collected :8/14/2012 12:20:00 PM Location: Well 7-A

Received

Collected By PS99

Parameter(s)	Results	Qualifier	D.F.	Units	Limit	Method Number	Analyzed
Gross Alpha (See Attached)	1.02		1	pCi/L	15	E900.0	08/27/2012
Gross Beta (See Attached)	0.364		1	pCi/L		E900.0	08/27/2012
Radium-226 (See Attached)	0.313		1	pCi/L		E903.1	08/30/2012
Radium-228 (See Attached)	0.610		1	pCi/L		E904.0	08/29/2012
Total Uranium (see attached)	0.070		1	µg/L		ASTM D5174	09/06/2012

Qualifiers: E = Value above quantitation range B = Found in Blank

- D.F. = Dilution Factor D = Results for Dilution
- H = Received/analyzed outside of analytical holding time
- + = ELAP / NELAC does not offer certification for this analyte
- c = Calibration acceptability criteria exceeded for this analyte
- r = Reporting limit below calibration range
- J = Estimated value below calibration range
- s = Recovery exceeded control limits for this analyte
- N = Indicates presumptive evidence of compound
- Result(s) reported meet(s) NYS Regulatory Limit(s).

Result(s) flagged with 🖌 Exceed NYS Regulatory Limit(s). Limit noted.

Joann M. Slavin Laboratory Manager



575 Broad Hollow Road , Melville, NY

TEL: (631) 694-3040 FAX: (631) 420-8436

NYSDOH ID#10478

LABORATORY RESULTS

Results for the samples and analytes requested

Sample Information... Type : Potable Water Origin: Raw Well Special

Lab No. : 1208683-009

25 Adams Ave.

Bethpage, NY 11714

Client Sample ID. : N-08768

Attn To : Michael Boufis

Federal ID 2902817

Collected :8/14/2012 10:20:00 AM Point No: N-08768 Received :8/14/2012 12:20:00 PM Location: Well 8-A

Collected By PS99

Parameter(s)	Results	Qualifier	D.F.	Units	Limit	Method Number	Analyzed
Gross Alpha (See Attached)	1.43		1	pCi/L	15	E900.0	08/29/2012
Gross Beta (See Attached)	0.143		1	pCi/L		E900.0	08/29/2012
Radium-226 (See Attached)	0.000		1	pCi/L		E903.1	08/30/2012
Radium-228 (See Attached)	0.892		1	pCi/L		E904.0	08/29/2012
Total Uranium (see attached)	0.095		1	µg/L		ASTM D5174	09/06/2012

Qualifiers: E = Value above quantitation range

B = Found in Blank

- D.F. = Dilution Factor D = Results for Dilution
- H = Received/analyzed outside of analytical holding time
- + = ELAP / NELAC does not offer certification for this analyte
- c = Calibration acceptability criteria exceeded for this analyte
- r = Reporting limit below calibration range
- J = Estimated value below calibration range
- s = Recovery exceeded control limits for this analyte
- N = Indicates presumptive evidence of compound Result(s) reported meet(s) NYS Regulatory Limit(s).

Result(s) flagged with * Exceed NYS Regulatory Limit(s). Limit noted.

Page A-43

Joann M. Slavin Laboratory Manager



labs 575 Broad Hollow Road , Melville, NY

TEL: (631) 694-3040 FAX: (631) 420-8436

NYSDOH ID#10478

LABORATORY RESULTS

Results for the samples and analytes requested

Sample Information... Type: Potable Water Origin: Raw Well Special

Bethpage Water District 25 Adams Ave.

Lab No. : 1208683-006

Bethpage, NY 11714

Michael Boufis Attn To :

Client Sample ID. : N-09591

Federal ID 2902817

:8/14/2012 9:10:00 AM Point No: N-09591 Collected

Received :8/14/2012 12:20:00 PM Location: Well BGD-1

Collected By PS99

Parameter(s)	Results	Qualifier	D.F.	Units	Limit	Method Number	Analyzed
Gross Alpha (See Attached)	-0.752		1	pCi/L	15	E900.0	08/29/2012
Gross Beta (See Attached)	1.33		1	pCi/L		E900.0	08/29/2012
Radium-226 (See Attached)	0.186		1	pCi/L		E903.1	08/30/2012
Radium-228 (See Attached)	0.637		1	pCi/L		E904.0	09/04/2012
Total Uranium (see attached)	-0.013		1	µg/L		ASTM D5174	09/06/2012

Qualifiers: E = Value above quantitation range

- B = Found in Blank
- D.F. = Dilution Factor D = Results for Dilution
- H = Received/analyzed outside of analytical holding time
- + = ELAP / NELAC does not offer certification for this analyte
- c = Calibration acceptability criteria exceeded for this analyte
- r = Reporting limit below calibration range
- J = Estimated value below calibration range
- s = Recovery exceeded control limits for this analyte
- N = Indicates presumptive evidence of compound

Result(s) reported meet(s) NYS Regulatory Limit(s). Result(s) flagged with 🖌 Exceed NYS Regulatory Limit(s). Limit noted.

Date Reported : 9/12/2012

Joann M. Slavin Laboratory Manager



LABORATORY RESULTS

Results for the samples and analytes requested

Sample Information... Type : Potable Water Origin: Raw Well Special

Bethpage Water District

TEL: (631) 694-3040 FAX: (631) 420-8436

NYSDOH ID#10478

575 Broad Hollow Road , Melville, NY

25 Adams Ave. Bethpage. NY 11714 Lab No. : 1208683-003

Bethpage, NY 11714 Attn To: Michael Boufis Client Sample ID. : N-06915

Federal ID 2902817

Collected :8/14/2012 9:25:00 AM Point No: N-06915

Received : 8/14/2012 12:20:00 PM Location: Well 4-1

Collected By PS99

Parameter(s)	Results	Qualifier	D.F.	Units	Limit	Method Number	Analyzed
Gross Alpha (See Attached)	3.73		1	pCi/L	15	E900.0	08/29/2012
Gross Beta (See Attached)	2.36		1	pCi/L		E900.0	08/29/2012
Radium-226 (See Attached)	3.10		1	pCi/L		E903.1	08/30/2012
Radium-228 (See Attached)	1.62		1	pCi/L		E904.0	09/04/2012
Total Uranium (see attached)	0.231		1	µg/L		ASTM D5174	09/06/2012

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Qualifiers: E = Value above quantitation range

- B = Found in Blank
- D.F. = Dilution Factor D = Results for Dilution
- H = Received/analyzed outside of analytical holding time
- + = ELAP / NELAC does not offer certification for this analyte
- \mathbf{c} = Calibration acceptability criteria exceeded for this analyte
- r = Reporting limit below calibration range
- J = Estimated value below calibration range
- s = Recovery exceeded control limits for this analyte
- N = Indicates presumptive evidence of compound

Result(s) reported meet(s) NYS Regulatory Limit(s). Result(s) flagged with 🖌 Exceed NYS Regulatory Limit(s). Limit noted.

Joann M. Slavin Laboratory Manager



575 Broad Hollow Road , Melville, NY TEL: (631) 694-3040 FAX: (631) 420-8436 R

NYSDOH ID#10478

LABORATORY RESULTS

Results for the samples and analytes requested

Sample Information... Type : Potable Water Origin: Raw Well Special

Lab No. : 1208683-004

Bethpage Water District 25 Adams Ave.

Bethpage, NY 11714 Attn To : Michael Boufis

Client Sample ID. : N-06916

Federal ID 2902817

Collected : 8/14/2012 9:25:00 AM Point No: N-06916

Received :8/14/2012 12:20:00 PM Location: Well 4-2

Collected By PS99

Parameter(s)	Results	Qualifier	D.F.	Units	Limit	Method Number	Analyzed
Gross Alpha (See Attached)	3.09		1	pCi/L	15	E900.0	08/27/2012
Gross Beta (See Attached)	2.35		1	pCi/L		E900.0	08/27/2012
Radium-226 (See Attached)	1.76		1	pCi/L		E903.1	08/30/2012
Radium-228 (See Attached)	1.59		1	pCi/L		E904.0	09/04/2012
Total Uranium (see attached)	0.151		1	µg/L		ASTM D5174	09/06/2012

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Qualifiers: E = Value above quantitation range B = Found in Blank D.F. = Dilution Factor D = Results for Dilution

- H = Received/analyzed outside of analytical holding time
- + = ELAP / NELAC does not offer certification for this analyte
- c = Calibration acceptability criteria exceeded for this analyte
- r = Reporting limit below calibration range
- J = Estimated value below calibration range
- s = Recovery exceeded control limits for this analyte
- N = Indicates presumptive evidence of compound

Result(s) reported meet(s) NYS Regulatory Limit(s). Result(s) flagged with 🖌 Exceed NYS Regulatory Limit(s). Limit noted.

Joann M. Slavin Laboratory Manager

H 2 M	Labs 575 Broad Hollow Road TEL: (631) 694-3040	, Melville, NY FAX: (631) 420-8436 NYSDOH ID#10478	LABORATORY RESULTS Results for the samples and analytes requested	Sample Type : Origin:	e Information Potable Water Raw Well
Bethpage Wat 25 Adams Ave	er District		Lab No. :1209865-001	- 5	Special
Bethpage, NY Attn To :	11714 Michael Boufis	Client Sa	ample ID. : N-06915		
Federal ID : 29	902817				
Collected :9/1	8/2012 10:35:00 AM	Point No: N-06918	5		
Received : 9/1	8/2012 12:28:00 PM	Location: Well 4-1			
Collected By PS	99				

Parameter(s)	Results	Qualifier	D.F.	Units	Limit	Method Number	Analyzed
Radium-226 (See Attached)	2.25		1	pCi/L		E903.1	09/28/2012
Radium-228 (See Attached)	2.13		1	pCi/L		E904.0	09/26/2012

Qualifiers: E = Value above quantitation range B = Found in Blank D.F. = Dilution Factor D = Results for Dilution H = Received/analyzed outside of analytical holding time + = ELAP / NELAC does not offer certification for this analyte c = Calibration acceptability criteria exceeded for this analyte r = Reporting limit below calibration range J = Estimated value - below calibration range s = Recovery exceeded control limits for this analyte N = Indicates presumptive evidence of compound Result(s) reported meet(s) NYS Regulatory Limit(s). Result(s) flagged with * Exceed NYS Regulatory Limit(s). Limit noted.

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J.C. Broderick & Associates, 2017. Volatile Vapor Intrusion (VVI) and Groundwater Analytical Report with Radon Testing Bethpage High School 10 Cherry Avenue Bethpage, New York. May. This page is intentionally left blank.

EMSL Analytical Inc. (EMSL) of Cinnaminson, New Jersey provided laboratory analytical services. Copies of EMSL's NYSDOH certifications are available upon request.

The laboratory analytical results for the Radon in Air samples were reviewed and compared to the United States Environmental Protection Agency (EPA) <u>*Radon Measurement in Schools Revised Edition*</u> (EPA 402-R-92-014), dated July 1993.

	Sun	Tabl nmary of Radon S	e No. 7: amples Analysis I	Results	
Sample ID#	Box Number	Sample Device Number	Radon Activity pCi/L	Blank Device Number	Radon Activity pCi/L
Rm 001	165553	283724	1.9	283758	0.1
Rm 002	165563	283834	3.8	283928	0
Rm 004	165552	283801	1.2	283861	0
Rm 006	165562	283802	2.6	283819	0.04
Rm 007	165565	283772	2.4	283770	0.1
Rm 008	165556	283822	1.9	283759	0
Hall 013	165569	283876	1.1	283757	0.04
Rm 013A/B	165571	283667	1	283723	0.04
Rm 013D	165570	283885	1	283771	0.04
Rm 013E	165548	283803	0.9	283767	0.04
Hall 014	165554	283804	1.1	283848	0.04
HS Hall 0006	165540	283930	2.4	283812	0.04
HS Hall 0010A	165541	283926	1	283867	0.04
HS Rm 013	165543	283876	3.9	283827	0.2
HS Rm 013A	165542	283845	0.5	283749	0.4
HS Rm 013B	165544	283823	0.7	283811	0.4
HS Rm 013C	165545	283915	0.6	283830	0.1
HS Rm 013D	165546	283806	1.7	283727	0.1
Notes: Rm = Room HS = High School					

The following table summarizes the Groundwater Analytical Results:

The laboratory analysis results from the Radon samples submitted did not reveal any elevated concentrations of Radon exceeding 4.0 pCi/L, the referenced guidance value established by the EPA.



EMSL Analytical, Inc.

 200 Route 130 North, Cinnaminson, NJ 08077

 Phone/Fax:
 (800) 220-3675 / (856) 786-0327

 http://www.EMSL.com
 cinnaminsonradonlab@emsl.com

EMSL Order:381703842CustomerID:JCBR50CustomerPO:16-35984ProjectID:16-35984

Attn: Ed McGuire

J.C. Broderick & Associates 1775 Expressway Drive North Hauppauge, NY 11788

 Phone:
 (631) 584-5492

 Fax:
 (631) 584-5492

 Received:
 04/18/17 6:55 PM

 Analysis Date:
 4/19/2017

 Collected:
 4/12/2017

Project: 16-35984 / Bethpage Admin & HS

Bethpage Admin & HS 10 Cherry Avenue Bethpage, NY 11714

Test Report: Radon in Air Test Results

Samples for EMSL Kit 165563

•		Radon Activity			Temperature	Humidity	
Liquid Scintillatio	on ID Location	pCi/L	Start	Stop	F	%	Sample Type
283928	Rm 002	0	4/12/2017	4/17/2017	72	30	Blank
381703842-0001			3:44:00 PM	8:05:00 AN	1		
Sample Notes:	Radon device exposed >96 hours						
283834	Rm 002	3.8	4/12/2017	4/17/2017	72	30	Customer
381703842-0002			3:44:00 PM	8:05:00 AN	I		
Sample Notes:	Radon device exposed >96 hours						

		Radon Activity	.	01	Temperature	Humidity %	Sample Ture
Liquid Scintiliatio	on ID Location	pCI/L	Start	Stop	F	70	Sample Type
283758	Rm 001	0.1	4/12/2017	4/17/2017	7 72	40	Blank
381703842-0003			3:45:00 PM	8:06:00 AN	1		
Sample Notes:	Radon device exposed >96 hours						
283724	Rm 001	1.9	4/12/2017	4/17/2017	7 72	40	Customer
381703842-0004			3:45:00 PM	8:06:00 AN	1		
Sample Notes:	Radon device exposed >96 hours						

Samples for EMSL Kit 165552 Radon Activity Temperature								
on ID Location	pCi/L	Start	Stop	F	%	Sample Type		
Rm 004	0	4/12/2017	4/17/2017	72	30	Blank		
		3:47:00 PM	8:07:00 AM					
Radon device exposed >96 hours								
Rm 004	1.2	4/12/2017	4/17/2017	72	30	Customer		
		3:47:00 PM	8:07:00 AM					
Radon device exposed >96 hours								
	MSL Kit 165552 on ID Location Rm 004 Radon device exposed >96 hours Rm 004 Radon device exposed >96 hours	MSL Kit 165552 Radon Activity pCi/L on ID Location pCi/L Rm 004 0 Radon device exposed >96 hours 1.2 Radon device exposed >96 hours 1.2	MSL Kit 165552 Radon Activity pCi/L Start n ID Location pCi/L Start Rm 004 0 4/12/2017 3:47:00 PM Radon device exposed >96 hours 4/12/2017 3:47:00 PM Rm 004 1.2 4/12/2017 3:47:00 PM Radon device exposed >96 hours 3:47:00 PM	MSL Kit 165552 Radon Activity pCi/L T on ID Location pCi/L Start Stop Rm 004 0 4/12/2017 4/17/2017 3:47:00 PM 8:07:00 AM Radon device exposed >96 hours 4/12/2017 4/17/2017 Rm 004 1.2 4/12/2017 4/17/2017 3:47:00 PM 8:07:00 AM 8:07:00 AM Radon device exposed >96 hours 3:47:00 PM 8:07:00 AM	MSL Kit 165552 Radon Activity pCi/L Temperature Start Temperature Stop Rm 004 0 4/12/2017 4/17/2017 72 Radon device exposed >96 hours 3:47:00 PM 8:07:00 AM 72 Rm 004 1.2 4/12/2017 4/17/2017 72 8:07:00 AM 3:47:00 PM 8:07:00 AM 72 Radon device exposed >96 hours 3:47:00 PM 8:07:00 AM 72 Radon device exposed >96 hours 4/12/2017 4/17/2017 72	MSL Kit 165552 Radon Activity pCi/L Temperature Start Temperature Stop Humidity % Rm 004 0 4/12/2017 4/17/2017 72 30 Radon device exposed >96 hours 3:47:00 PM 8:07:00 AM 20 Rm 004 1.2 4/12/2017 4/17/2017 72 30 Radon device exposed >96 hours 3:47:00 PM 8:07:00 AM 30 Radon device exposed >96 hours 3:47:00 PM 8:07:00 AM 30		



EMSL Analytical, Inc.

 200 Route 130 North, Cinnaminson, NJ 08077

 Phone/Fax:
 (800) 220-3675 / (856) 786-0327

 http://www.EMSL.com
 cinnaminsonradonlab@emsl.com

EMSL Order:381703842CustomerID:JCBR50CustomerPO:16-35984ProjectID:16-35984

Attn: Ed McGuire

J.C. Broderick & Associates 1775 Expressway Drive North Hauppauge, NY 11788

 Phone:
 (631) 584-5492

 Fax:
 (631) 584-5492

 Received:
 04/18/17 6:55 PM

 Analysis Date:
 4/19/2017

 Collected:
 4/12/2017

Project: 16-35984 / Bethpage Admin & HS

Bethpage Admin & HS 10 Cherry Avenue Bethpage, NY 11714

Test Report: Radon in Air Test Results

Samples for EMSL Kit 165554

		Radon Activity			Temperature	Humidity	
Liquid Scintillatio	on ID Location	pCi/L	Start	Stop	F	%	Sample Type
283848	Hall 014	0.04	4/12/2017	4/17/2017	74	30	Blank
381703842-0007			3:48:00 PM	8:03:00 AM	1		
Sample Notes:	Radon device exposed >96 hours						
283804	Hall 014	1.1	4/12/2017	4/17/2017	74	30	Customer
381703842-0008			3:48:00 PM	8:03:00 AM	1		
Sample Notes:	Radon device exposed >96 hours						

		Radon Activity	e	01	Temperature	Humidity %	Sample Ture
Liquid Scintiliatio	on ID Location	pCI/L	Start	Stop	F	70	Sample Type
283819	Rm 006	0.04	4/12/2017	4/17/2017	72	40	Blank
381703842-0009			3:49:00 PM	8:02:00 AM	l		
Sample Notes:	Radon device exposed >96 hours						
283802	Rm 006	2.6	4/12/2017	4/17/2017	72	40	Customer
381703842-0010			3:49:00 PM	8:02:00 AM	l		
Sample Notes:	Radon device exposed >96 hours						

Samples for E	MSL Kit 165565						
Liquid Scintillatic	on ID Location	Radon Activity pCi/L	Start	٦ Stop	emperature F	Humidity %	Sample Type
283770	Rm 007	0.1	4/12/2017	4/17/2017	74	20	Blank
381703842-0011			3:50:00 PM	8:01:00 AM			
Sample Notes:	Radon device exposed >96 hours						
283772	Rm 007	2.4	4/12/2017	4/17/2017	74	20	Customer
381703842-0012			3:50:00 PM	8:01:00 AM			
Sample Notes:	Radon device exposed >96 hours						



EMSL Analytical, Inc.

 200 Route 130 North, Cinnaminson, NJ 08077

 Phone/Fax:
 (800) 220-3675 / (856) 786-0327

 http://www.EMSL.com
 cinnaminsonradonlab@emsl.com

EMSL Order:381703842CustomerID:JCBR50CustomerPO:16-35984ProjectID:

Attn: Ed McGuire

J.C. Broderick & Associates 1775 Expressway Drive North Hauppauge, NY 11788

 Phone:
 (631) 584-5492

 Fax:
 (631) 584-5492

 Received:
 04/18/17 6:55 PM

 Analysis Date:
 4/19/2017

 Collected:
 4/12/2017

Project: 16-35984 / Bethpage Admin & HS

Bethpage Admin & HS 10 Cherry Avenue Bethpage, NY 11714

Test Report: Radon in Air Test Results

Samples for EMSL Kit 165556

•		Radon Activity			Temperature	Humidity	
Liquid Scintillatio	on ID Location	pCi/L	Start	Stop	F	%	Sample Type
283759	Rm 008	0	4/12/2017	4/17/2017	74	30	Blank
381703842-0013			3:50:00 PM	8:04:00 AM	1		
Sample Notes:	Radon device exposed >96 hours						
283822	Rm 008	1.9	4/12/2017	4/17/2017	74	30	Customer
381703842-0014			3:50:00 PM	8:04:00 AM	1		
Sample Notes:	Radon device exposed >96 hours						

-		Radon Activity			Temperature	Humidity	
Liquid Scintillatio	on ID Location	pCi/L	Start	Stop	F	%	Sample Type
283723	Rm 013A / B	0.04	4/12/2017	4/17/2017	72	30	Blank
381703842-0015			3:51:00 PM	7:59:00 AM			
Sample Notes:	Radon device exposed >96 hours						
283667	Rm 013A / B	1	4/12/2017	4/17/2017	72	30	Customer
381703842-0016			3:51:00 PM	7:59:00 AM			
Sample Notes:	Radon device exposed >96 hours						

Samples for E	MSL Kit 165569						
Liquid Scintillatio	on ID Location	Radon Activity pCi/L	Start	T Stop	emperature F	Humidity %	Sample Type
283757	Hall 013	0.04	4/12/2017	4/17/2017	72	30	Blank
381703842-0017			3:52:00 PM	7:58:00 AM			
Sample Notes:	Radon device exposed >96 hours						
283876	Hall 013	1.1	4/12/2017	4/17/2017	72	30	Customer
381703842-0018			3:52:00 PM	7:58:00 AM			
Sample Notes:	Radon device exposed >96 hours						



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EMSL Order:381703842CustomerID:JCBR50CustomerPO:16-35984ProjectID:16-35984

Attn: Ed McGuire

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 04/18/17 6:55 PM

 Analysis Date:
 4/19/2017

 Collected:
 4/12/2017

Project: 16-35984 / Bethpage Admin & HS

Bethpage Admin & HS 10 Cherry Avenue Bethpage, NY 11714

Test Report: Radon in Air Test Results

Samples for EMSL Kit 165570

•		Radon Activity			Temperature	Humidity	
Liquid Scintillatio	on ID Location	pCi/L	Start	Stop	F	%	Sample Type
283771	Rm 013D	0.04	4/12/2017	4/17/2017	7 70	40	Blank
381703842-0019			3:54:00 PM	7:59:00 AM	1		
Sample Notes:	Radon device exposed >96 hours						
283885	Rm 013D	1	4/12/2017	4/17/2017	70	40	Customer
381703842-0020			3:54:00 PM	7:59:00 AM	1		
Sample Notes:	Radon device exposed >96 hours						

Liquid Scintillatio	on ID Location	Radon Activity pCi/L	Start	Stop	Temperature F	Humidity %	Sample Type
283767	Rm 013E	0.04	4/12/2017	4/17/2017	7 74	30	Blank
381703842-0021			3:55:00 PM	8:00:00 AN	1		
Sample Notes:	Radon device exposed >96 hours						
283803	Rm 013E	0.9	4/12/2017	4/17/2017	7 74	30	Customer
381703842-0022			3:55:00 PM	8:00:00 AN	1		
Sample Notes:	Radon device exposed >96 hours						

