BROOKHAVEN
NATIONAL LABORATORY

Building 701
P.O. Box 5000
Upton, NY 11973-5000
Phone 631 344-8122
Fax 631 344-7630
rocco@bnl.gov

managed by Brookhaven Science Associates
for the U.S. Department of Energy

DEC 0 6 2011

Mr. John Sattler
Brookhaven Site Federal Project Director
Office of Environmental Management
U. S. Department of Energy
Brookhaven Site Office
Upton, New York 11973

Dear Mr. Sattler:

SUBJECT: FIINAL CLOSEOUT REPORT – BROOKHAVEN GRAPHITE RESEARCH REACTOR ENGINEERED CAP AND MONITORING SYSTEM INSTALLATION AREA OF CONCERN 9

Enclosed are fifteen copies of the Final Closeout Report for the Brookhaven Graphite Research Reactor Engineered Cap and Monitoring System Installation Area of Concern 9 for transmittal to the regulators for their files. The appendices are included as a CD to the report. Also enclosed are responses to comments provided by the U.S. Environmental Protection Agency (USEPA) on the draft report, which your staff found acceptable. USEPA concurred with the responses. The New York State Department of Environmental Conservation and the New York State Department of Health had no comments on the draft report.

If you have any questions, please contact me at extension 8122.

Sincerely,

Diane Rocco

Diane Rocco, Director
Environmental Restoration Projects

Enclosures:
As stated

cc:

M. Bebon, w/o encl.
M. Cowell, w/o encl.
B. Deschamps, w/o encl.
W. Dorsch, w/encl.
G. Goode, w/o encl.
M. Holland, BHSO, w/o encl.
R. Howe, w/encl.
T. Kneitel, BHSO, w/encl.
R. Lee, w/o encl.
R. Nash w/encl.
G. Penny, BHSO, w/o encl.
M. Pizzulli, w/encl.
J. Rampe, BHSO w/encl.
J. Remien, w/o encl.
M. Meriwether, w/o encl.

Final

CLOSEOUT REPORT

Brookhaven Graphite Research Reactor
Engineered Cap and Monitoring System Installation
Area of Concern 9

Brookhaven National Laboratory
Upton, New York

November 2011

Prepared by:
Brookhaven Science Associates
Building No. 460
Upton, NY 11973

U.S. Department of Energy
Brookhaven Site Office
Building 464
Upton, NY 11973

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Executive Summary

The Brookhaven Graphite Research Reactor (BGRR) Engineered Cap and Monitoring System are associated with Area of Concern (AOC) 9 at Brookhaven National Laboratory (BNL). Installation of the engineered cap and groundwater monitoring wells, and the completion of the associated preparation activities and as-left survey, referred to herein as the "BGRR Engineered Cap Project," are part of the remedial actions described in the *Record of Decision for AOC 9, Brookhaven Graphite Research Reactor* (BGRR ROD) (BNL, January 2005). The project was completed with funding under the American Recovery and Reinvestment Act (ARRA) and in accordance with Closeout Procedures for National Priorities List Sites, OSWER Directive 9320.2-09A-P, the *Draft Final Remedial Design/Remedial Action Work Plan for the Installation of an Engineered Cap and Monitoring System* (BNL, March 2008) and the *Addendum to the Draft Final Remedial Design/Remedial Action Work Plan for the Installation of an Engineered Cap and Monitoring System* (BNL, September 2010).

Work activities associated with the BGRR Engineered Cap Project commenced in May 2010 and were completed in May 2011, and included the following scope of work:

- Demolition of Building TR897, referred to herein as the BGRR Duct Service Building (DSB) down to existing grade;
- Installation of a permanent roof ("dog house") over the below ground duct (BGD) filter opening;
- Modification of BGRR utilities, including existing roof drains and fire protection piping;
- Removal of the two Building 701 temporary vestibules;
- Removal of electrical transformers and abatement of the associated asbestos containing material (ACM);
- Grouting the South Side Building 701 Air Plenum;
- Subgrade preparation, including removal of asphalt (approximately 3 inches thick) and soil (approximately 21 inches thick), as well as grading and compaction of the subgrade;
- Completion of an as-left survey, including independent verification performed by the Oak Ridge Institute for Science and Education (ORISE);
- Installation of the engineered cap;
- Installation of four groundwater monitoring wells; and
- Packaging, transportation and disposal of all project wastes.

The BGRR Engineered Cap Project was not a remediation project; however, an as-left radiological survey and sampling of the subgrade were performed prior to cap

installation. As-left survey data were compared to the site cleanup criteria specified in the *Record of Decision, Operable Unit I and Radiologically Contaminated Soils* (BNL, August 1999) (OU I ROD) for cesium (Cs)-137, radium (Ra)-226 and strontium (Sr)-90. The OU I ROD cleanup goals for these radionuclides were calculated using the Residual Radioactivity Computer Code (RESRAD), based on a total dose limit of 15 millirem per year (mrem/yr) to a future resident (non-farmer) after 50 years of institutional controls.

The following summarizes the as-left conditions for surficial soils prior to the installation of the engineered cap:

- The maximum Cs-137, Sr-90 and Ra-226 concentrations remaining in the soils are 1.32 picocuries per gram (pCi/g), 2.03 pCi/g and 0.629 pCi/g, respectively. The as-left average concentrations are well below the cleanup goals specified in the OU I ROD (Cs-137 = 23 pCi/g, Sr-90 = 15 pCi/g and Ra-226 = 5 pCi/g).

- The as-left average concentrations of the chemical contaminants of concern detected in soils samples are below the site cleanup goals (lead = 400 milligrams per kilogram [mg/kg], mercury = 1.84 mg/kg, nickel = 140 mg/kg, zinc = 2,200 mg/kg, copper = 270 mg/kg). The maximum concentrations of lead, mercury, nickel, zinc and copper detected in soil samples were 14.9 mg/kg, 0.110 mg/kg, 3.82 mg/kg, 14.6 mg/kg and 7.96 mg/kg, respectively.

The BGRR Engineered Cap Project meets all the completion requirements as specified in OSWER Directive 9320.2-09-A-P, *Closeout Procedures for National Priorities List Sites.*

The *Long-Term Surveillance and Maintenance Manual for the Brookhaven Graphite Research Reactor* will be prepared to include monitoring and maintenance activities for the BGRR Engineered Cap and Monitoring System. These activities will include maintenance and repair of the cap asphalt and coatings, groundwater monitoring and institutional controls (land use controls, notifications and restrictions such as no parking or vehicular traffic within 10 feet of the geomembrane anchor points, work planning controls such as digging permits, and government ownership).

Brookhaven Science Associates (BSA) will perform surveillance and maintenance activities. In addition to groundwater monitoring and maintaining institutional controls, BSA will ensure that that routine maintenance/inspections are performed. DOE will ensure enforcement of all institutional controls.

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APPENDICES (See Enclosed Disc)

Acronym List

ACM	Asbestos Containing Material
ALARA	As Low As Reasonably Achievable
Am	Americium
AOC	Area of Concern
ARRA	American Recovery and Reinvestment Act
ASTM	American Society for Testing and Materials
AT	Air Pressure Test
ATB	Asphalt Treated Base
BER	Brookhaven Executive Round Table
BGD	Below Ground Duct
BGRR	Brookhaven Graphite Research Reactor
BNL	Brookhaven National Laboratory
BSA	Brookhaven Science Associates
CAC	Community Advisory Council
C&D	Construction and Demolition
CERCLA	Comprehensive Environmental Response, Compensation & Liability Act
Ci	Curies
cpm	Counts Per Minute
Co	Cobalt
Cs	Cesium
DOE	Department Of Energy
DSB	Duct Service Building
EPA	Environmental Protection Agency
EPD	Environmental Protection Division
ERP	Environmental Restoration Projects
Eu	Europium
F&O	Facility and Operations
FRDP	Facility Review Disposition Project
FS	Feasibility Study
GERT	General Employee Radiological Training
GPS	Global Positioning System
HDPE	High-Density Polyethylene
HFBR	High Flux Beam Reactor
IAG	Interagency Agreement
JSA	Job Safety Analysis
LLRW	Low-Level Radioactive Waste
mg/kg	Milligrams Per Kilogram
mrem/yr	Millirem Per Year
NEPA	National Environmental Policy Act
NYS	New York State
NYSDEC	New York State Department of Environmental Conservation
ORISE	Oak Ridge Institute for Science and Education
OSWER	Office of Solid Waste and Emergency Response
OU	Operable Unit

PCBs	Polychlorinated Biphenyls
PCi/g	Picocuries Per Gram
PRAP	Proposed Remedial Action Plan
Pu	Plutonium
Ra	Radium
RCD	Radiological Controls Division
RCT	Radiological Control Technician
RD/RA	Remedial Design/Remedial Action
RESRAD	Residual Radioactivity Computer Code
ROD	Record of Decision
RWP	Radiological Work Permit
SBMS	Standards-Based Management System
Sr	Strontium
U	Uranium
Vbox	Vacuum Box
WP	Work Procedure

1.0 INTRODUCTION

1.1 Purpose

The purpose of this Closeout Report is to document the installation of Brookhaven Graphite Research Reactor (BGRR) Engineered Cap and Monitoring System, as well as the completion of the associated preparation activities and as-left survey, at Brookhaven National Laboratory (BNL). This work is referred to as the "BGRR Engineered Cap Project." The BGRR Engineered Cap Project is part of the remedial actions described in the *Record of Decision for AOC 9, Brookhaven Graphite Research Reactor* (BGRR ROD) (BNL, January 2005). The project was completed with funding under the American Recovery and Reinvestment Act (ARRA) and in accordance with Closeout Procedures at National Priority List Sites, OSWER Directive 9320.2-09A-P.

Activities associated with the BGRR Engineered Cap Project were performed by Brookhaven Science Associates (BSA) Environmental Restoration Projects (ERP), ERP-seconded and task order subcontractors, BSA's Radiological Control Division (RCD), and Environmental Protection Division (EPD) personnel. Independent verification activities were performed by Oak Ridge Institute for Science and Education (ORISE), DOE's independent subcontractor.

Work was performed in accordance with the BGRR ROD, the *Draft Final Remedial Design/Remedial Action Work Plan for the Installation of an Engineered Cap and Monitoring System* (BNL, March 2008) and the *Addendum to the Draft Final Remedial Design/Remedial Action Work Plan for the Installation of an Engineered Cap and Monitoring System* (BNL, September 2010). The as-left survey was performed in accordance with the Work Procedure 324-19, *Final Status Survey (FSS) Procedure for the BGRR Engineered Cap, Rev. 1* (BNL, April 2011).

The scope of work for the BGRR Engineered Cap Project included the following:

- Demolition of Building TR897, referred to herein as the BGRR Duct Service Building (DSB) down to existing grade;
- Installation of a permanent roof ("dog house") over the below ground duct (BGD) filter opening;
- Modification of BGRR utilities, including existing roof drains and fire protection piping;
- Removal of the two Building 701 temporary vestibules;
- Removal of electrical transformers and completion of the associated asbestos containing material (ACM) abatement;
- Grouting the South Side Building 701 Air Plenum;

- Subgrade preparation, including removal of asphalt (approximately 3 inches thick) and soil (approximately 21 inches thick), as well as grading and compaction of the subgrade;
- Completion of an as-left survey, including independent verification performed by ORISE;
- Installation of the engineered cap;
- Installation of four groundwater monitoring wells; and
- Packaging, transportation and disposal of all project wastes.

1.2 Site Description and Operational History

The U.S. Army occupied the BNL Site, formerly Camp Upton, during World Wars I and II. Between the wars, the Civilian Conservation Corps operated the BNL Site. It was transferred to the Atomic Energy Commission in 1947, to the Energy Research and Development Administration in 1975, and to Department of Energy (DOE) in 1977. Brookhaven Science Associates (BSA) operates BNL under a contract with DOE.

The BNL site covers almost 5,300 acres, much of which is wooded. It is an irregular polygon, and each side is approximately 2.5 miles long. The developed portion of the BNL site includes the principal facilities, which are located near the center of the BNL site on relatively high ground. The developed portion is approximately 1,650 acres, 500 acres of which were originally developed for U.S. Army use. Large, specialized research facilities occupy 200 acres and another 400 acres are occupied by roads, parking lots and connecting areas. The remaining 550 acres are occupied by outlying facilities including an apartment area, the Long Island Solar Farm, Former Hazardous Waste Management Area, Sewage Treatment Plant, firebreaks, and the Former Landfill Area. The terrain is gently rolling, with elevations varying from 40 to 120 feet above mean sea level. The land lies on the western rim of the shallow Peconic River watershed, with a tributary of the Peconic River rising in marshy areas in the northern section of the tract. The sole-source aquifer beneath BNL comprises three water-bearing units: the upper glacial deposits, the Magothy Formation, and the Lloyd Sand Member of the Raritan Formation. These units are hydraulically connected and make up a single zone of saturation with varying physical properties extending from a depth of 5 to 1,500 feet below the land surface. These three water-bearing units are designated as a “sole source aquifer” by the U.S. Environmental Protection Agency (EPA) and serve as the primary source of drinking water for Nassau and Suffolk counties.

A map illustrating the location of the BNL site is presented as Figure 1-1.

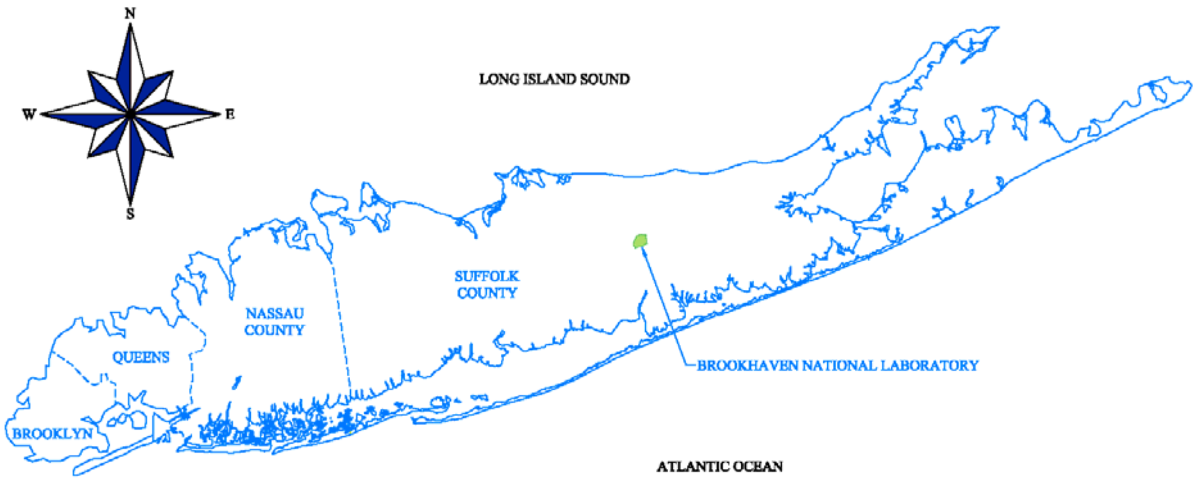


Figure 1-1. Location of Brookhaven National Laboratory

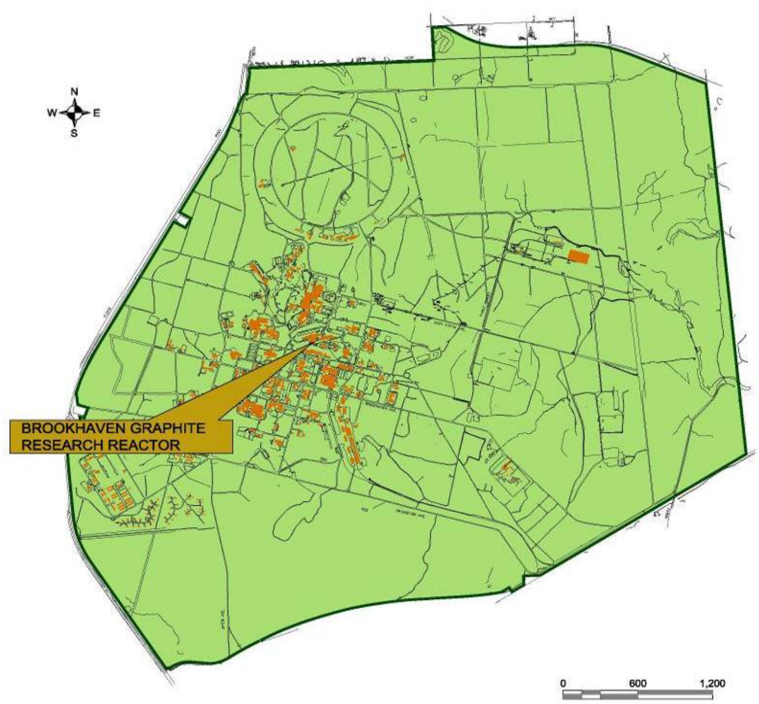


Figure 1-2. Location of the BGRR on BNL Site

The BGRR is centrally located within the BNL site (Figure 1-2). It operated from 1950 to 1968 and was the first reactor in the world designed and built strictly for peaceful research purposes. The BGRR was an air-cooled, graphite-moderated reactor.

Deactivation of the facility was initiated in September 1969. In March 1972, the last fuel element was removed from the reactor and shipment of the fuel to the DOE Savannah River Site was completed shortly thereafter. Portions of the BGRR facility were used as the BNL Science Museum from 1977 through 1997. Figure 1-3 illustrates the BGRR complex.

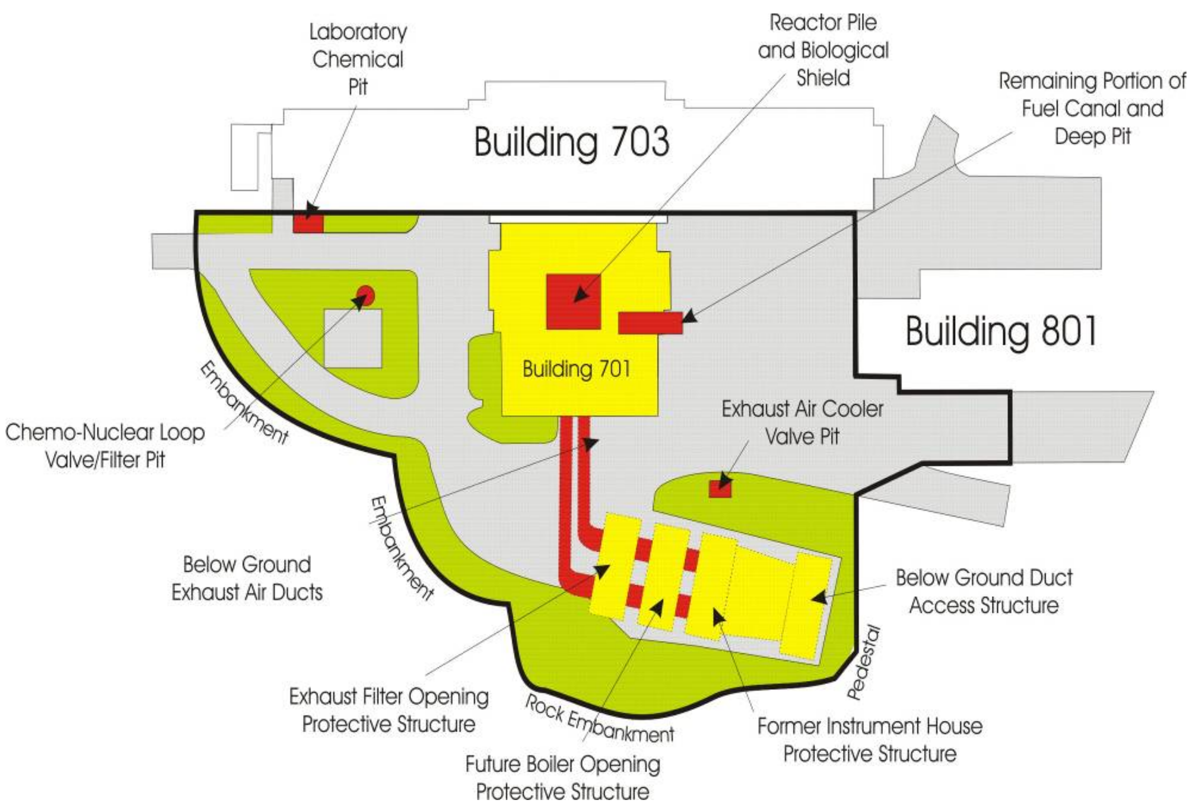


Figure 1-3. BGRR Complex

In 2005, the BGRR ROD was signed by the EPA, New York State Department of Environmental Conservation (NYSDEC), and DOE. This agreement requires the removal of the graphite pile, biological shield, canal structure, reasonably accessible contaminated soils, and the installation of a water infiltration control engineered cap and monitoring system for the remaining structures and subsurface contaminated soils. This closeout report addresses the installation of the water infiltration control engineered cap and monitoring system.

1.3 Regulatory and Enforcement History

In 1980, the BNL site was placed on the NYSDEC list of Inactive Hazardous Waste Sites. On December 21, 1989, the BNL site was included on the EPA National Priorities List because of soil and groundwater contamination that resulted from BNL's past operations. Subsequently, EPA, NYSDEC, and DOE entered into a Federal Facilities Agreement (herein referred to as the Interagency Agreement; [IAG]) that became effective in 1992 (Administrative Docket Number: II- Comprehensive Environmental Response, Compensation & Liability Act [CERCLA]-FFA-00201) to coordinate the cleanup.

The IAG identified AOCs to be evaluated for response actions. The BGRR is subject to the provisions of Section X – Areas of Concern of the IAG and is identified as AOC 9. The remediation of the BGRR complex is divided into four sub-AOCs. These include AOC 9A, the Canal; AOC 9B, Underground Ductwork; AOC 9C, Spill Sites; and, AOC 9D, the Pile Fan Sump. Additional areas of remedial action outside the scope of the AOC subdivisions include removal of the above-ground ductwork, graphite pile, and biological shield. Interim measures were authorized through issuance of Action Memoranda or National Environmental Policy Act (NEPA) Categorical Exclusions. The remaining cleanup activities for the BGRR were addressed in the BGRR ROD.

A Feasibility Study (FS) for the BGRR complex was prepared to evaluate the alternatives for remediation of the BGRR. Upon completion and review of the results of a FS for the BGRR and public review of the Brookhaven Graphite Research Reactor Proposed Remedial Action Plan (PRAP) the BGRR ROD was signed in March 2005. It documented the remedial action for the BGRR selected in accordance with the CERCLA consistent with the National Oil and Hazardous Substances Pollution Contingency Plan ("National Contingency Plan").

The final remedy was developed in collaboration with regulators using the Core Team Process. The BGRR ROD requirements were incorporated into the *Draft Final Remedial Design/Remedial Action Work Plan for the Installation of an Engineered Cap and Monitoring System* (BNL, March 2008) and the *Addendum to the Draft Final Remedial Design/Remedial Action Work Plan for the Installation of an Engineered Cap and Monitoring System* (BNL, September 2010)

1.4 Previous Remedial Activities

Several response actions were previously completed as interim measures (through Action Memoranda and NEPA Categorical Exclusions) to reduce or eliminate potential threats to human health or the environment. They included the removal and disposition of the following:

- Contaminated water that infiltrated and accumulated within the below-ground ducts;
- Experimental equipment and systems from the reactor building;
- Reactor exhaust fans, motors, valves and instruments;
- Pile fan sump, pipes and associated contaminated soil;

- Above-ground ducts, pipes and associated contaminated soil;
- Canal house and water treatment house, along with associated equipment, pipes, asphalt, concrete and accessible contaminated soils; and
- Reactor exhaust cooling coils and filters.
- Reactor below-ground duct primary liner; and
- Portions of the fuel canal outside the structural foundation footprint of the reactor building and accessible subsurface contaminated soil in the vicinity of the fuel canal, below-ground duct expansion joint #4 and secondary cooling air bustle.

In addition, remedial activities associated with the Graphite Pile Removal Project were completed between December 2009 and May 2010. This work, documented in the *Closeout Report of the Brookhaven Graphite Research Reactor Graphite Pile Removal, Area of Concern 9* (BNL, October 2010), included the following scope of activities:

- Removal and Disposal of Control Rods
- Removal and Disposal of Boron Shot
- Removal and Disposal of Shield Plugs
- Removal and Disposal of upper portion of Air Tight Membrane
- Removal and Disposal of Invar Rods
- Removal and Disposal of Graphite Pile

1.5 Description of Remaining Contaminated Soils and Below Grade Structures

During removal of the BGRR fuel canal in 2005, approximately 824 cubic yards of radiologically-contaminated soil and concrete were excavated and disposed of at an approved disposal facility as documented in the *BGRR Canal and Deep Soil Pockets Excavation and Removal Completion Report* (BNL, 2005). However, pockets of contaminated soil remain at several locations within the BGRR complex and they are the basis for the BGRR Engineered Cap Project. A description of the remaining contaminated soils and subsurface structures are discussed below in Sections 1.5.1 and 1.5.2, and are illustrated in Figures 1-4, 1-5 and 1-6.

1.5.1 Remaining Contaminated Soils and Subsurface Structures Outside Building 701 Footprint

<u>Below Ground Duct Concrete and Steel Structure</u> – This contaminated structure includes the concrete and steel remaining within the portion of the duct located outside of the foundation of Building 701. The structure contains approximately 0.825 curies (Ci) of radioactive materials consisting primarily of cesium (Cs)-137 (0.784 Ci), Strontium (Sr)-

90 (0.038 Ci), and Cobalt (Co)-60 (0.001 Ci). The remaining radioactivity consists of uranium, plutonium, and americium (approximately 0.002 Ci) in the form of fixed surface contamination. The estimated volume of radioactive material is 2,284 cubic yards of concrete and 100 cubic yards of steel plate.

Bustle Area (Deep Soil Pocket) Soils – This soil pocket is located adjacent to the secondary air bustle on the northeast side of the below ground duct where it exits from Building 701. In April 2005, contaminated soil was removed from between 27 feet below grade to the bottom of the ducts at approximately 33 feet below grade. Remaining contaminated soil exists between 33 feet below grade to 40 feet below grade (27 feet to groundwater) and is contaminated primarily with Cs-137 at a maximum concentration of 89,000 picocuries per gram (pCi/g) and Sr-90 at a maximum concentration of 11,200 pCi/g. The estimated volume of contaminated soil is 35 cubic yards.

Expansion Joint #4 & Cooler Drain Sumps Soils – This pocket includes soil adjacent to and underneath the north and south below ground duct cooler drains sumps and the duct expansion joint #4. The subsurface contaminated soil pocket extends from immediately below the expansion joint and cooler drain sump to a depth of 18 to 30 feet below grade (38 feet above groundwater). The soil is contaminated primarily with Cs-137 at a maximum concentration of 5,907 pCi/g and Sr-90 at a maximum concentration of 676 pCi/g. The estimated volume of contaminated soil is 107 cubic yards.

Fuel Canal Site Soils – This pocket consists of contaminated soils located directly below the site of the previously removed fuel canal. The pocket is located approximately 25 feet below grade and is contaminated primarily with Cs-137 at a maximum concentration of 269 pCi/g and Sr-90 at a maximum concentration of 54.3 pCi/g. The estimated volume of contaminated soil is 11 cubic yards.

Drains and Drywells Soils – Three building drain drywells are located outside of the foundation footprint of Building 701 and were connected to the east and west inlet air filter house drains, the west steam trap drains, the control rod drive mechanism floor drains, the fuel vault floor drains, and the east steam trap drains. The drywells are contaminated primarily with Cs-137 and Sr-90 with an average concentration of 93 pCi/g and 56 pCi/g, respectively. The contamination is located approximately 6 to 8 feet below grade (56 to 58 feet above groundwater). The estimated volume of contaminated soil and crushed stone is 2 cubic yards.

1.5.2 Remaining Contaminated Soils and Subsurface Structures Within Building 701 Footprint

Drains and Drywells Soils – Two building drain drywells are located under the footprint of Building 701. These drywells were connected to the east and west inlet air plenum drains. The drywells are contaminated primarily with Cs-137 and Sr-90 with an average concentration of 450 pCi/g and 1,730 pCi/g, respectively. The contamination is located approximately 23 feet below grade (45 feet above groundwater). The estimated volume of contaminated soil and crushed stone is 2 cubic yards.

Below Ground Duct Soils Under the Footprint of Building 701 – This pocket consists of contaminated soils located beneath the north duct in the vicinity of the below-ground expansion joint immediately south of the reactor. The subsurface contaminated soil pocket extends from immediately below the duct foundation pad to a depth of two feet (32 feet above groundwater). The soil is contaminated primarily with Cs-137 at a maximum concentration of 79,000 pCi/g and Sr-90 at a maximum concentration of 2,200 pCi/g. The estimated volume of contaminated soil is 69 cubic yards.

Deep Pit and Fuel Canal Soils Under the Footprint of Building 701 – This pocket consists of contaminated soils below the deep pit and portions of the canal that are below the foundation footprint of Building 701. This subsurface contaminated soil pocket extends from below the pile foundation pad and to a depth of two feet below the pad (32 feet above groundwater). The soil is contaminated primarily with Cs-137 at a maximum concentration of 405 pCi/g and Sr-90 at a maximum concentration of 103 pCi/g. The estimated volume of contaminated soil is 20 cubic yards.

Below Ground Duct Concrete and Steel Structure – This contaminated structure includes the concrete and steel remaining within the portion of the duct located underneath Building 701. The structure contains approximately 0.422 Ci of radioactive materials, consisting primarily of Cs-137 (0.399 Ci), Sr-90 (0.022 Ci), and Co-60 (0.001 Ci). The remaining radioactivity consists of uranium (U), plutonium (Pu), and americium (Am) (approximately 0.001 Ci) in the form of fixed surface contamination. The estimated volume of radioactive material is 377 cubic yards of concrete and 100 cubic yards of steel plate.

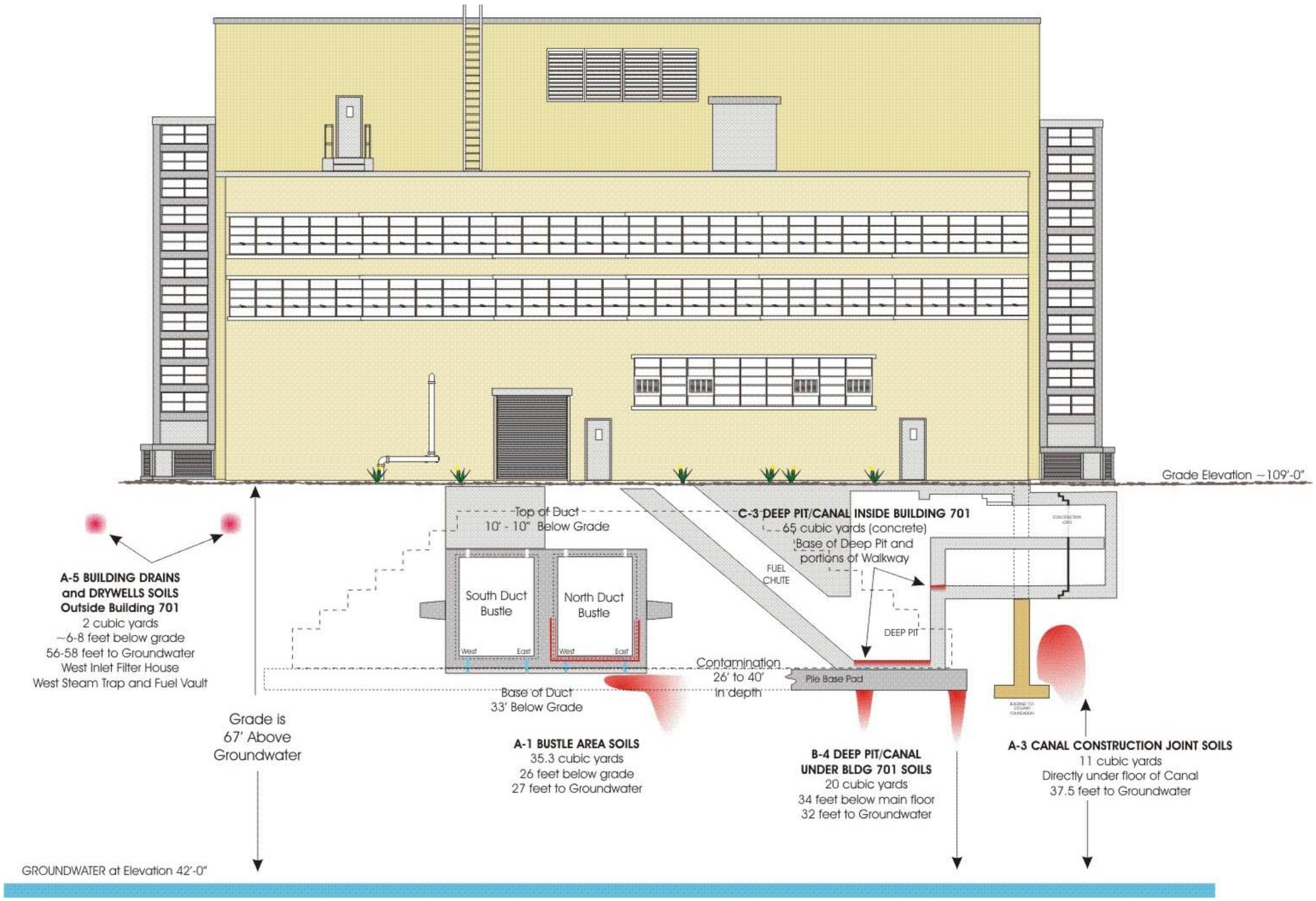


Figure 1-4 BGRR Contaminated Soil & Subsurface Structures, View to North

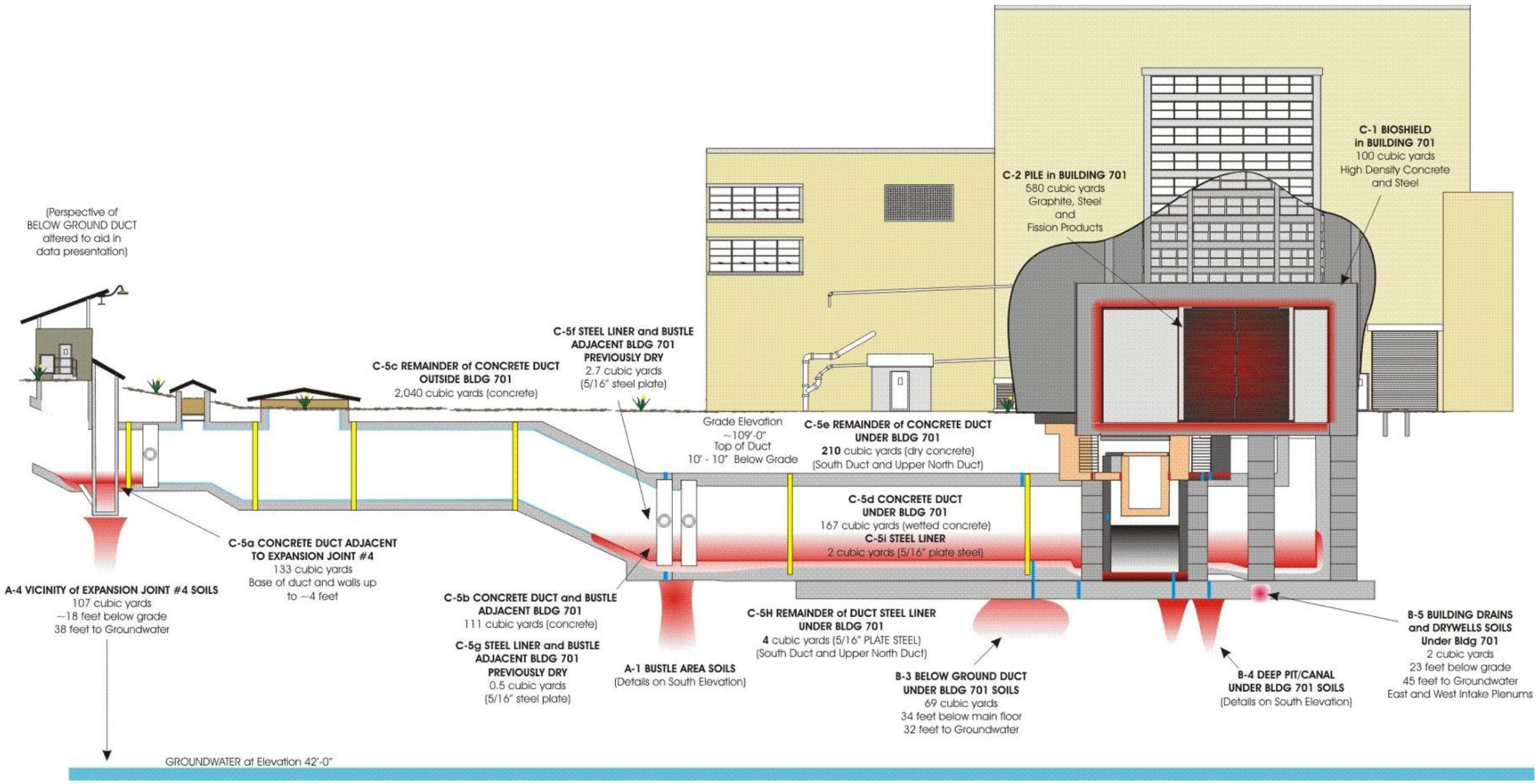
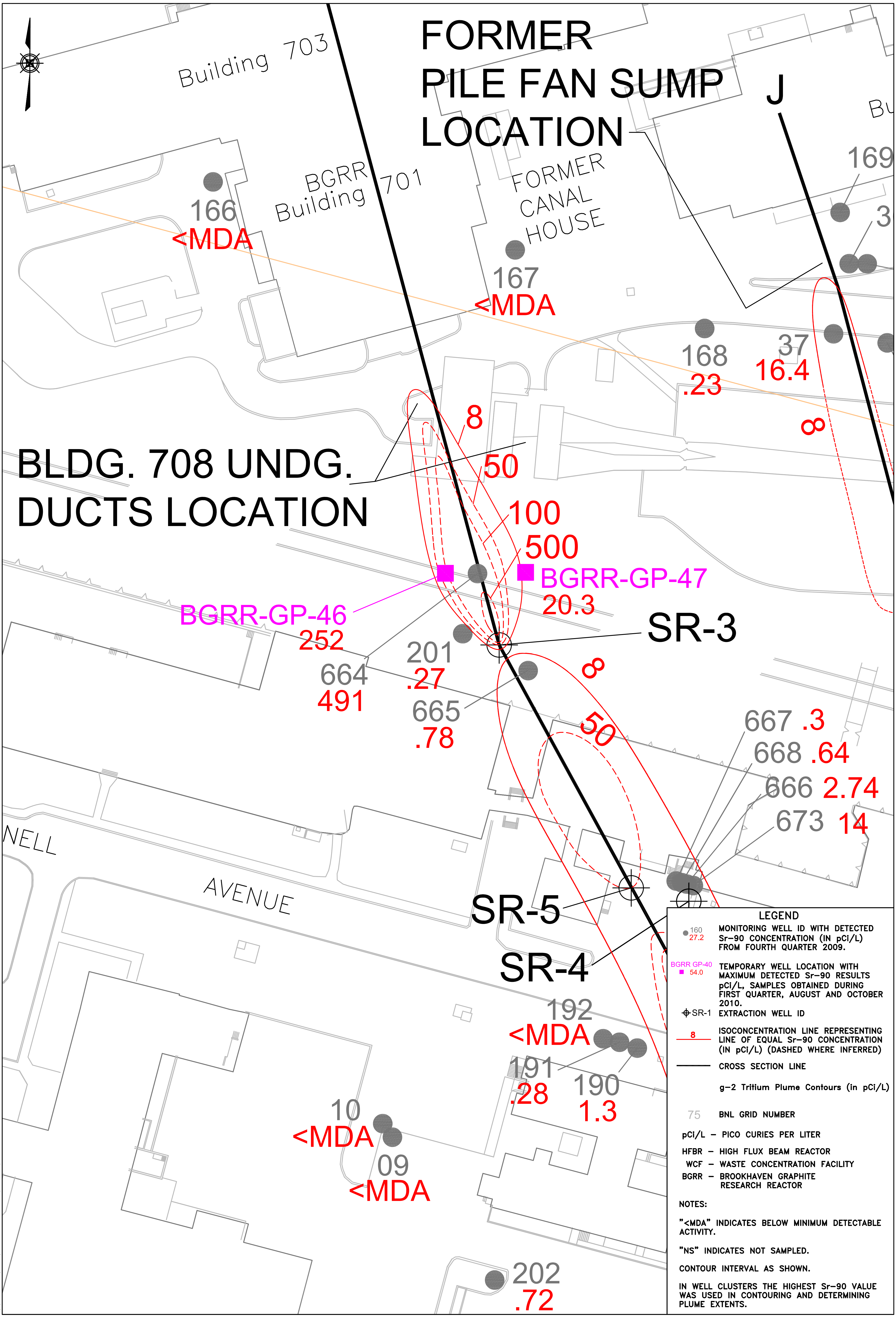


Figure 1-5 BGRR Contaminated Soil & Subsurface Structures, View to West



BROOKHAVEN NATIONAL LABORATORY ENVIRONMENTAL PROTECTION DIVISION	TITLE: OU III BGRR/WCF Sr–90 PLUME DISTRIBUTION 2010 BNL GROUNDWATER STATUS REPORT	DWN: AJZ	VT: HZ.: –	DATE: 06/30/11	PROJECT NO.: –
		CHKD: JEB	APPD: WRD	REV.: 11/04/11	NOTES: –
		FIGURE NO.: 1–6			

1.6 BNL Operable Units

As part of remedial efforts at BNL, 30 AOCs were identified and grouped into seven Operable Units (OUs). The seven OUs were subsequently reduced to six OUs as a result of combining OU II and OU VII. In February 2009, AOC 31, comprising the High Flux Beam Reactor (HFBR) complex, Waste Loading Area and the A/B Waste Line, was established.

This report documents completion of the installation of the water infiltration control engineered cap and monitoring system, which is part of AOC 9.

2.0 OPERABLE UNIT BACKGROUND

2.1 Site Cleanup Criteria

The completion criterion for this remedial action was the installation of the water infiltration control engineered cap and monitoring system outside of Building 701, which will serve to prevent water intrusion into radiologically-contaminated subsurface components and soils remaining on the BGRR complex. Though radiologically-contaminated soils were not expected at the depth of the engineered cap, an as-left radiological survey, which consisted of a complete radiological walkover survey and the collection of soil samples, was completed following removal of the existing overlying asphalt and soil to a depth of 24 inches.

It should be noted that the site cleanup criteria specified below were only used to guide the management of excavated asphalt and soil (overburden), as well as to assess the surficial as-left conditions prior to installation of the cap.

In accordance with Work Procedure 324-19, *Final Status Survey (FSS) Procedure for the BGRR Engineered Cap*, *Rev. 1* (BNL, April 2011), the primary radiological contaminants of concern for the BGRR Engineered Cap Project are the same as those specified in the *Record of Decision, Operable Unit I and Radiologically Contaminated Soils* (BNL, August 1999) (OU I ROD): Cs-137, radium (Ra)-226 and Sr-90. The cleanup goals for specific radionuclides were calculated using RESRAD, considering a residential scenario. The dose limit used was 15 millirem per year (mrem/yr) above background (*OSWER Directive 9200.4-1., EPA, 1997*), residential land use after 50 years of institutional control by the DOE, and industrial land use with no decay time (0 years). In addition, the NYSDEC cleanup guideline of 10 mrem/yr, from TAGM 4003, was adopted as an ALARA goal. The primary radiological isotope present at the site was Cs-137; its cleanup goal is 23 pCi/g.

The potential for radiologically contaminated soil to impact groundwater was also considered. A soil cleanup goal of 15 pCi/g was calculated for Sr-90, based on its potential to impact the groundwater. The goal also protects both residential and industrial uses. A cleanup goal of 5 pCi/g was selected for Ra-226, based on DOE Order 5400.5, *Radiation Protection of the Environment and the Public* (DOE, 1993).

Co-60, tritium, europium (Eu)-152, Eu-154, U-235, U-238, Pu-238, Pu-239/240 and Am-241 were considered as additional radiological contaminants of concern and are listed with their respective cleanup goals in Table 2-1.

Table 2-1

Radionuclides and Chemical Contaminants of Concern
for the BGRR Engineered Cap Project

Radionuclides of Concern	Cleanup Value (pCi/g)	Source of Cleanup Goal Value
Cs-137	23	OU I ROD (BNL, 2009)
Sr-90	15	OU I ROD (BNL, 2009)
Ra-226	5	OU I ROD (BNL, 2009)
H-3	424(2)	(1)
Co-60	1,260 (3)	(1)
Eu-152	51 (3)	(1)
Eu-154	180 (3)	(1)
U-235	4.6 (4)	(1)
U-238	4.7 (4)	(1)
Pu-238	57 (3)	(1)
Pu-239/Pu-240	35 (3)	(1)
Am-241	34 (3)	(1)

Notes:

1. For those nuclides not referenced, the estimated cleanup levels were not listed in either the OU I ROD nor in other BNL remediation references. If these nuclides were detected, RESRAD was used to develop the cleanup levels that will meet the 15 mrem/yr criteria.
2. The value is based on a RESRAD evaluation for a residential scenario with no decay.
3. The value is based on a RESRAD evaluation for a residential scenario with 50 years of decay.
4. Values listed for uranium are based on 4 mrem/yr from groundwater consumption.

2.2 Design Criteria

Technical specifications and design criteria for the BGRR Engineered Cap Project were established in the BGRR ROD and the *Draft Final Remedial Design/Remedial Action Work Plan for the Installation of an Engineered Cap and Monitoring System* (BNL, March 2008). The design criteria included:

- Grading the existing property to create a slope away from the below-grade duct and Building 701;
- Installation of an engineered cap to the west, east and south of Building 701 that will prevent water intrusion into remaining radiologically-contaminated sub-surface components and soil described in Section 1.5; and
- Installation of three groundwater monitoring wells along the southern perimeter of the engineered cap to monitor the effectiveness of the cap; and the installation

of one groundwater monitoring well north of Building 703 to monitor groundwater up-gradient of the cap.

2.3 Community Relations Activities

2.3.1 BNL Community Relations

The BNL Community Involvement Plan was published April 15, 1999. It is supplemented by project-specific plans. In the case of the BGRR, a BGRR Community Relations Plan was developed. In accordance with these two plans and CERCLA Sections 113 (k)(2)(B)(i-v) and 117, the community relations program focuses on informing and involving the public in the decision-making process to ensure that the views of the internal and external stakeholder communities are considered. A variety of activities are used to provide information and to seek public participation, including distribution of materials to a stakeholders' mailing list; holding community meetings, information sessions, tours, and workshops; and preparing and distributing fact sheets. The Administrative Record, which documents the basis for removal and remedial actions, was established and is maintained at the libraries listed below:

Brookhaven National Laboratory
Research Library
Bldg. 477A
Upton, NY 11973
631-344-3483 or 631-344-3489

Stony Brook University
Melville Library
Special Collections and University Archives
Room E-2320
Stony Brook, NY 11794
631-632-7119

U.S. EPA - Region II
Records Room
290 Broadway, 18th Floor
New York, New York 10007
212-637-4308

2.3.2 Community Involvement

The community involvement process for the BGRR was an integral part of making cleanup decisions. Project staff made numerous presentations to the Community Advisory Council (CAC), the Brookhaven Executive Round Table (BER), and various local civic associations.

Shortly after the 1997 decision to begin decommissioning the BGRR, possible decommissioning alternatives were developed and considered. Three roundtable meetings to elicit public comments and concerns were held in July and August of 1999.

Additionally, interested parties were invited to participate in the BGRR Working Group. Members included some local residents, representatives of several Suffolk County agencies, and representatives of the CAC. The Working Group had its initial meeting in June, 2000, and met until April, 2003. The Working Group closely followed the interim response actions and provided input on when information should be presented to the CAC.

The BGRR Proposed Remedial Action Plan (PRAP) was released for public review and comment on August 2, 2004. The Notice of Availability was published in Newsday and Suffolk Life, as were advertisements for two information sessions and a public meeting. Information sessions were held on August 17 and 19, and the public meeting was held on August 24, 2004. The public comment period closed on September 3, 2004. The Responsiveness Summary section of the BGRR ROD summarized the written and oral comments received during the public comment period and DOE's responses to these comments. Project staff continued to provide periodic updates to the CAC and the BER as the BGRR Engineered Cap Project entered the implementation phase.

3.0 CONSTRUCTION ACTIVITIES

The objective of the BGRR Engineered Cap Project was to safely complete the installation of the BGRR Engineered Cap and Monitoring System and as-left radiological survey. Work was initiated in May 2010 and completed in June 2011. The site plan for the BGRR Engineered Cap Project is shown on Figure 3-1.

An Environmental, Safety & Health (ES&H) Plan, Job Safety Analyses (JSAs) and project-specific work procedures were developed to address hazards and work steps associated with the BGRR Engineered Cap Project. The information presented in the project plans was presented during a project kick-off meeting. In addition, project hazards and work steps were reviewed with site workers prior to initiating work during daily tailgate safety meetings. Copies of project plans were available onsite at all times.

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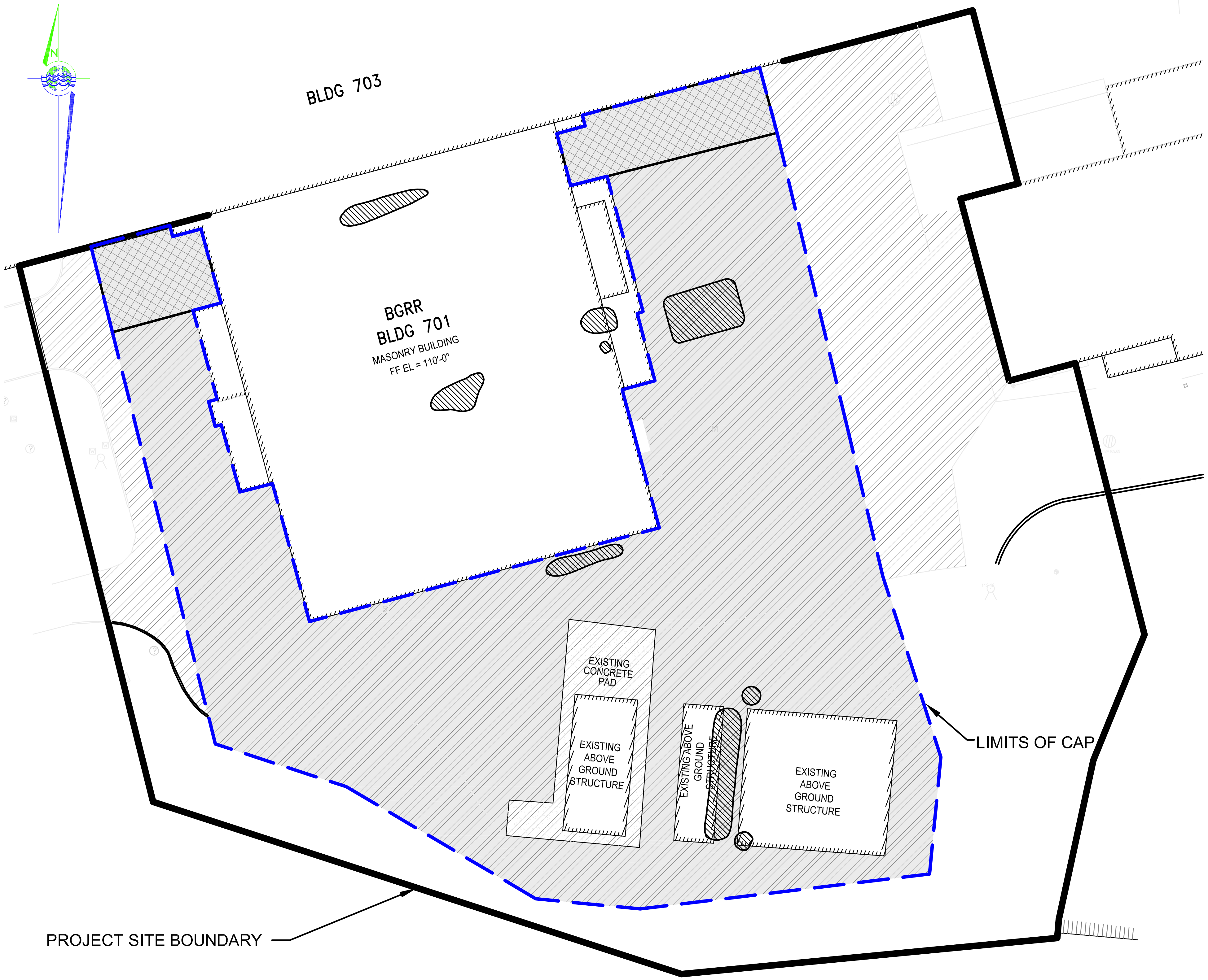

LEGEND

- ENGINEERED CAP - GEOMEMBRANE LINING
- ASPHALT
- ENGINEERED CAP - CONCRETE PAD
- EXISTING RADIOLOGICAL SOIL CONTAMINATION IS AT LEAST 20' BELOW GRADE
- PROJECT SITE BOUNDARY

BGRR ENGINEERED CAP SITE PLAN

SCALE: 1" = 40'

0 40 80

SCALE: 1" = 40'

P.W. GROSSER CONSULTING INC.
630 Johnson Ave. Suite 7
Bohemia, N.Y. 11716-2618
E-mail: www.pwgrosser.com
Ph: 631 589-6353 Fx: 631 589-8705

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	DATE 7/20/11	ACCT. NO.	SHEET - OF -
SCALE AS SHOWN	DWN. BY RN	JOB NO.	DWG. NO. 3-1
PROJ. QA	APP'D. BY MM	BLDG. NO. 701	
PATH:			

3.1 Preparation Activities

The completion of several preparation activities was necessary prior the installation of the engineered cap. These activities included:

- Demolition of the DSB down to existing grade;
- Installation of a permanent roof ("dog house") over the BGD filter openings;
- Removal of the Building 701 transformers;
- Miscellaneous preparation items, including the removal of the Building 701 temporary vestibules, modifications of building utilities and grouting the South Side Building 701 Air Plenum; and
- Subgrade preparation, including removal of asphalt (approximately 3 inches thick) and soil (approximately 21 inches thick), as well as grading and compaction of the subgrade.

3.1.1 Demolition of the Duct Service Building

The DSB (Building TR-897) was erected in 2003 to act as a temporary enclosure to allow for the removal of the BGD exit air filter and the primary liner. These activities were completed in 2004. The DSB was a one-story, metal arched structure approximately 74.5 feet long by 30 feet wide by 33 feet tall.

Photograph 1 – View of the DSB prior to demolition

Demolition of the DSB was performed in June 2010. An excavator equipped with hydraulic shears was the primary tool used to dismantle the building. The north wall of the DSB was dismantled first to allow for the removal of a gantry crane. Once removed, the gantry crane was disassembled and the remaining DSB was demolished to grade.

Photograph 2 – Demolition of the DSB

3.1.2 Installation of Roof Over the Below Ground Duct Filter Openings

Upon completing the demolition of the DSB, it was necessary to install a permanent roof ("dog house") over the BGD filter opening. The roof, which consists of wood rafters, roof sheets and drainage gutters, was installed between August 2010 and September 2010.

Photograph 3 – Installation of the permanent roof over the BGD filter opening

Photograph 4 – Completed permanent roof over BGD filter opening

3.1.3 Removal of Building 701 Transformers

Several transformers, located immediately southwest of Building 701, were removed by BNL Facility and Operations (F&O) between June 2010 and July 2010. The transformers were disconnected and drained prior to removal. BNL F&O sampled the oil drained from the transformers and determined that it did not contain polychlorinated biphenyls (PCBs). The non-PCB oil and oily rags and plastic that were generated while draining the transformers were packaged and shipped for offsite disposal, as discussed in Section 3.5.1. The transformers and associated cables were shipped offsite for dismantlement and recycling, as discussed in Sections 3.5.1 and 3.5.2. Associated components that contained asbestos were removed by Advanced Environmental Services of Bay Shore, NY.

Photograph 5 – Building 701 transformers prior to removal

The transformer pads, which included ACM, were subsequently demolished and the associated lead jacketed copper cables were removed and recycled onsite. Advanced Environmental Services of Bay Shore, New York performed asbestos abatement related to the removal of the transformer pads in September 2010. Concrete associated with the transformer pads, which was greater than 3 feet below existing grade, was left in place.

Photograph 6 – Asbestos abatement at previous location of Building 701 transformers

3.1.4 Miscellaneous Preparation Items

Several miscellaneous preparation items were also completed prior to installation of the engineered cap, as described below:

- Two temporary vestibules attached to Building 701 were located in areas where the engineered cap was to be constructed. The temporary vestibules were removed in September 2010.

- Shallow underground utilities, including building roof drains and fire protection piping, were located in areas where the cap was to be constructed. These utilities were modified between July 2010 and August 2010.

- The South Side Building 701 Air Plenum created a potential void space beneath the engineered cap. The plenum was grouted on October 20, 2010.

Photograph 7 – Grouted South Side Building 701 Air Plenum

3.1.5 Subgrade Preparation

The existing asphalt (approximately 3 inches thick) and some soil (approximately 21 inches thick) were removed over the entire area of the engineered cap. The asphalt and soil were sampled for radiological and hazardous contaminants, and in-process radiological surveys were performed in accordance with Work Procedure 324-19, *Final Status Survey (FSS) Procedure for the BGRR Engineered Cap, Rev. 1* (BNL, April 2011), as discussed further in Section 3.5. Asphalt and overburden soil results, as well as in-process radiological survey forms, are provided as Appendix A.

The asphalt met reuse criteria (which were 1/2 of Table 2-1 site cleanup criteria) and was recycled at the BNL site. The majority of excavated soil also met reuse criteria and was used as backfill for ongoing HFBR and BGRR remediation projects, and other projects within the BNL site. Approximately 2 cubic yards of soil and an isolated rock exhibited elevated radiological activity (approx. 70,000 counts per minute [cpm]) when measured with an unshielded 2-inch by 2-inch sodium iodide (NaI) detector. As discussed further in Section 3.2.2, 20,400 cpm was established as the trigger level for the project. A sample of this material was submitted for onsite gamma spectroscopy and the results identified Cs-137. Follow-up radiological surveys did not identify any additional radioactivity above 20,400 cpm in the area where the material was removed. The removed material was segregated and disposed as described in Section 3.5.

Photograph 8 – Removal of existing asphalt

Several interferences, including abandoned copper piping, two 22-inch cooling water lines, a valve box and control piping and concrete under-pour were encountered during subgrade preparation activities. This material was segregated and disposed as described in Section 3.5.

Photograph 9 – Piping encountered during subgrade preparation

Upon completing the as-left radiological survey described in Section 3.2, the subgrade was graded and compacted to an elevation 24 inches less than the final surface elevation of the asphalt wearing course. The subgrade was graded at a slope of 1 foot vertical to 75 feet horizontal (1.33% slope) away from the building. The subgrade land survey is included in Appendix B. Soil compaction test results are summarized in the *Project Completion Report for the Brookhaven National Laboratory BGRR Engineered Cap, Building 701* (EnviroTrac Ltd., July 2011), provided as Appendix C. The complete set of subgrade soil compaction test reports are provided in Appendix D.

3.2 As-Left Survey and Sampling

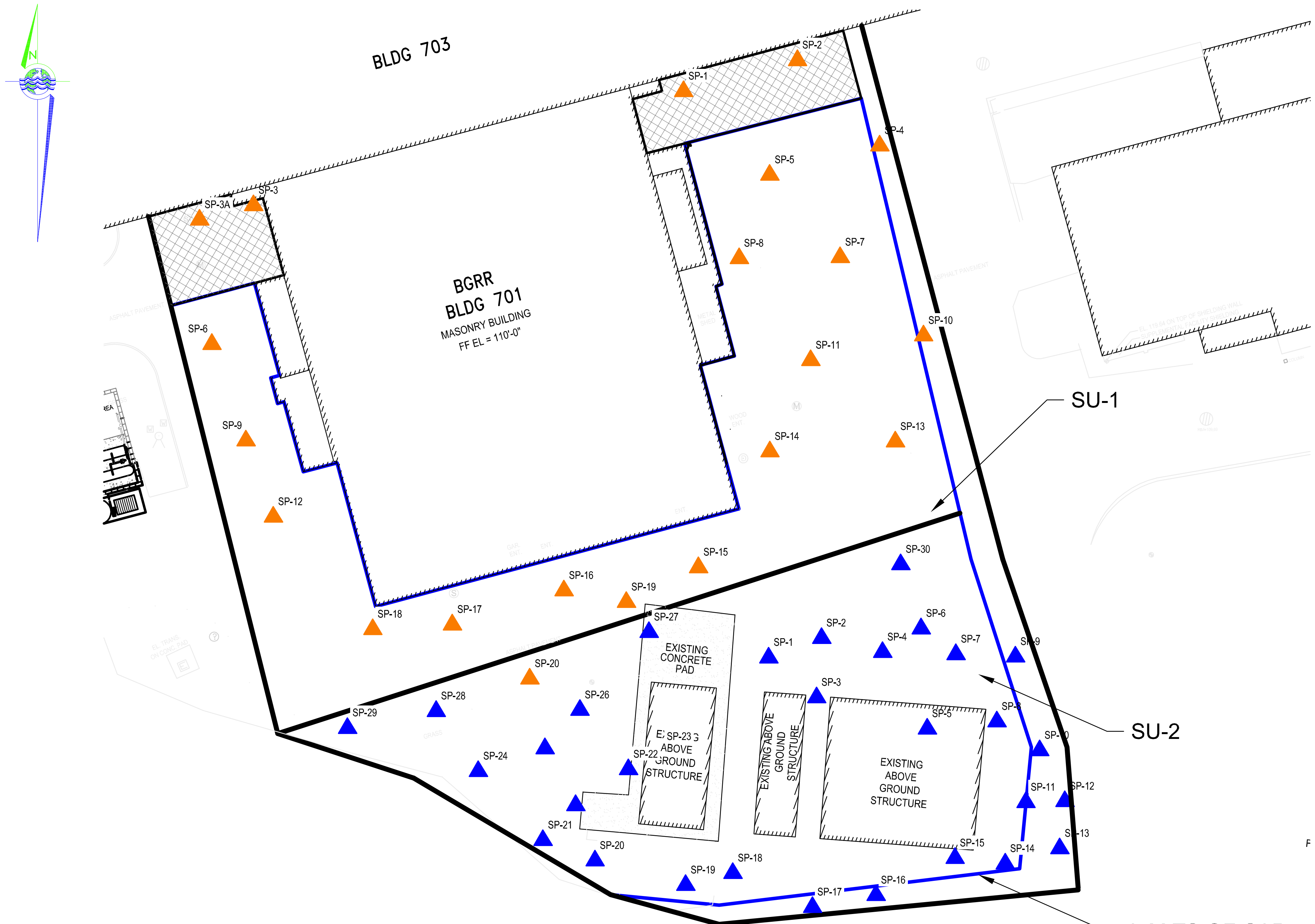
Once the existing asphalt and 21 inches of soil were removed, an as-left radiological survey was performed over the entire area of the engineered cap in accordance with Work Procedure (WP)-324-19, *Final Status Survey (FSS) Procedure for the BGRR Engineered Cap, Rev. 1*. As discussed in Section 2.1, the primary radionuclides of concern, based on exposure potential, were Cs-137, Ra-226 and Sr-90. Although less likely to be present, certain other radionuclides were monitored and include tritium, gamma emitters (e.g., Co-60, Eu-152 and Eu-154), and alpha emitters such as isotopes of uranium, americium and plutonium.

3.2.1 As-Left Survey Design

A two-step approach to confirming the as-left conditions was followed using the MARSSIM approach for the BGRR Engineered Cap Project. The first step consisted of a global positioning system (GPS)-based gamma scintillation walkover survey using a 2-inch by 2-inch NaI detector in conjunction with a Ludlum Model 2221 scaler/ratemeters and with the PRO XR Satellite Receiver Trimble model TSCe Data Logger (Trimble Unit). The second step involved the collection of soil samples, in accordance with BNL EM standard operating procedures (SOP) for offsite analysis to verify that residual radiological contamination levels were sufficiently low to meet the cleanup goals established for the site.

The engineered cap area was divided into two survey units (SU-1 & SU-2). Twenty surface soil samples were collected within SU-1, which encompasses the northern portion of the cap that surrounds Building 701. Thirty surface soil samples were collected within SU-2, which encompasses the southern portion of the cap in the vicinity of the below ground duct. Each soil sample was analyzed by onsite gamma spectroscopy. In addition, two composite soil samples were collected from each survey unit and sent offsite to GEL Laboratories, LLC of Charleston, South Carolina for radiological and metals analysis. The approximate survey unit boundaries and soil sample locations are shown on Figure 3-2.

Photograph 10 – Performing as-left radiological walkover survey prior to installation of the engineered cap



LEGEND

SP-6 — SURVEY UNIT 1 SAMPLE LOCATION

SP-14 — SURVEY UNIT 2 SAMPLE LOCATION

AS-LEFT SURVEY UNIT BOUNDARY

GENERAL NOTES:

1. SURVEY INFORMATION AND TOPOGRAPHIC DATA BASED ON SURVEY PREPARED BY MUNICIPAL LAND SURVEY, DATED MAY 12, 2010.

2. SAMPLES SP-1, SP-2, SP-3 AND SP-3A OF SURVEY UNIT 1 (SU-1) WERE LOCATED WITH A HAND HELD TAPE MEASURE FROM THE DETERMINED FIXED 0,0 POINT OF WORK PROCEDURE 324-19 REV. 0.

BGRR AS-LEFT SURVEY UNITS AND SAMPLE LOCATIONS PLAN

SCALE: 1" = 40'

0 40 80

SCALE: 1" = 40'

P.W. GROSSER CONSULTING INC.
630 Johnson Ave, Suite 7
Bohemia, N.Y. 11716-2618
E-mail: www.pwgrosser.com
Ph: 631 589-6353 Fx: 631 589-8705

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JOB TITLE: ENVIRONMENTAL RESTORATION PROJECTS, CONTRACT DE-AC02-98CH10886, WORK PACKAGE 324 - BGRR CAP		DWG. TITLE: BGRR AS-LEFT SURVEY UNITS AND SAMPLE LOCATIONS PLAN	
	DATE 7/20/11	ACCT. NO.	SHEET OF
SCALE AS SHOWN	DWN. BY RN	JOB NO.	DWG. NO.
PROJ. QA	APP'D. BY MM	BLDG. NO. 701	3-2
PATH:			

3.2.2 As-Left Survey and Sampling Results

The results of the as-left radiological walkover survey exhibit count rates below 20,400 cpm for all areas within the SU-1 and SU-2, as shown in Figure 3-3. The 20,400 cpm count rate was previously determined to approximate a Cs-137 concentration of 23 pCi/g in soil when using the unshielded NaI gamma scintillation detector, as specified in Work Procedure 324-19, *Final Status Survey (FSS) Procedure for the BGRR Engineered Cap, Rev. 1* (BNL, April 2011). Radiological walkover surveys indicated that greater than 95% of the area was less than 15,000 cpm.

In addition, individual one-minute fixed-count measurements were taken with the NaI probe at each of the fixed sample points. Of the 50 one-minute fixed-count measurements, 6 measurements exceeded the established 20,400 cpm level, due to their proximity to radiation sources within Building 801. The elevated measurements were validated with a shielded probe and were acceptable. Results of the 50 unshielded one-minute fixed-count measurements ranged from 5,667 to 30,688 cpm. Radiological survey forms for gamma walkover and fixed-count readings are provided in Appendix E.

BGRR AS-LEFT RADIOLOGICAL WALKOVER SURVEY RESULTS

SCALE: 1" = 40'

0 40 80

SCALE: 1" = 40'

LEGEND

GAMMA COUNT RATE

COLLIMATED (CPM)

- < 5,000
- 5,000 - 8,999

UNCOLLIMATED (CPM)

- < 15,000
- 15,000 - 20,399

GENERAL NOTES:

1. SURVEY INFORMATION AND TOPOGRAPHIC DATA BASED ON SURVEY PREPARED BY MUNICIPAL LAND SURVEY, DATED MAY 12, 2010.

P.W. GROSSER CONSULTING INC.
630 Johnson Ave. Suite 7
Bohemia, N.Y. 11716-2618
E-mail: www.pwgrosser.com
Ph: 631 589-6353 Fx: 631 589-8705

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	DATE 7/20/11	ACCT. NO.	SHEET OF
SCALE AS SHOWN	DWN. BY RN	JOB NO.	DWG. NO.
PROJ. QA	APP'D. BY MM	BLDG. NO. 701	3-3
PATH:			

Soil was collected at a minimum of 16 surface soil sample locations per survey unit as specified in Work Procedure 324-19, *Final Status Survey (FSS) Procedure for the BGRR Engineered Cap, Rev. 1*). A total of 50 surface soil samples were collected and combined into 4 composite soil samples for offsite analysis of radionuclides and chemical contaminants of concern, as described above.

All soil sample results were below the OU I site cleanup goals for Cs-137, Sr-90 and Ra-226, which are 23 pCi/g, 15 pCi/g, and 5 pCi/g, respectively. A summary of the soil sample results is provided in Table 3-1. Additional radionuclides were analyzed, including tritium and isotopes of uranium and plutonium; however no composite soil samples indicated detectable values for these radionuclides. These results are provided in Appendix E.

Table 3-1

Summary of BGRR Engineered Cap Soil Sample Results for Primary Radionuclides of Concern

	OU I Cleanup Goal (pCi/g)	SU-1 Comp (1-10) (pCi/g)		SU-1 Comp (11-20) (pCi/g)		SU-2 Comp (1-15) (pCi/g)		SU-2 Comp (16-30) (pCi/g)	
Cs-137	23	1.32	J	0.189	J	0.443	J	0.286	J
Sr-90	15	2.03		0.233	U	0.231	U	0.348	U
Ra-226	5	0.243		0.312		0.629		0.460	

Notes:
U – Indicates that the isotope was analyzed for, but was not detected.
J – Indicates an estimated value.

Chemical results for soil samples analyzed for mercury, lead, copper, nickel, and zinc also indicated that residual soil concentrations for these contaminants are within their respective cleanup goals. Composite soil sample results for chemical contaminants are provided in Table 3-2.

Table 3-2

Summary of BGRR Engineered Cap Soil Sample Results for Chemical Contaminants of Concern

	Cleanup Goal (mg/kg)	SU-1 Comp (1-10) (mg/kg)		SU-1 Comp (11-20) (mg/kg)		SU-2 Comp (1-15) (mg/kg)		SU-2 Comp (16-30) (mg/kg)	
Lead	400	9.98		14.9		11.3		11.4	
Mercury	1.84	0.110		0.0109	U	0.0678		0.0225	
Nickel	140	1.24		1.98		3.82		2.24	
Zinc	2,200	14.6		11.6		13.6		11.6	
Copper	270	5.32		5.34		5.39		7.96	

Notes:
U – Indicates that the isotope was analyzed for, but was not detected.
J – Indicates an estimated value.

3.2.3 As-Left Survey Conclusions

As indicated above, results of the as-left survey of surface soils following the completion of the subgrade preparation and spot remediation demonstrate conformance to the OU I cleanup goals. These cleanup goals were used to guide the management of excavated asphalt and soil (overburden), as well as to assess the surficial as-left conditions prior to installation of the cap.

3.2.4 Independent Verification

ORISE performed a Type A independent verification of the as-left survey. The Type A independent verification included a review of project plans and procedures, as well as review of as-left radiological walkover survey and soil sampling results. The ORISE independent verification for the BGRR Engineered Cap Project was performed between May 2011 and July 2011. ORISE determined that project cleanup goals were met. The independent verification is documented by the *Type A Verification Report for the Brookhaven Graphite Research Reactor Engineered Cap, Brookhaven National Laboratory, New York, DCN: 5098-SR-07-0* (ORISE, July 15, 2011), which is provided as Appendix F.

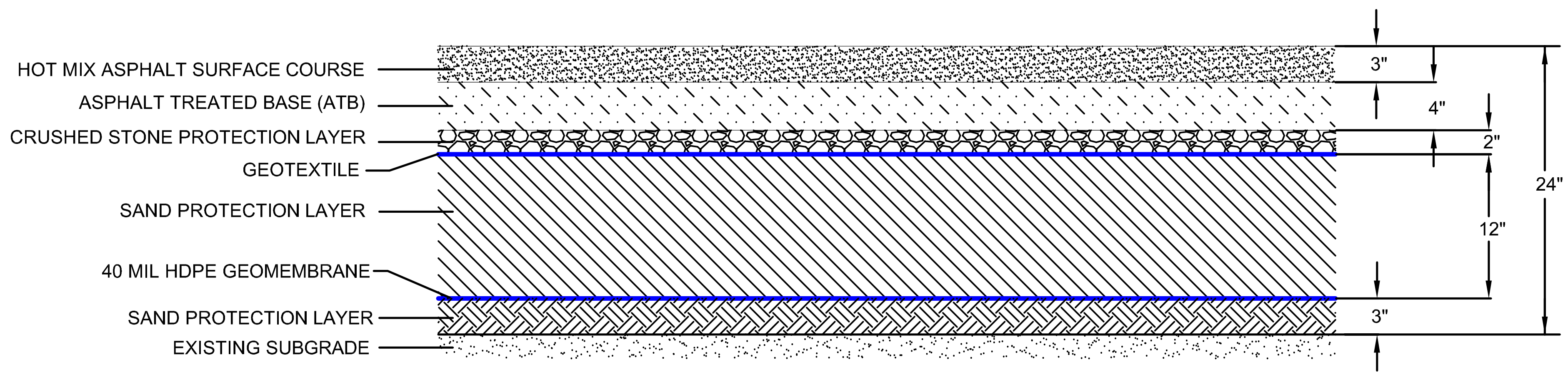
3.3 Engineered Cap Installation

The engineered cap was installed in four different sections (“East Cap,” West Cap,” “South Cap,” and “Southeast Cap”) between January 2011 and June 2011. As shown on Figure 3-1, the engineered cap covers an area of approximately 32,400 square feet. To the east, the cap extends approximately 60 to 70 feet from Building 701. The cap extends approximately 60 feet south from the southwest corner of Building 701 and approximately 120 feet south of the southeast corner of Building 701. To the west, the cap extends approximately 30 to 40 feet from Building 701. The engineered cap consists of a multi-layer barrier with the following layers from bottom to top:

- 3-inch thick sand protection layer;
- 40-mil high-density polyethylene (HDPE) liner;
- 12-inch thick sand protection layer;
- A geotextile liner;
- 2-inch thick crushed stone protection layer;
- 4-inch thick asphalt treated base (ATB) course; and
- 3-inch thick hot-mix asphalt surface course.

Two concrete pads were also installed adjacent to the Building 701 east and west rollup doors as part of the engineered cap, as further described in Section 3.3.1.

The redlined project specifications and the as-built drawings for the engineered cap are provided in Appendix B. The layers of the engineered cap are illustrated in Figure 3-4. Additional information associated with the construction of the engineered cap is specified in the *Project Completion Report for the Brookhaven National Laboratory BGRR Engineered Cap, Building 701* (EnviroTrac Ltd., July 2011), provided as Appendix C.



BGRR ENGINEERED CAP CONSTRUCTION DETAIL

NOT TO SCALE

P.W. GROSSER CONSULTING INC.

