DES Waste Management Division
29 Hazen Drive; PO Box 95
Concord, NH 03302-0095

Revised
License No. 276R Amendment Request
Rennie Farm Decommissioning
Laboratory Waste Test Pit Excavation Work Plan
Dartmouth College, Rennie Farm Site
Hanover, New Hampshire
DES Site No. 201111109, Project No. 27737

Prepared For:
Dartmouth College Office of Environmental Health and Safety
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RP Contact Name: Mr. Michael D. Cimis
Assistant Director of Environmental Health & Safety
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Prepared By:
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Contact Email: James.wieck@gza.com
GZA Project No. 04.0190030.02

GZA GeoEnvironmental, Inc.

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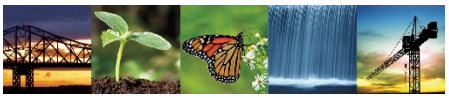
DN: cn=GZA GeoEnvironmental, Inc., o=GZA GeoEnvironmental, Inc., ou, email=karen.reed@gza.com, c=US
Date: 2016.08.05 11:06:17 -04'00'

Date of Report: August 5, 2016



GZA
Proactive by Design

GEOTECHNICAL
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Via Email

August 5, 2016
File No. 04.0190030.02

Twila M. Kenna, Ph.D.
Manager Radioactive Materials Program
New Hampshire Radiological Health Section, Bureau of Public Health Protection
New Hampshire Department of Health and Human Services
Division of Public Health Services
29 Hazen Drive
Concord, New Hampshire 03301-4604

Mr. Paul Rydel, P.G.
Project Manager
Hazardous Waste Remediation Bureau
New Hampshire Department of Environmental Services
29 Hazen Drive, P.O. Box 95
Concord, New Hampshire 03301

Re: ***Revised*** License No. 276R Amendment Request, Rennie Farm Decommissioning
Laboratory Waste Test Pit Excavation Work Plan
Dartmouth College, Rennie Farm Site
Hanover, New Hampshire
DES Site No. 201111109, Project No. 27737

Dear Dr. Kenna and Mr. Rydel:

This letter was prepared by GZA GeoEnvironmental, Inc. (GZA) on behalf of Dartmouth College (Dartmouth) to provide the New Hampshire Bureau of Public Health Protection, New Hampshire Radiological Health Section (RHS) and the New Hampshire Department of Environmental Services, Hazardous Waste Remediation Bureau (DES) a Work Plan describing proposed test pit excavation and waste management activities at the Dartmouth Rennie Farm property (site) in Etna, New Hampshire. As you are aware, Dartmouth completed radiological and hazardous waste investigations and remedial actions at the site during 2011, utilizing the services of GZA and Clym Environmental Services, LLC (Clym), a Maryland-based firm specializing in radioactive materials and waste management. This letter describes additional proposed radiological and hazardous waste investigations and remedial actions.

The work plan described herein was previously submitted to DES and RHS in GZA's letter[1] dated July 25, 2016. As requested by RHS, Proposed Radiological Work Plan

[1] Letter by GZA titled "*License No. 276R Amendment Request, Rennie Farm Decommissioning, Laboratory Waste Test Pit Excavation Work Plan, Dartmouth College, Rennie Farm Site, Hanover, New Hampshire, DES Site No. 201111109, Project No. 27737.*"

Element 9 of this work plan has been revised. The work plan included herein supersedes the work plan described in GZA's letter dated July 25, 2016. Please refer to Proposed Radiological Work Plan Elements section of this work plan for the revised version of Element 9. No other revisions have been made to the work plan, as previously submitted to DES and RHS.

The proposed work is necessary based on the unexpected observations of buried animal carcasses and laboratory waste during recent test pit excavations which investigated three anomalous areas identified using geophysical methods during recent remedial design data collection activities. The geophysical data were collected to support the design of a remedial system related to the presence of 1,4-dioxane in groundwater at concentrations exceeding the New Hampshire Ambient Groundwater Quality Standard (NH AGQS). The intent of this work plan is to seek RHS and DES approval to complete a thorough investigation, and containerize encountered laboratory waste materials, under proper radiological controls.

The work plan includes components proposed to address radiological and hazardous waste concerns. The remainder of this letter describes background information and the proposed investigations and remedial actions.

BACKGROUND
Previous Activities

As you know, animal carcasses used in laboratory radiological testing were buried within a less than 0.5-acre portion of the site (burial area) from the mid-1960s to 1978, and subsequently removed from the site during late 2011. The removal of the animal carcasses was performed by Dartmouth with assistance from Clym and GZA. GZA subcontracted with ENPRO Services, Inc. (ENPRO) of Newburyport, Massachusetts to perform the excavation activities. A site locus and site plan are attached as **Figure 1** and **Figure 2**, respectively.

The animal carcasses were buried within a series of 42 pits within the burial area. The locations of the pits and other site features referenced herein are illustrated on **Figure 2**. Soil samples were collected from each pit area after accessible waste items and proximate soil had been removed as a part of the remedial action survey. Samples were collected from areas most likely to represent remaining contamination (e.g., collected from the remaining soil underneath and beside each burial plot), at varying depths up to nine feet below the surface. In general soil was collected approximately one foot below the deepest waste plug and one foot to the east from the center of the waste plug.

Remedial action sampling included collection of 43 samples. Samples were packaged to meet the volume and containerization requirements of the receiving laboratory. Samples were stored in individual, sealed bags so as to prevent cross-contamination. Based on the results of the analysis of these samples, the College petitioned, and the NH-RHS approved, to use this data in support of final status surveying. Additional soil samples were collected during the remedial effort to further characterize wastes and to establish background levels. The results of the analysis of the soil samples are summarized in **Table 1**.

Ground water samples were also collected prior to, during, and after remedial operations as water levels allowed. A summary of the results of the analyses is included in **Table 2**. Dartmouth submitted a Final Status Survey report to the RHS during November of 2013, detailing the survey design and associated findings. Based on the results of this survey, the College petitioned, and RHS subsequently approved the site for release from radiological controls.

The previous site radiological remedial operations were conducted under the controls detailed in a Site Specific Health and Safety Plan[2] (Site HASP) inclusive of operational objectives and procedures broken down by each work phase of the project. The RHS approved this Site HASP and associated work plans in various iterations.

In addition to the laboratory animal carcasses, other laboratory wastes were identified during the removal of the carcasses. Groundwater quality monitoring performed following the removal of the laboratory animal carcasses detected the volatile organic compound (VOC) 1,4-dioxane in groundwater samples at concentrations exceeding its NH AGQS. Investigation and remedial design activities are ongoing to remediate the source of the 1,4-dioxane.

Recent Activities

Geophysical Surveys

As part of the on-going work at the site related to the detection of 1,4-dioxane, a ground penetrating radar (GPR) survey was performed that encompassed the former laboratory animal carcass burial area and the areas to the approximate south and west of the former burial area. The GPR survey was performed to evaluate the elevation of the bedrock surface. The lateral extents of the GPR survey are illustrated on **Figure 2**.

Hager-Richter Geoscience, Inc. (Hager-Richter) of Salem, New Hampshire was subcontracted by GZA to perform the GPR survey. Hager-Richter identified two anomalous areas where buried objects, including potentially boulders, may have been present (Anomaly 1 and Anomaly 2, see **Figure 1**). The area surrounding the anomalies was subsequently surveyed by Hager-Richter using electromagnetic (EM) methods to investigate the anomalies for the presence of metal as an indicator of the presence of objects other than boulders.

The EM survey indicated the potential presence of buried metal within the two areas identified using GPR, and within a third area proximate to the two areas identified using GPR (Anomaly 3, see **Figure 1**). The three anomalous areas identified using geophysical methods (GPR and EM) were marked in the field by Hager-Richter and subsequently surveyed by WSP of Nashua, New Hampshire. The surveyed locations of the anomalies are illustrated on **Figure 2** along with the estimated locations of the former laboratory animal carcass burial pits. The locations of the former burial pits, as illustrated on **Figure 2**, are based on the locations of features included on a historic sketch of the burial area and should be considered an approximate illustration of the general area in which laboratory animal carcasses were buried.

[2] HASP prepared by Clym titled "Project Health and Safety Plan," dated September 2011.

The recent geophysical survey included the entire historic burial area and surrounding adjacent areas of the site that would have been accessible for the burial of laboratory waste, and did not identify any other anomalous areas.

Test Pit Excavation

With the approval of the DES, GZA investigated these anomalies by excavating within the limits of the anomalies to the top of the bedrock surface. Excavation was performed on June 23, 2016 by ENPRO and observed by GZA. During the excavation of the area designated Anomaly 1, bags containing what appeared to be waste associated with the original burial site were encountered. Per the plan approved by DES, operations were discontinued and DES was notified of the conditions encountered. Bagged waste collected from the excavator bucket was contained and removed from the site by Dartmouth for analysis. What appeared to be additional bagged waste was observed within the excavation and, in accordance with the plan approved by DES, was not removed. GZA understands that Dartmouth collected wipe samples from the containerized waste, and the analysis of the wipe samples did not indicate the presence of levels of radioactivity above background levels.

During the removal of animal carcasses in 2011, Clym reported that high groundwater levels within what was anticipated to be the location of burial pit 28 limited the ability to locate waste. While considered approximate, the location of burial pit 28, as located on the site plan (**Figure 1**) by GZA, suggests that the laboratory waste recently encountered at the location of Anomaly 1 is waste previously obscured by the high groundwater level at the location of burial pit 28.

Test pit excavation of geophysical Anomaly 2 and Anomaly 3 encountered metal debris and boulders consistent with the geophysical anomalies identified by Hager-Richter, and did not encounter any waste associated with the historic laboratory waste burial activities.

Groundwater Sampling and Analyses

Groundwater samples were collected from selected groundwater monitoring wells for analysis of radiological parameters requested by the DES in their June 2, 2016 letter[3] to Dartmouth including carbon-14, tritium, nickel-63, cesium-137, and lead-210. Groundwater samples were collected by GZA on June 27, 2016 from the following monitoring wells:

- **GZ-11L** – Five samples labeled GZ-11L (A) though GZ-11L (E) were collected from this sidegradient monitoring well to provide a statistical basis for background concentrations of the radiological parameters. Monitoring well GZ-11L was sampled in place of GZ-1 (suggested by NHDES) due to the absence of groundwater within monitoring well GZ-1 at the time of the sampling round.
- **GZ-9L** – One sample was collected from this downgradient monitoring well to provide concentration data for the requested radiological parameters at the downgradient monitoring location where 1,4-dioxane has been detected at the highest concentrations relative to other downgradient locations; and

[3] NHDES letter titled "**Hanover** – Dartmouth College Rennie Farm Site, Hanover Center Road, DES Site #**201111109**, Project #27737, **Supplemental Hydrogeologic Investigation – Phase I Report**, prepared by GZA GeoEnvironmental, Inc., dated May 6, 2016."