Samples for EMSL Kit 165543											
Liquid Scintillatio	on ID Location	Radon Activity pCi/L	Start	Stop	Гетреrature F	Humidity %	Sample Type				
283827	HS Rm 013	0.2	4/12/2017	4/17/2017	70	70	Blank				
381703842-0023			4:08:00 PM	7:50:00 AM							
Sample Notes:	Radon device exposed >96 hours										
283873	HS Rm 013	3.9	4/12/2017	4/17/2017	70	70	Customer				
381703842-0024			4:08:00 PM	7:50:00 AM							
Sample Notes:	Radon device exposed >96 hours										



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EMSL Order:381703842CustomerID:JCBR50CustomerPO:16-35984ProjectID:16-35984

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Phone:	(631) 584-5492
Fax:	
Received:	04/18/17 6:55 PM
Analysis Date:	4/19/2017
Collected:	4/12/2017

Project: 16-35984 / Bethpage Admin & HS

Bethpage Admin & HS 10 Cherry Avenue Bethpage, NY 11714

Test Report: Radon in Air Test Results

Samples for EMSL Kit 165542

		Radon Activity			Temperature	Humidity	
Liquid Scintillatio	on ID Location	pCi/L	Start	Stop	F	%	Sample Type
283749	HS Rm 013A	0.4	4/12/2017	4/17/2017	72	70	Blank
381703842-0025			4:08:00 PM	7:42:00 AM			
Sample Notes:	Radon device exposed >96 hours						
283845	HS Rm 013A	0.5	4/12/2017	4/17/2017	72	70	Customer
381703842-0026			4:08:00 PM	7:42:00 AM			
Sample Notes:	Radon device exposed >96 hours						

Liquid Scintillatic	on ID Location	Radon Activity pCi/L	Start	Stop	Temperature F	Humidity %	Sample Type
283811	HS Rm 013B	0.4	4/12/2017	4/17/2017	7 70	70	Blank
381703842-0027			4:10:00 PM	7:43:00 AN	1		
Sample Notes:	Radon device exposed >96 hours						
283823	HS Rm 013B	0.7	4/12/2017	4/17/2017	7 70	70	Customer
381703842-0028			4:10:00 PM	7:43:00 AN	1		
Sample Notes:	Radon device exposed >96 hours						

Radon Activity pCi/L 0.1	Start	T Stop	emperature F	Humidity %	Sample Type
0.1	4/10/0017				
	4/12/2017	4/17/2017	72	60	Blank
	4:12:00 PM	7:52:00 AM			
0.6	4/12/2017	4/17/2017	72	60	Customer
	4:12:00 PM	7:52:00 AM			
	0.6	0.6 4/12/2017 4:12:00 PM	0.6 4/12/2017 4/17/2017 4:12:00 PM 7:52:00 AM	0.6 4/12/2017 4/17/2017 72 4:12:00 PM 7:52:00 AM	0.6 4/12/2017 4/17/2017 72 60 4:12:00 PM 7:52:00 AM



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EMSL Order: 381703842 CustomerID: JCBR50 CustomerPO: 16-35984 ProjectID:

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 04/18/17 6:55 PM

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 4/19/2017
 Collected:

Project: 16-35984 / Bethpage Admin & HS

Bethpage Admin & HS 10 Cherry Avenue Bethpage, NY 11714

Test Report: Radon in Air Test Results

Samples for EMSL Kit 165546

•		Radon Activity			Temperature	Humidity	
Liquid Scintillatio	on ID Location	pCi/L	Start	Stop	F	%	Sample Type
283727	HS Rm 013D	0.1	4/12/2017	4/17/2017	72	60	Blank
381703842-0031			4:14:00 PM	7:53:00 AM	I		
Sample Notes:	Radon device exposed >96 hours						
283806	HS Rm 013D	1.7	4/12/2017	4/17/2017	72	60	Customer
381703842-0032			4:14:00 PM	7:53:00 AM	I		
Sample Notes:	Radon device exposed >96 hours						

Samples for EMSL Kit 165540

Liquid Scintillatio	on ID Location	Radon Activity pCi/L	Start	Stop	Temperature F	Humidity %	Sample Type
		F = " =	otart	op	-		1 51
283812	HS Hall 0006	0.04	4/12/2017	4/17/2017	7 74	30	Blank
381703842-0033			4:17:00 PM	7:47:00 AN	Λ		
Sample Notes:	Radon device exposed >96 hours						
283930	HS Hall 0006	2.4	4/12/2017	4/17/2017	7 74	30	Customer
381703842-0034			4:17:00 PM	7:47:00 AN	1		
Sample Notes:	Radon device exposed >96 hours						

Samples for EMSL Kit 165541 Humidity Radon Activity Temperature % Liquid Scintillation ID pCi/L Stop F Sample Type I ocation Start 283867 HS Hall 0010A 0.04 4/12/2017 4/17/2017 30 Blank 72 381703842-0035 4:19:00 PM 7:41:00 AM Radon device exposed >96 hours Sample Notes: HS Hall 0010A 283926 1 4/12/2017 4/17/2017 72 30 Customer 381703842-0036 4:19:00 PM 7:41:00 AM Sample Notes: Radon device exposed >96 hours

The radon test was performed using a liquid scintillation radon detector/s and counted on a liquid scintillation counter using approved EPA testing protocols for Radon in Air testing. The EPA recommends fixing your home if the average of two short-term tests taken in the lowest lived-in level of the home show radon levels that are equal to or greater than 4.0pCi/L. The EPA recommends retesting your home every two years.

Please contact EMSL Analytical, Inc. or your State Health Department for further information.

All procedures used for generating this report are in complete accordance with the current EPA protocols for the analysis of Radon in Air.

Report Note

EMSL
SM

EMSL Analytical, Inc. 200 Route 130 North, Cinnaminson, NJ 08077

Phone/Fax: (800) 220-3675 / (856) 786-0327 http://www.EMSL.com cinnaminsonradonlab@emsl.com EMSL Order: 381703842 CustomerID: JCBR50 CustomerPO: 16-35984 ProjectID:

Attn: Ed McGuire J.C. Broderick & Associates

J.C. Broderick & Associates 1775 Expressway Drive North Hauppauge, NY 11788

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 Received:
 04/18/17 6:55 PM

 Analysis Date:
 4/19/2017

 Collected:
 4/12/2017

Project: 16-35984 / Bethpage Admin & HS

Test Site: Bethpage Admin & HS 10 Cherry Avenue Bethpage, NY 11714

Test Report: Radon in Air Test Results

Analyst(s)

Racquel Hafiz (36)

Y runal frumar Perro Ma

Laura Freeman, Radon Laboratory Manager & Peixue Ma, Ph.D, NJ Radon Measurement Specialist NJ MES 13502

In no event shall EMSL be liable for indirect, special, consequential, or incidental damages, including, but not limited to, damages for loss of profit or goodwill regardless of the negligence (either sole or concurrent) of EMSL, and whether EMSL has been informed of the possibility of such damages, arising out of or in connection with EMSL's services thereunder or the delivery, use, reliance upon or interpretation of test results by client or any third party. We accept no legal responsibility for the purposes for which the client uses the test results. In no event shall EMSL be liable to a client or any third party, whether based upon theories of tort, contract or any other legal or equitable theory, in excess of the amount paid to EMSL by client thereunder. The test results meets all NELAC requirements unless otherwise specified.

Samples analyzed by EMSL Analytical, Inc. Cinnaminson, NJ Accreditations: NRSB ARL6006, NJ DEP 03036, MEB 92525, PA 2573, IN 00455, IA L00032, RI RAS-024, ME 20200C, NE RMB-1083, NY ELAP 10872, NM 885-10L, FL RB2034, OH RL-39, NRPP #106178AL, KS-LB-0005, IL RNL2008202.

Initial report from 04/25/2017 16:12:27

Please visit <u>www.radontestinglab.com</u>

Massapequa Water District (MWD), 2013. H2M Analytical Radium results from 6/27/2013. July

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575 Broad Hollow Rd. , Melville, NY 11747 TEL: (631) 694-3040 FAX: (631) 420-8436 NYSDOH ID#10478

LABORATORY RESULTS

Results for the samples and analytes requested The lab is not directly responsible for the integrity of the sample before receipt at the lab and is responsible only for the certified tests requested Sample Information: Type : Groundwater Origin: Raw Well

Special

	receipt at the lab and is responsible only for the certified tests requested.
MASSAPEQUA W.D.	
84 GRAND AVE.	Lab No. :1306G69-001
MASSAPEQUA, NY 11758	Client Sample ID. : Monitoring Well 102T2D2
Attn To: Stan Carey	
Federal ID : 2902837	Monitoring Well 102T2D2
Collected : 06/27/2013 3:00 PM Point No	r.
Received : 06/28/2013 10:30 AM Location	:
Collected By : AC99	

Analytical Method: E900.0 :					<u>Analyst:</u> Sub
<u>Parameter(s)</u>	Results Qualifier	<u>D.F.</u> <u>Units</u>	<u>Limit</u>	Analyzed:	Container:
Gross Alpha (See Attached)	-0.810	1 pCi/L	15	07/12/2013	Container-01 of 03
Analytical Method: E903.1 :					Analyst: Sub
<u>Parameter(s)</u>	Results Qualifier	<u>D.F.</u> <u>Units</u>	<u>Limit</u>	Analyzed:	Container:
Radium-226 (See Attached)	0.181	1 pCi/L		07/18/2013	Container-01 of 03
Analytical Method: E904.0 :					Analyst: Sub
Parameter(s)	Results Qualifier	<u>D.F.</u> <u>Units</u>	<u>Limit</u>	Analyzed:	Container:
Radium-228 (See Attached)	0.653	1 pCi/L		07/17/2013	Container-01 of 03

Qualifiers: E = Value above quantitation range, Value estimated. B = Found in Blank

D.F. = Dilution Factor D = Results for Dilution

H = Received/analyzed outside of analytical holding time

+ = ELAP / NELAC does not offer certification for this analyte

c = Calibration acceptability criteria exceeded for this analyte

r = Reporting limit > MDL and < LOQ, Value estimated.

J = Estimated value - below calibration range

D = Estimated value - below calibration range

S = Recovery exceeded control limits for this analyte

N = Indicates presumptive evidence of compound Result(s) reported meet(s) NYS Regulatory Limit(s).

Result(s) flagged with 🙀 Exceed NYS Regulatory Limit(s). Limit A:

Joann M. Slavin

Laboratory Manager

Test results meet the requirements of NELAC unless otherwise noted.

This report shall not be reproduced except in full, without the written approval of the laboratory.



575 Broad Hollow Rd. , Melville, NY 11747 TEL: (631) 694-3040 FAX: (631) 420-8436 NYSDOH ID#10478

LABORATORY RESULTS

Results for the samples and analytes requested The lab is not directly responsible for the integrity of the sample before receipt at the lab and is responsible only for the certified tests requested Sample Information: Type : Groundwater Origin: Raw Well

Special

	receipt at the lab and is responsible only for the certified tests requested.		
MASSAPEQUA W.D.			
84 GRAND AVE.	Lab No. :1306G69-002		
MASSAPEQUA, NY 11758	Client Sample ID. : Monitoring Well TT-102D1		
Attn To: Stan Carey			
Federal ID : 2902837	Monitoring Well TT-102D1		
Collected : 06/27/2013 6:21 PM Point No	D:		
Received : 06/28/2013 10:30 AM Location	1.		
Collected By : AC99			

Analytical Method: E900.0 :					Analyst: Sub
Parameter(s)	Results Qualifier	<u>D.F. Units</u>	<u>Limit</u>	Analyzed:	Container:
Gross Alpha (See Attached)	0.252	1 pCi/L	15	07/12/2013	Container-01 of 03
Analytical Method: E903.1 :					Analyst: Sub
Parameter(s)	Results Qualifier	<u>D.F.</u> <u>Units</u>	<u>Limit</u>	Analyzed:	Container:
Radium-226 (See Attached)	0.520	1 pCi/L		07/18/2013	Container-01 of 03
Analytical Method: E904.0 :					Analyst: Sub
<u>Parameter(s)</u>	Results Qualifier	<u>D.F. Units</u>	<u>Limit</u>	Analyzed:	Container:
Radium-228 (See Attached)	1.56	1 pCi/L		07/12/2013	Container-01 of 03

Qualifiers: E = Value above quantitation range, Value estimated. B = Found in Blank

D.F. = Dilution Factor D = Results for Dilution

H = Received/analyzed outside of analytical holding time

+ = ELAP / NELAC does not offer certification for this analyte

c = Calibration acceptability criteria exceeded for this analyte

r = Reporting limit > MDL and < LOQ, Value estimated.

J = Estimated value - below calibration range

C = Deservery evene ded control limits for this and

S = Recovery exceeded control limits for this analyte

N = Indicates presumptive evidence of compound Result(s) reported meet(s) NYS Regulatory Limit(s).

Result(s) flagged with 🖌 Exceed NYS Regulatory Limit(s). Limit Regel A-62

Joann M. Slavin

Laboratory Manager

Test results meet the requirements of NELAC unless otherwise noted.

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Northrop Grumman Corporation (NGC), 2013. Email Regarding Preliminary Split Sampling Lab Results for Radiological Parameters in Groundwater Monitoring Well Samples Collected 4 and 5 June 2013, Bethpage, NY, Admin Record N90845.AR.002014. June. This page is intentionally left blank.
Steven Scharf - Preliminary Ground Water Results Split with BWD

From:	"Hannon, ED (AS)" <edward.hannon@ngc.com></edward.hannon@ngc.com>
To:	"Steven Scharf <sxscharf@gw.dec.state.ny.us>(sxscharf@gw.dec.state.ny.us</sxscharf@gw.dec.state.ny.us>
Date:	6/20/2013 4:32 PM
Subject:	Preliminary Ground Water Results Split with BWD
CC:	"Hannon, ED (AS)" <edward.hannon@ngc.com>, "Weber, Fred (AS)" <fred.webe< th=""></fred.webe<></edward.hannon@ngc.com>

Gentlemen

Below please find **preliminary** lab results for groundwater monitoring well samples collected by Northrop Grumman and split with the Bethpage Water District on June 4 and 5, 2013. The final quality control report is expected to be available late next week. We will submit the report, when it becomes available. Also, quality control is being performed on samples that were analyzed for a broader range of constituents (including Nassau County Department of Health Water Quality Monitoring parameters, 1,4 – dioxane, chromium's). We expect to have those results ready for submission next week, as well.

Let me know if you have any questions or require any additional information.

Thank You Ed Hannon

"Preliminary Split Sampling Lab Results"

Well ID	Parameter	Method	Act ± Unc (MDC) ¹	Units ²
	Gross Alpha	EPA 900.0m	3.12 ± 1.56 (2.10)	pCi/L
MW-116-5	Gross Beta	EPA 900.0m	2.54 ± 1.33 (2.24)	pCi/L
	Radium-226	EPA 903.1	1.06 ± 0.709 (0.879)	pCi/L
	Radium-228	EPA 904.0	0.421 ± 0.394 (0.805)	pCi/L
	Total Uranium	ASTM D5174.97	0.0447 ± 0.0011 (0.197)	ug/L
	Gross Alpha	EPA 900.0m	3.04 ± 1.48 (1.58)	pCi/L
	Gross Beta	EPA 900.0m	2.37 ± 1.30 (2.22)	pCi/L
GM-37D2	Radium-226	EPA 903.1	1.00 ± 0.634 (0.716)	pCi/L
	Radium-228	EPA 904.0	0.963 ± 0.412 (0.662)	pCi/L
	Total Uranium	ASTM D5174.97	0.0452 ± 0.0009 (0.197)	ug/L
	Gross Alpha	EPA 900.0m	5.43 ± 2.15 (1.89)	pCi/L
	Gross Beta	EPA 900.0m	2.89 ± 1.44 (2.34)	pCi/L
GM-71D2	Radium-226	EPA 903.1	2.28 ± 1.01 (0.729)	pCi/L
	Radium-228	EPA 904.0	1.14 ± 0.511 (0.897)	pCi/L
	Total Uranium	ASTM D5174.97	0.134 ± 0.0023 (0.197)	ug/L

Note 1: Act = Activity Unc = Uncertainty (MDC) = Minimum Detectable Concentration Note 2: pCi/L = picocuries/Liter ug/L = micrograms/Liter Resolution, 2016c. Lab Results for April 14 through 20, 2016 Sample Event, Project #60266589 Phase FI.WS. SDG: 395851 and 395751. May. NOT YET PUBLISHED This page is intentionally left blank.

Certificate of Analysis

Company : Address :	Katahdin 600 Tech	Analytical Servation	ices									
ridaress .							-			10		
	Scarboro	ugh, Maine 0407	/4				Rep	ort Date:	Ma	ıy 10,	, 2016	
Contact:	Ms. Jenn	ifer Obrin										
Project:	NWIRP	Bethpage Project	t # 60266589 Ph	nase FI.WS								
Client Sample Sample ID: Matrix: Collect Date: Receive Date: Collector:	E ID: TT3 395 Gro 18- 20- Clie	805D-GW-0413 751001 pund Water APR-16 APR-16 ent	816			Project: Client II	KATA D: KATA	A00116 A003				
Parameter	Qualif	ier Result	Uncertainty	MDC	TPU	RL	Units D	F Analyst	Date 7	lime	Batch	Mtd.
Rad Alpha Spec Ana	alysis wid "As Poor	inad"										
Thorium-228	<i>uu As Kece</i>	U 0.0874	+/-0 173	0.293	+/-0 174	0.500	nCi/I	KYB2	05/05/16 2	214	1562055	1
Thorium-220		U 0.0074	+/-0.175	0.298	+/-0.174	0.500	pCi/L	KAD2	05/05/10 2	-217	1502055	1
Thorium-232		U 0.100	+/-0.147	0.183	+/-0.149	0.500	pCi/L pCi/L					
Alphaspec U. Liau	id "As Recei	ived"					r					
Uranium-233/234	115 110000	0.566	+/-0.313	0.242	+/-0.323	0.500	pCi/L	KXB2	05/05/16 0)917	1562056	2
Uranium-235/236		U 0.135	+/-0.195	0.235	+/-0.196	0.500	pCi/L					
Uranium-238		0.228	+/-0.207	0.190	+/-0.210	0.500	pCi/L					
Rad Gas Flow Prop	ortional Co	unting										
Radium-228 in Dr	inking Water	r EPA 904.0 "As	Received"									
Radium-228		1.26	+/-0.449	0.554	+/-0.493	1.00	pCi/L	AXM6	05/10/16 1	317	1562314	3
Rad Radium-226	inkina Wata	r FPA 003 1 (Da	-omanati "As Ri	acaivad"								
Radium-220 in Dif	πκίης νίαιει	1 32	+/-0 315	0 264	+/-0 367	1.00	pCi/L	I XP1	04/29/16 1	000	1561456	4
Radium 220		1.52	17 0.515	0.201	17 0.007	1.00	PerE	L211 1	01/20/10 1	000	1501 150	
The following Analy	tical Metho	ods were perform	med									
Method D	escription											
1 D	OE EML HA	SL-300, Th-01-RC	C Modified									
2 D	OE EML HA	SL-300, U-02-RC	Modified									
3 E	PA 904.0/ EP	A 9320										
4 E	PA 903.1											
Surrogate/Tracer F	Recovery	Test					Batch II	Recover	ry% Ac	cepta	ıble Lim	its
Thorium-229 Tra			1562055	91	.3	(30%)	-110%)					
Uranium-232 Tra			1562056	92	.4	(30%)	-110%)					
Barium Carrier		Radium-22	8 in Drinking W	Vater EPA 904.0	"As Received"		1562314	96	.5	(30%)	-110%)	
Yttrium Carrier Radium-228 in Drinking Water EPA 904.0 "As Received"							1562314	81	.7	(30%-	-110%)	

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Certificate of Analysis

Company : Address :	Katahdin Analytical Services 600 Technology Way	
	Scarborough, Maine 04074	Report Date: May 10, 2016
Contact:	Ms. Jennifer Obrin	
Project:	NWIRP Bethpage Project # 60266589 Phase FI.WS	
Client Sample Sample ID:	e ID: TT305D-GW-041816 395751001	Project: KATA00116 Client ID: KATA003
Parameter	Qualifier Result Uncertainty MDC	TPU RL Units DF Analyst Date Time Batch Mtd.
Surrogate/Tracer I	Recovery Test	Batch ID Recovery% Acceptable Limits

Notes:

The MDC is a sample specific MDC.

Company : Address :	Katahdin Ana 600 Technolog	lytical Servi gy Way	ices										
	Scarborough,	Maine 0407	4				R	eport	Date:	N	Aay 10	, 2016	
Contact:	Ms. Jennifer (Obrin											
Project:	NWIRP Beth	page Project	# 60266589 Pł	ase FI.WS									
Client Sample Sample ID: Matrix: Collect Date: Receive Date: Collector:	ID: TT312S 3957510 Ground 18-APR 20-APR Client	-GW-0418 002 Water 16 16	316			Project: Client II	KA D: KA	TA00 TA00)116)3				
Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	DF A	Analyst	Date	Time	Batch	Mtd.
Rad Alpha Spec Anal Alphaspec Th, Liqua Thorium-228	lysis id "As Received" U	-0.0182	+/-0.124	0.303	+/-0.125	0.500	pCi/L	I	KXB2	05/05/16	2214	1562055	1
Thorium-230	U	-0.0128	+/-0.113	0.273	+/-0.114	0.500	pCi/L						
Thorium-232	U	-0.00198	+/-0.0809	0.150	+/-0.0813	0.500	pCi/L						
Alphaspec U, Liquid	d "As Received"												
Uranium-233/234		0.215	+/-0.182	0.201	+/-0.184	0.500	pCi/L	I	KXB2	05/05/16	0917	1562056	5 2
Uranium-235/236	U	0.104	+/-0.150	0.181	+/-0.151	0.500	pCi/L						
Uranium-238		0.244	+/-0.180	0.0915	+/-0.183	0.500	pC1/L						
Rad Gas Flow Propo Radium-228 in Driv	rtional Countin	ו g ג 10 <i>04 ח</i> "ג כ	Received"										
Radium-228	U	0.281	+/-0.420	0.721	+/-0.422	1.00	pCi/L	A	AXM6	05/10/16	1317	1562314	. 3
Rad Radium-226	-						I						
Radium-226 in Drin	iking Water EPA	A 903.1 (De-	-emanati "As Re	eceived"									
Radium-226	U	0.068	+/-0.149	0.275	+/-0.149	1.00	pCi/L]	LXP1	04/29/16	1000	1561456	4
The following Analyt	tical Methods w	vere perform	ned										
Method De	escription	-											
1 DC	DE EML HASL-30	00, Th-01-RC	Modified										
2 DC	DE EML HASL-30	00, U-02-RC	Modified										
3 EP	A 904.0/ EPA 932	20											
4 EP	A 903.1												
Surrogate/Tracer Ro	ecovery T	Test					Batch	ID F	Recover	ry% A	Accept	able Lin	nits
Thorium-229 Trace	er	Alphaspec '	Th, Liquid "As	Received"			15620	55	71	.3	(30%	-110%)	
Uranium-232 Trace	er	Alphaspec	U, Liquid "As F	Received"			15620	56	91	.3	(30%	-110%)	
Barium Carrier		.0 "As Received"		15623	14	98	.8	(30%	-110%)				
Yttrium Carrier Radium-228 in Drinking Water EPA 904.0 "As Received"								14	93	.5	(30%	-110%)	

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Certificate of Analysis

Company : Address :	Katahdin Analytical Services 600 Technology Way	
	Scarborough, Maine 04074	Report Date: May 10, 2016
Contact:	Ms. Jennifer Obrin	
Project:	NWIRP Bethpage Project # 60266589 Phase FI.WS	
Client Sample Sample ID:	e ID: TT312S-GW-041816 395751002	Project: KATA00116 Client ID: KATA003
Parameter	Qualifier Result Uncertainty MDC	TPU RL Units DF Analyst Date Time Batch Mtd.
Surrogate/Tracer I	Recovery Test	Batch ID Recovery% Acceptable Limits

Notes:

The MDC is a sample specific MDC.