630 Johnson Ave, Suite 7
Bohemia, N.Y. 11716-2618
E-mail: www.pwgrosser.com
Ph: 631 589-6353 Fx: 631 589-8705

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	DATE 7/20/11	ACCT. NO.	SHEET - OF -
SCALE AS SHOWN	DWN. BY RN	JOB NO.	DWG. NO. 3-4
PROJ. QA	APP'D. BY MM	BLDG. NO. 701	
PATH:			

3.3.1 Concrete Pads Installation

The installation of the concrete pads was not originally specified in the *Draft Final Remedial Design/Remedial Action Work Plan for the Installation of an Engineered Cap and Monitoring System* (BNL, March 2008); however the pads were later deemed necessary to provide a more stable access to the building after soil settling (sinkholes) was observed near the two rollup doors. Soil sloughing beneath the west Building 703 south grade beam (near the Building 701 west rollup door) and the east Building 703 south grade beam (near the Building 701 east rollup door) was determined to be the cause of the soil settling. Since the original design of the engineered cap had the geomembrane attaching to the Building 703 south grade beam on the east and west sides of Building 701, the design was modified to terminate the geomembrane portion of the cap at the northern end. As specified in the *Addendum to the Draft Final Remedial Design/Remedial Action Work Plan for the Installation of an Engineered Cap and Monitoring System* (BNL, September 2010), the modified design included the installation of 12-inch thick reinforced concrete pads at the east and west junctures of Buildings 701 and 703. The concrete pads provide a more stable attachment point than the Building 703 grade beam as there is no risk of failure of the cap's attachment should there be continued sloughing or soil settling.

One vertical foot of New York State (NYS) No. 57 crushed blue stone was placed and compacted with a vibratory plate tamper prior to pouring the concrete. The concrete mix included a waterproofing admixture to increase the impermeability of the concrete. Retrofit waterstops were installed between the concrete pads and the Building 701 and Building 703 grade beams to prevent water intrusion. In addition, the geomembrane for the engineered cap was attached to the concrete pads using a gasketed batten system. Compressive strength testing of the concrete was performed by Nicolia Ready-Mix Corporation of West Babylon, New York. Additional information regarding the concrete pads, including concrete testing results, are provided in the *Project Completion Report for the Brookhaven National Laboratory BGRR Engineered Cap, Building 701* (EnviroTrac Ltd., July 2011) (Appendix C). Concrete strength test reports are also provided in Appendix D.

Photograph 11 – Installation of the concrete pad near the Building 701 east rollup door.

3.3.2 3-inch Sand Protection Layer

The 3-inch sand protection layer was installed below the HDPE liner to protect the liner from puncture by the rock and gravel below. The sand protection layer was installed in a 3-inch lift and compacted to 85% maximum density (per American Society for Testing and Materials [ASTM] D1557-09, *Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort* [ASTM, 2009]). The sand protection layer was graded at a slope of 1 foot vertical to 75 feet horizontal (1.33% slope) away from Building 701. Soil compaction tests were performed by Soil Mechanics Drilling Corp of Seaford, NY. Soil compaction test results are summarized in the *Project Completion Report for the Brookhaven National Laboratory BGRR Engineered Cap, Building 701* (EnviroTrac Ltd., July 2011) (Appendix C). The complete set of soil compaction test reports are provided in Appendix D.

3.3.3 HDPE Liner

The 40 mil HDPE liner was installed in accordance with the manufacturer's instructions. The seams between liner sheets were overlapped by 6 inches and welded using an extrudate material made from the same resin as the geomembrane. The liner was anchored to the concrete building foundation using stainless steel battens and concrete anchors to prevent water intrusion along the building foundation wall. The liner was also anchored to all penetrations (i.e., piping, storm drains, monitoring well casings) using stainless steel bands to prevent water intrusion at these locations.

The physical properties of the HDPE liner meet or exceed the ASTM test method values specified in Table 2-1 of the *Draft Final Remedial Design/Remedial Action Work Plan for the Installation of an Engineered Cap and Monitoring System* (BNL, March 2008) and the table provided in Section 31 05 19.16 of the project specifications. Specification sheets for the HDPE liner were reviewed and approved by the project engineer. The HDPE liner was tested in accordance with project specifications.

Each geomembrane seam was tested by Chenango Contracting, the geomembrane subcontractor, in accordance with ASTM D 4437 *Standard Practice for Determining the Integrity of Field Seams Used in Joining Flexible Polymeric Sheet Geomembranes*.

All field seams were non-destructively tested over the full seam length. The location, date, test unit, name of tester, and outcome of all non-destructive testing were recorded on a "Geomembrane Seaming Record," which is provided in the *Project Completion Report for the Brookhaven National Laboratory BGRR Engineered Cap, Building 701* (EnviroTrac Ltd., July 2011) (Appendix C). Double fusion seams were tested using an air pressure test (AT) in accordance with ASTM D 4437 and ASTM D 5820, *Standard Practice for Pressurized Air Channel Evaluation of Dual Seamed Geomembranes*. Extrusion seams were tested using a vacuum box (Vbox) in accordance with ASTM D 4437 and ASTM D 5641, *Standard Practice for Geomembrane Seam Evaluation by Vacuum Chamber*. All of the seams passed the non-destructive tests prior to being covered with soil.

As directed in the project specifications, the geomembrane subcontractor performed one destructive test per 1,500 linear feet of seam length in accordance with ASTM D 4437 and ASTM D 6392, *Standard Test Method for Determining the Integrity of Non-Reinforced Geomembrane Seams Produced Using Thermo-Fusion Methods*. The location, name of tester, and outcome of all destructive testing were recorded on a "Seam Destructive Sample Log," which is provided in *Project Completion Report for the Brookhaven National Laboratory BGRR Engineered Cap, Building 701* (EnviroTrac Ltd., July 2011) (Appendix C). The destructive sample size was 12 inches wide by 36 inches long with the seam centered lengthwise. From the sample, the geomembrane subcontractor cut ten identical 1-inch wide replicate specimens. Five of the specimens were field tested for peel strength and five specimens were tested for shear strength. Each of the destructive test samples passed the peel strength and shear strength tests.

Photograph 12 – Installation the HDPE liner near the Building 701 east rollup door

3.3.4 12-inch Sand Protection Layer

The 12-inch sand protection layer was installed on top of the HDPE liner to protect the linter from puncture by the crushed stone and asphalt base courses above. The sand protection layer was compacted to 85% maximum density (per ASTM D1557-09). The sand protection layer was graded at a slope of 1 foot vertical to 75 feet horizontal (1.33% slope) away from Building 701. Soil compaction tests were performed by Soil Mechanics Drilling Corp of Seaford, NY. Soil compaction test results are summarized in the *Project Completion Report for the Brookhaven National Laboratory BGRR Engineered Cap, Building 701* (EnviroTrac Ltd., July 2011) (Appendix C). The complete set of soil compaction test reports are provided in Appendix D.

Photograph 13 – Area south of Building 701 after placement of 12-inch sand protection layer

3.3.5 Geotextile Layer

The geotextile layer was installed on top of the sand protection layer in accordance with the manufacturer’s instructions. The seams between the geotextile sheets were overlapped by a minimum of 18 inches. Pins were not used to hold down the geotextile layer due to the threat of puncturing the underlying geomembrane. Instead, sandbags were used to weight down the geotextile layer during windy conditions.

The physical properties of the geotextile meet or exceed the ASTM test method values specified in Table 2-2 of the *Draft Final Remedial Design/Remedial Action Work Plan* *for the Installation of an Engineered Cap and Monitoring System* (BNL, March 2008) and the table provided in Section 31 05 19.13 of the project specifications. Specification sheets for the geotextile were reviewed and approved by the project engineer.

Photograph 14 – Geotextile layer installed west of Building 701

3.3.6 2-inch Crushed Stone Protection Layer

The 2-inch crushed stone protection layer was installed on top of the geotextile layer to provide protection to the geotextile layer from the hot temperatures during installation of the ATB. The crushed stone protection layer was compacted with a vibratory compactor; however since the layer was less than 6 inches, the sand cone test for compaction was not performed. Instead, the 2-inch crushed stone protection layer was visibly inspected by a professional engineer to ensure sufficient compaction. The crushed stone protection layer was graded at a slope of 1 foot vertical to 75 feet horizontal (1.33% slope) away from Building 701.

Photograph 15 – Installation of crushed stone protection layer

3.3.7 Asphalt Treated Base

The 4-inch thick ATB base course was installed and compacted on top of the crushed stone protection layer in accordance with the specifications. Compaction tests were performed by Soil Mechanics Drilling Corp of Seaford, NY. The compaction test results are summarized in the *Project Completion Report for the Brookhaven National Laboratory BGRR Engineered Cap, Building 701* (EnviroTrac Ltd., July 2011) (Appendix C). The complete set of ATB compaction test reports are provided in Appendix D.

3.3.8 Hot-Mix Asphalt Surface

The 3-inch thick hot-mix asphalt surface course was installed and compacted on top of the ATB course in accordance with project specifications. The hot mix asphalt surface course was treated with an asphalt seal coat to reduce water infiltration into the asphalt pavement. The seal coat was installed in accordance with the product specifications.

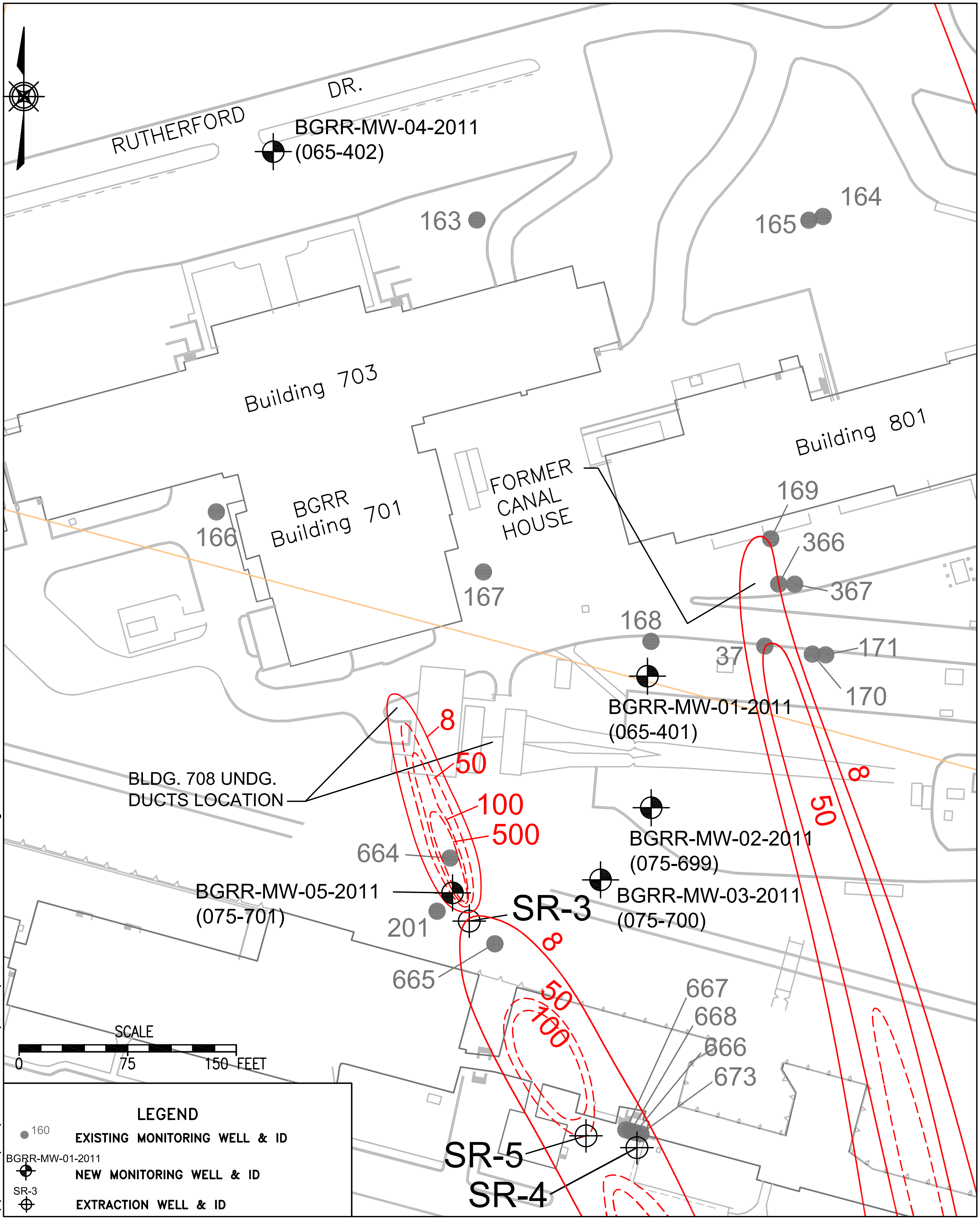
Photograph 16 – Treating asphalt surface with seal coat west of Building 701

Photograph 17 – Finished engineered cap southeast of Building 701

3.4 Groundwater Monitoring Well Installation

Groundwater monitoring well installation was performed between March 2011 and April 2011. In accordance with the *Draft Final Remedial Design/Remedial Action Work Plan for the Installation of an Engineered Cap and Monitoring System* (BNL, March 2008), three groundwater monitoring wells (BGRR-MW-01-2011 through BGRR-MW-03-2011) were installed along the southern perimeter of the engineered cap for the purpose of monitoring the effectiveness of the cap; and one groundwater monitoring well (BGRR-MW-04-2011) was installed to the north of Building 703 to monitor groundwater up-gradient of the cap. An additional groundwater monitoring well that was outside of the scope of the BGRR Engineered Cap Project (BGRR-MW-05-2011) was installed by EPD to monitor groundwater in the vicinity of a nearby groundwater treatment (extraction) well, as well as to provide for additional groundwater monitoring south of the cap. The hollow-stem auger drilling method was used to install the five groundwater monitoring wells. Groundwater monitoring well locations are shown on Figure 3-5 and well construction details, including well screen intervals, are provided in Appendix G.

Photograph 18 – Finished flush-mount groundwater monitoring well.



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BROOKHAVEN NATIONAL LABORATORY ENVIRONMENTAL PROTECTION DIVISION	TITLE: OU III BGRR/WCF MONITORING WELL LOCATIONS 2011 BGRR GW CHARACTERIZATION	DWN: AJZ	VT: HZ.: -	DATE: 03/23/11	PROJECT NO.: -
		CHKD: VJR	APPD: VJR	REV.: 11/04/11	NOTES: -
		FIGURE NO.: 3-5			

3.5 Waste Management

3.5.1 Waste Characterization, Handling and Disposal

The waste management strategy, waste characterization, packaging, handling, and storage were performed in accordance with the *Waste Management Plan for Brookhaven Graphite Research Reactor (BGRR) Miscellaneous Tasks and Post Removal Restoration* (BNL, February 2008) and BNL Standards Based Management System (SBMS) waste management procedures.

Approximately 131 cubic yards of debris resulting from the demolition of the DSB was characterized as low-level radioactive waste (LLRW). The DSB waste was placed into an intermodal shipping container or connex box and shipped via rail to Energy Solutions of Clive, Utah for disposal.

Approximately 2 cubic yards of debris resulting from the removal of the Building 704 vestibules was placed into a construction debris dumpster container and transported via truck and disposed of as C&D waste at the Brookhaven Town Landfill in Brookhaven, New York.

The 68.3 gallons of oil drained from the building 701 transformers was placed into two 55-gallon drums and shipped via truck to Veolia ES Technical Services in Middlesex, New Jersey for disposal. The associated oily debris (approx. 0.27 cubic yards of rags, plastic, etc.) was placed into a 55-gallon drum and shipped via truck to Clean Harbors Modern Landfill in York, Pennsylvania. The transformers and lead jacketed copper cables (containing approximately 40 pounds of lead and 600 pounds of copper) were loaded onto a flatbed truck and shipped to Crestwood Metal Corporation's facility in Holbrook, NY for dismantlement and recycling. Demolition of the transformer pad created approximately 6 cubic yards of ACM, which was place into a roll-off container and shipped to Veolia Greentree Landfill in Kersey, Pennsylvania for disposal.

As described in Section 3.1, asphalt that was removed during subgrade preparation was recycled at the BNL site. The majority of excavated soil was reused as backfill for ongoing HFBR and BGRR projects, as well as other projects within the BNL site; however approximately 2 cubic yards of soil that exhibited radioactivity slightly above background levels was placed into an intermodal shipping container with LLRW from the HFBR Fan Houses Project and shipped via rail to Energy Solutions of Utah for disposal. In addition, a small rock that exhibited activity slightly above background levels was segregated and placed into an intermodal shipping container with waste from the BGRR Bioshield Removal Project and shipped via rail to Energy Solutions of Clive, Utah for disposal.

Several interferences, including abandoned copper pipe, two 22-inch cooling water lines, a valve box and control piping and concrete under-pour, were encountered during subgrade preparation activities. This material (approx. 8,000 pounds), was placed into an intermodal shipping container with waste from the BGRR Bioshield Removal Project and shipped via rail to Energy Solutions of Utah for disposal.

Table 3-3
Project Waste Summary

Waste Type	Manifested Volume	Containers	Disposal Facility	Shipping Method
Clean Demolition Debris	2 yd^3 (C&D)	1-Construction Debris Dumpster	Brookhaven Town Landfill	Truck
Hazardous Industrial Waste - ACM	6 yd^3	1-20 yard Roll-off	Veolia Greentree Landfill, Kersey, PA	Truck
Radiologically Contaminated Demolition Debris	131 yd^3 (LLRW)	6-20 cubic yard intermodals 1-20 foot connex box	Energy Solutions, Clive, Utah	Rail
Non-PCB Oil	68.3 gallons	2-55 gallon drums	Veolia ES Technical Services, Middlesex, NJ	Truck
Non-PCB Oily debris	0.27 yd^3	1-55 gallon drum	Clean Harbors Modern Landfill, York PA	Truck
Copper, steel, concrete	8,000 lbs (LLRW)	1-intermodal container	Energy Solutions, Clive, Utah	Rail

3.5.2 Pollution Prevention and Waste Minimization Opportunities

Waste minimization and pollution prevention methods employed during the BGRR Engineered Cap Project included characterizing asphalt, concrete and soil (overburden) that was removed during subgrade preparation. Approximately 300 cubic yards of asphalt and 23 cubic yards of concrete were recycled at the BNL site; and the majority of the approximately 1,800 cubic yards of soil were reused as backfill for HFBR and BGRR projects, as well as other projects within the BNL site. In addition, the Building 701 transformers and the associated lead jacketed copper cables were dismantled and recycled at Crestwood Metal Corporation’s facility in Holbrook, NY.

3.6 Site Restoration

In accordance with project specifications, site restoration activities included grading and the installation of erosion controls (e.g., riprap, straw matting, etc.) adjacent to the completed engineered cap. In addition, disturbed grassed areas were seeded with native Long Island grasses. Hydroseeding methods were utilized in accordance with the handling and application requirements provided in project specifications. Site restoration activities were completed in June 2011. Future site controls are discussed in Section 7.0.

Photograph 19 – Installation of erosion controls along eastern border of finished engineered cap.

4.0 CHRONOLOGY OF EVENTS

The following table lists a chronology of the main events for the BGRR Engineered Cap Project.

Table 4-1 Chronology of Events for the BGRR Engineered Cap Project

Date	Event
January 31, 2005	BGRR ROD Approved
March 28, 2008	Draft Final Remedial Design/Remedial Action Work Plan for installation of the BGRR Engineered Cap and Monitoring System
June 2010	Demolition of the Duct Service Building
August-September 2010	Installation of permanent roof over the BGD filter openings
June-October 2010	Removal of the Building 701 transformers, concrete pad and associated asbestos abatement
September-October 2010	Completion of miscellaneous preparation items prior to cap installation
January-June 2011	Subgrade preparation and installation of the engineered cap
May 2011	Completion of the as-left survey
March-April 2011	Installation of groundwater monitoring wells for the engineered cap
June 2011	Completion of site restoration
June 2011	Completion of project waste disposal

5.0 PERFORMANCE STANDARDS & QUALITY CONTROL

The performance standard was the installation of the BGRR Engineered Cap and Monitoring System in accordance with project specifications. Asphalt and overburden soils were surveyed and sampled during subgrade preparation to guide the management, reuse and disposal of these materials. These results are provided in Appendix A.

An as-left survey of surface soils was performed after removing overlying asphalt and soil and performing spot remediation. As-left concentrations for Cs-137, Sr-90 and Ra-226 in surface soils were below the OU I cleanup goals of 23 pCi/g, 15 pCi/g, and 5 pCi/g, respectively. In addition, concentrations of mercury, lead, nickel, copper and zinc in soil were below the OU I cleanup goals of 1.84 mg/kg, 400 mg/kg, 140 mg/kg, 270 mg/kg and 2,200 mg/kg, respectively. These results are provided in Appendix D.

Quality control/quality assurance (QA/QC) soil samples were collected in accordance with Work Procedure 324-19, *Final Status Survey (FSS) Procedure for the BGRR Engineered Cap, Rev. 1* (BNL, April, 2011). Field duplicates were collected at a minimum frequency of one per twenty soil samples and analyzed for the radiological and chemical contaminants of concern. QA/QC results are summarized with asphalt and overburden soil survey and soil sample results provided in Appendix A.

The results of soil compaction, concrete strength, asphalt compaction and geomembrane QA/QC testing all met project specifications. Materials testing for the engineered cap were performed as follows:

- Concrete test cylinders were collected and tested by Soil Mechanics Drilling Corp. of Seaford, NY, at three locations on the east concrete pad and two locations on the west concrete pad.

- Sand cone analysis to determine compaction for the subgrade and 3-inch sand protection layer was performed at 26 locations by Soil Mechanics Drilling Corp. of Seaford, NY.

- Sand cone analysis to determine compaction for the 12-inch sand protection layer was performed at 15 locations by Soil Mechanics Drilling Corp. of Seaford, NY.

- Asphalt pavement cores were collected at 4 locations to determine compaction of the ATB layer.

- QA/AC testing of the geomembrane was performed by Chenango Contracting, Inc. of Johnson City, NY.

The geomembrane installation and QA/QC documentation is provided as Appendix D of the *Project Completion Report for the Brookhaven National Laboratory BGRR Engineered Cap, Building 701* (EnviroTrac Ltd., July 2011) (Appendix C). Concrete test reports, soil compaction test reports and ATB compaction test reports are provided in Appendix D.

6.0 Final Inspection and Certifications

In accordance with the BGRR ROD, an as-left survey was performed of surface soils after the removal of asphalt and overburden soils and prior to the installation of the cap. These results were previously discussed in Section 3.2.

As discussed in Section 5.0, materials testing was performed during the installation of the engineered cap. These testing results are summarized in the *Project Completion Report for the Brookhaven National Laboratory BGRR Engineered Cap, Building 701* (EnviroTrac Ltd., July 2011) (Appendix C). In addition, the complete set of concrete strength, soil compaction and ATB compaction test reports are provided in Appendix D.

All cap materials were approved by a licensed engineer. The subgrade and the top of the engineered cap were surveyed by a licensed land surveyor to ensure slopes met project specifications. Any modifications to the engineered cap design specifications are recorded in the redlined project specifications. Redlined project specifications, as-built drawings and land surveys are provided in Appendix B.

During all facets of the BGRR Engineered Cap Project there was strict adherence to industrial safety and radiological safety requirements. All work was performed under the authorization of written and approved procedures. JSAs were prepared and approved as a part of each work package. General oversight was provided by ERP Managers.

6.1 Industrial Hygiene Oversight & Monitoring

Industrial hygiene oversight and monitoring was conducted by the ERP Safety and Health Manager in accordance with ERP procedures. A JSA was prepared for each work package, identifying hazards associated with each of the tasks and specifying required controls for each hazard. The ERP Safety and Health Manager ensured that monitoring occurred as specified in the JSA. Industrial hygiene monitoring included noise monitoring and silica/dust monitoring.

6.2 Radiological Oversight & Monitoring

Radiological oversight and monitoring were conducted by BNL Radiological Control Technicians (RCTs) during the BGRR Engineered Cap Project. Radiological work permits (RWPs) were not utilized because the early characterization and radiological walkover surveys identified low levels of contamination well below the acceptance criteria at the surface and to a depth of two feet.

General Employee Radiological Training (GERT), which provides basic knowledge of radiological control, was provided to project personnel as an awareness training.

Radiological surveys and sampling were conducted during the BGRR Engineered Cap Project to validate the previous characterization and obtain current data. Surveys and sampling were performed in accordance with WP-324-19, *Final Status Survey (FSS) Procedure for the BGRR Engineered Cap, Rev. 1*.

The equipment used during BGRR Engineered Cap Project was monitored for radiological contamination. All equipment that was released from the work zone was surveyed in accordance with FS-SOP-1005*, Radiological Surveys Required For Release of Materials from Areas Controlled For Radiological Purposes* (BNL, November 2007).

As discussed in Section 3.2, results of the as-left survey of surface soils following the completion of the subgrade preparation for the BGRR Engineered Cap work areas were below the established screening levels and all samples were below the established release criterion. The as-left survey was verified as acceptable by ORISE.

7.0 OPERATION AND MAINTENANCE ACTIVITIES

The BNL Land Use Controls Management Plan will be revised to include the BGRR Engineered Cap and Monitoring System, and BNL site utility drawings will be updated.

The *Long-Term Surveillance and Maintenance Manual for the Brookhaven Graphite Research Reactor* will be prepared to include monitoring and maintenance activities for the BGRR Engineered Cap and Monitoring System. These activities will include maintenance and repair of the cap asphalt and coatings, groundwater monitoring and institutional controls (land use controls, notifications and restrictions such as no parking or vehicular traffic within 10 feet of the geomembrane anchor points, work planning controls such as digging permits, and government ownership).

Long-term groundwater monitoring of the BGRR Sr-90 plume is being performed in accordance with the BGRR ROD and the *Record of Decision for Operable Unit III* (BNL, April 2000). The frequency for monitoring the groundwater monitoring wells installed as part of the BGRR Engineered Cap Project will vary depending on the particular phase of the cleanup efforts and the location of the particular groundwater monitoring well. Currently, the groundwater monitoring wells for this plume are sampled on either an annual or semi-annual frequency. The associated data are reported in the Quarterly Operations Reports (three times per year), and evaluated in detail and reported in the Annual Groundwater Status Report.

Brookhaven Science Associates (BSA) will perform surveillance and maintenance activities. In addition to groundwater monitoring and maintaining institutional controls, BSA will ensure that that routine maintenance/inspections are performed. DOE will ensure enforcement of all institutional controls.

8.0 SUMMARY OF PROJECT COSTS

The BGRR Engineered Cap Project was performed with ARRA funding. The project cost $1,965,331 to complete. The original cost estimate was $1,724,873. Additional costs were incurred due to weather delays and encountering abandoned underground utilities and structures that were not anticipated.

The cleanup costs for the BGRR Engineered Cap Project included the following:

Engineering and planning	$333,599
Cap installation and related field work	$1,572,909
Waste Transportation and Disposal	$58,823
Total Cost	$1,965,331

9.0 OBSERVATIONS AND LESSONS LEARNED

The following is a summary of the lessons learned from this project and the corrective actions for future projects:

- While contouring and compacting soil with an excavator on the south side of Building 701, an active sanitary pipe was inadvertently struck and damaged. The sanitary pipe was approximately six inches below existing grade. When BNL F&O utility mark-outs were verified, it was determined that the sanitary pipe ran directly south from a manhole located adjacent to the Building 701 wall. The edge of the manhole had been painted to show where the pipe exited; however the sanitary line itself was not marked out after the overlying asphalt was removed, which was previously painted to show the location of the pipe. BNL SBMS requires utility mark-outs to be maintained but does not provide examples. For excavation projects, the use of highly visible mark-outs, such as flags, ribbons and spray paint markings on building walls should be considered.

- Significant time delays and cost overruns were incurred as a result of unknown conditions below grade prior to the commencement of construction activities. Several abandoned utilities and structures were encountered at various locations during construction activities that were not known to exist previously. A comprehensive geophysical survey of the entire work area could have revealed the buried structures and utilities and enabled project personnel to be better prepared.

- Delays were caused as a result of both extremely cold and extremely wet conditions. Although ideal weather conditions can never be truly anticipated, a geomembrane project requiring the driest conditions possible to be most efficient should likely not be scheduled as a late winter/spring project. The ideal time for open excavations and placement of HDPE liner would be in the early summer through autumn.

10.0 PROTECTIVENESS

The installation of the BGRR Engineered Cap and Monitoring System is protective of human health and the environment. The cap will prevent water intrusion into the remaining radiologically-contaminated soils and sub-surface components and re-direct surface water away from Building 701.

10.1 Facility Review Disposition Project Issues

The Facility Review Disposition Project (FRDP) was initiated in 1998 to resolve the issues identified during the preceding BNL Facility Review Project. The completion of the BGRR Engineered Cap Project satisfies the closure requirements associated with the FRDP issues summarized in Table 10-1.

Table 10-1 BGRR Engineered Cap Project FRDP Issues Summary

BNL I.D. #	SCDHS I.D. #	Building	BNL Issue Description	Resolution
404	N/A	701	Exit Air Cooler Drain Sumps – These were used to collect cooler leakage.	The sumps were covered by the engineered cap.

11.0 FIVE YEAR REVIEW

Five-year reviews will be conducted to determine whether the remedy implemented continues to be protective of human health and the environment. These reviews will be performed in accordance with the *Comprehensive Five-Year Review Guidance, OSWER No. 9355.7-03B-P* (EPA, June 2001). The BGRR complex will be included in the next sitewide Five-Year Review in 2016.

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APPENDIX A

Overburden Soil and Asphalt Results and In-Process Radiological Survey Forms

BGRR Engineered Cap Project
Asphalt and Overburden Soil
Offsite Radiochemical Analytical Results (Composite)
COC# 31214

Sample ID	Residential Cleanup Value	Asphalt Comp 1-4		Asphalt Comp 5-8		Soil Comp 1-4		Soil Comp 5-8	
Sample Depth		NA		NA		1'		1'	
Sample Date		12/22/2010		12/22/2010		12/22/2010		12/22/2010	
Rad Gamma Spec Analysis									
Americium-241	34	-0.0365	U	0.0492	U	0.0145	U	0.00079	U
Beryllium-7	NA	0.282	J	-0.0445	U	-0.0009	U	-0.0818	U
Cesium-134	NA	0.0513	UI	0.0232	DL	0.0293	U	0.02	U
Cesium-137	23	0.0606	J-UI	0.08	J	0.15	J	0.0137	U
Cobalt-57	NA	-0.0016	DL	-0.0004	U	-0.001	U	0.00049	U
Cobalt-60	1,260	0.013	U	0.00748	U	0.00166	U	0.00723	U
Europium-152	51	-0.0697	U	3.91E-06	U	0.0247	U	0.0229	U
Europium-154	NA	-0.0265	U	-0.0432	U	-0.0141	U	0.0195	U
Europium-155	NA	0.00359	U	0.0009	U	0.0124	U	0.0229	U
Manganese-54	NA	-0.0133	U	-0.0053	U	-0.0077	U	-0.0043	U
Sodium-22	NA	-0.0083	U	-0.0147	U	-0.0045	U	0.00619	U
Zinc-65	NA	0.00665	U	0.00601	U	-0.0083	U	-0.0245	U
Rad Alpha Spec Analysis									
Plutonium-241	NA	1.07	U	-4.74	U	-4.04	U	-2.7	U
Plutonium 239/240	35	0.00051	U	-0.015	U	0.0166	U	-0.0056	U
Uranium-235/236	4.6	-0.019	U	0	U	0.263	J	0.14	U
Uranium-238	4.7	0.625	J	0.132	U	0.532	J	0.227	U
Rad Gas Flow Proportional Counting									
Strontium-90	15	-0.321	U	0.145	U	0.00661	U	0.161	U
Rad Liquid Scintillation Analysis									
Carbon-14	NA	-1.22	U	-0.613	U	-0.944	U	-0.812	U
Nickel-63	NA	-1.29	U	-2.05	U	-2.31	U	-0.461	U
Tritium	NA	-58.9	U	-48.6	U	-4.42	U	5.3	U

Notes:

DL - Below the detection limit

NA - Not Applicable

NR - Not Reported

J - Indicates an estimated concentration

U - Indicates that the compound was analyzed for, but was not detected

All units are pCi/g

Gamma Spec results only reported for those parameters that were recorded during the analysis

BGRR Engineered Cap
Asphalt and Overburden Soil
Offsite Metals Data (Composite)
COC# 31214

Sample ID	Residential Cleanup Value	Asphalt Comp 1-4		Asphalt Comp 5-8		Soil Comp 1-4		Soil Comp 5-8	
Sample Depth		NA		NA		1'		1'	
Sample Date		12/22/2010		12/22/2010		12/22/2010		12/22/2010	
TAL Metals									
Copper	270	15.1	*N	13	*N	15.9	*N	6.21	*N
Iron	NA	6,390	*	6,310	*	6,700	*	4,250	*
Lead	400	7.16	*N	10.4	*N	12.2	*N	13.2	*N
Mercury	1.84	0.00386	U	0.00402	B	0.00688	B	0.0145	B
Nickel	140	3.12	*	3.53	*	3.93	*	2.74	*
Zinc	2,200	17.2	*	20	*	13.7	*	10.4	*

Notes:
DL - Below the detection limit
NA - Not Applicable
NR - Not Reported
J - Indicates an estimated concentration
U - Indicates that the compound was analyzed for, but was not detected
* - Indicates that a Quality Control paramter was not within specifications
N - Metals - The Matrix Spike sample recovery is not within specified control limits
All units are mg/kg

BGRR Engineered Cap Project
Asphalt and Overburden Soil
Offsite Soil Radiochemical Analytical Results (Composites)
COC# 31217

Sample ID	Residential Cleanup Value	BGRR ENGR CAP SU1 13A-16A		BGRR ENGR CAP SU1 13B-16B		BGRR ENGR CAP SU1 17A-20A		BGRR ENGR CAP SU1 17B-20B		BGRR ENGR CAP SU1 9A-12A	
Sample Depth		NA		2'		NA		2'		NA	
Sample Date		2/23/2011		2/23/2011		2/23/2011		2/23/2011		2/23/2011	
Rad Gamma Spec Analysis											
Actinium-228	NA	0.67	J	0.623	J	0.648	J	0.496	J	0.413	J
Americium-241	34	0.0147	U	0.0159	U	-0.0043	U	0.0364	U	-0.029	U
Americium-241	34	0.0138	U	0.0158	U	0.028	U	0.0514	U	0.0149	U
Beryllium-7	NA	-0.0335	U	-0.0129	U	-0.0099	U	0.0148	U	0.0226	U
Bismuth-214	NA	0.324		0.387		0.308		0.261		0.288	
Cesium-134	NA	0.0179	U	0.0374	J-UI	0.0379	U	0.0236	DL	0.00437	DL
Cesium-137	23	0.0332	U	0.24	J	-0.0032	U	0.00501	U	0.0352	U
Cobalt-57	NA	-0.0035	U	-0.0003	U	0.0134	U	0.00836	DL	0.00419	U
Cobalt-60	1,260	-0.0033	U	0.00218	U	0.0272	U	-0.0018	U	-0.0003	U
Europium-152	51	-0.0108	U	-0.0155	U	-0.0171	U	-0.0004	U	0.0132	U
Europium-154	NA	0.00724	U	-0.0083	U	-0.0091	U	-0.0056	U	-0.025	U
Europium-155	NA	0.00496	U	0.016	U	0.0215	U	0.0539	U	0.00796	U
Lead-212	NA	0.601		0.64		0.596		0.535		0.24	
Lead-214	NA	0.478		0.399		0.429		0.33		0.303	
Manganese-54	NA	-0.0017	U	-0.0034	U	0.00938	U	0.00028	U	0.00469	U
Potassium-40	NA	8.29		4.72		7.55		4.05		4.55	
Sodium-22	NA	0.00236	U	-0.0007	U	-0.004	U	-0.0023	U	-0.0086	U
Thallium-208	NA	0.15		0.172		0.173		0.136		0.116	
Zinc-65	NA	0.00786	U	-0.0131	U	0.0416	U	0.0175	U	0.0324	U
Rad Alpha Spec Analysis											
Plutonium-241	NA	-0.82	U	0.311	U	-2.97	U	-0.0993	U	1.23	U
Plutonium 239/240	35	0	U	0.0185	U	-0.0049	U	0.00602	U	0.00561	U
Uranium-235/236	4.6	0.0747	U	0.183	U	0.317	U	0.0947	U	-0.0251	U
Uranium-238	4.7	0.439	U	0.261	U	0.565	J	0.0582	U	0.129	U
Rad Gas Flow Proportional Counting											
Strontium-90	15	0.776	U	0.301	U	0.201	U	0.569	U	0.51	U
Rad Liquid Scintillation Analysis											
Carbon-14	NA	-0.463	U	-0.384	U	-1.04	U	-0.211	U	-0.567	U
Nickel-63	NA	-0.598	DL	-2.05	DL	-2.73	DL	-1.89	DL	-1.54	DL
Tritium	NA	47.5	U	101	U	-10.1	U	52.3	U	-40.3	U

Sample ID	Residential Cleanup Value	BGRR ENGR CAP SU1 9B-12B		BGRR ENGR CAP SU2 1A-4A		BGRR ENGR CAP SU2 1B-4B		BGRR ENGR CAP SU2 5A-7A		BGRR ENGR CAP SU2 5B-7B	
Sample Depth		2'		NA		2'		NA		2'	
Sample Date		2/23/2011		2/24/2011		2/24/2011		2/24/2011		2/24/2011	
Rad Gamma Spec Analysis											
Actinium-228	NA	0.491	J	0.684	J	0.745	J	-		-	
Americium-241	34	0.0032	U	0.0214	U	0.00388	U	-0.0069	U	0.0335	U
Americium-241	34	0.0351	U	0.0103	U	-0.0228	U	0.0107	U	0.00318	U
Beryllium-7	NA	0.0195	U	0.144	U	-0.0271	U	0.15	U	0.0337	U
Bismuth-214	NA	0.346		0.481		0.435		0.299		0.371	
Cesium-134	NA	0.0364	U	0.0759	UI	0.048	UI	0.021	DL	0.0551	UI
Cesium-137	23	-0.0122	U	0.0081	U	0.202	J	0.00334	U	0.00992	U
Cobalt-57	NA	0.00057	DL	0.00404	DL	-0.0047	DL	-0.0025	U	0.00578	U
Cobalt-60	1,260	0.00415	U	0.00392	U	-0.0065	U	0.00828	U	0.00249	U
Europium-152	51	-0.041	U	-0.0414	U	-0.0073	U	-0.0018	U	-0.0106	U
Europium-154	NA	-0.0531	U	0.00941	U	-0.01	U	0.0392	U	-0.0094	U
Europium-155	NA	0.0359	U	0.0109	U	0.049	U	0.0328	U	0.00675	U
Lead-212	NA	0.574		0.734		0.7		0.479		0.577	
Lead-214	NA	0.42		0.563		0.611		0.459		0.384	
Manganese-54	NA	-0.0008	U	-0.0019	U	-0.0025	U	0.0178	U	0.00249	U
Potassium-40	NA	3.74		8.84		5.71		6.67		4.02	
Sodium-22	NA	-0.0212	U	0.00283	U	-0.0035	U	0.0134	U	-0.0037	U
Thallium-208	NA	0.18		0.214		0.197		0.179		0.176	
Zinc-65	NA	0.00859	U	0.0182	U	-0.0248	U	13.4	*	-0.0384	U
Rad Alpha Spec Analysis											
Plutonium-241	NA	-2.3	U	-1.51	U	0.48	U	-1.85	U	-1.95	U
Plutonium 239/240	35	-0.0164	U	0.012	U	0.00991	U	0.00551	U	-0.0055	U
Uranium-235/236	4.6	0.0809	U	-0.0246	U	0.0924	U	0.199	U	0.161	U
Uranium-238	4.7	0.324	U	0.0831	U	0.523	J	0.242	U	0.574	J
Rad Gas Flow Proportional Counting											
Strontium-90	15	-0.223	U	0.948	U	0.482	U	0.196	U	0.604	U
Rad Liquid Scintillation Analysis											
Carbon-14	NA	0.314	U	-0.106	U	-0.29	U	-0.215	U	-0.434	U
Nickel-63	NA	-0.606	DL	-2.91	DL	0.163	DL	-1.96	DL	-2.16	DL
Tritium	NA	33.1	U	-11.3	U	31.1	U	119	U	67.5	U

Notes:
DL - Below the detection limit
NA - Not Applicable
NR - Not Reported
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U - Indicates that the compound was analyzed for, but was not detected
All units are pCi/g
Gamma Spec results only reported for those parameters that were recorded during the analysis

BGRR Engineered Cap
Asphalt and Overburden Soil
Offsite Metals Data (Composites)
COC# 31217

Sample ID	Residential Cleanup Value	BGRR ENGR CAP SU1 13A-16A		BGRR ENGR CAP SU1 13B-16B		BGRR ENGR CAP SU1 17A-20A		BGRR ENGR CAP SU1 17B-20B		BGRR ENGR CAP SU1 9A-12A	
Sample Depth		NA		2'		NA		2'		NA	
Sample Date		2/23/2011		2/23/2011		2/23/2011		2/23/2011		2/23/2011	
TAL Metals											
Copper	270	15.6	*	18.8	*	8.76	*	2.53	*	6.81	*
Iron	NA	4,910	*N	5,230	*N	3,640	*N	2,360	*N	1,540	*N
Lead	400	44.1	*N	5.23	*N	37.3	*N	1.16	*N	7.69	*N
Mercury	1.84	0.00395	U	0.00874	B	0.00463	B	0.00393	U	0.00395	U
Nickel	140	4.7	*	2.85	*	1.76	*	1.29	*	1.27	*
Zinc	2,200	7.24	*	19	*	19.8	*	4.58	*	4.74	*

Sample ID	Residential Cleanup Value	BGRR ENGR CAP SU1 9B-12B		BGRR ENGR CAP SU2 1A-4A		BGRR ENGR CAP SU2 1B-4B		BGRR ENGR CAP SU2 5A-7A		BGRR ENGR CAP SU2 5B-7B	
Sample Depth		2'		NA		2'		NA		2'	
Sample Date		2/23/2011		2/24/2011		2/24/2011		2/24/2011		2/24/2011	
TAL Metals											
Copper	270	2.65	*	4.37	*	5.11	*	7.53	*	2.25	*
Iron	NA	2,510	*N	4,370	*N	4,510	*N	3,450	*N	2,920	*N
Lead	400	10.9	*N	6.06	*N	14.8	*N	7.45	*N	3.64	*N
Mercury	1.84	0.00415	U	0.00404	U	0.0325	B	0.0037	U	0.00405	B
Nickel	140	1.71	*	2.6	*	2.71	*	2.61	*	1.54	*
Zinc	2,200	7.05	*	14.7	*	12.5	*	13.4	*	6.03	*

Notes:
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NA - Not Applicable
NR - Not Reported
J - Indicates an estimated concentration
U - Indicates that the compound was analyzed for, but was not detected
* - Indicates that a Quality Control paramter was not within specifications
N - Metals - The Matrix Spike sample recovery is not within specified control limits
All units are mg/kg

BGRR Engineered Cap Proejct
Pre-Excavation Soil
Offsite Soil Radiochemical Analytical Results (Composite)
COC #31308

Sample ID	Residential Cleanup Value	ENG CAP SU2 12-15		ENG CAP SU2 16-18		ENG CAP SU2 20-23		ENG CAP SU2 8-11	
Sample Depth		2'		2'		2'		2'	
Sample Date		3/4/2011		3/4/2011		3/4/2011		3/4/2011	
Rad Gamma Spec Analysis									
Actinium-228	NA	1.04		1.23		0.902		0.797	J
Americium-241	34	-0.0123	U	-0.0106	U	-0.0073	U	-0.0128	U
Americium-241	34	0.0317	U	0.00473	U	0.0203	U	0.0704	U
Beryllium-7	NA	0.068	U	0.00194	U	0.0765	U	0.0368	U
Bismuth-214	NA	0.635		0.71		0.541		0.447	
Cesium-134	NA	0.0521	UI	0.0724	UI	0.0415	UI	0.0385	J-UI
Cesium-137	23	0.0765	J	0.389	J	0.44	J	0.0363	J
Cobalt-57	NA	0.00191	U	0.00409	U	-0.0033	U	-0.0025	U
Cobalt-60	1,260	0.00544	U	0.00874	U	0.00121	U	-0.0107	U
Europium-152	51	-0.0024	U	-0.0182	U	-0.0054	U	0.0112	U
Europium-154	NA	-0.0147	U	0.0151	U	-0.0057	U	-0.0099	U
Europium-155	NA	0.0662	U	0.095	J-UI	0.0228	U	0.0293	U
Lead-210	NA	-		0.892	J	-		-	
Lead-212	NA	1.14		1.22		1.07		0.907	
Lead-214	NA	0.874		0.853		0.749		0.651	
Manganese-54	NA	0.00036	U	0.0107	U	-0.0055	U	0.011	U
Potassium-40	NA	8.12		8.21		6.4		6.17	
Sodium-22	NA	-0.0053	U	0.00532	U	-0.0038	U	-0.0036	U
Thallium-208	NA	0.311		0.355		0.268		0.238	
Zinc-65	NA	-0.0067	U	-0.0374	U	0.00331	U	-0.0025	
Rad Alpha Spec Analysis									
Plutonium-241	NA	-1.74	U	-0.361	U	-0.281	U	-1.08	U
Plutonium 239/240	35	0.0215	U	0.0469	U	0.0544	U	0.00925	U
Uranium-235/236	4.6	-0.0455	U	0.178	U	0.0776	U	0	U
Uranium-238	4.7	0.365	U	0.504	J	0.744	J	0.438	U
Rad Gas Flow Proportional Counting									
Strontium-90	15	-0.152	U	0.466	U	-0.284	U	0.607	U
Rad Liquid Scintillation Analysis									
Carbon-14	NA	0.289	U	-0.552	U	-0.729	U	-0.755	U
Nickel-63	NA	-1.01	U	-0.319	U	0.369	U	-0.802	U
Tritium	NA	-14.8	U	-23.6	U	-4.41	U	19.7	U

Notes:
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U - Indicates that the compound was analyzed for, but was not detected
All units are pCi/g
Gamma Spec results only reported for those parameters that were recorded during the analysis

BGRR Engineered Cap Project
Pre-Excavation Soil
Offsite Metals Data (Composites)
COC# 31308

Sample ID	Residential Cleanup Value	ENG CAP SU2 12-15		ENG CAP SU2 16-18		ENG CAP SU2 20-23		ENG CAP SU2 8-11	
Sample Depth		2'		2'		2'		2'	
Sample Date		3/4/2011		3/4/2011		3/4/2011		3/4/2011	
TAL Metals									
Copper	270	5.4		4.49		11.5		5.79	
Iron	NA	8,570	*	9,430	*	8,630	*	6,120	*
Lead	400	8.85		13.9		18.4		6.79	
Mercury	1.84	0.0228	B	0.276		0.0391	B	0.0168	B
Nickel	140	5.12		5.1		5.62		4.44	
Zinc	2,200	25.3		37.8		28.7		11.8	

Notes:
DL - Below the detection limit
NA - Not Applicable
NR - Not Reported
J - Indicates an estimated concentration
U - Indicates that the compound was analyzed for, but was not detected
* - Indicates that a Quality Control paramter was not within specifications
N - Metals - The Matrix Spike sample recovery is not within specified control limits
All units are mg/kg

BGRR Engineered Cap Project
QA/QC
Offsite Soil Radiochemical Analytical Results (Composites)

Sample ID	Residential Cleanup Value	BGRR ENGR CAP SU-1 #015		BGRR ENGR CAP SU-2 #001	
Sample Depth		2.5'		2.5'	
Sample Date		5/5/2011		3/26/2011	
Rad Gamma Spec Analysis					
Actinium-228	NA	-		-	
Americium-241	34	-0.006	U	-0.0902	U
Americium-241	34	-		-	
Beryllium-7	NA	0.110	U	-0.0327	DL
Bismuth-214	NA	-		-	
Cesium-134	NA	0.0178	U	0.0447	UI
Cesium-137	23	0.527	J	0.0192	U
Cobalt-57	NA	0.00616	U	0.00342	U
Cobalt-60	1,260	0.0105	U	-0.00715	U
Europium-152	51	-0.0201	U	-0.034	U
Europium-154	NA	-0.0604	U	-0.000521	U
Europium-155	NA	0.0341	U	0.0355	U
Lead-212	NA	-		-	
Lead-214	NA	-		-	
Manganese-54	NA	-0.00693	U	0.00375	U
Potassium-40	NA	-		-	
Sodium-22	NA	-0.0173	U	0.000279	U
Thallium-208	NA	-		-	
Zinc-65	NA	0.00572	U	-0.00885	U
Rad Alpha Spec Analysis					
Plutonium-241	NA	-		-	
Plutonium 239/240	35	-		-	
Uranium-235/236	4.6	-		-	
Uranium-238	4.7	-		-	
Rad Gas Flow Proportional Counting					
Strontium-90	15	0.491	U	0.181	U
Rad Liquid Scintillation Analysis					
Carbon-14	NA	-		-	
Nickel-63	NA	-		-	
Tritium	NA	26.3	U	-16.2	U

Notes:
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NA - Not Applicable
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Gamma Spec results only reported for those parameters that were recorded during the analysi

RADIOLOGICAL SURVEY FORM
FS-SOP-1000

REASON FOR SURVEY
☐ ROUTINE ■ SPECIAL
☐ RWP # ☐ WP #

LOCATION & EQUIPT. Engineered Cap Equipment **DATE:** 05/11/2011 **TIME:** 1230

Surveyed Engineered Cap Equipment, Tools, and Trailer for release. Performed smears, spot direct frisk and LAS.

Found no detectable contamination on the LAS or direct frisk areas.

Smears #1 and #2 were taken on the rubber material seam tool.

Smears #3 to #8 were taken on the Polaris Big Boss ATV tires.

Smears #9 to #11 were taken on the Polaris Big Boss ATV body.

Smears #12 to #14 were taken on various hand tools.

Smears #15 and #16 were taken on a Honda ES 6500 generator.

Smears #17 to #22 were taken on the Takeuchi TL 140 skid steer including the fork lift and bucket attachments.

Smears #23 to #30 were taken on the Caterpillar Excavator.

Smears #31 to #36 were taken on the Hertz Rental Dump Truck #656-14-1065.

Smears #37 to #47 were taken on the Wells Cargo Trailer #981 and various equipment inside the trailer.

Smears #48 to #52 were taken on the Hertz Rental Dump Truck #656-14-3009.

Smears #53 to #57 were taken on the CASE 621C Front End Loader.

INSTRUMENT

Model #	Serial #	CAL DUE
S5-XLB	67705	04-23-2011
LUD-3	50662	10-20-2011
N/A	N/A	N/A

LEGEND

○ - SMEAR SURVEY LOCATION △ - AIR SAMPLE LOCATION
□ - MASSLINN SURVEY LOCATION # - DIRECT FRISK LOCATION
XXXY/ZZZ XXX = contact reading Y = radiation type ZZZ = reading @ 30cm

AIRBORNE ACTIVITY SURVEY

Sample #	Duration	Flow Rate	Field Analysis: cpm	Field Analysis: µCi/cc	% DAC
N/A					

DOSE RATE (HIGHEST)

CONTACT READING	N/A
GENERAL AREA READING	N/A

MASSLINN SURVEY RESULTS (in dpm)

1. <1K DPM/LAS	5. <1K DPM/LAS
2.	6.
3.	7.
4.	8.

SMEAR SURVEY RESULTS (dpm/100cm²) (α, β-γ) ³H

1. See	8. Attached	15. Results
2. Batch	9. Number	16. 28378
3.	10.	17.
4.	11.	18.
5.	12.	19.
6.	13.	20.
7.	14.	21.

Surveyed By [signature] E. Houseknecht **Date:** 05/11/2011 **Reviewed By:** [signature] **Date:** 5/11/11

Activity Report

ENG. CAP EQUIPMENT

Batch Name:	28,378	**Acquisition Date:**	5/11/11
Batch ID:	1 Minute Smear Analysis - 201105111211	**Acquisition Time: (minutes)**	1.0
Group:	D		
Device:	S5 XLB	**Operating Voltage: (volts)**	1,380.0
Selected Geometry:	1/8" Stainless Steel		

Efficiency Factors

Alpha Efficiency: (%)	0.27	±	0.00	**Beta Efficiency: (%)**	0.19	±	0.00

Sample ID	Quantity	Alpha (DPM)	2σ	Alpha MDA (DPM)	Beta Activity (DPM)	2σ	Beta MDA (DPM)
20110511121110-D1	0.00	-0.56	0.64	14.79	19.95	23.29	32.73
20110511121241-D2	0.00	-0.56	0.64	14.79	19.95	23.29	32.73
20110511121401-D3	0.00	-0.55	0.64	14.79	-0.76	10.65	32.73
20110511121511-D4	0.00	-0.56	0.64	14.79	25.13	25.49	32.73
20110511121631-D5	0.00	-0.55	0.64	14.79	-0.76	10.65	32.73
20110511121751-D6	0.00	-0.55	0.64	14.79	-0.76	10.65	32.73
20110511121901-D7	0.00	-0.55	0.64	14.79	4.42	14.85	32.73
20110511122021-D8	0.00	-0.55	0.64	14.79	-0.76	10.65	32.73
20110511122131-D9	0.00	3.13	7.40	14.79	-0.90	10.65	32.73
20110511122251-D10	0.00	-0.55	0.64	14.79	-0.76	10.65	32.73
20110511122401-D11	0.00	-0.55	0.64	14.79	-0.76	10.65	32.73
20110511122521-D12	0.00	-0.55	0.64	14.79	-0.76	10.65	32.73
20110511122631-D13	0.00	-0.55	0.64	14.79	4.42	14.85	32.73
20110511122751-D14	0.00	-0.55	0.64	14.79	4.42	14.85	32.73
20110511122912-D15	0.00	-0.55	0.64	14.79	-5.93	2.48	32.73
20110511123022-D16	0.00	3.14	7.40	14.79	-6.07	2.50	32.73
20110511123142-D17	0.00	6.82	10.45	14.79	4.14	14.86	32.73
20110511123302-D18	0.00	-0.56	0.64	14.79	9.60	18.11	32.73
20110511123412-D19	0.00	-0.55	0.64	14.79	4.42	14.85	32.73
20110511123532-D20	0.00	-0.56	0.64	14.79	9.60	18.11	32.73
20110511123652-D21	0.00	-0.56	0.64	14.79	14.78	20.86	32.73
20110511123802-D22	0.00	-0.55	0.64	14.79	-0.76	10.65	32.73
20110511123922-D23	0.00	-0.56	0.64	14.79	14.78	20.86	32.73
20110511124032-D24	0.00	-0.56	0.64	14.79	9.60	18.11	32.73
20110511124152-D25	0.00	-0.55	0.64	14.79	-0.76	10.65	32.73
20110511124312-D26	0.00	-0.55	0.64	14.79	-5.93	2.48	32.73
20110511124422-D27	0.00	-0.55	0.64	14.79	-0.76	10.65	32.73
20110511124542-D28	0.00	-0.55	0.64	14.79	4.42	14.85	32.73
20110511124703-D29	0.00	-0.56	0.64	14.79	9.60	18.11	32.73
20110511124813-D30	0.00	-0.56	0.64	14.79	9.60	18.11	32.73
20110511124933-D31	0.00	-0.55	0.64	14.79	-0.76	10.65	32.73
20110511125053-D32	0.00	-0.55	0.64	14.79	-0.76	10.65	32.73
20110511125203-D33	0.00	-0.56	0.64	14.79	9.60	18.11	32.73
20110511125323-D34	0.00	-0.56	0.64	14.79	9.60	18.11	32.73
20110511125433-D35	0.00	-0.55	0.64	14.79	-0.76	10.65	32.73

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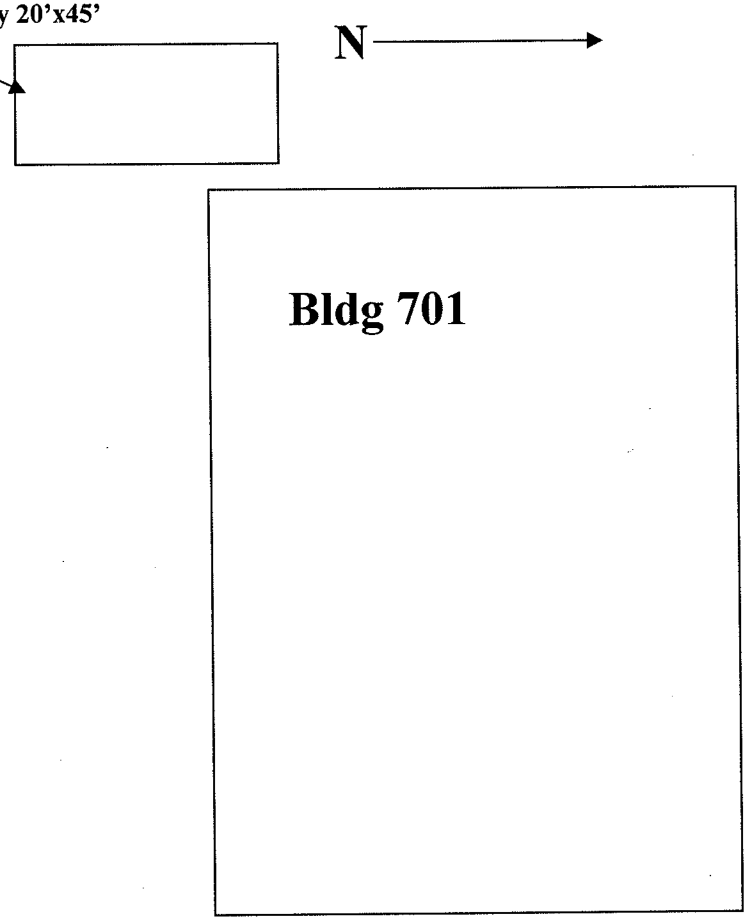
RADIOLOGICAL SURVEY FORM FS-SOP-1000	REASON FOR SURVEY	
	☐ ROUTINE	☐ SPECIAL
	☐ RWP #	☐ WP # 324-19
LOCATION & EQUIPT. Engr. Cap SU-1 walkover	DATE: 4-13-2011	TIME: 1600

INSTRUMENT		
Model #	Serial #	CAL DUE
L-2221	211784	12-09-11
N/A	N/A	N/A
N/A	N/A	N/A
N/A	N/A	N/A

Performed walk over survey with NaI detector (un-collimated) . Background was 8200 –9700 cpm., no activity above background was detected. Survey performed after asphalt layer was removed.

This is the area that was surveyed.
Area size approximately 20'x45'



LEGEND

- ○ - SMEAR SURVEY LOCATION
- △ - AIR SAMPLE LOCATION
- ☐ - MASSLINN SURVEY LOCATION
- # - DIRECT FRISK LOCA-
- C̄ - CONTAMINATION
- ✱ CONTACT
- XXXY / ZZZ — XXX = contact reading Y = radiation type ZZZ = reading @ 30cm

AIRBORNE ACTIVITY SURVEY

Sample #	Duration	Flow Rate	Field Analysis cpm	Field Analysis µCi/cc	% DAC
N/A					

DOSE RATE (HIGHEST)

CONTACT READING	N/A
GENERAL AREA READING	N/A

MASSLINN SURVEY RESULTS (in dpm)

1. N/A	5. N/A
2.	6.
3.	7.
4.	8.

SMEAR SURVEY RESULTS (dpm/100cm^2) α, β-γ ^{3}H

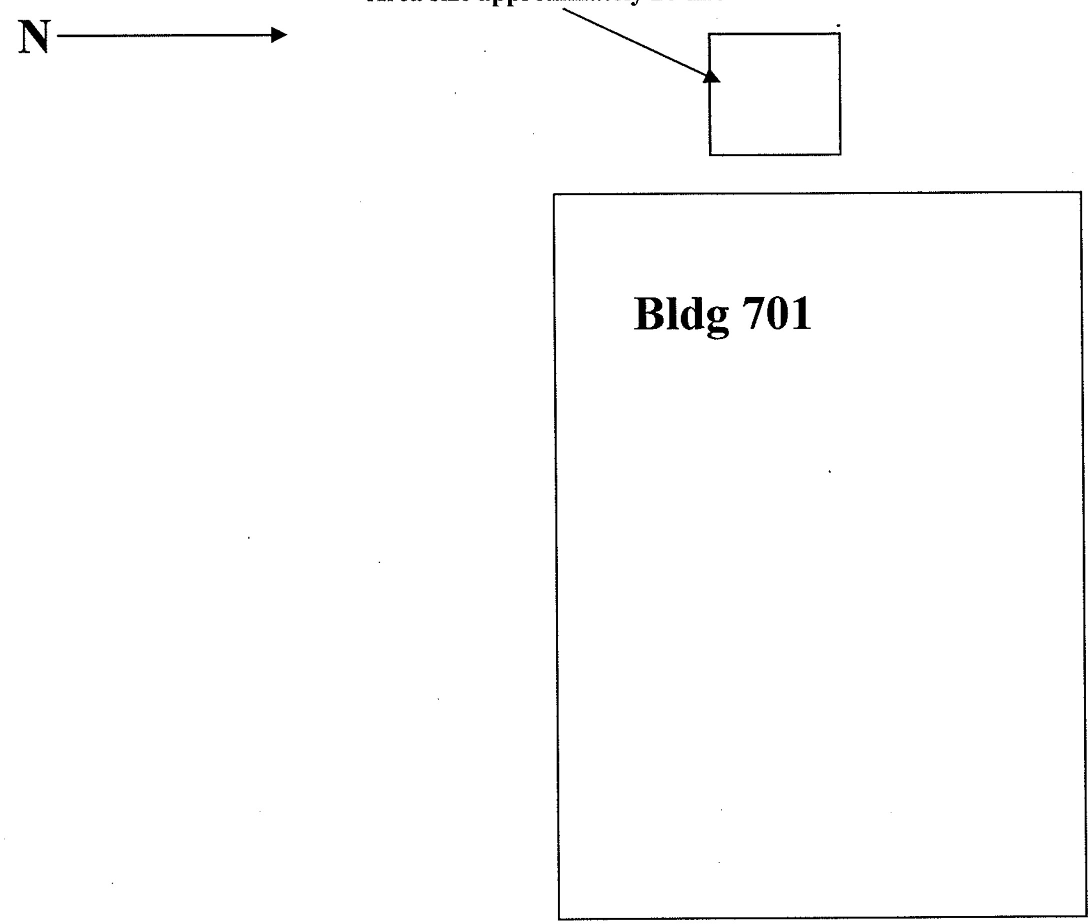
1. See	8. Attached	15. Results
2. Batch	9. Number	16. N/A
3.	10.	17.
4.	11.	18.
5.	12.	19.
6.	13.	20.
7.	14.	21.

Surveyed By D. Dove [signature] Date: 4-13-2011 Reviewed By: [signature] Date: 4/19/11

RADIOLOGICAL SURVEY FORM FS-SOP-1000	REASON FOR SURVEY		INSTRUMENT		
	☐ ROUTINE	☐ SPECIAL	Model #	Serial #	CAL DUE
	☐ RWP #	☐ WP # 324-19	L-2221	211784	12-09-11
LOCATION & EQUIPT. Engr. Cap SU-1 walkover	DATE: 4-15-2011	TIME: 1100	N/A	N/A	N/A
			N/A	N/A	N/A
			N/A	N/A	N/A

Performed walk over survey with NaI detector (un-collimated) . Background was 8800 –10700 cpm., no activity above background was detected. Survey performed after asphalt layer was removed.

This is the area that was surveyed.
Area size approximately 20'x20'



LEGEND

○ - SMEAR SURVEY LOCATION
△ - AIR SAMPLE LOCATION
□ - MASSLINN SURVEY LOCATION
- DIRECT FRISK LOCA-
C̅ - CONTAMINATION
* CONTACT
XXXY / ZZZ XXX = contact reading Y = radiation type ZZZ = reading @ 30cm

AIRBORNE ACTIVITY SURVEY

Sample #	Duration	Flow Rate	Field Analysis cpm	Field Analysis µCi/cc	% DAC
N/A					

DOSE RATE (HIGHEST)

CONTACT READING	N/A
GENERAL AREA READING	N/A

MASSLINN SURVEY RESULTS (in dpm)

1. N/A	5. N/A
2.	6.
3.	7.
4.	8.

SMEAR SURVEY RESULTS (dpm/100cm²) α, β-γ ³H

1. See	8. Attached	15. Results
2. Batch	9. Number	16. N/A
3.	10.	17.
4.	11.	18.
5.	12.	19.
6.	13.	20.
7.	14.	21.

Surveyed By D. Dove Date: 4-15-2011 Reviewed By: Date: 4/19/11

RADIOLOGICAL SURVEY FORM FS-SOP-1000	REASON FOR SURVEY	
	☐ ROUTINE	☐ SPECIAL
	☐ RWP #	☒ WP # 324-19
LOCATION & EQUIPT. Eng. Cap SU-1	DATE: 04-12-2011	TIME: 0815

One minute sodium iodide survey performed over sample locations 4 and (3) add. locations Eng. Cap SU-1

Sample Location	2x2 Counts per minute
Resample 4	21757
Border 1	23270
Border 2	26228
Border 3	23537

Survey performed due to Cs-137 being identified at the initial sample location # 4 Survey unit 1. Amount of Cs-137 identified = 5 pico curies per gram.
Re-sampled location 4 and bound area with 3 additional sample locations identified as Border 1,2, and 3

Note: Probe was unshielded

Background at waist level 31797 one minute count

Gamma walk over performed approximately. 10 feet out from sample location 004
Note: sample points Border 1,2 and 3 were approximately 5 feet from sample point 004

INSTRUMENT

Model #	Serial #	CAL DUE
L-2221	211784	12-9-2011
n/a	n/a	n/a
n/a	n/a	n/a
n/a	n/a	n/a

LEGEND

○ - SMEAR SURVEY LOCATION △ - AIR SAMPLE LOCATION
☐ - MASSLINN SURVEY LOCATION # - DIRECT FRISK LOCATION
$\frac{XXXY}{ZZZ}$ XXX = contact reading Y = radiation type ZZZ = reading @ 30cm

AIRBORNE ACTIVITY SURVEY

Sample #	Duration	Flow Rate	Field Analysis cpm	Field Analysis µCi/cc	% DAC
N/A					

DOSE RATE (HIGHEST)

CONTACT READING	
GENERAL AREA READING	

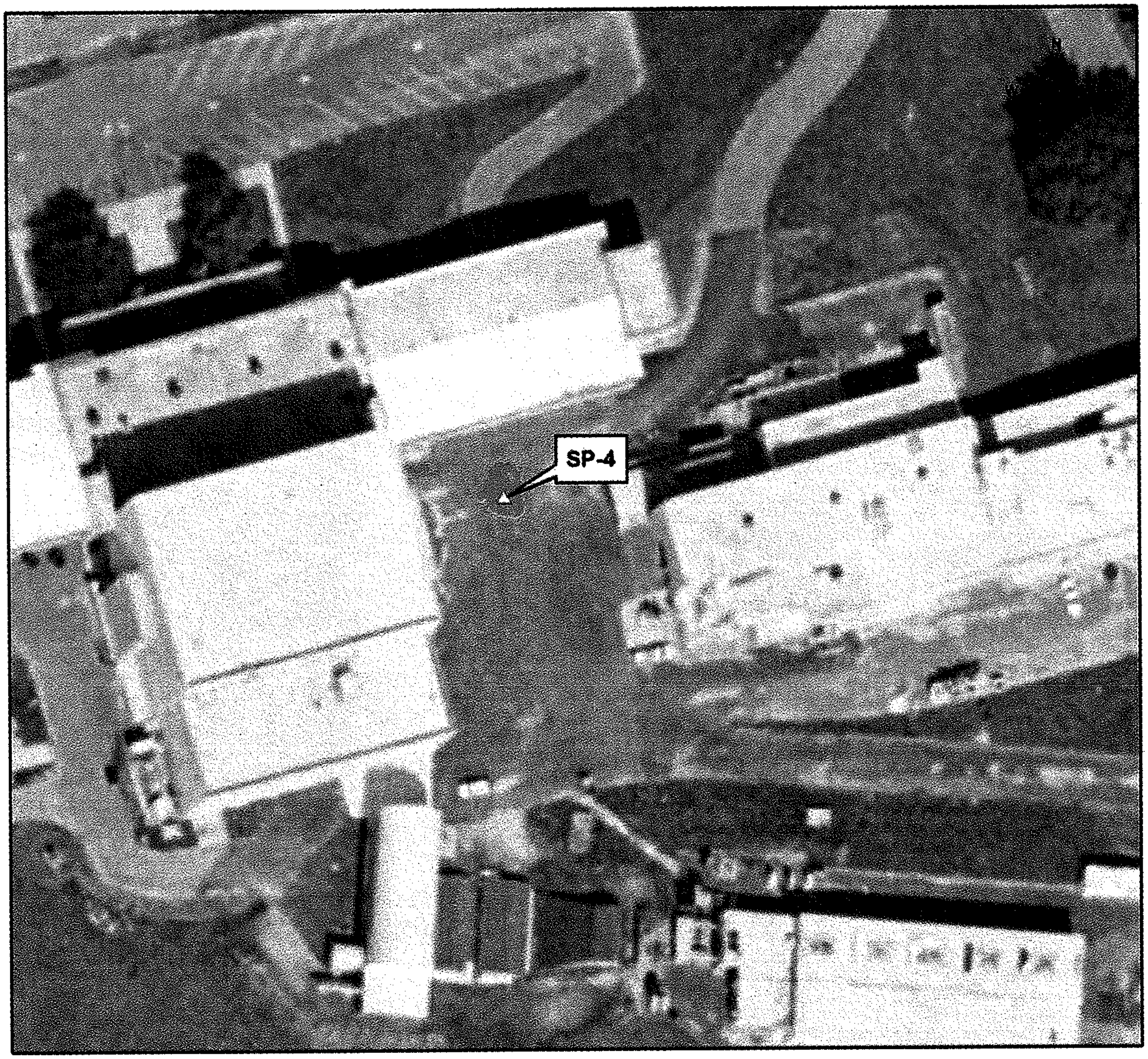
MASSLINN SURVEY RESULTS (in dpm)

1.	N/A	5.	N/A
2.		6.	
3.		7.	
4.		8.	

SMEAR SURVEY RESULTS (dpm/100cm²) α, β-γ, ³H

1.	See	8.	Attached	15.	Results
2.	Batch	9.	Number	16.	n/a
3.		10.		17.	
4.		11.		18.	
5.		12.		19.	
6.		13.		20.	
7.		14.		21.	

Surveyed By [signature] MBulter Date: 4-12-2011 Reviewed By: [signature] Date: 4/13/11



Coordinate System: NAD83, New York Long Island - Units: Feet

0 50 100 200 Feet

Legend

△ Survey Point SP-004

Gamma Count Rate

COLLIMATED (cpm)

- < 5,000
- 5,000 - 8,999
- ≥ 9,000

GPS-Based Radiological Survey
Brookhaven National Laboratory
SP-004 and Survey Data
As of April 12, 2011

ERP GAMMA ANALYSIS SUMMARY

C.O.C. # N/A
P. SULLIVAN 631 897-3202

COUNT DATE: **04/12/2011-A**

LINE #	SAMPLE #	WEIGHT (GRAMS)	SAMPLE DESCRIPTION / LOCATION	RESULTS
1	041211-001	1048	ENG. CAP SU-1 SP-004 BORDER #1	^{137}Cs (0.62 pCi/gm) + BACKGROUND
2	041211-002	1106	ENG. CAP SU-1 SP-004 BORDER #2	^{137}Cs (0.15 pCi/gm) + BACKGROUND
3	041211-003	1230	ENG. CAP SU-1 SP-004 BORDER #3	^{137}Cs (0.27 pCi/gm) + BACKGROUND
4	041211-004	1249	ENG. CAP SU-1 SP-004 RESAMPLE	^{137}Cs (0.44 pCi/gm) + BACKGROUND
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				

P. Sull 04/12/11

4 SAMPLES TOTAL

RADIOLOGICAL SURVEY FORM FS-SOP-1000

REASON FOR SURVEY

☐ ROUTINE ☐ SPECIAL
☐ RWP # ☒ WP # 324-19

LOCATION & EQUIPT. Engineer Cap SU-1 DATE: 4-14-2011 TIME: 0930

Survey of East intake wall during drill activity

INSTRUMENT		
Model #	Serial #	CAL DUE
S5-XLB	67705	04-23-2011
LUD-3	72518	2/17/12
n/a	n/a	n/a

LEGEND

○ - SMEAR SURVEY LOCATION △ - AIR SAMPLE LOCATION
☐ - MASSLINN SURVEY LOCATION # - DIRECT FRISK LOCATION
XXXY / ZZZ XXX = contact reading Y = radiation type ZZZ = reading @ 30cm

Smears (1) thru (09) taken on drill bit / drill after each use on the East intake wall areas yielding counts greater than background (Note one smear was taken per drill area)

Smears (10) thru (18) taken on the East intake wall following drill activities on the areas yielding activity greater than background. (Note one smear was taken per drill area)

Note: Drill areas were taped prior to drilling, collection device placed under each drill location prior to drilling in areas yielding activity greater than background

Note: Highest direct frisk of the 9 holes yielding activity was 220 ccpm– per probe area

All smears were 100 cm2.