- **GZ-2** – One sample was collected from this downgradient monitoring well to provide concentration data for the requested radiological parameters at the downgradient monitoring location adjacent to the laboratory waste burial area where 1,4-dioxane has been detected at the highest concentrations relative to other locations adjacent to the laboratory waste burial area. Monitoring well GZ-2 was sampled in place of GZ-14U (requested by NHDES) which was dry at the time of the sampling round. Based on the results of monitoring of 1,4-dioxane at GZ-2 and our understanding of the hydrogeology of the laboratory waste burial area, GZ-2 is representative of overburden groundwater quality immediately downgradient of the laboratory waste burial area.

Groundwater quality samples were submitted to Eastern Analytical, Inc. (EAI) of Concord, New Hampshire. Analyses for radiological parameters was subcontracted by EAI to GEL Laboratories, LLC (GEL) of Charleston, South Carolina. The target radiological parameters were not detected above GEL's respective laboratory reporting limits (RLs) for each of the samples, with the exception of Lead-210 which was detected at a concentration of 5.23 picocuries per liter (pCi/L) in the sample collected from well GZ-9L. GEL's RL for lead-2010 for the analyses each of the samples is 5 pCI/L. A copy of GELs analytical laboratory report is attached.

GEL's analytical laboratory report was provided to Clym for evaluation of the results. GZA understands that, based on Clym's understanding of site conditions and review of the data, the results of the analysis of the groundwater samples collected by GZA is consistent with anticipated background levels.

WORK PLAN

The objective of the proposed work is to complete the excavation of Anomaly 1 and a buffer surrounding the area to locate and remove residual laboratory waste. The preliminary limits of excavation are illustrated on **Figure 1,** and include an approximately 30-foot by 30-foot (900 square foot) area. If waste material is encountered within 5 feet of the preliminary limits of excavation shown on **Figure 2**, the excavation will be expanded such that the final limits of excavation include a 5-foot buffer zone between the location of any observed laboratory waste and the completed excavation side walls. The excavation will extend vertically downward within the limits of excavation to the surface of the weather bedrock, as determined based on resistance to penetration by the excavator bucket.

It is our intent to rely on the previously approved HASP for overarching site safety controls for this requested work, with the clarifications and specifications included herein. All proposed radiological activities are to take place under the authority of the Dartmouth College State of New Hampshire Radioactive Materials License number 276R.

AS you are aware, Dartmouth has contracted with GZA to oversee the on-going investigations and remedial actions relative to chemical contaminants. GZA, in turn, has selected subcontractors to conduct various aspects of this work (e.g., site excavation). Dartmouth College has requested that Clym assist in the radiological elements of this effort.

The following describe the primary elements of the radiological and hazardous waste aspects of the proposed work.

Proposed Radiological Work Plan Elements

1. Conduct and document site dose rate survey (uR/hr), including measurements at ground level and at one meter.
2. Establish and document control zones, based on the area to be excavated (HASP Section No. 10).
3. Control operations with Radiological Work Permits (HASP Section No. 2) and Job Safety Briefings (HASP Section No. 5).
4. Complete and document personal protective equipment assessments, based on site conditions and known or possible contaminants (HASP Section No. 6).
5. Conduct radiation awareness training and site safety operations training for all site personnel prior to operations (HASP Section No. 5).
6. Investigate area of interest via excavation. If potential waste items are encountered, initial field measurements will be made with radiation detection instrumentation and the items will be containerized.
7. Collect soil samples from areas contiguous to the anomalous area. Ship soil samples for radio analysis (note samples will also be collected for analysis of possible chemical constituents).
8. Conduct post-operations site dose rate survey.
9. ***Waste material will be containerized on-site and stored in a secure area (lockable sealand container or similar) for further survey and investigation to properly characterize waste for off-site processing and disposal.***
10. Prepare a report of findings and sample analysis results inclusive of a request for any follow-up work suggested by these findings and results.

There have been changes in the personnel responsible for the overall administration, funding and management of Dartmouth College operations (as listed in Section 3 of the HASP). In support of these specific efforts, the Key Personnel directly involved should be updated to include Maureen O'Leary, PhD as the Project Officer and Katrina Morgan as the Radiation Safety Officer. The site contamination limits (HASP Table 11.1) would remain in place.

The Other Emergency Contacts (HASP Table 10.4) is updated as follows:

CONTACT	TELEPHONE NUMBER
Maureen O'Leary	Office: (603) 646-1762
	Cellular: (603) 359-5543
Katrina Morgan	Office: (603) 646-1762
	Cellular: (603) 359-3017
Michael Cimis	Office: (603) 646-1762
	Cellular: (603) 359-3018
Lebanon Fire Department	911 or (603) 448-8810
State of New Hampshire (Radiological Health Section)	Office: (603) 271-4588

Proposed Hazardous Waste Remediation Work Plan Elements

1. Excavation to top of weather bedrock within the final limits of excavation, as described above, using an excavator equipped with an approximate 8-cubic-foot bucket. Excavation to be performed by ENPRO and observed and documented by GZA. Excavator operator and laborer(s) to have OSHA 40-hour HAZWOPER training. Excavation to be conducted gradually with a maximum 1-foot vertical penetration of the overburden with each pass of the excavator bucket.
2. Observation of overburden throughout the process of excavation for evidence of laboratory waste, stained soil, and odors indicative of chemical waste or buried animal carcasses.
3. Screening of soils within the excavator bucket and breathing zone at the limit of the excavation for total VOCs using a photoionization detector (PID).
4. Removal and segregation of soil exhibiting odors indicative of chemical waste and soil to which any liquids may drain from containers including bagged waste. Soil exhibiting these characteristics will be stockpiled on and under a minimum of two layers of minimum 6-milimeter polyethylene sheeting. The soil stockpile will be enclosed within a polyethylene-sheeting-covered soil berm. Soil samples will be collected from any stockpiled soil at the completion of the excavation activities. Composite soil samples will be collected and submitted for analytical laboratory analysis of VOCs by EPA Method 8260B and 1,4-dioxane by EPA Method 8260B SIM. Additional soil samples may be collected for waste characterization purposes, consistent with the results of the analyses and the permit requirements of the selected disposal facility.
5. Discrete soil samples will be collected from soils exhibiting evidence of potential contamination with chemical waste and from the completed excavation side walls. Soil samples will be submitted for analytical laboratory analysis of VOCs by EPA Method 8260B and 1,4-dioxane by EPA Method 8260B SIM. The number and location of discrete soil samples will be determined based on the conditions encountered; however, we anticipate that two discrete soil samples will be collected from each completed excavation sidewall with the sampling depth consistent with the depth at which laboratory waste is encountered. Discrete soil samples will be collected using the excavator bucket to avoid entering the excavation.
6. Backfilling of the excavation with soil from the excavation. Imported sand and gravel fill will be used in the event that additional soil is needed to fill the excavation to approximately the original grade.
7. Preparation of a summary report summarizing the conditions encountered. The summary report will include: GZA's test pit excavation logs for the three anomaly areas; narrative description of the work performed and conditions encountered; results of field screening; tabulated summary of the results of laboratory analyses; photographs documenting the conditions encountered and extent of the excavation, and a revised version of **Figure 1** illustrating the limits of excavation. The report will include the information described in proposed radiological work plan element No. 10.

Health and safety procedures will be consistent with the requirements outlined in the referenced HASP. The anticipated duration of the active excavation program is between two to three days. As we discussed during our meeting on July 22, 2016, site control will include the use of temporary construction fence, which will be locked when unattended.

We trust that the information included herein meets the needs of the NHDES. We appreciate your review of this letter/work plan and look forward to receiving your comments. Should you have any questions, please do not hesitate to contact Mr. James M. Wieck at 603-232-8732.

Very truly yours,

GZA GEOENVIRONMENTAL, INC.

James M. Wieck, P.G.
Senior Project Manager

Steven R. Lamb, P.G., C.G.W.P.
Principal

Ronald A. Breton, P.E.
Senior Principal, Consultant/Reviewer

JMW/SRL/RAB:erc/kr
P:\04Jobs\0190000s\04.0190030.00\04.0190030.02\Work\Test Pit Work Plan\FINAL 04.0190030.02 Lab Waste Test Pit Excavation Work Plan_Revised 080516.docx

Attachments: Figures
Tables
GEL Laboratory Reports

cc: Maureen O'Leary, PhD, MBA, CBSP, Dartmouth College
Mr. Michael D. Cimis, CIH, CHMM, Dartmouth College
Ellen Arnold, Esq.
Mr. Charles Watts, Clym

LEGEND:

- ACTIVE DUG WELL
- ABANDONED DUG WELL
- WATER SUPPLY WELL
- GZ-1 — GROUNDWATER MONITORING WELL
- SPRING
- STREAM - 1 — SURFACE WATER QUALITY MONITORING LOCATION (SEE FIGURE 1 FOR SURFACE SAMPLING LOCATIONS STREAM - 2 AND STREAM - 3)
- INTERMITTENT/PERENNIAL STREAM; ARROW INDICATES DIRECTION OF SURFACE WATER FLOW
- APPROXIMATE PROPERTY BOUNDARY
- LOCATION OF INTERMITTENT STREAM
- AREA OF GPR AND EM ANOMOLIES (SEE NOTES 4 AND
- APPROXIMATE FORMER LOCATION OF FENCE
- LIMITS OF GPR SURVEY

N W E S

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SCALE IN FEET

GENERAL NOTES:

1) 2010-2011 1-FT COLOR AERIAL PHOTOS FOR THE TOWN OF HANOVER WERE OBTAINED FROM THE NH GRANIT NEW HAMPSHIRE STATEWIDE GIS CLEARINGHOUSE.

2) APPROXIMATE PROPERTY BOUNDARIES BASED ON REVIEW OF TOWN OF HANOVER, NEW HAMPSHIRE TAX MAP 13, 15, AND 16, DATED APRIL 1, 2015.