Company : Address :	Katahdin Ana 600 Technolo	llytical Servi gy Way	ices									
	Scarborough,	Maine 0407	4				R	eport Dat	e:	May 10	, 2016	
Contact:	Ms. Jennifer (Obrin								•		
Project:	NWIRP Beth	page Project	# 60266589 Ph	ase FI.WS								
Client Sample Sample ID: Matrix: Collect Date: Receive Date: Collector:	ID: TT312I 3957510 Ground 18-APR 20-APR Client	-GW-0418 003 Water 2-16 2-16	16			Project: Client II	KA' D: KA'	TA00110 TA003	ý			
Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	DF Anal	yst Da	te Time	Batch	Mtd.
Rad Alpha Spec Anal Alphaspec Th, Liqua Thorium-228	lysis id "As Received U	-0.0244	+/-0.109	0.276	+/-0.109	0.500	pCi/L	KXB	2 05/05/	16 2214	1562055	5 1
Thorium-230	U	0.0631	+/-0.174	0.323	+/-0.176	0.500	pCi/L					
Thorium-232	U	-0.000588	+/-0.103	0.233	+/-0.104	0.500	pCi/L					
Alphaspec U, Liquid	d "As Received"	,										
Uranium-233/234		0.321	+/-0.226	0.230	+/-0.230	0.500	pCi/L	KXB	2 05/05/	16 0917	1562056	5 2
Uranium-235/236	U	0.152	+/-0.180	0.194	+/-0.181	0.500	pCi/L					
Uranium-238		0.190	+/-0.186	0.230	+/-0.187	0.500	pCı/L					
Rad Gas Flow Propor	rtional Countin	1g A 004 0 "As	Pagainad"									
Radium-228 in Drin	iking water ELT	0 400	+/-0 381	0.628	+/-0 387	1.00	pCi/L	AXN	6 05/10/	16 1317	1562314	13
Rad Radium-226	6	0.100	17 0.501	0.020	17 0.507	1.00	perE	1111	0 05/10/	10 1517	150251	
Radium-226 in Drin	iking Water EPA	A 903.1 (De-	emanati "As Re	ceived"								
Radium-226	0	0.478	+/-0.217	0.266	+/-0.234	1.00	pCi/L	LXP	1 04/29/	16 1000	1561456	i 4
The following Analyt	ical Methods w	vere nerforn	ned									
Method De	escription	ere periori										
1 DC	DE EML HASL-3	00, Th-01-RC	Modified									
2 DC	DE EML HASL-3	00, U-02-RC	Modified									
3 EP	A 904.0/ EPA 93	20										
4 EP	A 903.1											
Surrogate/Tracer Ro	ecovery 7	ſest					Batch	ID Reco	overy%	Accept	able Lin	nits
Thorium-229 Tracer Alphaspec Th Liquid "As Received"							15620	55	82.6	(30%	-110%)	
Uranium-232 Trace	er	Alphaspec	U, Liquid "As F	Received"			15620	56	87.4	(30%	-110%)	
Barium Carrier	.0 "As Received"		15623	14	97.4	(30%	-110%)					
Yttrium Carrier Radium-228 in Drinking Water EPA 904.0 "As Received"								14	94.2	(30%	-110%)	

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Certificate of Analysis

Company : Address :	Katahdin Analytical Services 600 Technology Way	
	Scarborough, Maine 04074	Report Date: May 10, 2016
Contact:	Ms. Jennifer Obrin	
Project:	NWIRP Bethpage Project # 60266589 Phase FI.WS	
Client Sample Sample ID:	e ID: TT312I-GW-041816 395751003	Project: KATA00116 Client ID: KATA003
Parameter	Qualifier Result Uncertainty MDC	TPU RL Units DF Analyst Date Time Batch Mtd.
Surrogate/Tracer 1	Recovery Test	Batch ID Recovery% Acceptable Limits

Notes:

The MDC is a sample specific MDC.

Company : Address :	Katahdin Analy 600 Technology	vtical Servi y Way	ices										
	Scarborough, M	faine 0407	4]	Repo	rt Date:	N	May 10	, 2016	
Contact:	Ms. Jennifer Ob	orin						1			5	, ,	
Project:	NWIRP Bethna	ge Project	# 60266589 Ph	ase FI WS									
Client Sample I Sample ID: Matrix: Collect Date: Receive Date: Collector:	ID: TT307D- 39575100 Ground V 15-APR-1 20-APR-1 Client	GW-0415)4 Vater 16 16	516			Project: Client II	KA D: KA	ATA(ATA(00116 003				
Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
Rad Alpha Spec AnalAlphaspec Th, LiquiThorium-228Thorium-230Thorium-232Alphaspec U, LiquiaUranium-233/234Uranium-235/236Uranium-238Rad Gas Flow ProporRadium-228Rad Gas Gas Flow ProporRadium-228Rad Radium-226Partime 226 in Drin	ysis d "As Received" U U U "As Received" U U tional Counting king Water EPA U	0.101 0.146 0.0972 0.359 0.0911 0.0596 904.0 "As 0.261	+/-0.146 +/-0.189 +/-0.143 +/-0.216 +/-0.145 +/-0.119 Received" +/-0.260	0.177 0.279 0.178 0.179 0.200 0.193 0.422	+/-0.147 +/-0.193 +/-0.144 +/-0.221 +/-0.145 +/-0.119 +/-0.263	0.500 0.500 0.500 0.500 0.500 0.500 1.00	pCi/L pCi/L pCi/L pCi/L pCi/L pCi/L		KXB2 KXB2 AXM6	05/05/16 05/05/16 05/10/16	0917	1562055 1562056 1562314	1
Radium-220 in Drin Radium-226	ting water LPA	0.194	+/-0.180	0 285	+/-0.183	1.00	pCi/L		LXP1	04/29/16	1000	1561456	4
The following AnalytiMethodDesign (Control of the second	ical Methods we scription	re perforn	ned				POLL				1000		· •
1 D0	E EML HASL-300	, Th-01-RC	Modified										
2 DO	E EML HASL-300	, U-02-RC	Modified										
3 EP.	A 904.0/ EPA 9320												
4 EPA	A 903.1												
Surrogate/Tracer Re	covery Te	st					Batch	ı ID	Recove	ry% A	Accepta	able Lin	nits
Thorium-229 Trace	er A	Iphaspec 7	Th, Liquid "As]	Received"			1562	055	81	1.7	(30%	-110%)	
Uranium-232 Trace	er A	Alphaspec 1	U, Liquid "As R	eceived"			1562	056	93	3.8	(30%	-110%)	
Barium Carrier	.0 "As Received"		1562314 99.4 (30%-11			-110%)							
Yttrium Carrier	Yttrium Carrier Radium-228 in Drinking Water EPA 904.0 "As Received"									5.3	(30%	-110%)	

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Certificate of Analysis

Company : Address :	Katahdin Analytical Services 600 Technology Way	
	Scarborough, Maine 04074	Report Date: May 10, 2016
Contact:	Ms. Jennifer Obrin	
Project:	NWIRP Bethpage Project # 60266589 Phase FI.WS	
Client Sample Sample ID:	e ID: TT307D-GW-041516 395751004	Project: KATA00116 Client ID: KATA003
Parameter	Qualifier Result Uncertainty MDC	TPU RL Units DF Analyst Date Time Batch Mtd.
Surrogate/Tracer I	Recovery Test	Batch ID Recovery% Acceptable Limits

Notes:

The MDC is a sample specific MDC.

Company : Address :	Katahdin Anal 600 Technolog	ytical Servi gy Way	ices										
	Scarborough, I	Maine 0407	4				I	Repor	rt Date:	Ν	Aay 10	, 2016	
Contact:	Ms. Jennifer C	brin						.1.				,	
Project:	NWIRP Bethn	age Project	# 60266589 Ph	ase FI WS									
Client Sample I Sample ID: Matrix: Collect Date: Receive Date: Collector:	ID: TT306D 3957510 Ground 18-APR- 20-APR- Client	-GW-0418 05 Water -16 -16	316			Project: Client II	KA D: KA	ATA(ATA(00116 003				
Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
Rad Alpha Spec Anal Alphaspec Th, Liqui Thorium-228 Thorium-230 Thorium-232 Alphaspec U, Liquia Uranium-233/234 Uranium-235/236 Uranium-238 Rad Gas Flow Propor Radium-228 in Drin Radium-228	ysis id "As Received" U U U t "As Received" U U rtional Countin king Water EPA	0.0376 -0.0248 -0.0287 0.352 0.0516 0.156 g .904.0 "As 1.43	+/-0.106 +/-0.106 +/-0.0807 +/-0.233 +/-0.142 +/-0.173 <i>Received</i> " +/-0.585	0.123 0.273 0.230 0.229 0.246 0.229 0.840	+/-0.107 +/-0.106 +/-0.0811 +/-0.238 +/-0.142 +/-0.174 +/-0.630	0.500 0.500 0.500 0.500 0.500 0.500 1.00	pCi/L pCi/L pCi/L pCi/L pCi/L pCi/L		KXB2 KXB2 AXM6	05/05/16 05/05/16 05/10/16	2214 0917 1317	1562055 1562056 1562314	1
Radium-226 in Drin	king Water EPA	903.1 (De-	-emanati "As Re	ceived"									
Radium-226		0.810	+/-0.297	0.327	+/-0.324	1.00	pCi/L		LXP1	04/29/16	1000	1561456	6 4
The following AnalytiMethodDetermine	ical Methods was	ere perforr	ned										
1 DO	DE EML HASL-30	0, Th-01-RC	Modified										
2 DO	DE EML HASL-30	0, U-02-RC	Modified										
3 EP.	A 904.0/ EPA 932	0											
4 EPA	A 903.1												
Surrogate/Tracer Re	ecovery T	est					Batch	n ID	Recove	ry% A	ccept	able Lin	nits
Thorium-229 Trace	er .	Alphaspec '	Th, Liquid "As	Received"			1562	055	74	1.4	(30%	-110%)	
Uranium-232 Trace			1562	056	95	5.7	(30%	-110%)					
Barium Carrier		.0 "As Received"		1562314 95.6 (30%-11			-110%)						
Yttrium Carrier	Yttrium Carrier Radium-228 in Drinking Water EPA 904.0 "As Received"								1562314 85.1 (30%-110%)				

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Certificate of Analysis

Company : Address :	Katahdin Analytical Services 600 Technology Way	
	Scarborough, Maine 04074	Report Date: May 10, 2016
Contact:	Ms. Jennifer Obrin	
Project:	NWIRP Bethpage Project # 60266589 Phase FI.WS	
Client Sample Sample ID:	e ID: TT306D-GW-041816 395751005	Project: KATA00116 Client ID: KATA003
Parameter	Qualifier Result Uncertainty MDC	TPU RL Units DF Analyst Date Time Batch Mtd.
Surrogate/Tracer I	Recovery Test	Batch ID Recovery% Acceptable Limits

Notes:

The MDC is a sample specific MDC.

Company : Address :	Katahdin Ana 600 Technolo	ulytical Servi ogy Way	ices								
110010001	Scarborough.	Maine 0407	74				Ren	ort Date.	May 10	2016	
Contact:	Ms Jennifer (Obrin					Rep	on Dute.	May 10	, 2010	
Project:	NWIDD Doth	naga Project	+ # 60266580 Dh	asa EI WS							
			t # 00200389 FII	lase F1. w 5				00115			
Client Sample I Sample ID: Matrix: Collect Date: Receive Date: Collector:	ID: EB01-0 3957510 Ground 15-APR 20-APR Client	41516 006 Water 2-16 2-16				Project: Client II	KATA D: KATA	A00116 A003			
Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units D	F Analyst	Date Time	Batch	Mtd.
Rad Alpha Spec Anal Alphaspec Th, Liqui Thorium-228	ysis id "As Received 11	0.0113	+/-0 120	0.252	+/-0 121	0.500	pCi/L	KXB2 ()	5/05/16 2214	1562055	1
Thorium-230	U	0.0115	+/-0.165	0.343	+/-0.166	0.500	pCi/L	KAD2 0	5/05/10 2211	1002000	1
Thorium-232	U	-0.00198	+/-0.0811	0.150	+/-0.0815	0.500	pCi/L				
Alphaspec U, Liquid	d "As Received"	,									
Uranium-233/234	U	0.0211	+/-0.156	0.320	+/-0.156	0.500	pCi/L	KXB2 0	5/05/16 0917	1562056	5 2
Uranium-235/236	U	0.143	+/-0.181	0.225	+/-0.182	0.500	pCi/L				
Uranium-238	U	0.0921	+/-0.149	0.231	+/-0.150	0.500	pCi/L				
Rad Gas Flow Propor Radium-228 in Drin	rtional Countin king Water EPA	ng A 904.0 "As	Received"								
Radium-228	U	-0.119	+/-0.269	0.555	+/-0.269	1.00	pCi/L	AXM6 0	5/10/16 1317	1562314	. 3
Rad Radium-226											
Radium-226 in Drin	king Water EP	A 903.1 (De-	-emanati "As Re	ceived"							
Radium-226	U	-0.0341	+/-0.0819	0.210	+/-0.0819	1.00	pC1/L	LXP1 0	4/29/16 1000	1561456	9 4
The following Analyt	ical Methods v	vere perfori	med								
Method De	scription										
1 DC	E EML HASL-3	00, Th-01-RC	C Modified								
2 DO	E EML HASL-3	00, U-02-RC	Modified								
3 EP.	A 904.0/ EPA 93	20									
4 EP.	A 903.1										
Surrogate/Tracer Re	ecovery 7	ſest					Batch II	Recovery	y% Accepta	able Lin	nits
Thorium-229 Trace	er	Alphaspec '	Th, Liquid "As	Received"			1562055	67.	5 (30%	-110%)	
Uranium-232 Trace	er	Alphaspec	U, Liquid "As R	Received"			1562056	90.9	9 (30%	-110%)	
Barium Carrier		Radium-22	8 in Drinking W	ater EPA 904	.0 "As Received"		1562314	105	5 (30%	-110%)	
Yttrium Carrier		Radium-22	8 in Drinking W	ater EPA 904	.0 "As Received"		1562314	81	(30%	-110%)	

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Certificate of Analysis

Company : Address :	Katahdin Analytical Services 600 Technology Way	
	Scarborough, Maine 04074	Report Date: May 10, 2016
Contact:	Ms. Jennifer Obrin	
Project:	NWIRP Bethpage Project # 60266589 Phase FI.WS	
Client Sample Sample ID:	e ID: EB01-041516 395751006	Project: KATA00116 Client ID: KATA003
Parameter	Qualifier Result Uncertainty MDC	TPU RL Units DF Analyst Date Time Batch Mtd
Surrogate/Tracer I	Recovery Test	Batch ID Recovery% Acceptable Limits

Notes:

The MDC is a sample specific MDC.

Company : Address :	Katahdin Ana 600 Technolo	alytical Servi	ces								
11001055	Scarborough	Maine 0407	4				Dop	ort Data:	May 10	2016	
Contact	Ma Jannifar	Obrin	+				кер	IT Date.	May 10	, 2010	
Contact:	MIS. Jemmer		"	FLUIG							
Project:	NWIRP Beth	page Project	# 60266589 Ph	ase FI.WS							
Client Sample I Sample ID: Matrix: Collect Date: Receive Date: Collector:	ID: TT3065 395751 Ground 18-APF 20-APF Client	S-GW-0418 007 Water R-16 R-16	16			Project: Client II	KATA D: KATA	.00116 .003			
Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units DF	Analyst D	ate Time	Batch	Mtd.
Rad Alpha Spec Anal Alphaspec Th, Liqui	lysis id "As Received		. / 0.100	0.000	. / 0.100	0.500	0.1	WWD2 05/00	116 0014	1560055	
Thorium-228	U	0.00115	+/-0.100	0.223	+/-0.100	0.500	pCi/L	KXB2 05/03	/16 2214	1562055	1
Thorium-232	U	-0.00994	+/-0.148	0.262	+/-0.0689	0.500	pCi/L				
Alphaspec II Liquid	d "As Received"	,	., 0.0007	01100	., 0.0005	01200	Penz				
Uranium-233/234	U	0.109	+/-0.149	0.203	+/-0.150	0.500	pCi/L	KXB2 05/05	/16 0917	1562056	2
Uranium-235/236	U	0.186	+/-0.200	0.228	+/-0.202	0.500	pCi/L				
Uranium-238	U	0.101	+/-0.150	0.219	+/-0.151	0.500	pCi/L				
Rad Gas Flow Propor Radium-228 in Drin	rtional Counting Water EP	ng A 904.0 "As .	Received"								
Radium-228		1.18	+/-0.432	0.546	+/-0.473	1.00	pCi/L	AXM6 05/10	/16 1317	1562314	3
Rad Radium-226											
Radium-226 in Drin	iking Water EP	A 903.1 (De-	emanati "As Re	ceived"							
Radium-226		0.605	+/-0.224	0.236	+/-0.241	1.00	pCi/L	LXP1 04/29	/16 1115	1561456	6 4
The following Analyt	ical Methods v	vere perform	ned								
Method De	scription										
1 DC	DE EML HASL-3	00, Th-01-RC	Modified								
2 DC	DE EML HASL-3	00, U-02-RC	Modified								
3 EP.	A 904.0/ EPA 93	20									
4 EP.	A 903.1										
Surrogate/Tracer Re	ecovery	Гest					Batch ID	Recovery%	Accepta	able Lin	nits
Thorium-229 Trace	er	Alphaspec 7	Th, Liquid "As	Received"			1562055	80.1	(30%	-110%)	
Uranium-232 Trace	er	Alphaspec	U, Liquid "As R	Received"			1562056	96.7	(30%	-110%)	
Barium Carrier		Radium-228	8 in Drinking W	ater EPA 904	.0 "As Received"		1562314	93.3	(30%	-110%)	
Yttrium Carrier	Yttrium Carrier Radium-228 in Drinking Water EPA 904.0 "As Received"						1562314	91.2	(30%	-110%)	

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Certificate of Analysis

Company : Address :	Katahdin Analytical Services 600 Technology Way	
	Scarborough, Maine 04074	Report Date: May 10, 2016
Contact:	Ms. Jennifer Obrin	
Project:	NWIRP Bethpage Project # 60266589 Phase FI.WS	
Client Sample Sample ID:	e ID: TT306S-GW-041816 395751007	Project: KATA00116 Client ID: KATA003
Parameter	Qualifier Result Uncertainty MDC	TPU RL Units DF Analyst Date Time Batch Mtd.
Surrogate/Tracer I	Recovery Test	Batch ID Recovery% Acceptable Limits

Notes:

The MDC is a sample specific MDC.

Company : Address :	Katahdin Anal 600 Technolog	ytical Servi gy Way	ces									
	Scarborough, N	Maine 0407	4				R	eport Date:		May 10	, 2016	
Contact:	Ms. Jennifer O	brin						•				
Project:	NWIRP Bethp	age Project	# 60266589 Ph	ase FI.WS								
Client Sample Sample ID: Matrix: Collect Date: Receive Date: Collector:	ID: TT306I- 3957510 Ground V 18-APR- 20-APR- Client	GW-04181 08 Water -16 -16	16			Project: Client II	KA' D: KA'	ГА00116 ГА003				
Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units]	DF Analy	st Dat	e Time	Batch	Mtd.
Rad Alpha Spec Anal Alphaspec Th, Lique Thorium-228 Thorium-230 Thorium-232 Alphaspec U, Liquid Uranium 233/234	lysis id "As Received" U U U d "As Received"	0.115 0.0741 0.0221	+/-0.160 +/-0.140 +/-0.0904 +/-0.255	0.239 0.231 0.158	+/-0.162 +/-0.142 +/-0.0906	0.500 0.500 0.500	pCi/L pCi/L pCi/L	KXB2	05/05/1	6 2214	1562055	1
Uranium 235/234	I	0.308	+/-0.233	0.219	+/-0.239	0.500	pCi/L pCi/I	KAD2	03/03/1	0 0917	1502050) 2
Uranium-238	U	0.203	+/-0.221	0.270	+/-0.223	0.500	pCi/L pCi/L					
Rad Gas Flow Propo Radium-228 in Drin	rtional Counting	g 904.0 "As I	Received"	0.505		1.00			05/10/1	< 1015	15 (221)	
Radium-228		0.999	+/-0.433	0.597	+/-0.462	1.00	pCi/L	AXM6	05/10/1	6 1317	1562314	. 3
Rad Radium-226	akina Water FPA	$0.031(D_{0})$	omanati "As Ra	coivad"								
Radium-226 in Dri	iking muler Li II	0.306	+/-0.170	0.209	+/-0.181	1.00	pCi/L	LXP1	04/29/1	6 1040	1561456	i 4
The Call		e					I					
Method De	scription	ere periorn	nea									
		0 Th 01 PC	Modified									
1 DC	DE EMIL HASL-30	0, 111-01-KC	Modified									
2 DC 3 FP	2A 904 0/ FPA 932	0, 0-02-RC 1 0	widdinied									
4 EP	PA 903.1	0										
Surrogate/Tracer R	ecoverv T	est					Batch	ID Recov	erv%	Accept	able Lin	nits
Thorium-229 Trace	er	Alphaspec [Th Liquid "As	Received"			15620	55	<u></u>	(30%	_110%)	
Uranium-232 Trac	er 2	Alphaspec V	U, Liquid "As R	leceived"			15620	56	59	(30%	-110%)	
Barium Carrier]	Radium-228	8 in Drinking W	ater EPA 904	.0 "As Received"		15623	14	37.8	(30%	-110%)	
Yttrium Carrier]	Radium-228	8 in Drinking W	ater EPA 904	.0 "As Received"		15623	14	95.7	(30%	-110%)	

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Certificate of Analysis

Company : Address :	Katahdin Analytical Services 600 Technology Way	
	Scarborough, Maine 04074	Report Date: May 10, 2016
Contact:	Ms. Jennifer Obrin	
Project:	NWIRP Bethpage Project # 60266589 Phase FI.WS	
Client Sample Sample ID:	e ID: TT306I-GW-041816 395751008	Project: KATA00116 Client ID: KATA003
Parameter	Qualifier Result Uncertainty MDC	TPU RL Units DF Analyst Date Time Batch Mtd.
Surrogate/Tracer I	Recovery Test	Batch ID Recovery% Acceptable Limits

Notes:

The MDC is a sample specific MDC.