Direct frisk performed on the drill bit / drill following the drilling of the areas yielding activity greater than background. Background for Lud-3 100cpm
Result= No detectable activity greater than background per direct frisk

AIRBORNE ACTIVITY SURVEY

Sample #	Duration	Flow Rate	Field Analysis cpm	Field Analysis µCi/cc	% DAC
N/A					

DOSE RATE (HIGHEST)

CONTACT READING	N/A
GENERAL AREA READING	N/A

MASSLINN SURVEY RESULTS (in dpm)

1. N/A	5. N/A
2.	6.
3.	7.
4.	8.

SMEAR SURVEY RESULTS (dpm/100cm²) α, β-γ ³H

1. See	8. Attached	15. Results
2. Batch	9. Number	16. 28049
3.	10.	17.
4.	11.	18.
5.	12.	19.
6.	13.	20.
7.	14.	21.

Surveyed By [signature] Butler Date: 4-14-2011 Reviewed By: [signature] Date: 4-20-11

Activity Report

EAST AIR INTAKE WALL

Batch Name:	28,049	**Acquisition Date:**	4/14/11
ıtch ID:	1 Minute Smear Analysis - 201104141023	**Acquisition Time: (minutes)**	1.0
Group:	D		
Device:	S5 XLB	**Operating Voltage: (volts)**	1,350.0
Selected Geometry:	1/8" Stainless Steel		

Efficiency Factors

Alpha Efficiency: (%)	0.27	±	0.00	**Beta Efficiency: (%)**	0.19	±	0.00

Sample ID	Quantity	Alpha (DPM)	2σ	Alpha MDA (DPM)	Beta Activity (DPM)	2σ	Beta MDA (DPM)
20110414102355-D1	0.00	0.00	0.00	9.99	5.21	10.42	14.10
20110414102655-D2	0.00	0.00	0.00	9.99	5.21	10.42	14.10
20110414102815-D3	0.00	0.00	0.00	9.99	5.21	10.42	14.10
20110414102935-D4	0.00	-0.01	0.01	9.99	26.05	23.31	14.10
20110414103045-D5	0.00	-0.01	0.01	9.99	15.63	18.05	14.10
20110414103206-D6	0.00	0.00	0.00	9.99	0.00	0.00	14.10
20110414103316-D7	0.00	-0.01	0.01	9.99	20.84	20.84	14.10
20110414103436-D8	0.00	0.00	0.01	9.99	10.42	14.74	14.10
20110414103556-D9	0.00	0.00	0.01	9.99	10.42	14.74	14.10
2011 10414103706-D10	0.00	0.00	0.00	9.99	5.21	10.42	14.10
0414103826-D11	0.00	-0.01	0.01	9.99	15.63	18.05	14.10
20110414103936-D12	0.00	-0.01	0.01	9.99	20.84	20.84	14.10
20110414104056-D13	0.00	-0.01	0.01	9.99	20.84	20.84	14.10
20110414104216-D14	0.00	-0.01	0.01	9.99	20.84	20.84	14.10
20110414104326-D15	0.00	-0.01	0.01	9.99	20.84	20.84	14.10
20110414104446-D16	0.00	-0.01	0.01	9.99	15.63	18.05	14.10
20110414104556-D17	0.00	0.00	0.00	9.99	5.21	10.42	14.10
20110414104716-D18	0.00	0.00	0.01	9.99	10.42	14.74	14.10

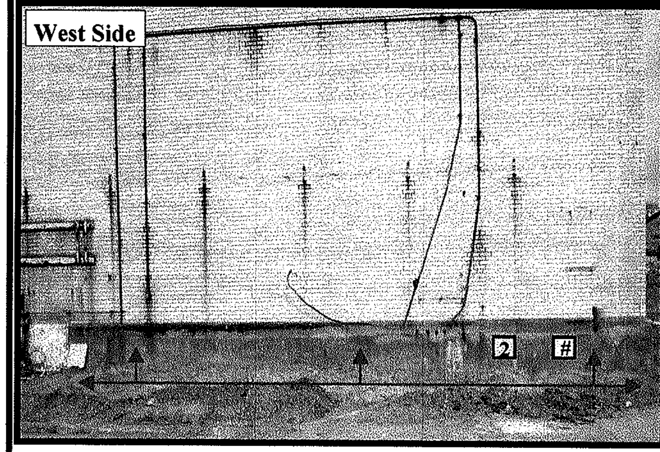
ıviewed by: [signature]

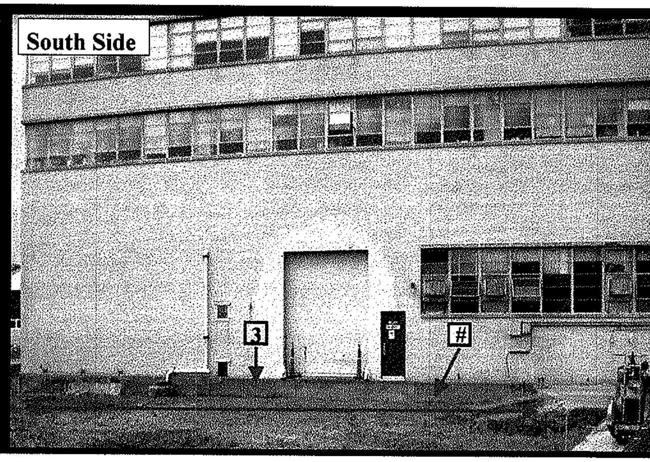
2 of 2

RADIOLOGICAL SURVEY FORM FS-SOP-1000	REASON FOR SURVEY ☐ Routine ☐ RWP# ~~8~~	☐ Special ☒ WP 324-31
Location / Equipment: Bldg. 701, S. & W. foundation wall	Date: 04/ ~~11~~ 8 /11	Time: 1530

Survey: Exposed south and west side foundation walls, direct frisk and LAS.

INSTRUMENTS Model #	Serial #	CAL DUE
LUD-3	72518	02/17/12
LUD-3	92741	10/20/11
N/A	→	→
N/A	→	→
N/A	→	→





LEGEND

○ - SMEAR SURVEY LOCATION
▲ - AIR SAMPLE LOCATION
☐ - MASSLINN SURVEY LOCATION
[#] - DIRECT FRISK LOCATION
C̄ - CONTAMINATION
* CONTACT
XXXY/ZZZ XXX = contact reading Y = radiation type ZZZ = reading @ 30cm

AIRBORNE ACTIVITY SURVEY

Sample #	Duration	Flow Rate	Field Analysis cpm	Field Analysis µCi/cc	% DAC
N/A	→				→

DOSE RATE (HIGHEST)

CONTACT READING	N/A
GENERAL AREA READING	N/A

MASSLINN SURVEY RESULTS (in dpm)

1.	< 1K	5.	< 1K
2.	↓	6.	N/A
3.	↓	7.	↓
4.	↓	8.	↓

SMEAR SURVEY RESULTS (dpm/100cm^2) α, β-γ, ^{3}H

1.	N/A	8.	N/A	15.	N/A
2.	↓	9.	↓	16.	↓
3.	↓	10.	↓	17.	↓
4.	↓	11.	↓	18.	↓
5.	↓	12.	↓	19.	↓
6.	↓	13.	↓	20.	↓
7.	↓	14.	↓	21.	↓

Note:

(A) LAS taken on the exposed accessible surface areas of the foundation wall, designated by the [red high-lighted] arrows, all were equivalent to bkgd. at 70cpm on the south Side wall end and 50cpm on the west side wall.

(B) Direct frisk taken on the accessible surface areas of both foundation wall sides, all were equivalent to background and < 100ccpm. .

(C) Red high lighted arrows are indicative of the area of the walls surveyed.

Surveyed Sean A. Gully Date: 04/ 08 /11 Reviewed By: [signature] Date: 4/8/11

FS-SOP-1000
Attachment 9. 2

RADIOLOGICAL SURVEY FORM
FS-SOP-1000

REASON FOR SURVEY
☐ Routine ______ ☐ Special ______
☐ RWP# ______ ☒ WP 324-31

INSTRUMENTS Model #	Serial #	CAL DUE
LUD-3	72518	02/17/12
LUD-3	74871	09/08/11
N/A	→	→
N/A	→	→
N/A	→	→

Location / Equipment: Bldg. 701, East foundation wall.
Date: 04/ 08 /11
Time: 1130

Survey: Exposed east side foundation wall, direct frisk and LAS.

LEGEND
○ - SMEAR SURVEY LOCATION
▲ - AIR SAMPLE LOCATION
☐ - MASSLINN SURVEY LOCATION
[#] - DIRECT FRISK LOCATION
C - CONTAMINATION
* CONTACT
XXXY / ZZZ XXX = contact reading Y = radiation type ZZZ = reading @ 30cm

AIRBORNE ACTIVITY SURVEY

Sample #	Duration	Flow Rate	Field Analysis cpm	Field Analysis µCi/cc	% DAC
N/A	→				→

DOSE RATE (HIGHEST)

CONTACT READING	N/A
GENERAL AREA READING	N/A

MASSLINN SURVEY RESULTS (in dpm)

1.	< 1K	5.	< 1K
2.	↓	6.	↓
3.	↓	7.	↓
4.	↓	8. thru 12.	↓

SMEAR SURVEY RESULTS (dpm/100cm^2) α, β-γ, ^{3}H

1.	N/A	8.	N/A	15.	N/A
2.	↓	9.	↓	16.	↓
3.	↓	10.	↓	17.	↓
4.	↓	11.	↓	18.	↓
5.	↓	12.	↓	19.	↓
6.	↓	13.	↓	20.	↓
7.	↓	14.	↓	21.	↓

Note:

(A) LAS taken on the exposed accessible surface areas of the foundation wall, designated by the [red high-lighted] arrows, all were equivalent to bkgd. at 90cpm on the south east end and 50cpm on the north east end and < 1Kdpm.

(B) Direct frisk of the same areas of the foundation wall ranged from < 100ccpm to 4. 5Kcpm, and the fixed contamination that is evident, is prevalent along the wall that is highlighted by the blue arrow.

(C) Two coats of fixative applied to the wall.

(D) Two composite soil samples taken at the base of the wall in the blue highlighted area.

Surveyed Mike Hollander and Sean A. Gully Date: 04/ 08 /11 Reviewed By: [signature] Date: 4/12/11

FS-SOP-1000
Attachment 9. 2

Page 1 of 2

ERP GAMMA ANALYSIS SUMMARY

C.O.C. # N/A
P. SULLIVAN 631 897-3202

COUNT DATE: **04/11/2011-A**

LINE #	SAMPLE #	WEIGHT (GRAMS)	SAMPLE DESCRIPTION / LOCATION	RESULTS
1	041111-001	1280	E.C. COMP @ BASE OF E. AIR INTAKE	^{137}Cs (0.40 pCi/gm) + BACKGROUND
2	041111-002	1321	E.C. COMP @ BASE OF E. AIR INTAKE	^{137}Cs (0.30 pCi/gm) + BACKGROUND
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
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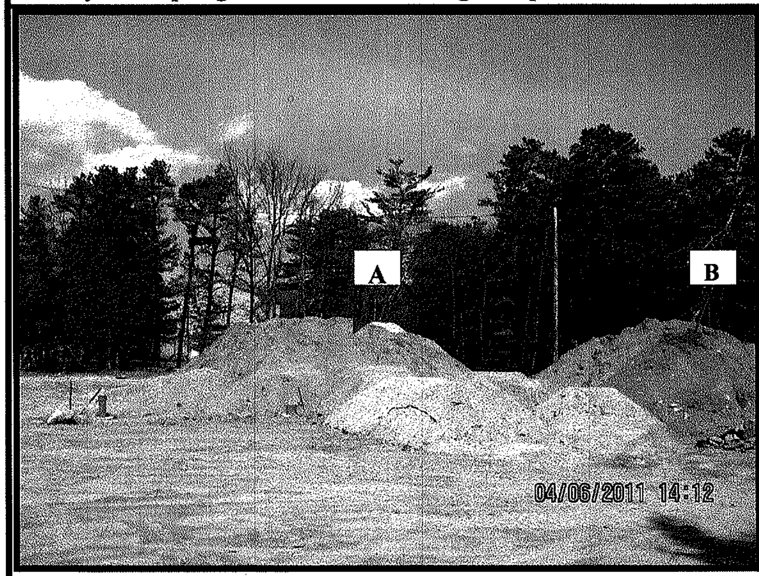
18				
19				
20				
21				
22				
23				
24				
25				

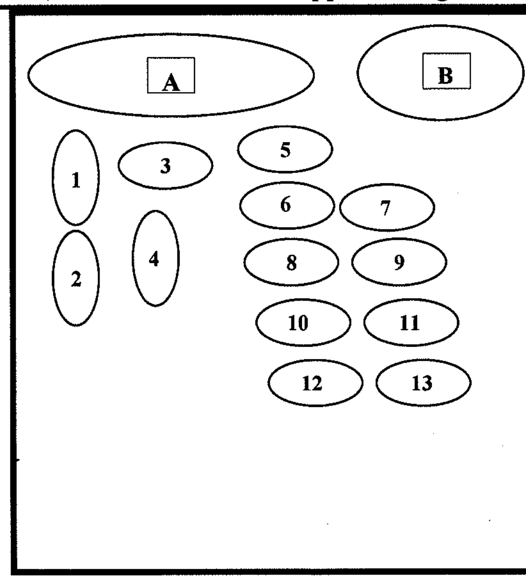
P. Sull 04/11/11

2 SAMPLES TOTAL

RADIOLOGICAL SURVEY FORM FS-SOP-1000	REASON FOR SURVEY ☐ Routine ________ ☒ Special Soil Sampling ☐ RWP# ________ ☐ WP ________		
Location / Equipment: Bldg. 802, foot print over burden.	Date: 04/ 06 /11	Time: 1430	
Survey: Sampling of soils from the Engr. Cap remediation at bldg. 701, that are stored in lot opposite bldg. 811.			

INSTRUMENTS Model #	Serial #	CAL DUE
Gamma Spec GELI	ERP Det. 01 & 02	10/15/11
N/A →	→	→
N/A →	→	→
N/A →	→	→
N/A →	→	→





LEGEND

- ○ - SMEAR SURVEY LOCATION
- ▲ - AIR SAMPLE LOCATION
- ▢ - MASSLINN SURVEY LOCATION
- [#] - DIRECT FRISK LOCATION
- $\overline{C}$ - CONTAMINATION
- * CONTACT
- $\frac{XXXY}{ZZZ}$ XXX = contact reading Y = radiation type ZZZ = reading @ 30cm

AIRBORNE ACTIVITY SURVEY

Sample #	Duration	Flow Rate	Field Analysis cpm	Field Analysis µCi/cc	% DAC
See ASL	→	→	→	→	→

DOSE RATE (HIGHEST)

CONTACT READING	N/A
GENERAL AREA READING	N/A

MASSLINN SURVEY RESULTS (in dpm)

1.	N/A	5.	N/A
2.	↓	6.	↓
3.	↓	7.	↓
4.	↓	8.	↓

SMEAR SURVEY RESULTS (dpm/100cm^2) α, β-γ, ^{3}H

1.	N/A	8.	N/A	15.	N/A
2.	↓	9.	↓	16.	↓
3.	↓	10.	↓	17.	↓
4.	↓	11.	↓	18.	↓
5.	↓	12.	↓	19.	↓
6.	↓	13.	↓	20.	↓
7.	↓	14.	↓	21.	↓

Note:
(A) Soil samples taken from thirteen piles [smaller, see above] and location of same depicted on above schematic. This is for soil verification.

Surveyed Mike Hollander and Sean A. Gully Date: 04/ 06 /11 Reviewed By: [signature] Date: 4/7/11

FS-SOP-1000
Attachment 9. 2 [signatures]

ERP GAMMA ANALYSIS SUMMARY

C.O.C. # N/A
P. SULLIVAN 631 897-3202

COUNT DATE: **04/07/2011-A**

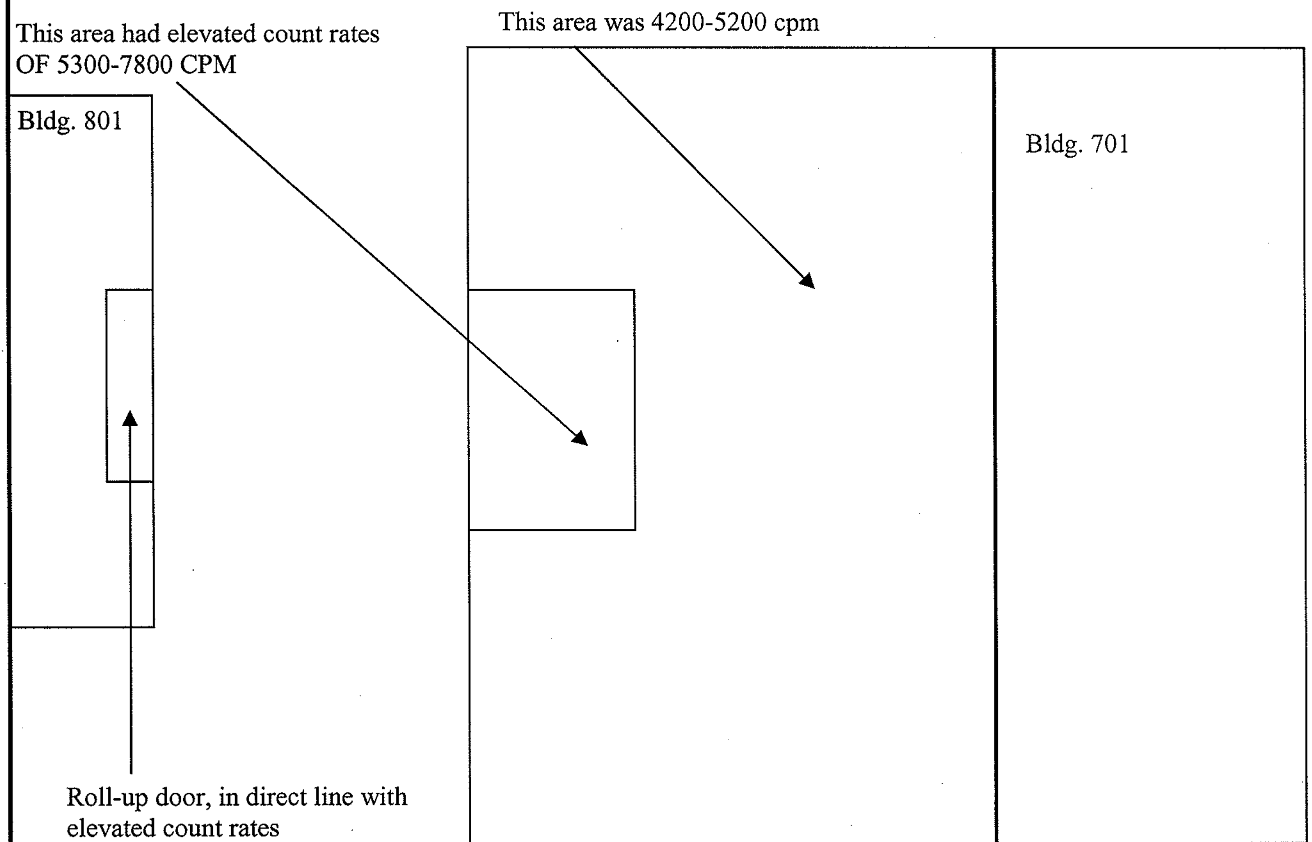
LINE #	SAMPLE #	WEIGHT (GRAMS)	SAMPLE DESCRIPTION / LOCATION	RESULTS
1	040711-001	1157	ENG. CAP OVERBURDEN SU-2 - 001	^{137}Cs (0.06 pCi/gm) + BACKGROUND
2	040711-002	1280	ENG. CAP OVERBURDEN SU-2 - 002	^{137}Cs (0.06 pCi/gm) + BACKGROUND
3	040711-003	1147	ENG. CAP OVERBURDEN SU-2 - 003	^{137}Cs (0.06 pCi/gm) + BACKGROUND
4	040711-004	1202	ENG. CAP OVERBURDEN SU-2 - 004	BACKGROUND
5	040711-005	1208	ENG. CAP OVERBURDEN SU-2 - 005	BACKGROUND
6	040711-006	1265	ENG. CAP OVERBURDEN SU-2 - 006	^{137}Cs (0.08 pCi/gm) + BACKGROUND
7	040711-007	1204	ENG. CAP OVERBURDEN SU-2 - 007	^{137}Cs (0.08 pCi/gm) + BACKGROUND
8	040711-008	1308	ENG. CAP OVERBURDEN SU-2 - 008	^{137}Cs (0.05 pCi/gm) + BACKGROUND
9	040711-009	1259	ENG. CAP OVERBURDEN SU-2 - 009	^{137}Cs (0.07 pCi/gm) + BACKGROUND
10	040711-010	1337	ENG. CAP OVERBURDEN SU-2 - 010	BACKGROUND
11	040711-011	1205	ENG. CAP OVERBURDEN SU-2 - 011	^{137}Cs (0.05 pCi/gm) + BACKGROUND
12	040711-012	1279	ENG. CAP OVERBURDEN SU-2 - 012	^{137}Cs (0.08 pCi/gm) + BACKGROUND
13	040711-013	1322	ENG. CAP OVERBURDEN SU-2 - 013	BACKGROUND
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				

P. Sull
04/07/11

13 SAMPLES TOTAL

RADIOLOGICAL SURVEY FORM FS-SOP-1000	REASON FOR SURVEY		INSTRUMENT		
	☐ ROUTINE	☐ SPECIAL	Model #	Serial #	CAL DUE
	☐ RWP #	☐ WP # 324-19	L-2221	211784	12-09-11
LOCATION & EQUIPT. Engr. Cap SU-! walkover	DATE: 4-6-2011	TIME: 1700	N/A	N/A	N/A
Walkover after asphalt removed and prior to overburden removal			N/A	N/A	N/A
			N/A	N/A	N/A

Performed walk over survey with NaI detector (collimated) . Background was 4200 –5200 cpm. Area with elevated count rates attributed to shine from Bldg 801



LEGEND

○ - SMEAR SURVEY LOCATION
△ - AIR SAMPLE LOCATION
□ - MASSLINN SURVEY LOCATION
- DIRECT FRISK LOCA-
C - CONTAMINATION
* CONTACT
XXXY / ZZZ — XXX = contact reading Y = radiation type ZZZ = reading @ 30cm

AIRBORNE ACTIVITY SURVEY

Sample #	Duration	Flow Rate	Field Analysis cpm	Field Analysis µCi/cc	% DAC
N/A					

DOSE RATE (HIGHEST)

CONTACT READING	N/A
GENERAL AREA READING	N/A

MASSLINN SURVEY RESULTS (in dpm)

1.	N/A	5.	N/A
2.		6.	
3.		7.	
4.		8.	

SMEAR SURVEY RESULTS (dpm/100cm²) α, β-γ ^{3}H

1.	See	8.	Attached	15.	Results
2.	Batch	9.	Number	16.	N/A
3.		10.		17.	
4.		11.		18.	
5.		12.		19.	
6.		13.		20.	
7.		14.		21.	

Surveyed By D. Dove / M. Hollander Date: 4-6-2011 Reviewed By: Date: 4/7/11

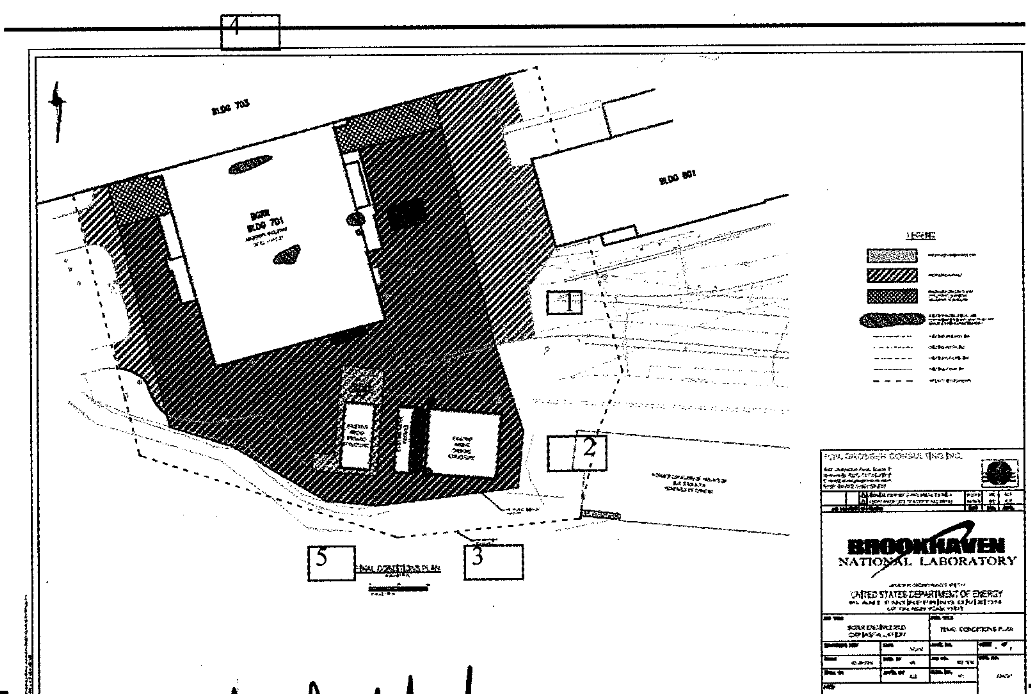
FS-SOP-1000
Attachment 9.2

RADIOLOGICAL SURVEY FORM FS-SOP-1000	REASON FOR SURVEY	
	☐ ROUTINE	☐ SPECIAL
	☐ RWP #	☒ WP # 324-19
LOCATION & EQUIPT. Outside BGRR grounds	DATE: 3/30/11	TIME: 09:00

Monitoring well's 1 thru 5

Performed gamma walkover survey 10 feet out from all monitoring well locations with results as follows………
#1…..3700-4100 cpm w/ bkgd. at 5550 cpm.
#2……2900-3700 cpm w/ bkgd at 2850cpm.
#3…...2600-2750 cpm w/ bkgd at 2700 cpm.
#4…...2150-2400 cpm w/ bkgd at 2200 cpm.
#5…...2050-2250 cpm w/ bkgd at 2100 cpm.

All reading's done with collimated probe.
Background obtained at waist level with all other readings 1 inch from ground level.



Denotes monitoring well location

INSTRUMENT

Model #	Serial #	CAL DUE
L-2221	211784	12/09/11
N/A	N/A	N/A

LEGEND

○ - SMEAR SURVEY LOCATION   △ - AIR SAMPLE LOCATION
☐ - MASSLINN SURVEY LOCATION   # - DIRECT FRISK LOCATION
XXXY / ZZZ   XXX = contact reading   Y = radiation type   ZZZ = reading @ 30cm

AIRBORNE ACTIVITY SURVEY

Sample #	Duration	Flow Rate	Field Analysis cpm	Field Analysis µCi/cc	% DAC
N/A					

DOSE RATE (HIGHEST)

CONTACT READING	N/A
GENERAL AREA READING	N/A

MASSLINN SURVEY RESULTS (in dpm)

1.	N/A	5.	N/A
2.		6.	
3.		7.	
4.		8.	

SMEAR SURVEY RESULTS (dpm/100cm²) α, β-γ ^{3}H

1.	See	8.	Attached	15.	Results
2.	Batch	9.	Number	16.	N/A
3.		10.		17.	
4.		11.		18.	
5.		12.		19.	
6.		13.		20.	
7.		14.		21.	

Surveyed By Hollander [signature]   Date: 3/30/11   Reviewed By: [signature]   Date: 3/30/11

ERP GAMMA ANALYSIS SUMMARY

C.O.C. # N/A
P. SULLIVAN 631 897-3202

COUNT DATE: **04/07/2011-B**

LINE #	SAMPLE #	WEIGHT (GRAMS)	SAMPLE DESCRIPTION / LOCATION	RESULTS
1	040711-014	1061	ENG. CAP MW #1 - 001	BACKGROUND
2	040711-015	943	ENG. CAP MW #1 - 002	BACKGROUND
3	040711-016	983	ENG. CAP MW #2 - 001	BACKGROUND
4	040711-017	1035	ENG. CAP MW #2 - 002	BACKGROUND
5	040711-018	1029	ENG. CAP MW #3 - 001	BACKGROUND
6	040711-019	1024	ENG. CAP MW #3 - 002	BACKGROUND
7	040711-020	1076	ENG. CAP MW #4 - 001	BACKGROUND
8	040711-021	1053	ENG. CAP MW #4 - 002	BACKGROUND
9	040711-022	931	ENG. CAP MW #5 - 001	BACKGROUND
10	040711-023	986	ENG. CAP MW #5 - 002	BACKGROUND
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				

MW = MONITORING WELL

P. Sull 04/07/11

10 SAMPLES TOTAL

RADIOLOGICAL SURVEY FORM FS-SOP-1000	REASON FOR SURVEY	
	☐ ROUTINE	☐ SPECIAL
	☐ RWP #	☒ WP # 324-19
LOCATION & EQUIPT. South Side Walk Over	DATE: 03-30-11	TIME: 1030

Collimated Survey

Collimated Survey performed for Engineering Cap.

Performed a walk over survey on the North West and North East ends of the Duct Service Building Concrete Slab after concrete was removed. 2 background check were performed on the North West side, one taken on the North End was 3480 cpm and one on the South End was 2913 Cpm. Readings during the walkover was 2250to 3380 cpm. One background was taken on the North East End, and it was 2497cpm. Readings during the walk over were from 2580 to 2790 cpm.

INSTRUMENT

Model #	Serial #	CAL DUE
LUD-2221	211784	12-09-2011
N/A	N/A	N/A

LEGEND

○ - SMEAR SURVEY LOCATION △ - AIR SAMPLE LOCATION

☐ - MASSLINN SURVEY LOCATION # - DIRECT FRISK LOCATION

XXXY/ZZZ XXX = contact reading Y = radiation type ZZZ = reading @ 30cm

AIRBORNE ACTIVITY SURVEY

Sample #	Duration	Flow Rate	Field Analysis cpm	Field Analysis µCi/cc	% DAC
N/A					

DOSE RATE (HIGHEST)

CONTACT READING	N/A
GENERAL AREA READING	N/A

MASSLINN SURVEY RESULTS (in dpm)

1. N/A	5. N/A
2.	6.
3.	7.
4.	8.

SMEAR SURVEY RESULTS ($dpm/100cm^2$) α, β-γ ^3H

1. See	8. Attached	15. Results
2. Batch	9. Number	16. N/A
3.	10.	17.
4.	11.	18.
5.	12.	19.
6.	13.	20.
7.	14.	21.

Surveyed By [signature] Eugene E. Houseknecht II Date: 03-31-2011 Reviewed By: [signature] Date: 4/4/11

RADIOLOGICAL SURVEY FORM FS-SOP-1000	REASON FOR SURVEY ☐ ROUTINE ☐ SPECIAL ☐ RWP # ☒ WP # 324-19	
LOCATION & EQUIPT. BGRR engineered cap	DATE: 3/26/11-3/28/11	TIME: 15:00

Soil overburden piles across from bldg. 811/ pipes between inst. and boiler cuthouses

Walked over all soil/asphalt and concrete piles from BGRR engineering cap work on the south excavation area. Background in area ranged from 6500-7800 cpm. Readings ranged from 6500-13,500 cpm. Investigated 13,500 reading, dugout 1 foot of dirt and found rock that was 2X3X1 and read 18,237 counts on a one minute count. Rock is orange in nature and consistent with other rocks found onsite showing natural radioactivity.

All composite results from Gel laboratories show levels below release limits in ROD for radioactivity and metals data.

Surveyed two standpipes between boiler and instrument cuthouse. Two smears in each pipe and also frisked outside and inside of pipes. Lud-3 background at 80 cpm with same reading inside and outside pipe while frisking. Pipes are filled with concrete to within 1.5 feet of top of pipe. L-2221 readings showed bkdg. Levels inside pipe at 12,500 cpm.

INSTRUMENT

Model #	Serial #	CAL DUE
L-2221	211784	12/09/11
L-3	39857	9/07/11
N/A		
N/A		

LEGEND

○ - SMEAR SURVEY LOCATION △ - AIR SAMPLE LOCATION

☐ - MASSLINN SURVEY LOCATION # - DIRECT FRISK LOCATION

XXXY/ZZZ XXX = contact reading Y = radiation type ZZZ = reading @ 30cm

AIRBORNE ACTIVITY SURVEY

Sample #	Duration	Flow Rate	Field Analysis cpm	Field Analysis µCi/cc	% DAC
N/A					

DOSE RATE (HIGHEST)

CONTACT READING	N/A
GENERAL AREA READING	N/A

MASSLINN SURVEY RESULTS (in dpm)

1.	N/A	5.	N/A
2.		6.	
3.		7.	
4.		8.	

SMEAR SURVEY RESULTS (dpm/100cm²) α, β-γ, ³H

1.	See	8.	Attached	15.	Results
2.	Batch	9.	Number	16.	27,811
3.		10.		17.	
4.		11.		18.	
5.		12.		19.	
6.		13.		20.	
7.		14.		21.	

Surveyed By Hollander [signature] Date: 3/28/11 Reviewed By: [signature] Date: 3/29/11

Activity Report

I/S PNPG BY CUTHOUSE FOR EXPANSION JOINT

Batch Name:	27,811	**Acquisition Date:**	3/26/11
Batch ID:	1 Minute Smear Analysis - 201103260915	**Acquisition Time: (minutes)**	1.0
Group:	D		
Device:	S5 XLB	**Operating Voltage: (volts)**	1,350.0
Selected Geometry:	1/8" Stainless Steel		

Efficiency Factors

Alpha Efficiency: (%)	0.27	±	0.00	**Beta Efficiency: (%)**	0.19	±	0.00

Sample ID	Quantity	Alpha (DPM)	2σ	Alpha MDA (DPM)	Beta Activity (DPM)	2σ	Beta MDA (DPM)
20110326091556-D1	0.00	-0.01	0.01	9.99	31.27	25.53	14.10
20110326091856-D2	0.00	-0.01	0.01	9.99	15.63	18.05	14.10
20110326092016-D3	0.00	-0.01	0.01	9.99	15.63	18.05	14.10
20110326092137-D4	0.00	0.00	0.01	9.99	10.42	14.74	14.10

Reviewed by:

RADIOLOGICAL SURVEY FORM FS-SOP-1000	REASON FOR SURVEY	
	☐ ROUTINE	☐ SPECIAL
	☐ RWP #	☒ WP # 324-19
LOCATION & EQUIPT. Secondary Air Piping South Side	DATE: 03-22-11	TIME: 1045

Performed a survey on Secondary Air Piping on the South Side of the Instrument House. 4 smears were taken inside the piping after it was cut at ground level. 2 taken upstream of the cut and 2 taken down stream (the piping that will be left in the ground). 1 smear taken of copper piping that was also removed. Performed a direct frisk of the inside of the piping and of the copper piping. No Detectable Contamination Found.

INSTRUMENT

Model #	Serial #	CAL DUE
LUD-3	44141	02-03-2012
N/A	N/A	N/A

LEGEND

○ - SMEAR SURVEY LOCATION △ - AIR SAMPLE LOCATION

☐ - MASSLINN SURVEY LOCATION # - DIRECT FRISK LOCATION

XXXY / ZZZ XXX = contact reading Y = radiation type ZZZ = reading @ 30cm

AIRBORNE ACTIVITY SURVEY

Sample #	Duration	Flow Rate	Field Analysis cpm	Field Analysis µCi/cc	% DAC
N/A					

DOSE RATE (HIGHEST)

CONTACT READING	N/A
GENERAL AREA READING	N/A

MASSLINN SURVEY RESULTS (in dpm)

1.	N/A	5.	N/A
2.		6.	
3.		7.	
4.		8.	

SMEAR SURVEY RESULTS (dpm/100cm²) α, β-γ ³H

1.	See	8.	Attached	15.	Results
2.	Batch	9.	Number	16.	27768
3.		10.		17.	
4.		11.		18.	
5.		12.		19.	
6.		13.		20.	
7.		14.		21.	

Surveyed By: [signature] Eugene E. Houseknecht II Date: 03-22-2011 Reviewed By: [signature] Date: 3/23/11

Activity Report

ENGD CAP 2ND AIR PIPING SOUTH SIDE

Batch Name:	27,768	**Acquisition Date:**	3/22/11
Batch ID:	1 Minute Smear Analysis - 201103221053	**Acquisition Time: (minutes)**	1.0
Group:	D		
Device:	S5 XLB	**Operating Voltage: (volts)**	1,350.0

Selected Geometry: 1/8" Stainless Steel

Efficiency Factors

Alpha Efficiency: (%)	0.27	±	0.00	**Beta Efficiency: (%)**	0.19	±	0.00

Sample ID	Quantity	Alpha (DPM)	2σ	Alpha MDA (DPM)	Beta Activity (DPM)	2σ	Beta MDA (DPM)
20110322105340-D1	0.00	0.00	0.01	9.99	10.42	14.74	14.10
20110322105641-D2	0.00	-0.01	0.01	9.99	15.63	18.05	14.10
20110322105801-D3	0.00	0.00	0.01	9.99	10.42	14.74	14.10
20110322105921-D4	0.00	-0.01	0.01	9.99	15.63	18.05	14.10
20110322110031-D5	0.00	0.00	0.01	9.99	10.42	14.74	14.10

Reviewed by: ______________________

Page 2 of 2

3-22-11

RADIOLOGICAL SURVEY FORM FS-SOP-1000	REASON FOR SURVEY ☐ ROUTINE ☐ SPECIAL ☐ RWP # ☒ WP # 324-19
LOCATION & EQUIPT. South Side Walk Over	DATE: 03-18-11 TIME: 0930

Collimated Survey

Collimated Survey performed for Engineering Cap.

Performed a walk over survey on the North Side of the Future Boiler Dog House and between the Future Boiler Dog House and Instrument Hose after the asphalt was removed and before the work crew removed any soil. Background checks were performed.

North Side of the Future Boiler Dog House. One taken on the East end, one on the West end . Background ranged from 2900 to 3423 cpm. Readings during the walk over were from 2754 to 3720 cpm.

Between the Future Boiler and the Instrument House. One taken on the South and North Ends and one in the middle. Background range was 2732 to 3011 cpm. Readings during the walk over were from 2512 to 2938 cpm.

INSTRUMENT

Model #	Serial #	CAL DUE
LUD-2221	211780	12-09-2011
N/A	N/A	N/A

LEGEND

○ - SMEAR SURVEY LOCATION △ - AIR SAMPLE LOCATION

☐ - MASSLINN SURVEY LOCATION # - DIRECT FRISK LOCATION

XXXY / ZZZ XXX = contact reading Y = radiation type ZZZ = reading @ 30cm

AIRBORNE ACTIVITY SURVEY

Sample #	Duration	Flow Rate	Field Analysis cpm	Field Analysis µCi/cc	% DAC
N/A					

DOSE RATE (HIGHEST)

CONTACT READING	N/A
GENERAL AREA READING	N/A

MASSLINN SURVEY RESULTS (in dpm)

1.	N/A	5.	N/A
2.		6.	
3.		7.	
4.		8.	

SMEAR SURVEY RESULTS (dpm/100cm²) α, β-γ ³H

1.	See	8.	Attached	15.	Results
2.	Batch	9.	Number	16.	N/A
3.		10.		17.	
4.		11.		18.	
5.		12.		19.	
6.		13.		20.	
7.		14.		21.	

Surveyed By Eugene E. Houseknecht II Date: 03-18-2011 Reviewed By: Date: 3/18/11

RADIOLOGICAL SURVEY FORM
FS-SOP-1000

REASON FOR SURVEY

☐ ROUTINE	☐ SPECIAL
☐ RWP #	☒ WP # 324-19

LOCATION & EQUIPT. South East Side Walk Over

DATE: 03-16-11 **TIME:** 1445

Survey performed for Engineering Cap.

Performed a walk over survey of the dirt removed from under the concrete stairs on the South East Side of Bldg 701. The dirt was surveyed by Building 811 in 2 10 yard piles no more than 2 feet deep. 6 background check were performed. Background range was from 7300 to 7600cpm. Readings during the walk over were from 7200 to 8100 cpm. 4 soil samples were taken.

INSTRUMENT

Model #	Serial #	CAL DUE
LUD-2221	211780	12-09-2011
N/A	N/A	N/A

LEGEND

○ - SMEAR SURVEY LOCATION △ - AIR SAMPLE LOCATION
☐ - MASSLINN SURVEY LOCATION # - DIRECT FRISK LOCATION
XXXY/ZZZ XXX = contact reading Y = radiation type ZZZ = reading @ 30cm

AIRBORNE ACTIVITY SURVEY

Sample #	Duration	Flow Rate	Field Analysis cpm	Field Analysis µCi/cc	% DAC
N/A					

DOSE RATE (HIGHEST)

CONTACT READING	N/A
GENERAL AREA READING	N/A

MASSLINN SURVEY RESULTS (in dpm)

1.	N/A	5.	N/A
2.		6.	
3.		7.	
4.		8.	

SMEAR SURVEY RESULTS (dpm/100cm^2) (α, β-γ) ^{3}H

1.	See	8.	Attached	15.	Results
2.	Batch	9.	Number	16.	N/A
3.		10.		17.	
4.		11.		18.	
5.		12.		19.	
6.		13.		20.	
7.		14.		21.	

Surveyed By Eugene E. Houseknecht II **Date:** 03-16-2011 **Reviewed By:** **Date:** 3/17/11

ERP GAMMA ANALYSIS SUMMARY

C.O.C. # N/A
P. SULLIVAN 631 897-3202

COUNT DATE: **03/17/2011-A**

LINE #	SAMPLE #	WEIGHT (GRAMS)	SAMPLE DESCRIPTION / LOCATION	RESULTS
1	031711-001	1157	SOUTH VAULT OVERBURDEN - ENG. CAP	^{137}Cs (0.14 pCi/gm) + BACKGROUND
2	031711-002	1308	SOUTH VAULT OVERBURDEN - ENG. CAP	^{137}Cs (0.17 pCi/gm) + BACKGROUND
3	031711-003	1073	NORTH VAULT OVERBURDEN - ENG. CAP	^{137}Cs (0.13 pCi/gm) + BACKGROUND
4	031711-004	1258	NORTH VAULT OVERBURDEN - ENG. CAP	^{137}Cs (0.09 pCi/gm) + BACKGROUND
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				

4 SAMPLES TOTAL

RADIOLOGICAL SURVEY FORM FS-SOP-1000	REASON FOR SURVEY ☐ ROUTINE ☐ SPECIAL ☐ RWP # ☒ WP # 324-19
LOCATION & EQUIPT. South Side Walk Over	DATE: 03-17-11 TIME: 1310

Collimated Survey

Collimated Survey performed for Engineering Cap.

Performed a walk over survey on the North Side of the Below Ground Ducts between the Cut House and the Instrument House after the asphalt was removed and before the work crew removed any soil. 2 background check were performed. One taken on the East end, one on the West end and one in the middle. Background ranged from 2853 to 3805 cpm. Readings during the walk over were from 2750 to 3530 cpm.

INSTRUMENT

Model #	Serial #	CAL DUE
LUD-2221	211780	12-09-2011
N/A	N/A	N/A

LEGEND

○ - SMEAR SURVEY LOCATION △ - AIR SAMPLE LOCATION
☐ - MASSLINN SURVEY LOCATION # - DIRECT FRISK LOCATION
XXXY/ZZZ XXX = contact reading Y = radiation type ZZZ = reading @ 30cm

AIRBORNE ACTIVITY SURVEY

Sample #	Duration	Flow Rate	Field Analysis cpm	Field Analysis μCi/cc	% DAC
N/A					

DOSE RATE (HIGHEST)

CONTACT READING	N/A
GENERAL AREA READING	N/A

MASSLINN SURVEY RESULTS (in dpm)

1.	N/A	5.	N/A
2.		6.	
3.		7.	
4.		8.	

SMEAR SURVEY RESULTS (dpm/100cm²) α, β-γ, ³H

1.	See	8.	Attached	15.	Results
2.	Batch	9.	Number	16.	N/A
3.		10.		17.	
4.		11.		18.	
5.		12.		19.	
6.		13.		20.	
7.		14.		21.	

Surveyed By [signature] Eugene E. Houseknecht II Date: 03-17-2011 Reviewed By: [signature] Date: 3/17/11

RADIOLOGICAL SURVEY FORM FS-SOP-1000	REASON FOR SURVEY: ☐ ROUTINE ☐ SPECIAL ☐ RWP # ☒ WP # 324-19
LOCATION & EQUIPT. Pipe Survey	DATE: 03-17-11 TIME: 1130

Surveyed the Pipe on the South side of Building 701 located just West of the old Duct Services Building. Pipe goes down into the Below Ground Ducts, and is filled with concrete. Performed direct frisk of the cut pipe that was left in the duct, no detectable contamination was found. 2 smears were taken. The pipe that was cut off was placed into an Intermodal for disposal.

INSTRUMENT

Model #	Serial #	CAL DUE
LUD-3	50631	01-04-2012
N/A	N/A	N/A

LEGEND

○ - SMEAR SURVEY LOCATION △ - AIR SAMPLE LOCATION
☐ - MASSLINN SURVEY LOCATION # - DIRECT FRISK LOCATION
XXXY/ZZZ XXX = contact reading Y = radiation type ZZZ = reading @ 30cm

AIRBORNE ACTIVITY SURVEY

Sample #	Duration	Flow Rate	Field Analysis cpm	Field Analysis µCi/cc	% DAC
N/A					

DOSE RATE (HIGHEST)

CONTACT READING	N/A
GENERAL AREA READING	N/A

MASSLINN SURVEY RESULTS (in dpm)

1.	N/A	5.	N/A
2.		6.	
3.		7.	
4.		8.	

SMEAR SURVEY RESULTS (dpm/100cm²) α, β-γ, ³H

1.	See	8.	Attached	15.	Results
2.	Batch	9.	Number	16.	27722
3.		10.		17.	
4.		11.		18.	
5.		12.		19.	
6.		13.		20.	
7.		14.		21.	

Surveyed By: [signature] Eugene E. Houseknecht II Date: 03-17-2011 Reviewed By: [signature] Date: 3/17/11

Activity Report

3/17/11
10:50:45AI

PIPE ON SOUTH SIDE OF BLDG 701

Batch Name: 27,722

Batch ID: 1 Minute Smear Analysis - 201103171046

Group: D

Device: S5 XLB

Selected Geometry: 1/8" Stainless Steel

Acquisition Date: 3/17/11

Acquisition Time: (minutes) 1.0

Operating Voltage: (volts) 1,350.0

Efficiency Factors

Alpha Efficiency: (%) 0.27 ± 0.00

Beta Efficiency: (%) 0.19 ± 0.00

Sample ID	Quantity	Alpha (DPM)	2σ	Alpha MDA (DPM)	Beta Activity (DPM)	2σ	Beta MDA (DPM)
20110317104624-D1	0.00	0.00	0.01	9.99	10.42	14.74	14.10
20110317104924-D2	0.00	-0.01	0.01	9.99	20.84	20.84	14.10

Reviewed by: ______________

Page 2 of 2
T
3-17-11

RADIOLOGICAL SURVEY FORM FS-SOP-1000	REASON FOR SURVEY	
	☐ ROUTINE ☐ SPECIAL	
	☐ RWP # ☒ WP # 324-19	
LOCATION & EQUIPT. Across from building 811	DATE: 3/15/11	TIME: 0945

Overburden soil pile staging area for BGRR engineered cap

Walked over soil and asphalt piles from survey unit #2 for the BGRR engineered cap project.
Soil/Asphalt is from the southernmost part of excavation around cuthouse's and former DSB building pad.

Background reading 6500-7500 cpm (uncollimated).

Readings ranged from 6500-9000 cpm while traversing all piles.

Awaiting composite sample results from GEL for final disposition of accumulated soil.

INSTRUMENT

Model #	Serial #	CAL DUE
L-2221	211784	12/09/11
N/A	N/A	N/A

LEGEND

○ - SMEAR SURVEY LOCATION △ - AIR SAMPLE LOCATION
☐ - MASSLINN SURVEY LOCATION # - DIRECT FRISK LOCATION
XXXY/ZZZ XXX = contact reading Y = radiation type ZZZ = reading @ 30cm

AIRBORNE ACTIVITY SURVEY

Sample #	Duration	Flow Rate	Field Analysis cpm	Field Analysis µCi/cc	% DAC
N/A					

DOSE RATE (HIGHEST)

CONTACT READING	N/A
GENERAL AREA READING	N/A

MASSLINN SURVEY RESULTS (in dpm)

1. N/A	5. N/A
2.	6.
3.	7.
4.	8.

SMEAR SURVEY RESULTS (dpm/100cm²) α, β-γ, ³H

1. See	8. Attached	15. Results
2. Batch	9. Number	16. N/A
3.	10.	17.
4.	11.	18.
5.	12.	19.
6.	13.	20.
7.	14.	21.

Surveyed By Hollander Date: 3/16/11 Reviewed By: Date: 3/16/11

RADIOLOGICAL SURVEY FORM FS-SOP-1000	REASON FOR SURVEY: ☐ ROUTINE ☐ SPECIAL ☐ RWP # ☒ WP # 324-19	
LOCATION & EQUIPT. South East Side Walk Over	DATE: 03-16-11	TIME: 1445

Survey performed for Engineering Cap.

Performed a walk over survey of the dirt removed from under the concrete stairs on the South East Side of Bldg 701. The dirt was surveyed by Building 811 in 2 10 yard piles no more than 2 feet deep. 6 background check were performed. Background range was from 7300 to 7600cpm/min. Readings during the walk over were from 7200 to ~~81000~~ 8100 3-17-11 cpm/min. 4 soil samples were taken.

INSTRUMENT

Model #	Serial #	CAL DUE
LUD-2221	211780	12-09-2011
N/A	N/A	N/A

LEGEND

○ - SMEAR SURVEY LOCATION △ - AIR SAMPLE LOCATION
☐ - MASSLINN SURVEY LOCATION # - DIRECT FRISK LOCATION
XXXY/ZZZ XXX = contact reading Y = radiation type ZZZ = reading @ 30cm

AIRBORNE ACTIVITY SURVEY

Sample #	Duration	Flow Rate	Field Analysis cpm	Field Analysis µCi/cc	% DAC
N/A					

DOSE RATE (HIGHEST)

CONTACT READING	N/A
GENERAL AREA READING	N/A

MASSLINN SURVEY RESULTS (in dpm)

1.	N/A	5.	N/A
2.		6.	
3.		7.	
4.		8.	

SMEAR SURVEY RESULTS (dpm/100cm²) α, β-γ ³H

1.	See	8.	Attached	15.	Results
2.	Batch	9.	Number	16.	N/A
3.		10.		17.	
4.		11.		18.	
5.		12.		19.	
6.		13.		20.	
7.		14.		21.	

Surveyed By [signature] II Eugene E. Houseknecht II Date: 03-16-2011 Reviewed By: [signature] Date: 3/17/11

ERP GAMMA ANALYSIS SUMMARY

C.O.C. # N/A
M. ROBLES 631. 708.6343

COUNT DATE: **03/16/2011-A**

LINE #	SAMPLE #	WEIGHT (GRAMS)	SAMPLE DESCRIPTION / LOCATION	RESULTS
1	031611-001	1498	136' PILE TOP RUBBLE EAST	^{137}Cs (26.0 pCi/gm) 60Co (2.7 pCi/gm) 241Am (4.17 pCi/gm)+ BACKGROUND
2	031611-002	1810	136' PILE TOP RUBBLE EAST	60Co (1.53 pCi/gm) 152Eu (7.96 pCi/gm) + BACKGROUND
3	031611-003	1327	SE SOIL UNDER STAIRS BGRR	^{137}Cs (0.13 pCi/gm) + BACKGROUND
4	030611-004	1153	SE SOIL UNDER STAIRS BGRR	^{137}Cs (0.05 pCi/gm) + BACKGROUND
5	031611-005	1202	SE SOIL UNDER STAIRS BGRR	^{137}Cs (0.07 pCi/gm) + BACKGROUND
6	031611-006	1001	SE SOIL UNDER STAIRS BGRR	^{137}Cs (0.13 pCi/gm) + BACKGROUND
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				

6 SAMPLE TOTAL

RADIOLOGICAL SURVEY FORM FS-SOP-1000	REASON FOR SURVEY: ☐ ROUTINE ☐ SPECIAL ☐ RWP # ☒ WP # 324-19
LOCATION & EQUIPT. South Side Walk Over	DATE: 03-14-11 TIME: 1215

Collimated Survey

Collimated Survey performed for Engineering Cap.

Performed a walk over survey on the South Side of Bldg 701 after the asphalt was removed and before the work crew removed any soil.

2 background check were performed. One taken on the North end of the was 3015 cpm/min and the one taken on the South end was 2735 cpm/min.. Readings during the walk over were from 2300 to 3400 cpm/min.

INSTRUMENT

Model #	Serial #	CAL DUE
LUD-2221	211780	12-09-2011
N/A	N/A	N/A

LEGEND

○ - SMEAR SURVEY LOCATION △ - AIR SAMPLE LOCATION
☐ - MASSLINN SURVEY LOCATION # - DIRECT FRISK LOCATION
XXXY/ZZZ XXX = contact reading Y = radiation type ZZZ = reading @ 30cm

AIRBORNE ACTIVITY SURVEY

Sample #	Duration	Flow Rate	Field Analysis cpm	Field Analysis µCi/cc	% DAC
N/A					

DOSE RATE (HIGHEST)

CONTACT READING	N/A
GENERAL AREA READING	N/A

MASSLINN SURVEY RESULTS (in dpm)

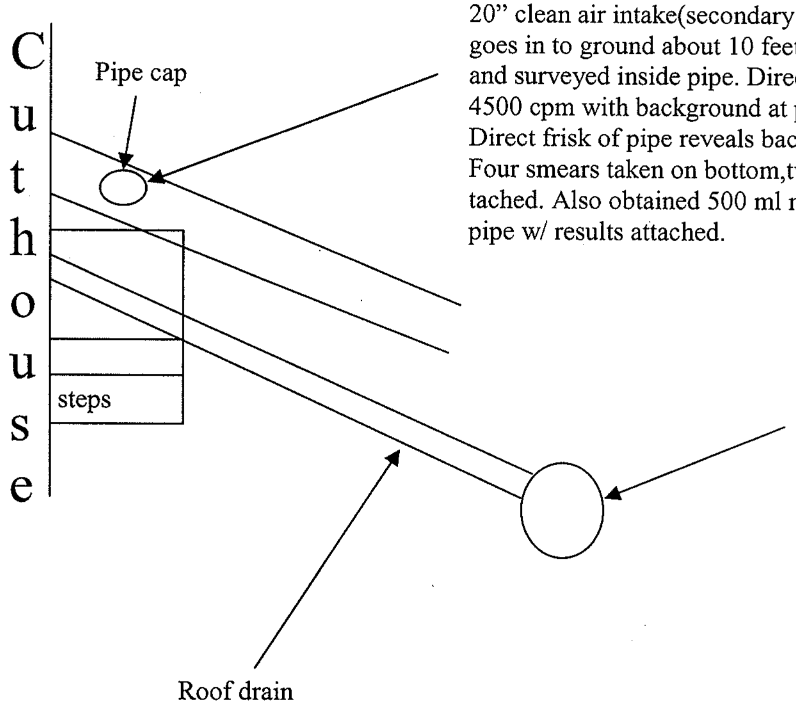
1.	N/A	5.	N/A
2.		6.	
3.		7.	
4.		8.	

SMEAR SURVEY RESULTS ($dpm/100cm^2$) α, β-γ ^3H

1.	See	8.	Attached	15.	Results
2.	Batch	9.	Number	16.	N/A
3.		10.		17.	
4.		11.		18.	
5.		12.		19.	
6.		13.		20.	
7.		14.		21.	

Surveyed By [signature] Eugene E. Houseknecht II Date: 03-14-2011 Reviewed By: [signature] Date: 3/15/11

RADIOLOGICAL SURVEY FORM FS-SOP-1000	REASON FOR SURVEY ☐ ROUTINE ☐ SPECIAL ☐ RWP # ☒ WP # 324-31
LOCATION & EQUIPT. Bldg. 701 cuthouse area	DATE: 3/10/11 TIME: 14:00
South area for bgrr engineered cap	



20" clean air intake(secondary air). Pipe comes out of cuthouse wall and goes in to ground about 10 feet south of cuthouse. Removed pipe cap and surveyed inside pipe. Direct scan inside pipe with NAI 2x2 reads 4500 cpm with background at plane of pipe opening reading 9,000 cpm. Direct frisk of pipe reveals background levels at 80 cpm w/ LUD-3. Four smears taken on bottom,two sides and pipe opening w/ results attached. Also obtained 500 ml marinelli of rust/debris from bottom of pipe w/ results attached.

Drywell sump approx. two feet deep for roof drain and also houses instrument lines. Direct frisk of all lines and walls is at bkgd. levels of 80 cpm. NAI 2x2 scan inside bottom of drywell reads 5000 cpm with bkgd. at opening of drywell at 8500 cpm. One masslin wipe taken on walls and lines.

INSTRUMENT

Model #	Serial #	CAL DUE
Tennelec	67705	4/23/11
L-2221	211784	12/9/11
Lud-3	50631	1/4/12
N/A		

LEGEND

○ - SMEAR SURVEY LOCATION △ - AIR SAMPLE LOCATION

☐ - MASSLINN SURVEY LOCATION # - DIRECT FRISK LOCATION

XXXY/ZZZ XXX = contact reading Y = radiation type ZZZ = reading @ 30cm

AIRBORNE ACTIVITY SURVEY

Sample #	Duration	Flow Rate	Field Analysis cpm	Field Analysis µCi/cc	% DAC
N/A					

DOSE RATE (HIGHEST)

CONTACT READING	N/A
GENERAL AREA READING	N/A

MASSLINN SURVEY RESULTS (in dpm)

1.	<1k/las	5.	N/A
2.		6.	
3.		7.	
4.		8.	

SMEAR SURVEY RESULTS (dpm/100cm²) (α) (β-γ) ³H

1.	See	8.	Attached	15.	Results
2.	Batch	9.	Number	16.	27,648
3.		10.		17.	
4.		11.		18.	
5.		12.		19.	
6.		13.		20.	
7.		14.		21.	

Surveyed By Hollander [signature] Date: 3/10/11 Reviewed By: [signature] Date: 3-17-11

FS-SOP-1000
Attachment 9.2

Activity Report

20" CLEAN AIR INTAKE AT CUTHOUSE

Batch Name: 27,648

Batch ID: 1 Minute Smear Analysis - 201103101420

Group: D

Device: S5 XLB

Selected Geometry: 1/8" Stainless Steel

Acquisition Date: 3/10/11

Acquisition Time: (minutes) 1.0

Operating Voltage: (volts) 1,350.0

Efficiency Factors

Alpha Efficiency: (%) 0.27 ± 0.00

Beta Efficiency: (%) 0.19 ± 0.00

Sample ID	Quantity	Alpha (DPM)	2σ	Alpha MDA (DPM)	Beta Activity (DPM)	2σ	Beta MDA (DPM)
20110310142032-D1	0.00	-0.01	0.01	9.99	15.63	18.05	14.10
20110310142332-D2	0.00	3.68	7.39	9.99	20.70	20.85	14.10
20110310142453-D3	0.00	3.68	7.39	9.99	41.54	29.48	14.10
20110310142613-D4	0.00	-0.01	0.01	9.99	36.48	27.58	14.10

Reviewed by: [signature]

ERP GAMMA ANALYSIS SUMMARY

C.O.C. # N/A
P. SULLIVAN 631 897-3202

COUNT DATE: **03/10/2011-B**

LINE #	SAMPLE #	WEIGHT (GRAMS)	SAMPLE DESCRIPTION / LOCATION	RESULTS
1	031011-013	751	20" AIR LINE - SOUTH CUTHOUSE	^{137}Cs (0.93 pCi/gm) + BACKGROUND
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
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21				
22				
23				
24				
25				

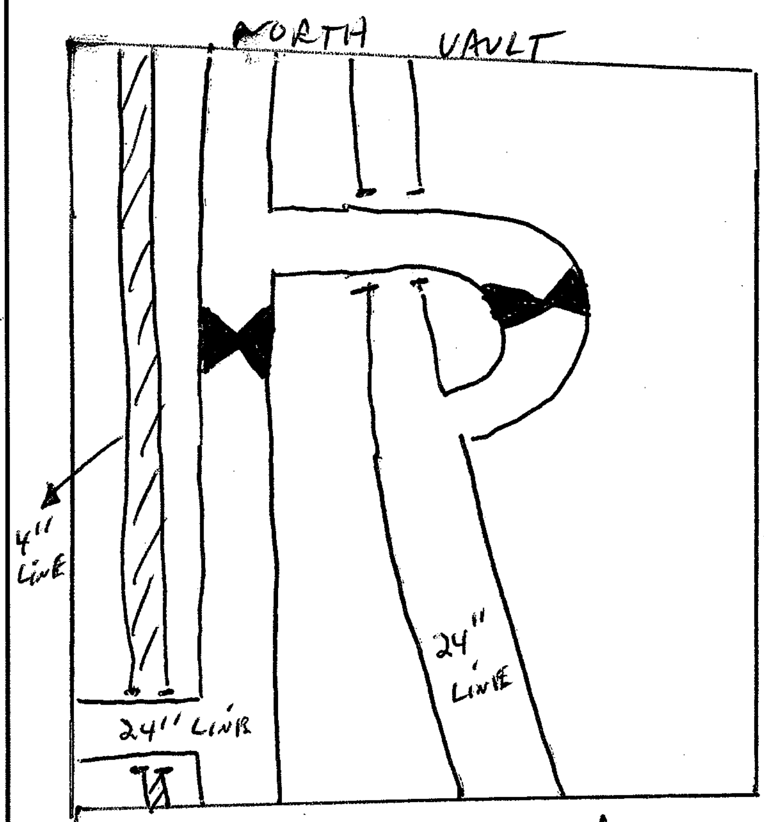
1 SAMPLE TOTAL

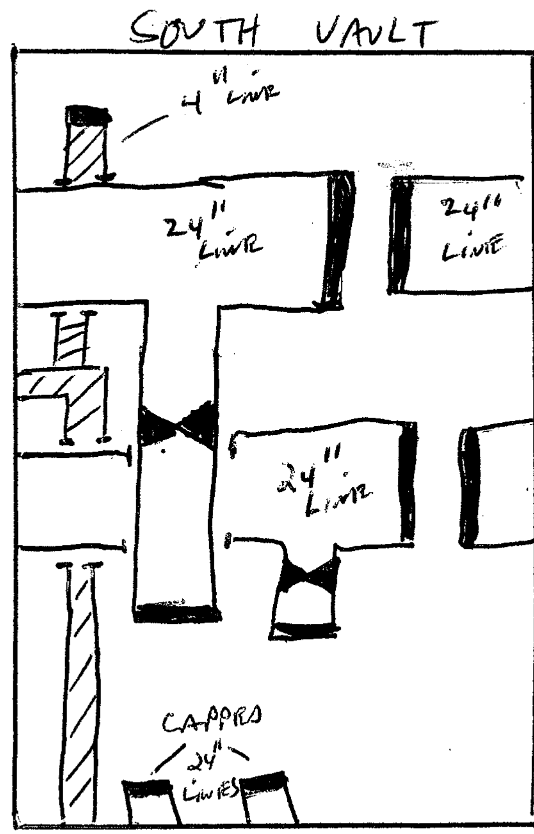
RADIOLOGICAL SURVEY FORM FS-SOP-1000	REASON FOR SURVEY		INSTRUMENT		
	☐ ROUTINE	☐ SPECIAL	Model #	Serial #	CAL DUE
	☐ RWP #	☒ WP # 324-19	Tennelec	67705	4/23/11
LOCATION & EQUIPT. Cooling vaults 'S' of bldg. 701	DATE: 3/8/11	TIME: 15:20	L-2221	211784	12/9/11
Initial entry to two cooling vaults north of doghouses on south side of bldg. 701			Lud-3	50631	1/4/12
			N/A	→	→

Scanned floors/walls and piping in both vaults and all levels at bkgd. reading's (bkgd. at 4500-6000 cpm uncollimated).
Random direct frisk's taken on 20 % of floor/walls and piping and all reading's were at bkgd. levels(80-100 cpm).

Ten smear's obtained on wall's and piping in each vault.

Two marinelli's obtained in each vault off floor for gamma analysis. Results attached . First count was initial with samples wet and second count was final with samples dried out.





LEGEND

○ - SMEAR SURVEY LOCATION △ - AIR SAMPLE LOCATION
☐ - MASSLINN SURVEY LOCATION # - DIRECT FRISK LOCATION
XXXY/ZZZ XXX = contact reading Y = radiation type ZZZ = reading @ 30cm

AIRBORNE ACTIVITY SURVEY

Sample #	Duration	Flow Rate	Field Analysis cpm	Field Analysis µCi/cc	% DAC
N/A	→	→	→	→	→

DOSE RATE (HIGHEST)

CONTACT READING	N/A
GENERAL AREA READING	N/A

MASSLINN SURVEY RESULTS (in dpm)

1. N/A	5. N/A
2.	6.
3.	7.
4.	8.

SMEAR SURVEY RESULTS (dpm/100cm²) (α, β-γ) ³H

1. See	8. Attached	15. Results
2. Batch	9. Number	16. 27631
3.	10.	17.
4.	11.	18.
5.	12.	19.
6.	13.	20.
7.	14.	21.

Surveyed By Hollander [signature] Date: 3/9/11 Reviewed By: [signature] Date: 3/9/11

Activity Report

N AND S COOLING VAULTS SOUTH OF 701

Batch Name:	27,631	**Acquisition Date:**	3/8/11
Batch ID:	1 Minute Smear Analysis - 201103081513	**Acquisition Time: (minutes)**	1.0
Group:	D		
Device:	S5 XLB	**Operating Voltage: (volts)**	1,350.0
Selected Geometry:	1/8" Stainless Steel		

Efficiency Factors

Alpha Efficiency: (%)	0.27	±	0.00	**Beta Efficiency: (%)**	0.19	±	0.00

Sample ID	Quantity	Alpha (DPM)	2σ	Alpha MDA (DPM)	Beta Activity (DPM)	2σ	Beta MDA (DPM)
20110308151411-D1	0.00	-0.01	0.01	9.99	31.27	25.53	14.10
20110308151712-D2	0.00	-0.01	0.01	9.99	36.48	27.58	14.10
20110308151832-D3	0.00	-0.01	0.01	9.99	20.84	20.84	14.10
20110308151952-D4	0.00	-0.01	0.01	9.99	31.27	25.53	14.10
20110308152102-D5	0.00	-0.01	0.01	9.99	26.05	23.31	14.10
20110308152222-D6	0.00	0.00	0.01	9.99	10.42	14.74	14.10
20110308152342-D7	0.00	3.69	7.39	9.99	10.28	14.74	14.10
20110308152452-D8	0.00	-0.01	0.01	9.99	15.63	18.05	14.10
20110308152612-D9	0.00	0.00	0.00	9.99	5.21	10.42	14.10
20110308152722-D10	0.00	-0.01	0.01	9.99	20.84	20.84	14.10
20110308152842-D11	0.00	0.00	0.00	9.99	5.21	10.42	14.10
20110308153002-D12	0.00	-0.01	0.01	9.99	26.05	23.31	14.10
20110308153112-D13	0.00	0.00	0.00	9.99	5.21	10.42	14.10
20110308153232-D14	0.00	-0.01	0.01	9.99	20.84	20.84	14.10
20110308153353-D15	0.00	-0.01	0.01	9.99	15.63	18.05	14.10
20110308153503-D16	0.00	3.69	7.39	9.99	10.28	14.74	14.10
20110308153623-D17	0.00	-0.01	0.01	9.99	20.84	20.84	14.10
20110308153743-D18	0.00	-0.01	0.01	9.99	15.63	18.05	14.10
20110308153853-D19	0.00	-0.01	0.01	9.99	15.63	18.05	14.10
20110308154013-D20	0.00	-0.01	0.01	9.99	15.63	18.05	14.10

Reviewed by:

ERP GAMMA ANALYSIS SUMMARY

C.O.C. # N/A
P. SULLIVAN 631 897-3202

COUNT DATE: 03/09/2011-A

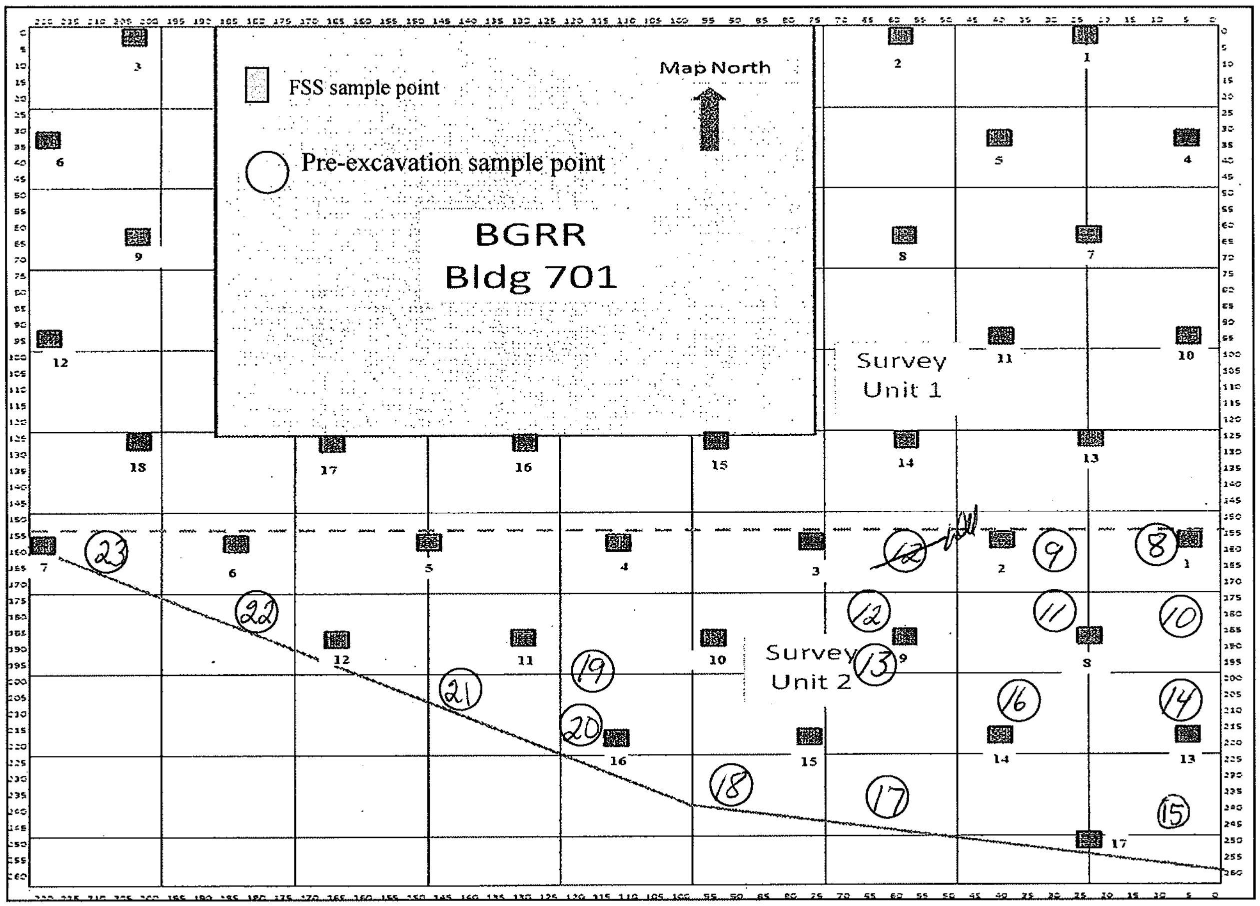
LINE #	SAMPLE #	WEIGHT (GRAMS)	SAMPLE DESCRIPTION / LOCATION	RESULTS
1	030811-001	1015	NORTH VAULT - 001	^{137}Cs (0.29 pCi/gm) + BACKGROUND
2	030811-002	1315	NORTH VAULT - 002	^{137}Cs (0.27 pCi/gm) + BACKGROUND
3	030811-003	1104	SOUTH VAULT - 001	^{137}Cs (0.90 pCi/gm) + BACKGROUND
4	030811-004	967	SOUTH VAULT - 002	^{137}Cs (2.54 pCi/gm) + BACKGROUND
5				
6			**SAME SAMPLES AFTER DRYING**	
7	030911-001	901	NORTH VAULT - 001 DRY	^{137}Cs (0.27 pCi/gm) + BACKGROUND
8	030911-002	912	NORTH VAULT - 002 DRY	^{137}Cs (0.41 pCi/gm) + BACKGROUND
9	030911-003	1042	SOUTH VAULT - 001 DRY	^{137}Cs (1.03 pCi/gm) + BACKGROUND
10	030911-004	983	SOUTH VAULT - 002 DRY	^{137}Cs (2.69 pCi/gm) + BACKGROUND
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				

4 SAMPLES TOTAL

RADIOLOGICAL SURVEY FORM FS-SOP-1000	REASON FOR SURVEY ☐ ROUTINE ☐ SPECIAL ☐ RWP # ☒ WP # 324-19	INSTRUMENT		
LOCATION & EQUIPT. Building 701	DATE: 03/04/11 TIME: 15:00	Model #	Serial #	CAL DUE
Pre-excavation samples of dirt prior to engineering cap installation		L-2221	211784	12/9/11
		Lud-3	50534	11/4/11
		N/A	→	→
		N/A	→	→

Performed dirt sampling in survey unit #2 in preparation for start of engineering cap work.

L-2221 readings at sample points were all at bkgd. levels (2800-6000 cpm collimated)
All sampling tool's masslin wiped at end of day with no activity detected.
All HPGE results are at bkgd. levels….samples to be composited and sent to GEL for further analysis.



LEGEND

○ - SMEAR SURVEY LOCATION
△ - AIR SAMPLE LOCATION
☐ - MASSLINN SURVEY LOCATION
- DIRECT FRISK LOCATION
XXXY/ZZZ XXX = contact reading Y = radiation type ZZZ = reading @ 30cm

AIRBORNE ACTIVITY SURVEY

Sample #	Duration	Flow Rate	Field Analysis cpm	Field Analysis µCi/cc	% DAC
N/A	→	→	→	→	→

DOSE RATE (HIGHEST)

CONTACT READING	N/A
GENERAL AREA READING	N/A

MASSLINN SURVEY RESULTS (in dpm)

1.	<1k	5.	<1k
2.	↓	6.	↓
3.	↓	7.	↓
4.	↓	8.	↓

SMEAR SURVEY RESULTS (dpm/100cm²) α, β-γ, ^3H

1.	See	8.	Attached	15.	Results
2.	Batch	9.	Number	16.	N/A
3.	↓	10.	↓	17.	↓
4.		11.		18.	
5.		12.		19.	
6.		13.		20.	
7.		14.		21.	

Surveyed By Hollander/Dove Date: 3/04/11 Reviewed By: [signature] Date: 3-7-11

FS-SOP-1000
Attachment 9.2

Page 1 of ~~2~~ 3

RADIOLOGICAL SURVEY FORM
FS-SOP-1000

REASON FOR SURVEY

☐ ROUTINE		☐ SPECIAL	
☐ RWP #		☒ WP #	324-19

LOCATION & EQUIPT. Building 701

DATE: 03/04/11 **TIME:** 15:00

Pre-excavation samples of dirt prior to engineering cap installation

INSTRUMENT

Model #	Serial #	CAL DUE
L-2221	211784	12/9/11
Lud-3	50534	11/4/11
N/A	→	→
N/A	→	→

LEGEND

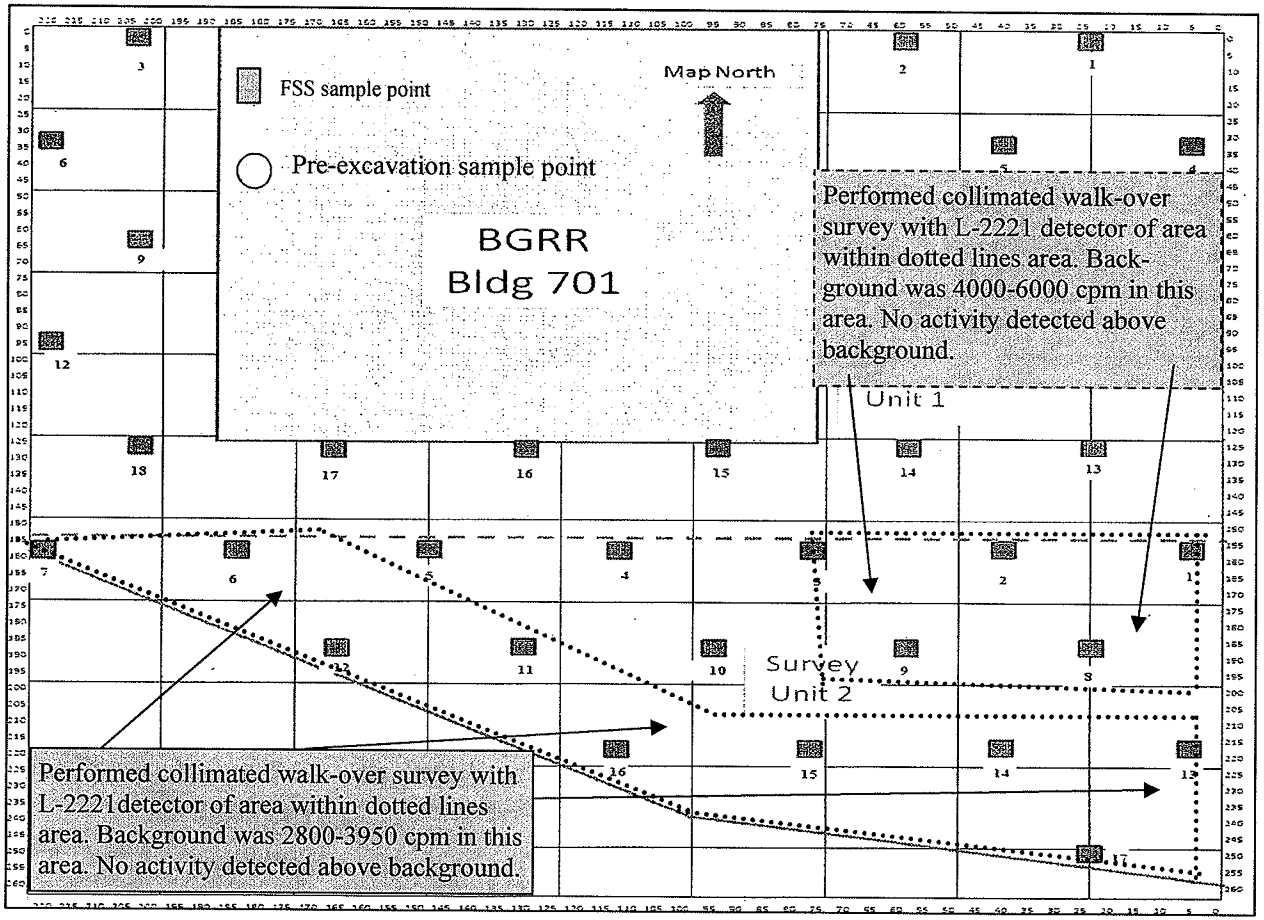
○ - SMEAR SURVEY LOCATION △ - AIR SAMPLE LOCATION

☐ - MASSLINN SURVEY LOCATION # - DIRECT FRISK LOCATION

XXXY / ZZZ XXX = contact reading Y = radiation type ZZZ = reading @ 30cm

Performed dirt sampling in survey unit #2 in preparation for start of engineering cap work.