3) LOCATIONS OF MONITORING WELLS GZ-1 THROUGH GZ-23U, WATER SUPPLY WELL WSW-1, DUG WELL (FORMERLY WATER SUPPLY WELL FOR 8 RENNIE ROAD), ONSITE INTERMITTENT STREAM, GROUND SURFACE TOPOGRAPHY WITHIN CERTAIN AREAS OF THE SITE, AND CERTAIN OTHER SITE FEATURES BASED ON SURVEYS BY WSP TRANSPORATION AND INFRASTRUCTURE DURING OCTOBER 2014, JUNE 2015, JANUARY 2016, AND MAY 31, 2016.

4) GPR INDICATES GROUND PENETRATING RADAR; EM INDICATES ELECTROMAGNETIC INDUCTION (GEONICS EM61 AND EM31 INSTRUMENTS).

5) THE AREAS OF GPR AND EM ANOMALIES SHOWN HEREON ARE BASED ON SURFICIAL GEOPHYSICAL SURVEYS PERFORMED BY HAGER-RICHTER GEOSCIENCE, INC. OF SALEM, NEW HAMPSHIRE. GPR SURVEYS WERE PERFORMED ON MAY 5 AND MAY 9, 2016 AND THE EM SURVEY WAS PERFORMED ON MAY 27, 2016.

NO.	ISSUE / DESCRIPTION	BY	DATE

DARTMOUTH COLLEGE, RENNIE FARM SITE
HANOVER, NEW HAMPSHIRE
NHDES SITE NO. 201111109, PROJECT NO. 277737

SITE PLAN

PREPARED BY: GZA GeoEnvironmental, Inc. Engineers and Scientists www.gza.com		PREPARED FOR: DARTMOUTH COLLEGE	
PROJ MGR: JMW	REVIEWED BY: SRL	CHECKED BY: JMW	FIG 1
DESIGNED BY: JMW	DRAWN BY: KCM	SCALE: 1 inch = 125 feet	
DATE: 07-20-2016	PROJECT NO. 04.0190030.02	REVISION NO.	

P:\04Jobs\01900\00s\04.0190030.00\04.0190030.02\Figures-CAD\JULY2016\16_FIGs\Figure 1 - Site Plan.mxd, 7/29/2016, 11:31:42 AM, kathryn.moran

LEGEND:

- GZ-1 — GROUNDWATER MONITORING WELL
- 1080 — GROUND SURFACE TOPOGRAPHIC CONTOURS
- APPROXIMATE FORMER LOCATION OF FENCE
- LIMITS OF GPR SURVEY
- AREA OF GPR AND EM ANOMOLIES AND NUMBER (SEE NOTES 4 AND 5)
- 40 — APPROXIMATE LOCATION OF LABORATORY WASTE BURIAL PIT AND NUMBER (SEE NOTE 6)

GENERAL NOTES:

1) 2010-2011 1-FT COLOR AERIAL PHOTOS FOR THE TOWN OF HANOVER WERE OBTAINED FROM THE NH GRANIT NEW HAMPSHIRE STATEWIDE GIS CLEARINGHOUSE.

2) APPROXIMATE PROPERTY BOUNDARIES BASED ON REVIEW OF TOWN OF HANOVER, NEW HAMPSHIRE TAX MAP 13, 15, AND 16, DATED APRIL 1, 2015.

3) LOCATIONS OF MONITORING WELLS GZ-1 THROUGH GZ-23U, WATER SUPPLY WELL WSW-1, DUG WELL (FORMERLY WATER SUPPLY WELL FOR 8 RENNIE ROAD), ONSITE INTERMITTENT STREAM, GROUND SURFACE TOPOGRAPHY WITHIN CERTAIN AREAS OF THE SITE, AND CERTAIN OTHER SITE FEATURES BASED ON SURVEYS BY WSP TRANSPORATION AND INFRASTRUCTURE DURING OCTOBER 2014, JUNE 2015, JANUARY 2016, AND MAY 31, 2016.

4) GPR INDICATES GROUND PENETRATING RADAR; EM INDICATES ELECTROMAGNETIC INDUCTION (GEONICS EM61 AND EM31 INSTRUMENTS).

5) THE AREAS OF GPR AND EM ANOMALIES SHOWN HEREON ARE BASED ON SURFICIAL GEOPHYSICAL SURVEYS PERFORMED BY HAGER-RICHTER GEOSCIENCE, INC. OF SALEM, NEW HAMPSHIRE. GPR SURVEYS WERE PERFORMED ON MAY 5 AND MAY 9, 2016 AND THE EM SURVEY WAS PERFORMED ON MAY 27, 2016.

6) THE APPROXIMATE LOCATIONS OF LABORATORY WASTE BURIAL PITS ARE BASED ON A SKETCH TITLED "RADIOACTIVE BURIAL AREA AT RENNIE FARM" AND THE SURVEYED LOCATIONS OF FEATURES ILLUSTRATED ON THE SKETCH INCLUDING A FENCE POST IDENTIFIED AS THE SOUTHWESTERN CORNER OF THE BURIAL AREA FENCE, A FENCE POST ALLOCATED ALONG THE SOUTHERN FENCE LINE, THE HUMAN BURIAL AREA, AND SECTIONS OF STONE WALLS. THE LOCATIONS OF THE LISTED FEATURES IS BASED ON A SURVEYS BY WSP (SEE NOTE 3).

7) LOCATIONS OF GEOPHYSICAL ANOMALY TEST PITS ARE BASED ON LOCATIONS OF ANOMALIES AS LOCATED IN THE FIELD BY WSP AND MEASUREMENTS TO SITE FEATRUES BY GZA.

N W E S

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NO.	ISSUE / DESCRIPTION	BY	DATE

DARTMOUTH COLLEGE, RENNIE FARM SITE
HANOVER, NEW HAMPSHIRE
NHDES SITE NO. 201111109, PROJECT NO. 277737

HISTORICAL BURIAL AREA PLAN

PREPARED BY: GZA GeoEnvironmental, Inc. Engineers and Scientists www.gza.com		PREPARED FOR: DARTMOUTH COLLEGE	
PROJ MGR: JMW	REVIEWED BY: SRL	CHECKED BY: JMW	FIG 2
DESIGNED BY: JMW	DRAWN BY: MJD	SCALE: 1 inch = 20 feet	
DATE: 07-20-2016	PROJECT NO. 04.0190030.02	REVISION NO.	

P:\04Jobs\01900\04.0190030.00\04.0190030.02\Figures-CAD\JUL'2020\16_FIGs\Figure 2 - Historical Burial Area Plan.mxd, 7/20/2016, 10:45:14 AM, kathryn.moran

Table 1

Work Order	Receipt Date	Sample Count	Description	Report Date
290167	11/14/2011	8	Initial background and plot layover (“green”) samples	12/13/2011
290717	11/21/2011	4	Characterization of soil contiguous to plots (“red”)	12/16/2011
291709	12/9/2011	1	Initial chemical characterization of potential mixed waste soil (“purple”), Intermodal #1	1/6/2012
292375	12/20/2011	33	Plots 1-33 post waste removal (“yellow”)	1/6/2012
292402	12/20/2011	10	Plots 34-43 post waste removal (“yellow”)	1/6/2012
292570	12/22/2011	3	Chemical characterization of potential mixed waste soil (“purple”), Intermodals #2-4	1/19/2012
295636	11/14/2011	8	Re-log of #290167 to include refined detection limits and nuclides of interest	2/22/2012
296570	2/24/2012	26	Comprehensive characterization of potential mixed waste soil (“purple”), Intermodals 1-4 (GZA)	3/14/2012
295640	12/20/2011	33	Re-log of #292375 to include refined detection limits and nuclides of interest	3/21/2012
295642	12/20/2011	10	Re-log of #292402 to include refined detection limits and nuclides of interest	3/21/2012
303457	4/28/2012	10	Additional background samples for statistical testing	5/16/2012

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Note: Table prepared by Clym Environmental Services, LLC

Table 2 Radiological Parameters
Water Quality Data Summary

Rennie Farm
Etna, New Hampshire

Well Location	Sample Date[1]	Parameter[2]	Radiologic (pCi/L)[4]							
			Gross Gamma Spec Isotopes					Gross Alpha	Gross Beta	Radon
			Uranium	Bismuth-214	Lead-212	Lead-214	Potassium-40			
		AGQS[3]	*NE*	*NE*	*NE*	*NE*	*NE*	*15*	*NE*	*NE*
GZ-1	20-Dec-12		ND	50.9	ND	52.2	ND	ND	ND	NT
	19-Apr-12[8]		NT	NT	NT	NT	NT	NT	NT	NT
	20-Dec-12		ND	ND	ND	ND	ND	ND	ND	NT
	5-Dec-11		ND	ND	ND	ND	ND	ND	ND	NT
	29-Nov-11		UI	ND	ND	ND	ND	ND	ND	NT
	20-Nov-11		ND	108	ND	100	ND	ND	ND	NT
	13-Nov-11		ND	UI	ND	ND	ND	ND	ND	NT
	6-Nov-11		ND	ND	ND	ND	ND	NT	NT	NT
	27-Oct-11		NT	NT	NT	NT	NT	ND	ND	NT
	4-Feb-10		0.00009 E	UI	ND	UI	ND	ND	ND	1,974
	20-Nov-09[5]		NT	48.6	ND	51.2	ND	14.9	21.8	NT
GZ-2	20-Dec-12		ND	19.2	ND	ND	ND	ND	ND	NT
	19-Apr-12[9]		NT	NT	NT	NT	NT	ND	ND	NT
	12-Dec-11		ND	ND	ND	ND	ND	ND	ND	NT
	5-Dec-11		ND	ND	ND	ND	ND	ND	ND	NT
	29-Nov-11		ND	ND	ND	ND	ND	ND	ND	NT
	20-Nov-11		ND	39.5	ND	UI	ND	ND	ND	NT
	13-Nov-11		ND	ND	ND	ND	ND	ND	ND	NT
	6-Nov-11		ND	ND	ND	ND	ND	NT	NT	NT
	27-Oct-11		NT	NT	NT	NT	NT	ND	3.21	NT
	4-Feb-10		0.000051 E	ND	ND	ND	ND	ND	ND	718
	20-Nov-09[5]		0.0167	20.4	3.95	23.6	37.1	180	247	NT
GZ-3	20-Dec-12		ND	53.8	ND	40.8	ND	ND	3.61	NT
	19-Apr-12		ND	396.0	ND	471.0	ND	ND	ND	NT
	12-Dec-11		ND	ND	ND	UI	ND	ND	ND	NT
	5-Dec-11		ND	13.6	ND	UI	ND	ND	ND	NT
	29-Nov-11		ND	ND	ND	ND	ND	ND	ND	NT
	20-Nov-11		ND	117	ND	120	ND	ND	ND	NT
	13-Nov-11		ND	UI	ND	UI	ND	ND	ND	NT
	6-Nov-11		ND	ND	ND	ND	ND	NT	NT	NT
	27-Oct-11		NT	NT	NT	NT	NT	ND	ND	NT
	4-Feb-10		0.000070	29.2	ND	UI	ND	ND	ND	3,293
	20-Nov-09[5]		NT	62.6	ND	63.6	ND	13.9	17.3	NT
GZ-4[6]	20-Dec-12		ND	135	ND	149	ND	ND	ND	NT
	19-Apr-12		ND	706	ND	772	ND	ND	ND	NT
	12-Dec-11		ND	ND	ND	ND	ND	ND	ND	NT
	5-Dec-11		ND	35.3	ND	UI	ND	ND	ND	NT
	29-Nov-11		ND	ND	ND	ND	ND	ND	3.82	NT
	20-Nov-11		ND	188	ND	209	ND	ND	ND	NT
	13-Nov-11		ND	UI	ND	28.9	ND	ND	ND	NT
	6-Nov-11		ND	ND	ND	ND	ND	NT	NT	NT
	27-Oct-11		NT	NT	NT	NT	NT	ND	ND	NT
	4-Feb-10									
	20-Nov-09									