Company : Address :	Katahdin Ana 600 Technolog	lytical Servi gy Way	ices								
	Scarborough,	Maine 0407	4				Rer	ort Date:	May 10), 2016	
Contact:	Ms. Jennifer (Dbrin					1			,	
Project:	NWIRP Bethr	age Project	# 60266589 Ph	ase FI WS							
Client Sample I Sample ID: Matrix: Collect Date: Receive Date: Collector:	ID: TT3041 3957510 Ground 15-APR 20-APR Client	-GW-041: 009 Water -16 -16	516	ase 11. ws		Project: Client II	KAT. D: KAT.	400116 4003			
Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units D	F Analyst	Date Time	Batch	Mtd.
Rad Alpha Spec Anal Alphaspec Th, Liqui Thorium-228 Thorium-230	l ysis id "As Received" U U	, 0.143 0.104	+/-0.174 +/-0.169	0.234 0.271	+/-0.176 +/-0.172	0.500 0.500	pCi/L pCi/L	KXB2 0	5/05/16 2214	1562055	1
Thorium-232	U	0.000793	+/-0.128	0.282	+/-0.128	0.500	pC1/L				
Alphaspec U, Liquid	d "As Received"	0.000	10.007	0.001	(0.221	0.500	<i>C</i> ' <i>T</i>	WWD2 0	5/05/16 0017	15 (205)	
Uranium-233/234		0.323	+/-0.227	0.231	+/-0.231	0.500	pCi/L	KXB2 0	5/05/16 0917	1562056	2
Uranium-235/250	I	0.276	+/-0.228	0.196	+/-0.231	0.300	pCi/L pCi/I				
Rad Gas Flow Propor	rtional Countin	σ	0.101	0.202	17 0.105	0.500	pent				
Radium-228 in Drin	king Water EPA	904.0 "As	Received"								
Radium-228	U	-0.0326	+/-0.411	0.753	+/-0.411	1.00	pCi/L	AXM6 0	5/10/16 1317	1562314	. 3
Rad Radium-226											
Radium-226 in Drin	king Water EPA	903.1 (De-	-emanati "As Re	ceived"							
Radium-226		0.420	+/-0.181	0.168	+/-0.193	1.00	pCi/L	LXP1 0	4/29/16 1040	1561456	4
The following Analyt	ical Methods w	ere perfori	ned								
Method De	scription	-									
1 DC	E EML HASL-30	0, Th-01-RC	Modified								
2 D0	E EML HASL-30	0, U-02-RC	Modified								
3 EP.	A 904.0/ EPA 932	20									
4 EP.	A 903.1										
Surrogate/Tracer Re	ecovery T	est					Batch II	Recovery	y% Accept	able Lin	nits
Thorium-229 Trace	er	Alphaspec '	Th, Liquid "As]	Received"			1562055	81.	8 (30%	5-110%)	
Uranium-232 Trace	Uranium-232 Tracer Alphaspec U, Liquid "As Received"						1562056	86.	1 (30%	5-110%)	
Barium Carrier		Radium-22	8 in Drinking W	ater EPA 904	4.0 "As Received"		1562314	- 106	6 (30%	5-110%)	
Yttrium Carrier		Radium-22	8 in Drinking W	ater EPA 904	4.0 "As Received"		1562314	92.	7 (30%	5-110%)	

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Certificate of Analysis

Company : Address :	Katahdin Analytical Services 600 Technology Way	
	Scarborough, Maine 04074	Report Date: May 10, 2016
Contact:	Ms. Jennifer Obrin	
Project:	NWIRP Bethpage Project # 60266589 Phase FI.WS	
Client Sample Sample ID:	e ID: TT304I1-GW-041516 395751009	Project: KATA00116 Client ID: KATA003
Parameter	Qualifier Result Uncertainty MDC	TPU RL Units DF Analyst Date Time Batch Mtd.
Surrogate/Tracer I	Recovery Test	Batch ID Recovery% Acceptable Limits

Notes:

The MDC is a sample specific MDC.

Company : Address :	Katahdin Anal 600 Technolog	lytical Servi gy Way	ices										
	Scarborough, I	Maine 0407	4				R	leport	Date:	Ν	May 10	, 2016	
Contact:	Ms. Jennifer C	Dbrin						-			-		
Project:	NWIRP Bethp	age Project	# 60266589 Ph	ase FI.WS									
Client Sample II Sample ID: Matrix: Collect Date: Receive Date: Collector:	D: TT307I- 3957510 Ground 14-APR 20-APR- Client	GW-0414 010 Water -16 -16	16			Project: Client II	KA D: KA	TA0(TA0()116)3				
Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	DF A	nalyst	Date	Time	Batch	Mtd.
Rad Alpha Spec Analys Alphaspec Th, Liquid Thorium-228	sis "As Received" U	, -0.0417	+/-0.067	0 214	+/-0.0672	0.500	pCi/L	1	XXB2	05/05/16	2214	1562055	5 1
Thorium-230	U	0.025	+/-0.112	0.222	+/-0.113	0.500	pCi/L	-	0102	00/00/10		1002000	
Thorium-232	U	0.0195	+/-0.0804	0.141	+/-0.0805	0.500	pCi/L						
Alphaspec U, Liquid '	'As Received"												
Uranium-233/234		0.311	+/-0.207	0.185	+/-0.211	0.500	pCi/L]	KXB2	05/05/16	0917	1562056	5 2
Uranium-235/236	U	0.160	+/-0.183	0.228	+/-0.184	0.500	pCi/L						
Uranium-238	U	-0.00725	+/-0.0626	0.145	+/-0.0627	0.500	pCi/L						
Rad Gas Flow Proport	ional Countin	g	D : ///										
Radium-228 in Drinki	ng water EPA	0 463	Received	0.728	1/0/149	1.00	nCi/I		VM6	05/10/16	1217	1562214	1 2
Radium-228	U	0.405	+/-0.441	0.728	+/-0.448	1.00	pCI/L	1	AAMO	03/10/10	1517	1302314	+ 3
Radium-226 in Drinki	ing Water EPA	903.1 (De-	emanati "As Re	ceived"									
Radium-226		0.440	+/-0.140	0.128	+/-0.154	1.00	pCi/L		LXP1	05/03/16	1125	1561457	7 4
The following Analytic	ol Mothoda w	ana nanfan	nad										
Method Desc	ription	ere periori	neu										
1 DOF	EMI HASI 30	0 Th 01 PC	Modified										
2 DOE	EMIL HASL 30	0, 11-01-KC	Modified										
2 DOL 3 FPA	904 0/ FPA 932	0, 0-02-RC 1	Wiodified										
4 EPA	903.1	.0											
Surrogate/Tracer Rec	overv T	est					Ratch	п	Pacova	w0/	ccent	able Lin	nite
The minute 220 Transen	overy 1	A 11	Th. T	D : 1"			15620	1D 1	1((200/		
Uranium-232 Tracer		Alphaspec	U, Liquid "As R	Received"			15620)56	93	.6	(30%	-110%)	
Barium Carrier		Radium-228	8 in Drinking W	ater EPA 904.	0 "As Received"		15623	314	10)3	(30%	-110%)	
Yttrium Carrier		Radium-228	8 in Drinking W	ater EPA 904.	0 "As Received"		15623	814	82	.5	(30%	-110%)	

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Certificate of Analysis

Company : Address :	Katahdin Analytical Services 600 Technology Way	
	Scarborough, Maine 04074	Report Date: May 10, 2016
Contact:	Ms. Jennifer Obrin	
Project:	NWIRP Bethpage Project # 60266589 Phase FI.WS	
Client Sample Sample ID:	e ID: TT307I-GW-041416 395751010	Project: KATA00116 Client ID: KATA003
Parameter	Qualifier Result Uncertainty MDC	TPU RL Units DF Analyst Date Time Batch Mtd.
Surrogate/Tracer I	Recovery Test	Batch ID Recovery% Acceptable Limits

Notes:

The MDC is a sample specific MDC.

Company : Address :	Katahdin Ana 600 Technolo	llytical Servi gy Way	ices								
	Scarborough,	Maine 0407	/4				Re	oort Date:	May 10	, 2016	
Contact:	Ms. Jennifer (Obrin					-			,	
Project:	NWIRP Beth	nage Project	# 60266589 Ph	ase FI WS							
Client Sample Sample ID: Matrix: Collect Date: Receive Date:	ID: TT307S 395751(Ground 14-APR 20-APR	GW-0414 011 Water 2-16 2-16	16			Project: Client II	KAT D: KAT	A00116 A003			
Collector:	Client	D		100			U.4 D			D (1	
Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units D	F Analyst	Date Time	Batch	Mtd.
Rad Alpha Spec Anal	lysis	,,									
Alphaspec 1n, Liqui	a As keceivea	0.128	1/ 0 169	0.138	. / 0 171	0.500	pCi/I	VVP2 05/	105/16 2213	1562055	1
Thorium-220	U	0.0224	+/-0.109	0.355	+/-0.171	0.500	pCi/L pCi/L	KAB 2 03/	05/10 2215	1502055	1
Thorium-232	U	-0.00198	+/-0.0843	0.155	+/-0.0847	0.500	pCi/L				
Alphaspec U, Liquid	d "As Received"	,					1				
Uranium-233/234		0.259	+/-0.213	0.259	+/-0.216	0.500	pCi/L	KXB2 05/	05/16 0917	1562056	2
Uranium-235/236	U	0.179	+/-0.193	0.220	+/-0.195	0.500	pCi/L				
Uranium-238	U	0.0411	+/-0.113	0.196	+/-0.113	0.500	pCi/L				
Rad Gas Flow Propor	rtional Countir	ng A 904 0 "As	Received"								
Radium-228	U	0.182	+/-0.237	0.404	+/-0.239	1.00	pCi/L	AXM6 05/	/10/16 1317	1562314	3
Rad Radium-226	-						I				
Radium-226 in Drin	nking Water EPA	A 903.1 (De-	-emanati "As Re	ceived"							
Radium-226		0.790	+/-0.183	0.123	+/-0.218	1.00	pCi/L	LXP1 05/	03/16 1125	1561457	4
The following Analyt	ical Methods w	vere perfori	med								
Method De	scription										
1 DC	DE EML HASL-3	00, Th-01-RC	2 Modified								
2 DC	DE EML HASL-3	00, U-02-RC	Modified								
3 EP.	A 904.0/ EPA 932	20									
4 EP.	A 903.1										
Surrogate/Tracer Re	ecovery T	ſest					Batch II	D Recovery%	% Accept:	able Lin	nits
Thorium-229 Trace	er	Alphaspec '	Th, Liquid "As	Received"			156205	5 86.2	(30%	-110%)	
Uranium-232 Trace	er	Alphaspec	U, Liquid "As F	Received"			156205	5 87	(30%	-110%)	
Barium Carrier		Radium-22	8 in Drinking W	ater EPA 904/	.0 "As Received"		1562314	4 104	(30%	-110%)	
Yttrium Carrier	rium Carrier Radium-228 in Drinking Water EPA 904.0 "As Received"							4 92.7	(30%	-110%)	

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Certificate of Analysis

Company : Address :	Katahdin Analytical Services 600 Technology Way	
	Scarborough, Maine 04074	Report Date: May 10, 2016
Contact:	Ms. Jennifer Obrin	
Project:	NWIRP Bethpage Project # 60266589 Phase FI.WS	
Client Sample Sample ID:	e ID: TT307S-GW-041416 395751011	Project: KATA00116 Client ID: KATA003
Parameter	Qualifier Result Uncertainty MDC	TPU RL Units DF Analyst Date Time Batch Mtd.
Surrogate/Tracer I	Recovery Test	Batch ID Recovery% Acceptable Limits

Notes:

The MDC is a sample specific MDC.

Company : Address :	Katahdin Anal 600 Technolog	ytical Servi 39 Way	ces										
	Scarborough, N	Maine 0407	4				F	Repor	rt Date:	J	May 10	, 2016	
Contact:	Ms. Jennifer O	brin						-			-		
Project:	NWIRP Bethp	age Project	# 60266589 Ph	ase FI.WS									
Client Sample I Sample ID: Matrix: Collect Date: Receive Date: Collector:	ID: MW10-C 3957510 Ground V 14-APR- 20-APR- Client	GW-04141 12 Water -16 -16	6			Project: Client II	KA D: KA	TA(TA(00116 003				
Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
Rad Alpha Spec Anal Alphaspec Th, Liqui	l ysis id "As Received"												
Thorium-228	U	-0.0236	+/-0.104	0.271	+/-0.104	0.500	pCi/L		KXB2	05/05/16	5 2213	1562055	<i>i</i> 1
Thorium-230	U	-0.0167	+/-0.137	0.331	+/-0.13/	0.500	pCi/L pCi/I						
Alphasnec II Liquid	1 "As Received"	0.0151	17 0.0707	0.235	17 0.0991	0.500	pent						
Uranium-233/234	U	0.156	+/-0.179	0.223	+/-0.180	0.500	pCi/L		KXB2	05/05/16	5 0917	1562056	52
Uranium-235/236	U	0.0578	+/-0.159	0.276	+/-0.159	0.500	pCi/L		11102	00/00/10		1002000	_
Uranium-238	U	0.0278	+/-0.104	0.175	+/-0.104	0.500	pCi/L						
Rad Gas Flow Propor Radium-228 in Drin	rtional Counting aking Water EPA	g 904.0 "As	Received"										
Radium-228		0.617	+/-0.340	0.489	+/-0.354	1.00	pCi/L		AXM6	05/10/16	5 1317	1562314	4 3
Rad Radium-226													
Radium-226 in Drin	iking Water EPA	903.1 (De-	emanati "As Re	ceived"	10100	1.00	~~~						
Radium-226		0.442	+/-0.147/	0.138	+/-0.162	1.00	pC1/L		LXP1	05/03/16	0 1125	1561457	4
The following Analyt	ical Methods we	ere perforn	ned										
Method De	scription												
1 DC	DE EML HASL-30	0, Th-01-RC	Modified										
2 DOE EML HASL-300, U-02-RC Modified													
3 EP.	A 904.0/ EPA 9320	0											
4 EP.	A 903.1												
Surrogate/Tracer Re	ecovery To	est					Batch	ID	Recove	ry% 4	Accept	able Lin	nits
Thorium-229 Trace	er 4	Alphaspec 7	Th, Liquid "As	Received"			15620)55	74	.5	(30%	-110%)	
Uranium-232 Trace	er A	Alphaspec V	U, Liquid "As F	Received"			15620	562056 86.8 (30%-110%)					
Barium Carrier	1	Radium-228	8 in Drinking W	ater EPA 904.	0 "As Received"		15623	314	97	.4	(30%-110%)		
Yttrium Carrier Radium-228 in Drinking Water EPA 904.0 "As Received"							15623	314	4 90.4 (30%-110%)				

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Certificate of Analysis

Company : Address :	Katahdin Analytical Services 600 Technology Way	
	Scarborough, Maine 04074	Report Date: May 10, 2016
Contact:	Ms. Jennifer Obrin	
Project:	NWIRP Bethpage Project # 60266589 Phase FI.WS	
Client Sample Sample ID:	e ID: MW10-GW-041416 395751012	Project: KATA00116 Client ID: KATA003
Parameter	Qualifier Result Uncertainty MDC	TPU RL Units DF Analyst Date Time Batch Mtd.
Surrogate/Tracer I	Recovery Test	Batch ID Recovery% Acceptable Limits

Notes:

The MDC is a sample specific MDC.

Company : Address :	Katahdin Anal 600 Technolog	ytical Servi gy Way	ices									
	Scarborough, M	Maine 0407	4				Re	port Date:		May 10	, 2016	
Contact:	Ms. Jennifer O	brin						•		•		
Project:	NWIRP Bethp	age Project	:# 60266589 Ph	ase FI.WS								
Client Sample I Sample ID: Matrix: Collect Date: Receive Date: Collector:	ID: FD01-G 3957510 Ground V 15-APR- 20-APR- Client	W-041516 113 Water -16 -16	5			Project: Client II	KAT D: KAT	2A00116 2A003				
Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units E	F Analys	t Date	Time	Batch	Mtd.
Rad Alpha Spec Anal Alphaspec Th, Liqui Thorium-228	ysis id "As Received" U	0.130	+/-0.188	0.227	+/-0.190	0.500	pCi/L	KXB2	05/05/1	5 2213	1562055	1
Thorium-230	U	0.00622	+/-0.163	0.357	+/-0.164	0.500	pCi/L					
Thorium-232	U	0.011	+/-0.135	0.286	+/-0.136	0.500	pCi/L					
Alphaspec U, Liquid	d "As Received"											
Uranium-233/234	U	0.162	+/-0.162	0.188	+/-0.164	0.500	pCi/L	KXB2	05/05/10	5 0917	1562056	2
Uranium-235/236		0.219	+/-0.199	0.182	+/-0.201	0.500	pCi/L					
Uranium-238	U utional Countin	0.117	+/-0.152	0.216	+/-0.153	0.500	pC1/L					
Radium-228 in Drin	king Water FPA	904 0 "As	Received"									
Radium-228 in Drin	King Water EIM	0.609	+/-0.374	0.564	+/-0.387	1.00	pCi/L	AXM6	05/10/1	5 1318	1562314	3
Rad Radium-226		0.000	., 0.0, 1	0.001	., 0.007	1100	Perz	111110	00/10/1	, 1010	1002011	2
Radium-226 in Drin	king Water EPA	903.1 (De-	-emanati "As Re	eceived"								
Radium-226		0.383	+/-0.135	0.138	+/-0.152	1.00	pCi/L	LXP1	05/03/10	5 1125	1561457	4
The following Analyt	ical Methods w	ere perforr	ned									
Method De	scription	F										
1 DC	E EML HASL-30	0, Th-01-RC	Modified									
2 DC	2 DOE EML HASL-300, U-02-RC Modified											
3 EP.	A 904.0/ EPA 932	0										
4 EP.	A 903.1											
Surrogate/Tracer Re	ecovery T	est					Batch I	D Recove	ry%	Accept	able Lin	nits
Thorium-229 Trace	er	Alphaspec '	Th, Liquid "As	Received"			156205	5 8	1.3	(30%	-110%)	
Uranium-232 Trace	er .	Alphaspec	U, Liquid "As F	Received"			156205	6 9	96.3 (30%-110%)			
Barium Carrier]	Radium-22	8 in Drinking W	ater EPA 904	.0 "As Received"		156231	4 90	5.5	(30%-110%)		
Yttrium Carrier Radium-228 in Drinking Water EPA 904.0 "As Received"							156231	4 90).8	(30%	-110%)	

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Certificate of Analysis

Company : Address :	Katahdin Analytical Services 600 Technology Way	
	Scarborough, Maine 04074	Report Date: May 10, 2016
Contact:	Ms. Jennifer Obrin	
Project:	NWIRP Bethpage Project # 60266589 Phase FI.WS	
Client Sample Sample ID:	e ID: FD01-GW-041516 395751013	Project: KATA00116 Client ID: KATA003
Parameter	Qualifier Result Uncertainty MDC	TPU RL Units DF Analyst Date Time Batch Mtd.
Surrogate/Tracer I	Recovery Test	Batch ID Recovery% Acceptable Limits

Notes:

The MDC is a sample specific MDC.

Company : Address :	Katahdin Ana 600 Technolo	alytical Servi	ices								
i iddiedd i	Scarborough	Maine 0407	14				Don	ort Data:	May 10	2016	
Contact	Ma Jannifar	Obrin	+				Керс	IT Date.	Way 10	, 2010	
Contact:	MIS. Jemmer			EL INIC							
Project:	NWIRP Beth	page Project	t # 60266589 Ph	ase FI.WS							
Client Sample Sample ID: Matrix: Collect Date: Receive Date: Collector:	ID: TT304I 395751 Ground 15-APF 20-APF Client	D-GW-0415 014 Water R-16 R-16	516			Project: Client II	KATA D: KATA	.00116 .003			
Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units DF	Analyst Da	ate Time	Batch	Mtd.
Rad Alpha Spec Anal Alphaspec Th, Liqui	lysis id "As Received	Į″ 0.011	. / 0.0022	0.217	. / 0.0027	0.500		KND2 05/05	116 0012	15(2055	1
Thorium-228	U	-0.011	+/-0.0933	0.217	+/-0.0937	0.500	pCi/L pCi/L	KXB2 05/05	/10/2213	1562055	1
Thorium-230	U	-0.00388	+/-0.0889	0.163	+/-0.125	0.500	pCi/L pCi/L				
Alphaspec I/ Liquid	d "As Received"	"					r				
Uranium-233/234	U	0.219	+/-0.250	0.312	+/-0.252	0.500	pCi/L	KXB2 05/05	/16 0946	1562056	2
Uranium-235/236	U	-0.0152	+/-0.131	0.303	+/-0.131	0.500	pCi/L				
Uranium-238	U	0.257	+/-0.270	0.337	+/-0.273	0.500	pCi/L				
Rad Gas Flow Propor Radium-228 in Drin	rtional Counting Water EP	ng A 904.0 "As	Received"								
Radium-228		0.655	+/-0.401	0.608	+/-0.415	1.00	pCi/L	AXM6 05/10	/16 1318	1562314	3
Rad Radium-226											
Radium-226 in Drin	iking Water EP	A 903.1 (De-	-emanati "As Re	ceived"							
Radium-226		0.492	+/-0.154	0.145	+/-0.168	1.00	pCi/L	LXP1 05/03	/16 1125	1561457	4
The following Analyt	ical Methods v	were perform	med								
Method De	scription										
1 DC	DE EML HASL-3	00, Th-01-RC	C Modified								
2 DC	2 DOE EML HASL-300, U-02-RC Modified										
3 EPA 904.0/ EPA 9320											
4 EP	A 903.1										
Surrogate/Tracer Re	ecovery	Гest					Batch ID	Recovery%	Accepta	able Lin	nits
Thorium-229 Trace	er	Alphaspec '	Th, Liquid "As I	Received"			1562055	80.9	(30%	-110%)	
Uranium-232 Trace	er	Alphaspec	- U, Liquid "As R	leceived"			1562056	71.6	(30%	-110%)	
Barium Carrier		Radium-22	8 in Drinking W	ater EPA 904	.0 "As Received"		1562314	92.2	92.2 (30%-110%)		
Yttrium Carrier Radium-228 in Drinking Water EPA 904.0 "As Received"							1562314	93.1	(30%	-110%)	

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Certificate of Analysis

Company : Address :	Katahdin Analytical Services 600 Technology Way	
	Scarborough, Maine 04074	Report Date: May 10, 2016
Contact:	Ms. Jennifer Obrin	
Project:	NWIRP Bethpage Project # 60266589 Phase FI.WS	
Client Sample Sample ID:	e ID: TT304D-GW-041516 395751014	Project: KATA00116 Client ID: KATA003
Parameter	Qualifier Result Uncertainty MDC	TPU RL Units DF Analyst Date Time Batch Mtd.
Surrogate/Tracer I	Recovery Test	Batch ID Recovery% Acceptable Limits

Notes:

The MDC is a sample specific MDC.

Company : Address :	Katahdin Analy 600 Technology	vtical Servi y Way	ices										
	Scarborough, M	1aine 0407	4				R	eport	Date:	Ν	/Iav 10	. 2016	
Contact.	Ms. Jennifer Oh	orin						-r				,	
Project:	NWIRP Bethna	ore Project	# 60266589 Ph	ase FI WS									
Client Sample Sample ID: Matrix: Collect Date: Receive Date: Collector:	ID: TT304S-(39575101 Ground V 15-APR-1 20-APR-1 Client	GW-0415 I5 Vater 16 16	16			Project: Client II	KA D: KA	TA00 TA00)116)3				
Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	DF A	nalyst	Date	Time	Batch	Mtd.
Rad Alpha Spec Anal Alphaspec Th, Liquit Thorium-228	lysis id "As Received" U	0.0668	+/-0.185	0.320	+/-0.185	0.500	pCi/L	ŀ	XXB2	05/05/16	2213	1562055	5 1
Thorium-230	U	0.0127	+/-0.181	0.389	+/-0.182	0.500	pCi/L pCi/I						
Alphasnec II Liquid	d "As Received"	0.0475	17 0.144	0.107	17 0.145	0.500	pen						
Uranium-233/234	U	0.139	+/-0.177	0.219	+/-0.178	0.500	pCi/L	ŀ	KXB2	05/05/16	0946	1562056	2
Uranium-235/236	U	0.135	+/-0.195	0.235	+/-0.196	0.500	pCi/L						
Uranium-238	U	0.139	+/-0.177	0.219	+/-0.178	0.500	pCi/L						
Rad Gas Flow Propor Radium-228 in Drin	rtional Counting	904.0 "As	Received"										
Radium-228	U	0.572	+/-0.377	0.581	+/-0.388	1.00	pCi/L	A	AXM6	05/10/16	1318	1562314	3
Rad Radium-226													
Radium-226 in Drin	iking Water EPA	903.1 (De-	emanati "As Re	eceived"									
Radium-226		0.530	+/-0.145	0.0923	+/-0.164	1.00	pCi/L	I	LXP1	05/03/16	1155	1561457	4
The following Analyt	ical Methods we	re perforn	ned										
Method De	scription												
1 DC	DE EML HASL-300), Th-01-RC	Modified										
2 DC	2 DOE EML HASL-300, U-02-RC Modified												
3 EP	A 904.0/ EPA 9320)											
4 EP	A 903.1												
Surrogate/Tracer Re	ecovery Te	st					Batch	ID F	Recover	ry% A	ccepta	able Lin	nits
Thorium-229 Trace	er A	Alphaspec 7	Th, Liquid "As	Received"			15620	55	68	.4	(30%	-110%)	
Uranium-232 Trace	er A	Alphaspec V	U, Liquid "As F	Received"			15620	56	89.9 (30%-110%)				
Barium Carrier	R	Radium-228	8 in Drinking W	ater EPA 904/	4.0 "As Received"		15623	14	98	.1	(30%	-110%)	
Yttrium Carrier Radium-228 in Drinking Water EPA 904.0 "As Received"							15623	14	91	.6	(30%	-110%)	

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Certificate of Analysis

Company : Address :	Katahdin Analytical Services 600 Technology Way	
	Scarborough, Maine 04074	Report Date: May 10, 2016
Contact:	Ms. Jennifer Obrin	
Project:	NWIRP Bethpage Project # 60266589 Phase FI.WS	
Client Sample Sample ID:	e ID: TT304S-GW-041516 395751015	Project: KATA00116 Client ID: KATA003
Parameter	Qualifier Result Uncertainty MDC	TPU RL Units DF Analyst Date Time Batch Mtd.
Surrogate/Tracer I	Recovery Test	Batch ID Recovery% Acceptable Limits

Notes:

The MDC is a sample specific MDC.