All sampling tool's masslinn wiped at end of day with no activity detected.
All HPGE results are at bkgd. levels….samples to be composited and sent to GEL for further analysis.



AIRBORNE ACTIVITY SURVEY

Sample #	Duration	Flow Rate	Field Analysis cpm	Field Analysis µCi/cc	% DAC
N/A	→	→	→	→	→

DOSE RATE (HIGHEST)

CONTACT READING	N/A
GENERAL AREA READING	N/A

MASSLINN SURVEY RESULTS (in dpm)

1.	<1k	5.	<1k
2.	↓	6.	↓
3.	↓	7.	↓
4.	↓	8.	↓

SMEAR SURVEY RESULTS (dpm/100cm²) α, β-γ, ³H

1.	See	8.	Attached	15.	Results
2.	Batch	9.	Number	16.	N/A
3.	↓	10.	↓	17.	↓
4.		11.		18.	
5.		12.		19.	
6.		13.		20.	
7.		14.		21.	

Surveyed By Hollander/Dove [signature] **Date:** 3/04/11 **Reviewed By:** [signature] **Date:** 3-7-11

ERP GAMMA ANALYSIS SUMMARY

C.O.C. # N/A
M. ROBLES 631 708-6343

COUNT DATE: **03/04/2011-A**

LINE #	SAMPLE #	WEIGHT (GRAMS)	SAMPLE DESCRIPTION / LOCATION	RESULTS
1	030411-001	990	ENG. CAP SU2 - 008	BACKGROUND
2	030411-002	996	ENG. CAP SU2 - 009	BACKGROUND
3	030411-003	1063	ENG. CAP SU2 - 010	BACKGROUND
4	030411-004	960	ENG. CAP SU2 - 011	BACKGROUND
5	030411-005	1133	ENG. CAP SU2 - 012	BACKGROUND
6	030411-006	1198	ENG. CAP SU2 - 013	BACKGROUND
7	030411-007	955	ENG. CAP SU2 - 014	^{137}Cs (0.13 pCi/gm) + BACKGROUND
8	030411-008	969	ENG. CAP SU2 - 015	BACKGROUND
9	030411-009	914	ENG. CAP SU2 - 016	^{137}Cs (0.43 pCi/gm) + BACKGROUND
10	030411-010	947	ENG. CAP SU2 - 017	BACKGROUND
11	030411-011	936	ENG. CAP SU2 - 018	^{137}Cs (0.52 pCi/gm) + BACKGROUND
12	030411-012	969	ENG. CAP SU2 - 019	BACKGROUND
13	030411-013	929	ENG. CAP SU2 - 020	^{137}Cs (0.93 pCi/gm) + BACKGROUND
14	030411-014	1112	ENG. CAP SU2 - 021	BACKGROUND
15	030411-015	1249	ENG. CAP SU2 - 022	BACKGROUND
16	030411-016	817	ENG. CAP SU2 - 023	^{137}Cs (0.09 pCi/gm) + BACKGROUND
17				
18				
19				
20				
21				
22				
23				
24				
25				

16 SAMPLES TOTAL

Dove [signature]

Page 1 of 1

BROOKHAVEN NATIONAL LABORATORY

P.O. # ____

Chain of Custody No. 31308

Requires EDD ☒

SAMPLING CHAIN OF CUSTODY

Analysis Requested By		Sampling Contractor		Analytical Laboratory	
Name:	Mike Holland[illegible]	Name:	Ray Aque	Name:	GEL
Life No: N6455	Ext. 4839	Contact:	ERP RCT	Address:	2040 Savage Rd.
Acct. No: 65280/65283	Dept:	Phone:	x5252	City: Charleston St: SC	Zip: 29407
Email Reports To:		Email/Fax:		Contact:	Heather Shaffer
1	hollander@bnl.gov	Sampler:	Same	Phone:	
2	pizzulli@bnl.gov			Email/Fax:	
Project Name:		Project Manager:		Field Engineer:	
BGRR Exc'd Cap		M. Pizzulli		M. Hollander	

Comments:

Type: UiD	Smp	Coll	Sample Information: Site ID/Bldg/Life #	Depth/RWP	Date	Time	Matrix	Additional Sample Information: Name/Description	Cont. Vol./Units	Cont. Type	# of Cont	Preservative	Alpha/Beta	Tritium	Gamma	Strontium-90	524.2	624	Nuclide-specific Alpha Am-241, Pu-238/239, U-235/238	PCBs	Metals Hg, Pb, Cu, Zn	[illegible]	
001	E	C	Bldg 701/N1455	2'	3/4/11	0920	S	BGRR Exc'd Cap SU2 (Samples 8-11)	500 ml	P	1	None		✓	✓	✓			✓		✓	✓	
002	↓	↓	↓	2'	↓	1020	S	↓ (↓ 12-15)	↓	↓	↓	↓		✓	✓	✓			✓		✓	✓	
003	↓	↓	↓	2'	↓	1119	S	↓ (↓ 16-19)	↓	↓	↓	↓		✓	✓	✓			✓		✓	✓	
004	↓	↓	↓	2'	↓	1352	S	↓ (↓ 20-23)	↓	↓	↓	↓		✓	✓	✓			✓		✓	✓	

1 Relinquished By/Date/Time	2 Relinquished By/Date/Time	3 Relinquished By/Date/Time
Print [illegible] 3/4/11 0815	Print	Print
Signature [illegible]	Signature	Signature
1 Received By/Date/Time	**2 Received By/Date/Time**	**3 Received By/Date/Time**
Print K. M[illegible] 3/4/11	Print	Print
Signature [illegible] [illegible]	Signature	Signature

Contractor Lab Sample Disposal:
☐ Return To Client ☒ Disposal by Lab
☐ Archive For ____ Months

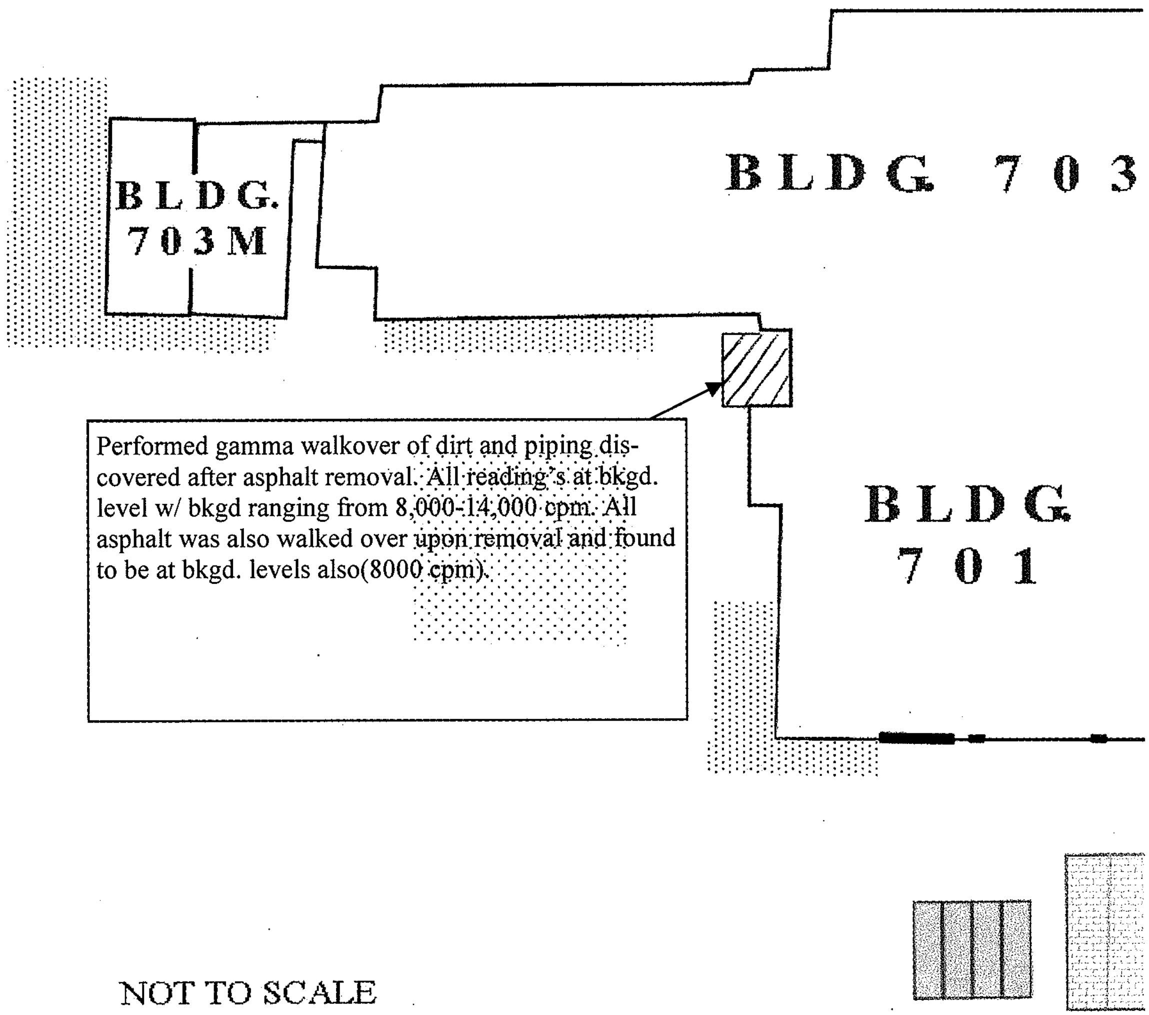
Data Package: ☐ Full ☒ Summary

Turn-Around Time Required:
☐ Rush (1 Day) ☐ 14 Days ☐ 30 Days
☒ 7 Days ☐ Other ( )

Distribution WHITE (1) - Stays with Sample; PINK (2) - Lab or Other GREEN (3) - Returned to Client with Report GOLDENROD (4) - Field Copy - (Sampler)

RADIOLOGICAL SURVEY FORM FS-SOP-1000	REASON FOR SURVEY ☐ ROUTINE ☐ SPECIAL ☐ RWP# ■ WP# 324-19		
LOCATION / EQUIPMENT: BLDG. 701 / 703 EXTERIOR AREAS	DATE: 2/23/11	TIME: 11:00	

Gamma walkover survey for first phase of west concrete pad installation



INSTRUMENT

Model #	Serial #	CAL DUE
LUD-2221	211784	12/9/11
N/A →		
N/A →		
N/A →		

LEGEND

○ - SMEAR SURVEY LOCATION
△ - AIR SAMPLE LOCATION
☐ - MASSLINN SURVEY LOCATION
- DIRECT FRISK LOCATION
XXXY / ZZZ XXX = contact reading Y = radiation type ZZZ = reading @ 30cm

AIRBORNE ACTIVITY SURVEY

Sample #	Duration	Flow Rate	Field Analysis cpm	Field Analysis µCi/cc	% DAC
N/A →					

DOSE RATE (HIGHEST)

CONTACT READING	N/A
GENERAL AREA READING	N/A

MASSLINN SURVEY RESULTS (in dpm)

1.	N/A	5.	N/A
2.	↓	6.	↓
3.	↓	7.	↓
4.	↓	8.	↓

SMEAR SURVEY RESULTS (dpm/100cm^2) α, β-γ, ^{3}H

1.	N/A	8.	N/A	15.	N/A
2.	↓	9.	↓	16.	↓
3.	↓	10.	↓	17.	↓
4.	↓	11.	↓	18.	↓
5.	↓	12.	↓	19.	↓
6.	↓	13.	↓	20.	↓
7.	↓	14.	↓	21.	↓

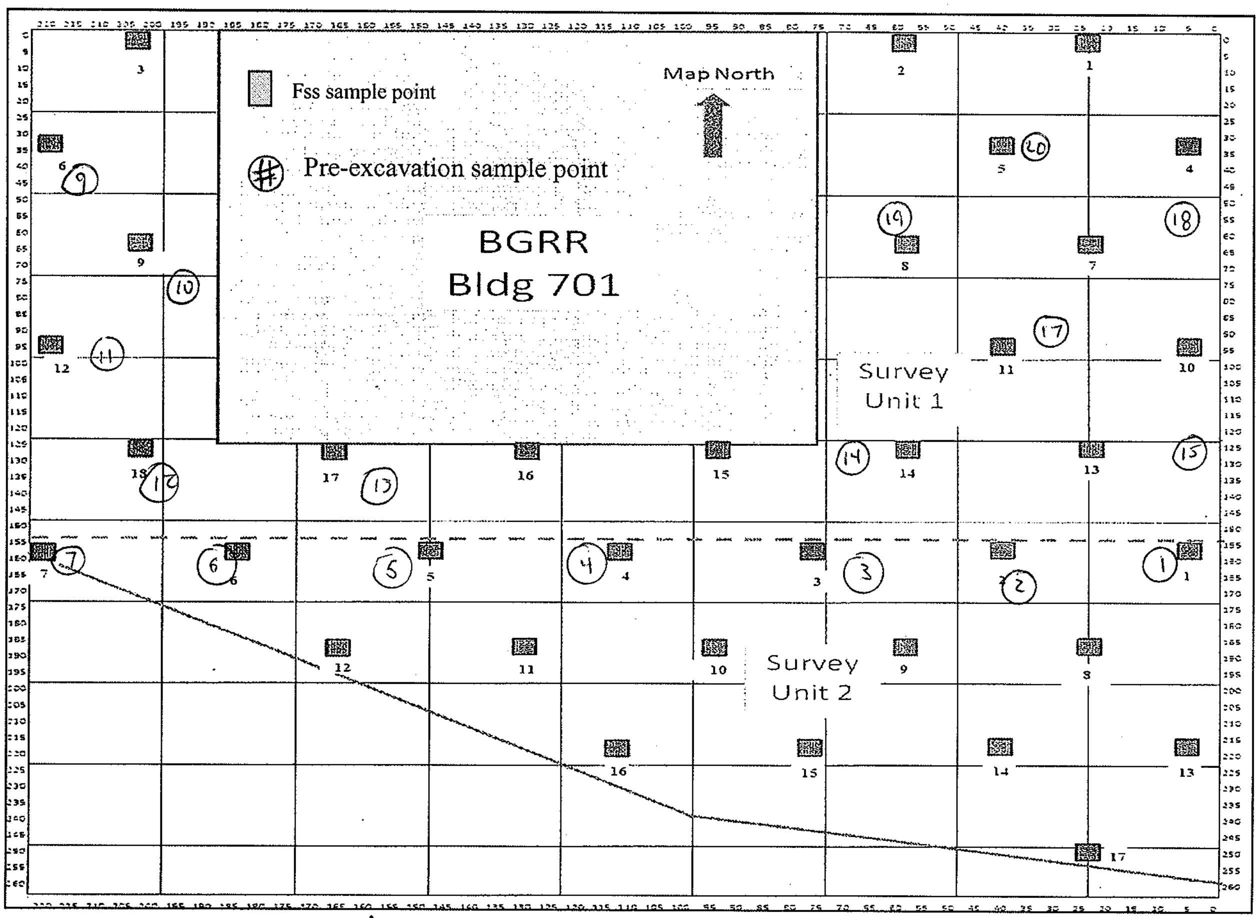
Surveyed By: Hollander [signature] Date: 2/23/11 Reviewed By: [signature] Date: 2-26-11

RADIOLOGICAL SURVEY FORM FS-SOP-1000	REASON FOR SURVEY	
	☐ ROUTINE	☐ SPECIAL
	☐ RWP #	☒ WP # 324-19
LOCATION & EQUIPT. Building 701	DATE: 2/23-2/24/11	TIME: 14:30

Pre-excavation samples of dirt and asphalt prior to engineering cap installation

Performed asphalt and dirt sampling in survey unit #1 and #2 in preparation for start of engineering cap work.

L-2221 readings at sample points were all at bkgd. levels (7,000-11,000 cpm uncollimated)
All sampling tool's masslin wiped at end of day with no activity detected.
All HPGE results are at bkgd. levels….samples to be composited and sent to GEL for further analysis.



INSTRUMENT

Model #	Serial #	CAL DUE
L-2221	211784	12/9/11
Lud-3	50534	11/4/11
N/A	→	→
N/A	→	→

LEGEND

○ - SMEAR SURVEY LOCATION △ - AIR SAMPLE LOCATION
☐ - MASSLINN SURVEY LOCATION # - DIRECT FRISK LOCATION
XXXY/ZZZ XXX = contact reading Y = radiation type ZZZ = reading @ 30cm

AIRBORNE ACTIVITY SURVEY

Sample #	Duration	Flow Rate	Field Analysis cpm	Field Analysis µCi/cc	% DAC
N/A	→	→	→	→	→

DOSE RATE (HIGHEST)

CONTACT READING	N/A
GENERAL AREA READING	N/A

MASSLINN SURVEY RESULTS (in dpm)

1.	<1k	5.	<1k
2.	↓	6.	↓
3.	↓	7.	↓
4.	↓	8.	↓

SMEAR SURVEY RESULTS (dpm/100cm²) α, β-γ, ³H

1.	See	8.	Attached	15.	Results
2.	Batch	9.	Number	16.	N/A
3.	↓	10.	↓	17.	↓
4.	↓	11.	↓	18.	↓
5.	↓	12.	↓	19.	↓
6.	↓	13.	↓	20.	↓
7.	↓	14.	↓	21.	↓

Surveyed By Hollander [signature] Date: 2/26/11 Reviewed By: [signature] Date: 2-26-11

ERP GAMMA ANALYSIS SUMMARY

C.O.C. # N/A
P. SULLIVAN 631 897-3202

COUNT DATE: **02/24/2011-B**

LINE #	SAMPLE #	WEIGHT (GRAMS)	SAMPLE DESCRIPTION / LOCATION	RESULTS
1	022411-003	737	ENG. CAP SU2 **1A**	BACKGROUND
2	022411-004	1084	ENG. CAP SU2 **1B**	BACKGROUND
3	022411-005	830	ENG. CAP SU2 2**A**	BACKGROUND
4	022411-006	1180	ENG. CAP SU2 **2B**	BACKGROUND
5	022411-007	772	ENG. CAP SU2 3**A**	BACKGROUND
6	022411-008	1106	ENG. CAP SU2 **3B**	BACKGROUND
7	022411-009	748	ENG. CAP SU2 4**A**	BACKGROUND
8	022411-010	1049	ENG. CAP SU2 **4B**	^{137}Cs (0.37 pCi/gm) + BACKGROUND
9	022411-011	1002	ENG. CAP SU2 5**A**	BACKGROUND
10	022411-012	1093	ENG. CAP SU2 **5B**	BACKGROUND
11	022411-013	866	ENG. CAP SU2 6**A**	BACKGROUND
12	022411-014	1154	ENG. CAP SU2 **6B**	BACKGROUND
13	022411-015	842	ENG. CAP SU2 7**A**	BACKGROUND
14	022411-016	1122	ENG. CAP SU2 **7B**	BACKGROUND
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				

14 SAMPLES TOTAL

2/24/2011

ERP GAMMA ANALYSIS SUMMARY

C.O.C. # N/A
P. SULLIVAN 631 897-3202

COUNT DATE: **02/23/2011-A**

LINE #	SAMPLE #	WEIGHT (GRAMS)	SAMPLE DESCRIPTION / LOCATION	RESULTS
1	022311-001	1108	ENGINEERED CAP SU-1 - **14A**	BACKGROUND
2	022311-002	1196	ENGINEERED CAP SU-1 - **14B**	^{137}Cs (0.08 pCi/gm)
3	022311-003	870	ENGINEERED CAP SU-1 - **15A**	BACKGROUND
4	022311-004	1041	ENGINEERED CAP SU-1 - **15B**	BACKGROUND
5	022311-005	852	ENGINEERED CAP SU-1 - **16A**	BACKGROUND
6	022311-006	1213	ENGINEERED CAP SU-1 - **16B**	^{137}Cs (0.25 pCi/gm)
7	022311-007	820	ENGINEERED CAP SU-1 - **17A**	BACKGROUND
8	022311-008	1248	ENGINEERED CAP SU-1 - **17B**	BACKGROUND
9	022311-009	912	ENGINEERED CAP SU-1 - **18A**	BACKGROUND
10	022311-010	1179	ENGINEERED CAP SU-1 - **18B**	BACKGROUND
11	022311-011	805	ENGINEERED CAP SU-1 - **19A**	BACKGROUND
12	022311-012	1195	ENGINEERED CAP SU-1 - **19B**	BACKGROUND
13	022311-013	941	ENGINEERED CAP SU-1 - **20A**	BACKGROUND
14	022311-014	1247	ENGINEERED CAP SU-1 - **20B**	BACKGROUND
15	022311-015	922	ENGINEERED CAP SU-1 - **9A**	BACKGROUND
16	022311-016	1026	ENGINEERED CAP SU-1 - **9B**	BACKGROUND
17	022311-017	749	ENGINEERED CAP SU-1 - **10A**	BACKGROUND
18	022311-018	1187	ENGINEERED CAP SU-1 - **10B**	BACKGROUND
19	022311-019	980	ENGINEERED CAP SU-1 - **11A**	BACKGROUND
20	022311-020	1025	ENGINEERED CAP SU-1 - **11B**	BACKGROUND
21	022311-021	828	ENGINEERED CAP SU-1 - **12A**	BACKGROUND
22	022311-022	940	ENGINEERED CAP SU-1 - **12B**	BACKGROUND
23	022311-023	618	ENGINEERED CAP SU-1 - **13A**	BACKGROUND
24	022311-024	1115	ENGINEERED CAP SU-1 - **13B**	BACKGROUND
25				

M. Ka[illegible] 2/23/2011

24 SAMPLES TOTAL

Page 1 of 1

BROOKHAVEN NATIONAL LABORATORY

SAMPLING CHAIN OF CUSTODY

P.O. #

Chain of Custody No. **31217**

Requires EDD ☒

Analysis Requested By	Sampling Contractor	Analytical Laboratory
Name: MIKE HOLLANDER	Name: P. W. GROSSER	Name: GEL
Life No: N6455 Ext. 4839	Contact:	Address: 2040 SAVAGE Rd.
Acct. No: 65240/65343 Dept: EP	Phone:	City: CHARLESTON St: S.C. Zip: 29407
Email Reports To:	Email/Fax:	Contact: HEATHER SHAFFER
1 hollander@bnl.gov	Sampler: NICK JOHNSON	Phone:
2 Pizzulli@bnl.gov		Email/Fax:
Project Name:	**Project Manager:**	**Field Engineer:**
BGRR Engineered CAP	Michelle Pizzulli	MIKE HOLLANDER

Comments:

UiD	Smp	Coll	Site ID/Bldg/Life #	Depth/RWP	Date	Time	Matrix	Name/Description	Cont. Vol/Units	Cont. Type	# of Cont	Preservative	Alpha/Beta	Tritium	Gamma	Strontium-90	524.2	624 Am-241 Cm-244	Nuclide-specific Alpha U-235,238 (Pu-239/240)	PCBs	Metals Hg, Pb, Fe, Cu, Ni, Zn	C-14, Ni-63	
001	E	C	Bnl/701/N6455	0-0.5	2/23/11	1330	R	BGRR Eng'd CAP Sul (Samples 9A-12A)	500ml	P	1	NONE		✓	✓	✓			X		✓	X	
002		C		2		1340	S	(Samples 9B-12B)			1			✓	✓	✓			X		✓	X	
003		C		0-0.5		0945	R	(Samples 13A-16A)			1			✓	✓	✓			X		✓	X	
004		C		2		0950	S	(Samples 13B-16B)			1			✓	✓	✓			X		✓	X	
005		C		0-0.5		1040	R	(Samples 17A-20A)			1			✓	✓	✓			X		✓	X	
006		C		2		1045	S	(Samples 17B-20B)			1			✓	✓	✓			X		✓	X	
007		C		2	2/24/11	1040	S	BGRR Eng'd CAP Sul (1B-4B)	500ml	P	1	NONE		✓	✓	✓			X		✓	X	
008	E	C		2	2/24/11	1220	S	(5B-7B)						✓	✓	✓			X		✓	X	
009		C	Bnl 701 N6455	0-0.5	2/24/11	1045	R	(1A-4A)						✓	✓	✓			X		✓	X	
010		C		0-0.5	2/24/11	1230	R	(5A-7A)						✓	✓	✓			X		✓	X	
3																							

1 Relinquished By/Date/Time	2 Relinquished By/Date/Time	3 Relinquished By/Date/Time
Print MIKE HOLLANDER 2/23/11 1010	Print	Print
Signature [signature]	Signature	Signature
1 Received By/Date/Time	**2 Received By/Date/Time**	**3 Received By/Date/Time**
Print R. Metz 2/28/11	Print	Print
Signature [signature] 1010	Signature	Signature

Contractor Lab Sample Disposal:
☐ Return To Client ☒ Disposal by Lab
☐ Archive For ____ Months

Data Package: ☐ Full ☒ Summary

Turn-Around Time Required:
☐ Rush (1 Day) ☒ 14 Days ☐ 30 Days
☐ 7 Days ☐ Other ( )

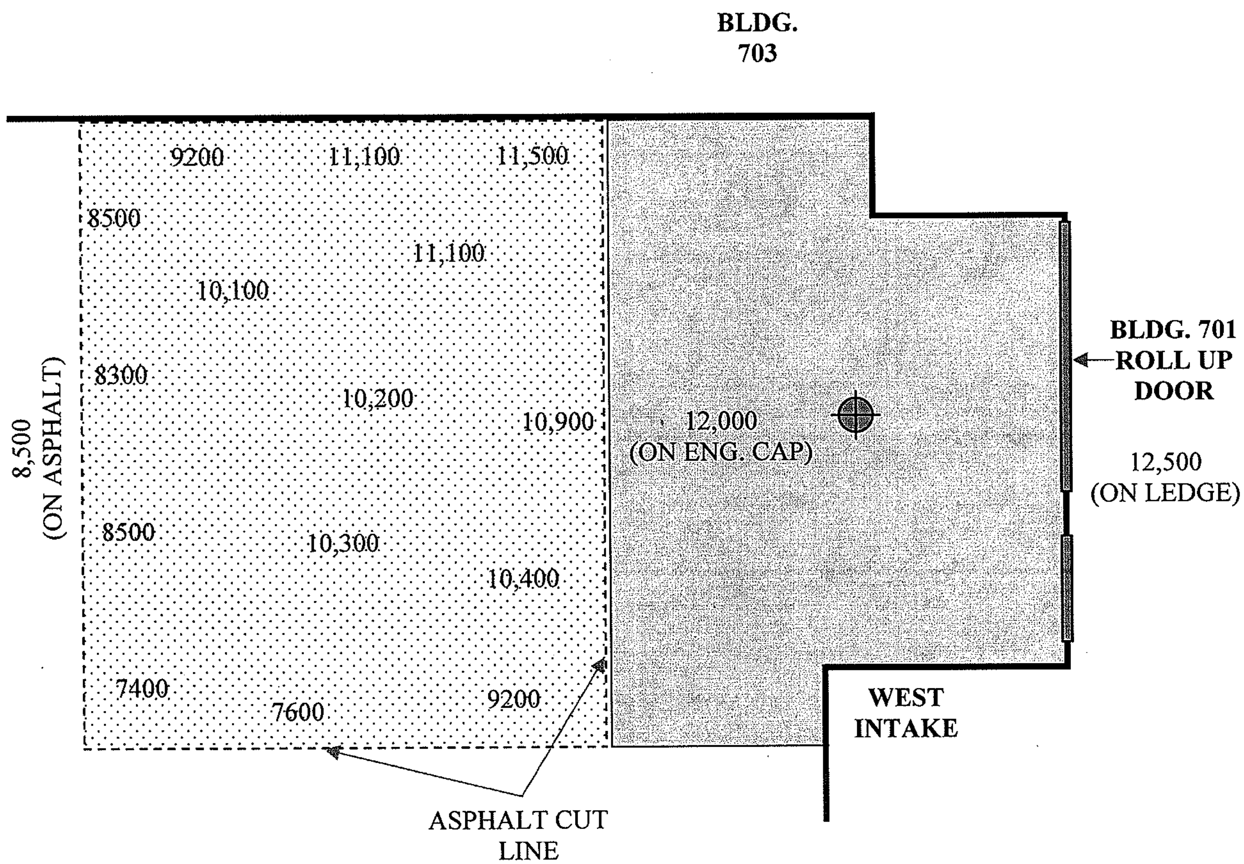
Distribution WHITE (1) - Stays with Sample; PINK (2) - Lab or Other GREEN (3) - Returned to Client with Report GOLDENROD (4) - Field Copy - (Sampler)

RADIOLOGICAL SURVEY FORM FS-SOP-1000	REASON FOR SURVEY ☐ ROUTINE ______ ■ SPECIAL PRE-EXCAVATION ☐ RWP# ______ ☐ WP# 324-19	
LOCATION / EQUIPMENT: BLDG. 701 / 703 EXTERIOR AREAS	DATE: 03/02/2011	TIME: 0900

REMOVED ASPHALT AND BASE SURVEY - ENGINEERED CAP, WEST SIDE, SURVEY UNIT 1, SECTION 2

INSTRUMENT

Model #	Serial #	CAL DUE
LUD-2221	211784	12/09/2011
N/A →		
N/A →		
N/A →		



ALL READINGS TAKEN IN CONTACT WITH SURFACE OF SOIL, AND SHOWN IN COUNTS PER MINUTE

SURVEYED AREA (SOIL SURFACE IMMEDIATELY AFTER ASPHALT REMOVAL)

SURVEY OF REMOVED ASPHALT = ≤ AVG. BKGD (AVG. BKGD ~ 7500 CPM)

LEGEND

○ - SMEAR SURVEY LOCATION △ - AIR SAMPLE LOCATION

☐ - MASSLINN SURVEY LOCATION # - DIRECT FRISK LOCATION

XXXY / ZZZ XXX = contact reading Y = radiation type ZZZ = reading @ 30cm

AIRBORNE ACTIVITY SURVEY

Sample #	Duration	Flow Rate	Field Analysis cpm	Field Analysis µCi/cc	% DAC
N/A →					

DOSE RATE (HIGHEST)

CONTACT READING	N/A
GENERAL AREA READING	N/A

MASSLINN SURVEY RESULTS (in dpm)

1.	N/A ↓	5.	N/A ↓
2.		6.	
3.		7.	
4.		8.	

SMEAR SURVEY RESULTS (dpm/100cm²) α, β-γ, ³H

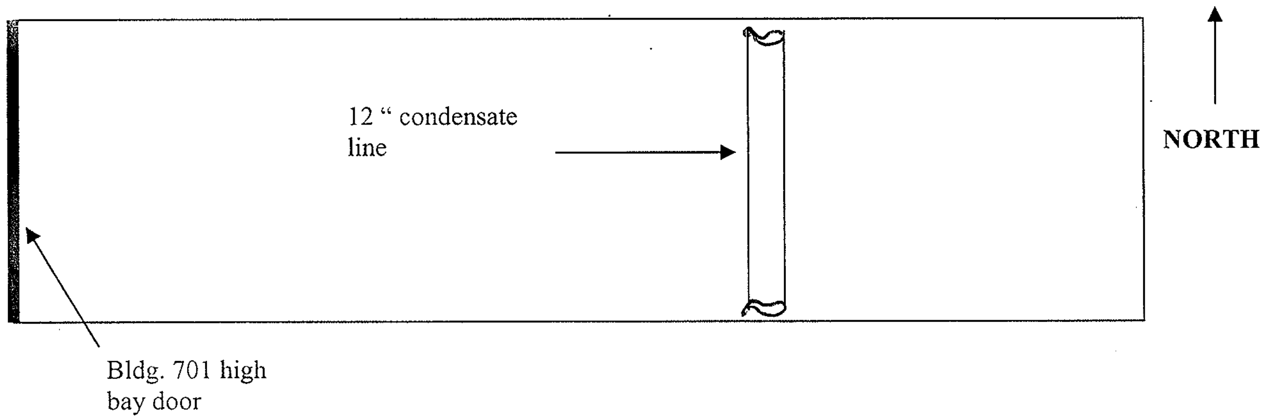
1.	N/A ↓	8.	N/A ↓	15.	N/A ↓
2.		9.		16.	
3.		10.		17.	
4.		11.		18.	
5.		12.		19.	
6.		13.		20.	
7.		14.		21.	

Surveyed By: [signature] Date: 03/02/2011 Reviewed By: [signature] Hommsten Date: 3/2/11

FS-SOP-1000
Attachment 9.2 of FS-SOP-1000

RADIOLOGICAL SURVEY FORM FS-SOP-1000	REASON FOR SURVEY ☐ ROUTINE ☐ SPECIAL ☐ RWP # ☒ WP # 324
LOCATION & EQUIPT. Outside bldg. 701/703	DATE: 1/24/11 TIME: 09:30

East side concrete pad (12" condensate line)



PPA= Per Probe Area

Surveyed Abandoned condensate line to allow removal prior to concrete forming.

All frisks external were <100 ccpm/PPA with background at 90-100 cpm.
All scans w/ NAI 2x2 detector were at background levels external with back-ground at 19,000-20,000 cpm.
Internal scans w/ 2x2 NAI were 5,000-7,000 cpm.
All frisks internal were <100 ccpm/PPA.
Masslin's external and internal were < 1kdpm/wipe.
All smear results attached were internal to pipe.

INSTRUMENT

Model #	Serial #	CAL DUE
tennelec	67705	4/23/11
L-3	44141	1/29/11
L-2221	211784	12/9/11
N/A		

LEGEND

○ - SMEAR SURVEY LOCATION △ - AIR SAMPLE LOCATION
☐ - MASSLINN SURVEY LOCATION # - DIRECT FRISK LOCATION
XXXY / ZZZ XXX = contact reading Y = radiation type ZZZ = reading @ 30cm

AIRBORNE ACTIVITY SURVEY

Sample #	Duration	Flow Rate	Field Analysis cpm	Field Analysis µCi/cc	% DAC
N/A					

DOSE RATE (HIGHEST)

CONTACT READING	N/A
GENERAL AREA READING	N/A

MASSLINN SURVEY RESULTS (in dpm)

1.	<1k	5.	N/A
2.	<1k	6.	
3.	<1k	7.	
4.	<1k	8.	

SMEAR SURVEY RESULTS (dpm/100cm²) (α, β-γ) ³H

1.	See	8.	Attached	15.	Results
2.	Batch	9.	Number	16.	27,158
3.		10.		17.	
4.		11.		18.	
5.		12.		19.	
6.		13.		20.	
7.		14.		21.	

Surveyed By Hollander [signature] Date: 1/24/11 Reviewed By: [signature] Date: 1/24/11

Activity Report

1/24/11
9:28:22AM

engr'g cap 12 inch cond. line

Batch Name: 27,158

Batch ID: 1 Minute Smear Analysis - 201101240917

Group: E

Device: S5 XLB

Selected Geometry: 1/8" Stainless Steel

Acquisition Date: 1/24/11

Acquisition Time: (minutes) 1.0

Operating Voltage: (volts) 1,350.0

Efficiency Factors

Alpha Efficiency: (%) 0.27 ± 0.00

Beta Efficiency: (%) 0.19 ± 0.00

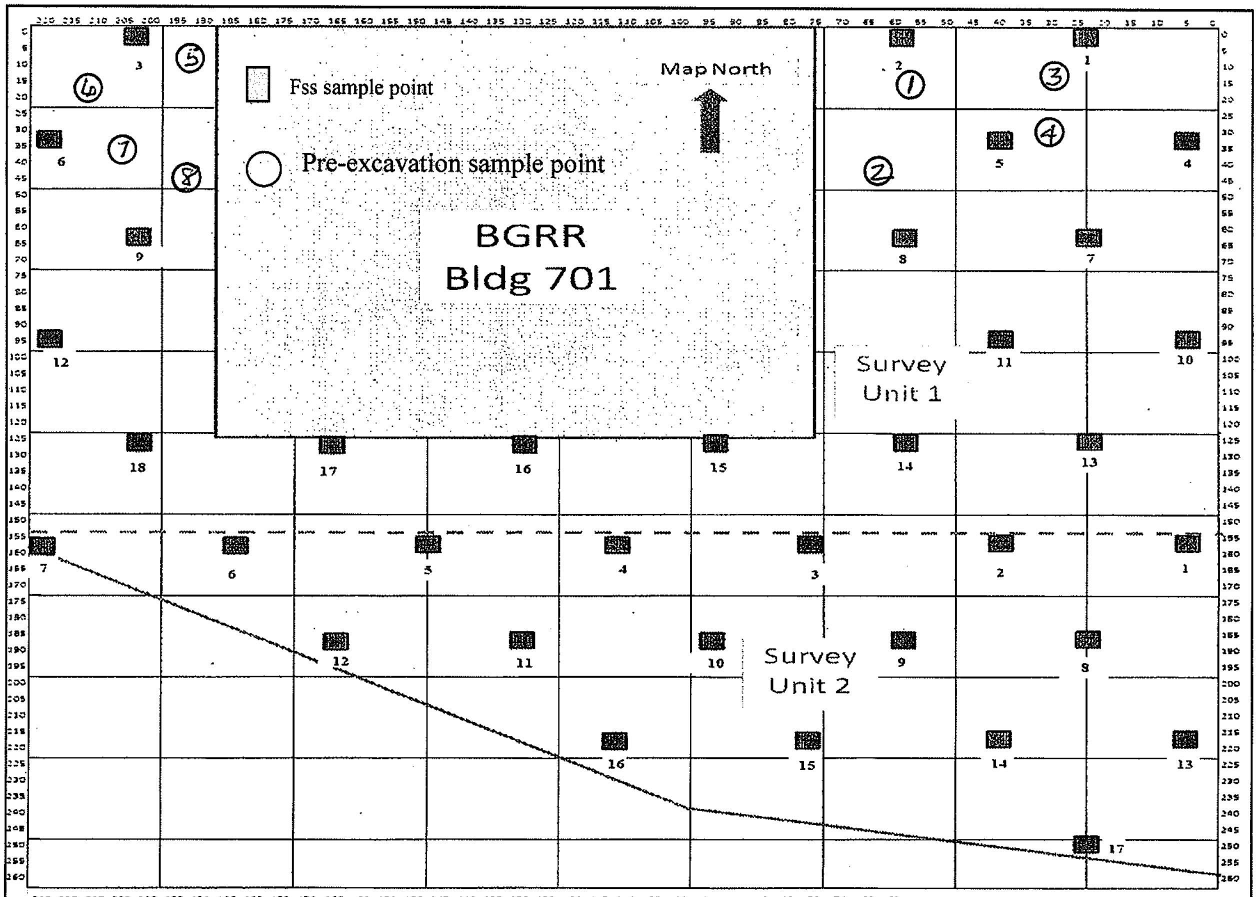
Sample ID	Quantity	Alpha (DPM)	2σ	Alpha MDA (DPM)	Beta Activity (DPM)	2σ	Beta MDA (DPM)
20110124091740-E1	0.00	-0.38	0.52	13.93	27.63	27.74	37.00
20110124092041-E2	0.00	-0.38	0.52	13.93	17.21	23.50	37.00
20110124092201-E3	0.00	-0.38	0.52	13.93	38.05	31.41	37.00
20110124092321-E4	0.00	-0.39	0.52	13.93	48.48	34.70	37.00
20110124092431-E5	0.00	-0.38	0.52	13.93	32.84	29.64	37.00
20110124092551-E6	0.00	-0.37	0.52	13.93	6.79	18.31	37.00
20110124092711-E7	0.00	3.31	7.40	13.93	22.28	25.71	37.00

Reviewed by: ____________________

RADIOLOGICAL SURVEY FORM FS-SOP-1000	REASON FOR SURVEY		INSTRUMENT		
	☐ ROUTINE	☐ SPECIAL	Model #	Serial #	CAL DUE
	☐ RWP #	☒ WP # 324-19	Ludlum—3	70149	8/13/2011
LOCATION & EQUIPT. Building 701	DATE: 12/21/10	TIME: 1615	Gamma spec	ERP	10/15/2011
Pre-excavation samples of dirt and asphalt prior to engineering cap installation			N/A		
			N/A		

Performed asphalt and dirt sampling in survey unit #1 in preparation for start of engineering cap work.

All sample locations are centered to map scale.
All equipment utilized for excavation were masslinn surveyed and were < 1000 dpm.



LEGEND

○ - SMEAR SURVEY LOCATION △ - AIR SAMPLE LOCATION
☐ - MASSLINN SURVEY LOCATION # - DIRECT FRISK LOCATION
XXXY/ZZZ XXX = contact reading Y = radiation type ZZZ = reading @ 30cm

AIRBORNE ACTIVITY SURVEY

Sample #	Duration	Flow Rate	Field Analysis cpm	Field Analysis µCi/cc	% DAC
N/A					

DOSE RATE (HIGHEST)

CONTACT READING	N/A
GENERAL AREA READING	N/A

MASSLINN SURVEY RESULTS (in dpm)

1.	See Map	5.	N/A
2.	N/A	6.	
3.		7.	
4.		8.	

SMEAR SURVEY RESULTS (dpm/100cm^2) α, β-γ, ^{3}H

1.	See	8.	Attached	15.	Results
2.	Batch	9.	Number	16.	N/A
3.		10.		17.	
4.		11.		18.	
5.		12.		19.	
6.		13.		20.	
7.		14.		21.	

Surveyed By Tim Long [signature] Date: 12/21/10 Reviewed By: [signature] Date: 12/22/10

ERP GAMMA ANALYSIS SUMMARY

C.O.C. # N/A

COUNT DATE: 12/21/2010-A

P. SULLIVAN - 631 897-3202

LINE #	SAMPLE #	WEIGHT (GRAMS)	SAMPLE DESCRIPTION / LOCATION	RESULTS
1	122110-001	928	ENG. CAP PRE EXCAVATION 1A	BACKGROUND
2	122110-002	1193	ENG. CAP PRE EXCAVATION 1B	BACKGROUND
3	122110-003	1015	ENG. CAP PRE EXCAVATION 2A	BACKGROUND
4	122110-004	1095	ENG. CAP PRE EXCAVATION 2B	^{137}Cs (0.06 pCi/gm) + BACKGROUND
5	122110-005	940	ENG. CAP PRE EXCAVATION 3A	BACKGROUND
6	122110-006	1090	ENG. CAP PRE EXCAVATION 3B	^{137}Cs (0.1 pCi/gm) + BACKGROUND
7	122110-007	798	ENG. CAP PRE EXCAVATION 4A	BACKGROUND
8	122110-008	1212	ENG. CAP PRE EXCAVATION 4B	BACKGROUND
9	122110-009	872	ENG. CAP PRE EXCAVATION 5A	BACKGROUND
10	122110-010	1166	ENG. CAP PRE EXCAVATION 5B	BACKGROUND
11	122110-011	828	ENG. CAP PRE EXCAVATION 6A	^{137}Cs (0.07 pCi/gm) + BACKGROUND
12	122110-012	1105	ENG. CAP PRE EXCAVATION 6B	BACKGROUND
13	122110-013	893	ENG. CAP PRE EXCAVATION 7A	BACKGROUND
14	122110-014	1075	ENG. CAP PRE EXCAVATION 7B	BACKGROUND
15	122110-015	838	ENG. CAP PRE EXCAVATION 8A	BACKGROUND
16	122110-016	1067	ENG. CAP PRE EXCAVATION 8B	BACKGROUND
17				
18				
19				
20				
21				
22				
23				
24				
25				

A = ASPHALT

B = BASE UNDER ASPHALT (0-2' SAMPLE)

16 SAMPLES TOTAL

12-22-10

Page 1 of 1

BROOKHAVEN NATIONAL LABORATORY

P.O. # ______

Chain of Custody No. 31214

Requires EDD ☒

SAMPLING CHAIN OF CUSTODY

Analysis Requested By	Sampling Contractor	Analytical Laboratory
Name: MIKE HOLLANDER	Name: Tim LONG	Name: GEL
Life No: N6455 Ext. 4839	Contact: ERP RCT	Address: 2040 SAVAGE Rd.
Acct. No: 65280/65283 Dept: ERP	Phone: X 4424	City: CHARLESTON St: S.C. Zip: 29407
Email Reports To:	Email/Fax: ——	Contact: HEATHER SHAFFER
1 hollander @ bnl.gov	Sampler: SAME	Phone:
2 Pizzulli @ bnl.gov		Email/Fax:
Project Name:	**Project Manager:**	**Field Engineer:**
BGRR ENGINEERED CAP	Michelle Pizzulli	RICH THOMAS

Comments:

UiD	Smp	Coll	Site ID/Bldg/Life #	Depth/RWP	Date	Time	Matrix	Name/Description	Cont. Vol./Units	Cont. Type	# of Cont	Preservative	Alpha/Beta	Tritium	Gamma	Strontium - 90	524.2	624	Nuclide-specific Alpha U-235, 238 Pu-238, 239/240	PCBs	Metals Hg, Pb, Fe, Cu, Ni, Zn	C-14, Ni-63	
001	E	C	BNL / BLDG. 701 / N6455	0-0.5	12/22/10	09:37	A	ASPHALT composite 1-4	4000g	P	1	NONE		√	√	√			X		√	X	
002	|	|	|	0-0.5	12/22/10	10:04	A	" 5-8	|	P	1	|		√	√	√			X		√	X	
003	|	|	|	0-2	12/22/10	10:15	S	soil 1-4	|	P	1	|		√	√	√			X		√	X	
004	↓	↓	↓	0-2	12/22/10	10:25	S	" 5-8	↓	P	1	↓		√	√	√			X		√	X	

1 Relinquished By/Date/Time	2 Relinquished By/Date/Time	3 Relinquished By/Date/Time
Print MIKE HOLLANDER 12/22/10	Print	Print
Signature [signature] 1130	Signature	Signature
1 Received By/Date/Time	**2 Received By/Date/Time**	**3 Received By/Date/Time**
Print [illegible] 12/22/10	Print	Print
Signature [signature] 1130	Signature	Signature

Contractor Lab Sample Disposal:
☐ Return To Client ☒ Disposal by Lab
☐ Archive For ______ Months

Data Package: ☐ Full ☒ Summary

Turn-Around Time Required:
☐ Rush (1 Day) ☒ 14 Days ☐ 30 Days
☐ 7 Days ☐ Other ( )

RADIOLOGICAL SURVEY FORM
FS-SOP-1000

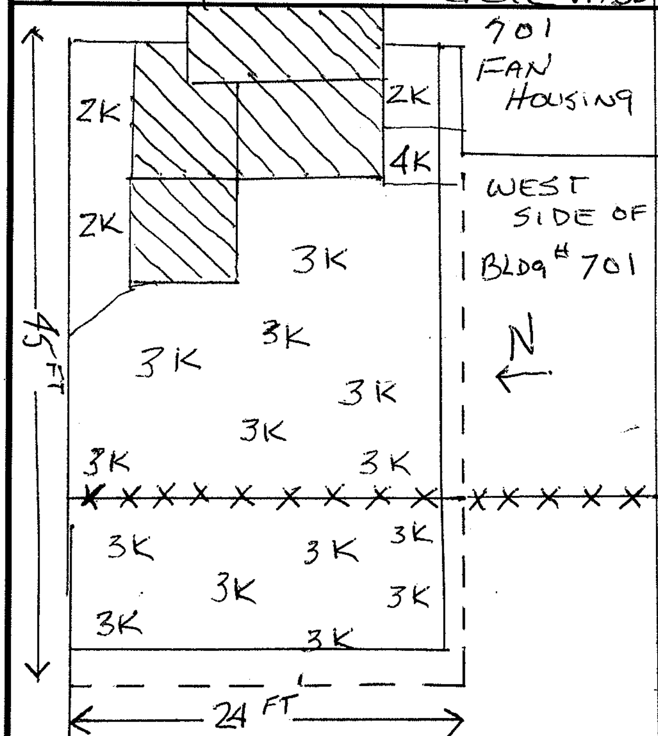
REASON FOR SURVEY
☐ Routine ______ ☐ Special ______
☐ RWP# ______ ☒ WP 324-19

Location / Equipment: Bldg. ~~701~~ 701

Date: 12-03-2010 **Time:** 1530

SURVEY FOR CONCRETE PADS POST POUR ACTIVITY

INSTRUMENTS Model #	Serial #	CAL DUE
2221/44-10	211780	12-8-10
N/A	N/A	N/A

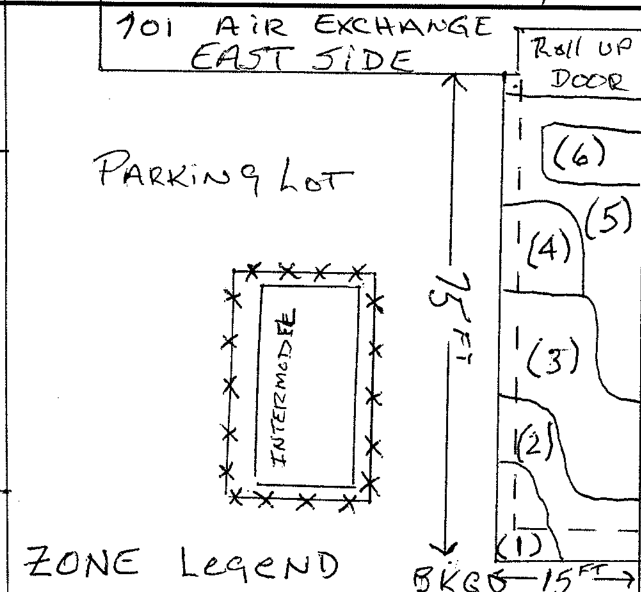


[hatched box] - DENOTES METAL PLATES

XXX DENOTES RADIOLOGICAL CONTROLLED AREA

ALL READINGS ARE IN CPM

(DRAWINGS NOT TO SCALE)



ZONE LEGEND	BKGD
(1) 10,500 - 11,000	8,500
(2) 9,500 - 10,000	7,200
(3) 8,500 - 9,200	6,400
(4) 7,800 - 8,100	5,200
(5) 6,000 - 6,800	4,300
(6) 4,800 - 5,600	3,800

DIMENSIONS INCLUDE 5 FT BUFFER

N

ALL READINGS ARE IN CPM

~~XXX~~ = RMA STORAGE AREA

HIGH READINGS DUE TO BUILD# 801

LEGEND
○ - SMEAR SURVEY LOCATION
▲ - AIR SAMPLE LOCATION
☐ - MASSLINN SURVEY LOCATION
[#] - DIRECT FRISK LOCATION
$\overline{C}$ - CONTAMINATION
✱ CONTACT
$\frac{XXXY}{ZZZ}$ XXX = contact reading Y = radiation type ZZZ = reading @ 30cm

AIRBORNE ACTIVITY SURVEY

Sample #	Duration	Flow Rate	Field Analysis cpm	Field Analysis µCi/cc	% DAC
		N	A		

DOSE RATE (HIGHEST)

CONTACT READING	N/
GENERAL AREA READING	A

MASSLINN SURVEY RESULTS (in dpm)

1.	N/A	5.	N/A
2.		6.	
3.		7.	
4.		8.	

SMEAR SURVEY RESULTS (dpm/100cm²) α, β-γ, ³H

1.	See	8.	Attached	15.	Results
2.	Batch	9.	Number	16.	
3.		10.		17.	
4.		11.	N	18.	
5.		12.		19.	
6.		13.	A	20.	
7.		14.		21.	

Surveyed By: [signature] **Date:** 12/4/2010 **Reviewed By:** [signature] **Date:** 12/6/10

RADIOLOGICAL SURVEY FORM FS-SOP-1000	REASON FOR SURVEY	
	☐ ROUTINE	☐ SPECIAL
	☐ RWP #	☒ WP # 324-19
LOCATION & EQUIPT. Bldg 701 South West and West	DATE: 10-14-2010	TIME: 1530

Sides Pre and Post Cement and Asphalt Removal Walkover Survey

Performed a pre and post walkover survey on the southwest and west sides of Bldg 701 for concrete and asphalt removal. Took 4 soil sample and checked them using ERP GAMMA Analysis (see attached sheet for results). Background on the southwest side before removal was 3200 cpm/min and ~~agter~~ f [initials] 10/19/10 after removal was 3400 cpm/min. Background on the West side before removal was 7760 cpm/min and 7600 cpm/min after removal. All readings for the southwest and west side were less than background.

INSTRUMENT

Model #	Serial #	CAL DUE
LUD-2221	211780	12-08-2010
LUD-3	44168	09-07-2011
N/A	N/A	N/A

LEGEND

○ - SMEAR SURVEY LOCATION   △ - AIR SAMPLE LOCATION

☐ - MASSLINN SURVEY LOCATION   # - DIRECT FRISK LOCATION

XXXY / ZZZ   XXX = contact reading   Y = radiation type   ZZZ = reading @ 30cm

AIRBORNE ACTIVITY SURVEY

Sample #	Duration	Flow Rate	Field Analysis cpm	Field Analysis µCi/cc	% DAC
N/A					

DOSE RATE (HIGHEST)

CONTACT READING	N/A
GENERAL AREA READING	N/A

MASSLINN SURVEY RESULTS (in dpm)

1.	N/A	5.	N/A
2.		6.	
3.		7.	
4.		8.	

SMEAR SURVEY RESULTS (dpm/100cm^2) α, β-γ, ^{3}H

1.	See	8.	Attached	15.	Results
2.	Batch	9.	Number	16.	N/A
3.		10.		17.	
4.		11.		18.	
5.		12.		19.	
6.		13.		20.	
7.		14.		21.	

Surveyed By [signature] Eugene E. Houseknecht II   Date: 10-18-2010   Reviewed By: [signature]   Date: 10-19-10

ERP GAMMA ANALYSIS SUMMARY

C.O.C. # N/A

COUNT DATE: **10/16/2010-A**

P. SULLIVAN - 631 897-3202

PAGE ~~1 OF 1~~ 2 of 2 ??? 10-18-10

LINE #	SAMPLE #	WEIGHT (GRAMS)	SAMPLE DESCRIPTION / LOCATION	RESULTS
1	101610-001	1256	BLDG. 701 S.W. EXCAVATION - 001	BACKGROUND
2	101610-002	1284	BLDG. 701 S.W. EXCAVATION - 002	BACKGROUND
3	101610-003	1485	BLDG. 701 S.W. EXCAVATION - 003	BACKGROUND
4	101610-004	1400	BLDG. 701 S.W. EXCAVATION - 004	^{137}Cs (0.60 pCi/gm) + BACKGROUND
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				

P. Sull 10/16/2010

3 SAMPLES TOTAL

RADIOLOGICAL SURVEY FORM FS-SOP-1000	REASON FOR SURVEY	
	☐ ROUTINE	☐ SPECIAL
	☐ RWP #	☒ WP # 314-26
LOCATION & EQUIPT. West Side Walk Over Survey	DATE: 10-28-10	TIME: 1420

Survey performed for Bulk Gas Tank Installation.

Performed a walk over survey on the West Side of Bldg 701 after a 3 foot wide and about 30 foot long trench was dug for preparation for Bulk Gas Tank installation. 2 soil samples were taken. 3 background check were performed. 1 about 18 inches from West side of Bldg 701 with a background of 3040 cpm/min. The next was about 20 feet West of the building with a background of 2750 cpm/min and the last about 30 feet West of the building with a background of 2654 cpm/min. Found nothing above background while performing the walk over survey.

For soil sample results see attached page.

INSTRUMENT

Model #	Serial #	CAL DUE
LUD-2221	211780	12-08-2010

LEGEND

○ - SMEAR SURVEY LOCATION   △ - AIR SAMPLE LOCATION
☐ - MASSLINN SURVEY LOCATION   # - DIRECT FRISK LOCATION
XXXY / ZZZ   XXX = contact reading   Y = radiation type   ZZZ = reading @ 30cm

AIRBORNE ACTIVITY SURVEY

Sample #	Duration	Flow Rate	Field Analysis cpm	Field Analysis µCi/cc	% DAC
N/A					

DOSE RATE (HIGHEST)

CONTACT READING	N/A
GENERAL AREA READING	N/A

MASSLINN SURVEY RESULTS (in dpm)

1.	N/A	5.	N/A
2.		6.	
3.		7.	
4.		8.	

SMEAR SURVEY RESULTS (dpm/100cm²) α, β-γ, ³H

1.	See	8.	Attached	15.	Results
2.	Batch	9.	Number	16.	N/A
3.		10.		17.	
4.		11.		18.	
5.		12.		19.	
6.		13.		20.	
7.		14.		21.	

Surveyed By: Eugene E. Houseknecht II   Date: 10-28-2010   Reviewed By: Date: 11-2-10

ERP GAMMA ANALYSIS SUMMARY

C.O.C. # N/A

COUNT DATE: **10/28/2010-A**

P. SULLIVAN - 631 897-3202

PAGE ~~1 OF 1~~ 2 of 2
SS
10-29-10

LINE #	SAMPLE #	WEIGHT (GRAMS)	SAMPLE DESCRIPTION / LOCATION	RESULTS
1	102810-001	1320	BLDG. 701 WEST SIDE TRENCH 01	BACKGROUND
2	102810-002	1349	BLDG. 701 WEST SIDE TRENCH 02	BACKGROUND
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				

2 SAMPLES TOTAL

RADIOLOGICAL SURVEY FORM FS-SOP-1000	REASON FOR SURVEY: ☐ ROUTINE ☐ RWP # ☐ SPECIAL ☒ WP # 324-27
LOCATION & EQUIPT. South / West Side Walk Over	DATE: 11-10-10 TIME: 1130

Survey for Asbestos Conduit Removal

Survey performed for Asbestos Conduit Removal.

Performed a walk over survey on the South West Side of Bldg 701 after a 3 foot wide 15 to 20 foot long trench was dug for the conduit removal. 1 soil samples were taken. 2 background check were performed. One taken on the North end of the Trench was 2025 cpm/min and the one taken on the South end was 2091 cpm/min.. Found nothing above background while performing the walk over survey.

For soil sample results see attached page.

Performed a direct frisk of the Asbestos Conduit after it was removed. Background was 60 to 80 cpm/min. Found nothing above background.

INSTRUMENT

Model #	Serial #	CAL DUE
LUD-2221	211780	12-08-2010
LUD-3	39890	08-16-2011
N/A	N/A	N/A

LEGEND

○ - SMEAR SURVEY LOCATION △ - AIR SAMPLE LOCATION

☐ - MASSLINN SURVEY LOCATION # - DIRECT FRISK LOCATION

XXXY/ZZZ XXX = contact reading Y = radiation type ZZZ = reading @ 30cm

AIRBORNE ACTIVITY SURVEY

Sample #	Duration	Flow Rate	Field Analysis cpm	Field Analysis µCi/cc	% DAC
N/A					

DOSE RATE (HIGHEST)

CONTACT READING	N/A
GENERAL AREA READING	N/A

MASSLINN SURVEY RESULTS (in dpm)

1.	N/A	5.	N/A
2.		6.	
3.		7.	
4.		8.	

SMEAR SURVEY RESULTS (dpm/100cm²) α, β-γ, ³H

1.	See	8.	Attached	15.	Results
2.	Batch	9.	Number	16.	N/A
3.		10.		17.	
4.		11.		18.	
5.		12.		19.	
6.		13.		20.	
7.		14.		21.	

Surveyed By [signature] Eugene E. Houseknecht II Date: 11-10-2010 Reviewed By: [signature] Date: 11-11-10

ERP GAMMA ANALYSIS SUMMARY

C.O.C. # N/A

COUNT DATE: **11/10/2010-A**

P. SULLIVAN - 631 897-3202

PAGE ~~1 OF 1~~ SS 11-10-10 2 of 2

LINE #	SAMPLE #	WEIGHT (GRAMS)	SAMPLE DESCRIPTION / LOCATION	RESULTS
1	111010-001	940	BLDG. 701 S.W. EXCAVATION	^{137}Cs (1.03 pCi/gm) + BACKGROUND
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				

1 SAMPLE TOTAL

APPENDIX B

Redlined Project Specifications, As-Built Drawings and Land Surveys

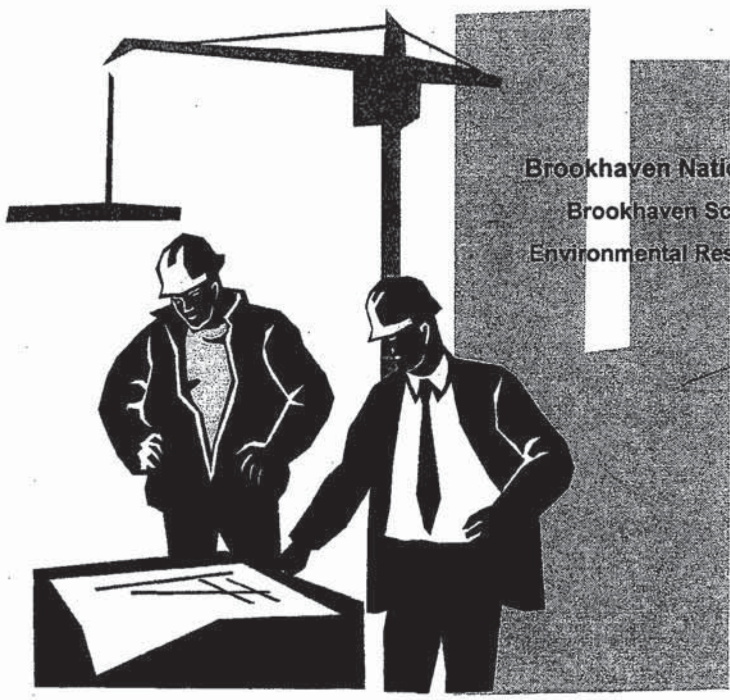
Red Line

Specifications for

Engineered Cap

Building 701
Brookhaven Graphite Research Reactor

September 22, 2010



Brookhaven National Laboratory
Brookhaven Science Associates
Environmental Restoration Projects
Upton, NY 11973

BROOKHAVEN
NATIONAL LABORATORY

ESH&Q Risk Level Low (A3-Minor)
Designer: B. McCaffrey
Project Manager: M. Pizzulli

SIGNATURE PAGE

Prepared by: ______________________ Date: 10/7/10

ERP Project Engineer

Reviewed by: ______________________ Date: 10/6/10

ERP Project Manager

Reviewed by: ______________________ Date: 10/6/10

ERP Radiological Control Manager

Reviewed by: ______________________ Date: 10/7/10

ERP Health & Safety Manager

Reviewed by: ______________________ Date: 10/6/10

ERP D&D Manager

Reviewed by: ______________________ Date: 10/8/2010

Senior Contracts Specialist

STATEMENT OF WORK

An engineered cap will be installed on the west, south, and east sides of Building 701, located at Brookhaven National Laboratory (BNL).

In general, work consists of, but is not limited to, site demolition of existing asphalt, concrete, recycled concrete aggregate (RCA), and backfill material; and installation of the engineered cap consisting of a 40-mil HDPE geomembrane, sand protective layer, geotextile layer, RCA layer, asphalt treated base (ATB) layer, and an asphalt surface course.

DRAWING INDEX

Number	Title	Date
Contract Drawings		
324-22-1	Final Conditions Plan	9-22-10
324-22-2	Existing Conditions Plan	9-22-10
324-22-3	Cap Excavation Plan	9-22-10
324-22-4	Final Grade Plan	9-22-10
324-22-5	Details	9-22-10
324-22-5	Details	9-22-10

TABLE OF CONTENTS

DIVISION 00 – PROCUREMENT AND CONTRACTING REQUIREMENTS
SECTION 00 21 13 – INSTRUCTIONS TO CONTRACTORS

PART 1 - GENERAL

1.1 Section Includes

A. Project Summary

B. Bid Requirements

C. Contractor's Qualifications

D. Preparation of Technical Proposal

1.2 Project Summary

A. The general scope of the project includes, but is not limited to, installation of an engineered cap consisting of a high density polyethylene (HDPE) geomembrane overlain ultimately by asphalt paving. The work will be performed around the west, south, and east sides of Building 701 at Brookhaven National Laboratory (BNL), Upton, New York 11973. The project is further defined in Section 01 10 00 – Summary of Work and elsewhere in these Specifications.

B. This Specification provides the general instructions, parameters, limitations, and site-specific requirements in which the Contractor will be allowed to perform the work. The Contractor shall provide to Brookhaven Science Associates (BSA), as part of the bid documents, how it intends to execute the work in accordance with the general instructions, parameters, limitations, and site-specific requirements.

C. The specific tasks outlined in the bid form are defined in Section 01 10 00 – Summary of Work.

D. BSA reserves the right to reject any bid in which the Contractor fails to provide all of the required submittals, and in which the bid fails to meet all of the qualification requirements.

1.3 Bid Requirements

A. Bids shall be submitted in duplicate on the form provided. In addition, the following must be submitted:

- Bid Submittal Checklist (Section 00 43 93) and required supporting documentation
- Detailed Project Work Schedule that details how the work will be completed by the Contract completion date and identifies Critical Path activities

1.4 Contractor's Qualifications

A. To be considered for award, Contractors must meet the requirements of Section 00 45 13 – Contractor's Qualifications. BSA reserves the right to reject any bid in which the Contractor fails to meet all of the qualification requirements.

1.5 Preparation of Technical Proposal

A. Contractors are to organize their Technical Proposal in the following order, separated with LABELED TABS for each Section and Subsection.

TECHNICAL PROPOSAL

TAB A. Bid Submittal Checklist

Contractors shall provide the Bid Submittal Checklist described in Section 00 43 93 – Bid Submittal Checklist.

TAB B. Corporate Experience

Contractors shall provide all of the required Corporate Experience qualification submittals described in Section 00 45 13 – Contractor's Qualifications.

In summary, the Contractor shall provide a general statement of corporate experience demonstrating the successful completion of projects that are comparable in size, scope, and method. The Contractor also must have successfully completed three (3) projects involving installation of polyethylene geomembrane liners in the last five (5) years.

TAB C. Client References

Contractors shall provide three most recent (within 5 years) client references for which the Contractor has performed work that is similar in nature and magnitude to the work described in these Specifications. The client reference list must include the project name, a summary of the scope of work, the dates that the work was performed, and the client contact information (i.e., name, address, contact name, telephone number).

TAB D. Project Management Qualifications and Experience

Contractors shall provide all of the required Project Management Qualifications and Experience qualification submittals described in Section 00 45 13 – Contractor's Qualifications.

In summary, the Contractor shall submit the resumes of its proposed Project Manager, Field Superintendent, Site Health & Safety Officer, and Master Seamer.

TAB E. Safety Performance History

The Contractor and Sub-Contractors shall provide all of the required Safety Performance History qualification submittals as described in Section 00 45 13 – Contractor's Qualifications.

In summary, every organization on the Contractor's team that will be performing work shall have a Recordable Incident Rate (RIR) less than 4.0, and an Insurance Experience Modification Rating (EMR) less than 1.0 in each of the last three (3) years of available data [2006, 2007, & 2008].

The Contractor shall provide: 1) Verification of the firm's RIR and EMR for the past three years of available data [2006, 2007, & 2008], 2) OSHA Form 300A (Summary of Work-Related Injuries and Illnesses) 3) the Table of Contents from the firm's corporate Health and Safety Manual.

TAB F. Corporate QA/QC Program Summary

The Contractor shall provide all of the required Corporate QA/QC Program Summary qualification submittals as described in Section 00 45 13 – Contractor's Qualifications.

In summary, the Contractor shall provide their conceptual approach for implementation of their quality assurance / quality control program and shall include a quality control organizational chart. The technical submittal shall be specific to the work described in Section 01 11 00 - Summary of Work and describe the general roles and responsibilities of key quality assurance / quality control personnel.

The Contractor shall also provide the Table of Contents of the firm's Quality Assurance Plan.

TAB G. Technical Approach

The Contractor shall provide their technical approach for the completion of the engineered cap as set forth in Section 00 45 13 – Contractor's Qualifications and these Specifications.

Contractors shall describe how they will execute the work set forth in the Specifications including, but not limited to, installation sequence, set-up and lay-down areas, equipment used, waste management, approach to health & safety, and construction management.

Contractors shall also provide a preliminary detailed construction schedule.

TAB H. List of Sub-Contractors

The Contractor shall provide a list of any major Sub-Contractors and suppliers needed to complete the work. The listing shall, at a minimum, include name and addresses of proposed Sub-Contractors, description of the work to be subcontracted, type of subcontract anticipated, an estimated value of the subcontract, and the business size of any Sub-Contractors (i.e., small business, disadvantaged business, large business, etc.). BSA reserves the right to approve or disapprove Sub-Contractors.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

END OF SECTION 00 21 13

DIVISION 00 – PROCUREMENT AND CONTRACTING REQUIREMENTS
SECTION 00 31 19 – EXISTING CONDITION INFORMATION

PART 1 - GENERAL

1.1 Related Sections

A. Section 00 10 01 – Statement of Work

1.2 References

A. Contract Drawings

B. Innovative Technical Solutions, Inc., *Completion Report – Brookhaven Graphite Research Reactor Canal and Deep Soil Pocket Excavation and Removal*, Brookhaven National Laboratory, Upton, NY, July 2005

1.3 Parking Area East and South of Building 701

A. Description

1. The BGRR Canal and Below Ground Duct Deep Soil Pocket were located to the east and south of Building 701 and were removed during March – June 2005.

2. Radiological surveys of the bottom of the excavations indicate residual radioactive contamination exists greater than 20 feet below grade. The work under this Contract will not be considered radiological work.

3. The area was backfilled to grade. A layer of recycled concrete aggregate (RCA) 12 inches thick, a 1-1/2 inch thick Type 1A base course, and a 1-1/2 inch thick asphalt wearing course were installed over the entire parking area to the east and south of Building 701.

1.4 Parking Area West of Building 701

A. Description

1. No subsurface radiological contamination is known to exist on the west side of Building 701.

2. The parking area is assumed to have a 6 inch thick base course and asphalt wearing course.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

3.00 Contractor's Responsibilities

A. Contractor shall have full responsibility for reviewing and verifying such information and data, and for coordination of the work with BSA.

END OF SECTION 00 31 19

DIVISION 00 – PROCUREMENT AND CONTRACTING REQUIREMENTS
SECTION 00 43 93 – BID SUBMITTAL CHECKLIST

PART 1 - GENERAL

1.1 General

A. The Contractor shall complete the checklist below in its entirety and include it as part of the bid, as outlined inn Section 01 33 00 - Submittals. In addition, the bid shall include the required documentation and information necessary to demonstrate the Contractor's qualifications against the requirements described in Section 00 45 13 – Contractor's Qualifications. BSA may also conduct interviews with the key project personnel to ensure that their experience and qualifications meet the requirements set forth in Section 00 45 13 – Contractor's Qualifications.

B. BSA reserves the right to reject any bid in which the Contractor fails to provide all of the required submittals, and in which the bid fails to meet all of the qualification requirements.

1.2 Related Sections

A. Section 00 45 13 – Contractor's Qualifications

B. Section 01 33 00 – Submittals

1.3 Checklist

A. Name of Firm: ____

B. Corporate Experience

1. Documentation of ten (10) or more years of experience in projects involving installation of polyethylene geomembrane liners is included.

_____Yes _______No

2. General statement supported by detailed description of three (3) similar projects completed during the previous five (5) years is included.

_____Yes _______No

C. Client References

1. Client references for three (3) most recent projects of similar scope provided.

_____Yes _______No

D. Project Management Qualifications and Experience

1. Resume of proposed Project Manager addressing the specific required qualifications and experience provided.

_____Yes _______No

2. Resume of proposed Field Superintendent addressing the specific required qualifications and experience provided.

_____Yes _______No

3. Resume of proposed Site Health & Safety Officer addressing the specific required qualifications and experience provided.

_____Yes _______No

4. Resume of proposed Master Seamer addressing the specific required qualifications and experience provided.

_____Yes _______No

E. Safety Performance History

1. Recordable Incident Rate (RIR) for Contractor and applicable Sub-Contractors provided for last three (3) years demonstrating rate is less than 4.0.

_____Yes _______No

2. Experience Modification Rate (EMR) for Contractor and applicable Sub-Contractors provided for last three (3) years demonstrating rate is less than 1.0.

_____Yes _______No

3. Verification of RIRs and EMRs provided.

_____Yes _______No

4. Copy of OSHA 300A forms for Contractor and applicable Sub-Contractors.

_____Yes _______No

5. Copy of Table of Contents from Contractor's corporate Health and Safety Manual provided.

_____Yes _______No

F. Corporate QA/QC Program Summary

1. Corporate QA/QC Program demonstrating compliance with BSA's requirements provided.

_____Yes _______No

2. Copy of Table of Contents of Contractor's corporate Quality Assurance Plan provided.

_____Yes _______No

G. Technical Approach

1. Documentation demonstrating compliance BSA's technical and performance requirements is provided.

_____Yes _______No

2. Detailed description of installation sequence is provided.

   ______Yes ______No

3. Detailed description for set-up and lay-down areas is provided.

   ______Yes ______No

4. Detailed listing of equipment to be used is provided.

   ______Yes ______No

5. Detailed strategy for waste management that meets BSA's requirements provided.

   ______Yes ______No

6. Detailed approach to health and safety that meets BSA's requirements is provided.

   ______Yes ______No

7. Detailed description for construction management that meets BSA's requirements is provided.

   ______Yes ______No

8. Preliminary construction schedule is provided.

   ______Yes ______No

H. List of Sub-Contractors

1. List of proposed sub-Contractors and description of assigned work scopes.

   ______Yes ______No

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

END OF SECTION 00 43 93

DIVISION 00 – PROCUREMENT AND CONTRACTING REQUIREMENTS
SECTION 00 45 13 – CONTRACTOR'S QUALIFICATIONS

PART 1 - GENERAL

1.1 General

A. Only Contractors that meet BSA's qualification requirements provided in Paragraph 1.3 below will be considered for award. The bid shall include all of the required qualification documentation described in Paragraph 1.3 below, to objectively demonstrate that the Contractor meets these qualification requirements.