Notes:
1. Samples collected by GZA GeoEnvironmental, Inc. (GZA) personnel on the date indicted in the table.
2. Samples analyzed by GEL Laboratories of Charleston, South Carolina.
3. NH AGQS indicates New Hampshire Ambient Groundwater Quality Standard as defined in State of New Hampshire Code of Administrative Rules Env-Or 603.03. Radionuclide contaminants are defined by Env-Dw 703.
4. µg/L indicates micrograms per liter, mg/L indicates milligrams per liter, and pCi/L indicates picocuries per liter.
5. Samples collected on this date were not field-filtered due to a misunderstanding between GZA and GEL Laboratories, and therefore considered non-representative because of naturally occurring radionuclides associated with sediment in samples.
6. Well GZ-4 was installed primarily for water levels only and was not sampled during initial rounds because it was considered to be hydrologically cross-gradient from the disposal pit area and not indicative of donwgradient water quality. GZ-4 was added to later sampling round to provide addtional information regarding area-wide groundwater quality.
7. ND indicates not detected above analytical laboratory reporting limit; BC indicates standards are by compound; NE indicates no AGQS established; NT indicates not tested and UI indicates uncertain identification at levels belwo quantitative detection levels (applies to gamma spectroscopy indvidual compounds) .
8. The upgradient well GZ-1 was dry during the sampling event therefore, no groundwater could be collected.
9. Well GZ-2 went dry during sampling and a gamma spec analysis bottle volume could not be obtained.

Eastern Analytical, Inc.
professional laboratory & drilling services

Jim Wieck
GZA GeoEnvironmental, Inc. (NH)
5 Commerce Park North, Suite 201
Bedford , NH 03110

ACCREDITED IN ACCORDANCE WITH nelac

Subject: Laboratory Report

Eastern Analytical, Inc. ID:	157615
Client Identification:	Radionuclide Sampling
Date Received:	6/27/2016

Dear Mr. Wieck :

Enclosed please find the report of analysis for the above identified project.
As discussed, analyses were subcontracted and are listed as follows:

Analysis:	Subcontract - Radionuclide
Subcontractor Lab:	GEL Laboratories, LLC

A complete copy of the report is attached. This report may not be reproduced except in full, without the written approval of the laboratory.

We appreciate this opportunity to be of service and look forward to your continued patronage.

Sincerely,

Lorraine Olashaw — 7.14.16 — 30

Lorraine Olashaw, Lab Director | Date | # of pages (excluding cover letter)

SAMPLE CONDITIONS PAGE

EAI ID#: **157615**

Client: **GZA GeoEnvironmental, Inc. (NH)**

Client Designation: **Radionuclide Sampling**

Temperature upon receipt (°C): 5.7 **Received on ice or cold packs (Yes/No): Y**

Acceptable temperature range (°C): 0-6

Lab ID	Sample ID	Date Received	Date Sampled	Sample Matrix	% Dry Weight	Exceptions/Comments (other than thermal preservation)
157615.01	GZ-9L	6/27/16	6/27/16	aqueous		Adheres to Sample Acceptance Policy
157615.02	GZ-2	6/27/16	6/27/16	aqueous		Adheres to Sample Acceptance Policy
157615.03	GZ-11L (A)	6/27/16	6/27/16	aqueous		Adheres to Sample Acceptance Policy
157615.04	GZ-11L (B)	6/27/16	6/27/16	aqueous		Adheres to Sample Acceptance Policy
157615.05	GZ-11L (C)	6/27/16	6/27/16	aqueous		Adheres to Sample Acceptance Policy
157615.06	GZ-11L (D)	6/27/16	6/27/16	aqueous		Adheres to Sample Acceptance Policy
157615.07	GZ-11L (E)	6/27/16	6/27/16	aqueous		Adheres to Sample Acceptance Policy

Samples were properly preserved and the pH measured when applicable unless otherwise noted. Analysis of solids for pH, Flashpoint, Ignitibility, Paint Filter, Corrosivity, Conductivity and Specific Gravity are reported on an "as received" basis.
Immediate analyses, pH, Total Residual Chlorine, Dissolved Oxygen and Sulfite, performed at the laboratory were run outside of the recommended 15 minute hold time.
All results contained in this report relate only to the above listed samples.
References include:
1) EPA 600/4-79-020, 1983
2) Standard Methods for Examination of Water and Wastewater,20th Edition, 1998 and 22nd Edition, 2012
3) Test Methods for Evaluating Solid Waste SW 846 3rd Edition including updates IVA and IVB
4) Hach Water Analysis Handbook, 2nd edition, 1992

GEL Laboratories LLC
a member of The GEL Group INC

PO Box 30712 Charleston, SC 29417
2040 Savage Road Charleston, SC 29407
P 843.556.8171
F 843.766.1178

gel.com

July 14, 2016

Mr. Michael O. Serard
Eastern Analytical, Inc.
25 Chenell Drive
Concord, New Hampshire 03301

Re: Radiochemistry Analyses - Serard
Work Order: 400292

Dear Mr. Serard:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on June 29, 2016. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

Our policy is to provide high quality, personalized analytical services to enable you to meet your analytical needs on time every time. We trust that you will find everything in order and to your satisfaction. If you have any questions, please do not hesitate to call me at (843) 556-8171, ext. 4289.

Sincerely,

Hope Taylor for
Julie Robinson
Project Manager

Chain of Custody: 157615
Enclosures

GEL LABORATORIES LLC
2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis Report
for

ETAI001 Eastern Analytical, Inc.

Client SDG: 400292 GEL Work Order: 400292

The Qualifiers in this report are defined as follows:

* A quality control analyte recovery is outside of specified acceptance criteria

** Analyte is a Tracer compound

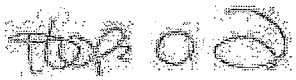
** Analyte is a surrogate compound

U Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.

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 Certificate of Analysis.

The designation ND, if present, appears in the result column when the analyte concentration is not detected above the limit as defined in the 'U' qualifier above.

This data report has been prepared and reviewed in accordance with GEL Laboratories LLC standard operating procedures. Please direct any questions to your Project Manager, Julie Robinson.

Reviewed by 

GEL LABORATORIES LLC
2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: July 14, 2016

Company : Eastern Analytical, Inc.
Address : 25 Chenell Drive

Concord, New Hampshire 03301
Contact: Mr. Michael O. Serard
Project: Radiochemistry Analyses - Serard

Client Sample ID:	GZ-9L	Project:	ETAI00116
Sample ID:	400292001	Client ID:	ETAI001
Matrix:	Water		
Collect Date:	27-JUN-16 11:00		
Receive Date:	29-JUN-16		
Collector:	Client		

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Gamma Spec Analysis												
Gammaspec, Gamma, Liquid (Cesium-137) "As Received"												
Cesium-137	U	-0.578	+/-3.16	4.67	10.0	pCi/L		MXR1	07/06/16	1530	1577139	1
Rad Gas Flow Proportional Counting												
GFPC, Pb210, Liquid "As Received"												
Lead-210		5.23	+/-2.85	4.03	5.00	pCi/L		KSD1	07/11/16	1202	1578271	2
Rad Liquid Scintillation Analysis												
LSC, Tritium Dist, Liquid "As Received"												
Tritium	U	342	+/-309	507	700	pCi/L		TXJ1	07/06/16	0427	1578300	3
Liquid Scint C14, Liquid "As Received"												
Carbon-14	U	-12.1	+/-18.7	33.0	50.0	pCi/L		TXJ1	07/05/16	1645	1578293	4
Liquid Scint Ni63, Liquid "As Received"												
Nickel-63	U	-22.7	+/-18.3	33.2	50.0	pCi/L		CXS7	07/13/16	0906	1578331	5

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 901.1	
2	DOE RP280 Modified	
3	EPA 906.0 Modified	
4	EPA EERF C-01 Modified	
5	DOE RESL Ni-1, Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Lead Carrier	GFPC, Pb210, Liquid "As Received"			63.7	(25%-125%)
Nickel Carrier	Liquid Scint Ni63, Liquid "As Received"			68.8	(25%-125%)

Notes:
Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

GEL LABORATORIES LLC
2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: July 14, 2016

Company : Eastern Analytical, Inc.
Address : 25 Chenell Drive

Concord, New Hampshire 03301
Contact: Mr. Michael O. Serard
Project: Radiochemistry Analyses - Serard

Client Sample ID: GZ-2
Sample ID: 400292002
Matrix: Water
Collect Date: 27-JUN-16 09:40
Receive Date: 29-JUN-16
Collector: Client

Project: ETAI00116
Client ID: ETAI001

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Gamma Spec Analysis												
Gammaspec, Gamma, Liquid (Cesium-137) "As Received"												
Cesium-137	U	0.288	+/-2.72	5.16	10.0	pCi/L		MXR1	07/06/16	1540	1577139	1
Rad Gas Flow Proportional Counting												
GFPC, Pb210, Liquid "As Received"												
Lead-210	U	0.829	+/-2.15	3.83	5.00	pCi/L		KSD1	07/11/16	1202	1578271	2
Rad Liquid Scintillation Analysis												
LSC, Tritium Dist, Liquid "As Received"												
Tritium	U	216	+/-291	495	700	pCi/L		TXJ1	07/06/16	0444	1578300	3
Liquid Scint C14, Liquid "As Received"												
Carbon-14	U	-0.548	+/-19.1	33.1	50.0	pCi/L		TXJ1	07/05/16	1717	1578293	4
Liquid Scint Ni63, Liquid "As Received"												
Nickel-63	U	-15.5	+/-16.0	28.8	50.0	pCi/L		CXS7	07/13/16	0927	1578331	5