Company : Address :	Katahdin Analy 600 Technolog	ytical Servi y Way	ces										
	Scarborough, N	1 1aine 0407	4				I	Repoi	rt Date:	Ν	Aay 10	, 2016	
Contact:	Ms. Jennifer O	brin											
Project:	NWIRP Bethna	age Project	# 60266589 Ph	ase FLWS									
Client Sample I Sample ID: Matrix: Collect Date: Receive Date: Collector:	ID: MW07-C 3957510 Ground V 14-APR- 20-APR- Client	W-04141 16 Water 16 16	6			Project: Client II	KA D: KA	ATA(ATA(00116 003				
Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
Rad Alpha Spec Anal Alphaspec Th, Liqui Thorium-228 Thorium-230 Thorium-232 Alphaspec U, Liquia Uranium-233/234 Uranium-235/236 Uranium-238 Rad Gas Flow Propor Radium-228 in Drin Radium-228	ysis d "As Received" U U U t "As Received" U rtional Counting king Water EPA	0.146 0.0419 -0.018 0.258 0.0346 0.249 904.0 "As . 1.30	+/-0.162 +/-0.149 +/-0.0763 +/-0.205 +/-0.130 +/-0.206 <i>Received''</i> +/-0.384	0.191 0.282 0.190 0.110 0.218 0.177 0.422	+/-0.164 +/-0.150 +/-0.0765 +/-0.208 +/-0.130 +/-0.208	0.500 0.500 0.500 0.500 0.500 0.500	pCi/L pCi/L pCi/L pCi/L pCi/L pCi/L		KXB2 KXB2 AXM6	05/07/16 05/05/16 05/10/16	1345 0946 1318	1562055 1562056 1562314	2 3 4 3
Rad Radium-226													
Radium-226 in Drin	king Water EPA	903.1 (De-	emanati "As Re	ceived"	. / 0 122	1.00			LVD1	05/02/16	1155	1561457	
Radium-226		0.290	+/-0.119	0.123	+/-0.133	1.00	pCi/L		LXPI	05/03/16	1155	1561457	4
The following Analyti	ical Methods we	re perform	ned										
Method Des	scription												
1 DO	E EML HASL-300), Th-01-RC	Modified										
2 DO	E EML HASL-300), U-02-RC I	Modified										
3 EPA	A 904.0/ EPA 9320)											
4 EPA	A 903.1												
Surrogate/Tracer Re	covery Te	est					Batch	n ID	Recove	ry% A	ccept	able Lin	nits
Thorium-229 Trace	er A	Alphaspec 7	Th, Liquid "As	Received"			1562	055	53	3.5	(30%	-110%)	
Uranium-232 Trace	er A	Alphaspec V	U, Liquid "As R	Received"			1562	056	108 (30%-110%)				
Barium Carrier	F	Radium-228	8 in Drinking W	ater EPA 904	.0 "As Received"		1562	314	314 101 (30%-110%)				
Yttrium Carrier Radium-228 in Drinking Water EPA 904.0 "As Received"							1562314 94.2 (30%-1109				-110%)		

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Certificate of Analysis

Company : Address :	Katahdin Analytical Services 600 Technology Way	
	Scarborough, Maine 04074	Report Date: May 10, 2016
Contact:	Ms. Jennifer Obrin	
Project:	NWIRP Bethpage Project # 60266589 Phase FI.WS	
Client Sample Sample ID:	e ID: MW07-GW-041416 395751016	Project: KATA00116 Client ID: KATA003
Parameter	Qualifier Result Uncertainty MDC	TPU RL Units DF Analyst Date Time Batch Mtd.
Surrogate/Tracer I	Recovery Test	Batch ID Recovery% Acceptable Limits

Notes:

The MDC is a sample specific MDC.
	Company : Address :	Katahdin Ana 600 Technolo	alytical Servi ogy Way	ices								
		Scarborough,	Maine 0407	4				Rep	ort Date:	May 10	, 2016	
	Contact:	Ms. Jennifer	Obrin							•		
	Project:	NWIRP Beth	page Project	# 60266589 Ph	ase FI.WS							
	Client Sample Sample ID: Matrix: Collect Date: Receive Date: Collector:	ID: MW06- 395751 Ground 14-APF 20-APF Client	-GW-04141 017 Water R-16 R-16	6			Project: Client II	KATA D: KATA	A00116 A003			
Par	rameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units D	F Analyst	Date Time	Batch	Mtd.
Rad A	l Alpha Spec Ana Alphaspec Th, Liqu	lysis uid "As Receivea	Į" 0.0119		0 235	. / 0.102	0.500	pCi/I	KXD2 05	/05/16 2213	1562055	1
Tho	orium-230	U	-0.0761	+/-0.101	0.349	+/-0.102	0.500	pCi/L pCi/L	KAD2 03/	05/10 2215	1502055	1
Tho	orium-232	Ū	0.0343	+/-0.136	0.235	+/-0.137	0.500	pCi/L				
A	lphaspec U, Liqui	id "As Received"	"									
Ura	nium-233/234		0.245	+/-0.210	0.208	+/-0.213	0.500	pCi/L	KXB2 05/	/05/16 0946	1562056	2
Ura	nium-235/236		0.186	+/-0.205	0.139	+/-0.206	0.500	pCi/L				
Ura	nium-238		0.320	+/-0.235	0.208	+/-0.239	0.500	pCi/L				
Rad R	l Gas Flow Propo Radium-228 in Dri	ortional Counti nking Water EP	ng A 904.0 "As	Received"								
Rad	lium-228	U	0.155	+/-0.263	0.464	+/-0.264	1.00	pCi/L	AXM6 05/	/10/16 1318	1562314	3
Rad	l Radium-226											
R	Radium-226 in Dri	nking Water EP	A 903.1 (De-	-emanati "As Re	eceived"							
Rad	lium-226		1.01	+/-0.202	0.079	+/-0.257	1.00	pCi/L	LXP1 05/	/03/16 1155	1561457	4
The	e following Analy	tical Methods v	were perform	ned								
Me	thod De	escription										
1	D	OE EML HASL-3	00, Th-01-RC	Modified								
2	D	OE EML HASL-3	00, U-02-RC	Modified								
3	E	PA 904.0/ EPA 93	20									
4	El	PA 903.1										
Su	rrogate/Tracer R	ecovery	Гest					Batch II	Recovery	% Accepta	able Lin	nits
,	Thorium-229 Trac	er	Alphaspec '	Th, Liquid "As	Received"			1562055	72.2	(30%	-110%)	
1	Uranium-232 Trac	cer	Alphaspec	U, Liquid "As F	Received"			1562056	97.7	(30%	-110%)	
]	Barium Carrier		Radium-22	8 in Drinking W	ater EPA 904	4.0 "As Received"		1562314	104	(30%	-110%)	
	Yttrium Carrier		Radium-22	8 in Drinking W	ater EPA 904	4.0 "As Received"		1562314	87.4	(30%	-110%)	

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Certificate of Analysis

Company : Address :	Katahdin Analytical Services 600 Technology Way	
	Scarborough, Maine 04074	Report Date: May 10, 2016
Contact:	Ms. Jennifer Obrin	
Project:	NWIRP Bethpage Project # 60266589 Phase FI.WS	
Client Sample Sample ID:	EID: MW06-GW-041416 395751017	Project: KATA00116 Client ID: KATA003
Parameter	Qualifier Result Uncertainty MDC	TPU RL Units DF Analyst Date Time Batch Mtd.
Surrogate/Tracer I	Recovery Test	Batch ID Recovery% Acceptable Limits

Notes:

The MDC is a sample specific MDC.

Company : Address :	Katahdin Analy 600 Technolog	ytical Servi y Way	ices										
	Scarborough, N	Maine 0407	/4				F	Report	Date:	Ν	/Iay 10	, 2016	
Contact:	Ms. Jennifer O	brin									2		
Project:	NWIRP Bethp	age Project	: # 60266589 Ph	ase FI.WS									
Client Sample I Sample ID: Matrix: Collect Date: Receive Date: Collector:	ID: TT304I2 3957510 Ground V 15-APR- 20-APR- Client	-GW-041: 18 Water 16 16	516			Project: Client II	KA D: KA	TA0(TA0()116)3				
Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	DF A	Analyst	Date	Time	Batch	Mtd.
Rad Alpha Spec Anal Alphaspec Th, Liqui Thorium-228	ysis d "As Received" U	0.126	+/-0.166	0.136	+/-0.168	0.500	pCi/L]	KXB2	05/05/16	2213	1562055	1
Thorium-232	U	0.0311	+/-0.100	0.311	+/-0.107	0.500	pCi/L						
Alphaspec II Liquid	l "As Received"	0.0175	17 0.119	0.232	17 0.117	0.500	pent						
Uranium-233/234	i ilis Received	0.334	+/-0.233	0.251	+/-0.237	0.500	pCi/L]	KXB2	05/07/16	1352	1562056	j 2
Uranium-235/236		0.160	+/-0.176	0.120	+/-0.177	0.500	pCi/L						
Uranium-238	U	0.178	+/-0.170	0.179	+/-0.171	0.500	pCi/L						
Rad Gas Flow Propor Radium-228 in Drin	tional Counting	g 904.0 "As	Received"										
Radium-228		1.19	+/-0.430	0.553	+/-0.471	1.00	pCi/L	1	AXM6	05/10/16	1318	1562314	. 3
Rad Radium-226													
Radium-226 in Drin	king Water EPA	903.1 (De-	-emanati "As Re	ceived"									
Radium-226		0.180	+/-0.119	0.171	+/-0.125	1.00	pCi/L		LXP1	05/03/16	1155	1561457	4
The following Analyti	ical Methods we	ere perform	med										
Method De	scription												
1 DO	E EML HASL-300	0, Th-01-RC	C Modified										
2 D0	E EML HASL-300	0, U-02-RC	Modified										
3 EP.	A 904.0/ EPA 9320	C											
4 EP.	A 903.1												
Surrogate/Tracer Re	ecovery Te	est					Batch	ID I	Recove	ry% A	ccept	able Lin	nits
Thorium-229 Trace	er A	Alphaspec '	Th, Liquid "As	Received"			15620)55	87	.5	(30%	-110%)	
Uranium-232 Tracer Alphaspec U, Liquid "As Received			Received"			15620)56	89	.5	(30%	-110%)		
Barium Carrier	I	Radium-22	8 in Drinking W	ater EPA 904	4.0 "As Received"		15623	314	10	00	(30%	-110%)	
Yttrium Carrier	I	Radium-22	8 in Drinking W	ater EPA 904	4.0 "As Received"		1562314 90.4 (30%-110%)						

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Certificate of Analysis

Company : Address :	Katahdin Analytical Services 600 Technology Way	
	Scarborough, Maine 04074	Report Date: May 10, 2016
Contact:	Ms. Jennifer Obrin	
Project:	NWIRP Bethpage Project # 60266589 Phase FI.WS	
Client Sample Sample ID:	e ID: TT304I2-GW-041516 395751018	Project: KATA00116 Client ID: KATA003
Parameter	Qualifier Result Uncertainty MDC	TPU RL Units DF Analyst Date Time Batch Mtd.
Surrogate/Tracer I	Recovery Test	Batch ID Recovery% Acceptable Limits

Notes:

The MDC is a sample specific MDC.

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QC Summary

Report Date: May 10, 2016 Client : **Katahdin Analytical Services** Page 1 of 4 600 Technology Way Scarborough, Maine **Contact:** Ms. Jennifer Obrin Workorder: 395751 RPD% REC% Parmname NOM Sample Qual QC Units Range Anlst Date Time Rad Alpha Spec Batch 1562055 QC1203534366 395751018 DUP U Thorium-228 pCi/L 0 05/05/1622:13 0.126 U -0.000204N/A KXB2 Uncert: +/-0.166 +/-0.103 TPU: +/-0.168 +/-0.104Thorium-230 0 U 0.0511 U 0.0112 pCi/L N/A Uncert: +/-0.166 +/-0.177 TPU: +/-0.167 +/-0.178Thorium-232 U 0.0195 U -0.00198 pCi/L 0 N/A Uncert: +/-0.119+/-0.101 TPU: +/-0.119+/-0.102OC1203534367 LCS Thorium-228 U 0.0407 pCi/L KXB2 05/05/1622:13 Uncert: +/-0.115 +/-0.115 TPU: 10.5 Thorium-230 9.57 pCi/L 91.4 (75%-125%) Uncert: +/-1.23 TPU: +/-2.26 Thorium-232 U -0.00198 pCi/L (75% - 125%)Uncert: +/-0.0821 TPU: +/-0.0825 QC1203534365 MB -0.0252 Thorium-228 U pCi/L KXB2 05/05/1622:13 Uncert: +/-0.110 TPU: +/-0.111Thorium-230 U 0.0155 pCi/L Uncert: +/-0.215 TPU: +/-0.216 Thorium-232 U 0.0374 pCi/L Uncert: +/-0.148TPU: +/-0.148Batch 1562056 OC1203534372 395751018 DUP Uranium-233/234 0.334 U pCi/L (0% - 100%) KXB2 05/05/1609:46 0.0777 44.7 Uncert: +/-0.233 +/-0.153 +/-0.237 +/-0.153 TPU: Uranium-235/236 30.9 0.160 0.218 pCi/L (0% - 100%)Uncert: +/-0.176 +/-0.241 TPU: +/-0.177+/-0.243 Uranium-238 U 0.178 U 0.223 pCi/L 0 N/A Uncert: +/-0.170+/-0.234 TPU: +/-0.171+/-0.236

QC1203534373 LCS

QC Summary

Workorder:	395751								Page 2	cof 4	
Parmname		NOM	Sample Q	ual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Rad Alpha Spec	1562056										
Datch	1302030										
Uranium 233/	734				13.8	pCi/I				KVB)	05/05/1600.46
Ofailfuili-255/2	234	L'incert:			+/-1 48	pCI/L				KAD2	03/03/1009.40
					+/-2.46						
Uranium-235/2	236	110.			0.910	pCi/L					
		Uncert:			+/-0.432	r					
		TPU:			+/-0.452						
Uranium-238		13.5			13.9	pCi/L		103	(75%-125%	5)	
		Uncert:			+/-1.48						
		TPU:			+/-2.48						
QC1203534371	MB										
Uranium-233/2	234			U	0.185	pCi/L				KXB2	05/05/1609:17
		Uncert:			+/-0.173						
		TPU:			+/-0.175						
Uranium-235/2	236				0.257	pCi/L					
		Uncert:			+/-0.212						
		TPU:			+/-0.215						
Uranium-238					0.200	pCi/L					
		Uncert:			+/-0.172						
		TPU:			+/-0.174						
Rad Gas Flow Batch	1562314										
0C1203535059	LCS										
Radium-228	100	13.9			13.0	nCi/L		93.9	(80%-120%) AXM6	05/10/1613.18
Radiani 220		Uncert:			+/-1.07	Pere		,5.,	(00/0 120/	, , , , , , , , , , , , , , , , , , , ,	05/10/1015.10
		TPU			+/-2.44						
QC1203535056	MB										
Radium-228				U	-0.377	pCi/L				AXM6	05/10/1613:18
		Uncert:			+/-0.297						
		TPU:			+/-0.297						
QC1203535057	395751018 MS										
Radium-228		140	1.19		114	pCi/L		81.1	(70%-130%	5) AXM6	05/10/1613:18
		Uncert:	+/-0.430		+/-10.6						
		TPU:	+/-0.471		+/-21.6						
QC1203535058	395751018 MSD										
Radium-228		140	1.19		134	pCi/L	15.8	95.2	(0%-20%	b) AXM6	05/10/1613:18
		Uncert:	+/-0.430		+/-11.4						
		TPU:	+/-0.471		+/-24.4						
Rad Ra-226 Batch	1561456										
001202522728	LCS										
Radium 226		12.2			120	nCi/I		105	(00%-1100	() I VD1	04/20/1612.10
Kauluill-220		12.2 Uncert			12.8 +/_0.026	pCI/L		105	(3070-110%) LAFI	04/29/1015:10
					+/-7.48						
OC1203532735	MB	110.			17-2.40						
Radium-226				U	0.0163	pCi/L				LXP1	04/29/1610:40

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QC Summary

395751									
	NOM	Sample Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
1561456									
	Uncent		. / 0.122						
	Uncert:		+/-0.132						
395997001 MS	110.		+/-0.152						
373777001 1113	12.2 U	0.135	12.0	pCi/L		98 7	(80%-120%)	LXP1	04/29/1610.40
	Uncert:	+/-0.115	+/-0.906	Pend		20.7	(00/0 120/0)		0 1/29/1010.10
	TPU:	+/-0.117	+/-1.89						
395997001 MSD									
	12.2 U	0.135	10.9	pCi/L	9.87	89.4	(0%-20%)	LXP1	04/29/1613:10
	Uncert:	+/-0.115	+/-0.827						
	TPU:	+/-0.117	+/-1.85						
1561457									
LCS									
	12.2		12.5	pCi/L		102	(90%-110%)	LXP1	05/03/1612:30
	Uncert:		+/-0.711						
	TPU:		+/-1.88						
MB									
		U	-0.0458	pCi/L				LXP1	05/03/1611:55
	Uncert:		+/-0.0777						
	TPU:		+/-0.0777						
395751018 MS	24.4	0.100	27.4	C'./I		110	(000/ 1000/)	LVD1	05/02/1612 20
	24.4	0.180	27.4	pC1/L		112	(80%-120%)	LXPI	05/03/1612:30
		+/-0.119	+/-1.44						
395751018 MSD	IFU.	+/-0.125	+/-4.37						
375751010 1150	24.4	0.180	27.8	nCi/L	1 25	113	(0% - 20%)	I XP1	05/03/1612.30
	Uncert:	+/-0.119	+/-1.46	PCI/L	1.23	115	(070 2070)		05/05/1012.50
	TPU:	+/-0.125	+/-5.21						
	395751 1561456 395997001 MS 395997001 MSD 1561457 LCS MB 395751018 MS 395751018 MSD	NOM 1561456 Uncert: TPU: 395997001 MS 12.2 U Uncert: TPU: 395997001 MSD 12.2 U Uncert: TPU: 1561457 12.2 U Uncert: TPU: 1561457 12.2 U Uncert: TPU: MB 12.2 U Uncert: TPU: 395751018 MS 24.4 Uncert: TPU: 395751018 MSD 24.4 Uncert: TPU: 24.4 Uncert: TPU: 24.4 Uncert: TPU:	NOM Sample Qual 1561456 Uncert: TPU: 395997001 MS 12.2 U 395997001 MS 12.2 U 395997001 MSD 12.2 U 395997001 MSD 12.2 U 12.2 U 0.135 Uncert: +/-0.115 TPU: +/-0.117 395997001 MSD 12.2 U 12.2 U 0.135 Uncert: +/-0.115 TPU: +/-0.117 1561457 LCS 12.2 Uncert: TPU: +/-0.117 MB U MB U 395751018 MS 24.4 0.180 Uncert: +/-0.119 TPU: +/-0.125 395751018 MSD 24.4 24.4 0.180 Uncert: +/-0.119 TPU: +/-0.125	NOM Sample Qual QC 1561456 Uncert: +/-0.132 395997001 MS TPU: +/-0.132 395997001 MS 12.2 U 0.135 12.0 Uncert: +/-0.115 +/-0.906 TPU: +/-0.117 +/-1.89 395997001 MSD 12.2 U 0.135 10.9 Uncert: +/-0.117 +/-1.89 395997001 MSD 12.2 U 0.135 10.9 Uncert: +/-0.117 +/-1.89 395997001 MSD 12.2 U 0.135 10.9 Uncert: +/-0.117 +/-1.89 1561457 LCS 12.2 12.5 Uncert: +/-0.711 TPU: +/-1.85 1561457 LCS 12.2 12.5 Uncert: +/-0.711 TPU: +/-0.711 TPU: +/-0.711 TPU: +/-0.711 TPU: +/-0.0777 TPU: +/-0.0777 TPU: +/-0.0777 TPU: +/-0.0777 TPU: +/-0.125 +/-4.37 395751018 MSD 24.4 0.180 27.4	NOM Sample Qual QC Units 1561456 Uncert: $+/-0.132$ TPU: $+/-0.132$ 395997001 MS 12.2 U 0.135 12.0 pCi/L 395997001 MS 12.2 U 0.135 1/-0.0906 TPU: 395997001 MSD 12.2 U 0.135 10.9 pCi/L Uncert: $+/-0.117$ $+/-1.89$ PCi/L Uncert: $+/-0.117$ $+/-1.85$ 1561457 LCS 12.2 12.5 pCi/L Uncert: $+/-0.711$ TPU: $+/-0.711$ TPU: $+/-0.771$ TPU: $+/-0.0777$ TPU: $+/-0.0777$ TPU: $+/-0.0777$ TPU: $+/-0.0777$ TPU: $+/-0.0777$ TPU: $+/-0.125$ $+/-4.37$ 395751018 MSD 24.4 0.180 27.4 PCi/L Uncert: $+/-0.125$ $+/-4.37$ 395751018 MSD 24.4 0.180 27.8 PCi/L Uncert: $+/-0.119$ $+/-1.46$ TPU: $+/-0.125$ $+/-4.37$ 2	NOM Sample Qual QC Units RPD% 1561456 Uncert: +/-0.132 TPU: +/-0.132 395997001 MS 12.2 0.135 12.0 pCi/L Uncert: +/-0.115 +/-0.906 TPU: +/-0.117 395997001 MSD 12.2 0.135 10.9 pCi/L 9.87 1561457 Uncert: +/-0.117 +/-1.89 12.2 0.135 10.9 pCi/L 9.87 1561457 Uncert: +/-0.117 +/-1.85 12.2 12.5 pCi/L 9.87 1561457 Uncert: +/-0.117 +/-1.88 MB U -0.0458 pCi/L 1.2.2 12.5 pCi/L 1.2.2 12.5 pCi/L 1.2.5 1.2.2 12.5 pCi/L 1.2.2 1.2.5 1.2.5 1.2.5 1.2.5 1.2.5 1.2.5 1.2.5 1.2.5 1.2.5 1.2.5 1.2.5 1.2.5 1.2.5 1.2.5 1.2.5 1.2.5 1.2.5 1.2.5 1.2.5 <td>NOM Sample Qual QC Units RPD% REC% 1561456 Uncert: +/-0.132 TPU: +/-0.132 395997001 MS 12.2 0 0.135 12.0 pCi/L 98.7 395997001 MSD 12.2 U 0.135 12.0 pCi/L 98.7 395997001 MSD 12.2 U 0.135 10.9 pCi/L 9.87 89.4 Uncert: +/-0.117 +/-1.89 12.2 0.135 10.9 pCi/L 9.87 89.4 Uncert: +/-0.115 +/-0.827 TPU: +/-0.117 +/-1.89 1561457 LCS 12.2 12.5 pCi/L 102 Uncert: +/-0.117 +/-1.88 PCi/L 102 MB Uncert: +/-0.0771 TPU: +/-0.0777 102 395751018 MS 24.4 0.180 27.4 pCi/L 112 395751018 MSD 24.4 0.180 27.8 pCi/L 1.25 113<td>$\begin{array}{c c c c c c c c c c c c c c c c c c c$</td><td>$\begin{array}{c c c c c c c c c c c c c c c c c c c$</td></td>	NOM Sample Qual QC Units RPD% REC% 1561456 Uncert: +/-0.132 TPU: +/-0.132 395997001 MS 12.2 0 0.135 12.0 pCi/L 98.7 395997001 MSD 12.2 U 0.135 12.0 pCi/L 98.7 395997001 MSD 12.2 U 0.135 10.9 pCi/L 9.87 89.4 Uncert: +/-0.117 +/-1.89 12.2 0.135 10.9 pCi/L 9.87 89.4 Uncert: +/-0.115 +/-0.827 TPU: +/-0.117 +/-1.89 1561457 LCS 12.2 12.5 pCi/L 102 Uncert: +/-0.117 +/-1.88 PCi/L 102 MB Uncert: +/-0.0771 TPU: +/-0.0777 102 395751018 MS 24.4 0.180 27.4 pCi/L 112 395751018 MSD 24.4 0.180 27.8 pCi/L 1.25 113 <td>$\begin{array}{c c c c c c c c c c c c c c c c c c c$</td> <td>$\begin{array}{c c c c c c c c c c c c c c c c c c c$</td>	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $

Notes:

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TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

The Qualifiers in this report are defined as follows:

- ** Analyte is a Tracer compound
- < Result is less than value reported
- > Result is greater than value reported
- BD Results are either below the MDC or tracer recovery is low
- FA Failed analysis.
- H Analytical holding time was exceeded
- J Value is estimated
- K Analyte present. Reported value may be biased high. Actual value is expected to be lower.
- L Analyte present. Reported value may be biased low. Actual value is expected to be higher.
- M M if above MDC and less than LLD
- M REMP Result > MDC/CL and < RDL
- N/A RPD or %Recovery limits do not apply.
- N1 See case narrative

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QC Summary

Worko	rder: 39575	1						Page 4	of 4		
Parmna	me	NOM	Sample Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
ND	Analyte concer	ntration is not detected above t	he detection limit								
NJ	Consult Case N	Narrative, Data Summary pack	age, or Project Manager con	ncerning thi	is qualifier	•					
Q	One or more q	uality control criteria have not	been met. Refer to the appl	icable narra	ative or DI	ER.					
R	Sample results	are rejected									
U	Analyte was an	nalyzed for, but not detected al	ove the MDL, MDA, MDC	or LOD.							
UI	Gamma Spectr	oscopyUncertain identificati	on								
UJ	Gamma Spectr	oscopyUncertain identificati	on								
UL	Not considered	l detected. The associated num	ber is the reported concentr	ation, whic	h may be i	inaccurate d	ue to a low l	bias.			
Х	Consult Case N	Narrative, Data Summary pack	age, or Project Manager con	ncerning thi	is qualifier	•					
Y	Other specific	qualifiers were required to pro	perly define the results. Con	nsult case n	arrative.						
^	RPD of sample	e and duplicate evaluated using	+/-RL. Concentrations are	e <5X the R	L. Qualif	ier Not App	licable for R	Radiochemi	stry.		
h	Preparation or	preservation holding time was	exceeded								
N/A in ** Indi ^ The I five tir	dicates that spil icates analyte is Relative Percent nes (5X) the con-	te recovery limits do not apply a surrogate/tracer compound. t Difference (RPD) obtained fr tract required detection limit (when sample concentration om the sample duplicate (E RL). In cases where either	n exceeds sp DUP) is eva the sample	pike conc. luated aga or duplica	by a factor inst the accur te value is l	of 4 or more eptence crite ess than 5X	e or %RPD pria when the the RL, a c	not applic ne sample : ontrol lim	able. is greater it of +/- tl	than
RL is u	used to evaluate	the DUP result.	,	I -				,			
For PS	, PSD, and SDI	LT results, the values listed are	the measured amounts, no	t final conc	entrations						

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.

Certificate of Analysis

Company : K Address : 6	atahdin Anal 00 Technolog	ytical Servi zv Wav	ices								
							-	-			
S	carborough, I	Maine 0407	4				Rep	ort Date:	May 11	, 2016	
Contact: N	Is. Jennifer C	brin									
Project: N	WIRP Bethp	age Project	t # 60266589 Pł	nase FI.WS							
Client Sample ID Sample ID: Matrix: Collect Date: Receive Date: Collector:	HN24S- 3958510 Ground 20-APR- 21-APR- Client	GW-0420 001 Water -16 -16	16			Project: Client II	KATA D: KATA	A00116 A003			
Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units D	F Analyst	Date Time	Batch	Mtd.
Rad Alpha Spec Analysi	S	,									
Alphaspec 1n, Liquia	As Keceivea	0.0201	1/0.0870	0.220	1/0.0892	0.500	»С:/I	WVD2 05	105/16 2212	1562055	1
Thorium 220	U	-0.0201	+/-0.0879	0.230	+/-0.0885	0.500	pCi/L pCi/L	KAB2 03	/03/10 2215	1362033	1
Thorium-232	U	-0.00198	+/-0.0821	0.152	+/-0.103	0.500	pCi/L				
Alphaspec II Liquid "	As Received"	0.00190	17 0.0021	0.152	17 0.0023	0.500	PerE				
Uranium-233/234	is neceiveu	0 593	+/-0 357	0.295	+/-0 369	0.500	pCi/L	KXB2 05	/05/16 0946	1562056	2
Uranium-235/236		0.418	+/-0.332	0.179	+/-0.338	0.500	pCi/L	10102 00	05/10 09 10	1502050	-
Uranium-238		0.145	+/-0.191	0.145	+/-0.192	0.500	pCi/L				
Rad Gas Flow Proportio	nal Countin	g									
Radium-228 in Drinkin	g Water EPA	904.0 "As	Received"								
Radium-228		0.941	+/-0.367	0.469	+/-0.397	1.00	pCi/L	AXM6 05	/10/16 1739	1562339	3
Rad Radium-226											
Radium-226 in Drinkin	g Water EPA	903.1 (De-	-emanati "As Re	eceived"							
Radium-226		0.890	+/-0.164	0.0827	+/-0.212	1.00	pCi/L	LXP1 05	/08/16 0915	1561849	4
The following Analytica	l Methods w	ere perfori	med								
Method Descr	iption										
1 DOE I	EML HASL-30	0, Th-01-RC	2 Modified								
2 DOE H	EML HASL-30	0, U-02-RC	Modified								
3 EPA 9	04.0/ EPA 932	0									
4 EPA 9	03.1										
Surrogate/Tracer Reco	very T	est					Batch II	Recovery	% Accepta	able Lin	nits
Thorium-229 Tracer		Alphaspec '	Th, Liquid "As	Received"			1562055	87.9	(30%	-110%)	
Uranium-232 Tracer		Alphaspec	U, Liquid "As F	Received"			1562056	75.9	(30%	-110%)	
Barium Carrier		Radium-22	8 in Drinking W	Vater EPA 904.0	"As Received"		1562339	98.3	(30%	-110%)	
Yttrium Carrier		Radium-22	8 in Drinking W	Vater EPA 904.0	"As Received"		1562339	87.4	(30%	-110%)	

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Certificate of Analysis

Company : Address :	Katahdin Analytical Services 600 Technology Way	
	Scarborough, Maine 04074	Report Date: May 11, 2016
Contact:	Ms. Jennifer Obrin	
Project:	NWIRP Bethpage Project # 60266589 Phase FI.WS	
Client Sample Sample ID:	EID: HN24S-GW-042016 395851001	Project: KATA00116 Client ID: KATA003
Parameter	Qualifier Result Uncertainty MDC	TPU RL Units DF Analyst Date Time Batch Mtd.
Surrogate/Tracer F	Recovery Test	Batch ID Recovery% Acceptable Limits

Notes:

The MDC is a sample specific MDC.

Company : Address :	Katahdin An 600 Technolo	alytical Servi ogy Way	ices								
	Scarborough	. Maine 0407	/4				Ren	ort Date:	May 11	2016	
Contact:	Ms. Jennifer	Obrin					nep	Jit Dute.	intug 11	, 2010	
Project:	NWIRP Beth	nage Project	# 60266580 Ph	ase FI WS							
		ipage i lojeci	. # 0020038911.	lase 11. w 5		D	17.4 50.4	00116			
Client Sample Sample ID: Matrix: Collect Date: Receive Date: Collector:	ID: FD03-0 395851 Ground 20-API 21-API Client	GW-042016 002 Water R-16 R-16)			Project: Client II	KATA D: KATA	.00116 .003			
Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units DF	Analyst D	ate Time	Batch	Mtd.
Rad Alpha Spec Ana Alphaspec Th, Liqu	l ysis iid "As Received	<i>l</i> " 0.0638	+/-0 147	0.234	+/-0 147	0.500	рСі/I	KXB2 05/04	5/16 2213	1562055	1
Thorium-228	U	-0.0315	+/-0.120	0.312	+/-0.120	0.500	pCi/L	KAB2 05/0.	//10/2213	1502055	1
Thorium-232	U	0.0295	+/-0.118	0.204	+/-0.118	0.500	pCi/L				
Alphaspec U, Liqui	d "As Received	"					•				
Uranium-233/234	U	0.00211	+/-0.156	0.347	+/-0.156	0.500	pCi/L	KXB2 05/05	5/16 0946	1562056	2
Uranium-235/236	U	0.115	+/-0.225	0.312	+/-0.226	0.500	pCi/L				
Uranium-238	U	0.145	+/-0.210	0.253	+/-0.211	0.500	pCi/L				
Rad Gas Flow Propo Radium-228 in Drin	ortional Counti nking Water EF	ng PA 904.0 "As	Received"								
Radium-228		1.39	+/-0.884	1.38	+/-0.912	1.00	pCi/L	AXM6 05/10)/16 1739	1562339	3
Rad Radium-226											
Radium-226 in Drii	nking Water EF	PA 903.1 (De-	-emanati "As Re	eceived"							
Radium-226		0.656	+/-0.146	0.0874	+/-0.179	1.00	pCi/L	LXP1 05/08	3/16 0915	1561849	4
The following Analyt	tical Methods	were perform	ned								
Method De	escription										
1 D0	OE EML HASL-3	300, Th-01-RC	Modified								
2 DC	OE EML HASL-3	300, U-02-RC	Modified								
3 EF	PA 904.0/ EPA 93	320									
4 EP	PA 903.1										
Surrogate/Tracer R	ecovery	Test					Batch ID	Recovery%	Accepta	able Lin	nits
Thorium-229 Trac	er	Alphaspec '	Th, Liquid "As	Received"			1562055	86.1	(30%	-110%)	
Uranium-232 Trac	er	Alphaspec	U, Liquid "As F	Received"			1562056	71.5	(30%	-110%)	
Barium Carrier		Radium-22	8 in Drinking W	Vater EPA 904	4.0 "As Received"		1562339	47.5	(30%	-110%)	
Yttrium Carrier		Radium-22	8 in Drinking W	Vater EPA 904	4.0 "As Received"		1562339	93.5	(30%	-110%)	

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Certificate of Analysis

Company : Address :	Katahdin Analytical Services 600 Technology Way	
	Scarborough, Maine 04074	Report Date: May 11, 2016
Contact:	Ms. Jennifer Obrin	
Project:	NWIRP Bethpage Project # 60266589 Phase FI.WS	
Client Sample Sample ID:	e ID: FD03-GW-042016 395851002	Project: KATA00116 Client ID: KATA003
Parameter	Qualifier Result Uncertainty MDC	TPU RL Units DF Analyst Date Time Batch Mtd.
Surrogate/Tracer I	Recovery Test	Batch ID Recovery% Acceptable Limits

Notes:

The MDC is a sample specific MDC.

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Certificate of Analysis

Company :	Katahdin Anal	ytical Serv	ices								
Address .		sy way									
	Scarborough, I	Maine 0407	74				Repo	ort Date:	May 11	, 2016	
Contact:	Ms. Jennifer O	brin									
Project:	NWIRP Bethp	age Project	t # 60266589 Ph	ase FI.WS							
Client Sample I Sample ID: Matrix: Collect Date: Receive Date: Collector:	ID: RW1-GV 3958510 Ground V 20-APR- 21-APR- Client	W-042016 03 Water -16 -16	ì			Project: Client II	KATA D: KATA	00116 003			
Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units DF	Analyst D	ate Time	Batch	Mtd.
Rad Gas Flow Propor Radium-228 in Drin	rtional Counting king Water EPA	g 904.0 "As	Received"								
Radium-228		2.19	+/-0.859	1.18	+/-0.929	1.00	pCi/L	AXM6 05/1	0/16 1739	1562339	1
Rad Radium-226											
Radium-226 in Drin	king Water EPA	903.1 (De	-emanati "As Re	eceived"							
Radium-226		0.815	+/-0.154	0.0703	+/-0.213	1.00	pCi/L	LXP1 05/0	8/16 0915	1561849	2
The following Analyt	ical Methods w	ere perfor	med								
Method De	scription										
1 EP.	A 904.0/ EPA 932	0									
2 EP.	A 903.1										
Surrogate/Tracer Re	ecovery T	est					Batch ID	Recovery%	Accept	able Lin	nits
Barium Carrier]	Radium-22	8 in Drinking W	ater EPA 904.0) "As Received"		1562339	46.3	(30%	-110%)	
Yttrium Carrier]	Radium-22	8 in Drinking W	ater EPA 904.0) "As Received"		1562339	96.9	(30%	-110%)	
Notes:											

The MDC is a sample specific MDC.

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Company : Address :	Katahdin Anal 600 Technolog	ytical Servi v Wav	ces										
i iudioss :	Scarborough. N	Maine 0407	4				R	eport]	Date:	Ν	May 11	. 2016	
Contact:	Ms. Jennifer O	brin					1	eport	sute.	1	iuy 11	, 2010	
Project:	NWIDD Dathr	aga Droiaat	# 60266590 DI	AND ELWS									
Tiojeet.		age Floject	# 00200389 FI	lase FI. w S				-					
Chent Sample Sample ID: Matrix: Collect Date: Receive Date: Collector:	ID: T1305S- 3958510 Ground V 19-APR- 21-APR- Client	GW-0419 04 Water 16 16	16			Project: Client II	KA D: KA	TA00 TA00	116 3				
Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	DF A	nalyst	Date	Time	Batch	Mtd.
Rad Alpha Spec Ana Alphaspec Th, Liqu Thorium-228	ilysis <i>uid "As Received"</i> U	0.0878	+/-0.142	0.221	+/-0.143	0.500	pCi/L	N	1XS2	05/09/16	1001	1562057	7 1
Thorium-230		0.366	+/-0.245	0.283	+/-0.256	0.500	pCi/L						
Thorium-232	U	0.0214	+/-0.0878	0.153	+/-0.0879	0.500	pCi/L						
Alphaspec U, Liqui	id "As Received"												
Uranium-233/234		0.533	+/-0.337	0.289	+/-0.346	0.500	pCi/L	Ν	IXS2	05/04/16	0846	1562058	3 2
Uranium-235/236	U	0.117	+/-0.200	0.175	+/-0.201	0.500	pCi/L						
Uranium-238		0.614	+/-0.347	0.142	+/-0.359	0.500	pCi/L						
Rad Gas Flow Propo Radium-228 in Dri	ortional Counting Inking Water EPA	g 904.0 "As .	Received"										
Radium-228		1.57	+/-0.373	0.334	+/-0.452	1.00	pCi/L	А	XM6	05/10/16	1739	1562339) 3
Rad Radium-226													
Radium-226 in Dri	nking Water EPA	903.1 (De-	emanati "As Re	eceived"									
Radium-226		4.61	+/-0.372	0.0948	+/-0.741	1.00	pCi/L	Ι	XP1	05/08/16	0915	1561849) 4
The following Analy	tical Methods we	ere perforn	ned										
Method D	escription	_											
1 D	OE EML HASL-30	0, Th-01-RC	Modified										
2 D	OE EML HASL-30	0, U-02-RC	Modified										
3 El	PA 904.0/ EPA 9320	0											
4 El	PA 903.1												
Surrogate/Tracer R	ecovery To	est					Batch	ID R	ecove	ry% A	Accept	able Lin	nits
Thorium-229 Trac	er /	Alphaspec 7	Th, Liquid "As	Received"			15620)57	88	.2	(30%	-110%)	
Uranium-232 Trac	cer /	Alphaspec	U, Liquid "As F	Received"			15620)58	77	.7	(30%	-110%)	
Barium Carrier	1	Radium-228	8 in Drinking W	ater EPA 904	0 "As Received"		15623	39	99	.2	(30%	-110%)	
Yttrium Carrier]	Radium-228	8 in Drinking W	/ater EPA 904	.0 "As Received"		15623	39	10)1	(30%	-110%)	

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Certificate of Analysis

Company : Address :	Katahdin Analytical Services 600 Technology Way	
	Scarborough, Maine 04074	Report Date: May 11, 2016
Contact:	Ms. Jennifer Obrin	
Project:	NWIRP Bethpage Project # 60266589 Phase FI.WS	
Client Sample Sample ID:	e ID: TT305S-GW-041916 395851004	Project: KATA00116 Client ID: KATA003
Parameter	Qualifier Result Uncertainty MDC	TPU RL Units DF Analyst Date Time Batch Mtd.
Surrogate/Tracer F	Recovery Test	Batch ID Recovery% Acceptable Limits

Notes:

The MDC is a sample specific MDC.

Company : Address :	Katahdin Anal 600 Technolog	lytical Servi gy Way	ces									
	Scarborough.	Maine 0407	4				Re	port Date:	1	May 11	. 2016	
Contact:	Ms Jennifer ()hrin					ite,	port Dute.		uluy 11	, 2010	
Droject:	NW/IDD Dathr	oran Ducia at	# 60266590 Dh	and ELWS								
Floject.	NWIKP Being	age Project	# 00200389 Pf	ase FI.wS								
Client Sample Sample ID: Matrix: Collect Date: Receive Date: Collector:	ID: TT305I- 3958510 Ground 19-APR 21-APR Client	GW-04192 005 Water -16 -16	16			Project: Client II	KAT D: KAT	A00116 A003				
Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units D	F Analys	t Date	Time	Batch	Mtd.
Rad Alpha Spec Ana Alphaspec Th, Liqu	nlysis uid "As Received"	,	. / 0.007.0	0.221	. / 0.0077	0.500	C: /		05/00/1	c 1001	15 (20)55	7 1
Thorium 228	U	-0.0196	+/-0.0876	0.221	+/-0.08/7	0.500	pCi/L	MXS2	05/09/10	5 1001	1562057	1
Thorium-232	U	0.0192	+/-0.0795	0.139	+/-0.0797	0.500	pCi/L pCi/L					
Alphaspec U Liau	id "As Received"						P					
Uranium-233/234	U III III III U	0.0969	+/-0.208	0.367	+/-0.209	0.500	pCi/L	MXS2	05/09/16	5 1356	1562058	3 2
Uranium-235/236	U	0.128	+/-0.203	0.281	+/-0.204	0.500	pCi/L					
Uranium-238	U	0.166	+/-0.202	0.270	+/-0.203	0.500	pCi/L					
Rad Gas Flow Propo Radium-228 in Dri	ortional Countin Inking Water EPA	g 904.0 "As	Received"									
Radium-228		1.14	+/-0.447	0.635	+/-0.484	1.00	pCi/L	AXM6	05/10/16	5 1739	1562339) 3
Rad Radium-226												
Radium-226 in Dri	nking Water EPA	903.1 (De-	emanati "As Re	eceived"								
Radium-226		1.80	+/-0.233	0.120	+/-0.346	1.00	pCi/L	LXP1	05/08/16	5 0950	1561849) 4
The following Analy	tical Methods w	ere perform	ned									
Method D	escription											
1 D	OE EML HASL-30	0, Th-01-RC	Modified									
2 D	OE EML HASL-30	0, U-02-RC	Modified									
3 El	PA 904.0/ EPA 932	20										
4 El	PA 903.1											
Surrogate/Tracer R	lecovery T	est					Batch I	D Recove	ry%	Accept	able Lin	nits
Thorium-229 Tracer	Al	phaspec Th	, Liquid "As Re	ceived"			156205	7 118	*	(30%	-110%)	
Uranium-232 Trac	cer	Alphaspec	U, Liquid "As F	Received"			156205	8 8	39	(30%	-110%)	
Barium Carrier		Radium-228	8 in Drinking W	ater EPA 904.	0 "As Received"		156233	9 98	8.6	(30%	-110%)	
Yttrium Carrier Radium-228 in Drinking Water EPA 904.0 "As Received" 15							156233	9 1	01	(30%	-110%)	

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Certificate of Analysis

Company : Address :	Katahdin Analytical Services 600 Technology Way	
	Scarborough, Maine 04074	Report Date: May 11, 2016
Contact:	Ms. Jennifer Obrin	
Project:	NWIRP Bethpage Project # 60266589 Phase FI.WS	
Client Sample Sample ID:	EID: TT305I-GW-041916 395851005	Project: KATA00116 Client ID: KATA003
Parameter	Qualifier Result Uncertainty MDC	TPU RL Units DF Analyst Date Time Batch Mtd.
Surrogate/Tracer F	Recovery Test	Batch ID Recovery% Acceptable Limits

Notes:

The MDC is a sample specific MDC.

Company : Address :	Katahdin Ana 600 Technolo	lytical Servi gy Way	ices										
	Scarborough.	Maine 0407	4				R	lenoi	rt Date:	ז	May 11	2016	
Contact:	Ms Jennifer (Obrin						copor	ti Dute.	1	ilay 11	, 2010	
Project:	NWIPD Both	naga Project	# 60266580 Ph	ase ELWS									
		page i lojeci	# 00200389 FI	lase 11. w S		D	77.4		00116				
Chent Sample Sample ID: Matrix: Collect Date: Receive Date: Collector:	ID: 11311S 3958510 Ground 19-APR 21-APR Client	GW-0419 006 Water -16 -16	116			Project: Client II	KA D: KA	TA(00116 003				
Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
Rad Alpha Spec Ana Alphaspec Th, Liqu Thorium-228	l lysis uid "As Received"	" 0 104	+/-0 154	0.225	+/-0 155	0 500	pCi/L		MXS2	05/09/16	5 1001	1562057	7 1
Thorium-230	U	-0.0424	+/-0.122	0.312	+/-0.122	0.500	pCi/L		1011102	00/07/10	1001	1002007	•
Thorium-232	U	0.0154	+/-0.0966	0.189	+/-0.0968	0.500	pCi/L						
Alphaspec U, Liqui	d "As Received"												
Uranium-233/234	U	0.068	+/-0.163	0.260	+/-0.163	0.500	pCi/L		MXS2	05/09/16	5 1354	1562058	3 2
Uranium-235/236	U	-0.042	+/-0.143	0.322	+/-0.143	0.500	pCi/L						
Uranium-238	U	0.00	+/-0.188	0.376	+/-0.189	0.500	pCi/L						
Rad Gas Flow Propo Radium-228 in Drin	ortional Countin nking Water EPA	ng A 904.0 "As	Received"										
Radium-228		1.47	+/-0.433	0.497	+/-0.497	1.00	pCi/L		AXM6	05/10/16	5 1739	1562339) 3
Rad Radium-226													
Radium-226 in Drii	nking Water EPA	A 903.1 (De-	emanati "As Re	eceived"									
Radium-226		2.12	+/-0.261	0.128	+/-0.419	1.00	pCi/L		LXP1	05/08/16	0950	1561849	9 4
The following Analy	tical Methods w	vere perform	ned										
Method De	escription												
1 D0	OE EML HASL-30	00, Th-01-RC	Modified										
2 D0	OE EML HASL-30	00, U-02-RC	Modified										
3 EF	PA 904.0/ EPA 932	20											
4 EF	PA 903.1												
Surrogate/Tracer R	ecovery 1	Test					Batch	ID	Recover	ry% /	Accepta	able Lir	nits
Thorium-229 Trac	er	Alphaspec '	Th, Liquid "As	Received"			15620)57	91	.2	(30%	-110%)	
Uranium-232 Tracer	A	lphaspec U,	Liquid "As Rec	ceived"			15620)58	27	*	(30%	-110%)	
Barium Carrier		Radium-22	8 in Drinking W	ater EPA 904.0	"As Received"		15623	39	96	i.5	(30%	-110%)	
Yttrium Carrier Radium-228 in Drinking Water EPA 904.0 "As Rea							15623	39	90).8	(30%	-110%)	

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Certificate of Analysis

Company : Address :	Katahdin Analytical Services 600 Technology Way	
	Scarborough, Maine 04074	Report Date: May 11, 2016
Contact:	Ms. Jennifer Obrin	
Project:	NWIRP Bethpage Project # 60266589 Phase FI.WS	
Client Sample Sample ID:	E ID: TT311S-GW-041916 395851006	Project: KATA00116 Client ID: KATA003
Parameter	Qualifier Result Uncertainty MDC	TPU RL Units DF Analyst Date Time Batch Mtd.
Surrogate/Tracer H	Recovery Test	Batch ID Recovery% Acceptable Limits

Notes:

The MDC is a sample specific MDC.