B. In addition, the bid shall include a description of the technical approach to completing the work, and shall clearly and thoroughly address the key performance attributes and expectations described in these Specifications.

C. BSA will consider the consolidated qualifications of the Contractor's team, including its proposed Sub-Contractors, in determining whether the Contractor meets BSA's qualification requirements. The Contractor shall be obligated to use all Sub-Contractors proposed in its bid that have been proposed to meet BSA's qualification requirements, unless otherwise approved by BSA.

1.2 Related Sections

A. Section 00 43 93 – Bid Submittal Checklist

1.3 Qualification Requirements

A. Corporate Experience

1. The Contractor shall have ten (10) or more years of experience in projects involving installation of polyethylene geomembrane liners. Additionally, the Contractor shall have completed at least three (3) similar projects during the previous five (5) years.

2. The Contractor must have experience with all aspects of this work, including work planning, subcontracting, and field execution.

B. Project Management Qualifications and Experience

1. Project Manager - The successful Contractor will be required to locate a full-time Project Manager to the BNL site. The Contractor's Project Manager candidate shall have a BS degree in engineering, construction management, environmental sciences, or a related field and a minimum of ten (10) years of experience. The candidate shall be proficient in all facets of project management including scheduling, resource assignment, tracking and reporting, and problem solving. The candidate shall have participated extensively in the preparation of the Bid.

2. Field Superintendent - The successful Contractor will be required to locate a full-time Field Superintendent to the BNL site. The Contractor's Field Superintendent candidate shall have a BS degree in engineering, construction management, environmental sciences, or a

related field and a minimum of ten (10) years of experience. The candidate shall have installed or supervised the installation of a minimum of two million (2,000,000) square feet of polyethylene geomembrane. The candidate shall have participated extensively in the preparation of the Bid.

3. Site Health & Safety (H&S) Officer - The successful Contractor will be required to locate a full-time Site Health & Safety (H&S) Officer to the BNL site. The Contractor's H&S Officer candidate shall have a minimum of ten (10) years of H&S experience in construction work environments. The candidate shall have received certification in the Comprehensive Practice of Industrial Hygiene (CIH) by the American Board of Industrial Hygiene. The candidate shall have experience with developing and implementing site-specific ES&H plans.

4. Master Seamer - The successful Contractor will be required to locate a full-time Master Seamer to the BNL site. The candidate shall have seamed a minimum of two million (2,000,000) square feet of polyethylene geomembrane using the same type of seaming apparatus specified for this project. The candidate shall have participated extensively in the preparation of the Bid.

C. Safety Performance History

1. Every organization on the Contractor's team that will be performing work shall have a Recordable Incident Rate (RIR) less than 4.0, and an Insurance Experience Modification Rating (EMR) less than 1.0 in each of the last three (3) years of available data [2006, 2007, and 2008].

D. Corporate QA/QC Program Summary

1. The Contractor shall have comprehensive written corporate quality assurance / quality control program. The Contractor shall provide their conceptual approach for implementation of their quality assurance / quality control program and shall include a quality control organizational chart. The technical submittal shall be specific to the work described in the Statement of Work and describe the general roles and responsibilities of key quality assurance / quality control personnel.

1.4 Contractor Qualification Documentation Requirements

A. Corporate Experience

1. The Contractor shall submit a general statement as to how and why it meets BSA's Corporate Experience requirements described in Paragraph 1.3.A above. This statement shall be supported by a detailed description of at least three (3) similar projects completed by the Contractor during the previous five (5) years. These project experience descriptions shall include the contract values and contact information for the owner and/ or contracting officer.

B. Client References

1. The Contractor shall submit three most recent client references for which the Contractor has performed work that is similar in nature and magnitude to the work described in this Specification. The client reference list must include the project name, a summary of the scope of work, the dates that the work was performed, and the client contact information (i.e., name, address, contact name, telephone number).

C. Project Management Qualifications and Experience

1. The Contractor shall submit resumes for the four (4) Project Management Personnel identified in Paragraph 1.3.B above addressing the required qualifications.

2. The Contractor shall also include an organization chart for the project and a listing of proposed Sub-Contractors.

D. Safety Performance History

1. The Contractor shall provide the Recordable Incident Rates (RIR) and Experience Modification Ratings (EMR) for itself and its Sub-Contractors as described Paragraph 1.0 2.C above for the last three years of available data [2006, 2007, and 2008]. The Contractor shall provide documentation verifying these ratings, as well as a copy of its OSHA 300A forms and the Table of Contents from the firm's corporate Health and Safety Manual.

E. Corporate QA/QC Program Summary

1. The Contractor shall submit a summary of its Corporate QA/QC program as described in Paragraph 1.02.D, above. Its program shall meet BSA's requirements described in these Specifications. The Contractor shall also provide the Table of Contents of the firm's Quality Assurance Plan.

1.5 Technical Approach Documentation Requirements

A. The bid shall include a detailed and thorough description of the Contractor's technical approach to complete the work in accordance with these Specifications.

B. In general, this technical description will demonstrate the understanding of the work and that all of BSA's technical and contract requirements are satisfied. BSA will not rank or grade the Contractor's technical approach description. However, BSA will use the Contractor's technical description to determine whether the bid meets BSA's minimum requirements in all aspects. BSA may reject any bid which does not provide a technical description that meets BSA's requirements based on BSA's review and analysis of the bid.

C. BSA's technical and performance requirements are described throughout its technical specifications. The Contractor shall thoroughly review these requirements in developing its submittal. Key areas to be specifically addressed in the Contractor's technical description include, but are not limited to, installation work sequence, set-up and laydown areas, equipment used, waste management, approach to health & safety, and construction management.

D. The Contractor shall also provide a preliminary construction schedule.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

END OF SECTION 00 45 13

DIVISION 00 – PROCUREMENT AND CONTRACTING REQUIREMENTS
SECTION 00 65 13 – CERTIFICATE OF COMPLIANCE FORMS

PART 1 - GENERAL

1.1 General

A. Certification of compliance with specification performance standards and manufacturers' specifications and directions shall be furnished for any portion of this work for which specific performance requirements and/or manufacturers' specifications are listed.

B. Submit a notarized certification from the manufacturer certifying that products, material, systems or installations comply with the Specifications.

C. It shall be the responsibility of the Contractor to secure two (2) copies of each certification when required and transmit same to BSA.

D. Certification shall be signed by an officer of the manufacturer, or other individual authorized to sign documents on behalf of the company, on the forms included in this Section.

E. Sample Certification Form (2 pages) is attached to this Section. Each item requiring certification shall be so noted and affidavits shall be filed singly to cover each specified material, installation, application, and the like.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

CERTIFICATION OF SPECIFICATION COMPLIANCE

I/WE, the MANUFACTURER/SUPPLIER and INSTALLER of ______________________________

____

as specified in Section Number ____________ of the Contract Documents prepared by Brookhaven National Laboratory, Upton, New York 11973 for:

(Project Title) ______________________________

(Building)____________________ (J/N) ______________

(Contract Number) ____________________________

do (does) herein certify that all materials furnished for said project do fully comply with all specification requirements as stated within the Contract Documents and further certifies that installation of this work has been performed in strict accordance with recognized standards of the industry governing such work, and all applicable Codes, Regulations, and Standards.

CONTRACTOR: ____

CERTIFICATION BY:______________________________ TITLE: ______________________

ADDRESS: ____

CERTIFICATION DATED: ______________________________________

Distribution:

Original and One Copy to:

Brookhaven National Laboratory
Building 701, P.O. Box 5000
Upton, New York 11973

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CERTIFICATION OF SPECIFICATION COMPLIANCE

CORPORATE ACKNOWLEDGEMENT

On the __________day of ________________, before me came ____________________________________

to me known and who by me being duly sworn did depose and say that he resides at ________________

_______________________________________ that he is the officer of the said corporation executing the foregoing instrument that he knows the seal of said corporation, that the seal affixed to said instrument is such corporate seal, that it was so affixed by order of the Board of Directors of said corporation and that he signed his name thereto by like order.

____

Notary Public

INDIVIDUAL ACKNOWLEDGEMENT

State of

County of

On the __________day of ________________, before me came ____________________________________

to me known and who by me being duly sworn did depose and say that he resides at ________________

________________________________ that he is the individual who executed the foregoing instrument.

____

Notary Public

PARTNERSHIP ACKNOWLEDGEMENT

State of

County of

On the __________day of ________________, before me came ____________________________________

to me known and who by me being duly sworn did depose and say that he resides at ________________

____

that he is a partner in the firm of ____

doing business under the name of ____

and that he executed the foregoing instrument on behalf of said partnership.

____

Notary Public

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END OF SECTION 00 65 13

DIVISION 00 – BIDDING AND CONTRACT REQUIREMENTS
SECTION 00 07 00 – GENERAL CONDITIONS

A. The General Conditions

1. Where any article, paragraph or subparagraph in said documents is supplemented by one of the following paragraphs, the provisions of such article, paragraph or subparagraph shall remain in effect and the supplemental provisions shall be considered as added thereto.

2. Where any article, paragraph, or subparagraph in said documents is amended, voided or superseded by any of the following paragraphs, the provisions of such article, paragraph or subparagraph not so amended, voided, or superseded shall remain in effect.

B. Execution and Correlation

1. All work mentioned or indicated in the Contract Documents shall be performed by the Contractor as part of this Contract unless it is specifically indicated in the Contract Documents that such work is to be done by others.

2. Should the Drawings or the Specifications disagree in themselves, with regard to quality or quantity, the Contractor shall provide the better quality or greater quantity of work and/or materials unless otherwise directed by written modifications to the Contract in accordance with applicable provisions of these Conditions.

3. The Contractor, and all Sub-Contractors, shall refer to all of the Drawings, including those showing primarily the work of the mechanical, electrical and other specialized trades, and to all of the Sections of the Specifications, and shall perform all work reasonably inferable there from as being necessary to produce the indicated results.

4. All indications or notations which apply to one of a number of similar situations, materials or processes shall be deemed to apply to all such situations, materials, or processes wherever they appear in the Work, except where a contrary result is clearly indicated by the Contract Documents.

C. Definitions

1. As used in these Specifications, the following have the meaning shown opposite each:

   a. BSA – Brookhaven Science Associates, operator of Brookhaven National Laboratory, and its authorized representatives of various Divisions and Departments.

   b. BNL Site – Land occupied by Brookhaven National Laboratory, in Brookhaven Township, Suffolk County, New York.

   c. ERP – BNL's Environmental Restoration Projects and its authorized representative.

   d. Site – Immediate area of BNL Site assigned to Contractor for performance of work.

e. Work or Project – Includes but is not limited to all labor, materials, tools, and equipment required and reasonably inferred by Contract to complete all construction.

f. Contractor – Person or entity identified in Lump Sum Contract and responsible for completion of all work.

g. Sub-Contractor – Person or entity directly contracting with Contractor including one who furnishes material worked to a special design according to Drawings and Specifications, but not including one who merely furnishes materials not so worked.

2. Wherever the terms "shown on drawings" are used in the Specifications, they shall mean "noted", "indicated", "scheduled", "detailed", or any other diagrammatic or written reference made on the drawings.

3. Wherever the terms "Provide" or "Provided" are used in these Specifications, they shall mean "FURNISH AND INSTALL". The term "Furnish" shall mean "to fit out and/or supply" material required for project use. The term "INSTALL" shall mean "set", "connect", "erect", "apply" or to "otherwise fix into position for use".

4. Wherever the terms "material" or "materials" are used in the Specifications, they shall mean any "product", "equipment", "device", "assembly" or "item" required under the contract, as indicated by trade or brand name, manufacturers' name, standard specification reference or other description.

5. The terms "approved" or "approval" shall mean the written approval of BSA.

6. The terms "directed", "required", "permitted", "ordered", "designated", "prescribed" and similar words shall mean the direction, requirement, permission, order, designation or prescription of BSA; the terms "approved", "acceptable", "satisfactory" and similar words shall mean approved by, acceptable or satisfactory to BSA; and the terms "necessary", "reasonable", "proper", "correct" and similar words shall mean necessary, reasonable, proper, or correct, in the judgment of BSA.

7. "New" shall mean manufactured within the past twenty-four (24) months and never before used.

8. Wherever the terms "HDPE liner", "high density polyethylene (HDPE) geomembrane liner", "geomembrane", "geomembrane containment liner", and similar words are used, they shall refer to the material specified in Section 31 05 19.16.

D. Review and Intent of Contract Documents

1. The Contractor shall, prior to starting the work on any single portion and at frequent intervals during the progress of the work, carefully study and compare the General Documents, General Conditions, Drawings, Specifications, Addenda and other Contract Documents and shall at once report to ERP any error, inconsistency or omission he may discover.

2. Any necessary change shall be ordered as provided in the provisions of the Contract Documents. Should the Contractor proceed with the work, without such notice to BSA, having discovered such errors, inconsistencies or omissions, all costs arising there from shall be borne by the Contractor.

E. Specifications and Standards

1. Applicable codes and standards for material furnished and work installed shall include all state laws, local ordinances, requirements of governmental agencies having jurisdiction, and applicable requirements of the latest editions of the following codes and standards including but not limited to:

ADA	Americans with Disabilities Act
BNL ES&H	BNL Environment, Safety and Health Standards
BNL RCM	BNL Radiation Control Manual
NYSDOT	New York State Department of Transportation, Office of Engineering, Standard Specification, Construction and Materials.
NEC	National Electrical Code
OSHA	Occupational Safety & Health Administration
EPA	Environmental Protection Agency
CFR	Code of Federal Regulations
FED-STD	Federal Standard
FS	Federal Specification
ASSE	American Society of Sanitary Engineers
NFPA	National Fire Protection Association
NYSBC	Building Code of New York State
NYCRR	New York State Codes, Rules and Regulations
UL	Underwriter's Laboratories
NEMA	National Electric Manufacturers Association
ASHRAE	American Society of Heating, Refrigeration and Air Conditioning
ASME	American Society of Mechanical Engineers
ANSI	American National Standards Institute
ASA	American Standards Association
AWWA	American Water Works Association

NBS	National Bureau of Standards
FM	Factory Mutual
SCDH	Suffolk County Department of Health
ASTM	American Society for Testing and Materials
SSPC	Society of Protective Coatings

In case of conflict, MOST STRINGENT codes will govern.

2. Where specific performance requirements are listed herein, it is the intent of this Specification that all manufacturers, fabricators, suppliers, installers, contractors, subcontractors, specialty and sub-subcontractors will provide services satisfying these requirements whether mentioned by trade or manufacturer's name or submitted for approval as a substitute.

3. Where no explicit quality or standards for materials or workmanship are established for work, such work shall be of such quality consistent with industry standards and of the construction quality established for the Project generally. Conform to specified manufacturer's published specifications and installation instructions unless otherwise specified or indicated.

4. Meet requirements of BNL Standards-Based Management System; ES&H Standards and other applicable SBMS standards, and all other codes and standards specified. In cases of conflict, the standard providing the greater protection shall govern.

5. BNL is an ISO 14001 certified laboratory. It shall be the duty and the responsibility of the Contractor and his subs to comply with the BNL standards and procedures in the area of environmental control, hazardous waste generation, spill prevention, and all other standards specified herein.

6. Copies are available for reference from BSA.

7. Volatile Organic Compounds (VOC's) and their emissions are controlled under the New York Codes, Rules and Regulations of the State of New York. Architectural surface coatings must comply with 6NYCRR Part 205. coating lines must comply with 6NYCRR Part 228.

8. For the purpose of the BNL location, Nassau, Suffolk, Westchester and Rockland Counties fall under the compliance rules of the New York City metropolitan area.

9. All coatings and coated products to be used in the work, shall comply with the appropriate rules and regulations.

10. Federal agencies, to the extent practicable, are required to amend procurement practices so as to minimize the purchase of products manufactured with ozone depleting substances. The Contractor shall, therefore, provide materials that use low or non-ozone depleting substances during their manufacture and/or installation. Materials that do not comply shall be identified in the Contractor's submittal for approval.

11. Federal agencies, to the maximum extent possible, are required to use recovered materials in construction products and manufactured materials. Specific products using recovered materials are covered within the applicable Specification sections.

F. Drawings

1. Drawings are generally done to scale as noted. Contractor shall not, however, scale the drawings for establishing dimensions and/or layout. Scaling of drawings by Contractor shall be at Contractor's own risk. Dimensions indicated on the documents shall be used. Request clarification if discrepancies noted.

2. Drawings of existing buildings and building site are available for reference through BSA.

3. The Contractor shall not perform any portion of the Work at any time without Contract Documents or, where required, approved Shop Drawings, Product Data or Samples for such portion of the Work.

4. Should the Contractor elect to release work for purchase, fabrication or installation without these submittal approvals, it shall be at his own risk and expense should the work be subsequently disapproved.

5. The Contractor shall give BSA timely notice of any additional design drawings, specifications, or instructions required to define the Work in greater detail, or to permit the proper progress of the Work and BSA will provide such information with reasonable promptness so as to cause no delay in the Work.

6. Whenever the Contractor proposes a substitution for a specified item of the work, BSA may require said Contractor to produce reasonable evidence that a material meets such requirements, such as certified reports of past tests by qualified testing laboratories, reports of studies by qualified experts, or other evidence which, in the opinion of BSA, would lead to a reasonable certainty that any material used, or proposed to be used, in the Work meets the requirements of the Contract Documents.

7. The Contract Documents are intended to produce a facility of consistent character and quality of design. All components of the project including visible items of mechanical and electrical equipment have been selected to have a coordinated design in relation to the overall appearance of the project. BSA shall judge the design and appearance of proposed substitutes on the basis of their suitability in relation to the overall design of the project.

G. Price-Anderson Amendments Act

1. Radiological protection is controlled under the requirements of Title 10, Code of Federal Regulations, Part 835, "Occupational Radiation Protection" (10 CFR Part 835).

2. The provisions of this CFR apply to any activity carried out pursuant to this contract by the Contractor, its Sub-Contractors, suppliers and employees that has the potential to result in the exposure of an individual to radiation or radioactive material.

3. The Contractor shall comply, in full, with all applicable requirements of this CFR and shall implement, document, report on, and maintain the required work documents, as necessary to ensure its full compliance.

H. Bio-Preferred Program

1. Clause FAR 52.223.2 – Affirmative Procurement of Bio-based Products Under Service and Construction Contracts applies to the work performed under this Contract. In the performance of this Contract, the Contractor shall make maximum use of bio-based products that are United States Department of Agriculture (USDA)-designated items. These items can be found on the USDA Web site http://www.biopreferred.gov/ DesignationItemList.aspx.

I. Work Permits

1. The work of this Contract is controlled by the requirements of ERP's Operations Procedures Manual (OPM).

2. The work is defined and permitted by approved job-specific work procedures.

J. Notice to Proceed

1. The Contractor shall not knowingly, without formal notice from BSA, prematurely commence operations on the BNL Site. The Notice to Proceed will not be issued by BSA prior to receipt, by Contracts and Procurement, of all required bonds and insurance documents, and prior to receipt, and approval by BSA, of the required Health and Safety Plan.

2. The Notice to Proceed will be issued, in accordance with Clause 1 above, along with a BNL Integrated Safety Management (ISM) Flowdown Form. This form shall be completed by every Sub-Contractor to be used on this Project and returned to BSA, by the Contractor, as part of the requirements of Section 01 30 00, "Submittal Procedures," Clause A.2, "Administrative Submittals."

3. Work may proceed, however, in the preparation and submittal of required submissions and the ordering of materials and equipment that do not require prior approval by BSA.

K. Use of Site

1. The right of possession of the premises and the improvements made thereon by the Contractor shall remain at all times in BNL. The Contractor's right to entry and use thereof arises solely from the permission granted by BSA under the Contract Documents.

2. The Contractor shall confine the use of the premises for all purposes, to the areas occupied by the construction and related storage areas as and if shown.

3. The Contractor shall repair or replace any existing trees, shrubbery or other planting damaged by operations and/or workmen employed in performance of the contract.

4. It shall be the responsibility of the Contractor to provide necessary and required security measures to safeguard the construction site and materials, both stored and installed, from theft, vandalism and intrusion of unauthorized persons during all working hours, non-working hours, weekends and holidays.

L. Work Hours

1. The Contractor shall perform all work on weekdays, excluding BNL holidays, between 8:00 a.m. and 5:00 p.m., unless otherwise specified or approved. The BNL holiday list is available upon request.

2. Notify BSA 24 hours in advance to request approval to work outside of the above working hours. Advise BSA of all planned activities and submit a list of all Contractor and Sub-Contractor employees who are expected on-site during the off-hour period. All employees working during off-hours must possess a valid BNL contractor employee photo identification badge.

3. If off-hours work request is approved, BSA will notify BNL Police Headquarters and the Main Gate of the days and hours that work is planned. Failure to notify BSA will be cause for BNL Police to deny access to the job-site.

M. Identification of Employees

1. All Contractor and Sub-Contractor employees must attend the Contractor/Vendor Orientation Training Course (Clause N below) and be approved by BSA in order to work on the BNL site. A contractor employee photo identification badge will then be issued in order to have access to the site.

2. U.S. citizens must bring proof of citizenship, photo ID and proof of Social Security number. Acceptable citizenship proof is a passport, birth certificate, naturalization papers, voting eligibility, or similar documentation. Drivers' license, military ID cards, union cards, and Social Security cards are insufficient by themselves as proof of citizenship. Proof of Social Security number includes Social Security card, pay stub, W-2 form or medical insurance card. Handwritten documents are not acceptable. Upon arrival at the BNL Main Gate, they will be sent to the Visitors Trailer to receive a temporary pass, which allows them access to the site to attend CVO training.

3. All Non-U.S. citizen workers, including Legal Permanent Residents, requiring access to BNL shall complete a BNL Form 473 located on the BNL home page, www.bnl.gov, Guest Registration link. Each worker shall provide the requested personal information and information concerning their company, forwarding the completed form to their designated BNL Project Manager. Non-U.S. citizens shall provide documentation showing eligibility to be in the United States. This includes a valid passport and visa. Other documentation, to include but not limited to, a permanent resident card, passport entry "process form 1-551", INS documents 1-94, 1-20, DS-2019, or 1-539 part 3 and proof of Social Security, may be necessary to establish legal status and work on the BNL site. Failure to provide proper documentation will result in access being denied until the required documents are provided. Foreign National Contractor employees must submit all required documents 30 days in

advance of the required access date as access approvals may take up to 30 days. All Foreign National Contractor employees are responsible to ensure they remain in legal INS status. BNL ID badges will expire on the expiration date of their current legal status or one year after issuance, whichever comes first. At that point they must reapply with updated documentation to continue eligibility to work at BNL.

4. The Contractor shall assure that all Contractor and Sub-Contractor employees promptly obtain a current BNL contractor employee photo identification badge. Badges shall be obtained in the Badging Office on the Ground Floor of the Research Support Center, Bldg. 400, Monday through Thursday, 8:30 a.m. to 4:00 p.m, and Friday, 8:30 a.m. to 1:00 p.m. In order to keep badging times to a minimum, the Contractor should limit sending all of his employees at the same time.

5. Contractor and Sub-Contractor employees shall wear the badge so as to be visible at all times while on-site.

6. Contractor employee identification badges are valid for one (1) year after issuance and will require renewal at the Badging Office, Bldg. 400. Badges will be provided at no cost to the Contractor. Immediately upon release of employees or project completion, Contractor's Superintendent shall return badges to the Badging Office. (BNL will retain badges for re-issue for one year.)

7. Contractor employees shall report lost identification badges immediately to the Badging Office, Bldg. 400.

N. Contractor Training Requirements

1. The following training will be required as a minimum for the Contractor's and Sub-Contractor's employees:

    a. OSHA 40 hr. HAZWOPER (will not be provided by BSA)

    b. OSHA 8 hr. HAZWOPER Supervisor (will not be provided by BSA)

    c. BNL's Contractor / Vendor Orientation

    d. Back Safety

    e. BGRR General Employee Training

    f. Emergency Planning and Response

    g. ERP General Employee Training

    h. Environmental Protection

    i. Excavation Safety

    j. Hand and Power Tool Safety

    k. Hazard Communication

l. Heat Stress Prevention

m. Lyme & Tick-Borne Disease Awareness

n. Noise and Hearing Conservation

o. Reducing Injuries and Accidents in the Workplace

p. Stop Work Procedure

2. All Contractor and Sub-Contractor employees are required to attend BNL's Contractor/Vendor Orientation Training on their first day on-site. (See Clause M above.)

3. Contractor/Vendor Orientation Training is a one and one-half (1-1/2) hour overview of BNL and OSHA safety requirements. The orientation is offered 8:30 a.m. weekdays in Building 938. Upon completion of the orientation, a card will be issued that must be signed by the ERP Project Manager. The Contractor's or Sub-Contractor's employee must then return to the Badging Office, Bldg. 400, to obtain an identification badge. This safety orientation will be valid for a period of one year. Satisfactory completion will be indicated by issue of employee identification badge.

4. Contractor and Sub-Contractor employees who have not attended the Safety Orientation will be directed to stop work until they have done so.

5. Following completion of the Contractor/Vendor Orientation Training (CVO), the Contractor's and Sub-Contractor's personnel will be required to complete the following BSA computer based training courses: Back Safety (TQ-BACKSAFE), BGRR General Employee Training (ER-GET-BGRR-W), Emergency Planning and Response (GE-EMERGPLAN), ERP General Employee Training (GE-ENV-GET), Environmental Protection (GE-ENV-GET), Hand and Power Tool Safety (TQ-TOOLSAFE), Hazard Communication (HP-IND-200), Heat Stress Prevention (TQ-HEATSTRESS), Lyme & Tick-Borne Disease Awareness (TQ-LYME1), Noise and Hearing Conservation (TQ-NOISE), Reducing Injuries and Accidents in the Workplace (TQ-SAFEAWARE), and Stop Work Procedure (GE-STOPWORK).

6. Completion of BSA on-site computer based training courses may be waived if equivalent training provided by the Contractor's Industrial Hygiene/Safety Program is approved by BSA.

7. If workers cannot read or speak English or are hearing impaired, an interpreter shall be provided by the Contractor to ensure that the training courses are relayed to them in a manner in which they can understand.

O. Pre-Construction Meeting

1. BSA will set up a Pre-Construction Meeting, at which time the ES&H issues, Safety Awareness issues, Submittal procedures, and Site Organization procedures will be addressed. The Contractor's Superintendents, Supervisors and Foreman are required to attend the Pre-Construction Meeting.

P. Construction Schedule and Notification

1. Fourteen (14) days prior to mobilization, submit a detailed work schedule showing the work being completed by the Contract completion date. Coordinate with Section 01 33 00 "Submittal Procedures".

2. BSA must be notified and made aware of all construction work in progress. BSA will provide appropriate telephone extension numbers for notifications.

3. When construction has not been previously scheduled, notify BSA each day before 8:30 a.m. of planned activities.

4. Special scheduling, when appropriate, will be agreed upon at a meeting, set up by BSA, to prepare a rough work schedule. The Contractor shall respond, within one (1) week, with a formal work schedule.

5. When work falls behind schedule due to Contractor's fault or negligence, increase all labor and overtime to assure completion within schedule.

6. Do not utilize men or materials which would cause work stoppage on BNL Site.

   a. Radiation Generating Devices are of special concern. The following industrial equipment, known to contain radiological sources or able to generate radiation, if brought to the BNL Site, require the Contractor to notify the Project Manager, in advance, and require a Radiological Work Permit to be approved prior to their use on site. RWPs require Health Physics review.

      1. Radiography Equipment

      2. Moisture Density Gauges

      3. Soil Density Gauges

7. BSA will utilize all available contractual remedies to enforce schedule compliance. Should the Contractor encounter delays caused by BSA, it is the Contractor's responsibility to promptly notify the contracting officer and to request an extension of the contract compliance date.

Q. Sub-Contractor Review

1. BSA reserves the right to review, to approve or disapprove proposed Sub-Contractors based upon past safety and performance quality. No later than two (2) weeks after signed Contract, submit directly to BSA, a complete list of proposed Sub-Contractors for review. Coordinate with Section 01 30 00 "Submittal Procedures".

2. Sub-Contractors must meet the current published OSHA DART Rate and Recordable Incidence Rates for construction in their trades. Sub-Contractors shall also have an insurance Experience Modification Rating equal to or less than one (1).

R. Coordination

1. Arrange and coordinate work, be responsible for acts and omissions of all parties involved in the work, be responsible for satisfactory performance of all work, ensure that each trade is fully informed of full extent of work required. Work of a trade is not necessarily limited to the Drawing or Specification page describing the work to be done by that trade.

2. Coordinate installation of all equipment and shop fabricated material, including that supplied by BSA. BSA assumes no responsibility for contractual relations between Contractor and other parties.

3. Coordinate and schedule all work with all BSA activities and operations through BSA.

4. Notify BSA forty-eight (48) hours in advance of commencement of work to allow Building Managers to give proper notice to building occupants.

S. Transport and Traffic

1. Schedule, confine, and perform work, as directed, so as not to interfere with BNL traffic on existing roads, walks, parking and other paved areas. Park all vehicles in designated parking areas. Load and unload vehicles where directed. Comply with all BNL traffic regulations. Violations will be backcharged from the Contract amount.

2. In transporting materials and equipment, use designated roads and railroad on BNL Site. Obtain information concerning these facilities from BSA. When necessary to maintain work schedule, ship all materials, including Sub-Contractors' items, from point of origin to BNL Site by direct means equal to, or better than, express service.

3. Notify BSA 24 hours in advance of all deliveries to the job site. The Contractor shall provide all equipment to off-load equipment and materials from vehicles.

T. Open Flame Operations:

1. It shall be the duty and responsibility of the Contractor performing any cutting or welding to comply with the provisions of BNL Standards-Based Management System; ES&H Standards, and the National Fire Protection Association's National Fire Codes pertaining to such work. The Contractor shall read and be familiar with the provisions of these standards and codes. The Contractor shall be responsible for all damages resulting from failure to so comply.

2. Notify BSA forty-eight (48) hours in advance of cutting, welding, or similar open flame operations.

3. Provide any required fire watch and take all required precautions where directed.

4. BSA will make arrangements for a Cutting/Welding Permit. No open flame operations shall proceed prior to the issuance of the written Cutting/Welding Permit nor shall work continue after expiration date of permit.

U. Protection of Property

1. Contractor shall be responsible for the security of property within the Work Site.
2. Protect, with whatever means and methods required, all new and existing property from damage by and as a result of work in this Contract as approved, including disappearance. Refer to Attachment A, approved 02/17/09, Article 14, Contractor's Responsibilities.
3. Repair, refinish, replace and otherwise correct all damage, and replace any missing materials, as directed and approved by BSA.

V. Service and System Interruptions

1. Do not interrupt service until directed. Notify BSA two (2) weeks in advance of all proposed service interruptions unless otherwise specified or directed.
2. Keep all interruptions to a minimum. Complete all possible prior work and prefabrication, and have all labor and materials on Site, as approved, prior to interruption.
3. Do not modify, disconnect and, in any way, impair fire protection and detection systems without approval.
4. Notify BSA forty-eight (48) hours in advance of all work on fire protection systems.

W. Cutting, Patching, and Penetrations

1. Cut, drill, alter, remove, and replace all existing construction as required for performance of work. Patch and finish all changed and damaged work to match existing construction as approved.
2. Seal all penetrations through fire rated systems with an approved fire and/or smoke stop material, Hilti North American Fire Stopping Systems, or equal as approved by BSA, capable of maintaining the level of fire protection of the wall, partition, floor or ceiling penetrated.
3. Systems selected shall be appropriate for the joint and/or penetration involved, such as floor to floor, wall to wall, floor to wall, head of wall, and whether there is movement or no movement capability.

X. Job Meetings

1. Job meetings will be held at the job site at least monthly unless otherwise designated by BSA.
2. The Contractor and his field superintendent, and the Sub-Contractors or vendors whose presence is necessary, shall attend job meetings.
3. Decisions, instructions and interpretations agreed upon at such meetings will be recorded in a "Memorandum of Meeting" prepared by BSA and furnished to the Contractor and each attendee for necessary action.

Y. Salvage

1. Salvage is that material and equipment, as defined in the Specifications, to be removed by the Contractor from the Project facility, but is to remain the property of BNL.

2. Remove all specified salvageable material and equipment and pass it through the vehicle radiation monitor. Place, where directed by, and turn over to, BSA, on the BNL Site.

3. Remove all non-salvageable material and equipment and legally dispose of same off the BNL Site.

4. All removed salvageable material and equipment, as defined in the Specifications, shall remain property of BNL.

5. All removed non-salvageable materials and equipment shall pass through the vehicle radiation monitor prior to exiting the BNL site.

Z. Construction Waste Management

1. Waste and demolition materials shall be segregated into disposal categories:

   a. Non-hazardous waste is any refuse, other than construction debris, that is considered industrial or special in nature (oil, anti-freeze, etc.). The BNL Standards-Based Management System (SBMS) contains the full descriptions.

   b. Construction rubbish and debris is any refuse as a result of the normal construction or earth clearing activity such as packing and shipping materials, discarded lumber and wood materials, metals, insulation, gypboard, piping, electrical scrap, tree branches, roots, and sweepings.

2. Non-hazardous waste shall be disposed of by the Contractor at the BNL Waste Management Facility, or at an off-site disposal facility approved by BSA.

3. Construction rubbish and debris shall be disposed per Section 01 74 19.

END OF SECTION 00 07 00

DIVISION 00 – BIDDING AND CONTRACT REQUIREMENTS
SECTION 00 08 00 – SUPPLEMENTARY CONDITIONS

A. Substantial Completion

1. Substantial Completion is the stage in the progress of the Work when the Work or a designated portion thereof is sufficiently complete, as determined by BSA in accordance with the Contract Documents, so as to be able to be occupied or utilized for its intended use.

B. BSA-Supplied Items / Services

1. Items / Services to be supplied to the Contractor by BSA are:

ii. Training

iii. Electrical power (120 V, 20A, single phase)

iv. Potable water and fire hydrant water with back flow preventer.

v. Industrial Hygienist for required sampling and monitoring.

vi. Digging Permits.

vii. Hot Work / Open Flame Permit.

C. Safety Requirements

1. All Contractor and Sub-Contractor employees are required to attend BNL's Contractor/Vendor Orientation Training (see Section 00 07 00.M and 00 07 00. N, General Conditions).

2. Excavating is recognized as one of the most hazardous construction operations. All Contractor and Sub-Contractor employees working in or near excavations should be familiar with the excavation safety requirements in 29 CFR 1926, Subpart P. The Supervisor must discuss the excavation safety requirements and specific hazard(s) and risk information with their staff. This job briefing should discuss specific work procedures, protective equipment requirements, and departmental contacts at the local application level. This job level discussion can be informal; however, a record of this briefing should be documented.

3. BSA will arrange and ESH&Q Division will provide additional safety instructions, as required. All personnel shall conform to special requirements for wearing TLD's, personal protective equipment, protective clothing, respirators, and other safety measures as required. TLD's, only, will be provided by BSA at no charge, unless otherwise specified.

4. All heavy equipment will be inspected for safe operation by BSA prior to use on site.

D. Industrial Hygiene Monitoring

1. All work on this Project with regard to, and of, the conditions listed must be done within the occupational exposure limits for Industrial Hygiene hazards set in OSHA 29CFR1926, 29CFR1910, and ACGIH *Threshold Limit Values®*. Compliance with the OSHA Permissible

Exposure Limits and American Conference of Governmental Industrial Hygienists (ACGIH) *Threshold Limit Values®* shall be determined by representative personnel exposure monitoring and dosimetry conducted by the BSA-supplied Industrial Hygienist. Monitoring shall be continuously performed during the total duration of the hazardous condition. The details of the project's exposure monitoring equipment, methods, and monitoring strategy shall be included in the Contractor's Health and Safety Plan. Conditions that require industrial hygiene monitoring include, but are not limited to:

a. Asbestos

b. Beryllium

c. Working with Chemicals, Adhesives, or Lead

d. Release of Silica (grinding, drilling, core boring, jackhammering of concrete, masonry, mortar, etc.)

e. Confined Spaces

f. Heat Stress

g. Carcinogens

h. Noise and Hearing Conditions

i. RF/Microwave/Non-Ionizing Radiation

j. Static Magnetic Fields

2. BSA is required to provide qualified monitoring and hazard assessment personnel (per DOE G440.1-3 *Occupational Exposure Assessment*) to conduct all Industrial Hygiene monitoring as outlined in the Contractor's Health and Safety Plan

3. The BSA Industrial Hygienist is required to conduct monitoring with calibrated equipment using NIOSH or OSHA approved methods, and to have analysis conducted by an American Industrial Hygiene Association (AIHA) Proficiency Analytical Testing certified laboratory or by National Institute of Standards and Technology (NIST) traceable calibrated direct reading instrumentation. All instrumentation used for surveys shall have been calibrated in compliance with the manufacturer's specification prior to use in the field.

4. Copies of all equipment calibration, field sampling sheets, laboratory analysis reports, and hazard assessment evaluation reports are to be provided to BSA, in accordance with the Shop Drawings, Manufacturers Data, and Samples Section above.

E. Contractor Radiological Training

1. All workers that may enter a controlled area on the BNL Site are required to wear a thermoluminescent dosimeter (TLD). In order to receive a TLD, at a minimum workers must complete General Employee Radiological Training (GERT). GERT is available as a Web-based course at http://training.bnl.gov and takes approximately one (1) hour to complete.

F. Wildfire Danger

1. This work will be performed in a wildland area of BNL, where brush fires are a real concern. The Contractor shall ensure that the conduct of operations minimizes the potential of the occurrence of wildland fires.

2. Preventing the parking of vehicles on grassy areas with engines running, and control of disposal of smoking materials, is the responsibility of the Contractor's Safety Representative.

3. Ensure gasoline-engine-driven portable generators and air compressors are equipped with spark arresters and that personnel are aware of fire break names if calls to the Fire Department [Ext. 2222 or (631) 344-2222] become necessary.

G. Schedule of Values

1. Successful bidder shall submit no later than 2 weeks after contract signing the following Schedule of Values breakdown.

   a. Engineered Cap Preparation & Mobilization

   b. Engineered Cap Installation

   c. Engineered Cap Demobilization

   d. Completion Report

H. Surveys and Stakeout

1. BSA will establish base lines and bench marks at the site of the work from which the Contractor shall complete the layout of the work to be performed under the Contract. From the basic data established by BSA, the Contractor shall establish reference control points and complete the layout of the work.

2. In addition, BSA will mark and/or stake out all known underground utility locations. Locations are approximate. Contractor shall be responsible to maintain the markings and/or the stakeouts for as long as they are required. Any excavating near these locations shall be by hand to locate utilities exactly.

3. The Contractor shall be responsible for all measurements that may be required for execution of the work to the exact position and elevation as prescribed in the specifications, shown on the drawings, or as the same may be modified at the direction of BSA to meet changed conditions or as result of modification to the Contract.

4. Further, the Contractor shall be responsible for the establishment of points, wall and partition lines required by the Sub-Contractors in laying out their work.

5. The Contractor shall furnish such stakes and other required equipment, tools and materials, and all labor as may be required in laying out any part of the work from the base lines and bench marks established by BSA.

6. If, for any reason, bench marks and/or utility location markings, monuments are disturbed, it shall be the responsibility of the Contractor to re-establish them, without cost to BSA, as directed by BSA. BSA may require that construction work be suspended at any time when location and limit marks established by the Contractor are not reasonably adequate to permit checking completed work or the work in progress.

7. BSA will back charge the Contractor for any re-establishment of stakeouts performed by BSA that were disturbed by the Contractor.

8. The Contractor shall provide two survey maps: one for the bottom of the final excavation grades, one for the final top of asphalt grades.

I. Construction Safety

1. The Contractor is solely responsible for Construction Safety for the duration of this Contract. He shall prepare and submit a Health and Safety Plan (HASP) twenty-one (21) days prior to start of work on site. A HASP Outline with an Occupational Medicine Program example is available from BSA and copies will be handed out at the Pre-Bid meeting. This plan will be reviewed and approved by BSA and shall include the following:

    a. Specific assignment of an individual, employed by the Contractor and named in the Plan, as well as one (1) alternate, as Safety Representative, who will be responsible for job site construction safety. A Multi-Discipline Contractor must demonstrate, with verification of completion of the "30-Hour OSHA Compliance for the Construction Industry" construction safety courses, familiarity with 29 CFR 1926, etc., the ability of the Safety Representatives to supervise the type of work for which they will be responsible. A Single-Discipline Contractor needs to complete the "10-Hour OSHA" course to demonstrate their ability. Sources for training can be obtained from BSA. A Safety Representative shall be on the Project Site whenever construction activities are being performed.

    b. A letter or certificate of compliance indicating that the Contractor is aware of, and has reviewed, and will comply with the safety regulations of both the OSHA Standards (29 CFR 1926/1910) and BNL Standards-Based Management System; Standard for Electrical Safety in the Workplace (NFPA 70E), ES&H Standards (available for reference through BSA).

    c. A copy of the company record of past injury, accident, fire and property damage experience, including motor vehicle, for previous two (2) years. In lieu of this data, Contractor may submit the previous two (2) years industrial insurance experience modifiers or rates.

    d. A descriptive outline of the Contractor's safety program indicating:

        1) Provisions for emergency aid.

2) Specific identification of "Competent Person" (per OSHA), his/her qualifications, including, but not limited to, Construction Safety Awareness courses taken, applicable to the nature of this Project, and where applicable, the method of accomplishment in a specific excavation plan. Competent Person must have had formal training, have knowledge of existing standards, and have authority to take actions deemed necessary.

3) A comprehensive occupational medicine program, under the direction and control of an occupational medicine physician, that provides these services in full compliance with all provisions of Section 8 ("Occupational Medicine") of Appendix A of the Federal Regulations 10 CFR 851 ("the Rule"), including the following provisions:

   a) plans and implements the occupational services,

   b) is, or is under the direction of, a physician licensed in the state of New York,

   c) is staffed by health care professionals with valid New York State licenses in their respective professions,

   d) determines the content of the worker health evaluations in accordance with current sound and acceptable medical practices and all pertinent statutory and regulatory requirements.

4) The Contractor shall attend daily tailgate safety briefings; these briefings are conducted by BSA.

5) A program to provide for the frequent and regular inspection and reporting of job site conditions relating to safety. An inventory of all chemicals used to perform the work, with their Material Safety Data Sheets, shall be maintained at the Job Site. Additionally, the program shall address storage of flammable and non-flammable chemicals.

6) A program certifying the safe operating condition and assuring the proper maintenance of earth moving equipment, cranes, vehicles and other such equipment, including an environmental protection spill prevention plan.

7) A program certifying the safe operating condition and assuring the proper maintenance of permanent and/or temporary light, power and electrical equipment, including protective devices (GFCI) for portable electric tools.

8) Provisions through meetings, established contacts or other means, for the mutual exchange of information with Contractor and Sub-Contractor personnel on:

   - Changes in scope of work
   - Recognized hazards
   - Identified inspection deficiencies
   - Future phases of work
   - Potential problem areas
   - Coordination of crafts

9) Upon approval of the HASP, the Contractor shall make any revisions noted and resubmit five (5) copies of the Plan to BSA for distribution.

2. All workers shall be able to comprehend the scope of work and safety instructions required to perform the job. All workers employed by the Contractor and the Sub-Contractor shall acknowledge, in writing, that they have read and understood the HASP. If workers cannot read or speak English or are hearing impaired, an interpreter shall be provided by the Contractor to ensure that the scope of work, information regarding hazards associated with the work-site, and safety requirements are relayed to them in a manner in which they can understand. The interpreter shall sign that he has explained the plan, and shall be at the work-site whenever these workers are on the job. The approved HASP shall be available at the job site to all Contractor and Sub-Contractor employees.

3. The Contractor shall be required to include the applicable safety requirements in all contracts with all tiers of Sub-Contractors.

4. Prior to the start of construction, a pre-construction meeting shall be scheduled with the Contractor to review specific safety requirements of the project.

5. BSA will make arrangements for a Digging Permit. A Digging Permit is required for all excavations greater than six (6) inches in depth. No excavation activities shall proceed prior to the issuance of the written Digging Permit nor shall work continue after the expiration date of the permit. Copies of the permit must be retained on site, distributed as directed on the permit, and kept on file for reference, until such time as the excavation is filled in.

6. BSA will make arrangements for a Cutting/Welding Permit. No open flame operations shall proceed prior to the issuance of the written Cutting/Welding Permit nor shall work continue after the expiration date of the permit.

7. Concrete and/or Masonry Penetrations are of specific safety concern at BNL. It is BSA policy that the Contractor ensure safe penetration into or through any existing concrete or masonry surface.

a. BNL Standards-Based Management System, ES&H Standards and Facilities and Operations Policies and Procedures shall be followed, including the completion of appropriate Penetration Permits and the provision and use of utility locating/detecting equipment.

b. In order to comply with these guides, the Contractor shall provide trained "Authorized Employees" and shall submit, for BSA review and approval, the name and type of the utility locating/detecting equipment to be used, as well as the specific names of the trained personnel who will perform the locating task with this equipment and who will execute the penetration work.

c. Non-aggressive penetrations cannot be executed without first using utility locating/ detecting equipment and obtaining approval by BSA.

d. Aggressive penetrations cannot be executed without first using utility locating/detecting equipment followed by the completion and approval of a BSA Aggressive Penetration Permit.

8. No work at the Site will be permitted to proceed and no payment requisitions will be authorized until the HASP and required work permits (e.g., digging) is submitted and approved.

9. BSA will not tolerate non-adherence to safety requirements under this Contract. These requirements shall include, but not be limited to, all applicable OSHA Safety requirements, the BNL Standards-Based Management System; ES&H Standards, all applicable codes and regulations, and the approved Health and Safety Plan. Failure to comply will result in BSA's direction to stop work in accordance with Article 27 of Attachment A. Non-compliance could also mean the barring of the violating individuals from the BNL Site. Repeated safety violations may also result in a permanent Work Stoppage under Article 30.

END OF SECTION 00 08 00

DIVISION 01 – GENERAL REQUIREMENTS
SECTION 01 10 00 – SUMMARY OF WORK

PART 1 – GENERAL

1.1 General

A. Works to be performed are as indicated in the Contract Documents that consist of the Drawings, Form of Contract, the Attachment A, General Terms and Conditions for Construction and Labor Hour Contracts, latest edition, the Division 00 - General and Supplementary Conditions, the Division 1 - General Requirements, and the Technical Sections of the Contract Specifications.

B. In case of discrepancies within the terms of the specifications themselves, the matter shall be promptly submitted to the Contracting Officer in accordance with Article 42.16, Attachment A - General Terms and Conditions (approved 03/16/06).

1.2 Project Description

A. The Project consists of installation of an engineered cap over deep subsurface radiologically contaminated soils around the west, south, and east sides of Building 701 (Brookhaven Graphite Research Reactor), as shown on the Contract Drawings and described within these Specifications. The engineered cap is designed to accommodate heavy truck loading (up to 80,000 pounds).

1.3 Scope

A. In general, the Work consists of, but is not limited to, site demolition of existing asphalt, concrete, recycled concrete aggregate (RCA), and backfill material; and installation of an engineered cap consisting of a 40-mil HDPE geomembrane, sand protective layer, geotextile layer, RCA layer, asphalt treated base (ATB) layer, and asphalt surface course.

B. Installation of the concrete pads adjacent to the west and east roll-up doors of Building 701, as shown on the Contract drawings, will be performed by an Contractor prior to the installation of the engineered cap.

1.4 Contractor's Responsibilities:

A. Task 1 – Engineered Cap Preparation & Mobilization

1. Preparation of all documentation listed in Section 01 33 00 (Submittals) in accordance with the schedule provided.

2. Mobilization of equipment and personnel, and training of personnel.

3. Establishment of temporary facilities and controls.

B. Task 2 – Engineered Cap Installation

1. Remove asphalt wearing course and base course, as denoted on the Contract Drawings. This material will be re-used on the BNL site.
2. Remove concrete curbing, as denoted on the Contract Drawings. This material will be re-used on the BNL site.
3. Excavate soil and recycled concrete aggregate (RCA), as denoted on the Contract Drawings. This material will be re-used on the BNL site.
4. Place, grade, and compact sand protective layer on top of the prepared subgrade, as denoted on the Contract Drawings
5. Installation 40-mil HDPE geomembrane, as denoted on the Contract Drawings.
6. Anchor geomembrane to building foundation walls and seal around penetrations (e.g, monitoring wells). Details are provided on the Contract Drawings.
7. Place, grade, and compact sand protective layer on top of the HDPE geomembrane, as denoted on the Contract Drawings.
8. Installation of geotextile, as denoted on the Drawings.
9. Place, grade, and compact concrete aggregate on top of the geotextile, as denoted on the Contract Drawings.
10. Installation of asphalt treated base (ATB) to four inches thick and hot mix asphalt surface course to three inches thick, as denoted on the Contract Drawings.
11. Seal asphalt surface with fog seal coat.

C. Task 3 – Engineered Cap Demobilization and Completion Report

1. Demobilization includes the Contractor's activities to demobilize equipment, components, and personnel associated with the installation of the engineered cap.
2. The Contractor shall prepare a project completion report, as outlined in Section 01 33 00 (Submittals).

1.5 Contractor Use of Premises:

A. Limit use of the premises to construction activities in areas indicated; allow for BNL occupancy and use by the public.

B. Confine operations to areas within Contract limits indicated. Portions of the site beyond areas in which construction operations are indicated are not to be disturbed.

C. Keep driveways and entrances clear at all times. Do not use these areas for parking or storage of materials. Schedule deliveries to minimize requirements for storage of materials.

PART 2 – PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

END OF SECTION 01 10 00

DIVISION 01 – GENERAL REQUIREMENTS
SECTION 01 33 00 – SUBMITTAL PROCEDURES

PART 1 – GENERAL

1.1 General

A. Extent

1. This Section includes administrative and procedural requirements for submittals required for performance of the Work, including the following:

   a. Contractor's Construction Schedule.

   b. Schedule Updates.

   c. Industrial Hygiene Monitoring Results.

   d. Product Data.

   e. Shop Drawings and Manufacturer's Data.

B. Bid Submittals

1. Refer to other Division 00 Sections and other Contract Documents for requirements for bid submittals. Such submittals include, but are not limited to, the following:

   a. Required Documentation Submittal Checklist.

   b. Corporate Experience.

   c. Client References.

   d. Project Management Qualifications and Experience.

   e. Safety Performance History.

   f. Corporate QA/QC Program Summary.

   g. Technical Approach.

   h. List of Sub-Contractors.

   i. Bid.

C. Administrative Submittals

1. Refer to other Division 01 Sections and other Contract Documents for requirements for administrative submittals. Such submittals include, but are not limited to, the following:

   a. Construction Schedule.

   b. Schedule of Values.

   c. Quality Assurance Plan.

d. Letter of Compliance with Safety Requirements and SBMS.

e. Health and Safety Plan.

f. Engineered Cap Installation Work Plan.

g. Proposed List of Heavy Equipment and Mobilization Dates.

h. Construction Progress Photographs (optional).

i. Project Completion Report.

j. Applications for Payment.

k. Insurance Certificates.

l. Certification of Specification Compliance.

1.2 Definitions

A. Manufacturer's Product Data include installation drawings, setting diagrams, layouts, schematics, descriptive literature, illustrations, schedules, performance and test data, similar materials and samples furnished by Contractor to explain and show in detail, specific portions of work required by Contract.

1.3 Submittal Procedures

A. Coordination

1. Coordinate preparation and processing of submittals with performance of construction activities. Transmit each submittal sufficiently in advance of performance of related construction activities to avoid delay.

2. Submittals to BSA by Contractor, or through the Contractor from Sub-Contractor, or any low tier Sub-Contractor, pursuant to a construction contract, shall show in detail (i) the proposed fabrication and assembly of structural elements and (ii) the installation (i.e., layout, form, fit, setting, and attachment details) of materials or equipment.

3. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.

B. Processing

1. Before submitting any data for approval, the Contractor shall coordinate all such drawings and data, and check them for accuracy, completeness, and compliance with Contract requirements. The Contractor shall see that all work contiguous with and having bearing on the work indicated on drawings is accurately and distinctly illustrated and that work shown is in conformity with contract requirements.

2. The Contractor shall indicate his approval on all submittals as evidence of the above coordination and review. Shop drawings and Manufacturer's data submitted to BSA

without evidence of Contractor's approval, may be returned for resubmission. Contractor's received stamp is not considered as approval.

3. To avoid the need to delay installation as a result of the time required to process submittals, allow sufficient time for submittal review, including time for resubmittals.

   a. Allow 10 working days for review. Allow additional time if BSA must delay processing to permit coordination with subsequent submittals.

   b. If resubmittal is necessary, process the same as the initial submittal.

   c. Allow 10 working days for reprocessing each submittal.

   d. No extension of Contract Time will be authorized because of failure to transmit submittals to BSA sufficiently in advance of the Work to permit processing.

      3. The General Conditions portion of the Contractor's monthly payment requisitions may be reduced if required Shop Drawings, Manufacturers Data, Samples and any other required submissions are not received, or until they are received in a timely manner.

C. Submittal Preparation

1. Place a permanent label or title block on each submittal for identification. Indicate the name of the entity that prepared each submittal on the label or title block.

   a. Provide a space approximately 4 by 5 inches (100 by 125 mm) on the label or beside the title block on Shop Drawings to record the Contractor's review and approval markings and the action taken.

   b. Include the following information on the label for processing and recording action taken.

      1. Project Name and Building Number.

      2. Job Number and Contract Number.

      3. Date and Specification Section Reference.

      4. Name and address of the Contractor, Sub-Contractor, supplier and manufacturer.

   c. Submittal Transmittal

      1. Package each submittal appropriately for transmittal and handling. Transmit each submittal from the Contractor to BSA using a transmittal form. BSA will not accept submittals received from sources other than the Contractor.

      2. On the transmittal, record relevant information and requests for data. On the form, or separate sheet, record deviations from Contract Document requirements, including variations and limitations. Attach Contractor's Certification of Specification Compliance forms stating that information complies with Contract Document requirements.

3. Transmittal Form: Use Contractor's Standard Transmittal forms.

4. Address all submissions to:

   Michelle Pizzulli
   Brookhaven National Laboratory
   Building 701, Box 5000
   Upton, New York 11973

5. Mark all transmittal forms as follows:

   JOB TITLE: BGRR Engineered Cap
   BLDG. NO. 701

1.4 Contractor's Construction Schedule

A. Bar-Chart Schedule

1. Prepare a fully developed, horizontal bar-chart-type, Contractor's construction schedule. Submit within fourteen (14) calendar days prior to mobilization.

2. Provide a separate time bar for each significant construction activity. Provide a continuous vertical line to identify the first working day of each week. Use the same breakdown of units of the Work as indicated in the "Schedule of Values."

3. Prepare the schedule on a sheet, or series of sheets, of stable transparency, or other reproducible media, of sufficient width to show data for the entire construction period.

4. Secure time commitments for performing critical elements of the Work from parties involved. Coordinate each element on the schedule with other construction activities; include minor elements involved in the sequence of the Work. Show each activity in proper sequence. Indicate graphically the sequences necessary for completion of related portions of the Work.

5. Coordinate the Contractor's Construction Schedule with the Schedule of Values, list of subcontracts, Submittal Schedule, progress reports, payment requests, and other schedules.

6. Indicate completion in advance of the date established for Substantial Completion. Indicate Substantial Completion on the schedule to allow time for the BSA procedures necessary for certification of Substantial Completion.

7. Schedule Updating

   a. Revise the schedule after each meeting, event, or activity where revisions have been recognized or made. Issue the updated schedule concurrently with the report of each meeting.

1.5 Document Submittals

A. Quality Assurance Plan

1. The Quality Assurance Plan will be prepared by the Contractor to address the criteria in 10 CFR 830.122, BSA SBMS requirements. At a minimum, the following sections shall be included in the Plan as applicable to the Work:

    1. Program
    2. Personnel Training and Qualifications
    3. Quality Improvement
    4. Documents and Records
    5. Work Progress
    6. Design
    7. Procurement
    8. Inspection and Acceptance Testing
    9. Management Assessment
    10. Independent Assessment

B. Health and Safety Plan (HASP)

1. The HASP shall be prepared in accordance with 29 CFR 1910.120, 29 CFR 1926, all applicable BSA SBMS requirements, and Section 00 80 00, Paragraph I "Construction Safety". The Plan shall also address the risks, hazards and mitigative actions described in the JRA.

C. Engineered Cap Installation Work Plan

1. An electronic copy of the required procedure format in Microsoft Word format will be provided to the Contractor for use as a document template. The Plan shall contain the summary of the work and describe the responsibilities of the project personnel. The Plan shall contain all requirements of OSHA and SBMS requirements. Additionally prior to site mobilization, the Contractor shall provide BSA with their proposed detailed site layout showing equipment location, material storage, ingress and egress to the work areas and site modification requirements. The site layout plan is subject to BSA approval.

2. The Plan shall prescribe the means and methods that will be employed to safely perform the work. At a minimum, the following sections shall be included in the Plan:

    a. Heavy equipment to be used.

    b. Work Sequence.

    c. Site Preparation.

d. Hold Points, including but not limited to, inspections of the subgrade, geomembrane installation, geomembrane interfaces with concrete / piping surfaces, and asphalt placement.

e. Erosion and sediment control.

D. Project Completion Report

1. This Report shall contain a complete description of the Work performed by the Contractor including:

a. Introduction – general description of the project

b. Summary of existing site conditions

c. Overview of Work Performed

1. Dates of significant activities (e.g. start, complete, duration)
2. Noteworthy challenges and accomplishments
3. Safety Performance
4. Work Activities
5. Major tools & equipment used
6. Site demolition
7. Excavation
8. Subgrade preparation
9. Installation of HDPE geomembrane
10. Placement of backfill material
11. Installation of geotextile layer
12. Installation of asphalt treated base course and wearing course
13. Description of "as built" conditions

d. Lessons Learned

e. Figures, including depictions of "as built" conditions and surveys

f. Photographs showing before, during and after work (optional)

1.6 Daily Construction Reports:

A. Prepare a daily construction report recording the following information concerning events at the site, and submit duplicate copies to BSA at weekly intervals:

1. List of Sub-Contractors at the site.

2. Approximate count of personnel at the site.

3. High and low temperatures, general weather conditions.

4. Accidents, occurrences, and unusual events.

5. Meetings and significant decisions.

6. Stoppages, delays, shortages, and losses.

7. Emergency procedures.

1.7 Manufacturer's Product Data

A. Collect Product Data into a single submittal for each element of construction or system. Product Data includes printed information, such as manufacturer's installation instructions, Manufacturer's Safety Data Sheets (MSDS), catalog cuts, and standard color charts.

B. Mark each copy to show applicable choices and options. Where printed Product Data includes information on several products that are not required, mark copies to indicate the applicable information. Include the following information:

1. Manufacturer's printed recommendations.

2. Compliance with trade association standards and with recognized testing agency standards.

3. Applications of testing agency labels and seals.

4. Notation of dimensions verified by field measurement and coordination requirements.

C. Do not submit Product Data until compliance with requirements of the Contract Documents has been confirmed.

D. Submit two (2) copies for each submission of manufacturer's cuts and data sheets until approved.

E. Distribution:

1. Furnish copies of final submittal to installers, Sub-Contractors, suppliers, manufacturers, fabricators, and others required for performance of construction activities. Show distribution on transmittal forms.

2. Do not proceed with installation until a copy of Product Data is in the Installer's possession.

3. Do not permit use of unmarked copies of Product Data in connection with construction.

1.8 Quality Assurance Submittals

A. Submit quality-control submittals, including design data, certifications, manufacturer's instructions, manufacturer's field reports, and other quality-control submittals as required under other sections of the Specifications.

1.9 Inspection and Test Reports

A. Requirements for submittal of inspection and test reports from independent testing agencies are specified in various other sections of the Specifications.

B. Submit two (2) copies of the required reports.

1.10 Record Document Submittals

A. Maintain a clean, undamaged set of black line white-prints of Contract Drawings and Shop Drawings. Mark the set to show the actual installation where the installation varies substantially from the Work as originally shown. Mark which drawing is most capable of showing conditions fully and accurately. Where Shop Drawings are used, record a cross-reference at the corresponding location on the Contract Drawings. Give particular attention to concealed elements that would be difficult to measure and record at a later date.

B. Mark record sets with red erasable pencil. Use other colors to distinguish between variations in separate categories of the Work.

C. Mark new information that is important to BSA but was not shown on Contract Drawings or Shop Drawings.

D. Note related change-order numbers where applicable.

E. Organize record drawing sheets into manageable sets. Bind sets with durable-paper cover sheets; print suitable titles, dates, and other identification on the cover of each set.

F. Protect record documents from deterioration and loss in a secure, fire-resistant location. Provide access to record documents for BSA's reference during normal working hours.

G. Refer to Specification Sections for requirements of miscellaneous record keeping and submittals in connection with actual performance of the Work. Immediately prior to the date or dates of Substantial Completion, complete miscellaneous records and place in good order. Identify miscellaneous records properly and bind or file, ready for continued use and reference. Submit to BSA for the permanent project records.

1.11 BSA Review

A. Except for submittals for the record or information, where action and return is required, BSA will review each submittal, mark to indicate action taken, and return promptly.

1. Compliance with specified characteristics is the Contractor's responsibility.

B. Action Stamp: BSA will stamp each submittal with a uniform, action stamp. BSA will mark the stamp appropriately to indicate the action taken, as follows:

1. No Exception Taken: When BSA marks a submittal "NET," the Work covered by the submittal may proceed provided it complies with requirements of the Contract Documents. Final payment depends on that compliance.

2. Make Corrections Noted: When BSA marks a submittal "MCN," the Work covered by the submittal may proceed provided it complies with notations or corrections on the submittal and requirements of the Contract Documents. Final payment depends on that compliance.

3. Revise and Resubmit, Rejected, and Submit Specified Item: When BSA marks a submittal with these comments, do not proceed with Work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Revise or prepare a new submittal according to the notations; resubmit without delay. Repeat if necessary to obtain different action mark.

   a. Do not use, or allow others to use, submittals marked with these comments, at the Project Site or elsewhere where Work is in progress.

4. Other Action: Where a submittal is for information or record purposes or special processing or other activity, BSA may return the submittal marked "Reviewed."

C. Unsolicited Submittals: BSA will return unsolicited submittals to the sender without action, or marked "Not Reviewed."

1.12 Submittal Schedule

A. The Contractor shall submit the required documentation in accordance with the following submittal schedule:

Submittal	Submittal Date
Required Documentation Submittal Checklist	With Bid
Corporate Experience	With Bid
Client References	With Bid
Project Management Qualifications and Experience	With Bid
Safety Performance History	With Bid
Corporate QA/QC Program Summary	With Bid
Technical Approach	With Bid
List of Sub-Contractors	With Bid
Bid	With Bid
Schedule	14 Calendar Days before Mobilization
Schedule of Values	14 Calendar Days before Mobilization
Quality Assurance Plan	14 Calendar Days Prior to Start of Work
Letter of Compliance with Safety Requirements and SBMS	20 Calendar Days after Contract Signing
Health and Safety Plan	21 Calendar Days Prior to Start of Work
Engineered Cap Installation Work Plan	21 Calendar Days Prior to Start of Work
Proposed list of heavy equipment and mobilization dates	21 Calendar Days Prior to Start of Work
Schedule Updates	Weekly
Industrial Hygiene Monitoring Results	5 calendar days after the receipt of results from analytical laboratories or 5 calendar days after analysis by direct reading instruments, meters, or monitors.
Survey of bottom of excavation	Prior to placement of geomembrane
Project Completion Report including Project Records to BSA	20 Calendar Days following completion of Work

PART 2 – PRODUCTS

2.1 General

A. The Contractor shall submit the required product documentation in accordance with the following Specification sections:

Section	Product	Submittals
09 96 53	Elastomeric Coating	Manufacturer's technical data, MSDS, and product literature
31 05 19.13	Geotextile	Manufacturer's certificate
31 05 19.16	HDPE Geomembrane	Manufacturer's certificate
32 12 16	Asphalt Paving	Product data, Job-Mix designs, material certificates, and MSDS.
32 12 36.13	Asphaltic Seal and Fog Coats	Product data and MSDS.
32 12 73	Asphalt Paving Joint Sealants	Product data

PART 3 – EXECUTION

3.1 General

A. The Contractor shall submit the required documentation in accordance with the following Specification sections:

Section	Topic	Submittals
31 05 19.16	HDPE Geomembrane	Completion drawing of numbered geomembrane panels
31 05 19.16	HDPE Geomembrane	Field testing results and documentation of testing for geomembrane installation (i.e., non-destructive testing, destructive testing)
31 05 19.16	HDPE Geomembrane	Warranty certificate
31 20 00	Soil Compaction	Compaction results
32 12 16	Asphalt Paving	Compaction results
32 12 73	Asphalt Paving Joint Sealants	Compliance letter for equipment

END OF SECTION 01 33 00

DIVISION 01 – GENERAL REQUIREMENTS
SECTION 01 50 00 – TEMPORARY FACILITIES AND CONTROLS

PART 1 – GENERAL

1.1 Summary

A. This section specifies temporary services and facilities, including utilities, construction and support facilities, security and protection. Provide facilities ready for use. Maintain, expand and modify as needed. Remove when no longer needed, or replaced by permanent facilities.

1.2 Use Charges

A. BSA will not impose on the Contractor, except for telephone charges, the cost or use charges for temporary utilities, providing the use of these utilities is not abused by the Contractor.

1.3 Regulations

A. Comply with applicable laws and regulations.

1.4 Standards

A. Comply with NFPA Code 241, "Building Construction and Demolition Operations", ANSI-A10 Series standards for "Safety Requirements for Construction and Demolition", and NECA Electrical Design Library "Temporary Electrical Facilities."

1. Electrical Service: Comply with NEMA, NECA and UL standards and regulations for temporary electric service. Install service in compliance with National Electric Code (NFPA 70).

2. GFIs: Ground fault circuit interrupters are required for all electric services to construction sites from other than permanent wiring of building or structure.

1.5 Inspections

A. Arrange for BSA personnel to inspect and test each temporary utility, as required, before use.

1.6 Conditions of Use

A. Keep facilities clean and neat. Operate in a safe and efficient manner. Take necessary fire prevention measures. Do not overload, or permit facilities to interfere with progress. Do not allow hazardous, dangerous or unsanitary conditions, or public nuisances to develop or persist on the site.

PART 2 – PRODUCTS

2.1 Materials and Equipment

A. Provide new materials and equipment. When acceptable to BSA, undamaged previously used materials and equipment in serviceable condition may be used. Provide materials and equipment suitable for the use intended.

B. Tarpaulins:

1. Waterproof, fire-resistant, UL labeled tarpaulins with flame-spread rating of 15 or less. For temporary enclosures provide translucent nylon reinforced laminated polyethylene or polyvinyl chloride fire retardant tarpaulins.

C. Temporary Fencing:

1. Wood slat and wire roll-out-type snow fencing, securely fastened to vertical galvanized or painted steel fence supports.

2. Open-mesh expanded plastic sheet fencing is an acceptable substitute if properly installed and maintained.

PART 3 – EXECUTION

3.1 Temporary Utility Installation:

A. All requests by the Contractor for temporary services, i.e. electric power, for their own use or for use by any Sub-Contractor, shall be made only through the Project Manager.

B. BSA will furnish, without charge, sources of water and electric power and will perform initial tie-in and removal of same. BSA will, upon request, indicate locations.

C. Contractor shall supply, install, maintain, and remove all equipment and required devices for temporary water, power, and lighting systems from point of initial tie-in as necessary to perform the work.

D. Water Service: Install water service and distribution piping of sizes and pressures adequate for construction. Sterilize water piping prior to use. Provide 3/4" heavy-duty, rubber hoses 100 ft. long with shut-off nozzle at each outlet. BSA will provide a back-flow preventer.

E. Electric Power Service:

1. Power available at the Site will be 20 amp, 115/120 volt, single phase service. Contractor shall provide extensions, GFI outlets, transformers where required and accessories for end use.

2. Electrical Power Cords: Provide grounded "hard-service" extension cords.

F. Lighting: Provide temporary lighting with local switching to fulfill security requirements and provide illumination for construction operations and traffic conditions.

1. Lamps and Light Fixtures: Provide general service incandescent lamps. Provide guard cages or tempered glass enclosures, where exposed to breakage. Provide exterior fixtures where exposed to moisture.

3.2 Field Offices

A. BSA will provide office and break room space for Contractor personnel.

3.3 Storage and Fabrication Shed

A. Install sheds, equipped to accommodate materials and equipment involved. Sheds may be open shelters, enclosed spaces within the building, separate trailers, or combined with the field office.

B. Provide incombustible construction for sheds located within the construction area, or within 30 feet of building lines. Comply with NFPA 241.

3.4 Sanitary Facilities

A. Sanitary Facilities include temporary toilets and drinking water fixtures. Comply with regulations and local health codes. Install where facilities, as approved by BSA, will best serve the Project. Provide paper goods and similar disposable materials for each facility. Provide covered waste containers for used material.

1. Toilets:

A. Install self-contained single-occupant toilet units of the chemical type, properly vented and fully enclosed with a glass fiber reinforced polyester shell or similar nonabsorbent material. Toilets must be serviced at least weekly, and more often if needed, as determined by BSA.

b. Drinking Water Facilities:

i. Provide individual bottled water or containerized tap-dispenser bottled-water type drinking water units.

3.5 Collection and Disposal of Waste

A. Collect waste and dispose into the dumpster daily. Comply with NFPA 241 for removal of combustible waste. Enforce requirements strictly. Provide a dumpster of sufficient size for the waste to be generated. Do not overfill. Remove and replace on a timely basis.

B. Handle hazardous, dangerous, or unsanitary waste materials separately from other waste by containerizing properly. Dispose in a lawful manner.

C. Coordinate with Supplementary Conditions and Section 017419 "Construction Waste Management and Disposal".

3.6 Rodent and Pest Control

A. BSA will provide, if required, an exterminator to perform extermination and control procedures so the project will be free of pests at Substantial Completion.

B. Notify BSA if pests or rodents are observed at the Site.

3.7 Fire Protection

A. Maintain temporary fire protection of types needed to protect against predictable and controllable fire losses. Comply with NFPA 10 "Standard for Portable Fire Extinguishers" and NFPA 241 "Standard for Safeguarding Construction, Alterations and Demolition Operations."

B. Fire Extinguishers:

1. Provide, in accordance with OSHA requirements, hand-carried, portable UL-rated, Class "A" fire extinguishers for temporary offices and similar spaces. In other locations provide hand-carried, portable, UL-rated, Class "ABC" dry chemical extinguishers. Locate fire extinguishers where effective for the intended purpose.

   a. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire protection facilities, Siamese connections, and access routes for fighting fires. Prohibit smoking in hazardous fire exposure areas.

   b. Store combustible materials in containers in fire-safe locations.

   c. Provide continuous supervision of welding operations, combustion type temporary heating units whenever operating, and other sources of fire ignition.

3.8 Barricades, Warning Signs and Lights:

A. Comply with standards and code requirements for erection of barricades. Provide appropriate warning signs to inform personnel and the public of the hazard being protected against. Where needed, provide lighting, including flashing lights.

3.9 Environmental Protection

A. Operate temporary facilities and equipment and conduct construction by methods that comply with environmental regulations, and minimize the possibility that air, waterways and subsoil might be contaminated or polluted.

B. When the work requires the Contractor to bring temporary fuel storage facilities on to the BNL Site, the Contractor shall be responsible for providing a temporary impermeable containment area for all fuel transfer operations in accordance with New York State Department of Environmental Conservation (NYSDEC) Petroleum Bulk Storage regulations.

C. If, during construction activities, a release, discharge, or spill of petroleum products or chemicals occurs, the Contractor shall:

1. Immediately notify Safeguards and Security at Ext. 2222 (or 911) from Site telephones or 631-344-2222 from cell phones, and BSA, of the release, discharge, or spill.

2. Immediately, per the BNL SBMS, initiate cleanup and disposal operations by a BSA approved hazardous waste management Contractor, complete the operations, and be responsible for monitoring and/or sampling in the event of a spill, to the satisfaction of BSA.

D. The disposal of contaminated material will be coordinated by BSA through the Waste Management Division of the Environmental Management Division, with appropriate documentation and disposition forms.

E. Avoid use of tools and equipment which produce harmful noise. Restrict use of noise making tools and equipment to hours that will minimize complaints.

END OF SECTION 01 50 00

DIVISION 01 – GENERAL REQUIREMENTS
SECTION 01 74 19 – CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 – GENERAL

1.1 Summary

A. This section includes administrative and procedural requirements for the following:

1. Salvaging non-hazardous demolition and construction waste.

2. Recycling non-hazardous demolition and construction waste.

3. Re-using non-hazardous demolition and construction waste.

4. Disposing of non-hazardous demolition and construction waste.

1.2 Definitions

A. Clean: Untreated and unpainted; not contaminated with oils, solvents, caulk, paint, or the like.

B. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.

C. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.

D. Disposal: Removal off of the work site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.

E. Recycle: The process of sorting, cleansing, treating, and reconstituting solid waste and other discarded materials for the purpose of using the altered form. Recycling does not include burning, incineration, or thermally destroying waste.

F. Re-use: Recovery of demolition or construction waste and subsequent incorporation into Work or other Work.

G. Salvage: Recovery of demolition or construction waste and subsequent re-use or sale.

H. Toxic: Poisonous to humans either immediately or after a long period of exposure.

I. Trash: Any product or material unable to be re-used, returned, recycled, or salvaged.

J. Waste: Extra material or material that has reached the end of its useful lift in its intended use. Waste includes salvageable, returnable, recyclable, and reusable material.

1.3 Performance Requirements

A. Salvage / Reuse / Recycling Requirements:

1. Demolition Waste:

a. Asphaltic concrete paving

b. Concrete

c. Concrete reinforced steel

d. Structural and miscellaneous metal

2. Construction Waste:

a. Metal

b. Packaging: Paper, cardboard, boxes, wood crates

PART 2 – PRODUCTS

Not used.

PART 3 - EXECUTION

3.1 Plan Implementation

A. Contractor's Responsibilities: Implement waste management plan as provided by BSA. The Contractor shall supply all equipment required for size-reducing waste and loading waste into Contractor or Sub-Contractor supplied containers, transport, and dispose of waste as appropriate. Segregate waste materials by type to facilitate salvage, re-use, recycling, or disposal of materials.

3.2 Salvaging Demolition and Construction Waste

A. Clean salvaged items.

B. Pack or crate items after cleaning. Identify contents of containers.

C. Store items in a secure area.

3.3 Recycling Demolition and Construction Waste

A. Asphaltic Concrete Paving: Break up and load paving for transport to asphalt recycling facility or for recycling on-site into new paving.