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 901.1	
2	DOE RP280 Modified	
3	EPA 906.0 Modified	
4	EPA EERF C-01 Modified	
5	DOE RESL Ni-1, Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Lead Carrier	GFPC, Pb210, Liquid "As Received"			90.8	(25%-125%)
Nickel Carrier	Liquid Scint Ni63, Liquid "As Received"			79.3	(25%-125%)

Notes:
Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

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Certificate of Analysis

Report Date: July 14, 2016

Company :	Eastern Analytical, Inc.
Address :	25 Chenell Drive
	Concord, New Hampshire 03301
Contact:	Mr. Michael O. Serard
Project:	Radiochemistry Analyses - Serard

Client Sample ID:	GZ-11L (A)	Project:	ETAI00116
Sample ID:	400292003	Client ID:	ETAI001
Matrix:	Water		
Collect Date:	27-JUN-16 12:40		
Receive Date:	29-JUN-16		
Collector:	Client		

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Gamma Spec Analysis												
Gammaspec, Gamma, Liquid (Cesium-137) "As Received"												
Cesium-137	U	-4.9	+/-4.77	7.74	10.0	pCi/L		MXR1	07/07/16	0710	1577139	1
Rad Gas Flow Proportional Counting												
GFPC, Pb210, Liquid "As Received"												
Lead-210	U	-0.451	+/-1.96	3.73	5.00	pCi/L		KSD1	07/12/16	0915	1578271	2
Rad Liquid Scintillation Analysis												
LSC, Tritium Dist, Liquid "As Received"												
Tritium	U	106	+/-286	507	700	pCi/L		TXJ1	07/06/16	0500	1578300	3
Liquid Scint C14, Liquid "As Received"												
Carbon-14	U	-7.32	+/-18.9	33.0	50.0	pCi/L		TXJ1	07/05/16	1748	1578293	4
Liquid Scint Ni63, Liquid "As Received"												
Nickel-63	U	-22.4	+/-18.0	32.7	50.0	pCi/L		CXS7	07/13/16	0949	1578331	5

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 901.1	
2	DOE RP280 Modified	
3	EPA 906.0 Modified	
4	EPA EERF C-01 Modified	
5	DOE RESL Ni-1, Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Lead Carrier	GFPC, Pb210, Liquid "As Received"			91.5	(25%-125%)
Nickel Carrier	Liquid Scint Ni63, Liquid "As Received"			70	(25%-125%)

Notes:
Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

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Certificate of Analysis

Report Date: July 14, 2016

Company : Eastern Analytical, Inc.
Address : 25 Chenell Drive

Concord, New Hampshire 03301
Contact: Mr. Michael O. Serard
Project: Radiochemistry Analyses - Serard

Client Sample ID: GZ-11L (B)
Sample ID: 400292004
Matrix: Water
Collect Date: 27-JUN-16 12:45
Receive Date: 29-JUN-16
Collector: Client

Project: ETAI00116
Client ID: ETAI001

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Gamma Spec Analysis												
Gammaspec, Gamma, Liquid (Cesium-137) "As Received"												
Cesium-137	U	0.0549	+/-4.28	7.00	10.0	pCi/L		MXR1	07/07/16	0710	1577139	1
Rad Gas Flow Proportional Counting												
GFPC, Pb210, Liquid "As Received"												
Lead-210	U	-0.262	+/-2.16	4.07	5.00	pCi/L		KSD1	07/11/16	1202	1578271	2
Rad Liquid Scintillation Analysis												
LSC, Tritium Dist, Liquid "As Received"												
Tritium	U	134	+/-288	505	700	pCi/L		TXJ1	07/06/16	0516	1578300	3
Liquid Scint C14, Liquid "As Received"												
Carbon-14	U	-4.25	+/-19.0	33.0	50.0	pCi/L		TXJ1	07/05/16	1819	1578293	4
Liquid Scint Ni63, Liquid "As Received"												
Nickel-63	U	-15.7	+/-17.7	31.8	50.0	pCi/L		CXS7	07/13/16	1011	1578331	5

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 901.1	
2	DOE RP280 Modified	
3	EPA 906.0 Modified	
4	EPA EERF C-01 Modified	
5	DOE RESL Ni-1, Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Lead Carrier	GFPC, Pb210, Liquid "As Received"			90.8	(25%-125%)
Nickel Carrier	Liquid Scint Ni63, Liquid "As Received"			72	(25%-125%)

Notes:
Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

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Certificate of Analysis

Report Date: July 14, 2016

Company : Eastern Analytical, Inc.
Address : 25 Chenell Drive

Concord, New Hampshire 03301
Contact: Mr. Michael O. Serard
Project: Radiochemistry Analyses - Serard

Client Sample ID: GZ-11L (C)
Sample ID: 400292005
Matrix: Water
Collect Date: 27-JUN-16 12:50
Receive Date: 29-JUN-16
Collector: Client

Project: ETAI00116
Client ID: ETAI001

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Gamma Spec Analysis												
Gammaspec, Gamma, Liquid (Cesium-137) "As Received"												
Cesium-137	U	-0.283	+/-4.52	7.04	10.0	pCi/L		MXR1	07/07/16	0711	1577139	1
Rad Gas Flow Proportional Counting												
GFPC, Pb210, Liquid "As Received"												
Lead-210	U	0.113	+/-1.93	3.60	5.00	pCi/L		KSD1	07/11/16	1202	1578271	2
Rad Liquid Scintillation Analysis												
LSC, Tritium Dist, Liquid "As Received"												
Tritium	U	60.4	+/-280	504	700	pCi/L		TXJ1	07/06/16	0533	1578300	3
Liquid Scint C14, Liquid "As Received"												
Carbon-14	U	5.86	+/-19.3	33.0	50.0	pCi/L		TXJ1	07/05/16	1851	1578293	4
Liquid Scint Ni63, Liquid "As Received"												
Nickel-63	U	-19.2	+/-18.1	32.8	50.0	pCi/L		CXS7	07/13/16	1032	1578331	5

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 901.1	
2	DOE RP280 Modified	
3	EPA 906.0 Modified	
4	EPA EERF C-01 Modified	
5	DOE RESL Ni-1, Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Lead Carrier	GFPC, Pb210, Liquid "As Received"			91.5	(25%-125%)
Nickel Carrier	Liquid Scint Ni63, Liquid "As Received"			70	(25%-125%)

Notes:
Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

GEL LABORATORIES LLC
2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: July 14, 2016

Company : Eastern Analytical, Inc.
Address : 25 Chenell Drive

Concord, New Hampshire 03301
Contact: Mr. Michael O. Serard
Project: Radiochemistry Analyses - Serard

Client Sample ID:	GZ-11L (D)	Project:	ETAI00116
Sample ID:	400292006	Client ID:	ETAI001
Matrix:	Water		
Collect Date:	27-JUN-16 12:55		
Receive Date:	29-JUN-16		
Collector:	Client		

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Gamma Spec Analysis												
Gammaspec, Gamma, Liquid (Cesium-137) "As Received"												
Cesium-137	U	-4.13	+/-3.83	5.99	10.0	pCi/L		MXR1	07/07/16	0738	1577139	1
Rad Gas Flow Proportional Counting												
GFPC, Pb210, Liquid "As Received"												
Lead-210	U	1.96	+/-2.03	3.37	5.00	pCi/L		KSD1	07/11/16	1202	1578271	2
Rad Liquid Scintillation Analysis												
LSC, Tritium Dist, Liquid "As Received"												
Tritium	U	206	+/-294	504	700	pCi/L		TXJ1	07/06/16	0549	1578300	3
Liquid Scint C14, Liquid "As Received"												
Carbon-14	U	-18.8	+/-18.5	33.0	50.0	pCi/L		TXJ1	07/05/16	1922	1578293	4
Liquid Scint Ni63, Liquid "As Received"												
Nickel-63	U	23.8	+/-19.1	31.7	50.0	pCi/L		CXS7	07/14/16	0738	1578331	5

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 901.1	
2	DOE RP280 Modified	
3	EPA 906.0 Modified	
4	EPA EERF C-01 Modified	
5	DOE RESL Ni-1, Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Lead Carrier	GFPC, Pb210, Liquid "As Received"			91.5	(25%-125%)
Nickel Carrier	Liquid Scint Ni63, Liquid "As Received"			66.3	(25%-125%)

Notes:
Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

GEL LABORATORIES LLC
2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: July 14, 2016

Company : Eastern Analytical, Inc.
Address : 25 Chenell Drive

Concord, New Hampshire 03301
Contact: Mr. Michael O. Serard
Project: Radiochemistry Analyses - Serard

Client Sample ID: GZ-11L (E)
Sample ID: 400292007
Matrix: Water
Collect Date: 27-JUN-16 13:00
Receive Date: 29-JUN-16
Collector: Client

Project: ETAI00116
Client ID: ETAI001

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Gamma Spec Analysis												
Gammaspec, Gamma, Liquid (Cesium-137) "As Received"												
Cesium-137	U	-0.237	+/-3.77	6.09	10.0	pCi/L		MXR1	07/07/16	0738	1577139	1
Rad Gas Flow Proportional Counting												
GFPC, Pb210, Liquid "As Received"												
Lead-210	U	3.51	+/-2.33	3.52	5.00	pCi/L		KSD1	07/11/16	1202	1578271	2
Rad Liquid Scintillation Analysis												
LSC, Tritium Dist, Liquid "As Received"												
Tritium	U	150	+/-290	507	700	pCi/L		TXJ1	07/06/16	0605	1578300	3
Liquid Scint C14, Liquid "As Received"												
Carbon-14	U	2.01	+/-19.1	32.9	50.0	pCi/L		TXJ1	07/05/16	1953	1578293	4
Liquid Scint Ni63, Liquid "As Received"												
Nickel-63	U	-12	+/-19.8	35.1	50.0	pCi/L		CXS7	07/13/16	1116	1578331	5

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 901.1	
2	DOE RP280 Modified	
3	EPA 906.0 Modified	
4	EPA EERF C-01 Modified	
5	DOE RESL Ni-1, Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Lead Carrier	GFPC, Pb210, Liquid "As Received"			88.8	(25%-125%)
Nickel Carrier	Liquid Scint Ni63, Liquid "As Received"			65.1	(25%-125%)