Company : Address :	Katahdin Ana 600 Technolo	llytical Servi ogy Way	ices										
	Scarborough,	Maine 0407	4				R	eport l	Date:	N	Aay 11	, 2016	
Contact:	Ms. Jennifer (Obrin						1					
Project:	NWIRP Beth	page Project	: # 60266589 Ph	ase FI.WS									
Client Sample Sample ID: Matrix: Collect Date: Receive Date: Collector:	ID: TT3111 3958510 Ground 19-APR 21-APR Client	-GW-0419 007 Water R-16 R-16	16			Project: Client II	KA D: KA	TA00 TA00	116 3				
Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	DF A	nalyst	Date	Time	Batch	Mtd.
Rad Alpha Spec Anal Alphaspec Th, Liqui Thorium-228	lysis id "As Received U	0.0823	+/-0.146	0.221	+/-0.147	0.500	pCi/L	N	AXS2	05/09/16	1002	1562057	1
Thorium-230	U	-0.00763	+/-0.125	0.287	+/-0.125	0.500	pCi/L						
Thorium-232	U	-0.019	+/-0.0752	0.200	+/-0.0755	0.500	pCi/L						
Alphaspec U, Liquid	d "As Received"	,											
Uranium-233/234	U	0.227	+/-0.231	0.228	+/-0.233	0.500	pCi/L	Ν	1XS2	05/04/16	0846	1562058	2
Uranium-235/236	U	0.00	+/-0.119	0.176	+/-0.119	0.500	pCi/L						
Uranium-238	U 	0.192	+/-0.234	0.314	+/-0.236	0.500	pCi/L						
Radium-228 in Driv	rtional Countil	ng 4 904 0 "As	Received"										
Radium-228 in Drin	iking water Err	1.93	+/-0.430	0.426	+/-0 531	1.00	pCi/L	А	XM6	05/10/16	1739	1562339	3
Rad Radium-226		1.00	., 0.100	01120	1, 01001	1100	pere			00/10/10	1107	1002007	0
Radium-226 in Drin	iking Water EP	A 903.1 (De-	-emanati "As Re	eceived"									
Radium-226		2.05	+/-0.265	0.122	+/-0.459	1.00	pCi/L	L	LXP1	05/08/16	0950	1561849	4
The following Analyt	ical Methods w	vere perforr	ned										
Method De	escription	· · · · F · · · · ·											
1 DC	DE EML HASL-3	00, Th-01-RC	Modified										
2 DC	DE EML HASL-3	00, U-02-RC	Modified										
3 EP	A 904.0/ EPA 93	20											
4 EP	A 903.1												
Surrogate/Tracer Re	ecovery 7	ſest					Batch	ID R	ecove	ry% A	Accepta	able Lin	nits
Thorium-229 Trace	er	Alphaspec '	Th, Liquid "As	Received"			15620	57	81	.3	(30%	-110%)	
Uranium-232 Trace	er	Alphaspec	U, Liquid "As F			1562058 75.9 (30%-1			-110%)				
Barium Carrier		Radium-22	8 in Drinking W	ater EPA 904	.0 "As Received"		15623	39	10)1	(30%	-110%)	
Yttrium Carrier	Yttrium CarrierRadium-228 in Drinking Water EPA 904.0 "As Received"156233999.9(30%-110%)												

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Certificate of Analysis

Company : Address :	Katahdin Analytical Services 600 Technology Way	
	Scarborough, Maine 04074	Report Date: May 11, 2016
Contact:	Ms. Jennifer Obrin	
Project:	NWIRP Bethpage Project # 60266589 Phase FI.WS	
Client Sample Sample ID:	e ID: TT311I-GW-041916 395851007	Project: KATA00116 Client ID: KATA003
Parameter	Qualifier Result Uncertainty MDC	TPU RL Units DF Analyst Date Time Batch Mtd.
Surrogate/Tracer F	Recovery Test	Batch ID Recovery% Acceptable Limits

Notes:

The MDC is a sample specific MDC.

Company : Address :	Katahdin Analy 600 Technology	rtical Servi y Way	ices										
	Scarborough, M	laine 0407	4				I	Repo	rt Date:	N	May 11	, 2016	
Contact:	Ms. Jennifer Ob	orin						•			2	,	
Project:	NWIRP Bethpa	ge Project	# 60266589 Ph	ase FI.WS									
Client Sample I Sample ID: Matrix: Collect Date: Receive Date: Collector:	D: FD02-GV 39585100 Ground V 19-APR-1 21-APR-1 Client	V-041916 08 Vater 16 16	;			Project: Client II	KA D: KA	ATA(ATA(00116 003				
Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
Rad Alpha Spec Anal Alphaspec Th, Liquit Thorium-228 Thorium-230	ysis d "As Received" U	0.279 0.172	+/-0.228 +/-0.196	0.234 0.260	+/-0.234 +/-0.200	0.500 0.500	pCi/L pCi/L		MXS2	05/10/16	0929	1565953	1
Thorium-232	U	0.139	+/-0.166	0.185	+/-0.168	0.500	pCi/L						
Alphaspec U, Liquia	"As Received"	0 1 4 2	. / 0.105	0.200	. / 0.100	0.500	C:/T		MYGO	05/00/16	1250	15(2059	
Uranium-233/234	U	0.143	+/-0.195	0.200	+/-0.196	0.500	pCi/L pCi/L		MA52	05/09/10	1330	1562058	. <u>Z</u>
Uranium-238	U	0.143	+/-0.195	0.266	+/-0.196	0.500	pCi/L						
Rad Gas Flow Propor Radium-228 in Drin	tional Counting	904.0 "As	Received"				I						
Radium-228		1.72	+/-0.420	0.461	+/-0.503	1.00	pCi/L		AXM6	05/10/16	1739	1562339	3
Rad Radium-226													
Radium-226 in Drin	king Water EPA	903.1 (De-	emanati "As Re	ceived"	. / 0.100	1.00	C' /		LVD1	05/11/14	0005	1561050	
Radium-226		0.831	+/-0.155	0.0866	+/-0.199	1.00	pCi/L		LXPI	05/11/16	0905	1201820	4
The following Analyti	ical Methods we	re perforn	ned										
Method Des	scription												
1 DO	E EML HASL-300	, Th-01-RC	Modified										
2 DO	E EML HASL-300	, U-02-RC	Modified										
3 EP/	A 904.0/ EPA 9320												
4 EP/	A 903.1												
Surrogate/Tracer Re	covery Te	st					Batch	n ID	Recove	ry% A	Accept	able Lin	nits
Thorium-229 Trace	r A	Iphaspec 7	Th, Liquid "As	Received"			1565	953	7	6	(30%	-110%)	
Uranium-232 Trace	er A	Iphaspec I	U, Liquid "As R	Received"			1562	058	93	3.2	(30%	-110%)	
Barium Carrier	R	adium-228	8 in Drinking W	ater EPA 904	.0 "As Received"		1562	339	1	01	(30%	-110%)	
Yttrium Carrier	Attrium Carrier Radium-228 in Drinking Water EPA 904.0 "As Received"							339	99	9.5	(30%	-110%)	

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Certificate of Analysis

Company : Address :	Katahdin Analytical Services 600 Technology Way	
	Scarborough, Maine 04074	Report Date: May 11, 2016
Contact:	Ms. Jennifer Obrin	
Project:	NWIRP Bethpage Project # 60266589 Phase FI.WS	
Client Sample Sample ID:	e ID: FD02-GW-041916 395851008	Project: KATA00116 Client ID: KATA003
Parameter	Qualifier Result Uncertainty MDC	TPU RL Units DF Analyst Date Time Batch Mtd.
Surrogate/Tracer I	Recovery Test	Batch ID Recovery% Acceptable Limits

Notes:

The MDC is a sample specific MDC.

Company : Address :	Katahdin Analy 600 Technolog	ytical Servi y Way	ices										
	Scarborough, N	1aine 0407	4				R	eport I	Date:	N	Aay 11	, 2016	
Contact:	Ms. Jennifer Ol	brin									2		
Project:	NWIRP Bethpa	age Project	: # 60266589 Ph	ase FI.WS									
Client Sample I Sample ID: Matrix: Collect Date: Receive Date: Collector:	ID: TT310S- 39585100 Ground V 20-APR- 21-APR- Client	GW-0420 09 Water 16 16	016			Project: Client II	KA D: KA	TA001 TA003	16 }				
Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	DF Ai	nalyst	Date	Time	Batch	Mtd.
Rad Alpha Spec Anal Alphaspec Th, Liqui Thorium-228	ysis id "As Received" U	0.0386	+/-0.122	0.228	+/-0.122	0.500	pCi/L	М	XS2	05/09/16	1002	1562057	1
Thorium-230	U	0.128	+/-0.162	0.244	+/-0.166	0.500	pCi/L						
Thorium-232		0.193	+/-0.161	0.144	+/-0.164	0.500	pCi/L						
Alphaspec U, Liquid	d "As Received"												
Uranium-233/234	U	0.0979	+/-0.173	0.262	+/-0.174	0.500	pCi/L	Μ	XS2	05/04/16	0846	1562058	2
Uranium-235/236	U	0.106	+/-0.182	0.159	+/-0.183	0.500	pCi/L						
Dramum-258	U rtional Countina	0.0979	+/-0.175	0.202	+/-0.174	0.500	pCI/L						
Radium-228 in Drin	king Water EPA	904.0 "As	Received"										
Radium-228		2.39	+/-0.575	0.723	+/-0.692	1.00	pCi/L	A	XM6	05/10/16	1739	1562339	3
Rad Radium-226							1						
Radium-226 in Drin	king Water EPA	903.1 (De-	-emanati "As Re	ceived"									
Radium-226		0.987	+/-0.169	0.088	+/-0.246	1.00	pCi/L	L	XP1	05/11/16	0905	1561850	4
The following Analyt	ical Methods we	re perforr	ned										
Method De	scription	-											
1 DC	E EML HASL-300), Th-01-RC	Modified										
2 DO	E EML HASL-300), U-02-RC	Modified										
3 EP.	A 904.0/ EPA 9320)											
4 EP.	A 903.1												
Surrogate/Tracer Re	ecovery Te	est					Batch	ID R	ecove	ry% A	ccept	able Lin	nits
Thorium-229 Trace	er A	Alphaspec '	Th, Liquid "As]	Received"			15620	57	10	02	(30%	-110%)	
Uranium-232 Trace	er A	Alphaspec			15620	58	9	15	(30%	-110%)			
Barium Carrier	F	Radium-22	8 in Drinking W	ater EPA 904	0 "As Received"		15623	39	98	3.1	(30%	-110%)	
Yttrium CarrierRadium-228 in Drinking Water EPA 904.0 "As Received"156233							39	96	5.5	(30%	-110%)		

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Certificate of Analysis

Company : Address :	Katahdin Analytical Services 600 Technology Way	
	Scarborough, Maine 04074	Report Date: May 11, 2016
Contact:	Ms. Jennifer Obrin	
Project:	NWIRP Bethpage Project # 60266589 Phase FI.WS	
Client Sample Sample ID:	EID: TT310S-GW-042016 395851009	Project: KATA00116 Client ID: KATA003
Parameter	Qualifier Result Uncertainty MDC	TPU RL Units DF Analyst Date Time Batch Mtd.
Surrogate/Tracer H	Recovery Test	Batch ID Recovery% Acceptable Limits

Notes:

The MDC is a sample specific MDC.

Company : Address :	Katahdin Anal 600 Technolog	lytical Servi gy Way	ces									
	Scarborough,	Maine 0407	4				R	eport Date	:	May 11	, 2016	
Contact:	Ms. Jennifer C	Dbrin						-		-		
Project:	NWIRP Bethr	age Project	# 60266589 Ph	ase FI.WS								
Client Sample Sample ID: Matrix: Collect Date: Receive Date: Collector:	ID: HN24I-0 3958510 Ground 20-APR 21-APR Client	GW-04201 010 Water -16 -16	6			Project: Client II	KA' D: KA'	TA00116 TA003				
Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	DF Analy	st Dat	e Time	Batch	Mtd.
Rad Alpha Spec Anal Alphaspec Th, Liqui Thorium-228	lysis id "As Received" U	, 0.0261	+/-0.131	0.263	+/-0.132	0.500	pCi/L	MXS2	2 05/09/1	6 1002	1562057	7 1
Thorium-230	U	0.080	+/-0.165	0.290	+/-0.16/	0.500	pCi/L					
Almhaan oo II Liaui	d "A a Dessived"	0.00002	+/-0.090	0.191	+/-0.0901	0.500	pci/L					
Uranium 233/234	a As Keceivea	0.285	±/-0.266	0.310	±/-0 269	0.500	pCi/I	MXS	2 05/09/1	6 1356	1562058	2 2
Uranium-235/234	U	-0.0285	+/-0.200	0.322	+/-0.209	0.500	pCi/L	MAS	5 05/09/1	0 1550	1502056	, 2
Uranium-238	U	0.166	+/-0.210	0.261	+/-0.211	0.500	pCi/L					
Rad Gas Flow Propo	rtional Countin	g					•					
Radium-228 in Drir	iking Water EPA	904.0 "As	Received"									
Radium-228		1.63	+/-0.457	0.578	+/-0.527	1.00	pCi/L	AXM	6 05/10/1	6 1739	1562339) 3
Rad Radium-226												
Radium-226 in Drir	ıking Water EPA	903.1 (De-	emanati "As Re	eceived"								
Radium-226		2.99	+/-0.299	0.121	+/-0.514	1.00	pCi/L	LXP1	05/11/1	6 0905	1561850) 4
The following Analyt	tical Methods w	ere perform	ned									
Method De	escription											
1 DC	DE EML HASL-30	0, Th-01-RC	Modified									
2 DC	2 DOE EML HASL-300, U-02-RC Modified											
3 EP	EPA 904.0/ EPA 9320											
4 EP	A 903.1											
Surrogate/Tracer R	ecovery T	est					Batch	ID Reco	very%	Accept	able Lin	nits
Thorium-229 Trace	er	Alphaspec '	Th, Liquid "As	Received"			15620	57	82.8	(30%-110%)		
Uranium-232 Trac	er	Alphaspec	U, Liquid "As F	Received"			15620	58	81.2 (30%-110%)			
Barium Carrier		Radium-22	8 in Drinking W	ater EPA 904	.0 "As Received"		15623	39	105	(30%	-110%)	
Yttrium Carrier Radium-228 in Drinking Water EPA 904.0 "As Received"							15623	339 94.6 (30%-110%				

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Certificate of Analysis

Company : Address :	Katahdin Analytical Services 600 Technology Way	
	Scarborough, Maine 04074	Report Date: May 11, 2016
Contact:	Ms. Jennifer Obrin	
Project:	NWIRP Bethpage Project # 60266589 Phase FI.WS	
Client Sample Sample ID:	e ID: HN24I-GW-042016 395851010	Project: KATA00116 Client ID: KATA003
Parameter	Qualifier Result Uncertainty MDC	TPU RL Units DF Analyst Date Time Batch Mtd.
Surrogate/Tracer I	Recovery Test	Batch ID Recovery% Acceptable Limits

Notes:

The MDC is a sample specific MDC.

Company : Address :	Katahdin Ana 600 Technolo	lytical Servi gy Way	ices										
	Scarborough,	Maine 0407	4				F	Repor	t Date:	N	/lay 11	, 2016	
Contact:	Ms. Jennifer (Obrin						-			-		
Project:	NWIRP Beth	page Project	# 60266589 Ph	ase FI.WS									
Client Sample Sample ID: Matrix: Collect Date: Receive Date: Collector:	ID: TT314S 3958510 Ground 20-APR 21-APR Client	-GW-0420 011 Water -16 -16	116			Project: Client II	KA D: KA)0116)03				
Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
Rad Alpha Spec Ana Alphaspec Th, Liqu Thorium-228	llysis <i>uid "As Received"</i> U	-0.0206	+/-0.0922	0.233	+/-0.0924	0.500	pCi/L		MXS2	05/09/16	1002	1562057	1
Thorium-230	U	0.0436	+/-0.132	0.248	+/-0.133	0.500	pCi/L						
Thorium-232	U	0.0427	+/-0.103	0.167	+/-0.103	0.500	pCi/L						
Alphaspec U, Liqui	id "As Received"												
Uranium-233/234	U	0.145	+/-0.184	0.229	+/-0.185	0.500	pCi/L		MXS2	05/04/16	0846	1562058	2
Uranium-235/236	U	0.0898	+/-0.177	0.245	+/-0.177	0.500	pCi/L						
Uranium-238	U	0.0529	+/-0.145	0.252	+/-0.146	0.500	pC1/L						
Rad Gas Flow Propo	ortional Countin	ng A 004 0 "A -	D										
Radium 220 in Dri	nking water EFA	A 904.0 AS	Keceivea	0.377	1/0.232	1.00	pCi/I		AYM6	05/10/16	1730	1562330	3
Radium 226	U	0.225	+/-0.230	0.377	+/-0.232	1.00	pCI/L		AANIO	03/10/10	1739	1302339	5
Radium-226 in Dri	nking Water FPA	4 903 1 (De-	emanati "As Ra	ceived"									
Radium-226	U	0.0612	+/-0.0735	0.124	+/-0.0745	1.00	pCi/L		LXP1	05/11/16	0905	1561850	4
		e	,				I						
I ne following Analy Mothod D	tical Methods w	ere periori	nea										
I D	OE EML HASL-30	00, Th-01-RC	Modified										
2 D	2 DOE EML HASL-300, U-02-RC Modified												
3 EI	PA 904.0/ EPA 932	20											
4 EI	PA 903.1												
Surrogate/Tracer R	ecovery T	lest					Batch	ID	Recove	ry% A	ccept	able Lin	nits
Thorium-229 Trac	er	Alphaspec 7	Th, Liquid "As	Received"			15620)57	88	8.9	(30%-110%)		
Uranium-232 Trac	cer	Alphaspec	U, Liquid "As F	Received"			15620)58	8	89 (30%-110%)			
Barium Carrier		Radium-22	8 in Drinking W	ater EPA 904	.0 "As Received"		15623	339	93	5.7	(30%-110%)		
Yttrium Carrier Radium-228 in Drinking Water EPA 904.0 "As Received"							15623	339	9 101 (30%-110			-110%)	

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Certificate of Analysis

Company : Address :	Katahdin Analytical Services 600 Technology Way	
	Scarborough, Maine 04074	Report Date: May 11, 2016
Contact:	Ms. Jennifer Obrin	
Project:	NWIRP Bethpage Project # 60266589 Phase FI.WS	
Client Sample Sample ID:	e ID: TT314S-GW-042016 395851011	Project: KATA00116 Client ID: KATA003
Parameter	Qualifier Result Uncertainty MDC	TPU RL Units DF Analyst Date Time Batch Mtd.
Surrogate/Tracer H	Recovery Test	Batch ID Recovery% Acceptable Limits

Notes:

The MDC is a sample specific MDC.

Company : Address :	Katahdin Anal 600 Technolog	ytical Servi y Way	ces										
	Scarborough, N	Maine 0407	4				F	Repor	rt Date:	N	Aay 11	, 2016	
Contact:	t: Ms. Jennifer Obrin												
Project:	NWIRP Bethp	age Project	# 60266589 Ph	ase FI.WS									
Client Sample Sample ID: Matrix: Collect Date: Receive Date: Collector:	ID: TT314I- 3958510 Ground V 20-APR- 21-APR- Client	GW-0420 12 Water 16 16	16			Project: Client II	KA D: KA	ATA(ATA(00116 003				
Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
Rad Alpha Spec Anal Alphaspec Th, Liqui Thorium-228	lysis id "As Received" U	0.0757	+/-0.134	0.204	+/-0.135	0.500	pCi/L		MXS2	05/09/16	1002	1562057	7 1
Thorium-230	U	0.169	+/-0.196	0.288	+/-0.200	0.500	pCi/L						
Almhaan oo II Liaui	d "A a Deceived"	0.0470	+/-0.114	0.165	+/-0.114	0.500	pCI/L						
Uranium 233/234	a As Keceivea	0.234	+/-0.245	0 305	+/-0 248	0.500	nCi/I		MXS2	05/04/16	0846	1562058	2 2
Uranium-235/234	U	0.234	+/-0.165	0.305	+/-0.248	0.500	pCi/L		WIA52	05/04/10	0840	1502056	, 2
Uranium-238	U	0.0816	+/-0.160	0.222	+/-0.161	0.500	pCi/L						
Rad Gas Flow Propo	rtional Counting	g											
Radium-228 in Drir	nking Water EPA	904.0 "As	Received"										
Radium-228		1.15	+/-0.374	0.443	+/-0.417	1.00	pCi/L		AXM6	05/10/16	1739	1562339) 3
Rad Radium-226													
Radium-226 in Drir	nking Water EPA	903.1 (De-	emanati "As Re	ceived"									
Radium-226		0.363	+/-0.117	0.102	+/-0.137	1.00	pC1/L		LXP1	05/11/16	0905	1561850) 4
The following Analyt	tical Methods we	ere perform	ned										
Method De	escription												
1 DC	DE EML HASL-30	0, Th-01-RC	Modified										
2 DC	2 DOE EML HASL-300, U-02-RC Modified												
3 EP	EPA 904.0/ EPA 9320												
4 EP	PA 903.1												
Surrogate/Tracer R	ecovery To	est					Batch	ID	Recove	ry% A	Accepta	able Lin	nits
Thorium-229 Trace	er /	Alphaspec [Th, Liquid "As	Received"			15620	057	8	8	(30%-110%)		
Uranium-232 Trac	er /	Alphaspec V	U, Liquid "As R	Received"			15620	058	78	78.4 (30%-110%)			
Barium Carrier	1	Radium-228	8 in Drinking W	ater EPA 904	.0 "As Received"		15623	339	94	i .7	(30%	-110%)	
Yttrium Carrier Radium-228 in Drinking Water EPA 904.0 "As Received"							15623	339	94	4.6	(30%	-110%)	

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Certificate of Analysis

Company : Address :	Katahdin Analytical Services 600 Technology Way	
	Scarborough, Maine 04074	Report Date: May 11, 2016
Contact:	Ms. Jennifer Obrin	
Project:	NWIRP Bethpage Project # 60266589 Phase FI.WS	
Client Sample Sample ID:	EID: TT314I-GW-042016 395851012	Project: KATA00116 Client ID: KATA003
Parameter	Qualifier Result Uncertainty MDC	TPU RL Units DF Analyst Date Time Batch Mtd.
Surrogate/Tracer R	Recovery Test	Batch ID Recovery% Acceptable Limits

Notes:

The MDC is a sample specific MDC.