B. Concrete: Remove reinforcement steel and other metals from concrete and sort with other metals.

1. Pulverize concrete to maximum 4-inch (100-mm) size.

C. Metals: Separate metals by type.

D. Packaging:

1. Cardboard and boxes: Break down packaging into flat sheets. Bundle and store in a dry location.

E. Paper: Place in approved paper recycling containers.

3.4 Transportation and Disposal of Waste

A. Transportation and disposal of waste will be the responsibility of the Contractor.

END OF SECTION 01 74 19

DIVISION 01 – GENERAL REQUIREMENTS
SECTION 01 77 00 – CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 Final Inspection

A. When work is complete, the Contractor shall request BSA to perform a final inspection.

B. Prior to requesting inspection by BSA, the Contractor shall assure that the Work is completed in accordance with the specified requirements and is ready for the requested inspection.

1. The Contractor shall provide to BSA a list of items remaining to be completed or corrected.

2. Within a reasonable time after receipt of the list, BSA will inspect to determine status of completion.

3. Should BSA determine that the Work is not substantially complete:

i. BSA will so notify the Contractor, in writing, giving the reasons therefore.

ii. The Contractor shall remedy the deficiencies and notify BSA when ready for re-inspection.

iii. BSA will then re-inspect the Work.

iv. This procedure will be repeated until all deficiencies have been corrected and Work accepted as completed.

v. Work performed during the pre-acceptance/acceptance/project close-out period shall be performed in accordance with the Contractor's approved Health and Safety Plan as well as all applicable BNL and OSHA construction safety requirements. This also includes any "punch-list work" generated during the construction period. Additional Work Planning may be necessary and will be accomplished at no additional cost to BSA.

4. Results of the completed inspection will form the basis of requirements for final acceptance.

1.2 Final Acceptance

A. Before requesting final acceptance of the Work and the last monthly payment, complete the following:

1. Submit last monthly payment request for completed work with releases of claims. Final payment request shall be for balance of retainage held, in accordance with Clause 1.8 below.

2. Submit a copy of the final inspection list stating that each item has been completed or otherwise resolved for acceptance.

1.3 Record Document Submittals

A. Do not use Record Documents for construction purposes; protect from loss in a secure location; provide access to Record Documents for BSA's reference.

B. Submit Record Documents in compliance with Section 01 33 00 "Submittal Procedures".

1.4 Record Drawings

A. Maintain a clean, undamaged set of blue or black line white-prints of Contract Drawings and Shop Drawings. Mark up these drawings to show the actual installation. Mark whichever drawing is most capable of showing conditions accurately. Give particular attention to concealed elements that would be difficult to measure and record at a later date.

B. Organize record drawing sheets into manageable sets, bind with durable paper cover sheets, and print suitable titles, dates and other identification on the cover.

C. The Contractor shall provide two survey maps: one for the bottom of the final excavation grades, one for the final top of asphalt grades.

D. Provide record drawings electronically in AutoCAD version 2004 or newer.

1.5 Record Specifications

A. Maintain one copy of the Project Specifications, including addenda. Give particular attention to substitutions, selection of options and similar information on elements that are concealed or cannot be readily discerned later by direct observation. Note related record drawing information and Product Data.

B. Upon completion of the Work, submit record Specifications to BSA for their records.

1.6 Certification of Specification Compliance

A. In addition to the periodic submissions already made, organize one complete set of CSCs into a heavy-duty 3-ring, vinyl-coated binder. Mark identification on front and spine.

B. Include CSCs for each section of the Specifications, the work of each Sub-Contractor, and each material and item of equipment furnished and/or installed.

C. CSCs are provided in Section 00 65 13.

1.7 Completion Report

A. Complete the project completion report for BSA review and approval in accordance with Section 01 33 00.

1.8 Final Payment

A. After compliance with all of the above requirements for Project Closeout, submit final payment requesting release of balance of 5% retainage and Contract closeout.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

END OF SECTION 01 77 00

DIVISION 02 – DEMOLITION AND STRUCTURE MOVING
SECTION 02 41 13 – SELECTIVE SITE DEMOLITION

PART 1 - GENERAL

1.1 Related sections

A. Section 00 01 01 – Statement of Work

B. Section 01 33 00 – Submittals

1.2 Section Includes

A. Demolition of concrete curbs, asphalt, concrete structures, and other related site features.

1.3 Codes and Standards

A. OSHA 29 CFR 1926

B. NFPA241 Construction, Alteration, and Demolition Operations

C. NESHAPS 40 CFR 61 Subpart M

D. BSA Standards-Based Management System

1.4 General

A. The Contractor shall include means and methods for selective demolition in the Engineered Cap Installation Work Plan (see Section 01 33 00).

B. The Contractor shall furnish all labor, materials, and equipment necessary to provide selective demolition, removals, and legally dispose of non-salvageable material off the BNL site.

C. All removed salvageable and non-salvageable materials and equipment shall pass through the vehicle radiation monitor prior to disposal on the BNL site or exiting the BNL site.

D. Demolition requires the selective removal and disposal of the following:

a. Saw cut and remove portions of asphalt pavement and concrete curb as shown on the drawings.

b. Demolition of concrete slabs and concrete drainage rings as shown on the drawings.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

3.1 Demolition

A. Existing concrete or bituminous pavement shall be removed as required or as directed. The pavement shall be sawed with an approved concrete saw along all removal lines that do not terminate at a joint. The pavement shall be removed in such a manner that the remaining pavement will have a straight and vertical exposed face.

B. Broken concrete, broken bituminous pavement, and all other rubble shall be re-used on the BNL site.

C. Protect public and all property from flying or falling debris. Control dust and dirt resulting from demolition work.

D. Load rubble in roll-off containers for re-use on the BNL site.

E. The Contractor shall monitor the work in accordance with the ES&H Plan.

F. The Contractor shall be responsible for safe practices and operations, and all barricades, warning lights, danger signs and other safety precautions to protect all persons and vehicles, either directly related or incidental to the project, from injury or damage.

G. The Contractor shall promptly replace any items demolished that were not so scheduled to be demolished to the approval of BSA at no additional cost to BSA.

H. Roadways shall remain clear and usable during demolition work to allow for removal of debris.

3.2 Cleaning

A. The Contractor shall clean adjacent structures and improvements of dust, dirt, and debris caused by demolition operations. The Contractor shall return adjacent areas to the condition existing before demolition operations began.

END OF SECTION 02 41 13

DIVISION 03 – CONCRETE
SECTION 03 30 00 – CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 General

A. Furnish all labor, materials and equipment necessary to provide cast-in-place concrete work, including, but not limited to, reinforcement, concrete materials, mix design, placement procedures, formwork, anchorages, finishes, and accessories.

B. To the maximum extent, cement and concrete shall be supplied from manufacturers and batch plants that incorporate ground granulated blast furnace (GGBF) slag into their product during its production.

1. GGBF is available from many sources including Blue Circle Cement, Inc., Lehigh Portland Cement Co., and Lone Star Industries, Inc.

C. At the completion of the concrete work, submit the following:

1. Quantity in cubic yards and dollar value of concrete provided that incorporated GGBF slag in its design mix.

D. Transit mix supplier must be experienced in manufacturing ready-mixed concrete products that comply with ASTM C94, and be located within a 30 minute travel range of BNL. Submit name of transit mix supplier that uses GGBF slag within 15 days of signed Contract. Approval of supplier is dependent on receipt of written guarantee that concrete strength will conform to strength specified. Failure to conform to specified strength will result in removal of supplier and of under-strength concrete from the job and a new supplier provided, all at no additional cost to BNL.

E. Conform with ACI 301 & 318, latest editions.

F. Provide air entrained concrete developing minimum compressive strength of 3,500 psi in 28 days with a slump of four (4) inches maximum. Air content to be 5% ± 1% by volume.

1.2 Submittals

A. Product Data: For each type of product indicated.

B. Design Mixes: For each concrete mixture.

C. Material certificates and test reports.

1.3 Quality Assurance:

A. Comply with ACI 301, "Specification for Structural Concrete," including the following, unless modified by the requirements of the Contract Documents.

1. General requirements, including submittals, quality assurance, acceptance of structure, and protection of in-place concrete.
2. Formwork and form accessories.
3. Steel reinforcement and supports.
4. Concrete mixtures.
5. Handling, placing, and constructing concrete.

PART 2 - PRODUCTS

2.1 Materials

A. Formwork: Furnish formwork and form accessories according to ACI 301, faced to provide required finish, in largest practicable sizes to minimize number of joints.

B. Steel Reinforcement

1. Plain-Steel Welded Wire Fabric: ASTM A 185, plain, fabricated from as-drawn steel wire into flat sheets.
2. Supports: Bolsters, chairs, spacers and other devices as required, CRSI "Manual of Standard Practice."

C. Concrete Materials

1. Portland Cement: ASTM C 150, Type I or Type II, with ground granulated blast furnace slag.
2. Normal-Weight Aggregate: ASTM C 33, uniformly graded, 1-1/2-inch (38-mm) nominal maximum aggregate size.
3. Lightweight Aggregate: ASTM C 33, graded, 1-1/2-inch (38-mm) nominal maximum aggregate size.
4. Water: Complying with ASTM C 94, potable.

D. Admixtures

1. Admixtures certified by manufacturer to contain not more than 0.1 percent water-soluble chloride ions by mass of cementitious material and to be compatible with other admixtures and cementitious materials. Do not use admixtures containing calcium chloride.
2. Air-Entraining Admixture: ASTM C 260.
3. Corrosion-Inhibiting Admixture: Commercially formulated, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete.

4. Crystalline Waterproofing Admixture:

   a. Aggregate state: Liquid, non-flammable, non-corrosive

   b. Water/cement ratio: 0.55 maximum of concrete mix

   c. Compressive strength: ASTM C-39, up to 25% increase over untreated concrete

   d. Flexural strength: ASTM C-293, does not detrimentally alter concrete mix

   e. Permeability: COE CRD-C 48, no measurable leakage through waterproofed concrete when tested at 460 feet of water head or 200 psi of water pressure

E. Waterstops

1. Flexible PVC Waterstops: CE CRD-C 572, for embedding in concrete to prevent passage of fluids through joints. Factory fabricate corners, intersections, and directional changes.

2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Construction Joint PVC Waterstops:

      ~~1. Greenstreak.~~

      ~~2. Meadows: W. R. Meadows, Inc.~~

      ~~3. Murphy: Paul Murphy Plastics Co.~~

      ~~4. Progress Unlimited Inc.~~

      ~~5. Sternson Group.~~

      ~~6. Tamms Industries Co.; Div. of LaPorte Construction Chemicals North America, Inc.~~

      ~~7. Vinylex Corporation.~~

      ~~8. Westec Barrier Technologies; Div. of Western Textile Products, Inc.~~

      9. Earthshield
      6" RCB TPV Waterstop
      Part No. JP636

   b. Retrofit Waterstops:

      1. Earth Shield Part No. JP320 L

      ~~2. Approved Equal~~

F. Joint-Filler Strips

1. ASTM D 1751, asphalt-saturated cellulosic fiber or ASTM D 1752, cork or self-expanding cork.

   W.R. Meadows
   Fibre Expansion Joint No. 320

G. Curing Materials

1. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

2. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf.

3. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

4. Water: Potable.

H. Concrete Mixtures

1. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.

2. Comply with ACI 301 requirements for concrete mixtures.

3. Prepare design mixes, proportioned according to ACI 301, for normal-weight concrete determined by either laboratory trial mix or field test data bases, as follows:

4. The required average compressive strength of the trial mix specimens (f'_{cr}) shall exceed the specified minimum compressive strength (f'_c) by at least 1,200 psi for specified concrete strengths between 3,000 and 5,000 psi. (For other specified concrete strengths, follow Table 5.3.2.2 of ACI 318.)

5. Trial mixes having proportions and consistencies required for the proposed work, and made with samples of the materials to be used, shall be made using at least three (3) water to cementious materials ratios that will produce a range of strengths encompassing the required average strength (f'_{cr}).

6. For each water to cementious materials ratio or cementious materials content, at least three (3) test cylinders for each test age shall be made and tested.

7. The mix design for the proposed mix shall be that trial mix which produces the required average strength (f'_{cr}) unless a lower water-cementious material ratio or higher minimum cementious material content is required elsewhere within these specifications.

PART 3 - EXECUTION

3.1 Concrete Mixing

A. Ready-Mixed Concrete: Comply with ASTM C 94 and ASTM C 1116.

1. When air temperature is between 85 and 90 deg F (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

B. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mix type, mix time, quantity, and amount of water added. Record approximate location of final deposit in structure.

3.2 Installation

A. Formwork: Design, construct, erect, shore, brace, and maintain formwork according to ACI 301.

B. Steel Reinforcement: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting of reinforcement.

C. Joints: Construct joints true to line with faces perpendicular to surface plane of concrete.

1. Construction Joints: Locate and install so as not to impair strength or appearance of concrete, at locations indicated or as approved by BSA.

D. Waterstops: The material, design, and location of waterstops in construction joints and expansion joints shall be as indicated on the Drawings. Each piece of pre-molded waterstop shall be of maximum practicable length in order that the number of end joints will be held to a minimum. Joints at intersections and at ends of pieces shall be made in the manner most appropriate to the material being used.

E. Tolerances: Comply with ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

3.3 Concrete Placement

A. Comply with recommendations in ACI 304R for measuring, mixing, transporting, and placing concrete.

B. Consolidate concrete with mechanical vibrating equipment.

3.4 Finishing Formed Surfaces

A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defective areas repaired and patched, and fins and other projections exceeding 1/4 inch (6 mm) in height rubbed down or chipped off.

3.5 Finishing Unformed Surfaces

A. General: Comply with ACI 302.1R for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Screed surfaces with a straightedge and strike off. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane before excess moisture or bleedwater appears on the surface.

C. Do not further disturb surfaces before starting finishing operations.

D. Nonslip Broom Finish: Apply a nonslip broom finish to surfaces indicated and to exterior concrete platforms, steps, and ramps. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route.

3.6 Concrete Protection Curing:

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection, and follow recommendations in ACI 306 for hot-weather protection during curing.

B. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions occur before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

C. Begin curing after finishing concrete, but not before free water has disappeared from concrete surface.

D. Cure formed and unformed concrete (except high-early strength) by maintaining above 50°F and in a moist condition for at least seven days after placement as follows:

1. Moisture Curing: Keep surfaces continuously moist with:

   a. water

   b. continuous water-fog spray

   c. absorptive cover, water saturated and kept continuously wet.

2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm), and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

E. Cure high-early strength concrete by maintaining above 50°F and in a moist condition for at least three days after placement by one of the above methods.

F. Procedures for accelerated curing may be used with prior BSA approval.

3.7 Field Quality Control

A. Testing Agency: Contractor will engage a qualified independent testing and inspecting agency to sample materials, perform tests, and submit test reports during concrete placement. Tests will be performed according to ACI 301.

B. Testing Frequency: One composite sample for each day's pour of each concrete mix exceeding 5 cu. yd. (4 cu. m), but less than 25 cu. yd. (19 cu. m), plus one set for each additional 50 cu. yd. (38 cu. m) or fraction thereof.

END OF SECTION 03 30 00

DIVISION 09 – FINISHES
SECTION 09 96 53 – ELASTOMERIC COATINGS

PART 1 – GENERAL

1.1 Description of Work

A. This Section specifies the application of special coating / lining systems to items and surfaces scheduled, including surface preparation, prime coats, and top coats. The primary coating material shall be a solvent-free, fast-setting (6-60 seconds), 100% polyurea elastomeric coating and lining system formulated to be used for applications requiring a seamless, flexible, waterproof, abrasion and impact resistant surface that may be applied on a multitude of substrates in low temperature and high humidity.

1.2 References and Standards

A. All references and standards listed shall be the latest revisions.

B. SSPC TU-13: Surface Preparation of Concrete

1.3 Submittals

A. Submit manufacturer's technical data, MSDS, and product literature indicating that the products comply with the specified requirements.

1.4 Quality Assurance

A. Single Source Responsibility: Provide primers and undercoat materials produced by the same manufacturer, or recommended by manufacturer, for each type of special coating / lining system specified to ensure compatibility, and proper chemical and mechanical bond.

B. Manufacturer: A company specializing in manufacturing industrial grade polyurea coatings with a minimum 5-year documentable satisfactory experience.

C. Applicator: A company specializing in applying polyurea coatings with a minimum 5 years satisfactory documented experience, and coating manufacturer's certification showing evidence of annual re-certification of its applicators. Applicator must have completed a 40-hour certification program in the use of heated plural-component pumping equipment, and the specified polyurea material.

1. Applicator must own the plural component pumping equipment.

2. Applicator must furnish references of projects of similar field conditions at least 5 years old, including name, address, and telephone number.

D. Equipment Requirements: Equipment must be a plural component impingement mixing unit capable of consistently producing at 2+ gallons per minute at 2,500 psi, 160 °F.

1.5 Delivery, Storage, and Handling

A. Deliver product in the manufacturer's original, new, unopened packages and containers, clearly marked with manufacturer's identification, printed instructions, lot numbers, and shelf life expiration date for each component.

B. Store materials not in use in tightly covered containers in a dry, well-ventilated area at an ambient temperature between 50 °F and 90 °F, away from sunlight, heat, or other hazards.

1.6 Project Conditions

A. For temperatures below 35 °F, consult manufacturer.

B. Surfaces shall be kept free of traffic once surface preparation has begun.

C. Do not apply over frozen or ice capped surfaces.

PART 2 – PRODUCTS

2.1 Acceptable Manufacturers

~~A. The Sherwin-Williams Company~~

~~11410 Alameda Drive, Strongsville, OH 44149~~

~~Phone: 440-846-4107~~

~~Fax: 440-846-4349~~

~~Website: www.sherwin-williams.com~~

Bridge Preservation
87 Shawnee Avenue
Kansas City, KS
Tel: 913-321-9000
Fax: 913-321-9007

2.2 Materials

~~A. Special Coating / Lining System~~s

~~1. Envirolastic® AR200 HD~~

~~2. Envirolastic® AR425~~

Bridge Deck Membrane

B. Primers

1. ~~Corobond Conductive Epoxy Primer~~

~~2. Corobond HS Epoxy Prime~~r

~~3. Corobond LT Epoxy Prime~~r

PART 3 – EXECUTION

3.1 Site Inspection

A. Ensure that environmental conditions are suitable for application and curing. Temperature of the surface to be coated must be at least 5 degrees above the dew point.

B. Inspect surfaces for oil contamination and other critical factors at time of installation. Surfaces to receive coatings must be structurally sound and thoroughly dry.

3.2 Surface Preparation

A. Degrease concrete as necessary using high pressure water and biodegradable detergents. Rinse thoroughly.

B. Remove all existing coatings and linings by best method available. SAND Blasting

C. Surface must be clean, sound, and dry prior to application.

3.3 Priming

A. Prime with the appropriate primer system, following manufacturer's recommendations and coverage rates.

3.4 Installation

A. Apply special coating / lining system in a single application in accordance with manufacturer's instructions to a total thickness specified below. Spray apply only through required equipment. Maintain an even distance from surface providing a uniform application with a 50% overlap from one pass to the next.

B. Thickness of Special Coating / Lining System:

1. Heavy Duty vehicular: 70-125 mils

3.5 Cleaning

A. At the end of each work day, remove rubbish, empty containers, rags, and other discarded items from the site. After completing work, clean glass and spattered surfaces. Remove spattered coatings by washing, scraping, or other methods, being careful not to scratch or damage adjacent finished surfaces.

END OF SECTION 09 96 53

DIVISION 31 – EARTHWORK
SECTION 31 05 19.13 – GEOTEXTILES FOR EARTHWORK

PART 1 – GENERAL

1.1 Section Includes

A. Materials and procedures for installing woven geotextiles.

1.2 References

A. AASHTO M 288: Geotextile Specifications for Highway Applications

B. ASTM D 4791: Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.

1.3 Submittals

A. Submit Manufacturer's certificate that each fabric complies with the requirements of this Section.

1.4 Sampling and Testing

A. Prior to shipment, test each individual shipment and lot of geotextile and send testing reports with the shipment to the job site. Clearly label all rolls as being part of the same production run certified as meeting all material requirements.

1.5 Packaging, Shipping, and Storage

A. Protect the geotextile from direct sunlight, chemicals, mud, dirt, and debris during shipment and storage. Replace at the Contractor's expense any geotextile damaged or deteriorated during shipping, storage or construction.

B. Labeling and Tagging:

1. Identify each package by a tag or label securely affixed to the outside of the roll on at least one end.

2. Provide the following required information on the tag:

a. Name of the geotextile manufacturer.

b. Brand name of the product, width, length, and package weight of geotextile.

c. Lot Number.

1.6 Acceptance

A. BSA will reject geotextile at installation if it has defects, rips, holes, flaws, deterioration, or damage incurred during manufacture, transport, handling or storage.

PART 2 – PRODUCTS

2.1 Geotextile

A. Manufacturer

1. US Fabrics, Inc. - US 230

~~2. Approved equal~~.

B. Furnish Class 1 fabric as specified in AASHTO M 288, with apparent opening size of 40 US Sieve maximum average roll value.

C. Woven geotextile shall meet the requirements shown in the following table for the following material.

Minimum Values for Woven Geomembrane

Property	Test Method	Value
Tensile Strength (lbs.)	ASTM D 4632	315
Elongation @ break (%)	ASTM D 4632	15
Mullen Burst (psi)	ASTM D 3786	600
Puncture Strength (lbs.)	ASTM D 4833	~~145~~ 150
Trapezoidal Tear (lbs.)	ASTM D 4533	~~115~~ 165
Apparent Opening Size (US Sieve)	ASTM D 4751	40
Permittivity (sec^{-1})	ASTM D 4491	~~0.02~~ .9
UV Resistance, % Retained	ASTM D 4355	90

PART 3 – EXECUTION

3.1 General

A. Place geotextile on areas that are smooth, and free of projections or depressions. Do not drag the geotextile across the subgrade. Roll geotextile out as smoothly as possible.

B. Do not operate construction equipment or traffic directly on geotextile.

C. Overlap the geotextile a minimum of 18 inches for all longitudinal and transverse joints, or sew the geotextile.

D. Repair: Place patch over damaged area and extend 3 feet beyond the perimeter of the tear or damage.

E. In the presence of wind, all geotextiles shall be weighted with sandbags. Do not use pins to secure the geotextile, as it may damage the geomembrane geomembrane underneath.

F. When placed for construction, cover the geotextile with indicated cover material as soon as possible. Do not leave uncovered for more than five days. Place cover material on the geotextile in a manner that the geotextile is not torn, punctured, or shifted.

END OF SECTION 31 05 19.13

DIVISION 31 – EARTHWORK
SECTION 31 05 19.16 – GEOMEMBRANES FOR EARTHWORK

PART 1 - GENERAL

1.1 Section Includes

A. Specifications and guidelines for installing high-density polyethylene (HDPE) geomembrane geomembrane.

1.2 Definitions

A. The terms "high density polyethylene (HDPE) geomembrane liner", "HDPE liner", "liner", "geomembrane", "geomembrane containment liner", and similar words are interchangeable with respect to these Specifications and Contract Drawings.

1.3 References

A. American Society for Testing and Materials (ASTM)

1. D 1004: Test Method for Initial Tear Resistance of Plastic Film and Sheeting
2. D 1238: Standard Test Method for Flow Rates of Thermoplastics by Extrusion Plastometer
3. D 1505: Test Method for Density of Plastics by the Density-Gradient Technique
4. D 1603: Test Method for Carbon Black in Olefin Plastics
5. D 3895: Standard Test Method for Oxidative-Induction Time of Polyolefins by Differential Scanning Calorimetry
6. D 4791: Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.
7. D 4833: Standard Test Method for Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products
8. D 5199: Standard Test Method for Measuring Nominal Thickness of Geotextiles and Geomembranes
9. D 5397: Standard Test Method for Evaluation of Stress Crack Resistance of Polyolefin Geomembranes Using Notched Constant Tensile Load Test
10. D 5596: Standard Test Method for Microscopic Evaluation of the Dispersion of Carbon Black in Polyolefin Geosynthetics
11. D 5994: Standard Test Method for Measuring Core Thickness of Textured Geomembranes

12. D 6392: Standard Test Method for Determining the Integrity of Nonreinforced Geomembrane Seams Produced Using Thermo-Fusion Methods

13. D 6497: Standard Guide for Mechanical Attachment of Geomembrane to Penetrations or Structures.

14. D 6693: Standard Test Method for Determining Tensile Properties of Nonreinforced Polyethylene and Nonreinforced Flexible Polypropylene Geomembranes

1.4 Submittals

A. Submit Manufacturer's certificate that geomembrane material complies with the requirements of this Section.

B. Provide all related documentation required by Specification Section 01 33 00 – Submittals.

C. Completion drawing of numbered geomembrane panels.

D. Field testing results for geomembrane installation.

E. Warranty certificate.

1.5 Sampling and Testing

A. Prior to shipment, test each individual shipment and lot of geomembrane liner and send testing reports with the shipment to the job site. Clearly label all rolls as being part of the same production run certified as meeting all material requirements.

1.6 Packaging, Shipping, and Storage

A. Protect the geomembrane liner from direct sunlight, chemicals, mud, dirt, and debris during shipment and storage.

B. Labeling and Tagging

1. Identify each package by a label or tag securely affixed to the outside of the roll on at least one end.

2. Provide the following required information on the label or tag:

a. Manufacturer's name

b. Product identification

c. Thickness

d. Length

e. Width

f. Roll number

g. Lot Number

1.7 Qualifications

A. Manufacturer

1. The manufacturer shall have at least five (5) years continuous experience in manufacturing polyethylene and/or experience totaling 10,000,000 square feet of manufactured polyethylene geomembrane.

B. Contractor

1. The Contractor shall be the manufacturer or a dealer trained to install the manufacturer's geomembrane.

2. Installation shall be performed under the constant direction of a field superintendent who shall remain on site and be responsible, throughout the geomembrane installation, for geomembrane layout, seaming, testing, repairs and all other activities by the Contractor.

   a. The field superintendent shall have installed or supervised the installation of a minimum of 2,000,000 square feet of polyethylene geomembrane.

   b. Seaming shall be performed under the direction of a master seamer (who may also be the field superintendent) who has seamed a minimum of 2,000,000 square feet of polyethylene geomembrane, using the same type of seaming apparatus specified for this project.

   c. The field superintendent and/or master seamer shall be present whenever seaming is performed.

1.8 Warranty

A. Material shall be warranted, on a pro-rata basis against Manufacturer's defects for a period of 5 years from the date of geomembrane installation.

B. Installation shall be warranted against defects in workmanship for a period of 1 year from the date of geomembrane completion.

PART 2 - Products

2.1 Geomembrane

A. Manufacturer

~~1. GeoCHEM, Inc.~~

~~2. Gundle/SLT Environmental, Inc. (GSE)~~

~~3. Poly-Flex, Inc.~~

~~4. Raven Industries, Inc.~~

5. Solmax International - Solmax 440-1000

~~6. Approved Equa~~l.

B. Materials

1. The geomembrane shall be High-Density Polyethylene (HDPE).

2. Metal battens shall be 0.25-inch thick by 2 inches wide stainless steel.

3. Gasket material shall be neoprene, closed cell medium, 0.25-inch thick by 2 inches wide, with adhesive on one side, or other gasket material as approved by the geomembrane manufacturer.

4. Banding clamps and hardware shall be 0.5-inch wide stainless steel.

5. Sealant shall be General Electric Silicone, RTV 103, or equivalent.

C. Geomembrane Raw Materials

1. The geomembrane shall be manufactured of polyethylene resins produced in the United States and shall be compounded and manufactured specifically for the intended purpose.

2. The natural polyethylene resin (without carbon black) shall meet the following requirements:

Property	**Test Method**	**HDPE**
Density [g/cm^3]	ASTM D 1505 or ASTM D 4883	0.940
Melt Flow Index [g/10 min.]	ASTM D 1238 Condition E	$\leq$ 0.4

D. Geomembrane Rolls

1. Do not exceed a combined maximum total of 1 percent by weight of additives other than carbon black.

2. Geomembrane shall be free of holes, pinholes as verified by on-line electrical detection, bubbles, blisters, excessive contamination by foreign matter, and nicks and cuts on roll edges.

3. Geomembrane material is to be supplied in roll form. Each roll is to be identified with labels indicating roll number, thickness, length, width, and manufacturer.

4. The geomembrane rolls shall meet the following requirements:

Minimum Values for Smooth HDPE Geomembranes Solmax 440-1000

Property	Test Method(1)	Min. Value
Thickness, mil Minimum Average Lowest Individual Reading	ASTM D 5199	 40 36
Density, g/cm³	ASTM D 1505	0.94
Carbon Black Content, %	ASTM D 1603, modified	2.0 – 3.0
Carbon Black Dispersion	ASTM D 5596	*Note 3*
Tensile Properties(2): (each direction)	ASTM D 6693	
Strength at Yield, lb/in		84
Strength at Break, lb/in		~~152~~ 162
Elongation at Yield, %	(1.3" gauge length)	~~12~~ 13
Elongation at Break, %	(2.0" gauge length)	700
Tear Resistance, lb	ASTM D 1004	28
Puncture Resistance, lb (N)	ASTM D 4833	~~72~~ 80
Oxidative Induction Time, min.	ASTM D 3895	100
Environmental Stress Crack / Notched Constant Tensile Load, hr	ASTM D 5397	~~300~~ 400
Dimensional Stability, %	ASTM D 1204	± 2
Low Temperature Brittleness, °C	ASTM D 746	<-77
Coefficient of Linear Thermal Expansion, x 10^{-4} cm / cm °C	ASTM D 696	2.5 max
Water Vapor Transmission, g/m²/day	ASTM E 96	1.0 max

[1] Some test procedures have been modified for application to geosynthetics. All procedures and values are subject to change without prior notification.

[2] The combination of stress concentrations due to coextrusion texture geometry and the small specimen size results in large variations of test results. Therefore, these tensile properties are minimum average roll values.

[3] Only near spherical agglomerates are considered. 9 of 10 views shall be Category 1 or 2. No more than one view Category 3.

E. Extrudate Rod or Bead

1. Extrudate material shall be made from same type resin as the geomembrane.
2. Additives shall be thoroughly dispersed.
3. Materials shall be free of contamination by moisture or foreign matter.

PART 3 - EXECUTION

3.1 Transportation and On-Site Storage

A. The geomembrane rolls shall be shipped by flatbed trailer to the job site. The geomembrane shall be stored so as to be protected from puncture, dirt, grease, moisture and excessive heat. Damaged material shall be stored separately for repair or replacement. The rolls shall be stored on a prepared smooth surface (not wooden pallets) and should not be stacked more than two rolls high.

3.2 Earthwork

A. The Contractor shall inspect the subgrade preparation. Prior to geomembrane installation the subgrade shall be compacted in accordance with the project specifications. Weak or compressible areas which cannot be satisfactorily compacted should be removed and replaced with properly compacted fill. All surfaces to be lined shall be smooth, free of all foreign and organic material, sharp objects, or debris of any kind. The subgrade shall provide a firm, unyielding foundation with no sharp changes or abrupt breaks in grade. Standing water or excessive moisture shall not be allowed.

B. The Contractor, on a daily basis, shall approve the surface on which the geomembrane will be installed. After the supporting soil surface has been approved, it shall be the Contractor's responsibility to indicate to BSA any changes to its condition that may require repair work.

3.3 Method of Placement

A. The rolls shall be deployed using a spreader bar assembly attached to a loader bucket or by other methods approved by BSA.

B. The installer shall be responsible for the following:

1. Equipment or tools shall not damage the geomembrane during handling, transportation and deployment.
2. Personnel working on the geomembrane shall not smoke or wear damaging shoes.
3. The method used to unroll the panels shall not cause scratches or crimps in the geomembrane and shall not damage the supporting soil.
4. Do not allow heavy vehicular traffic directly on geomembrane. Rubber-tired ATV's and trucks are acceptable if wheel contact is less than 6 psi.

5. Adequate loading (e.g., sand bags or similar items that will not damage the geomembrane) shall be placed to prevent uplift by wind (in case of high winds, continuous loading is recommended along edges of panels to minimize risk of wind flow under the panels).

3.4 Weather

A. Geomembrane deployment shall proceed between ambient temperatures of 32° F and 104° F. Placement can proceed below 32° F only after it has been verified by the inspector that the material can be seamed according to the specification. Geomembrane placement shall not be done during any precipitation, in the presence of excessive moisture (e.g., fog, rain, dew) or in the presence of excessive winds, as determined by the installation supervisor.

3.5 Field Seaming

A. Seams shall meet the following requirements:

1. To the maximum extent possible, orient seams parallel to line of slope, i.e., down and not across slope.

2. Minimize number of field seams in corners, odd-shaped geometric locations and outside corners.

3. Slope seams (panels) shall extend a minimum of five-feet beyond the grade break into the flat area.

4. Use a sequential seam numbering system compatible with panel numbering system.

5. Align seam overlaps consistent with the requirements of the welding equipment being used. A 6-inch overlap is commonly suggested.

3.6 Defects and Repairs

A. Examine all seams and non-seam areas of the geomembrane for defects, holes, blisters, undispersed raw materials, and any sign of contamination by foreign matter.

B. Repair and non-destructively test each suspect location in both seam and non-seam areas. Do not cover geomembrane at locations that have been repaired until test results with passing values are available.

3.7 Field Testing

A. Non-Destructive Testing

1. Non-destructive testing may be carried out as the seaming progresses or at completion of all field seaming.

a. Vacuum Testing

1) Shall be performed in accordance with ASTM D 5641, Standard Practice for Geomembrane Seam Evaluation by Vacuum Chamber.

b. Air Pressure Testing (for Double Fusion Seams Only)

1) Shall be performed in accordance with ASTM D 5820, Standard Practice for Pressurized Air Channel Evaluation of Dual Seamed Geomembranes.

c. Other approved methods.

B. Destructive Testing

1. Destructive testing should be minimized to preserve the integrity of the geomembrane. The installer shall provide BSA with one destructive test sample per 1,500 lineal feet of seam length.

2. Sampling Procedures are performed as follows:

a. In order to obtain test results prior to completion of geomembrane installation, samples shall be cut by the installer as the seaming progresses. The installer shall also record the date, location, and pass or fail description. All holes in the geomembrane resulting from obtaining the seam samples shall be immediately patched and vacuum tested.

b. The samples shall be 12 inches wide by 24 inches long with the seam centered lengthwise. The sample shall be cut into three equal-length pieces, one to be given to BSA and one to be given to the installer.

c. Destructive testing shall be performed in accordance with ASTM D 6392, Standard Test Method for Determining the Integrity of Non-Reinforced Geomembrane Seams Produced Using Thermo-Fusion Methods.

d. BSA, at its discretion and expense, may send seam samples to a laboratory for testing. The test methods and procedures to be used by the independent laboratory shall be the same as used in field testing.

C. Procedures for Destructive Test Failure

1. The following procedures shall apply whenever a sample fails the field destructive test:

a. The installer shall cap strip the seam between the failed location and any passed test locations.

b. The installer can retrace the welding path to an intermediate location (usually 10 feet from the location of the failed test), and take a sample for an additional field test. If this test passes, then the seam shall be cap stripped between that location and the original failed location. If the test fails, then the process is repeated.

c. Over the length of seam failure, the installer shall either cut out the old seam, reposition the panel and reseam, or add a cap strip.

3.8 Repair Procedures

A. Remove damaged geomembrane and replace with acceptable geomembrane materials if damage cannot be satisfactorily repaired.

B. Repair any portion of unsatisfactory geomembrane or seam area failing a destructive or non-destructive test.

C. Installer shall be responsible for repair of defective areas.

D. All geomembrane surfaces shall be clean and dry at the time of repair.

E. Small holes shall be repaired by extrusion welding or a bead of extrudate over the hole. If the hole is larger than ¼ inch, it shall be patched.

F. Tears shall be repaired by patching. If the tear is on a slope or an area susceptible to stress and has a sharp end it must be rounded prior to patching.

G. Blisters, large cuts and undispersed raw materials shall be repaired by patches.

H. Patches shall be completed by extrusion welding. The weld area shall be ground no more than 10 minutes prior to welding. No more than 10% of the thickness shall be removed by grinding. Welding shall commence where the grinding started and must overlap the previous seam by at least 2 inches. Reseaming over an existing seam without regrinding is not permitted. The welding shall restart by grinding the existing seam and rewelding a new seam. Patches shall be round or oval in shape, made of the same geomembrane, and extend a minimum of 6 inches beyond the edge of defects.

I. Verification of Repairs

1. Each repair shall be non-destructively tested. Repairs that pass the non-destructive test shall be taken as an indication of an adequate repair. Failed tests indicate that the repair shall be repeated and retested until passing test results are achieved.

2. The installer shall keep daily documentation of all non-destructive and destructive testing. This documentation shall identify all seams that initially failed the test and include evidence that these seams were repaired and successfully retested.

3.9 Mechanical Attachments

A. Metal battens:

1. The geomembrane shall be anchored continuously to structure concrete using stainless steel battens, gaskets, and concrete anchor bolts in accordance with the contract drawings and the geomembrane manufacturer's specifications.

2. Surface Preparation: Concrete surfaces should be clean, dry, and uniform. Damaged areas shall be repaired.

3. The battens shall be bolted to structure concrete by stainless steel bolts on 12-inch intervals to create a leak-free connection.

4. Tighten anchor bolt nuts to uniformly deform gasket beneath battens to 12 to 15 percent of total thickness of gasket to obtain watertight connection of geomembrane to concrete surface. Do not exceed maximum torque as specified in manufacturer's instructions.

B. Pipe boots:

1. Pipe boots shall be fabricated in the field from the same geomembrane as installed.

2. Thoroughly clean contact surfaces.

3. Seal boot to surrounding geomembrane as specified for field seams using extrusion-welding methods.

4. Tighten stainless steel clamping bands to uniformly deform gasket beneath geomembrane to obtain watertight connection of geomembrane to pipe. Do not exceed maximum torque as specified in manufacturer's instructions.

3.10 Cover Material

A. The geomembrane shall be covered as soon as possible. The covering operation shall not damage the geomembrane. No construction equipment or machinery shall operate directly on the geomembrane.

3.11 Acceptance

A. The Contractor shall retain all ownership and responsibility for the geomembrane until accepted by BSA. Final acceptance is when all of the following conditions are met.

1. Installation is finished.

2. Verification of the adequacy of all field seams and repairs, including associated testing, is complete.

END OF SECTION 31 05 19.16

DIVISION 31 – EARTHWORK
SECTION 31 20 00 – EARTH MOVING

PART 1 - GENERAL

1.1 Section Includes

A. Preparing subgrades for pavements.

B. Excavating and backfilling.

C. Subbase course for pavements.

D. Erosion control measures.

1.2 General

A. Furnish all labor, materials and equipment necessary for earthwork operations.

B. Obtain an inspection from BSA of heavy equipment prior to use on site.

C. Confirm that BSA has obtained a Digging Permit prior to commencement of earth moving activities.

D. The Contractor shall be responsible for the packaging of waste in accordance with the BNL Standards Based Management System (SBMS) and these Specifications.

E. The Contractor's Competent Person shall inspect excavations greater than four (4) feet in depth on a daily basis or following a change in condition during the work day, such as additional excavation or rainfall.

F. Traffic:

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from BSA.

2. Road closings require 48-hour prior notification and approval of BSA.

1.3 Codes and Standards:

A. OSHA 29 CFR 1926.

B. BNL Standards-Based Management System; ES&H Standards (SBMS).

C. ASTM D-2487, D-2490, and D-698.

D. 6 NYCRR Part 375.

1.4 Definitions

A. Backfill: Soil materials used to fill an excavation.

B. Base Course: Course placed between the subbase course and hot-mix asphalt paving.

C. Bedding Course: Course placed over the excavated subgrade in a trench before laying pipe.

D. Borrow Soil: Satisfactory soil imported from on- or off-site for use as fill or backfill.

E. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.

1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by BSA. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.

2. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by BSA. Unauthorized excavation, as well as remedial work directed by BSA, shall be without additional compensation.

F. Fill: Soil materials used to raise existing grades.

G. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.

H. Subbase Course: Course placed between the subgrade and base course for hot-mix asphalt pavement, or course placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.

I. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.

J. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

1.5 Project Conditions

A. Existing Utilities:

1. Locations for known existing underground utilities are approximate. Use extreme care to avoid damage to all utilities.

2. Should unanticipated utilities, that are not shown on the Drawings or noted in the Digging Permit, be discovered during earth moving activities, immediately stop work and notify BSA for instructions. Do not proceed with the work until so directed by BSA.

3. Do not interrupt utilities serving facilities occupied by BSA or others unless permitted in writing by BSA and then only after arranging to provide temporary utility services according to requirements indicated.

PART 2 – PRODUCTS

2.1 Soil Materials

A. BSA to provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations on site.

B. Satisfactory Soils: ASTM D 2487 Soil Classification Groups GW, GP, GM, SW, SP, and SM, or a combination of these groups; free of rock or gravel larger than 3 inches (75 mm) in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.

C. Unsatisfactory Soils: ASTM D 2487 Soil Classification Groups GC, SC, ML, MH, CL, CH, OL, OH, AND PT or a combination of these groups.

1. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.

D. Backfill and Fill: Satisfactory soil materials.

E. Subbase Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, clean, blended, crushed, recycled concrete (RPCCA); 6NYCRR Part 360, blast furnace slag, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch (38-mm) sieve and not more than 12 percent passing a No. 200 (0.075-mm) sieve.

F. Base Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, clean, blended, crushed, recycled concrete (RPCCA); 6NYCRR Part 360, blast furnace slag, and natural or crushed sand; ASTM D 2940; with at least 95 percent passing a 1-1/2-inch (38-mm) sieve and not more than 8 percent passing a No. 200 (0.075-mm) sieve.

G. Crushed Stone Protection Layer: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, clean, blended, crushed, recycled concrete (RPCCA); 6NYCRR Part 360, blast furnace slag, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch (37.5-mm) sieve and not more than 12 percent passing a No. 200 (0.075-mm) sieve.

H. Sand Protection Layer: Naturally or artificially graded clean sand; with a permeability of 1x10-3 cm/sec or greater at 85% compaction in accordance with ASTM D-1557; complies with 6 NYCRR Part 375 for unrestricted use; with at least 100% passing a 1-inch (25 mm) sieve, 80% passing a No. 4 (4.75 mm) sieve, 20-60% passing a No. 40 (0.425 mm) sieve, and 5-20% passing a No. 200 (0.075 mm) sieve.

PART 3 - EXECUTION

3.1 Preparation

A. Notify BSA two (2) weeks in advance of all earthwork.

B. Ensure that a completed BNL Digging Permit is in place before starting earthwork.

C. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, freezing temperatures or frost, and other hazards created by earthwork operations. Provide protective insulating materials as necessary.

D. Do not stockpile materials or park equipment within 20 feet of trees and shrubs or within two (2) feet of the excavation.

E. Provide erosion-control measures such as hay bales, polyethylene sheeting and sediment ponds to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties, walkways, storm sewer systems, roads and other areas on or near the site.

F. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.

G. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.

H. Perform daily inspections of excavations greater than five (5) feet in depth.

3.2 Line and Grade

A. One set of points (baseline) and a grade reference (benchmark) will be furnished by BSA. Furnish all other lines and grades. Protect and replace all survey stakes.

B. Before grading is started, completely stake out areas to be graded.

C. Set grade stakes where spot elevations are shown, along center lines, at breaks in grade, along drainage swales, and as otherwise required to rough grade the area.

D. Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered, including rock, soil materials, and obstructions.

E. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.

F. Excavate for pavements to indicated elevations and dimensions. Extend excavations for inspections. Trim bottoms to required lines and grades to leave solid base to receive other work.

G. Proof roll subgrades, before filling or placing aggregate courses, with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof roll wet or saturated subgrades.

H. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities.

I. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill may be used when approved by BSA.

J. Fill unauthorized excavations under other construction or utility pipe as directed by BSA.

K. Stockpile borrow materials and satisfactory soil materials, without intermixing, in shaped, graded, drained, and covered stockpiles. Stockpile soil materials away from edge of excavations and outside drip line of remaining trees.

L. Backfills and Fills

1. Fill: Place and compact fill material in layers to required elevations.

M. Uniformly moisten or aerate subgrade and each subsequent fill or backfill layer before compaction to within 2 percent of optimum moisture content.

N. Remove and replace, or scarify and air dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

O. Compaction: Place backfill and fill materials in layers not more than 8 inches (200 mm) in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches (100 mm) in loose depth for material compacted by hand-operated tampers.

P. Compact soil to not less than the following percentages of maximum dry density according to ASTM D 698.

1. Subbase and Base Courses Under Pavements: Under pavements and walks, place subbase course on prepared subgrade. Place base course material over subbase. Compact to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D 1557.

2. The Contractor shall provide compaction results to BSA, as required.

3.3 Protection and Disposal

A. Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

B. Repair and re-establish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction.

C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.

D. Disposal: Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off BNL site.

END OF SECTION 31 20 00

DIVISION 31 – EARTHWORK
SECTION 31 25 00 – EROSION AND STORMWATER CONTROL

PART 1 - GENERAL

1.1 Related Sections

A. Section 31 00 00 – Earthwork

1.2 References

A. 6NYCRR700-705 "Surface Water Quality Standards"

B. 6NYCRR750-758 "State Pollution Discharge Elimination System" (SPDES)

C. 40 CFR141.11-16 "National Primary Drinking Water Regulations" (NPDWR)

1.3 Submittals

A. The Contractor shall submit to BSA the means and methods of controlling stormwater and erosion as part of the Engineered Cap Installation Work Plan.

PART 2 - PRODUCTS

2.1 Silt Barrier

A. The Contractor shall construct a silt barrier to control silt-laden runoff from traveling off the work site. The silt barrier shall consist of geotextile fabric affixed to wooden stakes with the bottom of the fabric buried approximately six (6) inches below grade. The geotextile fabric shall be made of ultra-violet resistant material, silt-film fabric having the following characteristics:

1. Grab strength (ASTM D 4632): 90 lbs.
2. Burst strength (ASTM D 751): 145 lbs.
3. Elongation (ASTM D 4632): 15% at 45 lbs.
4. Permeability coefficient (ASTM D 4751): 0.2 mm/sec at constant head of 50 mm.
5. Apparent opening size (ASTM D 4751): U.S. Standard Sieve Number 20, minimum.
6. Retained strength after accelerated weathering and ultra-violet exposure (ASTM D 4355): 70%.

PART 3 - EXECUTION

3.1 General

A. Use the procedures and physical controls specified in the Work Plan for controlling stormwater, slope erosion, and accumulation of water in the work areas.

B. Minimize the ponding of surface water runoff on contaminated areas of the site.

C. Implement controls to minimize the flow of stormwater into excavation areas, whether contaminated or not.

D. Incorporate accordingly, waste minimization efforts and contingency disposal paths into the Technical Work Plan.

3.2 Erosion and Stormwater Control

A. Plan and execute the excavation in a manner to prevent stormwater runoff from the excavated areas to areas outside of the excavation area.

B. Minimize amounts of exposed work and waste at any one time.

C. Provide temporary measures, as required, to prevent water flow and erosion. These measures include berms, dikes, drains, sediment control (silt) fences, and hay or straw bales.

END OF SECTION 31 25 00

DIVISION 32 – EXTERIOR IMPROVEMENTS
SECTION 32 12 16 – ASPHALT PAVING

PART 1 – GENERAL

1.1 General

A. Furnish all labor, materials and equipment necessary to install hot-mixed asphalt paving, patching, and paving overlay over prepared subbase.

1. Prepared subbase is specified in another Division 31 section.

2. Proof rolling of prepared subbase is included in this Section.

3. Saw-cutting of edges of existing pavement shall be included, where shown or required.

1.2 Definitions

A. Asphalt Treated Base: Asphalt treated base consists of a compacted course of base material which has been weatherproofed and stabilized by treatment with an asphalt binder.

1.3 Submittals:

A. General: Submit the following:

1. Product Data: For each type of product indicated. Include technical data and tested physical and performance properties.

2. Job-Mix Designs: Certification, by authorities having jurisdiction, of approval of each job mix proposed for the Work.

3. Material certificates and Material Safety Data Sheets (MSDS).

4. Compaction results.

1.4 Quality Assurance:

A. Manufacturer Qualifications: Manufacturer shall be registered with, and approved by, the New York State DOT.

B. Regulatory Requirements: Comply with New York State DOT for asphalt paving work.

C. Asphalt-Paving Publication: Comply with AI MS-22, "Construction of Hot Mix Asphalt Pavements," unless more stringent requirements are indicated.

1.5 Project Conditions:

A. Environmental Limitations: Do not apply asphalt materials if subgrade is wet or excessively damp or if the following conditions are not met:

B. Weather Limitations: Apply prime and tack coats when ambient temperature is above 60°F (15.5°C) and when temperature has not been below 35°F (1°C) for 12 hours immediately prior to application. Do not apply when base is wet or contains an excess of moisture.

C. Asphalt Treated Base Course: Minimum surface temperature of 40°F (4°C) and rising at time of placement.

D. Asphalt Surface Course: Minimum surface temperature of 60°F (15.5°C) at time of placement.

E. Grade Control:

1. Establish and maintain required lines and elevations.

PART 2 – PRODUCTS

2.1 Materials

A. General: Use locally available materials and gradations that exhibit a satisfactory record of previous installations.

B. Course Aggregate: Sound, angular crushed stone, crushed gravel, properly cured, crushed blast-furnace slag, or properly cleaned, blended, crushed, recycled concrete, complying with ASTM D 692.

C. Fine Aggregate: Sharp-edged natural sand or sand prepared from stone, gravel, properly cured blast-furnace slag, or combinations thereof, complying with ASTM D 1073.

D. Mineral Filler: Rock or slag dust, hydraulic cement, or other inert material passing the No. 200 sieve and complying with ASTM D 242.

E. Asphalt Binder: AASHTO MP 1, performance grade as recommended by NYSDOT.

F. Tack Coat: Emulsified asphalt; ASTM D 977, complying with 6NYCRR 205, slow setting, diluted in water, of suitable grade and consistency for application.

G. Asphalt-Aggregate Mixture: Provide plant-mixed, hot-laid asphalt-aggregate mixture complying with ASTM D 3515 and NYSDOT.

PART 3 – EXECUTION

3.1 Surface Preparation

A. General: Remove loose material from compacted subbase surface immediately before applying prime coat.

B. Refer to Site Plan and details for extent of paving which includes but is not limited to the following:

1. As part of Engineered Cap: 4" Type 3 asphalt treated base plus 3" Type 6 asphaltic wearing course.

2. Outside of Engineered Cap: 3" Type 3 asphalt base plus 2" Type 6 asphaltic wearing course.

C. Proof-roll prepared subbase surface to check for unstable areas and areas requiring additional compaction.

D. Do not begin paving work until deficient subbase areas have been corrected and are ready to receive paving.

E. Saw cut perimeter of patches and/or edges where new paving meets existing for smooth and even edged transitions.

F. Tack Coat:

1. Apply to contact surfaces of previously constructed asphalt or Portland cement concrete and surfaces abutting or projecting into hot-mixed asphalt pavement. Distribute at rate of 0.05 to 0.15 gal. per sq. yd. of surface.

2. Allow to dry until at proper condition to receive paving.

3. Exercise care in applying bituminous materials to avoid smearing of adjoining concrete surfaces. Remove and clean damaged surfaces.

3.2 Hot-Mix Asphalt Placement

A. General:

1. Machine place hot-mixed asphalt mixture on prepared surface, spread uniformly, and strike off. Spread mixture at minimum temperature of 250°F (121°C).

2. Place areas inaccessible to equipment by hand. Place each course to required grade, cross-section, and compacted thickness. Regulate paver machine speed to obtain smooth, continuous surface free of pulls and tears in asphalt-paving mat.

B. Paving Placing:

1. Place in strips not less than 10 feet wide, unless otherwise acceptable to BSA. After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips. Complete base course for section before placing surface course.

2. Immediately correct surface irregularities in paving course behind paver. Remove excess material forming high spots with shovel or lute.

2. Joints: Make joints between old and new pavements, or between successive days' work, to ensure continuous bond between adjoining work. Construct joints to have same texture, density, and smoothness as other sections of hot-mixed asphalt course. Clean contact surfaces and apply tack coat.

3.3 Rolling

A. General:

1. Begin rolling when mixture will bear roller weight without excessive displacement. Complete compaction before mix temperature cools to 185°F (85°C).

2. Compact mixture with hot hand tampers or vibrating plate compactors in areas inaccessible to rollers.

3. Breakdown Rolling: Complete breakdown or initial rolling immediately following rolling of joints and outside edge. Check surface after breakdown rolling and repair displaced areas by loosening and filling, if required, with hot material.

3. Intermediate Rolling: Follow breakdown rolling as soon as possible, while mixture is hot. Continue rolling until mixture has been evenly compacted to average density of 92 percent of reference maximum theoretical density, ASTM D 2041.

4. Finish Rolling: Perform finish rolling while mixture is still warm enough for removal of roller marks. Continue rolling until roller marks are eliminated and course has attained 95% laboratory density.

5. Patching: Remove and replace paving areas mixed with foreign materials and defective areas. Cut out such areas and fill with fresh, hot hot-mixed asphalt. Compact by rolling to specified surface density and smoothness.

6. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.

   a. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

3.4 Field Quality Control

A. General: Testing in-place hot-mixed asphalt courses for compliance with requirements for thickness and surface smoothness will be done by the Contractor. Repair or remove and replace unacceptable paving as required.

B. Thickness: In-place compacted thickness tested in accordance with ASTM D 3549 will not be acceptable if exceeding following allowable variations:

   1. Base Course: Plus or minus 1/2 inch (13 mm).

   2. Surface Course: Plus or minus 1/4 inch (6 mm).

C. Surface Smoothness: Test finished surface of each hot-mixed asphalt course for smoothness, using 10-foot straightedge applied parallel with and at right angles to centerline of paved area. Surfaces will not be acceptable if exceeding the following tolerances for smoothness.

   1. Base Course Surface: 1/4 inch (6 mm).

   2. Surface Course: 1/8 inch (3 mm).

END OF SECTION 32 12 16

DIVISION 32 – EXTERIOR IMPROVEMENTS
SECTION 32 12 36.13 – ASPHALTIC SEAL AND FOG COATS

Part 1 – GENERAL

1.1 Related Sections

A. 32 12 16 – Asphalt Paving

1.2 Description

A. The Work under this Section includes providing all labor, materials, tools, and equipment necessary to apply a fog seal coat to all new asphalt surfaces. This fog seal coat shall be composed of a slow setting asphalt emulsion and diluted with water. Blotting the fog seal with sand after the emulsion breaks is required.

1.3 Submittals:

A. General: Submit the following:

1. Product Data: For each type of product indicated. Include technical data and tested physical and performance properties.

2. Material certificates and Material Safety Data Sheets (MSDS).

1.4 Environmental Requirements

A. Do not place fog seal when atmospheric temperature is below 50 degrees F (10 degrees C).

B. Do not place fog seal when the asphalt surface temperature is less than 59 degrees F (15 degrees C).

C. Do not place fog seal when precipitation is occurring or if asphalt surface is wet or frozen.

PART 2 - PRODUCTS

SealMaster Professional Grade Sealant

2.1 Materials

A. The~~ type of asphalt material used for the fog seal coat shall be CSS-1 cationic emulsified asphal~~t.

B. T~~he blotter material shall be suitable clean sand~~.

Black Beauty Abrasives (slag)
Harsco Minerals
Mechanicsburg, PA

PART 3 - EXECUTION

3.1 General

A. The Contractor shall provide equipment for heating and applying the asphalt emulsion and for applying blotter material and removing blotter material.

B. The surface shall be clean and free from all loose material.

C. The rate of application shall be between 0.08 and 0.15 gallons per square yard.

D. The dilution rate of 50% (equal parts water to equal parts emulsion) is recommended to achieve the proper viscosity.

E. After application of the fog seal coat, blotter sand shall be applied by a ten (10) yard capacity truck with a rear-mounted spreader at a rate of three (3) to five (5) pounds per square yard.

F. Blotting sand shall be removed by means of a rotary broom and vacuum truck within ten (10) days after application of the fog seal coat.

END OF SECTION 32 12 36.13

DIVISION 32 – EXTERIOR IMPROVEMENTS

SECTION 32 12 73 – ASPHALT PAVING JOINT SEALANTS

Part 1 – GENERAL

1.1 Related Sections

A. 32 12 16 – Asphalt Paving

1.2 Description

A. The Work under this Section includes elastomeric hot applied joint sealing in asphalt.

1.3 References

A. ASTM D 5329: Test Methods for Sealants and Fillers, Hot Applied, for Joints and Cracks in Asphaltic and Portland Cement Concrete Pavements

B. ASTM D 6690: Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements

1.4 Submittals

A. Submit manufacturer's printed Product Data Sheet.

1.5 Certification

A. Contractor to submit a letter stating that equipment used to heat the material meets the requirements of this specification.

B. Upon request, the Contractor will submit manufacturer's test results on products used.

1.6 Environmental Requirements

A. Apply sealant only to clean, dry, properly prepared joints.

B. At ambient temperatures below forty (40) degrees F, use a hot compressed air lance to achieve clean, dry, warm space for sealant.

PART 2 - PRODUCTS

2.1 Materials

A. A hot applied elastomeric crack/joint sealant for asphaltic and concrete pavements. Liquid AC-20

2.2 Equipment

A. Melt down the sealant in a kettle or melter constructed as a double boiler. The space between the inner and outer shells filled with a high flash point heat transfer oil or other indirect heating means.

B. The kettle to be used must have constant agitation any time material is over three hundred (300) degrees F. The kettle must have temperature-monitoring capabilities.

C. Roofing kettles or other direct fired melters are not acceptable for these materials.

PART 3 – EXECUTION

3.1 Examination

A. Inspect existing pavement for conditions and defects that will adversely affect quality of work and which cannot be put into acceptable condition through normal preparatory work as specified.

B. Starting installation constitutes Contractor's acceptance of surface as suitable for installation.

3.2 Preparation

A. Sealant

1. Prepare sealant in specified equipment.

2. Heat sealant according to manufacturer's Product Data Sheet.

3.3 Application

A. Install heated sealant directly into joints not to exceed a one (1) inch wide band.

B. Control thickness to one-eighth (1/8) inch above pavement surface.

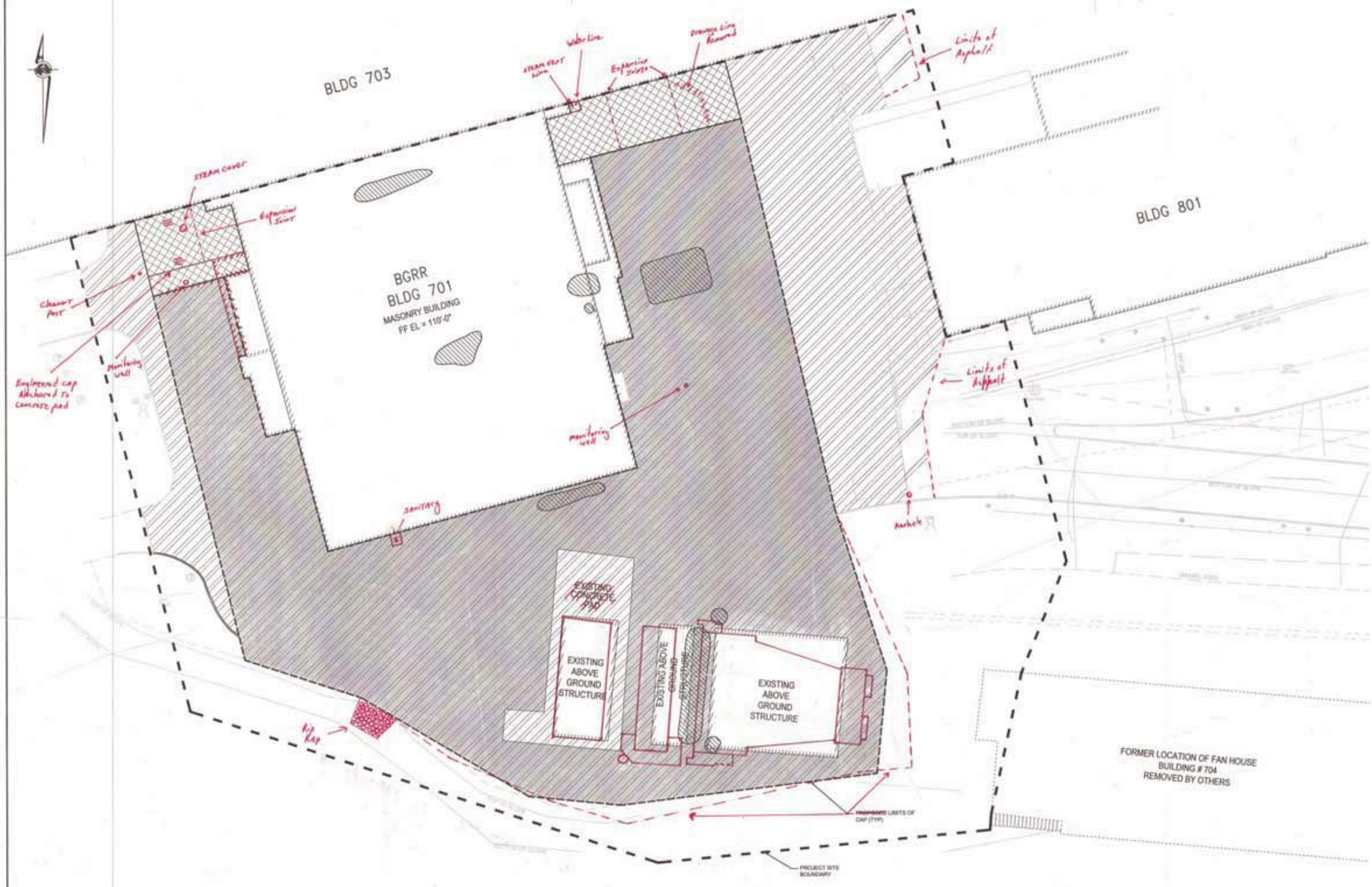
C. Finished sealed joints will be uniformly level and all depressions will be refilled to achieve flush to one eighth (1/8) inch concave surface appearance.

3.4 Protection

A. Care must be taken to keep the public from work area while sealant is being installed and traffic should not be allowed to cross sealant filled joints until sealant has cooled sufficiently to prevent tracking.

END OF SECTION 32 12 73

END OF SPECIFICATIONS



FINAL CONDITIONS PLAN

SCALE: 1" = 20'

LEGEND

- PROPOSED ENGINEERED CAP
- PROPOSED ASPHALT
- PROPOSED CONCRETE PAD (TYP. FOR 2 LOCATIONS ADJACENT TO BLDG. 701)
- EXISTING RADIOLOGICAL SOIL CONTAMINATION IS AT LEAST 20' BELOW GRADE - FOR INFORMATION ONLY
- EXISTING DRAINAGE LINE
- EXISTING WATER LINE
- EXISTING ELECTRIC LINE
- EXISTING STEAM LINE
- PROJECT SITE BOUNDARY

630 Johnson Ave. Suite 7
Bohemia, N.Y. 11716-2618
E-mail: www.pwgrosser.com
Ph: 631 589-6353 Fx: 631 589-8705

JOB NO.	SHEET	NO	REVISION	DATE	DWN.	APP'D.
		2	FINALIZE CONCRETE PAD AREAS, DETAILS	9-22-10	MK	RJZ
		1	ADDED PROPOSED CONCRETE PAD AREAS	8-19-10	MK	RJZ

BROOKHAVEN NATIONAL LABORATORY

UNDER CONTRACT WITH
UNITED STATES DEPARTMENT OF ENERGY
PLANT ENGINEERING DIVISION
UPTON, NEW YORK 11973

JOB TITLE: BGRR ENGINEERED CAP INSTALLATION		DWG. TITLE: FINAL CONDITIONS PLAN	
ILR,GPP,LNL, HEM	DATE 7-22-10	ACCT. NO.	SHEET 1 OF 6
SCALE AS SHOWN	DWN. BY MK	JOB NO. BNL1010	DWG. NO. 324-22-1
PROJ. QA	APP'D. BY RJZ	BLDG. NO. 701	
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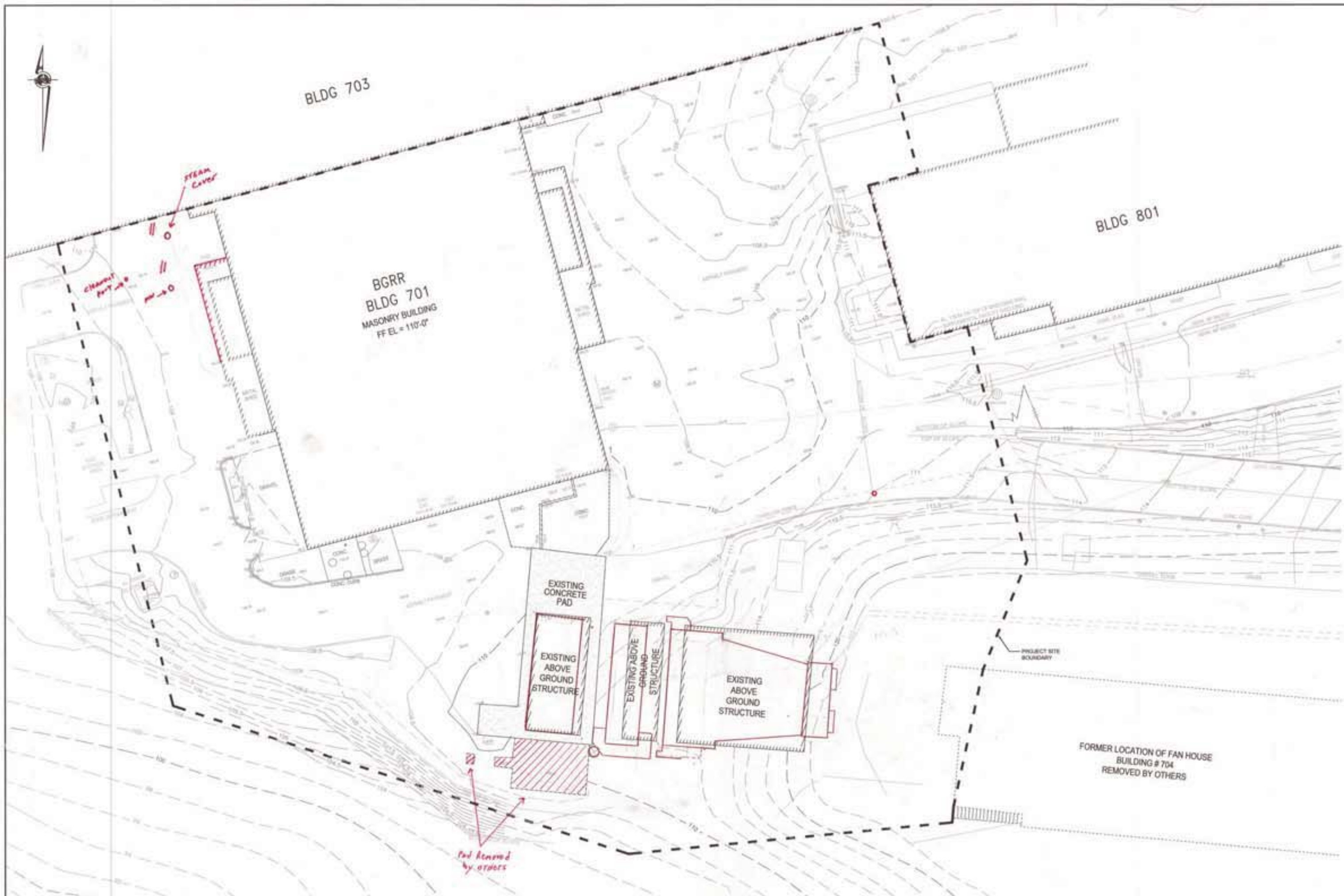
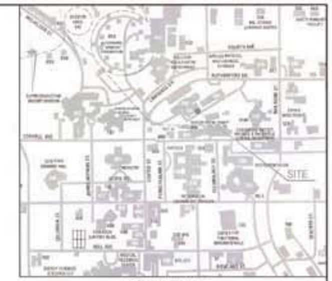


EXISTING CONDITIONS PLAN

SCALE: 1" = 20'

0 20 40

SCALE: 1" = 20'



VICINITY MAP

SCALE : 1" = 2,000'

0 1,000 2,000

LEGEND

100	EXISTING MAJOR CONTOUR
100	EXISTING MINOR CONTOUR
	EXISTING SPOT ELEVATION
— — — —	PROJECT SITE BOUNDARY
	EXISTING DRAINAGE LINE
	EXISTING WATER LINE
	EXISTING ELECTRIC LINE
	EXISTING STEAM LINE

GENERAL NOTES:

1. SURVEY INFORMATION AND TOPOGRAPHIC DATA BASED ON SURVEY PREPARED BY MUNICIPAL LAND SURVEY, DATED MAY 12, 2010.
2. PROPOSED GRADES NOT TO EXCEED 1V:3H FOR MAINTENANCE PURPOSES.

630 Johnson Ave. Suite 7
Bohemia, N.Y. 11716-2618
E-mail: www.pwgrosser.com
Ph: 631 589-6353 Fx: 631 589-8705

JOB NO.	SHEET	NO	REVISION	DATE	DWN.	APP'D.
		△	FINALIZE CONCRETE PAD AREAS, DETAILS	9-22-10	MK	RJZ
		△	ADDED PROPOSED CONCRETE PAD AREAS	8-19-10	MK	RJZ

BROOKHAVEN
NATIONAL LABORATORY

UNDER CONTRACT WITH
UNITED STATES DEPARTMENT OF ENERGY
PLANT ENGINEERING DIVISION
UPTON, NEW YORK 11973

JOB TITLE: BGRR ENGINEERED CAP INSTALLATION		DWG. TITLE: EXISTING CONDITIONS PLAN	
II,R,GPP,LNI, HEM	DATE 7-22-10	ACCT. NO.	SHEET 2 OF 6
SCALE AS SHOWN	DWN. BY MK	JOB NO. BNL1010	DWG. NO. 324-22-2
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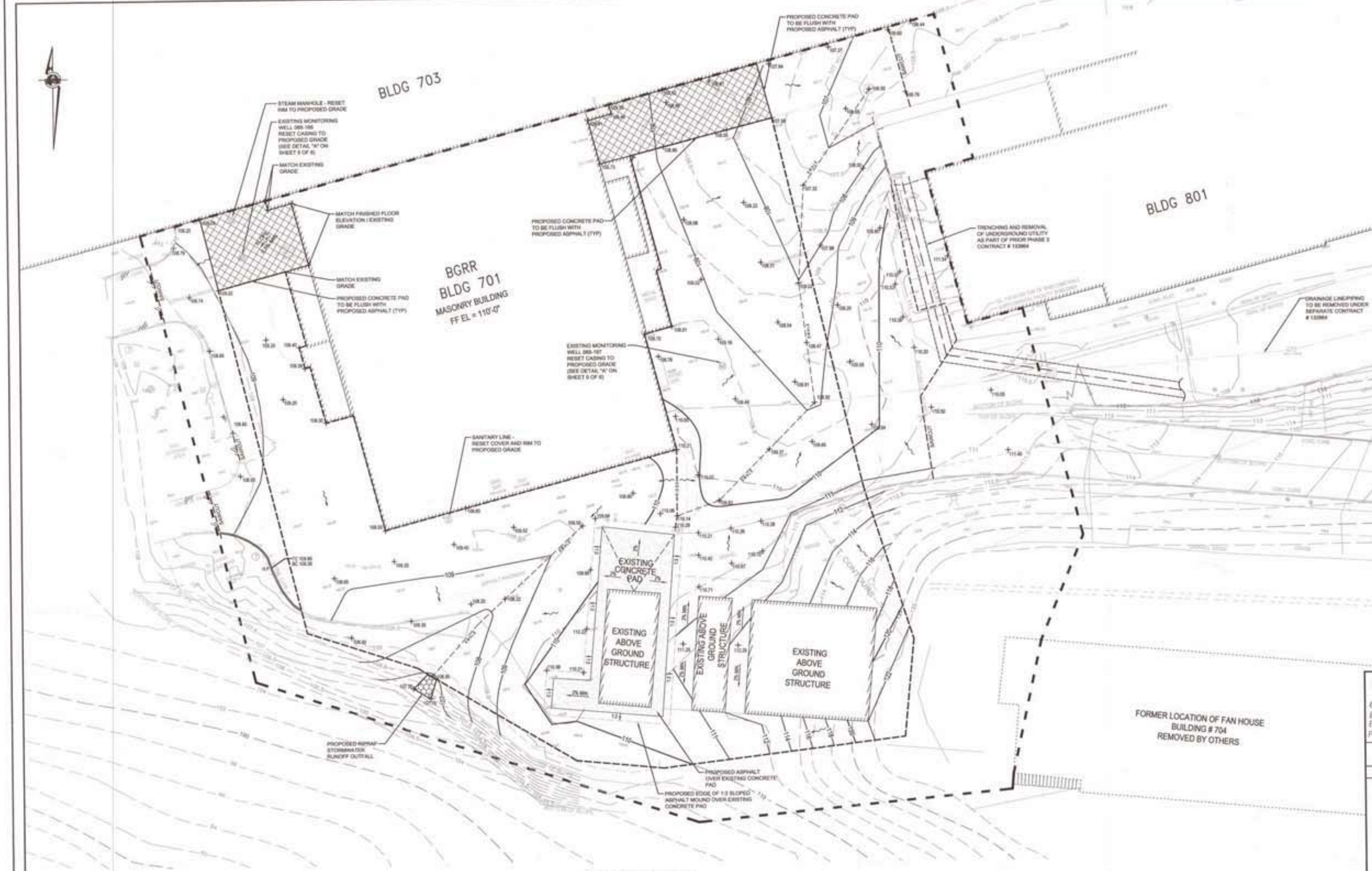

LEGEND

--- 100 ---	EXISTING MAJOR CONTOUR
--- 102 ---	EXISTING MINOR CONTOUR
	EXISTING SPOT ELEVATION
—110—	PROPOSED MAJOR CONTOUR
—109—	PROPOSED MINOR CONTOUR
----SWALE----	PROPOSED SWALE
+ 108.31	PROPOSED SPOT ELEVATION
	PROPOSED DRAINAGE FLOW DIRECTION
H.P.	HIGH POINT
	EDGE OF EXISTING PAVEMENT
	PROPOSED ASPHALT SAWCUT
	PROPOSED CAP LIMITS
	PROJECT SITE BOUNDARY
	EXISTING DRAINAGE LINE
	EXISTING WATER LINE
	EXISTING ELECTRIC LINE
	EXISTING STEAM LINE

FINAL GRADE PLAN

SCALE: 1" = 20'

0 20 40

SCALE: 1" = 20'

Refer To Final "As-Built" Survey

NOTES:

1. ASPHALT AREAS WITHIN PROPOSED LIMITS OF ENGINEERED CAP TO BE INSTALLED PER DETAIL "C", FIGURE 324-22-5.
2. ASPHALT AREAS OUTSIDE OF PROPOSED LIMITS OF ENGINEERED CAP BUT WITHIN PROPOSED LIMITS OF WORK TO BE INSTALLED PER DETAIL "D", FIGURE 324-22-5.
3. ANCHOR HDPE TO BUILDING 701 AND BUILDING 703 PER DETAIL "B", FIGURE 324-22-5.
4. FOR CONCRETE PADS TO REMAIN, ANCHOR HDPE GEOMEMBRANE TO CONCRETE PAD PER DETAIL "B", FIGURE 324-22-5. COVER CONCRETE PAD WITH ASPHALT PER DETAIL "E".
5. INTERFACE BETWEEN NEW ASPHALT AND EXISTING BUILDING FOUNDATION, STRUCTURE, OR PENETRATION TO BE SEALED WITH ELASTOMERIC HOT APPLIED JOINT SEALANT.