Notes:
Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

QC Summary

Report Date: July 14, 2016

Eastern Analytical, Inc.
25 Chenell Drive
Concord, New Hampshire

Contact: Mr. Michael O. Serard

Workorder: 400292

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Rad Gamma Spec										
Batch 1577139										
QC1203574180 400070001 DUP										
Cesium-137	U	-0.131	U	-0.499	pCi/L	N/A			N/A MXR1	07/07/16 07:45
	Uncertainty	+/-3.76		+/-5.18						
QC1203574181 LCS										
Americium-241	34400			33600	pCi/L		97.8	(75%-125%)		07/07/16 08:41
	Uncertainty			+/-659						
Cobalt-60	13500			13900	pCi/L		103	(75%-125%)		
	Uncertainty			+/-418						
Cesium-137	13400			13700	pCi/L		102	(75%-125%)		
	Uncertainty			+/-375						
QC1203574179 MB										
Cesium-137			U	0.664	pCi/L					07/07/16 07:43
	Uncertainty			+/-2.39						
Rad Gas Flow										
Batch 1578271										
QC1203576698 400292004 DUP										
Lead-210	U	-0.262	U	3.55	pCi/L	N/A			N/A KSD1	07/11/16 12:05
	Uncertainty	+/-2.16		+/-2.39						
QC1203576699 LCS										
Lead-210	677			685	pCi/L		101	(75%-125%)		07/11/16 12:05
	Uncertainty			+/-19.6						
QC1203576697 MB										
Lead-210			U	2.48	pCi/L					07/11/16 12:02
	Uncertainty			+/-2.06						
Rad Liquid Scintillation										
Batch 1578293										
QC1203576760 400292001 DUP										
Carbon-14	U	-12.1	U	-7.32	pCi/L	N/A			N/A TXJ1	07/05/16 20:56
	Uncertainty	+/-18.7		+/-18.9						
QC1203576762 LCS										
Carbon-14	1260			1190	pCi/L		94.4	(75%-125%)		07/05/16 21:58
	Uncertainty			+/-42.8						
QC1203576759 MB										
Carbon-14			U	-10.2	pCi/L					07/05/16 20:25
	Uncertainty			+/-18.8						
QC1203576761 400292001 MS										
Carbon-14	1260 U	-12.1		1260	pCi/L		100	(75%-125%)		07/05/16 21:27
	Uncertainty	+/-18.7		+/-44.0						
Batch 1578300										
QC1203576795 400292001 DUP										
Tritium	U	342	U	283	pCi/L	N/A			N/A TXJ1	07/06/16 06:38
	Uncertainty	+/-309		+/-303						
QC1203576797 LCS										

QC Summary

Workorder: 400292

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Rad Liquid Scintillation										
Batch 1578300										
Tritium	2320			2470	pCi/L		106	(75%-125%)		07/06/16 07:11
	Uncertainty			+/-460						
QC1203576794 MB										
Tritium			U	477	pCi/L				TXJ1	07/06/16 06:22
	Uncertainty			+/-322						
QC1203576796 400292001 MS										
Tritium	2330 U	342		2300	pCi/L		98.9	(75%-125%)		07/06/16 06:54
	Uncertainty	+/-309		+/-455						
Batch 1578331										
QC1203576901 400292001 DUP										
Nickel-63	U	-22.7	U	-10.3	pCi/L	N/A		N/A	CXS7	07/14/16 07:59
	Uncertainty	+/-18.3		+/-18.6						
QC1203576902 LCS										
Nickel-63	900			1020	pCi/L		113	(75%-125%)		07/13/16 12:21
	Uncertainty			+/-42.2						
QC1203576900 MB										
Nickel-63			U	-9.09	pCi/L					07/13/16 11:37
	Uncertainty			+/-21.4						

Notes:

Counting Uncertainty is 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
- ND Analyte concentration is not detected above the detection 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 Spectroscopy--Uncertain identification

QC Summary

Workorder: 400292

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time

UJ	Gamma Spectroscopy--Uncertain identification
UL	Not considered detected. The associated number is the reported concentration, which may be inaccurate due to a low bias.
X	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
Y	Other specific qualifiers were required to properly define the results. Consult case narrative.
^	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 indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more or %RPD not applicable.
^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.
* Indicates that a Quality Control parameter was not within specifications.
For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

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.

Product: **Gammaspec, Gamma, Liquid (Cesium-137)**
Analytical Method: EPA 901.1
Analytical Procedure: GL-RAD-A-013 REV# 25
Analytical Batch: 1577139

The following samples were analyzed using the above methods and analytical procedure(s).

GEL Sample ID#	Client Sample Identification
400292001	GZ-9L
400292002	GZ-2
400292003	GZ-11L (A)
400292004	GZ-11L (B)
400292005	GZ-11L (C)
400292006	GZ-11L (D)
400292007	GZ-11L (E)
1203574179	Method Blank (MB)
1203574180	400070001(NonSDG) Sample Duplicate (DUP)
1203574181	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

Data Summary:

There are no exceptions, anomalies or deviations from the specified methods. All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable.

Product: **GFPC, Pb210, Liquid**
Analytical Method: DOE RP280 Modified
Analytical Procedure: GL-RAD-A-018 REV# 13
Analytical Batch: 1578271

The following samples were analyzed using the above methods and analytical procedure(s).

GEL Sample ID#	Client Sample Identification
400292001	GZ-9L
400292002	GZ-2
400292003	GZ-11L (A)
400292004	GZ-11L (B)
400292005	GZ-11L (C)
400292006	GZ-11L (D)
400292007	GZ-11L (E)
1203576697	Method Blank (MB)

1203576698	400292004(GZ-11L (B)) Sample Duplicate (DUP)
1203576699	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

Data Summary:

All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable, with the following exceptions.

Technical Information

Recounts
Sample 400292003 (GZ-11L (A)) was recounted due to results more negative than the three sigma TPU. The second count is reported.

Product: **Liquid Scint C14, Liquid**
Analytical Method: EPA EERF C-01 Modified
Analytical Procedure: GL-RAD-A-003 REV# 15
Analytical Batch: 1578293

The following samples were analyzed using the above methods and analytical procedure(s).

GEL Sample ID#	Client Sample Identification
400292001	GZ-9L
400292002	GZ-2
400292003	GZ-11L (A)
400292004	GZ-11L (B)
400292005	GZ-11L (C)
400292006	GZ-11L (D)
400292007	GZ-11L (E)
1203576759	Method Blank (MB)
1203576760	400292001(GZ-9L) Sample Duplicate (DUP)
1203576761	400292001(GZ-9L) Matrix Spike (MS)
1203576762	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

Data Summary:

There are no exceptions, anomalies or deviations from the specified methods. All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable.

Product: **LSC, Tritium Dist, Liquid**

Analytical Method: EPA 906.0 Modified
Analytical Procedure: GL-RAD-A-002 REV# 21
Analytical Batch: 1578300

The following samples were analyzed using the above methods and analytical procedure(s).

GEL Sample ID#	Client Sample Identification
400292001	GZ-9L
400292002	GZ-2
400292003	GZ-11L (A)
400292004	GZ-11L (B)
400292005	GZ-11L (C)
400292006	GZ-11L (D)
400292007	GZ-11L (E)
1203576794	Method Blank (MB)
1203576795	400292001(GZ-9L) Sample Duplicate (DUP)
1203576796	400292001(GZ-9L) Matrix Spike (MS)
1203576797	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

Data Summary:

There are no exceptions, anomalies or deviations from the specified methods. All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable.

Product: Liquid Scint Ni63, Liquid
Analytical Method: DOE RESL Ni-1, Modified
Analytical Procedure: GL-RAD-A-022 REV# 18
Analytical Batch: 1578331

The following samples were analyzed using the above methods and analytical procedure(s).

GEL Sample ID#	Client Sample Identification
400292001	GZ-9L
400292002	GZ-2
400292003	GZ-11L (A)
400292004	GZ-11L (B)
400292005	GZ-11L (C)
400292006	GZ-11L (D)
400292007	GZ-11L (E)
1203576900	Method Blank (MB)
1203576901	400292001(GZ-9L) Sample Duplicate (DUP)
1203576902	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

Data Summary:

All sample data provided in this report met the acceptance criteria specified in the analytical methods and

procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable, with the following exceptions.

Technical Information

Recounts
Samples 1203576901 (GZ-9LDUP) and 400292006 (GZ-11L (D)) were recounted due to results more negative than the three sigma TPU. The second counts are reported.

Certification Statement

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless otherwise noted in the analytical case narrative.

CHAIN-OF-CUSTODY RECORD

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40-0292

EAI SRB# 157615

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Sample ID	Date Sampled	Matrix	aParameters	Sample Notes
GZ-9L	6/27/2016 11:00	aqueous	Subcontract - Tritium	
GZ-9L	6/27/2016 11:00	aqueous	Subcontract - Radionuclide Carbon-14	
GZ-9L	6/27/2016 11:00	aqueous	Subcontract - Radionuclide Cesium-137	
GZ-9L	6/27/2016 11:00	aqueous	Subcontraqt - Radionuclide Nickel-63	

EAI SRB# 157615 Project State: NH

Project ID:

Company GEL Laboratories, LLC
Address 2040 Savage Road
Address Charleston, SC 29417
Account #
Phone # (843) 556-8171
Fax Number (843) 766-1178

Results Needed by: Preferred date 10 day

QC Deliverables

☒ A ☐ A+ ☐ B ☐ B+ ☐ C ☐ P

Notes about project:

Email pdf of results and invoice to customerservice@eailabs.com.

Eastern Analytical Inc. PO Number: 44706

Please call prior to analyzing, if RUSH surcharges will be applied.

Samples Collected by:

Relinquished by — Date/Time 6/28/16 15:30 — Received by UPS

Relinquished by — Date/Time 6-29-16 0925 — Received by

Eastern Analytical, Inc. 25 Chenell Dr. Concord, NH 03301 Phone: (603)228-0525 1-800-287-0525 Fax: (603)228-4591

CHAIN-OF-CUSTODY RECORD

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EAI SRB# 157615

Sample ID	Date Sampled	Matrix	aParameters	Sample Notes
GZ-9L	6/27/2016 11:00	aqueous	Subcontract - Radionuclide Lead-210	
GZ-2	6/27/2016 9:40	aqueous	Subcontract - Tritium	
GZ-2	6/27/2016 9:40	aqueous	Subcontract - Radionuclide Carbon-14	
GZ-2	6/27/2016 9:40	aqueous	Subcontract - Radionuclide Cesium-137	

EAI SRB# 157615 Project State: NH

Project ID:

Company GEL Laboratories, LLC
Address 2040 Savage Road
Address Charleston, SC 29417
Account #
Phone # (843) 556-8171
Fax Number (843) 766-1178

Results Needed by: Preferred date 10 day

QC Deliverables

☒A ☐A+ ☐B ☐B+ ☐C ☐P

Notes about project:

Email pdf of results and invoice to customerservice@eailabs.com.