Company : Address :	Katahdin Anal 600 Technolog	ytical Servi gy Way	ices										
	Scarborough, I	Maine 0407	4				F	Repor	t Date:	-	May 11	, 2016	
Contact:	Ms. Jennifer O	brin						•					
Project:	NWIRP Bethp	age Project	# 60266589 Ph	ase FI.WS									
Client Sample Sample ID: Matrix: Collect Date: Receive Date: Collector:	ID: TT313S- 3958510 Ground 20-APR- 21-APR- Client	-GW-0420 113 Water -16 -16	16			Project: Client II	KA D: KA	TAO TAO)0116)03				
Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
Rad Alpha Spec Ana Alphaspec Th, Liqu Thorium-228 Thorium-230	lysis id "As Received" U U	-0.0482 0.161	+/-0.0774 +/-0.184	0.247 0.259	+/-0.0777 +/-0.188	0.500 0.500	pCi/L pCi/L		MXS2	05/09/10	5 1002	1562057	7 1
Thorium-232	U	0.00717	+/-0.0957	0.203	+/-0.0959	0.500	pCi/L						
Alphaspec U, Liqui	d "As Received"												
Uranium-233/234	U	0.0749	+/-0.128	0.112	+/-0.129	0.500	pCi/L		MXS2	05/04/16	6 0846	1562058	3 2
Uranium-235/236	U	0.0463	+/-0.130	0.139	+/-0.130	0.500	pCi/L						
Uranium-238	U	0.0659	+/-0.130	0.180	+/-0.130	0.500	pCi/L						
Rad Gas Flow Propo	rtional Counting	g	D										
Radium-228 in Drif	iking Water EPA	0 270	Received	0.525	1/0217	1.00	nCi/I		AVM6	05/10/1	1740	1562220) 2
Radium-228	U	0.279	+/-0.515	0.323	+/-0.517	1.00	pCI/L		AAMO	05/10/10	0 1/40	1302339	, ,
Radium-226 in Driv	nking Water EPA	903.1 (De-	emanati "As Re	ceived"									
Radium-226		0.215	+/-0.0849	0.0854	+/-0.0903	1.00	pCi/L		LXP1	05/11/10	5 0935	1561850) 4
The following Applyt	tical Mathada w	oro porforr	mod										
Method De	escription	ere periori	licu										
1 D(DE EML HASL-30	0 Th-01-RC	Modified										
2 DC	DE EMIL HASL-30	0 U-02-RC	Modified										
2 EP	PA 904.0/ EPA 932	0											
4 EP	PA 903.1	-											
Surrogate/Tracer R	ecovery T	est					Batch	ID	Recover	rv%	Accept	able Lin	nits
Thorium-229 Trac	er	Alphaspec '	Th. Liquid "As	Received"			15620)57	83	3.9	(30%	-110%)	
Uranium-232 Trac	er .	Alphaspec 1	U, Liquid "As F	Received"			15620)58	10)2	2 (30%-110%)		
Barium Carrier	1	Radium-228	8 in Drinking W	/ater EPA 904	.0 "As Received"		15623	339	99).7	(30%-110%)		
Yttrium Carrier	Yttrium Carrier Radium-228 in Drinking Water EPA 904.0 "As Re						15623	339	39 87 (30%-1			-110%)	

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Certificate of Analysis

Company : Address :	Katahdin Analytical Services 600 Technology Way	
	Scarborough, Maine 04074	Report Date: May 11, 2016
Contact:	Ms. Jennifer Obrin	
Project:	NWIRP Bethpage Project # 60266589 Phase FI.WS	
Client Sample Sample ID:	e ID: TT313S-GW-042016 395851013	Project: KATA00116 Client ID: KATA003
Parameter	Qualifier Result Uncertainty MDC	TPU RL Units DF Analyst Date Time Batch Mtd.
Surrogate/Tracer I	Recovery Test	Batch ID Recovery% Acceptable Limits

Notes:

The MDC is a sample specific MDC.

Company : Address :	Katahdin Anal 600 Technolog	ytical Servi y Way	ces									
	Scarborough, I	Maine 0407	4				Re	port Date:	Ν	/lay 11	, 2016	
Contact:	Ms. Jennifer O	brin						•		2		
Project:	NWIRP Bethp	age Project	# 60266589 Ph	ase FLWS								
Client Sample I Sample ID: Matrix: Collect Date: Receive Date: Collector:	D: EB02-04 3958510 Ground V 20-APR- 21-APR- Client	2016 14 Water 16 16				Project: Client II	KAT D: KAT	A00116 A003				
Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units D	F Analyst	Date	Time	Batch	Mtd.
Rad Alpha Spec Analy Alphaspec Th, Liquid Thorium-228 Thorium-230 Thorium-232 Alphaspec U, Liquid Uranium-233/234 Uranium-235/236 Uranium-238 Rad Gas Flow Propor Radium-228 in Drin	ysis d "As Received" U U U t "As Received" U U tional Counting king Water EPA	-0.0061 -0.0154 0.0891 0.183 0.0603 0.135 g <i>904.0 "As i</i>	+/-0.137 +/-0.129 +/-0.145 +/-0.216 +/-0.194 Received"	0.309 0.303 0.204 0.234 0.181 0.234	+/-0.137 +/-0.129 +/-0.146 +/-0.218 +/-0.170 +/-0.195	0.500 0.500 0.500 0.500 0.500 0.500	pCi/L pCi/L pCi/L pCi/L pCi/L pCi/L	MXS2 (MXS2 (05/09/16 05/04/16	1002 0846	1562057 1562058	1
Radium-228	U	0.216	+/-0.283	0.483	+/-0.286	1.00	pCi/L	AXM6 (05/10/16	1740	1562339	3
Rad Radium-226	Line Water EDA	0021/D										
Radium-220 in Drin. Radium-226	King waier EPA	905.1 (De- 0.0217	+/-0 0471	0 0892	+/-0.0472	1.00	nCi/I	I XP1 (05/11/16	0935	1561850	4
Radium-220	0	0.0217	17 0.0471	0.0072	17 0.0472	1.00	pent	LAII	55/11/10	0755	1501050	7
The following Analyti	ical Methods we	ere perforn	ned									
I DO	E EML HASL-30	0, Th-01-RC	Modified									
2 D0	E EML HASL-30	0, U-02-RC I 0	Modified									
3 EPA	A 904.0/ EPA 932 A 903 1	0										
Sumerate/Trease Ba	- 905.1 	oat					Dotob I	D Basaron		agant	bla I in	ita
			T1 T 1 1/1 A	D ' 1"			15 (20)5		y70 A			<u> </u>
Uranium-229 Trace	r . er .	Alphaspec Alphaspec I	Ih, Liquid "As U, Liquid "As R	Received" Received"			156205	7 76. 8 77.	.9 .1	(30%-110%) (30%-110%)		
Barium Carrier	1	Radium-229	8 in Drinkino W	/ater EPA 904	1.0 "As Received"		156233	9 10	2	(30%	-110%)	
Yttrium CarrierRadium-228 in Drinking Water EPA 904.0 "As Received"156233997.2(30%-11(30%-11)							-110%)					

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Certificate of Analysis

Company : Address :	Katahdin Analytical Services 600 Technology Way	
	Scarborough, Maine 04074	Report Date: May 11, 2016
Contact:	Ms. Jennifer Obrin	
Project:	NWIRP Bethpage Project # 60266589 Phase FI.WS	
Client Sample Sample ID:	e ID: EB02-042016 395851014	Project: KATA00116 Client ID: KATA003
Parameter	Qualifier Result Uncertainty MDC	TPU RL Units DF Analyst Date Time Batch Mtd
Surrogate/Tracer 1	Recovery Test	Batch ID Recovery% Acceptable Limits

Notes:

The MDC is a sample specific MDC.
GEL LABORATORIES LLC

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QC Summary

Report Date: May 11, 2016

Client :	Katahdin Analytical S 600 Technology Way	ervices	_		•	<u>/</u>	Report Date: May 11, 2016 Page 1 of 6					
Contact: Workorder:	Scarborough, Maine Ms. Jennifer Obrin 395851											
Parmnama		NOM	Sample	ՈսօԼ	00	Unite	RPD%	REC%	Rango Anlst	Dote Time		
Rad Alpha Spec		nom	Bampie	Zuai	QC	Onits	KID /0	REC /0	Kange Amst	Date Thit		
Batch	1562055											
OC1203534366	395751018 DUP											
Thorium-228		U	0.126	U	-0.000204	pCi/L	. 0		N/A KXB2	05/05/1622:13		
		Uncert:	+/-0.166		+/-0.103	1						
		TPU:	+/-0.168		+/-0.104							
Thorium-230		U	0.0511	U	0.0112	pCi/L	, 0		N/A			
		Uncert:	+/-0.166		+/-0.177							
		TPU:	+/-0.167		+/-0.178							
Thorium-232		U	0.0195	U	-0.00198	pCi/L	, 0		N/A			
		Uncert:	+/-0.119		+/-0.101							
		TPU:	+/-0.119		+/-0.102							
QC1203534367	LCS											
Thorium-228				U	0.0407	pCi/L	,		KXB2	05/05/1622:13		
		Uncert:			+/-0.115							
TI : 000		TPU:			+/-0.115	C : T		01.4				
Thorium-230		10.5 Un conto			9.57	pC1/L		91.4	(75%-125%)			
		Uncert:			+/-1.23							
Thorium 232		IPU:		I	+/-2.20	nCi/I			(75% 125%)			
1110110111-232		Uncert		U	$\pm /_{-0.0821}$	pci/L	,		(75%-125%)			
					+/-0.0821							
OC1203534365	MB	110.			17 0.0025							
Thorium-228	1122			U	-0.0252	pCi/L			KXB2	05/05/1622:13		
1.10110111 220		Uncert:		C	+/-0.110	penz				00,00,1022110		
		TPU:			+/-0.111							
Thorium-230				U	0.0155	pCi/L						
		Uncert:			+/-0.215	1						
		TPU:			+/-0.216							
Thorium-232				U	0.0374	pCi/L	,					
		Uncert:			+/-0.148							
D 1	15(205)	TPU:			+/-0.148							
Batch	1562056											
QC1203534372	395751018 DUP											
Uranium-233/2	234		0.334	U	0.0777	pCi/L	44.7		(0% - 100%) KXB2	05/05/1609:46		
		Uncert:	+/-0.233		+/-0.153							
		TPU:	+/-0.237		+/-0.153	~ -	6 0 -		(00/ 1000/)			
Uranium-235/2	236	TT ·	0.160		0.218	pCi/L	, 30.9		(0% - 100%)			
		Uncert:	+/-0.176		+/-0.241							
Unomission 029		TPU:	+/-0.1//	TT	+/-0.243	- C: /	0		NT / A			
Oranium-238		U	U.1/8	U	U.223	pC1/L	. 0		1N/A			
			$\pm /_{-0.170}$		+/-0.234							
		110.	1/ 0.1/1		17 0.230							

QC1203534373 LCS

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QC Summary

Workorder: 395851								Page 2		
Parmname	NOM	Sample Qual		QC	Units	RPD%	REC%	Range	Anlst	Date Time
Rad Alpha Spec										
Batch 1562056										
Linenium 222/224				12.0	аC:/I				VVD1	05/05/1600.46
Uranium-233/234	Uncort			13.8	pC1/L				KAB2	05/05/1609:40
				+/-1.48						
Uranium-235/236	110.			0.910	nCi/L					
61amum-255/250	Uncert.			+/-0 432	pei/L					
				+/-0.452						
Uranium-238	13.5			13.9	nCi/L		103	(75%-125%	%)	
	Uncert [.]			+/-1.48	POL		105	(13/0 123/	•)	
	TPU-			+/-2.48						
OC1203534371 MB	110.									
Uranium-233/234			U	0.185	pCi/L				KXB2	05/05/1609:17
Crainain 200, 201	Uncert:		C	+/-0.173	Perz					00/00/100/11/
	TPU			+/-0.175						
Uranium-235/236				0.257	pCi/L					
	Uncert:			+/-0.212	r					
	TPU:			+/-0.215						
Uranium-238				0.200	pCi/L					
	Uncert:			+/-0.172	1					
	TPU:			+/-0.174						
Batch 1562057 —										
OC1203534375 395851013 DUP										
Thorium-228	U	-0.0482	U	0.0406	pCi/L	0		N	V/A MXS2	05/09/1610:02
	Uncert:	+/-0.0774		+/-0.140	r					
	TPU:	+/-0.0777		+/-0.140						
Thorium-230	U	0.161	U	0.121	pCi/L	0		Ν	V/A	
	Uncert:	+/-0.184		+/-0.188	P					
	TPU:	+/-0.188		+/-0.191						
Thorium-232	U	0.00717	U	0.0273	pCi/L	0		Ν	V/A	
	Uncert:	+/-0.0957		+/-0.110	•					
	TPU:	+/-0.0959		+/-0.110						
QC1203534376 LCS										
Thorium-228				10.9	pCi/L				MXS2	05/09/1610:02
	Uncert:			+/-1.20	•					
	TPU:			+/-2.33						
Thorium-230				1.63	pCi/L			(75%-125%	%)	
	Uncert:			+/-0.476						
	TPU:			+/-0.569						
Thorium-232	9.93			9.65	pCi/L		97.2	(75%-125%	%)	
	Uncert:			+/-1.12						
	TPU:			+/-2.11						
QC1203534374 MB										
Thorium-228			U	-0.00652	pCi/L				MXS2	05/09/1610:02
	Uncert:			+/-0.0948						
	TPU:			+/-0.095						
Thorium-230			U	0.215	pCi/L					
	Uncert:			+/-0.197						

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QC Summary

Workorder: 395851		Page 3 of 6									
Parmname	NOM	Sample (Qual	QC	Units	RPD%	REC%	Range Anlst	Date Time		
Rad Alpha Spec Batch 1562057											
				10.000							
Thomium 222	TPU:		TT	+/-0.202	nCi/I						
1 nonum-232	Uncort		U	0.0352 ⊥/_0.109	pCI/L						
				+/-0.109							
Batch 1562058	110.										
OC1203534378 305851013 DUP											
Uranium-233/234	II	0 0749	П	0 186	nCi/L	0		N/A MXS2	05/04/1608·46		
01amum-235/234	Uncert [.]	+/-0.128	U	+/-0.226	pei/L	0		10/11/01/02	05/04/1000.40		
	TPU:	+/-0.129		+/-0.228							
Uranium-235/236	U	0.0463	U	0.00	pCi/L	0		N/A			
	Uncert:	+/-0.130		+/-0.115	r						
	TPU:	+/-0.130		+/-0.115							
Uranium-238	U	0.0659	U	0.116	pCi/L	0		N/A			
	Uncert:	+/-0.130		+/-0.184							
	TPU:	+/-0.130		+/-0.185							
QC1203534379 LCS											
Uranium-233/234				13.9	pCi/L			MXS2	05/04/1608:47		
	Uncert:			+/-1.77							
	TPU:			+/-2.88							
Uranium-235/236				0.795	pCi/L						
	Uncert:			+/-0.503							
H : 220	TPU:			+/-0.519	C ' T		100	(750) 1050()			
Uranium-238	13.5			14.7	pC1/L		109	(75%-125%)			
	Uncert:			+/-1.85							
OC1202524277 MP	IPU:			+/-5.01							
Uranium 232/234			II	0 182	pCi/I			MYS2	05/04/1608.46		
01amum-233/234	Uncert		U	$\pm /_{-0.221}$	pCI/L			MA52	03/04/1008.40		
				+/-0.221							
Uranium-235/236	110.		U	0.0979	pCi/L						
	Uncert:		C	+/-0.192	Perz						
	TPU:			+/-0.193							
Uranium-238			U	0.169	pCi/L						
	Uncert:			+/-0.199	-						
D. 1. 1575052	TPU:			+/-0.201							
Batch 1565953											
QC1203545100 395851008 DUP											
Thorium-228		0.279	U	0.0746	pCi/L	10.8		(0% - 100%) MXS2	05/10/1609:29		
	Uncert:	+/-0.228		+/-0.148							
	TPU:	+/-0.234		+/-0.148	0.1	0		27/4			
Thorium-230	U	0.172	U	0.147	pC1/L	0		N/A			
	Uncert:	+/-0.196		+/-0.191							
Thorium-232	IPU:	+/-0.200	ΤT	+/-0.194 0.117	nCi/I	0		NI/A			
1 HOTTUIII-232	U Uncert	+/_0 166	U	+/-0 140	pCI/L	0		1N/PA			
		+/-0.168		+/-0 141							
	110.	1, 0.100		.,							

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QC Summary

Workorder:	395851		<u> </u>		•				Page 4	4 of 6	
Parmname		NOM	Sample Qu	ual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Rad Alpha Spec	2										
Batch	1565953										
QC1203545101	LCS										
Thorium-228					9.39	pCi/L				MXS2	05/10/1609:29
		Uncert:			+/-1.03						
		TPU:			+/-1.93						
Thorium-230					1.30	pCi/L			(75%-125%	6)	
		Uncert:			+/-0.397						
TI : 000		TPU:			+/-0.461	C ' T		00	(TEN 1050	~~~	
Thorium-232		9.93			9.83	pC1/L		99	(75%-125%	6)	
		Uncert:			+/-1.05						
0C1202545000	MD	IPU:			+/-2.01						
QC1203343099	MB			II	0.0597	nCi/I				MXS2	05/10/1600.20
111011011-228		Uncert:		U	$\pm /_{-0.136}$	pci/L				WIA52	05/10/1009.29
					+/-0.136						
Thorium-230		110.		U	0.165	nCi/L					
1110110111 250		Uncert:		U	+/-0.200	PerE					
		TPU:			+/-0.204						
Thorium-232				U	0.0897	pCi/L					
		Uncert:			+/-0.132	1					
		TPU:			+/-0.133						
Rad Gas Flow											
Batch	1562339 —										
OC1203535152	LCS										
Radium-228		13.9			11.5	pCi/L		82.6	(80%-120%	6) AXM6	05/10/1617:40
		Uncert:			+/-0.963	1					
		TPU:			+/-2.09						
QC1203535149	MB										
Radium-228				U	0.056	pCi/L				AXM6	05/10/1617:40
		Uncert:			+/-0.263						
		TPU:			+/-0.263						
QC1203535150	395851013 MS										
Radium-228		139 U	0.279		134	pCi/L		96.3	(70%-130%	6) AXM6	05/10/1617:40
		Uncert:	+/-0.313		+/-10.7						
		TPU:	+/-0.317		+/-24.1						
QC1203535151	395851013 MSD					<i></i>			(0.1) 0.00		
Radium-228		139 U	0.279		118	pCı/L	12.5	84.9	(0%-20%	6) AXM6	05/10/1617:40
		Uncert:	+/-0.313		+/-9.49						
		TPU:	+/-0.31/		+/-21.3						
Rad Ra-226 Batch	1561849										
QC1203533793	LCS										
Radium-226		12.2			12.2	pCi/L		100	(90%-110%	6) LXP1	05/08/1610:20
		Uncert:			+/-0.618						
		TPU:			+/-1.77						
QC1203533790	MB										
Radium-226				U	0.0439	pCi/L				LXP1	05/08/1609:50

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QC Summary

Workorder	305851			•						
workorder.	575051							Page 5	of 6	
Parmname		NOM	Sample Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Rad Ra-226 Batch	1561849									
		Uncert:		+/-0.0621						
0.01000000000	00 CL C0001 3 CC	TPU:		+/-0.0627						
QC1203533791	396162001 MS	10.0	0.150	11.0	0.1		04.4	(000) 1000		05/00/1 <10 00
Radium-226		12.2	0.152	11.9	pC1/L		96.6	(80%-120%) LXPI	05/08/1610:20
		Uncert:	+/-0.0736	+/-0.600						
0.01202522702	20(1(2001 MCD	TPU:	+/-0.0771	+/-1.88						
QC1203533792	390102001 MSD	10.0	0.152	12.1	C: /I	0.54	100	(00/ 200/) I VD1	05/08/1610.20
Radium-220		12.2	0.152	13.1	pC1/L	9.54	106	(0%-20%) LAPI	05/08/1610:20
			+/-0.0730	+/-0.038						
Batch	1561850	IFU.	+/-0.0771	+/-2.49						
0.01202522505	1.00									
QC1203533797	LCS	10.0		11.0	C ' I		00.4	(000/ 1100/		05/11/1610 10
Radium-226		12.2		11.0	pC1/L		90.4	(90%-110%) LXPI	05/11/1610:10
		Uncert:		+/-0.340						
0C1202522704	MD	IPU:		+/-1.70						
Redium 226	MD		I	0.00	pCi/I				I VD1	05/11/1600.35
Radium-220		Uncert	0	+/-0.0407	pci/L				LAII	05/11/1007.55
				+/-0.0407						
OC1203533795	395851013 MS	110.		., 010107						
Radium-226		24.4	0.215	24.3	pCi/L		98.8	(80%-120%) LXP1	05/11/1609:35
		Uncert:	+/-0.0849	+/-1.19	1				,	
		TPU:	+/-0.0903	+/-4.61						
QC1203533796	395851013 MSD									
Radium-226		24.4	0.215	21.4	pCi/L	12.7	87	(0%-20%) LXP1	05/11/1609:35
		Uncert:	+/-0.0849	+/-1.10	-					
		TPU:	+/-0.0903	+/-3.18						

Notes:

TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

The Qualifiers in this report are defined as follows:

- ** Analyte is a Tracer compound
- Result is less than value reported <
- Result is greater than value reported >
- Results are either below the MDC or tracer recovery is low BD
- FA Failed analysis.
- Н Analytical holding time was exceeded
- Value is estimated J
- Κ Analyte present. Reported value may be biased high. Actual value is expected to be lower.
- L Analyte present. Reported value may be biased low. Actual value is expected to be higher.
- M if above MDC and less than LLD Μ
- М REMP Result > MDC/CL and < RDL
- RPD or %Recovery limits do not apply. N/A
- See case narrative N1

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QC Summary

Worko	rder:	395851				Page 6 of 6									
Parmna	me		NOM	Sample Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time			
ND	Analyte	e concentration is n	ot detected above the d	etection limit											
NJ	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier														
Q	One or more quality control criteria have not been met. Refer to the applicable narrative or DER.														
R	Sample results are rejected														
U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.														
UI	Gamma SpectroscopyUncertain identification														
UJ	Gamma SpectroscopyUncertain identification														
UL	Not considered detected. The associated number is the reported concentration, which may be inaccurate due to a low bias.														
Х	Consult	t Case Narrative, D	ata Summary package,	or Project Manager cond	cerning thi	is qualifier									
Y	Other s	pecific qualifiers w	ere required to properly	define the results. Cons	sult case n	arrative.									
^	RPD of sample and duplicate evaluated using +/-RL. Concentrations are <5X the RL. Qualifier Not Applicable for Radiochemistry.														
h	Preparation or preservation holding time was exceeded														
N/A in ** Ind ^ The	ndicates t icates an Relative	hat spike recovery alyte is a surrogate, Percent Difference	limits do not apply whe /tracer compound. (RPD) obtained from t	en sample concentration he sample duplicate (D	exceeds sj UP) is eva	pike conc. luated aga	by a factor	of 4 or more eptence crite	e or %RPD eria when th	not applic ne sample	able. is greater	than			
five tir	nes (5X)	the contract requir	ed detection limit (RL)	. In cases where either the	ne sample	or duplica	te value is l	ess than 5X	the RL, a c	ontrol lim	it of +/- tl	he			
RL is u	used to e	valuate the DUP re	sult.	1	C" 1	, , .									
For PS	s, PSD, a	nd SDILT results, t	the values listed are the	measured amounts, not	final conc	entrations	•								

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.