P.W. GROSSER CONSULTING INC

630 Johnson Ave. Suite 7
Bohemia, N.Y. 11716-2618
E-mail: www.pwgrosser.com
Ph: 631 589-6353 Fx: 631 589-8705

JOB NO.	SHEET	NO	REVISION	DATE	DWN.	APP'D.
		2	FINALIZE CONCRETE PAD AREAS, DETAILS	9-22-10	MK	RJZ
		1	ADDED PROPOSED CONCRETE PAD AREAS	6-19-10	MK	RJZ

BROOKHAVEN NATIONAL LABORATORY

UNDER CONTRACT WITH
UNITED STATES DEPARTMENT OF ENERGY
PLANT ENGINEERING DIVISION
UPTON, NEW YORK 11973

JOB TITLE: BGRR ENGINEERED CAP INSTALLATION		DWG. TITLE: FINAL GRADE PLAN	
ILR,GPP,LNL, HEM	DATE 7-22-10	ACCT. NO.	SHEET 4 OF 6
SCALE AS SHOWN	DWN. BY MK	JOB NO. BNL1010	DWG. NO. 324-22-4
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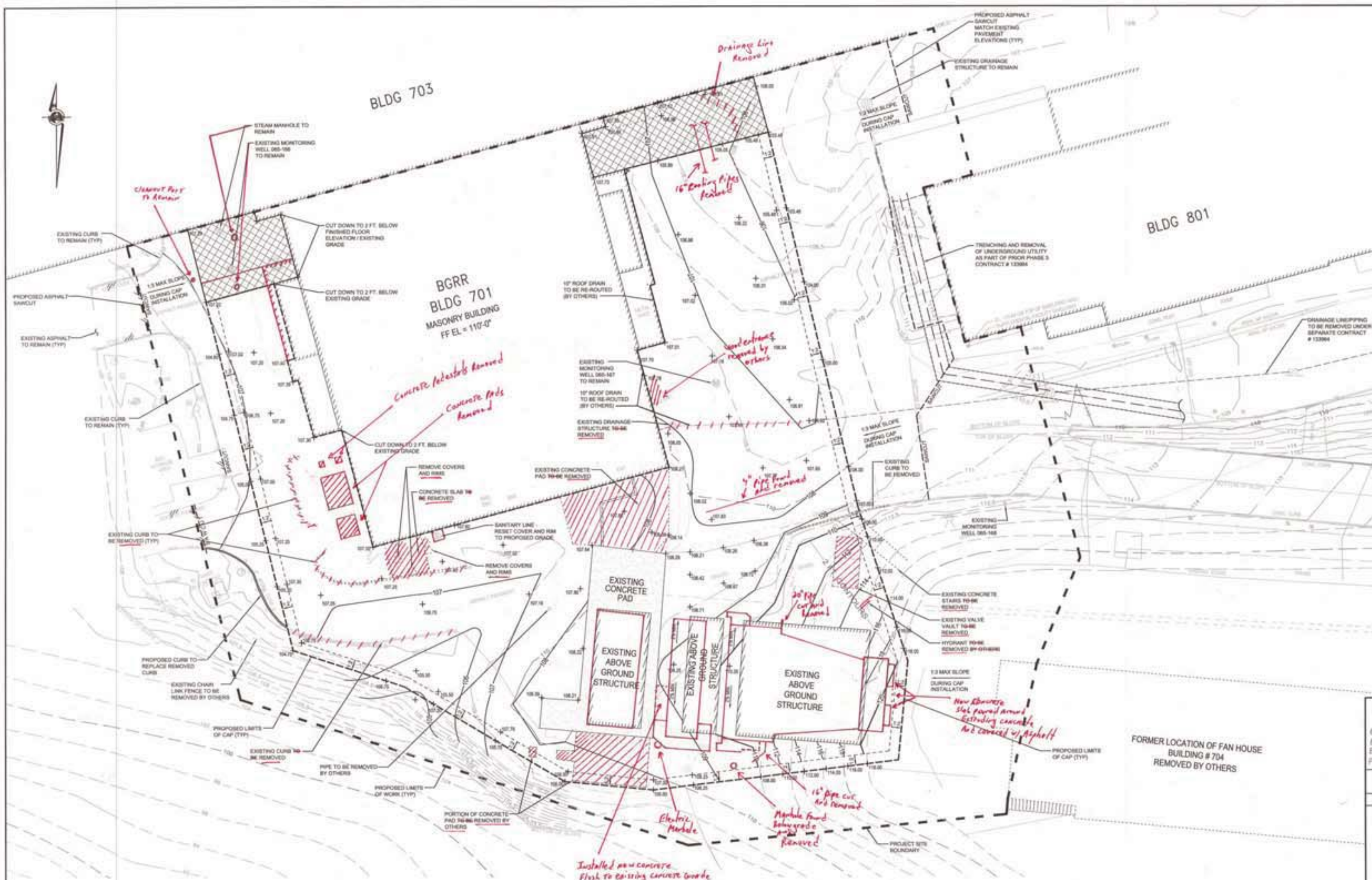

CAP EXCAVATION PLAN
SCALE: 1" = 20'

LEGEND

- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- EXISTING SPOT ELEVATION
- 110 — PROPOSED MAJOR CONTOUR
- 109 — PROPOSED MINOR CONTOUR
- SWALE — PROPOSED SWALE
- +108.31 — PROPOSED SPOT ELEVATION
- PROPOSED DRAINAGE FLOW DIRECTION
- H.P. — HIGH POINT
- EDGE OF EXISTING PAVEMENT
- PROPOSED ASPHALT SAWCUT
- PROPOSED CAP LIMITS
- PROJECT SITE BOUNDARY
- EXISTING DRAINAGE LINE
- EXISTING WATER LINE
- EXISTING ELECTRIC LINE
- EXISTING STEAM LINE

NOTES:

1. EXTENT OF NEW PAVEMENT SHOWN ON SHEET 1 OF 6 FOR CLARITY.

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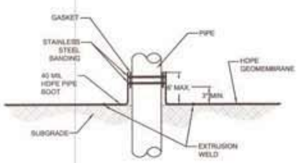
Bohemia, N.Y. 11716-2618
E-mail: www.pwgrosser.com
Ph: 631 589-6353 Fx: 631 589-8705

JOB NO.	SHEET	NO	REVISION	DATE	DWN.	APP'D.
			FINALIZE CONCRETE PAD AREAS, DETAILS	9-22-10	MK	RJZ
			ADDED PROPOSED CONCRETE PAD AREAS	8-19-10	MK	RJZ

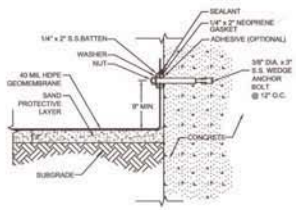
BROOKHAVEN
NATIONAL LABORATORY

UNDER CONTRACT WITH
UNITED STATES DEPARTMENT OF ENERGY
PLANT ENGINEERING DIVISION
UPTON, NEW YORK 11973

JOB TITLE: BGRR ENGINEERED CAP INSTALLATION		DWG. TITLE: CAP EXCAVATION PLAN	
ILR,OPP,LNL, HEM	DATE 7-22-10	ACCT. NO.	SHEET 3 OF 6
SCALE AS SHOWN	DWN. BY MK	JOB NO. BNL1010	DWG. NO.
PROJ. QA	APP'D. BY RJZ	BLDG. NO. 701	324-22-3
PATH:			

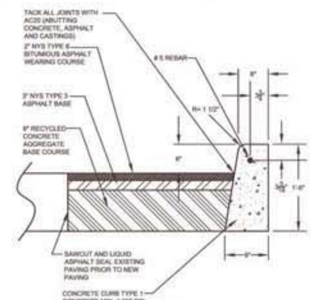


DETAIL "A"
PIPE PENETRATION
NOT TO SCALE

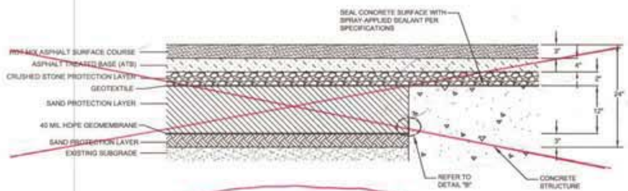


DETAIL "B"
ANCHORING HDPE LINER
TO CONCRETE
NOT TO SCALE

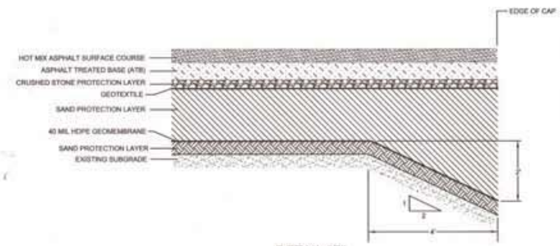
DETAIL "C"
ENGINEERED CAP CONSTRUCTION
NOT TO SCALE



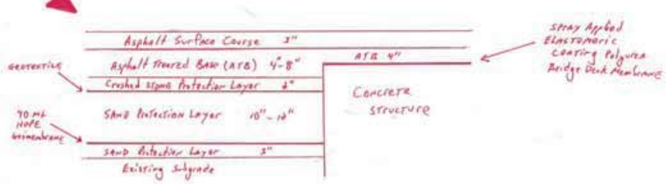
DETAIL"D"
TYPICAL ASPHALT PAVEMENT
AND CURB DETAIL
NOT TO SCALE



DETAIL"E"
ASPHALT OVER CONCRETE DETAIL
NOT TO SCALE



DETAIL "F"
ENGINEERED CAP - EDGE CONSTRUCTION
NOT TO SCALE



N.T.S.

CONSTRUCTION NOTES

1. ALL WORK, MATERIALS, SPECIFICATIONS, REGULATIONS, RULES, PERMITS, ETC., OF APPLICABLE STATE AND LOCAL MUNICIPALITIES AND REGIONAL UTILITY COMPANIES (PUBLIC AND PRIVATE) SHALL BE FOLLOWED BY THE CONTRACTOR.
2. THE CONTRACTOR IS RESPONSIBLE FOR FIELD VERIFICATION OF EXISTING FEATURES.
3. PROTECTION OF EXISTING UTILITIES SHALL BE COORDINATED BY THE CONTRACTOR IN COOPERATION WITH THE APPROPRIATE BNL UTILITY GROUP.
4. UTILITY MARKOUTS SHALL BE DONE PRIOR TO CONSTRUCTION OF TEMPORARY ROADWAY. CONTRACTOR SHALL CONTACT THE NECESSARY BNL UTILITY GROUP TO SCHEDULE FOR MARKOUTS.
5. EXCESS/SURPLUS SUBGRADE MATERIAL IS TO BE PLACED IN AN APPROVED STOCKPILE AREA DESIGNATED BY PROJECT MANAGER.
6. RELOCATION OF EXISTING UTILITY POLES, TRAFFIC SIGNS, HYDRANTS, ETC. SHALL BE COORDINATED BY THE CONTRACTOR WITH THE APPROPRIATE BNL UTILITY GROUP. THE CONTRACTOR IS RESPONSIBLE FOR FIELD VERIFICATION OF EXISTING FEATURES.
7. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL NECESSARY INSPECTIONS AND/OR CERTIFICATIONS REQUIRED BY CODES AND/OR UTILITY SERVICE COMPANIES. THESE INSPECTIONS AND/OR CERTIFICATIONS SHALL BE PERFORMED PRIOR TO ANNOUNCED BUILDING POSSESSION AND THE FINAL CONNECTION OF SERVICES.

NOTE:
PLEASE REFER TO SPECIFICATIONS FOR ENGINEERED CAP, BUILDING 701, BROOKHAVEN GRAPHITE RESEARCH REACTOR.

630 Johnson Ave. Suite 7
Bohemia, N.Y. 11716-2618
E-mail: www.pwgrosser.com
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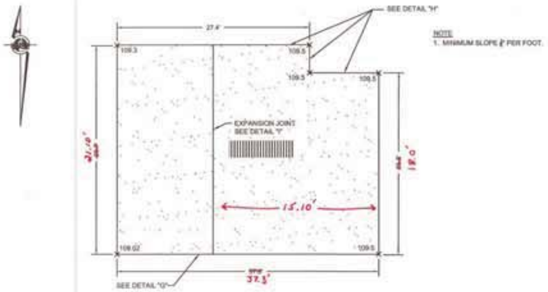
JOB NO.	SHEET	NO	REVISION	DATE	DWN.	APP'D.
		2	FINALIZE CONCRETE PAD AREAS, DETAILS	9-22-10	MK	RJZ
		1	ADDED PROPOSED CONCRETE PAD AREAS	8-19-10	MK	RJZ

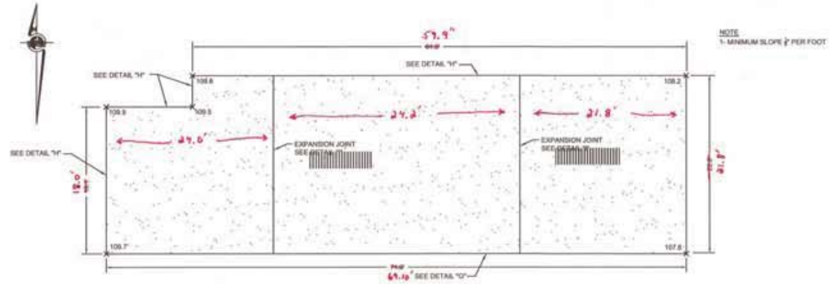
BROOKHAVEN NATIONAL LABORATORY

UNDER CONTRACT WITH
UNITED STATES DEPARTMENT OF ENERGY
PLANT ENGINEERING DIVISION
UPTON, NEW YORK 11973

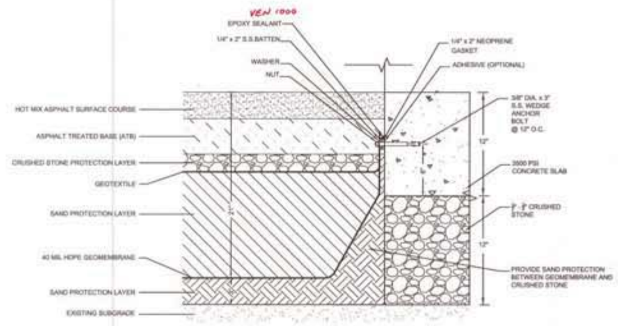
JOB TITLE: BGRR ENGINEERED CAP INSTALLATION		DWG. TITLE: DETAILS	
R,R,GPP,LNI, HEM	DATE 7-22-10	ACCT. NO.	SHEET 5 OF 6
SCALE AS SHOWN	DWN. BY MK	JOB NO. BNL1010	DWG. NO. 324-22-5
PROJ. QA	APP'D. BY RJZ	BLDG. NO. 701	
PATH:			



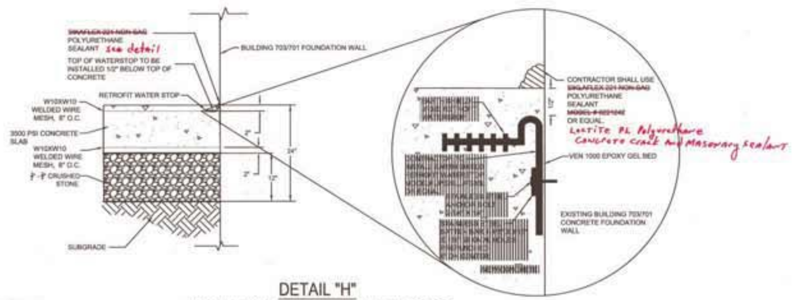
PLAN VIEW
CONCRETE PAD AT BLDG 701
WEST ROLL-UP DOOR
NOT TO SCALE



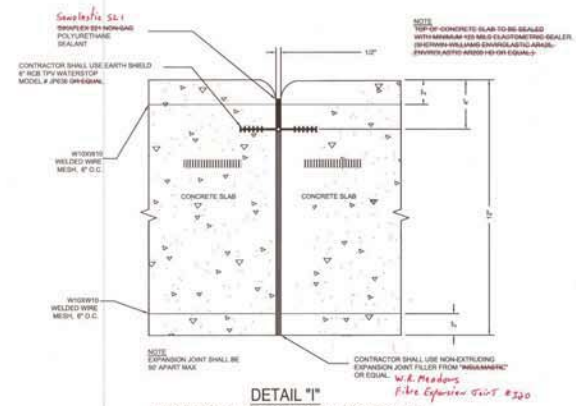
PLAN VIEW
CONCRETE PAD AT BLDG 701
EAST ROLL-UP DOOR
NOT TO SCALE



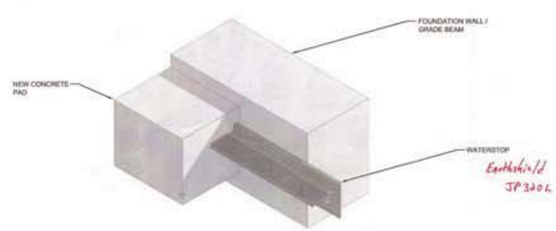
DETAIL "G"
ANCHORING HDPE GEOMEMBRANE
TO CONCRETE PAD
NOT TO SCALE



DETAIL "H"
ANCHORING RETROFIT WATERSTOP
TO FOUNDATION WALL / GRADE BEAM
NOT TO SCALE



DETAIL "I"
EXPANSION JOINT WITH WATERSTOP
NOT TO SCALE



ANCHORING RETROFIT WATERSTOP TO
FOUNDATION WALL / GRADE BEAM
3-DIMENSIONAL VIEW
NOT TO SCALE

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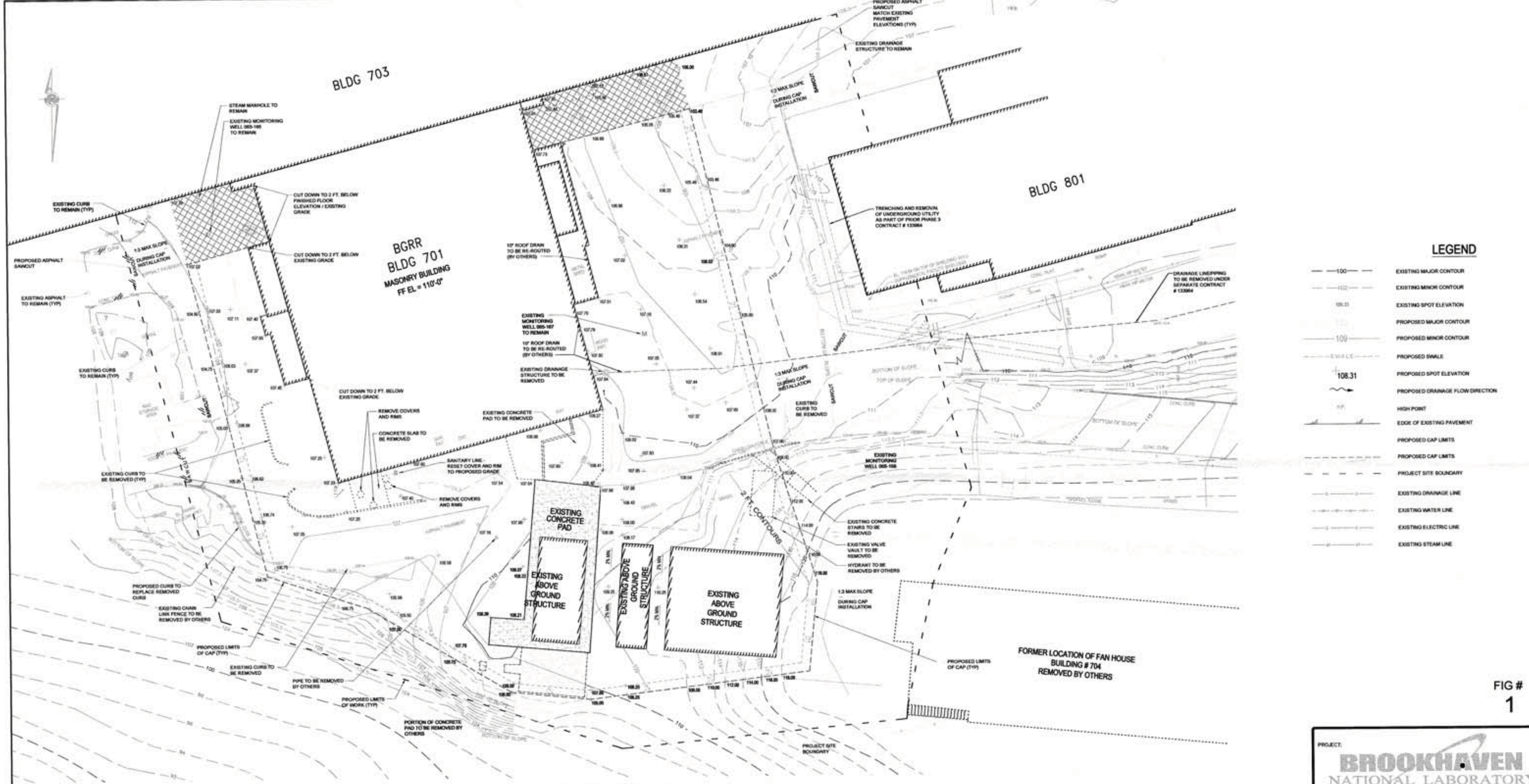
Bohemia, N.Y. 11716-2618
E-mail: www.pwgrosser.com
Ph: 631 589-6353 Fx: 631 589-8705

JOB NO.	SHEET	NO	REVISION	DATE	DWN.	APP'D.
		2	FINALIZE CONCRETE PAD AREAS, DETAILS	9-22-10	MK	RJZ
		1	ADDED PROPOSED CONCRETE PAD AREAS	8-19-10	MK	RJZ

BROOKHAVEN NATIONAL LABORATORY

UNDER CONTRACT WITH
UNITED STATES DEPARTMENT OF ENERGY
PLANT ENGINEERING DIVISION
UPTON, NEW YORK 11973

JOB TITLE: BGRR ENGINEERED CAP INSTALLATION		DWG. TITLE: DETAILS	
II,R,GPP,LNL, HEM	DATE 7-22-10	ACCT. NO.	SHEET 6 OF 6
SCALE AS SHOWN	DWN. BY JO/MK	JOB NO. BNL1010	DWG. NO.
PROJ. QA	APP'D. BY RJZ	BLDG. NO. 701	324-22-6
PATH:			



CAP EXCAVATION PLAN

SCALE: 1" = 20'

FIG # 1

PROJECT:

BROOKHAVEN NATIONAL LABORATORY

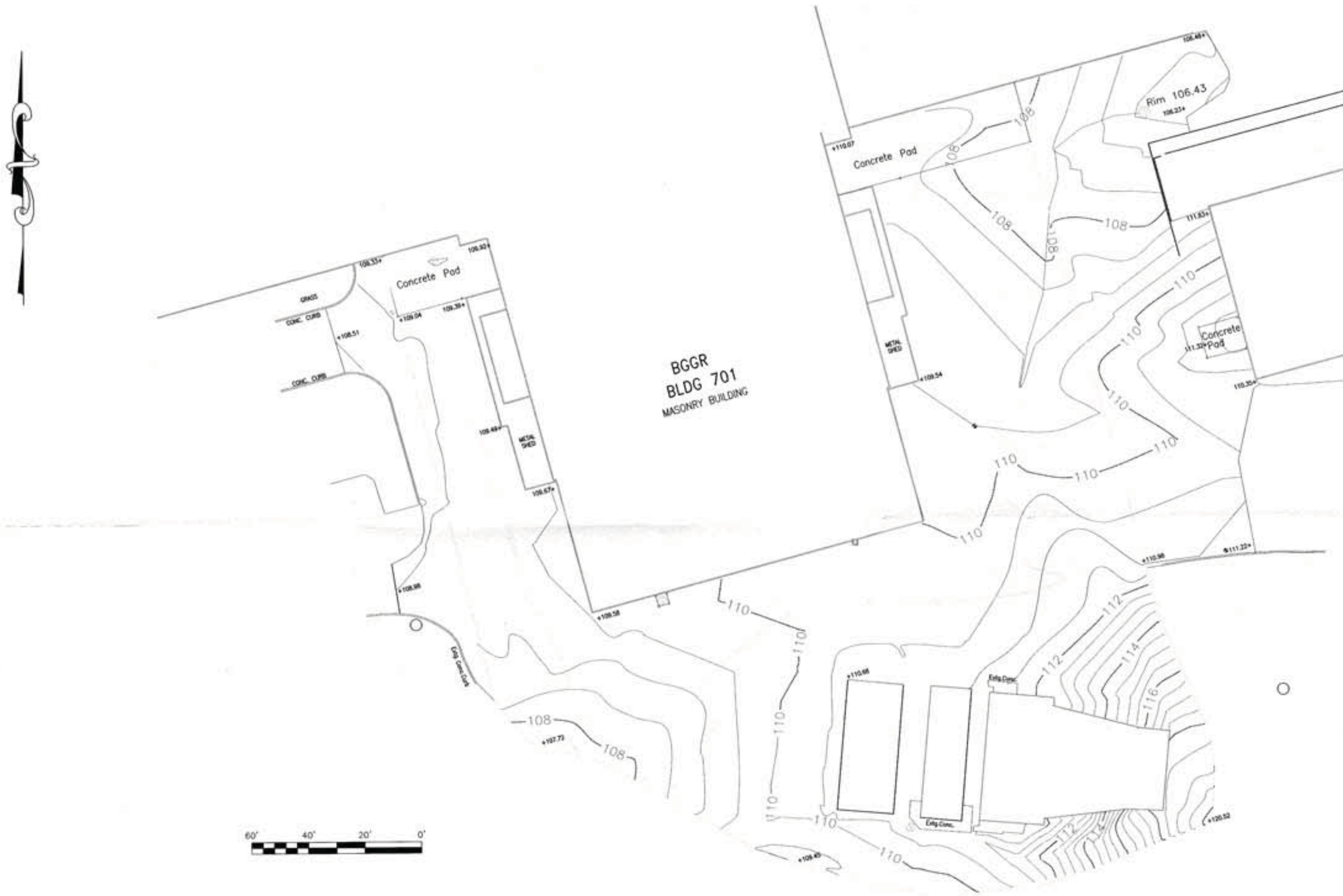
UNDER CONTRACT WITH
UNITED STATES DEPARTMENT OF ENERGY
PLANT ENGINEERING DIVISION
UPTON, NEW YORK 11973

DRAWING TITLE:

EXCAVATION BOTTOM SURVEY

EnviroTrac
ENVIRONMENTAL SERVICES
5 OLD DOCK ROAD, YAPHANK, NY 11980
PHONE: (631)924-3001 FAX: (631)924-5001

MAP BASED ON P.W. GROSSER CONSULTING INC. DRAWING DATED SEPTEMBER 22, 2011



Asphalt and Concrete Areas

Asphalt Pavement – Engineered Cap	32,001 s.f.
Asphalt Pavement – West Side (Typ.Sect.)	2133 s.f.
Asphalt Pavement – East Side (Typ.Sect.)	8946 s.f.
Concrete Pad – West Side	788 s.f.
Concrete Pads – East Side	1651 s.f.

Note : The areas of misc. existing concrete pads and building footprints have been deducted from the above quantities.

No.	Date	Revisions

MUNICIPAL LAND SURVEY P.C.
10 SYLVIA LANE
MIDDLE ISLAND, NEW YORK, 11953
(631) 345-2658

Final Survey
Buildings 701 and 801
Parking Lot Remediation
Brookhaven National Lab , Upton N.Y.

Robert W. Ott L.S.

Proj. No. 11024
Dwg. No. 1/1
Scale : 1"= 20'
Date : 7/18/2011

APPENDIX C

EnviroTrac Project Completion Report

PROJECT COMPLETION REPORT

Brookhaven National Laboratory
BGRR Engineered Cap
Building 701

Prepared for:

Brookhaven National Laboratory (BNL)
Building 701, Box 5000
Upton, New York 11973

Prepared by:

EnviroTrac Ltd.
5 Old Dock Road
Yaphank, NY 11980

July 2011

A Full Service Environmental Consulting and Contracting Firm

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APPENDICES

A. Concrete Mix Tickets

B. Concrete East Pad and West Pad Concrete Strength Test Cylinder Results

C. Base Compaction Results

D. Geomembrane Testing

E. Protection Layer Compaction Results

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1. Excavation Bottom Elevations

2. Final Survey

1.0 INTRODUCTION

The project consisted of the installations of an engineered cap over subsurface radiologically contaminated soils around the west, south, and east sides of Building 701 (Brookhaven Graphite Research Reactor), as shown on the Contract Drawings. Prior to the cap installation, two concrete pads were installed adjacent to the east and west roll-up doors of Building 701. Upon completion of the concrete pads, the cap installation commenced. Cap work consisted of demolition of existing asphalt, concrete, recycled concrete aggregate (RCA), and backfill material; and installation of an engineered cap consisting of a 40-mil HDPE geomembrane, sand protective layer, RCA layer, asphalt treated base layer (ATB) and asphalt surface course. All work was performed in accordance with the Contract Specifications and Drawings.

2.0 SUMMARY OF EXISTING SITE CONDITIONS

In general, existing site surface conditions represented conditions depicted on the Existing Conditions Plan provided as Sheet 2 of 6 of Contract Drawings. Subsurface soils have been pre-classified by BNL as Type C soils, considered to be relatively unstable, consisting of sands and gravels. Refer to the Record Drawings for subsurface utilities exposed during excavation.

3.0 OVERVIEW OF WORK PERFORMED

Major work items can be divided into the following work tasks:

- Construction of the East Pad
- Construction of the West Pad
- Installation of the South Cap including:
  - Material Excavation and Removal
  - Subgrade Preparation
  - HDPE Installation
  - Backfilling the Protection Layer and Geotextile Installation
  - Place Base Course, Asphalt, and Sealant

- Installation of the East Cap including:
    - Material Excavation and Removal
    - Subgrade Preparation
    - HDPE Installation
    - Backfilling the Protection Layer and Geotextile Installation
    - Place Base Course, Asphalt, and Sealant
- Installation of the West Cap including:
    - Material Excavation and Removal
    - Subgrade Preparation
    - HDPE Installation
    - Backfilling the Protection Layer and Geotextile Installation
    - Place Base Course, Asphalt, and Sealant
- Installation of the Southeast Cap including:
    - Material Excavation and Removal
    - Subgrade Preparation
    - HDPE Installation
    - Backfilling the Protection Layer and Geotextile Installation
    - Place Base Course, Asphalt, and Sealant

All work was preceded by a Construction Kick-Off meeting which took place on January 10th, 2011.

3.1 Construction of East Concrete Pad (1/11/11 – 2/22/11)

Construction of the east concrete pad began on January 11th, 2011. Work was completed in three stages, excavation, formwork/pad preparation, and concrete placement. The entire pad area was excavated to two feet below grade (fbg) with a two foot overcut to allow free movement while constructing the formwork. Excavation work was performed with CAT 320 Excavator (excavator) and manual hand tools where applicable. Soil and material where stockpiled and managed utilizing a Dae Woo skid steer. The subgrade preparation consisted of the placement and compaction of one vertical foot of New York State (NYS) No. 57 crushed blue stone. Compaction was achieved through the use of a vibratory plate tamper. Water stop as manufactured by Earth Shield was installed along all existing foundation walls and at expansion joints as detailed in Details H and I, respectively on the As-Built Record Drawings. Two layers of plain, welded wire fabric conforming to ASTM A 185 was installed at 10 and 2 inches below grade (bg). The pad was prepped, formed and poured in three sections – Sections 1, 2, and 3 as identified moving in an easterly direction away from the east overhead door.

3.1.1 Section 1 (1/11/11-1/31/11)

During the excavation of Section 1, it became apparent that a previously damaged vent line along the south wall of Building 703 would need to be addressed. It was determined that the area surrounding the vent line would be boxed and excluded from the Section 1 pour. This additional formwork was incorporated as Change Order (CO) 2 and this work was ultimately performed on January 25th, 2011. A total of 20 cubic yards (cy) of the specified concrete mix were placed as part of Section 1 on January 31st, 2011.

3.1.2 Section 2 (2/1/11 – 2/4/11)

Previously unknown 16" diameter cooling water lines were exposed during the excavation of the Section 3 area. These two lines were removed as part of CO 1, executed on January 24th, 2011. A handheld chop saw was utilized to cut the pipes below the 2 foot bg excavation depth. BNL provided EnviroTrac with caps that were affixed to the remaining pipe ends existing beneath the limits of our excavation. 21 cy of concrete mix were placed as part of Section 3.

3.1.3 Section 3 (2/7/11 – 2/9/11)

Section 2 was the third and final section of the East Pad to be placed. A total of 23 cy of concrete mix were delivered during the concrete placement.

3.1.4 East Pad Summary

The pad dimensions are illustrated in the As-Built Record Drawings.

Compressive strength testing was performed on February 17th, 2011 on cylinders collected from each of the three sections. Test results indicated that each section exceeded the minimum required compressive strength of 3500 psi.

Joint sealant was applied atop the expansion joints and the pad and foundation interfaces.

3.2 Construction of West Concrete Pad (2/23/11 – 3/9/11)

Construction of the west concrete pad began on February 23, 2011. The pad consists of two sections, each of which were completed in three stages, excavation, formwork/pad preparation, and concrete placement. Each section was excavated to two feet below grade (fbg) with a two foot overcut to allow free movement while constructing the formwork. The subgrade preparation consisted of the placement and compaction of one vertical foot of New York State (NYS) No. 57 crushed blue stone. Compaction was achieved through the use of a vibratory plate tamper. Water stop as manufactured by Earth Shield was installed along all existing foundation walls and at expansion joints as detailed in Details H and I, respectively on the As-Built Record Drawings. Two layers of plain, welded wire fabric conforming to ASTM A 185 was installed at 10 and 2 inches below grade (bg).

3.2.1 Section 1 (2/23/11 – 3/1/11)

Section 1 of the west pad is considered to be the section nearest to the overhead door. Hand excavation was performed in the area near Building 703 in which markouts indicated underground utilities to be present. A visual inspection of the basement was performed to determine the depth that the utilities enter the basement. Once hand cleared, excavation began utilizing the excavator on the remainder of Section 1. While excavating outward from the overhead a bank of five (5) unmarked brass pipes were exposed. Work was temporarily paused until authorized by BNL representatives to continue. These pipes were removed from the excavation for disposal. Upon satisfactory preparation, a total of 15 cy of concrete mix was delivered and placed as part of Section 1.

3.2.2 Section 2 (3/2/11 – 3/9/11)

Section 2 of the west pad was installed in a similar fashion as Section 1. During the excavation, the five (5 unmarked brass lines encountered in Section 1 were exposed in Section 2. These pipes were sampled and disposed of by BNL representatives. A total of 24 cy were delivered and placed as part of Section 2.

3.2.3 West Pad Summary

The pad dimensions are illustrated in the Record Drawings.

Compressive strength testing was performed and reported on April 6th, 2011 on cylinders collected from each of the two sections. Test results indicated that each section exceeded the minimum required compressive strength of 3500 psi.

Joint sealant was applied atop the expansion joints and the pad and foundation interfaces.

3.3 Installation of South Cap (3/8/11 – 5/25/11)

3.3.1 Material Excavation and Removal

Excavation of the area identified as the south side of the As-Built Record Drawings began on March 3, 2011. The excavation was advanced to a depth of two (2) feet bg. A 15cy dump truck was added to the equipment already on-site and was utilized to convey the excavated material to an off-site staging area established by BNL. During the excavation the following unknown subsurface items were exposed. As directed by BNL representatives, these items were left in place, removed, or modified as part of a separate approved CO. Table 1 summarizes these previously unknown subsurface conditions.

ITEM	STATUS	CHANGE ORDER
Two (2) 22" Cooling Water Lines	Removed	CO 4
Valve Box and Control Piping	Removed	CO 4
Concrete Under-pour	Removed	CO 5 and CO 8
Top of Concrete Below Ground Duct	Left in Place	Not Applicable

Duct Supports	Left in Place and modified	CO 6
Sanitary Line Manhole	Left in Place and modified	CO 7
42" Concrete Pipe	Left in Place	Not Applicable

3.3.2 Subgrade Preparation

An elevation survey was conducted to verify sufficient excavation depth. The results of the elevation survey are presented the Excavation Survey Map provided in Appendix B. Sand cone analysis was performed to verify that subgrade compaction met or exceeded the 85% specified in the Contract Specifications. Compaction results are provided in Appendix C. Upon Engineers review and approval of both survey, and compaction data, EnviroTrac was authorized to place a 3" layer of protection sand. The sand was reviewed and approved prior to delivery.

3.3.3 HDPE Geomembrane Installation

Chenango Contracting was retained to install all of the HDPE Geomembrane. Installation and testing was in accordance to Section 31 05 19.16 of the Contract Specifications. Required documentation and testing data has been provided in Appendix D.

3.3.4 Backfilling the Protection Layer and Geotextile Installation

Upon review and approval of the HDPE testing results, EnviroTrac was authorized to backfill the liner. The backfill material, referred to as "Protection Layer" in the Contract Drawings was imported from a previously approved source. EnviroTrac placed approximately one (1) foot of this material and retained others to verify compaction. Compaction results from the backfilled material are provided in Appendix E. With the exception of a small access/egress road installed to the south overhead door, all geotextile was installed by All County Paving. Refer 3.44

3.4 Installation of East Cap (4/5/11 – 5/25/11)

3.4.1 Material Excavation and Removal

Excavation of the area identified as the east side of the As-Built Record Drawings began on April 5th, 2011. The excavation was advanced to a depth of two (2) feet bg. Excavated material was transported to the off-site staging area near Building 811 established by BNL.

3.4.2 Subgrade Preparation

An elevation survey was conducted to verify sufficient excavation depth. The results of the elevation survey are presented the Excavation Survey Map provided in Appendix B. Sand cone analysis was performed to verify that subgrade compaction met or exceeded the 85% specified in the Contract Specifications. Compaction results are provided in Appendix C. Upon Engineers review and approval of both survey, and compaction data, EnviroTrac was authorized to place a 3" layer of protection sand. The sand was reviewed and approved prior to delivery.

3.4.3 HDPE Geomembrane Installation

Chenango Contracting was retained to install all of the HDPE Geomembrane. Installation and testing was in accordance to Section 31 05 19.16 of the Contract Specifications. Required documentation and testing data has been provided in Appendix D.

3.4.4 Backfilling the Protection Layer and Geotextile Installation

Upon review and approval of the HDPE Geomembrane testing results, EnviroTrac was authorized to backfill the liner. The backfill material, referred to as "Protection Layer" in the Contract Drawings was imported from a previously approved source. EnviroTrac placed approximately one (1) foot of this material and retained others to verify compaction. Compaction results from the backfilled material are provided in Appendix E. US 230 Geotextile was installed and finished with 2" of recycled concrete aggregate (RCA).

3.5 Installation of West Cap (4/13/11 – 5/24/11)

3.5.1 Material Excavation and Removal

Excavation of the area identified as the east side of the As-Built Record Drawings began on April 5th, 2011. The excavation was advanced to a depth of two (2) feet bg. Excavated material was transported to the off-site staging area established by BNL.

3.5.2 Subgrade Preparation

An elevation survey was conducted to verify sufficient excavation depth. The results of the elevation survey are presented the Excavation Survey Map provided in Appendix B. Sand cone analysis was performed to verify that subgrade compaction met or exceeded the 85% specified in the Contract Specifications. Compaction results are provided in Appendix C. Upon Engineers review and approval of both survey, and compaction data, EnviroTrac was authorized to place a 3" layer of protection sand. The sand was reviewed and approved prior to delivery.

3.5.3 HDPE Geomembrane Installation

Chenango Contracting was retained to install all of the HDPE Geomembrane. Installation and testing was in accordance to Section 31 05 19.16 of the Contract Specifications. Required documentation and testing data has been provided in Appendix D.

3.5.4 Backfilling the Protection Layer and Geotextile Installation

Upon review and approval of the HDPE testing results, EnviroTrac was authorized to backfill the liner. The backfill material, referred to as "Protection Layer" in the Contract Drawings was imported from a previously approved source. EnviroTrac placed approximately one (1) foot of this material and retained others to verify compaction. Compaction results from the backfilled material are provided in Appendix E. US 230 Geotextile was installed and finished with 2" of RCA.

3.6 Installation of Southeast Cap (5/2/11 – 5/26/11)

3.6.1 Material Excavation and Removal

Excavation of the area identified as the east side of the As-Built Record Drawings began on April 5th, 2011. The excavation was advanced to a depth of two (2) feet bg. Excavated material was transported to the off-site staging area established by BNL.

3.6.2 Subgrade Preparation

An elevation survey was conducted to verify sufficient excavation depth. The results of the elevation survey are presented the Excavation Survey Map provided in Appendix B. Sand cone analysis was performed to verify that subgrade compaction met or exceeded the 85% specified in the Contract Specifications. Compaction results are provided in Appendix C. Upon Engineers review and approval of both survey, and compaction data, EnviroTrac was authorized to place a 3" layer of protection sand. The sand was reviewed and approved prior to delivery.

3.6.3 HDPE Geomembrane Installation

Chenango Contracting was retained to install all of the HDPE Geomembrane. Installation and testing was in accordance to Section 31 05 19.16 of the Contract Specifications. Required documentation and testing data has been provided in Appendix D.

3.6.4 Backfilling the Protection Layer and Geotextile Installation

Upon review and approval of the HDPE Geomembrane testing results, EnviroTrac was authorized to backfill the liner. The backfill material, referred to as "Protection Layer" in the Contract Drawings was imported from a previously approved source. EnviroTrac placed approximately one (1) foot of this material and retained others to verify compaction. Compaction results from the backfilled material are provided in Appendix E. US 230 Geotextile was installed and finished with 2" of RCA.

3.7 *Asphalt Base-course, Top Coat, and Seal Coat (5/9/11-6/9/11)*

3.7.1 Cap Area

Upon completion of the RCA area, four (4) – inches of Asphalt Treated Base (ATB) was applied to the entire cap area. Compaction of the ATB was verified through core samples. A three (3) – inch wear course was applied atop the ATB which then received seal coat

3.7.2 Non Cap Area

The area described as "Typical Asphalt" located outside the limits of the Cap was constructed by installing a six (6) – inch RCA base, three (3) – inch NYS Type 3 Asphalt Base, and a two (2) – inch NYS Type 2 Asphalt wearing course.

4.0 LESSONS LEARNED

4.1 Geophysical Survey

Significant time delays and cost overruns were incurred as a result of unknown conditions below grade prior to the commencement of construction activities. Many former utilities and structures were encountered at various locations during construction activities that were not known to exist previously. A comprehensive geophysical survey of the entirety of the proposed engineered cap area plus the additional pavement excavation areas prior to construction could have possibly revealed the geophysical signatures associated with buried structures and utilities allowing the Owner and contractor to better prepare.

4.2 Weather Conditions

Delays were caused as a result of both extremely cold and extremely wet Spring conditions. Although ideal weather conditions can never be truly anticipated, a geomembrane project requiring the driest conditions possible to be most efficient should likely not be scheduled as a late winter/spring project. The ideal time for open excavations and placement of HDPE liner would be in early summer through autumn.

Appendix A

CUSTOMER

NICOLIA READY-MIX CORPORATION

P.O. BOX 1065 • WEST BABYLON, NEW YORK 11704
Island Park • Westbury • West Babylon • Smithtown • Yaphank • Riverhead

"WE BUILD CITIES"

DISPATCH: 631-669-7000 FAX: 631-669-7702
MAIN OFFICE: 631-888-2200 FAX: 631-888-2210

2 Load	3 Leave Plant	4 Arrive Job Site	5 Start Discharge	6 Finish Disch.	7 Leave Job Site	8 Arrive Plant
:	:	9:00	9:05	9:20	9:30	:

PRODUCT SAFETY WARNING

Caution! Freshly mixed concrete, cement, mortar, or grout may cause eye or skin injury! In case this material or its components contact skin areas, wash the contacted area promptly and thoroughly with water. If this material gets into eye, rinse the eye immediately and repeatedly with clean water and get prompt medical attention. If swallowed, dilute with a large quantity of water or milk (at least 2 quarts for adults). Avoid splashing into eyes or onto skin by using proper tools and protective clothing such as rubber gloves and boots, safety glasses, and moisture resistant skin coverings, etc. Wash thoroughly after handling and before smoking or eating.

DO NOT INDUCE VOMITING! CALL A DOCTOR IMMEDIATELY! KEEP CHILDREN AWAY!

I request delivery other than at curb line on a paved street and agree to the conditions and ASSUMPTION OF LIABILITY in Paragraph, DELIVERY, on reverse side.

X ____________________ SIGNATURE

PRODUCT DATA SAFETY SHEET AVAILABLE UPON REQUEST.

ADDITIONAL WATER ADDED TO THIS CONCRETE WILL REDUCE ITS STRENGTH. ANY WATER ADDED IS AT CUSTOMER'S RISK.

GALLONS ADDED AT CUSTOMER'S REQUEST ____________________

This sale and delivery is subject to the terms and conditions as stated on the reverse side. Purchaser's signature below constitutes acceptance of all the said Terms and Conditions and Acknowledges that He/She has read and understood the Product Safety Warning printed on this document.

My signature below indicates that I have read and understand both the front and back of this delivery ticket.

RECEIVED IN GOOD CONDITION BY:

X ____________________

TICKET #	ORDER #	PLANT	TRUCK #	DRIVER	1 TICKETED	DATE
302986	12388	3	189	RINGGOLD, RAYMOND	8:12	1/31/2011

CUSTOMER #	SOLD TO	PROJECT #	P.O. #
COD	ENVIROTRAC	JOB	JIM

DELIVERY ADDRESS	ZONE	USAGE	DESCRIPTION
BROOKHAVEN BROOKHAVEN NATL LAB /BLDG 701	0	SLABS	BROOKHAVEN NATL LAB

INSTRUCTIONS
752 CEMENT -1260 SAND -1730 3/4 -33.0 WATER-7.5 AIR RHEO222- 128.0 -RHEO235 30.1 POZZ 20 45.1

PKT #

MAXIMUM SLUMP 5.00

TEST CYLINDERS ____ YES ____ NO

QUANTITY THIS LOAD	QUANTITY DELIVERED	QUANTITY ORDERED	PRODUCT CODE	PRODUCT DESCRIPTION	UNIT OF MEASURE	UNIT PRICE	AMOUNT
10.00	10.00	20.00	ET4500	ENVIROTRAC 4500 PSI	CY	150.00	1500.00
10.00	10.00	1.00	12	WINTER CONCRETE	CY	5.00	50.00

PAYMENT
☐ CREDIT CARD ☐ C.O.D. ☐ CHECK

PHONE NUMBER ____________________

SUB TOTAL	$1,550.00
TAX	133.69
TICKET TOTAL	$1,683.69
ORDER TOTAL	$1,683.69

302986

PFS-VON-800-248-4907 NICOLIA-LDT

CUSTOMER

NICOLIA READY-MIX
CORPORATION

"WE BUILD CITIES"

P.O. BOX 1065 • WEST BABYLON, NEW YORK 11704
Island Park • Westbury • West Babylon • Smithtown • Yaphank • Riverhead
DISPATCH: 631-669-7000 MAIN OFFICE: 631-888-2200
FAX: 631-669-7702 FAX: 631-888-2210

2 Load	3 Leave Plant	4 Arrive Job Site	5 Start Discharge	6 Finish Disch.	7 Leave Job Site	8 Arrive Plant
:	:	9:00	9:05	9:20	9:30	:

PRODUCT SAFETY WARNING

Caution! Freshly mixed concrete, cement, mortar, or grout may cause eye or skin injury! In case this material or its components contact skin areas, wash the contacted area promptly and thoroughly with water. If this material gets into eye, rinse the eye immediately and repeatedly with clean water and get prompt medical attention.
If swallowed, dilute with a large quantity of water or milk (at least 2 quarts for adults). Avoid splashing into eyes or onto skin by using proper tools and protective clothing such as rubber gloves and boots, safety glasses, and moisture resistant skin coverings, etc. Wash thoroughly after handling and before smoking or eating.

DO NOT INDUCE VOMITING! CALL A DOCTOR IMMEDIATELY!
KEEP CHILDREN AWAY!

I request delivery other than at curb line on a paved street and agree to the conditions and ASSUMPTION OF LIABILITY in Paragraph, DELIVERY, on reverse side.

X ____________________
SIGNATURE

PRODUCT DATA SAFETY SHEET AVAILABLE UPON REQUEST.

ADDITIONAL WATER ADDED TO THIS CONCRETE WILL REDUCE ITS STRENGTH. ANY WATER ADDED IS AT CUSTOMER'S RISK.

GALLONS ADDED AT CUSTOMER'S REQUEST ____________________

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My signature below indicates that I have read and understand both the front and back of this delivery ticket.

RECEIVED IN GOOD CONDITION BY:

X ____________________

TICKET #	ORDER #	PLANT	TRUCK #	DRIVER	1-TICKETED	DATE
302986	12388	3	189	RINGGOLD, RAYMOND	8:12	1/31/2011

CUSTOMER #	SOLD TO	PROJECT #	P.O. #
COD	ENVIROTRAC	JOB	JIM

DELIVERY ADDRESS		ZONE	USAGE	DESCRIPTION
BROOKHAVEN	BROOKHAVEN NATL LAB /BLDG 701	0	SLABS	BROOKHAVEN NATL LAB

INSTRUCTIONS
752 CEMENT -1260 SAND -1730 3/4 -33.0 WATER-7.5 AIR RHEO222- 128.0 -RHEO235 30.1 POZZ 20 45.1

PKT #

MAXIMUM SLUMP 5.00

TEST CYLINDERS ____ YES ____ NO

QUANTITY THIS LOAD	QUANTITY DELIVERED	QUANTITY ORDERED	PRODUCT CODE	PRODUCT DESCRIPTION	UNIT OF MEASURE	UNIT PRICE	AMOUNT
10.00	10.00	20.00	ET4500	ENVIROTRAC 4500 PSI	CY	150.00	1500.00
10.00	10.00	1.00	12	WINTER CONCRETE	CY	5.00	50.00

SUB TOTAL	$1,550.00
TAX	133.69
TICKET TOTAL	$1,683.69
ORDER TOTAL	$1,683.69

PAYMENT
☐ CREDIT CARD ☐ C.O.D. ☐ CHECK
PHONE NUMBER ____________________

302986

CUSTOMER

NICOLIA READY-MIX CORPORATION

"WE BUILD CITIES"

P.O. BOX 1065 • WEST BABYLON, NEW YORK 11704
Island Park • Westbury • West Babylon • Smithtown • Yaphank • Riverhead
DISPATCH: 631-669-7000 MAIN OFFICE: 631-888-2200
FAX: 631-669-7702 FAX: 631-888-2210

2 Load	3 Leave Plant	4 Arrive Job Site	5 Start Discharge	6 Finish Disch.	7 Leave Job Site	8 Arrive Plant
:	:	10:22	10:24	10:42	10:52	:

PRODUCT SAFETY WARNING

Caution! Freshly mixed concrete, cement, mortar, or grout may cause eye or skin injury! In case this material or its components contact skin areas, wash the contacted area promptly and thoroughly with water. If this material gets into eye, rinse the eye immediately and repeatedly with clean water and get prompt medical attention.
If swallowed, dilute with a large quantity of water or milk (at least 2 quarts for adults). Avoid splashing into eyes or onto skin by using proper tools and protective clothing such as rubber gloves and boots, safety glasses, and moisture resistant skin coverings, etc. Wash thoroughly after handling and before smoking or eating.

DO NOT INDUCE VOMITING! CALL A DOCTOR IMMEDIATELY!
KEEP CHILDREN AWAY!

I request delivery other than at curb line on a paved street and agree to the conditions and ASSUMPTION OF LIABILITY in Paragraph, DELIVERY, on reverse side.

X ____________ SIGNATURE

PRODUCT DATA SAFETY SHEET AVAILABLE UPON REQUEST.

ADDITIONAL WATER ADDED TO THIS CONCRETE WILL REDUCE ITS STRENGTH. ANY WATER ADDED IS AT CUSTOMER'S RISK.

GALLONS ADDED AT CUSTOMER'S REQUEST 15 GAL

This sale and delivery is subject to the terms and conditions as stated on the reverse side. Purchaser's signature below constitutes acceptance of all the said Terms and Conditions and Acknowledges that He/She has read and understood the Product Safety Warning printed on this document.
My signature below indicates that I have read and understand both the front and back of this delivery ticket.

RECEIVED IN GOOD CONDITION BY:

X ____________

TICKET #	ORDER #	PLANT	TRUCK #	DRIVER	1-TICKETED	DATE
302987	12388	3	189	RINGGOLD, RAYMOND	9:43	1/31/2011

USTOMER #	SOLD TO	PROJECT #	P.O. #
COD	ENVIROTRAC	JOB	JIM

ELIVERY ADDRESS		ZONE	USAGE	DESCRIPTION
BROOKHAVEN	BROOKHAVEN NATL LAB /BLDG 701	0	SLABS	BROOKHAVEN NATL LAB

ISTRUCTIONS
752 CEMENT -1260 SAND -1730 3/4 -33.0 WATER-7.5 AIR RHEO222- 128.0 -RHEO235 30.1 POZZ 20 45.1

PKT #

MAXIMUM SLUMP 5 $\frac{1}{2}$ 5.00

TEST CYLINDERS X YES ___ NO 5"

QUANTITY THIS LOAD	QUANTITY DELIVERED	QUANTITY ORDERED	PRODUCT CODE	PRODUCT DESCRIPTION	UNIT OF MEASURE	UNIT PRICE	AMOUNT
10.00	20.00	20.00	ET4500	ENVIROTRAC 4500 PSI	CY	150.00	1500.00
10.00	20.00	1.00	12	WINTER CONCRETE	CY	5.00	50.00

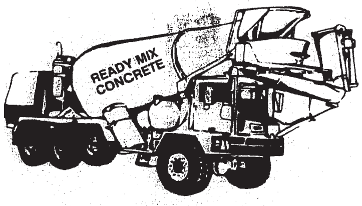
SUB TOTAL	$1,550.00
TAX	133.69
TICKET TOTAL	$1,683.69
ORDER TOTAL	$3,367.38

PAYMENT
] CREDIT CARD ☐ C.O.D. ☐ CHECK

IONE NUMBER ____________

302987

PFS-VON-800-248-4907 NICOLIA-LD



"WE BUILD CITIES"

NICOLIA READY-MIX CORPORATION

CUSTOMER

P.O. BOX 1065 • WEST BABYLON, NEW YORK 11704
Island Park • Westbury • West Babylon • Smithtown • Yaphank • Riverhead

DISPATCH: 631-669-7000 **MAIN OFFICE:** 631-888-2200
FAX: 631-669-7702 **FAX:** 631-888-2210

2 Load	3 Leave Plant	4 Arrive Job Site	5 Start Discharge	6 Finish Disch.	7 Leave Job Site	8 Arrive Plant
:	:	:	:	:	:	:

PRODUCT SAFETY WARNING

Caution! Freshly mixed concrete, cement, mortar, or grout may cause eye or skin injury! In case this material or its components contact skin areas, wash the contacted area promptly and thoroughly with water. If this material gets into eye, rinse the eye immediately and repeatedly with clean water and get prompt medical attention. If swallowed, dilute with a large quantity of water or milk (at least 2 quarts for adults). Avoid splashing into eyes or onto skin by using proper tools and protective clothing such as rubber gloves and boots, safety glasses, and moisture resistant skin coverings, etc. Wash thoroughly after handling and before smoking or eating.

DO NOT INDUCE VOMITING! CALL A DOCTOR IMMEDIATELY!
KEEP CHILDREN AWAY!

I request delivery other than at curb line on a paved street and agree to the conditions and ASSUMPTION OF LIABILITY in Paragraph, DELIVERY, on reverse side.

X ______________________
SIGNATURE

PRODUCT DATA SAFETY SHEET AVAILABLE UPON REQUEST.

ADDITIONAL WATER ADDED TO THIS CONCRETE WILL REDUCE ITS STRENGTH. ANY WATER ADDED IS AT CUSTOMER'S RISK.

GALLONS ADDED AT CUSTOMER'S REQUEST______________

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My signature below indicates that I have read and understand both the front and back of this delivery ticket.

RECEIVED IN GOOD CONDITION BY:

X ______________________

TICKET #	ORDER #	PLANT	TRUCK #	DRIVER	1-TICKETED	DATE
302994	12403	3	223	BONAVENTURA, DAWN	8:22	2/4/2011

USTOMER #	SOLD TO	PROJECT #	P.O. #
COD	ENVIROTRAC	JOB	JIM

ELIVERY ADDRESS		ZONE	USAGE	DESCRIPTION
BROOKHAVEN	BROOKHAVEN NATL LAB /BLDG 701	0	SLABS	BROOKHAVEN NATL LAB

ISTRUCTIONS
752 CEMENT -1260 SAND -1730 3/4 -33.0 WATER-7.5 AIR RHEO222- 128.0 -RHEO235 30.1 POZZ 20 45.1

PKT #	MAXIMUM SLUMP
	5.00

TEST CYLINDERS____YES____NO

QUANTITY THIS LOAD	QUANTITY DELIVERED	QUANTITY ORDERED	PRODUCT CODE	PRODUCT DESCRIPTION	UNIT OF MEASURE	UNIT PRICE	AMOUNT
11.00	11.00	21.00	ET4500	ENVIROTRAC 4500 PSI	CY	150.00	1650.00
3.00	3.00	3.00	10	TEST CYLINDERS EACH	EA	4.00	12.00
11.00	11.00	1.00	12	WINTER CONCRETE	CY	5.00	55.00

PAYMENT
☐ CREDIT CARD ☐ C.O.D. ☐ CHECK
HONE NUMBER ______________

SUB TOTAL	$1,717.00
TAX	148.09
TICKET TOTAL	$1,865.09
ORDER TOTAL	$1,865.09

302994

PFS-VON-800-248-4907 NICOLIA-LD1

CUSTOMER

NICOLIA READY-MIX CORPORATION

P.O. BOX 1065 • WEST BABYLON, NEW YORK 11704
Island Park • Westbury • West Babylon • Smithtown • Yaphank • Riverhead
DISPATCH: 631-669-7000 MAIN OFFICE: 631-888-2200
FAX: 631-669-7702 FAX: 631-888-2210

"WE BUILD CITIES"

2 Load	3 Leave Plant	4 Arrive Job Site	5 Start Discharge	6 Finish Disch.	7 Leave Job Site	8 Arrive Plant
:	:	:	:	:	:	:

PRODUCT SAFETY WARNING

Caution! Freshly mixed concrete, cement, mortar, or grout may cause eye or skin injury! In case this material or its components contact skin areas, wash the contacted area promptly and thoroughly with water. If this material gets into eye, rinse the eye immediately and repeatedly with clean water and get prompt medical attention.
If swallowed, dilute with a large quantity of water or milk (at least 2 quarts for adults). Avoid splashing into eyes or onto skin by using proper tools and protective clothing such as rubber gloves and boots, safety glasses, and moisture resistant skin coverings, etc. Wash thoroughly after handling and before smoking or eating.

DO NOT INDUCE VOMITING! CALL A DOCTOR IMMEDIATELY!
KEEP CHILDREN AWAY!

I request delivery other than at curb line on a paved street and agree to the conditions and ASSUMPTION OF LIABILITY in Paragraph, DELIVERY, on reverse side.

X ____________________
SIGNATURE

PRODUCT DATA SAFETY SHEET AVAILABLE UPON REQUEST.

ADDITIONAL WATER ADDED TO THIS CONCRETE WILL REDUCE ITS STRENGTH. ANY WATER ADDED IS AT CUSTOMER'S RISK.

GALLONS ADDED AT CUSTOMER'S REQUEST____________

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My signature below indicates that I have read and understand both the front and back of this delivery ticket.

RECEIVED IN GOOD CONDITION BY:

X ____________________

TICKET #	ORDER #	PLANT	TRUCK #	DRIVER	1-TICKETED	DATE
302994	12403	3	223	BONAVENTURA, DAWN	8:22	2/4/2011

CUSTOMER #	SOLD TO	PROJECT #	P.O. #
COD	ENVIROTRAC	JOB	JIM

DELIVERY ADDRESS		ZONE	USAGE	DESCRIPTION
BROOKHAVEN	BROOKHAVEN NATL LAB /BLDG 701	0	SLABS	BROOKHAVEN NATL LAB

INSTRUCTIONS
752 CEMENT -1260 SAND -1730 3/4 -33.0 WATER-7.5 AIR RHEO222- 128.0 -RHEO235 30.1 POZZ 20 45.1

PKT #
MAXIMUM SLUMP 5.00

TEST CYLINDERS____YES____NO

QUANTITY THIS LOAD	QUANTITY DELIVERED	QUANTITY ORDERED	PRODUCT CODE	PRODUCT DESCRIPTION	UNIT OF MEASURE	UNIT PRICE	AMOUNT
11.00	11.00	21.00	ET4500	ENVIROTRAC 4500 PSI	CY	150.00	1650.00
3.00	3.00	3.00	10	TEST CYLINDERS EACH	EA	4.00	12.00
11.00	11.00	1.00	12	WINTER CONCRETE	CY	5.00	55.00

SUB TOTAL	$1,717.00
TAX	148.09
TICKET TOTAL	$1,865.09
ORDER TOTAL	$1,865.09

PAYMENT
☐ CREDIT CARD ☐ C.O.D. ☐ CHECK
PHONE NUMBER ____________

302994

PFS-VON-800-248-4907 NICOLIA-LD

CUSTOMER

NICOLIA READY-MIX CORPORATION

"WE BUILD CITIES"

P.O. BOX 1065 • WEST BABYLON, NEW YORK 11704

Island Park • Westbury • West Babylon • Smithtown • Yaphank • Riverhead

DISPATCH: 631-669-7000 **MAIN OFFICE:** 631-888-2200

FAX: 631-669-7702 **FAX:** 631-888-2210

2 Load	3 Leave Plant	4 Arrive Job Site	5 Start Discharge	6 Finish Disch.	7 Leave Job Site	8 Arrive Plant
:	:	10:23	10:25	[illegible]	:	:

PRODUCT SAFETY WARNING

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DO NOT INDUCE VOMITING! CALL A DOCTOR IMMEDIATELY!
KEEP CHILDREN AWAY!

PRODUCT DATA SAFETY SHEET AVAILABLE UPON REQUEST.

ADDITIONAL WATER ADDED TO THIS CONCRETE WILL REDUCE ITS STRENGTH. ANY WATER ADDED IS AT CUSTOMER'S RISK.

GALLONS ADDED AT CUSTOMER'S REQUEST ____________

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I request delivery other than at curb line on a paved street and agree to the conditions and ASSUMPTION OF LIABILITY in Paragraph, DELIVERY, on reverse side.

X ____________________
SIGNATURE

RECEIVED IN GOOD CONDITION BY:

X ____________________

TICKET #	ORDER #	PLANT	TRUCK #	DRIVER	1-TICKETED	DATE
302995	12403	3	223	BONAVENTURA, DAWN	9:50	2/4/2011

CUSTOMER #	SOLD TO	PROJECT #	P.O. #
COD	ENVIROTRAC	JOB	JIM

DELIVERY ADDRESS		ZONE	USAGE	DESCRIPTION
BROOKHAVEN	BROOKHAVEN NATL LAB /BLDG 701	0	SLABS	BROOKHAVEN NATL LAB

INSTRUCTIONS

752 CEMENT -1260 SAND -1730 3/4 -33.0 WATER-7.5 AIR RHEO222- 128.0 -RHEO235 30.1 POZZ 20 45.1

PKT #	MAXIMUM SLUMP
	5.00

TEST CYLINDERS ____ YES ____ NO

QUANTITY THIS LOAD	QUANTITY DELIVERED	QUANTITY ORDERED	PRODUCT CODE	PRODUCT DESCRIPTION	UNIT OF MEASURE	UNIT PRICE	AMOUNT
10.00	21.00	21.00	ET4500	ENVIROTRAC 4500 PSI	CY	150.00	1500.00
10.00	21.00	1.00	12	WINTER CONCRETE	CY	5.00	50.00

SUB TOTAL	$1,550.00
TAX	133.69
TICKET TOTAL	$1,683.69
ORDER TOTAL	$3,548.78

PAYMENT

☐ CREDIT CARD ☐ C.O.D. ☐ CHECK

PHONE NUMBER ____________

302995

CUSTOMER

NICOLIA READY-MIX CORPORATION

P.O. BOX 1065 • WEST BABYLON, NEW YORK 11704
Island Park • Westbury • West Babylon • Smithtown • Yaphank • Riverhead

DISPATCH: 631-669-7000 MAIN OFFICE: 631-888-2200
FAX: 631-669-7702 FAX: 631-888-2210

"WE BUILD CITIES"

2 Load	3 Leave Plant	4 Arrive Job Site	5 Start Discharge	6 Finish Disch.	7 Leave Job Site	8 Arrive Plant
:	:	:	:	:	:	:

PRODUCT SAFETY WARNING

Caution! Freshly mixed concrete, cement, mortar, or grout may cause eye or skin injury! In case this material or its components contact skin areas, wash the contacted area promptly and thoroughly with water. If this material gets into eye, rinse the eye immediately and repeatedly with clean water and get prompt medical attention.
If swallowed, dilute with a large quantity of water or milk (at least 2 quarts for adults). Avoid splashing into eyes or onto skin by using proper tools and protective clothing such as rubber gloves and boots, safety glasses, and moisture resistant skin coverings, etc. Wash thoroughly after handling and before smoking or eating.

DO NOT INDUCE VOMITING! CALL A DOCTOR IMMEDIATELY!
KEEP CHILDREN AWAY!

I request delivery other than at curb line on a paved street and agree to the conditions and ASSUMPTION OF LIABILITY in Paragraph, DELIVERY, on reverse side.

X ______________________
SIGNATURE

PRODUCT DATA SAFETY SHEET AVAILABLE UPON REQUEST.

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GALLONS ADDED AT CUSTOMER'S REQUEST______________

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My signature below indicates that I have read and understand both the front and back of this delivery ticket.

RECEIVED IN GOOD CONDITION BY:

X ______________________

TICKET #	ORDER #	PLANT	TRUCK #	DRIVER	1-TICKETED	DATE
303003	12425	3	189	RINGGOLD, RAYMOND	9:26	2/9/2011

CUSTOMER #	SOLD TO	PROJECT #	P.O. #
COD	ENVIROTRAC	JOB	JIM

DELIVERY ADDRESS	ZONE	USAGE	DESCRIPTION
BROOKHAVEN BROOKHAVEN NATL LAB /BLDG 701	0	SLABS	BROOKHAVEN NATL LAB

INSTRUCTIONS
752 CEMENT -1260 SAND -1730 3/4 -33.0 WATER-7.5 AIR RHEO222- 128.0 -RHEO235 30.1 POZZ 20 45.1

PKT #
MAXIMUM SLUMP 5.00

TEST CYLINDERS____YES____NO

QUANTITY THIS LOAD	QUANTITY DELIVERED	QUANTITY ORDERED	PRODUCT CODE	PRODUCT DESCRIPTION	UNIT OF MEASURE	UNIT PRICE	AMOUNT
12.00	23.00	23.00	ET4500	ENVIROTRAC 4500 PSI	CY	150.00	1800.00
12.00	23.00	1.00	12	WINTER CONCRETE	CY	5.00	60.00

SUB TOTAL	$1,860.00
TAX	160.43
TICKET TOTAL	$2,020.43
ORDER TOTAL	$3,885.52

PAYMENT
☐ CREDIT CARD ☐ C.O.D. ☐ CHECK
PHONE NUMBER ______________

303003

PFS-VON-800-248-4907 NICOLIA-LDT

"WE BUILD CITIES"

CUSTOMER

NICOLIA READY-MIX CORPORATION

P.O. BOX 1065 • WEST BABYLON, NEW YORK 11704
Island Park • Westbury • West Babylon • Smithtown • Yaphank • Riverhead
DISPATCH: 631-669-7000 MAIN OFFICE: 631-888-2200
FAX: 631-669-7702 FAX: 631-888-2210

2 Load	3 Leave Plant	4 Arrive Job Site	5 Start Discharge	6 Finish Disch.	7 Leave Job Site	8 Arrive Plant
:	:	:	:	:	:	:

PRODUCT SAFETY WARNING

Caution! Freshly mixed concrete, cement, mortar, or grout may cause eye or skin injury! In case this material or its components contact skin areas, wash the contacted area promptly and thoroughly with water. If this material gets into eye, rinse the eye immediately and repeatedly with clean water and get prompt medical attention. If swallowed, dilute with a large quantity of water or milk (at least 2 quarts for adults). Avoid splashing into eyes or onto skin by using proper tools and protective clothing such as rubber gloves and boots, safety glasses, and moisture resistant skin coverings, etc. Wash thoroughly after handling and before smoking or eating.

DO NOT INDUCE VOMITING! CALL A DOCTOR IMMEDIATELY!
KEEP CHILDREN AWAY!

I request delivery other than at curb line on a paved street and agree to the conditions and ASSUMPTION OF LIABILITY in Paragraph, DELIVERY, on reverse side.

X ______________________
SIGNATURE

PRODUCT DATA SAFETY SHEET AVAILABLE UPON REQUEST.

ADDITIONAL WATER ADDED TO THIS CONCRETE WILL REDUCE ITS STRENGTH. ANY WATER ADDED IS AT CUSTOMER'S RISK.

GALLONS ADDED AT CUSTOMER'S REQUEST______________________

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My signature below indicates that I have read and understand both the front and back of this delivery ticket.
RECEIVED IN GOOD CONDITION BY:

X ______________________

TICKET #	ORDER #	PLANT	TRUCK #	DRIVER	1-TICKETED	DATE
303002	12425	3	189	RINGGOLD, RAYMOND	8:01	2/9/2011

USTOMER #	SOLD TO	PROJECT #	P.O. #
COD	ENVIROTRAC	JOB	JIM

ELIVERY ADDRESS		ZONE	USAGE	DESCRIPTION
BROOKHAVEN	BROOKHAVEN NATL LAB /BLDG 701	0	SLABS	BROOKHAVEN NATL LAB

ISTRUCTIONS
752 CEMENT -1260 SAND -1730 3/4 -33.0 WATER-7.5 AIR RHEO222- 128.0 -RHEO235 30.1 POZZ 20 45.1

PKT #

MAXIMUM SLUMP 5.00

TEST CYLINDERS_____YES_____NO

QUANTITY THIS LOAD	QUANTITY DELIVERED	QUANTITY ORDERED	PRODUCT CODE	PRODUCT DESCRIPTION	UNIT OF MEASURE	UNIT PRICE	AMOUNT
11.00	11.00	22.00	ET4500	ENVIROTRAC 4500 PSI	CY	150.00	1650.00
3.00	3.00	3.00	10	TEST CYLINDERS EACH	EA	4.00	12.00
11.00	11.00	1.00	12	WINTER CONCRETE	CY	5.00	55.00

PAYMENT
☐ **CREDIT CARD** ☐ **C.O.D.** ☐ **CHECK**
HONE NUMBER ______________

SUB TOTAL	$1,717.00
TAX	148.09
TICKET TOTAL	$1,865.09
ORDER TOTAL	$1,865.09

303002

PFS-VON-800-248-4907 NICOLIA-LDT

CUSTOMER

READY MIX CONCRETE

NICOLIA READY-MIX CORPORATION

P.O. BOX 1065 • WEST BABYLON, NEW YORK 11704
Island Park • Westbury • West Babylon • Smithtown • Yaphank • Riverhead
DISPATCH: 631-669-7000 MAIN OFFICE: 631-888-2200
FAX: 631-669-7702 FAX: 631-888-2210

"WE BUILD CITIES"

2 Load	3 Leave Plant	4 Arrive Job Site	5 Start Discharge	6 Finish Disch.	7 Leave Job Site	8 Arrive Plant
:	:	8:56	8:58	9:05	9:10	:

PRODUCT SAFETY WARNING

Caution! Freshly mixed concrete, cement, mortar, or grout may cause eye or skin injury! In case this material or its components contact skin areas, wash the contacted area promptly and thoroughly with water. If this material gets into eye, rinse the eye immediately and repeatedly with clean water and get prompt medical attention.
If swallowed, dilute with a large quantity of water or milk (at least 2 quarts for adults). Avoid splashing into eyes or onto skin by using proper tools and protective clothing such as rubber gloves and boots, safety glasses, and moisture resistant skin coverings, etc. Wash thoroughly after handling and before smoking or eating.

DO NOT INDUCE VOMITING! CALL A DOCTOR IMMEDIATELY!
KEEP CHILDREN AWAY!

I request delivery other than at curb line on a paved street and agree to the conditions and ASSUMPTION OF LIABILITY in Paragraph, DELIVERY, on reverse side.

X ____________________
SIGNATURE

PRODUCT DATA SAFETY SHEET AVAILABLE UPON REQUEST.

ADDITIONAL WATER ADDED TO THIS CONCRETE WILL REDUCE ITS STRENGTH. ANY WATER ADDED IS AT CUSTOMER'S RISK.

GALLONS ADDED AT CUSTOMER'S REQUEST____________

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My signature below indicates that I have read and understand both the front and back of this delivery ticket.
RECEIVED IN GOOD CONDITION BY:

X ____________________

TICKET #	ORDER #	PLANT	TRUCK #	DRIVER	1-TICKETED	DATE
303002	12425	3	189	RINGGOLD, RAYMOND	8:01	2/9/2011

CUSTOMER #	SOLD TO	PROJECT #	P.O. #
COD	ENVIROTRAC	JOB	JIM

DELIVERY ADDRESS		ZONE	USAGE	DESCRIPTION
BROOKHAVEN	BROOKHAVEN NATL LAB /BLDG 701	0	SLABS	BROOKHAVEN NATL LAB

INSTRUCTIONS
752 CEMENT -1260 SAND -1730 3/4 -33.0 WATER-7.5 AIR RHEO222- 128.0 -RHEO235 30.1 POZZ 20 45.1

PKT #
MAXIMUM SLUMP 5.00

TEST CYLINDERS____YES____NO

QUANTITY THIS LOAD	QUANTITY DELIVERED	QUANTITY ORDERED	PRODUCT CODE	PRODUCT DESCRIPTION	UNIT OF MEASURE	UNIT PRICE	AMOUNT
11.00	11.00	22.00	ET4500	ENVIROTRAC 4500 PSI	CY	150.00	1650.00
3.00	3.00	3.00	10	TEST CYLINDERS EACH	EA	4.00	12.00
11.00	11.00	1.00	12	WINTER CONCRETE	CY	5.00	55.00

SUB TOTAL	$1,717.00
TAX	148.09
TICKET TOTAL	$1,865.09
ORDER TOTAL	$1,865.09

PAYMENT
☐ CREDIT CARD ☐ C.O.D. ☐ CHECK
PHONE NUMBER ____________

303002

PFS-VON-800-248-4907 NICOLIA-LI

CUSTOMER

NICOLIA READY-MIX CORPORATION

"WE BUILD CITIES"

P.O. BOX 1065 • WEST BABYLON, NEW YORK 11704

Island Park • Westbury • West Babylon • Smithtown • Yaphank • Riverhead

DISPATCH: 631-669-7000 **MAIN OFFICE:** 631-888-2200

FAX: 631-669-7702 **FAX:** 631-888-2210

2 Load	3 Leave Plant	4 Arrive Job Site	5 Start Discharge	6 Finish Disch.	7 Leave Job Site	8 Arrive Plant
:	:	10:10	10:16	10:55	11:05	:

PRODUCT SAFETY WARNING

Caution! Freshly mixed concrete, cement, mortar, or grout may cause eye or skin injury! In case this material or its components contact skin areas, wash the contacted area promptly and thoroughly with water. If this material gets into eye, rinse the eye immediately and repeatedly with clean water and get prompt medical attention. If swallowed, dilute with a large quantity of water or milk (at least 2 quarts for adults). Avoid splashing into eyes or onto skin by using proper tools and protective clothing such as rubber gloves and boots, safety glasses, and moisture resistant skin coverings, etc. Wash thoroughly after handling and before smoking or eating.