Eastern Analytical Inc. PO Number: 44706

Please call prior to analyzing, if RUSH surcharges will be applied.

Samples Collected by: _____

Relinquished by	Date/Time	Received by
[illegible]	6/28/16 1530	UPS
	6/29/16 0925	[illegible]

Relinquished by Date/Time Received by

CHAIN-OF-CUSTODY RECORD

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EAI SRB# 157615

Sample ID	Date Sampled	Matrix	aParameters	Sample Notes
GZ-2	6/27/2016 9:40	aqueous	Subcontraqt - Radionuclide Nickel-63	
GZ-2	6/27/2016 9:40	aqueous	Subcontract - Radionuclide Lead-210	
GZ-11L (A)	6/27/2016 12:40	aqueous	Subcontract - Tritium	
GZ-11L (A)	6/27/2016 12:40	aqueous	Subcontract - Radionuclide Carbon-14	

EAI SRB# 157615 Project State: NH

Project ID:

Company GEL Laboratories, LLC
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Address Charleston, SC 29417
Account #
Phone # (843) 556-8171
Fax Number (843) 766-1178

Results Needed by: Preferred date 10 day

QC Deliverables

☒ A ☐ A+ ☐ B ☐ B+ ☐ C ☐ P

Notes about project:

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Eastern Analytical Inc. PO Number: 44706

Please call prior to analyzing, if RUSH surcharges will be applied.

Samples Collected by: _____

Relinquished by	Date/Time	Received by
[signature]	6/28/16 15:30 UPS	
	6/29/16 0925	[signature]
Relinquished by	Date/Time	Received by

Eastern Analytical, Inc. 25 Chenell Dr. Concord, NH 03301 Phone: (603)228-0525 1-800-287-0525 Fax: (603)228-4591

CHAIN-OF-CUSTODY RECORD

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EAI SRB# 157615

Sample ID	Date Sampled	Matrix	aParameters	Sample Notes
GZ-11L (A)	6/27/2016 12:40	aqueous	Subcontract - Radionuclide Cesium-137	
GZ-11L (A)	6/27/2016 12:40	aqueous	Subcontraqt - Radionuclide Nickel-63	
GZ-11L (A)	6/27/2016 12:40	aqueous	Subcontract - Radionuclide Lead-210	
GZ-11L (B)	6/27/2016 12:45	aqueous	Subcontract - Tritium	

EAI SRB# 157615 Project State: NH

Project ID:

Company GEL Laboratories, LLC
Address 2040 Savage Road
Address Charleston, SC 29417
Account #
Phone # (843) 556-8171
Fax Number (843) 766-1178

Results Needed by: Preferred date 10 day

QC Deliverables

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Notes about project:

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Eastern Analytical Inc. PO Number: 44706

Please call prior to analyzing, if RUSH surcharges will be applied.

Samples Collected by: _____

Relinquished by	Date/Time	Received by
	6/28/16 15:30	
	6/29/16 0925	

Relinquished by	Date/Time	Received by

CHAIN-OF-CUSTODY RECORD

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EAI SRB# 157615

Sample ID	Date Sampled	Matrix	aParameters	Sample Notes
GZ-11L (B)	6/27/2016 12:45	aqueous	Subcontract - Radionuclide Carbon-14	
GZ-11L (B)	6/27/2016 12:45	aqueous	Subcontract - Radionuclide Cesium-137	
GZ-11L (B)	6/27/2016 12:45	aqueous	Subcontraqt - Radionuclide Nickel-63	
GZ-11L (B)	6/27/2016 12:45	aqueous	Subcontract - Radionuclide Lead-210	

EAI SRB# 157615 Project State: NH

Project ID:

Company GEL Laboratories, LLC
Address 2040 Savage Road
Address Charleston, SC 29417
Account #
Phone # (843) 556-8171
Fax Number (843) 766-1178

Results Needed by: Preferred date 10 day
QC Deliverables
☒ A ☐ A+ ☐ B ☐ B+ ☐ C ☐ P

Notes about project:
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Eastern Analytical Inc. PO Number: 44706

Please call prior to analyzing, if RUSH surcharges will be applied.

Samples Collected by:

Relinquished by	Date/Time	Received by
	6/28/16 15:30	UPS
	6/29/16 0925	
Relinquished by	Date/Time	Received by

Eastern Analytical, Inc. 25 Chenell Dr. Concord, NH 03301 Phone: (603)228-0525 1-800-287-0525 Fax: (603)228-4591

CHAIN-OF-CUSTODY RECORD

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EAI SRB# 157615

Sample ID	Date Sampled	Matrix	aParameters	Sample Notes
GZ-11L (C)	6/27/2016 12:50	aqueous	Subcontract - Tritium	
GZ-11L (C)	6/27/2016 12:50	aqueous	Subcontract - Radionuclide Carbon-14	
GZ-11L (C)	6/27/2016 12:50	aqueous	Subcontract - Radionuclide Cesium-137	
GZ-11L (C)	6/27/2016 12:50	aqueous	Subcontraqt - Radionuclide Nickel-63	

EAI SRB# 157615 Project State: NH

Project ID:

Company GEL Laboratories, LLC
Address 2040 Savage Road
Address Charleston, SC 29417
Account #
Phone # (843) 556-8171
Fax Number (843) 766-1178

Results Needed by: Preferred date 10day

QC Deliverables

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Samples Collected by:

Relinquished by	Date/Time	Received by
	6/28/16 15:30 UPS	
	6/29/16 0925	
Relinquished by	Date/Time	Received by

Eastern Analytical, Inc. 25 Chenell Dr. Concord, NH 03301 Phone: (603)228-0525 1-800-287-0525 Fax: (603)228-4591

CHAIN-OF-CUSTODY RECORD

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EAI SRB# 157615

Sample ID	Date Sampled	Matrix	aParameters	Sample Notes
GZ-11L (C)	6/27/2016 12:50	aqueous	Subcontract - Radionuclide Lead-210	
GZ-11L (D)	6/27/2016 12:55	aqueous	Subcontract - Tritium	
GZ-11L (D)	6/27/2016 12:55	aqueous	Subcontract - Radionuclide Carbon-14	
GZ-11L (D)	6/27/2016 12:55	aqueous	Subcontract - Radionuclide Cesium-137	

EAI SRB# 157615 Project State: NH

Project ID:

Company GEL Laboratories, LLC
Address 2040 Savage Road
Address Charleston, SC 29417
Account #
Phone # (843) 556-8171
Fax Number (843) 766-1178

Results Needed by: Preferred date 10 day

QC Deliverables

☒ A ☐ A+ ☐ B ☐ B+ ☐ C ☐ P

Notes about project:

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Eastern Analytical Inc. PO Number: 44706

Please call prior to analyzing, if RUSH surcharges will be applied.

Samples Collected by: _____

Relinquished by	Date/Time	Received by
	6/28/16 15:30	UPS
	6/29/16 0925	
Relinquished by	Date/Time	Received by

CHAIN-OF-CUSTODY RECORD

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EAI SRB# 157615

Sample ID	Date Sampled	Matrix	aParameters	Sample Notes
GZ-11L (D)	6/27/2016 12:55	aqueous	Subcontraqt - Radionuclide Nickel-63	
GZ-11L (D)	6/27/2016 12:55	aqueous	Subcontract - Radionuclide Lead-210	
GZ-11L (E)	6/27/2016 13:00	aqueous	Subcontract - Tritium	
GZ-11L (E)	6/27/2016 13:00	aqueous	Subcontract - Radionuclide Carbon-14	

EAI SRB# 157615 Project State: NH

Project ID:

Company GEL Laboratories, LLC
Address 2040 Savage Road
Address Charleston, SC 29417
Account #
Phone # (843) 556-8171
Fax Number (843) 766-1178

Results Needed by: Preferred date 10 day

QC Deliverables

☒ A ☐ A+ ☐ B ☐ B+ ☐ C ☐ P

Notes about project:

Email pdf of results and invoice to customerservice@eailabs.com.

Eastern Analytical Inc. PO Number: 44706

Please call prior to analyzing, if RUSH surcharges will be applied.

Samples Collected by:

Relinquished by	Date/Time	Received by
	6/28/16 15:30	UPS
	6/29/16 0925	
Relinquished by	Date/Time	Received by

CHAIN-OF-CUSTODY RECORD

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EAI SRB# 157615

Sample ID	Date Sampled	Matrix	aParameters	Sample Notes
GZ-11L (E)	6/27/2016 13:00	aqueous	Subcontract - Radionuclide Cesium-137	
GZ-11L (E)	6/27/2016 13:00	aqueous	Subcontraqt - Radionuclide Nickel-63	
GZ-11L (E)	6/27/2016 13:00	aqueous	Subcontract - Radionuclide Lead-210	

EAI SRB# 157615 Project State: NH

Project ID:

Company GEL Laboratories, LLC
Address 2040 Savage Road
Address Charleston, SC 29417
Account #
Phone # (843) 556-8171
Fax Number (843) 766-1178

Results Needed by: Preferred date 10 day

QC Deliverables

☒ A ☐ A+ ☐ B ☐ B+ ☐ C ☐ P

Notes about project:

Email pdf of results and invoice to customerservice@eailabs.com.

Eastern Analytical Inc. PO Number: 44706

Please call prior to analyzing, if RUSH surcharges will be applied.

Samples Collected by:

Relinquished by	Date/Time	Received by
	6/28/16 15:30	UPS
	6/29/16	0925

Relinquished by	Date/Time	Received by

Eastern Analytical, Inc. 25 Chenell Dr. Concord, NH 03301 Phone: (603)228-0525 1-800-287-0525 Fax: (603)228-4591

GEL Laboratories LLC

SAMPLE RECEIPT & REVIEW FORM

Client: ETA	SDG/AR/COC/Work Order: 400292
Received By: Sandra Grimball	Date Received: 6/29/16

Suspected Hazard Information	Yes	No	*If Net Counts > 100cpm on samples not marked "radioactive", contact the Radiation Safety Group for further investigation.
COC/Samples marked as radioactive?		✓	Maximum Net Counts Observed* (Observed Counts - Area Background Counts): 0 cpm
Classified Radioactive II or III by RSO?		✓	If yes, Were swipes taken of sample containers < action levels?
COC/Samples marked containing PCBs?		✓	
Package, COC, and/or Samples marked as beryllium or asbestos containing?		✓	If yes, samples are to be segregated as Safety Controlled Samples, and opened by the GEL Safety Group.
Shipped as a DOT Hazardous?		✓	Hazard Class Shipped: UN#:
Samples identified as Foreign Soil?		✓	

	Sample Receipt Criteria	Yes	NA	No	Comments/Qualifiers (Required for Non-Conforming Items)
1	Shipping containers received intact and sealed?	✓			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
2	Samples requiring cold preservation within (0 ≤ 6 deg. C)?*			✓	Preservation Method: Ice bags Blue ice Dry ice (None) Other (describe) *all temperatures are recorded in Celsius 22°C
2a	Daily check performed and passed on IR temperature gun?	✓			Temperature Device Serial #: Secondary Temperature Device Serial # (If Applicable): 851020091184
3	Chain of custody documents included with shipment?	✓			
4	Sample containers intact and sealed?	✓			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
5	Samples requiring chemical preservation at proper pH?	✓			Sample ID's, containers affected and observed pH: If Preservation added, Lot#:
6	Do Low Level Perchlorate samples have headspace as required?			✓	Sample ID's and containers affected:
7	VOA vials contain acid preservation?			✓	(If unknown, select No)
8	VOA vials free of headspace (defined as < 6mm bubble)?			✓	Sample ID's and containers affected:
9	Are Encore containers present?			✓	(If yes, immediately deliver to Volatiles laboratory)
10	Samples received within holding time?	✓			ID's and tests affected:
11	Sample ID's on COC match ID's on bottles?	✓			Sample ID's and containers affected:
12	Date & time on COC match date & time on bottles?	✓			Sample ID's affected:
13	Number of containers received match number indicated on COC?			✓	Sample ID's affected: we received three containers of each Sample ID
14	Are sample containers identifiable as GEL provided?			✓	
15	COC form is properly signed in relinquished/received sections?	✓			
16	Carrier and tracking number.				Circle Applicable: FedEx Air FedEx Ground (UPS) Field Services Courier Other 1Z X46 599 01 9479 6573 22°C 1Z X46 599 01 9090 2525 23°C

Comments (Use Continuation Form if needed):

PM (or PMA) review: Initials SR Date 6/29/16 Page 1 of 1

GL-CHL-SR-001 Rev 3

List of current GEL Certifications as of 14 July 2016

State	Certification
Alaska	UST-0110
Arkansas	88-0651
CLIA	42D0904046
California	2940
Colorado	SC00012
Connecticut	PH-0169
Delaware	SC00012
DoD ELAP/ ISO17025 A2LA	2567.01
Florida NELAP	E87156
Foreign Soils Permit	P330-15-00283, P330-15-00253
Georgia	SC00012
Georgia SDWA	967
Hawaii	SC00012
Idaho Chemistry	SC00012
Idaho Radiochemistry	SC00012
Illinois NELAP	200029
Indiana	C-SC-01
Kansas NELAP	E-10332
Kentucky SDWA	90129
Kentucky Wastewater	90129
Louisiana NELAP	03046 (AI33904)
Louisiana SDWA	LA160006
Maryland	270
Massachusetts	M-SC012
Michigan	9976
Mississippi	SC00012
Nebraska	NE-OS-26-13
Nevada	SC000122016-1
New Hampshire NELAP	205415
New Jersey NELAP	SC002
New Mexico	SC00012
New York NELAP	11501
North Carolina	233
North Carolina SDWA	45709
North Dakota	R-158
Oklahoma	9904
Pennsylvania NELAP	68-00485
S.Carolina Radchem	10120002
South Carolina Chemistry	10120001
Tennessee	TN 02934
Texas NELAP	T104704235-16-11
Utah NELAP	SC000122016-20
Vermont	VT87156
Virginia NELAP	460202
Washington	C780
West Virginia	997404

CHAIN-OF-CUSTODY RECORD

157615
GZANH
29

Sample IDs	Date/Time (Composites need start and stop dates/times)	Matrix	Parameters and Sample Notes	# of containers
sample GZ-9L	6/27/16 1100	aqueous Grab or Comp	AqTot/TritiumAqSubGEL/C14AqSubGEL/Cs137AqSubGEL/Ni63AqSubGEL/Pb210AqSubGEL	3
☐ Sampler confirms ID and parameters are accurate			*Circle preservative/s:* HCL HNO_3 H_2SO_4 NaOH MEOH $Na_2S_2O_3$ ICE	Dissolved Sample Field Filtered ☐
sample GZ-2	6/27/16 940	aqueous Grab or Comp	AqTot/TritiumAqSubGEL/C14AqSubGEL/Cs137AqSubGEL/Ni63AqSubGEL/Pb210AqSubGEL	3
☐ Sampler confirms ID and parameters are accurate			*Circle preservative/s:* HCL HNO_3 H_2SO_4 NaOH MEOH $Na_2S_2O_3$ ICE	Dissolved Sample Field Filtered ☐
sample GZ-11L (A)	6/27/16 1240	aqueous Grab or Comp	AqTot/TritiumAqSubGEL/C14AqSubGEL/Cs137AqSubGEL/Ni63AqSubGEL/Pb210AqSubGEL	3
☐ Sampler confirms ID and parameters are accurate			*Circle preservative/s:* HCL HNO_3 H_2SO_4 NaOH MEOH $Na_2S_2O_3$ ICE	Dissolved Sample Field Filtered ☐
sample GZ-11L (B)	6/27/16 1245	aqueous Grab or Comp	AqTot/TritiumAqSubGEL/C14AqSubGEL/Cs137AqSubGEL/Ni63AqSubGEL/Pb210AqSubGEL	3
☐ Sampler confirms ID and parameters are accurate			*Circle preservative/s:* HCL HNO_3 H_2SO_4 NaOH MEOH $Na_2S_2O_3$ ICE	Dissolved Sample Field Filtered ☐

Please ensure this auto COC is accurate, adheres to permit or sampling requirements for this sampling event, and modify as necessary.

EAI Project ID

Project Name Radionuclide Sampling

State NH

Client (Pro Mgr) Jim Wieck

Customer GZA GeoEnvironmental, Inc. (NH)

Address 5 Commerce Park North, Suite 201

City Bedford NH 03110

Phone 623-3600 Fax 624-9463 (37)

Email: James.Wieck@gza.com

Direct 232-8732

Results Needed by: Preferred date 10day

Notes:

GZ-2: RAD Nickel-63/Lead-210 and Tritium/Carbon-14 collected from 1100-1530 due to slowly recharging well.

QC deliverables

☒ A ☐ A+ ☐ B ☐ B+ ☐ C ☐ PC

ReportingOptions

☒ HC ☐ NO FAX

☒ EDD PDF ☐ Partial FAX

☒ EDD email ☒ PDF Invoice

☒ PDF prelim, NO FAX ☐ EQUIS

☐ e-mail Login Confirmation

PO# verbal

Quote#:

Temp 5.0°C

Ice Y ☒ N ☐

Samples Collected by: Christopher Melby

Relinquished by Date/Time Received by

6/27/16 16:20

Relinquished by Date/Time Received by

CHAIN-OF-CUSTODY RECORD

157615 30

GZANH

Sample IDs	Date/Time *Composites need start and stop dates/times*	Matrix	Parameters and Sample Notes	# of containers
sample GZ-11L(C)	6/27/16 1250	aqueous Grab or Comp	AqTot/TritiumAqSubGEL/C14AqSubGEL/Cs137AqSubGEL/Ni63AqSubGEL/Pb210AqSubGEL	3
☐ Sampler confirms ID and parameters are accurate			*Circle preservative/s:* HCL HNO_3 H_2SO_4 NaOH MEOH $Na_2S_2O_3$ ICE	Dissolved Sample Field Filtered ☐
sample GZ-11L (D)	6/27/16 1255	aqueous Grab or Comp	AqTot/TritiumAqSubGEL/C14AqSubGEL/Cs137AqSubGEL/Ni63AqSubGEL/Pb210AqSubGEL	3
☐ Sampler confirms ID and parameters are accurate			*Circle preservative/s:* HCL HNO_3 H_2SO_4 NaOH MEOH $Na_2S_2O_3$ ICE	Dissolved Sample Field Filtered ☐
sample GZ-11L (E)	6/27/16 1300	aqueous Grab or Comp	AqTot/TritiumAqSubGEL/C14AqSubGEL/Cs137AqSubGEL/Ni63AqSubGEL/Pb210AqSubGEL	3
☐ Sampler confirms ID and parameters are accurate			*Circle preservative/s:* HCL HNO_3 H_2SO_4 NaOH MEOH $Na_2S_2O_3$ ICE	Dissolved Sample Field Filtered ☐
sample		aqueous Grab or Comp	AqTot/TritiumAqSubGEL/C14AqSubGEL/Cs137AqSubGEL/Ni63AqSubGEL/Pb210AqSubGEL	
☐ Sampler confirms ID and parameters are accurate			*Circle preservative/s:* HCL HNO_3 H_2SO_4 NaOH MEOH $Na_2S_2O_3$ ICE	Dissolved Sample Field Filtered ☐

Please ensure this auto COC is accurate, adheres to permit or sampling requirements for this sampling event, and modify as necessary.

EAI Project ID

Project Name Radionuclide Sampling

State NH

Client (Pro Mgr) Jim Wieck

Customer GZA GeoEnvironmental, Inc. (NH)

Address 5 Commerce Park North, Suite 201

City Bedford NH 03110

Phone 623-3600 Fax 624-9463 (37)

Email: James.Wieck@gza.com

Direct 232-8732

Results Needed by: Preferred date 10day

Notes:

QC deliverables

☒ A ☐ A+ ☐ B ☐ B+ ☐ C ☐ PC

ReportingOptions

☒ HC ☐ NO FAX

☒ EDD PDF ☐ Partial FAX

☒ EDD email ☒ PDF Invoice

☒ PDF prelim, NO FAX ☐ EQUIS

☐ e-mail Login Confirmation

PO# verbal

Quote#:

Temp 5.5°C

Ice Y☑ N☐

Samples Collected by: Christopher Meloy

Relinquished by	Date/Time	Received by
	6/27/16 16:50	
Relinquished by	Date/Time	Received by