DO NOT INDUCE VOMITING! CALL A DOCTOR IMMEDIATELY!
KEEP CHILDREN AWAY!

I request delivery other than at curb line on a paved street and agree to the conditions and ASSUMPTION OF LIABILITY in Paragraph, DELIVERY, on reverse side.

X ____________ SIGNATURE

PRODUCT DATA SAFETY SHEET AVAILABLE UPON REQUEST.

ADDITIONAL WATER ADDED TO THIS CONCRETE WILL REDUCE ITS STRENGTH. ANY WATER ADDED IS AT CUSTOMER'S RISK.

GALLONS ADDED AT CUSTOMER'S REQUEST____________

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My signature below indicates that I have read and understand both the front and back of this delivery ticket.

RECEIVED IN GOOD CONDITION BY:

X ____________

TICKET #	ORDER #	PLANT	TRUCK #	DRIVER	1-TICKETED	DATE
303003	12425	3	189	RINGGOLD, RAYMOND	9:26	2/9/2011

CUSTOMER #	SOLD TO	PROJECT #	P.O. #
COD	ENVIROTRAC	JOB	JIM

DELIVERY ADDRESS		ZONE	USAGE	DESCRIPTION
BROOKHAVEN	BROOKHAVEN NATL LAB /BLDG 701	0	SLABS	BROOKHAVEN NATL LAB

INSTRUCTIONS

752 CEMENT -1260 SAND -1730 3/4 -33.0 WATER-7.5 AIR RHEO222- 128.0 -RHEO235 30.1 POZZ 20 45.1

PKT #

MAXIMUM SLUMP 5.00

TEST CYLINDERS____YES____NO

QUANTITY THIS LOAD	QUANTITY DELIVERED	QUANTITY ORDERED	PRODUCT CODE	PRODUCT DESCRIPTION	UNIT OF MEASURE	UNIT PRICE	AMOUNT
12.00	23.00	23.00	ET4500	ENVIROTRAC 4500 PSI	CY	150.00	1800.00
12.00	23.00	1.00	12	WINTER CONCRETE	CY	5.00	60.00

PAYMENT

☐ CREDIT CARD ☐ C.O.D. ☐ CHECK

PHONE NUMBER ____________

SUB TOTAL	$1,860.00
TAX	160.43
TICKET TOTAL	$2,020.43
ORDER TOTAL	$3,885.52

303003

PFS-VON-800-248-4907 NICOLIA-LDT

CUSTOMER

NICOLIA READY-MIX CORPORATION

P.O. BOX 1065 • WEST BABYLON, NEW YORK 11704
Island Park • Westbury • West Babylon • Smithtown • Yaphank • Riverhead

"WE BUILD CITIES"

DISPATCH: 631-669-7000 MAIN OFFICE: 631-888-2200
FAX: 631-669-7702 FAX: 631-888-2210

2 Load	3 Leave Plant	4 Arrive Job Site	5 Start Discharge	6 Finish Disch.	7 Leave Job Site	8 Arrive Plant
:	:	9:00	:	:	:	:

PRODUCT SAFETY WARNING

Caution! Freshly mixed concrete, cement, mortar, or grout may cause eye or skin injury! In case this material or its components contact skin areas, wash the contacted area promptly and thoroughly with water. If this material gets into eye, rinse the eye immediately and repeatedly with clean water and get prompt medical attention. If swallowed, dilute with a large quantity of water or milk (at least 2 quarts for adults). Avoid splashing into eyes or onto skin by using proper tools and protective clothing such as rubber gloves and boots, safety glasses, and moisture resistant skin coverings, etc. Wash thoroughly after handling and before smoking or eating.

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KEEP CHILDREN AWAY!

I request delivery other than at curb line on a paved street and agree to the conditions and ASSUMPTION OF LIABILITY in Paragraph, DELIVERY on reverse side.

X ______________________
SIGNATURE

PRODUCT DATA SAFETY SHEET AVAILABLE UPON REQUEST.

ADDITIONAL WATER ADDED TO THIS CONCRETE WILL REDUCE ITS STRENGTH. ANY WATER ADDED IS AT CUSTOMER'S RISK.

GALLONS ADDED AT CUSTOMER'S REQUEST______________

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My signature below indicates that I have read and understand both the front and back of this delivery ticket.

RECEIVED IN GOOD CONDITION BY:

X ______________________

TICKET #	ORDER #	PLANT	TRUCK #	DRIVER	TICKETED	DATE
303077	12634	3	183		8:12	3/1/2011

CUSTOMER #	SOLD TO	PROJECT #	P.O. #
COD	ENVIROTRAC	JOB	JIM

DELIVERY ADDRESS		ZONE	USAGE	DESCRIPTION
BROOKHAVEN	BROOKHAVEN NATL LAB /BLDG 701	0	SLABS	BROOKHAVEN NATL LAB

INSTRUCTIONS
752 CEMENT -1260 SAND -1730 3/4 -33.0 WATER-7.5 AIR RHEO222- 128.0 -RHEO235 30.1 POZZ 20 45.1

PKT #	MAXIMUM SLUMP
	5.00

TEST CYLINDERS____YES____NO

QUANTITY THIS LOAD	QUANTITY DELIVERED	QUANTITY ORDERED	PRODUCT CODE	PRODUCT DESCRIPTION	UNIT OF MEASURE	UNIT PRICE	AMOUNT
7.00	7.00	15.00	ET4500	ENVIROTRAC 4500 PSI	CY	150.00	1050.00
7.00	7.00	1.00	12	WINTER CONCRETE	CY	5.00	35.00

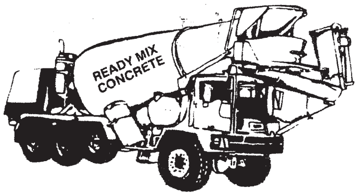
PAYMENT
☐ CREDIT CARD ☐ C.O.D. ☐ CHECK

PHONE NUMBER ______________

SUB TOTAL	$1,085.00
TAX	93.58
TICKET TOTAL	$1,178.58
ORDER TOTAL	$1,178.58

303077

PFS-VON-800-248-4907 NICOLIA-LDT



NICOLIA READY-MIX CORPORATION

CUSTOMER

P.O. BOX 1065 • WEST BABYLON, NEW YORK 11704
Island Park • Westbury • West Babylon • Smithtown • Yaphank • Riverhead
DISPATCH: 631-669-7000 MAIN OFFICE: 631-888-2200
FAX: 631-669-7702 FAX: 631-888-2210

"WE BUILD CITIES"

2 Load	3 Leave Plant	4 Arrive Job Site	5 Start Discharge	6 Finish Disch.	7 Leave Job Site	8 Arrive Plant
:	:	900	:	:	:	:

PRODUCT SAFETY WARNING

Caution! Freshly mixed concrete, cement, mortar, or grout may cause eye or skin injury! In case this material or its components contact skin areas, wash the contacted area promptly and thoroughly with water. If this material gets into eye, rinse the eye immediately and repeatedly with clean water and get prompt medical attention.
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KEEP CHILDREN AWAY!

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X ____________________
SIGNATURE

PRODUCT DATA SAFETY SHEET AVAILABLE UPON REQUEST.

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My signature below indicates that I have read and understand both the front and back of this delivery ticket.

RECEIVED IN GOOD CONDITION BY:

X ____________________

TICKET #	ORDER #	PLANT	TRUCK #	DRIVER	1-TICKETED	DATE
303077	12634	3	183		8:12	3/1/2011

CUSTOMER #	SOLD TO	PROJECT #	P.O. #
COD	ENVIROTRAC	JOB	JIM

DELIVERY ADDRESS		ZONE	USAGE	DESCRIPTION
BROOKHAVEN	BROOKHAVEN NATL LAB /BLDG 701	0	SLABS	BROOKHAVEN NATL LAB

INSTRUCTIONS
752 CEMENT -1260 SAND -1730 3/4 -33.0 WATER-7.5 AIR RHEO222- 128.0 -RHEO235 30.1 POZZ 20 45.1

PKT #
MAXIMUM SLUMP 5.00

TEST CYLINDERS ____ YES ____ NO

QUANTITY THIS LOAD	QUANTITY DELIVERED	QUANTITY ORDERED	PRODUCT CODE	PRODUCT DESCRIPTION	UNIT OF MEASURE	UNIT PRICE	AMOUNT
7.00	7.00	15.00	ET4500	ENVIROTRAC 4500 PSI	CY	150.00	1050.00
7.00	7.00	1.00	12	WINTER CONCRETE	CY	5.00	35.00

PAYMENT
☐ CREDIT CARD ☐ C.O.D. ☐ CHECK
PHONE NUMBER ____________________

SUB TOTAL	$1,085.00
TAX	93.58
TICKET TOTAL	$1,178.58
ORDER TOTAL	$1,178.58

303077

PES-VON-800-248-4907 NICOLIA-LDT

CUSTOMER

NICOLIA READY-MIX CORPORATION

P.O. BOX 1065 • WEST BABYLON, NEW YORK 11704
Island Park • Westbury • West Babylon • Smithtown • Yaphank • Riverhead

"WE BUILD CITIES"

DISPATCH: 631-669-7000 MAIN OFFICE: 631-888-2200
FAX: 631-669-7702 FAX: 631-888-2210

2 Load	3 Leave Plant	4 Arrive Job Site	5 Start Discharge	6 Finish Disch.	7 Leave Job Site	8 Arrive Plant
:	:	:	:	:	:	:

PRODUCT SAFETY WARNING

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X________________________
SIGNATURE

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My signature below indicates that I have read and understand both the front and back of this delivery ticket.

RECEIVED IN GOOD CONDITION BY:

X________________________

TICKET #	ORDER #	PLANT	TRUCK #	DRIVER	1-TICKETED	DATE
303111	12743	3	181		10:19	3/9/2011

CUSTOMER #	SOLD TO	PROJECT #	P.O. #
COD	ENVIROTRAC	JOB	JIM

DELIVERY ADDRESS	ZONE	USAGE	DESCRIPTION
BROOKHAVEN BROOKHAVEN NATL LAB /BLDG 701	0	SLABS	BROOKHAVEN NATL LAB

INSTRUCTIONS
EAST SIDE OF BLDG
752 CEMENT -1260 SAND -1730 3/4 -33.0 WATER-7.5 AIR RHEO222 128.0 -RHEO235 30.1 POZZ 20
45.1

PKT #

MAXIMUM SLUMP 5.00

TEST CYLINDERS ___YES___NO

QUANTITY THIS LOAD	QUANTITY DELIVERED	QUANTITY ORDERED	PRODUCT CODE	PRODUCT DESCRIPTION	UNIT OF MEASURE	UNIT PRICE	AMOUNT
12.00	24.00	24.00	ET4500	ENVIROTRAC 4500 PSI	CY	150.00	1800.00
12.00	24.00	1.00	12	WINTER CONCRETE	CY	5.00	60.00

PAYMENT
☐ CREDIT CARD ☐ C.O.D. ☐ CHECK

PHONE NUMBER ________________

SUB TOTAL	$1,860.00
TAX	160.43
TICKET TOTAL	$2,020.43
ORDER TOTAL	$4,040.86

303111

PFS-VON-800-248-4907 NICOLIA-LDT

NICOLIA READY-MIX CORPORATION

CUSTOMER

"WE BUILD CITIES"

P.O. BOX 1065 • WEST BABYLON, NEW YORK 11704
Island Park • Westbury • West Babylon • Smithtown • Yaphank • Riverhead

DISPATCH: 631-669-7000 **MAIN OFFICE:** 631-888-2200
FAX: 631-669-7702 **FAX:** 631-888-2210

2 Load	3 Leave Plant	4 Arrive Job Site	5 Start Discharge	6 Finish Disch.	7 Leave Job Site	8 Arrive Plant
:	:	:	:	:	:	:

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KEEP CHILDREN AWAY!

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X ______________________
SIGNATURE

PRODUCT DATA SAFETY SHEET AVAILABLE UPON REQUEST.

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GALLONS ADDED AT CUSTOMER'S REQUEST ______________

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My signature below indicates that I have read and understand both the front and back of this delivery ticket.
RECEIVED IN GOOD CONDITION BY:

X ______________________

TICKET #	ORDER #	PLANT	TRUCK #	DRIVER	1 TICKETED	DATE
303107	12743	3	225		8:15	3/9/2011

CUSTOMER #	SOLD TO	PROJECT #	P.O. #
COD	ENVIROTRAC	JOB	JIM

DELIVERY ADDRESS		ZONE	USAGE	DESCRIPTION
BROOKHAVEN	BROOKHAVEN NATL LAB /BLDG 701	0	SLABS	BROOKHAVEN NATL LAB

INSTRUCTIONS
EAST SIDE OF BLDG
752 CEMENT -1260 SAND -1730 3/4 -33.0 WATER-7.5 AIR RHEO222- 128.0 -RHEO235 30.1 POZZ 20
45.1

PKT #
MAXIMUM SLUMP 5.00

TEST CYLINDERS____YES____NO

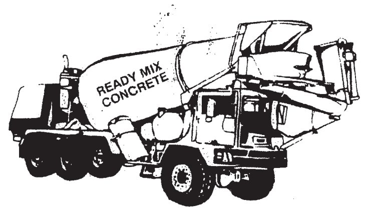
QUANTITY THIS LOAD	QUANTITY DELIVERED	QUANTITY ORDERED	PRODUCT CODE	PRODUCT DESCRIPTION	UNIT OF MEASURE	UNIT PRICE	AMOUNT
12.00	12.00	24.00	ET4500	ENVIROTRAC 4500 PSI	CY	150.00	1800.00
12.00	12.00	1.00	12	WINTER CONCRETE	CY	5.00	60.00

SUB TOTAL	$1,860.00
TAX	160.43
TICKET TOTAL	$2,020.43
ORDER TOTAL	$2,020.43

PAYMENT
☐ CREDIT CARD ☐ C.O.D. ☐ CHECK
PHONE NUMBER ______________

303107

PFS-VON-800-248-4907 NY



CUSTOMER

NICOLIA READY-MIX CORPORATION

"WE BUILD CITIES"

P.O. BOX 1065 • WEST BABYLON, NEW YORK 11704
Island Park • Westbury • West Babylon • Smithtown • Yaphank • Riverhead
DISPATCH: 631-669-7000 **MAIN OFFICE:** 631-888-2200
FAX: 631-669-7702 **FAX:** 631-888-2210

2 Load	3 Leave Plant	4 Arrive Job Site	5 Start Discharge	6 Finish Disch.	7 Leave Job Site	8 Arrive Plant
:	:	:	:	:	:	:

PRODUCT SAFETY WARNING

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X ____________________
SIGNATURE

PRODUCT DATA SAFETY SHEET AVAILABLE UPON REQUEST.

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GALLONS ADDED AT CUSTOMER'S REQUEST____________________

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My signature below indicates that I have read and understand both the front and back of this delivery ticket.
RECEIVED IN GOOD CONDITION BY:

X ____________________

TICKET #	ORDER #	PLANT	TRUCK #	DRIVER	1-TICKETED	DATE
303111	12743	3	181		10:19	3/9/2011

CUSTOMER #	SOLD TO	PROJECT #	P.O. #
COD	ENVIROTRAC	JOB	JIM

DELIVERY ADDRESS		ZONE	USAGE	DESCRIPTION
BROOKHAVEN	BROOKHAVEN NATL LAB /BLDG 701	0	SLABS	BROOKHAVEN NATL LAB

INSTRUCTIONS
EAST SIDE OF BLDG
752 CEMENT -1260 SAND -1730 3/4 -33.0 WATER-7.5 AIR RHEO222- 128.0 -RHEO235 30.1 POZZ 20 45.1

PKT #

MAXIMUM SLUMP 5.00

TEST CYLINDERS____YES____NO

QUANTITY THIS LOAD	QUANTITY DELIVERED	QUANTITY ORDERED	PRODUCT CODE	PRODUCT DESCRIPTION	UNIT OF MEASURE	UNIT PRICE	AMOUNT
12.00	24.00	24.00	ET4500	ENVIROTRAC 4500 PSI	CY	150.00	1800.00
12.00	24.00	1.00	12	WINTER CONCRETE	CY	5.00	60.00

SUB TOTAL	$1,860.00
TAX	160.43
TICKET TOTAL	$2,020.43
ORDER TOTAL	$4,040.86

PAYMENT
☐ CREDIT CARD ☐ C.O.D. ☐ CHECK

PHONE NUMBER ____________________

303111

PFS-VON-800-248-4907 NICOLIA-LDT

Appendix B

EnviroTrac

SOIL MECHANICS DRILLING CORP.
3770 MERRICK ROAD • SEAFORD, L.I., NEW YORK 11783 • (516) 221-2333
New York City License No. 28

REPORT NO.: 1

REPORT OF CONCRETE INSPECTION AND TESTING

JOB NO.: 11-091 SM LAB NO.:

CLIENT:
EnviroTrac, 5 Old Dock Road, Yaphank, NY 11980

SHEET: 1 OF 1

PROJECT LOCATION:
Brookhaven National Labs Bldg 701

DATE OF INSPECTION: 01/31/11

GENERAL CONTRACTOR:
East Pad

WEATHER:
AIR TEMP.:

CONCRETE CONTRACTOR:
EnviroTrac

CONCRETE PRODUCER:
Nicolia Ready Mix

BATCH PLANT INSPECTION

BATCH WEIGHTS - LB/CY		SOURCE AND TYPE	SPECIFIED CONCRETE COMPRESSIVE STRENGTH AT 28 DAYS
CEMENT			
FINE AGGREGATE			3500
COARSE AGGREGATE			CUBIC YARDS
WATER (GALS.)			
ADMIXTURE			20

AGGREGATE GRADATION
Cumulative Per Cent Finer

FINE AGGREGATE		COARSE AGGREGATE	
3/8"			
#4			
#8			
#16			
#30			
#50			
#100			
FM		FM	
MOISTURE		MOISTURE	

FIELD INSPECTION

LOCATION OF CONCRETE PLACEMENT:

Building 701- east loading dock

TEST SPECIMEN 4" WIDTH BY 8" LENGTH
AREA 12.69 SQ.IN. UNLESS NOTED

ASTM SEAL NO.	C-143 SLUMP INCHES	C-173 AIR %	C-1064 TEMP. CONC. (°)	AGE DAYS	TOTAL LOAD	C-39 COMPRESSIVE STRENGTH P.S.I.	BREAK TYPE	SPECIFIC LOACATION REPRESENTED BY TEST CYLINDERS
275509	5.00	3.0	60	7				East loading dock
275510				7	54410	4330		
275511				28				
275512				28				
1	--	--	--		111170	3930		Cylinders made by client
2					108750	3840		

REMARKS: Cylinders tested with unbonded caps, top & bottom per ASTM C1231.
*** No defects in test specimens.**

Rob Hill(ACI # 00049686)
CYLINDER TESTED BY

Andrew Prunitis
FIELD INSPECTOR

SOIL MECHANICS DRILLING CORP

SOIL MECHANICS DRILLING CORP.

3770 MERRICK ROAD • SEAFORD, L.I., NEW YORK 11783 • (516) 221-2333
New York City License No. 2E

REPORT NO.: 2

REPORT OF CONCRETE INSPECTION AND TESTING

JOB NO.: 11-091 SM LAB NO.: 7526

CLIENT: EnviroTrac, 5 Old Dock Road, Yaphank, NY 11980

SHEET: 1 OF 1

PROJECT LOCATION: Brookhaven National Labs Bldg 701 West Pad

GENERAL CONTRACTOR:

DATE OF INSPECTION: 3/1 & 3/9

WEATHER:

AIR TEMP.:

CONCRETE CONTRACTOR: EnviroTrac

CONCRETE PRODUCER:

BATCH PLANT INSPECTION

BATCH WEIGHTS - LB/CY		SOURCE AND TYPE	SPECIFIED CONCRETE COMPRESSIVE STRENGTH AT 28 DAYS
CEMENT			3500
FINE AGGREGATE			
COARSE AGGREGATE			CUBIC YARDS
WATER (GALS.)			
ADMIXTURE			

AGGREGATE GRADATION
Cumulative Per Cent Finer

	FINE AGGREGATE	COARSE AGGREGATE	
3/8"			
#4			
#8			
#16			
#30			
#50			
#100			
FM		FM	
MOISTURE		MOISTURE	

FIELD INSPECTION

LOCATION OF CONCRETE PLACEMENT:

West pad

TEST SPECIMEN 4" WIDTH BY 8" LENGTH
AREA 12.59 SQ IN UNLESS NOTED

ASTM	C-143	C-173	C-1064			C-39		
SEAL NO	SLUMP INCHES	AIR %	TEMP CONC (F)	AGE DAYS	TOTAL LOAD	COMPRESSIVE STRENGTH P.S.I.	BREAK TYPE	SPECIFIC LOACATION REPRESENTED BY TEST CYLINDERS
1	–	–	–	17	132011	4670	Type 4	
2				8	104671	3700	Type 4	

REMARKS: Cylinders tested with unbonded caps, top & bottom per ASTM C1231.
* No defects in test specimens.

Rob Hill(ACI # 00049686)
CYLINDER TESTED BY

Other than SMDC
FIELD INSPECTOR

SOIL MECHANICS DRILLING CORP

Appendix C

EnviroTrac

SUBSOIL INVESTIGATIONS

SOIL MECHANICS DRILLING CORP.

3770 MERRICK ROAD • SEAFORD, L.I., NEW YORK 11783
(516) 221-2333 • FAX (516) 679-4373

Date: 3-29-11

PROJECT: BROOKhAven LAB

TEST # 5 Depth of test from final grade: ±2'

FIELD DENSITY TEST

1. Wt. of Sand & Cone (a) = 14.89
2. Wt. of Sand & Cone (b) = - 7.20

   Wt. of Sand = 7.69

   Sand in Cone = -3.83

   NET SAND = 3.86 (c)

3. Volume of Soil = $\frac{\text{Net Sand (c)}}{\text{Sand Volume}} = \frac{3.86}{89.7} = .043$

4. Wt. of Soil & Can = 6.12

   Wt. of Can = - .59

   Wt. of Soil = 5.53 (d)

5. Moist. Density = $\frac{\text{Wt. of Soil (d)}}{\text{Vol. of Soil (3)}} = \frac{5.53}{.043} = 128.5$

6. WET

   Cup & Soil = 121.7

   Cup = 14.6

   Soil Wet = 107.1 (e)

   DRY

   Cup & Soil = 114.8

   Cup = 14.6

   Soil Dry = 100.2 (f)

   Soil Wet 107.1

   Soil Dry 100.2

   Moisture = 6.9

7. Moisture = $\frac{\text{Wet (e) - Dry (f) X100}}{\text{Dry (f)}} = \frac{6.9}{100.2} = 6.9$ (7) %

8. Dry Density = $\frac{\text{Moist. Density (5)}}{1. + \frac{\text{\% Moist. (7)}}{100}} = \frac{128.5}{1.069} = 120.2$

9. % Compaction = $\frac{\text{Dry Density}}{\text{Max. Density}} = \frac{120.2}{124.7} = 96.37$ %

10. Req. Density: 85 %

11. Pass ✓ Fail ____

LOCATION: ____

SUBSOIL INVESTIGATIONS

SOIL MECHANICS DRILLING CORP.

3770 MERRICK ROAD • SEAFORD, L.I., NEW YORK 11783
(516) 221-2333 • FAX (516) 679-4373

Date: 3-29-11

PROJECT: BRookhaven LAB
Area of Bldg 701

TEST # 4

Depth of test from final grade: ±2

FIELD DENSITY TEST

1. Wt. of Sand & Cone (a)= 15.09
2. Wt. of Sand & Cone (b)= - 7.67
   Wt. of Sand = 7.42
   Sand in Cone = - 3.83
   NET SAND = 3.59 (c)

3. Volume of Soil=

   Net Sand (c) / Sand Volume = 3.59 / 89.7 = .040

4. Wt. of Soil & Can = 5.55
   Wt. of Can = - .59
   Wt. of Soil = 4.96 (d)

5. Moist. Density=

   Wt. of Soil (d) / Vol. of Soil (3) = 4.96 / .040 = 124.0

6. WET
   Cup & Soil= 123.4
   Cup = 14.6
   Soil Wet = 108.8 (e)

   DRY
   Cup & Soil= 117.6
   Cup = 14.6
   Soil Dry = 103.0 (f)

   Soil Wet 108.8
   Soil Dry 103.0
   Moisture= 5.8

7. Moisture=

   Wet (e) - Dry (f) X100 / Dry (f) = 5.8 / 103 = 5.6 (7) %

8. Dry Density =

   Moist. Density (5) / 1.+ % Moist. (7) / 100 = 124.0 / 1.058 = 117.2

9. % Compaction = Dry Density / Max. Density = 117.2 / 121.6 = 96.39 %

10. Req. Density: 85 %
11. Pass ✓ Fail ______

LOCATION: South Side of Dog houses - West

TEST BORINGS • GROUND WATER DETERMINATIONS • FOUNDATION RECOMMENDATIONS • HOLLOW STEM AUGER BORINGS
LABORATORY ANALYSES • CONTROLLED LANDFILL • DIAMOND CORE DRILLING • SAND & GRAVEL PROSPECTING
BEARING VALUES • WELL POINT INSTALLATIONS • ENGINEERING SUPERVISION • PERCOLATION TESTS
SANITARY INVESTIGATIONS • UNDISTURBED SAMPLING • TEST PITS • TOP SOIL ANALYSES

SUBSOIL INVESTIGATIONS

SOIL MECHANICS DRILLING CORP.

3770 MERRICK ROAD • SEAFORD, L.I., NEW YORK 11783
(516) 221-2333 • FAX (516) 679-4373

Date: 3-29-11

PROJECT: BRookhAven LAB
Area of Bldg 701

TEST # 3

Depth of test from final grade: ±2'

FIELD DENSITY TEST

1. Wt. of Sand & Cone (a)= 15.11
2. Wt. of Sand & Cone (b)= -7.60
   Wt. of Sand = 7.51
   Sand in Cone = -3.83
   NET SAND = 3.68 (c)

3. Volume of Soil=

$$\frac{\text{Net Sand (c)}}{\text{Sand Volume}} = \frac{3.68}{89.7} = .041$$

4. Wt. of Soil & Can = 5.66
   Wt. of Can = -.59
   Wt. of Soil = 5.07 (d)

5. Moist. Density=

$$\frac{\text{Wt. of Soil (d)}}{\text{Vol. of Soil (3)}} = \frac{5.07}{.041} = 123.6$$

6. WET
   Cup & Soil= 123.4
   Cup = 14.6
   Soil Wet = 108.8 (e)

   DRY
   Cup & Soil= 117.6
   Cup = 14.6
   Soil Dry = 103.0 (f)

   Soil Wet 108.8
   Soil Dry 103.0
   Moisture= 5.8

7. Moisture=

$$\frac{\text{Wet (e)} - \text{Dry (f)} \times 100}{\text{Dry (f)}} = \frac{5.8}{103.0} = 5.6 \quad (7)\ \%$$

8. Dry Density =

$$\frac{\text{Moist. Density (5)}}{1. + \frac{\text{\% Moist. (7)}}{100}} = \frac{123.6}{1.056} = 117.0$$

9. % Compaction =

$$\frac{\text{Dry Density}}{\text{Max. Density}} = \frac{117.0}{121.6} = 96.20\ \%$$

10. Req. Density: 85 %
11. Pass ✓ Fail ____

LOCATION: South Side of Doghouses - EAST

SUBSOIL INVESTIGATIONS

SOIL MECHANICS DRILLING CORP.

3770 MERRICK ROAD • SEAFORD, L.I., NEW YORK 11783
(516) 221-2333 • FAX (516) 679-4373

Date: 3-29-11

PROJECT: BRookhaven LAB
Bldg #701-

TEST # 2

Depth of test from final grade: ±2'

FIELD DENSITY TEST

1. Wt. of Sand & Cone (a) = 15.15
2. Wt. of Sand & Cone (b) = 7.82
   Wt. of Sand = 7.33
   Sand in Cone = -3.83
   NET SAND = 3.50 (c)

3. Volume of Soil=

$$\frac{\text{Net Sand (c)}}{\text{Sand Volume}} = \frac{3.50}{89.7} = .039$$

4. Wt. of Soil & Can = 5.51
   Wt. of Can = - .59
   Wt. of Soil = 4.92 (d)

5. Moist. Density=

$$\frac{\text{Wt. of Soil (d)}}{\text{Vol. of Soil (3)}} = \frac{4.92}{.039} = 126.1$$

6. WET
   Cup & Soil = 119.6
   Cup = 14.6
   Soil Wet = 105.0 (e)

   DRY
   Cup & Soil = 115.2
   Cup = 14.6
   Soil Dry = 100.6 (f)

   Soil Wet 105.0
   Soil Dry 100.6
   Moisture = 4.4

7. Moisture=

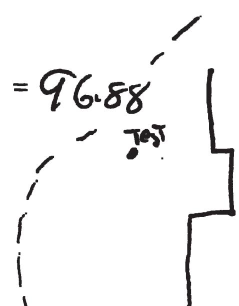
$$\frac{\text{Wet (e) - Dry (f) X100}}{\text{Dry (f)}} = \frac{4.4}{100.6} = 4.4 \quad (7)\ \%$$

8. Dry Density =

$$\frac{\text{Moist. Density (5)}}{1. + \frac{\%\ \text{Moist. (7)}}{100}} = \frac{126.1}{1.044} = 120.8$$

9. % Compaction =

$$\frac{\text{Dry Density}}{\text{Max. Density}} = \frac{120.8}{124.7} = 96.88\ \%$$



10. Req. Density: 85 %
11. Pass ✓ Fail ____

LOCATION: NORTHside of Doghouses - WEST

SUBSOIL INVESTIGATIONS

SOIL MECHANICS DRILLING CORP.

3770 MERRICK ROAD • SEAFORD, L.I., NEW YORK 11783
(516) 221-2333 • FAX (516) 679-4373

Date: 3-29-11

PROJECT: BRookhaven LAB
Bldg #701

TEST # 1

Depth of test from final grade: ±2'

FIELD DENSITY TEST

1. Wt. of Sand & Cone (a)= 14.61
2. Wt. of Sand & Cone (b)= -7.55

   Wt. of Sand = 7.06

   Sand in Cone = -3.83

   NET SAND = 3.23 (c)

3. Volume of Soil=

$$\frac{\text{Net Sand (c)}}{\text{Sand Volume}} = \frac{3.23}{89.7} = .036$$

4. Wt. of Soil & Can = 5.28

   Wt. of Can = -.59

   Wt. of Soil = 4.69 (d)

5. Moist. Density=

$$\frac{\text{Wt. of Soil (d)}}{\text{Vol. of Soil (3)}} = \frac{4.69}{.036} = 130.2$$

6. WET

   Cup & Soil = 120.3

   Cup = 14.6

   Soil Wet = 105.7 (e)

   DRY

   Cup & Soil = 114.2

   Cup = 14.6

   Soil Dry = 99.6 (f)

   Soil Wet 105.7

   Soil Dry 99.6

   Moisture = 6.1

7. Moisture=

$$\frac{\text{Wet (e) - Dry (f) X100}}{\text{Dry (f)}} = \frac{6.1}{99.6} = 6.1 \quad (7)\ \%$$

8. Dry Density =

$$\frac{\text{Moist. Density (5)}}{1. + \frac{\text{\% Moist. (7)}}{100}} = \frac{130.2}{1.061} = 122.7$$

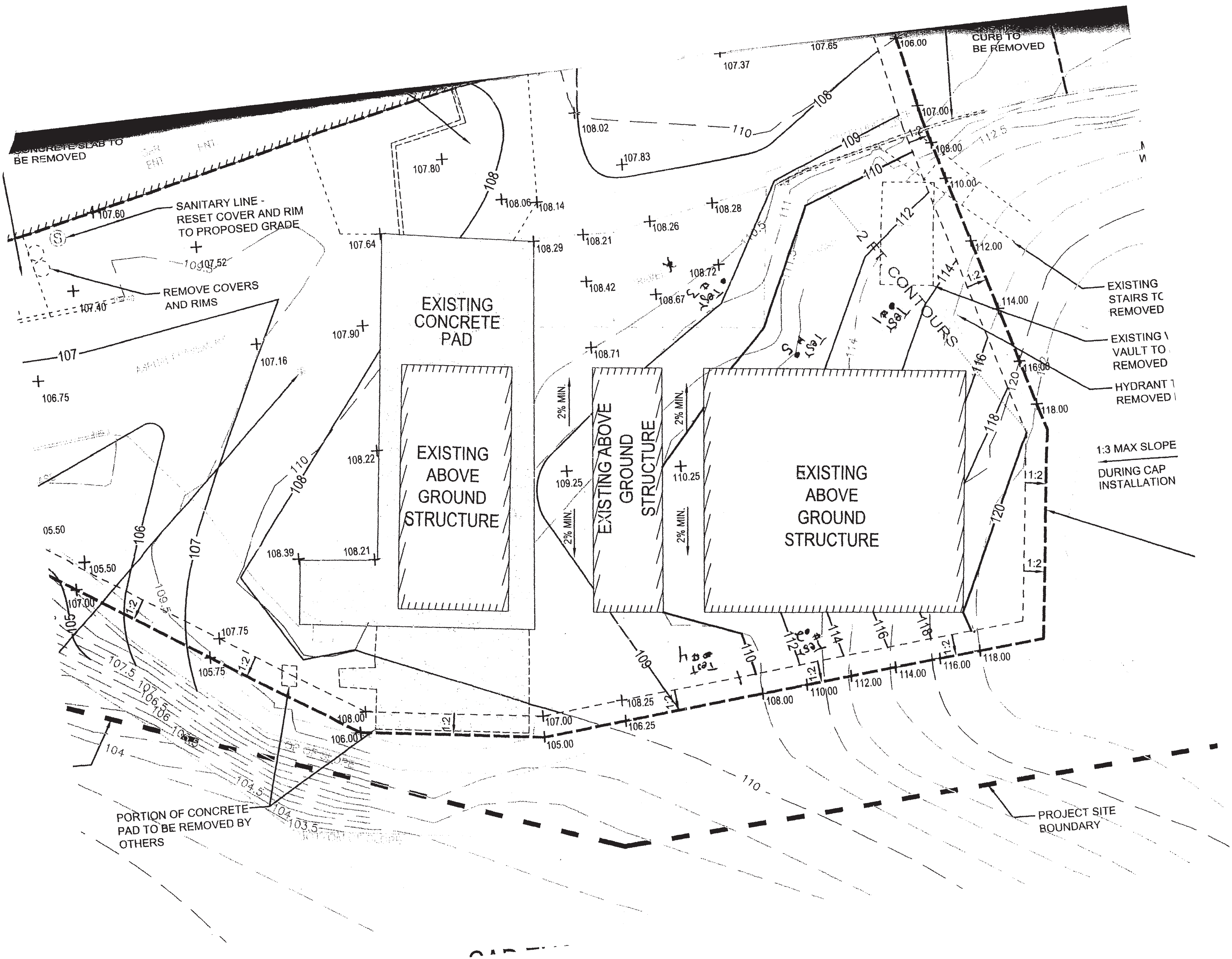
9. % Compaction =

$$\frac{\text{Dry Density}}{\text{Max. Density}} = \frac{122.7}{124.7} = 98.42\ \%$$

10. Req. Density: 85 %

11. Pass ✓ Fail ____

LOCATION: ____


CONCRETE SLAB TO BE REMOVED
CURB TO BE REMOVED
SANITARY LINE - RESET COVER AND RIM TO PROPOSED GRADE
REMOVE COVERS AND RIMS
EXISTING CONCRETE PAD
EXISTING ABOVE GROUND STRUCTURE
EXISTING ABOVE GROUND STRUCTURE
EXISTING ABOVE GROUND STRUCTURE
2% MIN.
2 FT CONTOURS
EXISTING STAIRS TO BE REMOVED
HYDRANT TO BE REMOVED
1:3 MAX SLOPE DURING CAP INSTALLATION
PROJECT SITE BOUNDARY
PORTION OF CONCRETE PAD TO BE REMOVED BY OTHERS
Test #1
Test #2
Test #3
Test #4
Test #5
1:2

JOB #

SOIL MECHANICS DRILLING CORP.

3770 MERRICK ROAD • SEAFORD, L.I., NEW YORK 11783
(516) 221-2333 • FAX (516) 679-4373

DATE 3-29-11

FIELD REPORT

		AM	PM
CLIENT Envisro Trac	AIR TEMP.	35°	40°
CONTRACTOR Envisro Trac	WEATHER	Sunny	

PROJECT Brookhaven Labratory
Bldg 701 Engineered CAP

Visited the above refrenced site for the purpose of Density test's For the Subgrade surrounding the Doghouses. There were 2 test's taken on the South Side and 3 test's taken along the North side of the Dog houses. All test's taken passed the required 85% As per ASTM D1556. The Area at the low roof of the Dog houses had an area that was pumping. This Area was excavated down to stable soils and recompacted with a Vibratory Plate tamper to the required 85%. All test's taken were ± 2' From Finished grade.

INSPECTOR. Pat Monaghan

JOB #

SOIL MECHANICS DRILLING CORP.

3770 MERRICK ROAD • SEAFORD, L.I., NEW YORK 11783
(516) 221-2333 • FAX (516) 679-4373

DATE 4/11/11

FIELD REPORT

CLIENT EnviroTrac

CONTRACTOR EnviroTrac

PROJECT BLDG 701 @ Brookhaven National Lab

AIR TEMP. 52 (AM | PM)

WEATHER Overcast

AREA WORKED

CONCRETE ☐ Density Test: East side Geo-tech sub-grade

ASPHALT ☐

OTHER ☐

TOTAL MATERIAL PLACED ______ PLANT INSPECTION YES ☐ NO ☐

CONCRETE

NO. OF CYLINDERS CAST ______ SLUMPS ______ CONCRETE TEMP. ______

AIR CONTENT ______ ADMIXTURES ______

REINFORCING STEEL INSPECTION

LOCATION INSPECTED & APPROVED TYPE RE-BAR USED ____ GRADE ____

A) SAME AS ABOVE LOCATION ☐

B) ADDITIONAL OR DIFFERENT LOCATION ☐

REJECTIONS ☐ EXPLANATION

SOILS

REMARKS Sand cone method density test were performed on the sub-grade located in the area noted above. The material consisted of clean sand and gravel. The density test had a prerequisite of 85% of the materials proctor value. The test reached or exceeded the required 85% density. See the attachment for the test results and locations.

INSPECTED BY J. Hill

SUBSOIL INVESTIGATIONS

SOIL MECHANICS DRILLING CORP.

3770 MERRICK ROAD • SEAFORD, L.I., NEW YORK 11783
(516) 221-2333 • FAX (516) 679-4373

Date:_________________

PROJECT:______________________________

____

TEST #_____ Depth of test from final grade:____

FIELD DENSITY TEST

1. Wt. of Sand & Cone (a)=
2. Wt. of Sand & Cone (b)= -__________
   Wt. of Sand =
   Sand in Cone = -__________
   NET SAND = (c)

3. Volume of Soil=

$$\frac{\text{Net Sand (c)}}{\text{Sand Volume}} = \_\_\_\_\_\_\_\_ =$$

4. Wt. of Soil & Can =
   Wt.of Can =-__________
   Wt. of Soil =__________(d)

5. Moist. Density=

$$\frac{\text{Wt. of Soil (d)}}{\text{Vol.of Soil (3)}} = \_\_\_\_\_\_\_\_ =$$

6. WET
   Cup & Soil=
   Cup =_______
   Soil Wet = (e)

   DRY
   Cup & Soil=
   Cup =_______
   Soil Dry = (f)

   Soil Wet ________
   Soil Dry ________
   Moisture=

7. Moisture=

$$\frac{\text{Wet (e) - Dry (f) X100}}{\text{Dry (f)}} = \_\_\_\_\_\_\_\_\_\_\_\_ = \quad (7)\ \%$$

8. Dry Density =

$$\frac{\text{Moist. Density (5)}}{1.+\frac{\text{\% Moist. (7)}}{100}} = \_\_\_\_\_\_\_\_\_\_\_\_ =$$

9. % Compaction =

$$\frac{\text{Dry Density}}{\text{Max. Density}} = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ = \quad \%$$

10. Req. Density: ____________%
11. Pass _________ Fail _______

LOCATION: ____

JOB #

SOIL MECHANICS DRILLING CORP.
3770 MERRICK ROAD • SEAFORD, L.I., NEW YORK 11783
(516) 221-2333 • FAX (516) 679-4378

DATE 4/12/11

FIELD REPORT

AM | PM

CLIENT EnviroTrac
AIR TEMP. 58°
CONTRACTOR EnviroTrac
WEATHER overcast
PROJECT BLDG 701 @ Brookhaven National Lab

AREA WORKED
CONCRETE ☐ Density Test Geo tech sub-grade. South SIDE West
ASPHALT ☐ side
OTHER ☐

TOTAL MATERIAL PLACED ______ PLANT INSPECTION YES ☐ NO ☐

CONCRETE

NO. OF CYLINDERS CAST ______ SLUMPS ______ CONCRETE TEMP. ______
AIR CONTENT ______ ADMIXTURES ______

REINFORCING STEEL INSPECTION

LOCATION INSPECTED & APPROVED ______ TYPE RE-BAR USED ______ GRADE ______

A) SAME AS ABOVE LOCATION ☐
B) ADDITIONAL OR DIFFERENT LOCATION ☐ ______

REJECTIONS ☐ EXPLANATION ______

SOILS

REMARKS Sand Cone density test were performed on the subgrade located in the area noted above. The test had a prerequisite of 85% of the materials modified proctor value. The test exceeded the required 85%. See the attachment for the test results and locations.

INSPECTED BY [signature]

SUBSOIL
INVESTIGATIONS

SOIL MECHANICS DRILLING CORP.
3770 MERRICK ROAD • SEAFORD, L.I., NEW YORK 11783
(516) 221-2333 • FAX (516) 679-4373

Date:__________________

PROJECT:___________________________
____

TEST #_____   Depth of test from final grade:____

FIELD DENSITY TEST

1. Wt. of Sand & Cone (a)=
2. Wt. of Sand & Cone (b)= -__________
   Wt. of Sand =
   Sand in Cone = -__________
   NET SAND = (c)

3. Volume of Soil=

$$\frac{\text{Net Sand (c)}}{\text{Sand Volume}} = \_\_\_\_\_\_\_\_ =$$

4. Wt. of Soil & Can =
   Wt.of Can =-__________
   Wt. of Soil =__________(d)

5. Moist. Density=

$$\frac{\text{Wt. of Soil (d)}}{\text{Vol.of Soil (3)}} = \_\_\_\_\_\_\_\_ =$$

6. WET
   Cup & Soil=
   Cup =_______
   Soil Wet = (e)

   DRY
   Cup & Soil=
   Cup =_______
   Soil Dry = (f)

   Soil Wet ________
   Soil Dry ________
   Moisture=

7. Moisture=

$$\frac{\text{Wet (e) - Dry (f) X100}}{\text{Dry (f)}} = \_\_\_\_\_\_\_\_\_\_ = \quad (7)\ \%$$

8. Dry Density =

$$\frac{\text{Moist. Density (5)}}{1. + \frac{\text{\% Moist. (7)}}{100}} = \_\_\_\_\_\_\_\_\_\_ =$$

9. % Compaction =

$$\frac{\text{Dry Density}}{\text{Max. Density}} = \_\_\_\_\_\_\_\_\_\_\_\_ = \quad \%$$

10. Req. Density: ___________%
11. Pass _________ Fail _______

LOCATION: ____

JOB #

SOIL MECHANICS DRILLING CORP.

3770 MERRICK ROAD • SEAFORD, L.I., NEW YORK 11783
(516) 221-2333 • FAX (516) 679-4373

DATE 4/20/11

FIELD REPORT

CLIENT ____ AIR TEMP. AM | PM

CONTRACTOR Envirotrac WEATHER

PROJECT Brookhaven National Labs Bldg 701

AREA WORKED West side Building 701

CONCRETE ☐

ASPHALT ☐

OTHER ☒ Sand + Cone Testing.

TOTAL MATERIAL PLACED ____ PLANT INSPECTION YES ☐ NO ☐

CONCRETE

NO. OF CYLINDERS CAST ____ SLUMPS ____ CONCRETE TEMP. ____

AIR CONTENT ____ ADMIXTURES ____

REINFORCING STEEL INSPECTION

LOCATION INSPECTED & APPROVED TYPE RE-BAR USED ____ GRADE ____

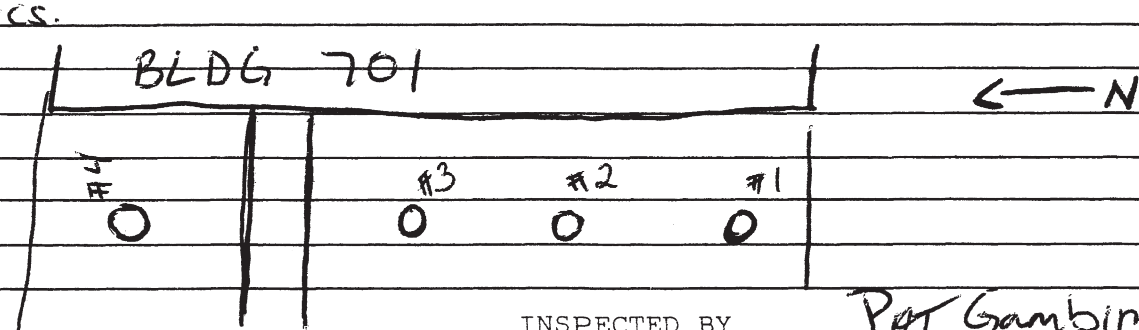
A) SAME AS ABOVE LOCATION ☐ N/A

B) ADDITIONAL OR DIFFERENT LOCATION ☐

REJECTIONS ☐ EXPLANATION ____

SOILS

REMARKS Performed sand + cone test on area preped. All tests today passed w/ above 85% compaction as per specs.



INSPECTED BY Pat Gambino

Appendix D

EnviroTrac

GEOMEMBRANE INSTALLATION QA/QC DOCUMENTATION

Prepared for:

BROOKHAVEN NATIONAL LABORATORY
BGGR CAP
RIDGE, NY

JULY 2011

Prepared By:

Chenango Contracting, Inc.

TABLE OF CONTENTS

Chenango Contracting Inc.

29 Arbutus Rd.
Johnson City, NY 13790
Phone (607) 729-8500
Fax (607) 729-2415

ABBREVIATIONS USED ON QA/QC DOCUMENTS

Name/Technician Abbreviations:

RJP	Rod Parker	*SR*	Soukhy Rachpraxa	*JZ*	Jeff Zeeuw
CR	Chuck Rhoades	*JW*	John Whitney	*BH*	Bart Hurt
JR	Joey Randall	*MBYZ*	Martin Bystrak	*SB*	Saychay Boutsady
RC	Robert Carr	*PNW*	Peter Ward	*TS*	Thavone Sonethavisouk
CJB	Carl Burdick	*CAP*	Charles Parks	*KO*	Koune Chanhdara
NB	Nick Brechko	*LS*	Lampheu Sisen	*DBS*	Don Soumphonphakdy
BTK	Bounthan Keophiphath	*PRM*	Paul Manley	*VC*	Viradet Chanthavong
JK	Jai Keopanya	*VS*	Vong Soumphonphakdy	*BB*	Boualay Boutsady
KC	Khamsouvanh Chanthavong	*LV*	Lasa Vongsouphath	*KP*	Khamsone Phouthavong

Location Abbreviations:

NEOS	North End of Seam	*EOP*	End of Panel
SEOS	South End of Seam	*AT*	Anchor Trench
EEOS	East End of Seam	*NAT*	North Anchor Trench
WEOS	West End of Seam	*SAT*	South Anchor Trench
N	North	*EAT*	East Anchor Trench
S	South	*WAT*	West Anchor Trench
E	East	*P-##*	Panel Number
W	West	*R-##*	Repair Number
F or Fr.	From	*EOS*	End of Seam
NEOP	North End of Panel	*SEOP*	South End of Panel
EEOP	East End of Panel	*WEOP*	West End of Panel

Repair Abbreviations:

BO	Burnout	*PT*	Pressure Test	*MH*	Manhole
D	Install Damage	*SB*	Sand Bag	*EW*	Extraction Well
DS	Destructive Seam Test	*T*	Panel Intersection	*PB*	Pipe Boot
RO	Run Off	*SI*	Soil Irregularity		
CO	Clean Out	*OT*	Other		
ST	Spark Test	*WS*	Welder Restart		
WR	Wrinkle	*EE*	Equipment Damage		
GV	Gas Vent	*VT*	Vacuum Test		

Geomembrane Type:

S or SM.	Smooth
T , TX. or Tex.	Textured

Updated: 7/14/11

CHENANGO CONTRACTING, INC.

29 ARBUTUS RD, JOHNSON CITY, NY 13790

TEL. (607) 729-8500 FAX (607) 729-2415

PANEL PLACEMENT LOG

PROJECT NAME:	BROOKHAVEN N.L.	QC REP.:	M.BYSTRAK
PROJECT NUMBER:	11008	MATERIAL:	40 HD SMOOTH SOLMAX

Panel Number	Smooth (S) / Textured (T)	Roll Number	Date Installed	Time Installed	Panel Width (ft)	Panel Length (ft)		Smooth Area (sf)	Textured Area (sf)
						Side A	Side B		
P 1	S	52378	3/30/11	13:45	10.5	50	50	525.0	0.0
P 2	S	52378	4/15/11	10:00	22.5	58	58	1305.0	0.0
P 3	S	52378	4/15/11	10:30	22.5	58	58	1305.0	0.0
P 4	S	52378	4/15/11	10:45	22.5	60	60	1350.0	0.0
P 5	S	52378	4/18/11	10:00	11.0	39	39	429.0	0.0
P 6	S	52378	4/18/11	11:45	17.0	61	61	1037.0	0.0
P 7	S	52378	4/19/11	9:00	22.5	53	53	1192.5	0.0
P 8	S	52378	4/19/11	9:30	5.0	0	16	40.0	0.0
P 9	S	52378	4/25/11	9:15	22.5	25	25	625.0	0.0
P 10	S	52378	4/25/11	9:20	22.5	25	26	650.0	0.0
P 11	S	52378	4/25/11	9:25	22.5	26	27	702.0	0.0
P 12	S	52378	4/25/11	9:45	22.5	27	39	921.0	0.0
P 13	S	52378	4/25/11	9:50	22.5	39	40	1560.0	0.0
P 14	S	52378	4/25/11	10:00	22.5	40	43	1639.0	0.0
P 15	S	52378	4/26/11	10:00	13.0	22	22	286.0	0.0
P 16	S	52378	4/26/11	10:15	9.0	6	6	54.0	0.0
P 17	S	52378	4/26/11	10:30	13.0	22	22	286.0	0.0
P 18	S	52378	4/26/11	12:45	13.0	22	22	286.0	0.0
P 19	S	52376	4/27/11	10:01	22.5	47	47	1057.5	0.0
P 20	S	52376	4/27/11	10:15	22.5	48	49	1691.3	0.0
P 21	S	52376	4/27/11	10:30	22.5	66	58	1396.0	0.0
P 22	S	52376	4/27/11	10:45	22.5	68	71	1563.8	0.0
P 23	S	52376	4/27/11	10:50	22.5	47	21	576.3	0.0
P 24	S	52376	4/27/11	11:00	10.0	50	30	400.0	0.0
P 25	S	52376	4/27/11	11:10	22.5	12	13	681.3	0.0
P 26	S	52376	4/29/11	9:30	21.0	25	31	688.0	0.0
P 27	S	52376	4/29/11	9:45	7.0	0	22	77.0	0.0
P 28	S	52376	5/9/11	8:30	22.5	60	60	1320.0	0.0
P 29	S	52376	5/9/11	9:00	22.5	60	72	1485.0	0.0
P 30	S	52376	5/9/11	9:15	22.5	72	72	1620.0	0.0
P 31	S	52376	5/9/11	9:30	22.5	72	75	1665.0	0.0
P 32	S	52376	5/9/11	10:30	22.5	60	60	1320.0	0.0
P 33	S	52376	5/9/11	10:40	22.5	60	48	1215.0	0.0
P 34	S	52378	5/9/11	11:00	22.5	48	31	900.0	0.0
P 35	S	52378	5/9/11	11:15	18.5	31	20	585.0	0.0
P 36	S	52375	5/9/11	13:00	22.5	44	44	990.0	0.0
P 37	S	52378	5/9/11	13:00	12.0	0	31	186.0	0.0
P 38								0.0	0.0
P 39								0.0	0.0
P 40								0.0	0.0
P 41								0.0	0.0

CHENANGO CONTRACTING, INC.

29 ARBUTUS RD, JOHNSON CITY, NY 13790
TEL. (607) 729-8500 FAX (607) 729-2415

GEOMEMBRANE TRIAL SEAM LOG

PROJECT NAME: BROOKHAVEN N.L.
PROJECT NUMBER: 11008
QC REP.: M.BYZ

	SMOOTH (ppi)		TEXTURED (ppi)	
	PEEL	SHEAR	PEEL	SHEAR
FUSION (min.)	60	80	60	80
EXTRUSION (min.)	52	80	52	80

* All Peel & Shear Values are (ppi)

						Fusion		Extrusion										
Date	Time	Temp (deg F)	Mach. No.	Tech ID	Setup S/T	Temp (deg C)	Speed (ft/m)	Preheat (deg F)	Barrel (deg F)	Peel #1 In	Peel #1 Out	Peel #2 In	Peel #2 Out	Peel #3 In	Peel #3 Out	Shear #1	Shear #2	Shear #3
3/31/11	8:15	44	X14	VC	SS			450	475	98		92		94		126	118	132
4/15/11	9:25	50	W1	VS	SS	365	11.5			99	96	105	96	98	94	128	122	126
4/15/11	11:00	56	X14	VC	SS			450	475		86		86		90	116	128	128
4/18/11	9:25	52	X14	VC	SS			450	475		85		84		84	120	126	126
4/18/11	12:45	54	X14	VC	SS			450	475		78		80		80	116	121	120
4/19/11	8:15	50	X8	VC	SS			450	475		74		79		76	126	124	120
4/15/11	9:00	60	W1	VS	SS	365	11.5			106	110	96	101	94	108	110	112	118
4/25/11	8:00	52	W1	VS	SS	365	11.5			103	105	101	103	100	106	115	116	115
4/25/11	11:00	64	X8	VC	SS			450	475		80		92		104	104	102	106
4/26/11	10:35	60	X8	VC	SS			450	475		84		92		94	116	120	124
4/27/11	9:00	60	W8	VS	SS	365	11.5			98	94	106	101	96	92	113	114	114
4/27/11	12:55	65	X8	VC	SS			450	475		90		90		92	115	124	120
4/29/11	8:45	55	X8	VC	SS			500	475		91		81		97	102	100	106
5/9/11	8:30	50	W8	VS	SS	365	11.0			82	89	89	85	88	94	130	125	115
5/9/11	12:30	50	W8	VS	SS	365	11.0			79	96	92	89	93	98	121	119	113
5/10/11	8:30	60	X8	VC	SS			450	475		76		82		84	120	122	120
5/11/11	8:35	54	X8	VC	SS			450	475		90		95		100	120	118	100

CHENANGO CONTRACTING, INC.

29 ARBUTUS RD, JOHNSON CITY, NY 13790
TEL.(607) 729-8500 FAX (607) 729-2415

GEOMEMBRANE SEAMING RECORD

PROJECT NAME:	BROOKHAVEN N.L.	AIR TEST TIME (MIN)	5
PROJECT NUMBER:	11008	PSI DROP (MAX)	4
QC REP:	M.BYZ		

* For Machine Setup and Weather Conditions please refer to the Trial Weld Log

	SEAM INFO				NON-DESTRUCTIVE TESTING INFO								
Seam Number	Date	Lgth (ft)	Start Time	Tech INI*	Date	Tech INI	Start Time	Start Press	Press Drop	AT P/F	Vbox P/F	Location Start	Location End
2 / 3	4/15/11	58	10:35	VS	4/15/11	MBYZ	11:05	30	1	PASS		Entire	Seam
3 / 4	4/15/11	58	10:46	VS	4/15/11	MBYZ	11:16	30	0	PASS		Entire	Seam
5 / 6	4/18/11	11	Extrude	VC	4/18/11	LS					PASS	Entire	Seam
6 / 7	4/19/11	18	Extrude	VC	4/18/11	LS					PASS	Entire	Seam
6 / 8	4/19/11	16	Extrude	VC	4/18/11	LS					PASS	Entire	Seam
7 / 8	4/19/11	5	Extrude	VC	4/18/11	LS					PASS	Entire	Seam
9 / 10	4/25/11	25	9:40	VS	4/25/11	LS	10:10	33	1	Pass		Entire	Seam
10 / 11	4/25/11	26	9:50	VS	4/25/11	LS	10:18	33	1	Pass		Entire	Seam
11 / 12	4/25/11	27	9:55	VS	4/25/11	LS	10:19	32	2	Pass		Entire	Seam
12 / 13	4/25/11	39	10:00	VS	4/25/11	LS	10:26	33	2	Pass		Entire	Seam
13 / 14	4/25/11	40	10:10	VS	4/25/11	LS	10:26	30	1	Pass		Entire	Seam
14 / 15	4/26/11	13	Extrude	VC	4/26/11	LS				PASS		Entire	Seam
15 / 16	4/26/11	9	Extrude	VC	4/26/11	LS				PASS		Entire	Seam
16 / 17	4/26/11	9	Extrude	VC	4/26/11	LS				PASS		Entire	Seam
17 / 18	4/26/11	13	Extrude	VC	4/26/11	LS				PASS		Entire	Seam
14 / 19	4/27/11	40	10:06	VS	4/27/11	LS	11:10	35	1	Pass		Entire	Seam
15 / 20	4/27/11	12	10:25	VS	4/27/11	LS	11:36	30	1	Pass		Entire	Seam
16 / 20	4/27/11	6	10:24	VS	4/27/11	LS	11:36	35	0	Pass		Entire	Seam
17 / 20	4/27/11	21	10:22	VS	4/27/11	LS	11:14	30	1	Pass		Entire	Seam
18 / 20	4/27/11	9	10:20	VS	4/27/11	LS	11:47	40	0	Pass		Entire	Seam
18 / 25	4/27/11	12	11:30	VS	4/27/11	LS	11:55	35	0	Pass		Entire	Seam
19 / 20	4/27/11	23	10:20	VS	4/27/11	LS	11:17	33	1	Pass		Entire	Seam
20 / 25	4/27/11	23	11:26	VS	4/27/11	LS	11:47	34	1	Pass		Entire	Seam
19 / 23	4/27/11	47	11:07	VS	4/27/11	LS	11:17	30	1	Pass		Entire	Seam
20 / 21	4/27/11	43	10:30	VS	4/27/11	LS	11:31	33	2	Pass		Entire	Seam
25 / 21	4/27/11	13	11:36	VS	4/27/11	LS	11:55	35	0	Pass		Entire	Seam
23 / 21	4/27/11	23	11:00	VS	4/27/11	LS	11:31	33	2	Pass		Entire	Seam
21 / 22	4/27/11	58	10:45	VS	4/27/11	LS	11:25	35	2	Pass		Entire	Seam
22 / 24	4/27/11	50	11:15	VS	4/27/11	LS	11:24	35	2	Pass		Entire	Seam
15 / 19	4/27/11	7	Extrude	VC	4/27/11					PASS		Entire	Seam
20 / 23	4/27/11	6	Extrude	VC	4/29/11					PASS		Entire	Seam
24 / 27	4/29/11	22	Extrude	VC	4/29/11					PASS		Entire	Seam
24 / 26	4/29/11	7	Extrude	VC	4/29/11					PASS		Entire	Seam
26 / 27	4/29/11	7	Extrude	VC	4/29/11					PASS		Entire	Seam
26 / 7	4/29/11	23	Extrude	VC	4/29/11					PASS		Entire	Seam
4 / 28	5/9/11	60	8:56	VS	5/9/11	LS	9:55	35	0	Pass		Entire	Seam
28 / 29	5/9/11	72	9:06	VS	5/9/11	LS	9:55	35	1	Pass		Entire	Seam
29 / 30	5/9/11	72	9:21	VS	5/9/11	LS	10:03	30	0	Pass		Entire	Seam

CHENANGO CONTRACTING, INC.

29 ARBUTUS RD, JOHNSON CITY, NY 13790
TEL.(607) 729-8500 FAX (607) 729-2415

GEOMEMBRANE SEAMING RECORD

PROJECT NAME:	BROOKHAVEN N.L.	AIR TEST TIME (MIN)	5
PROJECT NUMBER:	11008	PSI DROP (MAX)	4
QC REP:	M.BYZ		

*** For Machine Setup and Weather Conditions please refer to the Trial Weld Log**

	SEAM INFO				NON-DESTRUCTIVE TESTING INFO								
Seam Number	**Date**	**Lgth (ft)**	**Start Time**	**Tech INI***	**Date**	**Tech INI**	**Start Time**	**Start Press**	**Press Drop**	**AT P/F**	**Vbox P/F**	**Location Start**	**Location End**
					5/9/11	LS	10:03	30	0	Pass		WEOS	R60
30 / 31	5/9/11	75	9:40	VS	5/9/11	LS	10:03	30	0	Pass		R60	EEOS
31 / 32	5/9/11	23	11:06	VS	5/9/11	LS	11:25	30	0	Pass		Entire	Seam
31 / 33	5/9/11	23	11:03	VS	5/9/11	LS	11:31	30	1	Pass		Entire	Seam
31 / 34	5/9/11	20	11:00	VS	5/9/11	LS	11:41	30	2	Pass		Entire	Seam
31 / 35	5/9/11	15	11:30	VS	5/9/11	LS	11:38	30	1	Pass		Entire	Seam
32 / 33	5/9/11	60	10:45	VS	5/9/11	LS	11:25	30	0	Pass		Entire	Seam
					5/9/11	LS	11:34	30	0	Pass		SEOS	R63
33 / 34	5/9/11	48	11:05	VS	5/9/11	LS	11:34	30	0	Pass		R63	NEOS
34 / 35	5/9/11	31	11:20	VS	5/9/11	LS	11:41	30	0	Pass		Entire	Seam
31 / 37	5/9/11	12	13:44	VS	5/9/11						PASS	Entire	Seam
31 / 36	5/9/11	12	13:42	VS	5/9/11	LS	13:49	30	0	Pass		Entire	Seam
30 / 36	5/9/11	11	13:40	VS	5/9/11	LS	13:50	30	2	Pass		Entire	Seam
36 / 37	5/9/11	31	13:25	VS	5/9/11	LS	13:48	30	1	Pass		Entire	Seam
18 / 36	5/10/11	13	Extrude	VC	5/10/11						PASS	Entire	Seam
25 / 36	5/10/11	10	Extrude	VC	5/10/11						PASS	Entire	Seam
5 / 32	5/11/11	7	Extrude	VC	5/11/11						PASS	Entire	Seam
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CHENANGO CONTRACTING, INC.

29 ARBUTUS RD, JOHNSON CITY, NY 13790
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SEAM DESTRUCTIVE SAMPLE LOG

PROJECT NAME: BROOKHAVEN N.L.
PROJECT NUMBER: 11008
MATERIAL: 40 HD SOLMAX SMOOTH
QC REP.: M.BYZ

	SMOOTH (ppi)		TEXTURED (ppi)	
	PEEL	SHEAR	PEEL	SHEAR
FUSION (min.)	60	80	60	80
EXTRUSION (min.)	52	80	52	80

Destruct	Seam	Repair	Seam	Peel (ppi)										Shear (ppi)					Field	Lab
#	#	#	Tech ID	In1	Out1	In2	Out2	In3	Out3	In4	Out4	In5	Out5	1	2	3	4	5	Pass/Fail	Pass/Fail
DS-1	13 / 14	R 33	VS	78	86	84	80	74	80	76	80	80	76	96	100	100	100	98	Pass	NA
DS-2	25 / 21	R 38	VS	71	98	71	79	73	73	96	83	77	92	119	122	122	119	125	Pass	NA
DS-3	37 / 31	R 53	VS	88	86	90	86	93	90	83	92	95	84	105	107	107	109	103	Pass	NA

CHENANGO CONTRACTING, INC.

29 ARBUTUS RD, JOHNSON CITY, NY 13790
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REPAIR LOG

PROJECT NAME: BROOKHAVEN N.L. QC REP.: M.BYSTRAK
PROJECT NUMBER: 11008 MATERIAL: 40 HD SMOOTH SOLMAX

REPAIR #	DEFECT CODE*	REPAIR DATE	TECH ID	LOCATION Seam/Panel	Offset #1	Offset #2	REPAIR TYPE*	SIZE (ft x ft)	VAC.OR PROBE QC P/F	DATE
R 1	COR.	3/31/11	VC	1	3' F SEOP	EEOP	Patch	1X3	Pass	3/31/11
R 2	PIPE 8"	3/31/11	VC	1	6' F SEOP	2' F WEOP	BOOT	2X2	Pass	3/31/11
R 3	COR.	3/31/11	VC	1	5' F SEOP	WEOP	Patch	1X2	Pass	3/31/11
R 4	COR.	3/31/11	VC	1	10' F NEOP	WEOP	Patch	1X1	Pass	3/31/11
R 5	COR.	3/31/11	VC	1	10' F NEOP	5' F EEOP	Patch	2X11	Pass	3/31/11
R 6	PIPE 6"	3/31/11	VC	1	5' F NEOP	2' F WEOP	BOOT	2X2	Pass	3/31/11
R 7	COR.	3/31/11	VC	1	2' F NEOP	E.SIDE P1	Patch	3X9	Pass	3/31/11
R 8	COR.	4/18/11	VC	1	4' F NEOP	MID.P1	Patch	4X6	Pass	4/19/11
R 9	ID	4/15/11	VC	2	16' F EEOP	N.SIDE P2	Patch	1X4	Pass	4/15/11
R 10	COR.	4/15/11	VC	2	N.W.COR	P2	Patch	1X1	Pass	4/15/11
R 11	PT	4/15/11	VC	2 / 3	3' F EEOS		Patch	1X3	Pass	4/15/11
R 12	PT	4/15/11	VC	3 / 4	4' F EEOS		Patch	2X6	Pass	4/15/11
R 13	COR.	4/15/11	VC	4	WEOP	4' F SEOP	Patch	2X6	Pass	4/15/11
R 14	COR.	4/18/11	VC	5	7' F WEOP	8' F SEOP	Patch	2X4	Pass	4/18/11
R 15	EMB	4/18/11	VC	5	W.SIDE	BUILDING	Patch	1X28	Pass	4/18/11
R 16	COR.	4/18/11	VC	5	11' F NEOP	15' F WEOP	Patch	3X5	Pass	4/18/11
R 17	COR.	4/18/11	VC	6	10' F WEOP	NEOP	Patch	2X2	Pass	4/19/11
R 18	COR.	4/18/11	VC	6	44' F WEOP	NEOP	Patch	2X3	Pass	4/19/11
R 19	COR.	4/19/11	VC	6	3' F EEOP	NEOP	Patch	6X6	Pass	4/19/11
R 20	COR.	4/19/11	VC	1 / 7	S.P1	N.P7	Patch	4X4	Pass	4/19/11
R 21	1/2 MH	4/19/11	VC	7	24' F EEOP	NEOP	BOOT	4X4	Pass	4/19/11
R 22	EE	4/19/11	VC	6	5' F EEOP	8' F SEOP	Patch	1X1	Pass	4/19/11
R 23	COR.	4/25/11	VC	11	4' F SEOP	EEOP	Patch	2X4	Pass	4/25/11
R 24	PIPE 4"	4/25/11	VC	9	5' F WEOP	13' F SEOP	BOOT	2X2	Pass	4/25/11
R 25	COR.	4/25/11	VC	9	N.E.CORNER		Patch	2X3	Pass	4/25/11
R 26	PT	4/25/11	VC	9 / 10	EEOS		Patch	1X3	Pass	4/25/11
R 27	PT	4/25/11	VC	10 / 11	EEOS		Patch	1X1	Pass	4/25/11
R 28	PT	4/25/11	VC	11 / 12	EEOS		Patch	1X3	Pass	4/25/11
R 29	COR.	4/25/11	VC	12	7' F SEOP	12' F WEOP	Patch	3X4	Pass	4/25/11
R 30	COR.	4/25/11	VC	12	7' F SEOP	EEOP	Patch	3X3	Pass	4/25/11
R 31	PT	4/25/11	VC	12 / 13	EEOS		Patch	1X3	Pass	4/25/11
R 32	PT	4/25/11	VC	13 / 14	EEOS		Patch	1X2	Pass	4/25/11
R 33	DS-1	4/25/11	VC	13 14	21' F WEOS		Patch	2X3	Pass	4/25/11
R 34	COR.	4/25/11	VC	14	2' F WEOP	9' F SEOP	Patch	3X3	Pass	4/25/11
R 35	EE	4/25/11	VC	13	8' F SEOP	2' F WEOP	Patch	1X1	Pass	4/25/11
R 36	EE	4/25/11	VC	12	9' F SEOP	10' F WEOP	Patch	1X1	Pass	4/25/11
R 37	MH	4/26/11	VC	15 / 16 17	N.SIDE P16	ON BUILDING	BOOT	5X6	Pass	4/26/11
R 38	DS-2	4/27/11	VC	21 / 25	6' F EEOS		Patch	2X6	Pass	4/27/11
R 39	T	4/27/11	VC	18 / 25 / 20			Patch	3X3	Pass	4/27/11
R 40	T	4/27/11	VC	17 / 18 / 20			Patch	2X2	Pass	4/27/11
R 41	T	4/27/11	VC	16 / 17 / 20			Patch	2X2	Pass	4/27/11
R 42	T	4/27/11	VC	15 / 16 / 20			Patch	2X3	Pass	4/27/11
R 43	T	4/27/11	VC	15 / 19 / 20			Patch	2X2	Pass	4/27/11
R 44	T	4/27/11	VC	14 / 15 / 19			Patch	2X3	Pass	4/27/11
R 45	T	4/27/11	VC	19 / 20 / 23			Patch	2X3	Pass	4/27/11
R 46	T	4/27/11	VC	20 / 21 / 23			Patch	2X3	Pass	4/27/11

* See Abbreviation Sheet

CHENANGO CONTRACTING, INC.

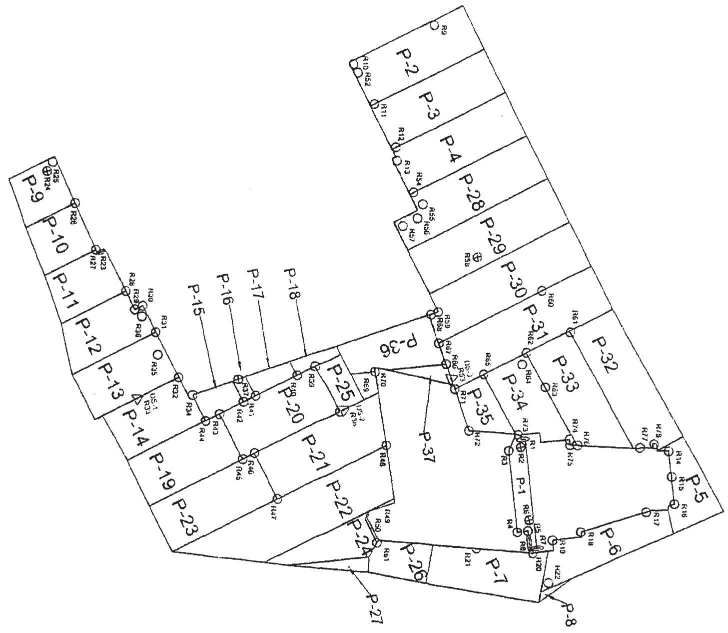
29 ARBUTUS RD, JOHNSON CITY, NY 13790
TEL. (607) 729-8500 FAX (607) 729-2415

REPAIR LOG

PROJECT NAME: BROOKHAVEN N.L. QC REP.: M.BYSTRAK
PROJECT NUMBER: 11008 MATERIAL: 40 HD SMOOTH SOLMAX

REPAIR	DEFECT	REPAIR	TECH	LOCATION			REPAIR	SIZE	VAC.OR PROBE QC	
#	CODE*	DATE	ID	Seam/Panel	Offset #1	Offset #2	TYPE*	(ft x ft)	P/F	DATE
R 47	T	4/27/11	VC	21 / 22 / 23			Patch	1X2	Pass	4/27/11
R 48	PT	4/27/11	VC	21 / 22	EEOS		Patch	1X2	Pass	4/27/11
R 49	ADDON	4/27/11	VC	22	EEOP	SEOP	Patch	5X15	Pass	4/27/11
R 50	ADDON	4/27/11	VC	24 /	WEOP		Patch	9X21	Pass	4/27/11
R 51	COR.	4/29/11	VC	24 / 26	NW COR P26	SW COR P24	Patch	3X3	Pass	4/29/11
R 52	WR	4/29/11	VC	2	NEXT TO R10	NW.COR	Patch	2X3	Pass	4/29/11
R 53	DS-3	5/10/11	VC	31 / 37	2' F NEOS		Patch	3X4	Pass	5/10/11
R 54	PT	5/10/11	VC	4 / 28	WEOS		Patch	1X2	Pass	5/10/11
R 55	COR.	5/10/11	VC	28	6' FSEOP	12' FEOP	Patch	2X4	Pass	5/10/11
R 56	EE	5/10/11	VC	28	7' FSEOP	4' FEOP	Patch	1X1	Pass	5/10/11
R 57	COR.	5/10/11	VC	28	7' FSEOP	WEOP	Patch	2X3	Pass	5/10/11
R 58	4"PIPE	5/10/11	VC	29	5' FSEOP	45' FWEOP	Patch	3X3	Pass	5/10/11
R 59	COR.	5/10/11	VC	30	12' FSEOP	3' FEOP	BOOT	2X4	Pass	5/10/11
R 60	PT	5/10/11	VC	30 / 31	25' FEOS		Patch	1X2	Pass	5/10/11
R 61	T	5/10/11	VC	31 / 32 / 33			Patch	2X2	Pass	5/10/11
R 62	T	5/10/11	VC	31 / 33 / 34			Patch	2X2	Pass	5/10/11
R 63	PT	5/10/11	VC	33 / 34	18' FSEOS		Patch	1X2	Pass	5/10/11
R 64	EE	5/10/11	VC	34	1' FSEOP	6' FWEOP	Patch	1X1	Pass	5/10/11
R 65	T	5/10/11	VC	31 / 34 / 35			Patch	2X3	Pass	5/10/11
R 66	T	5/10/11	VC	31 / 36 / 37			Patch	2X2	Pass	5/10/11
R 67	T	5/10/11	VC	30 / 31 / 36			Patch	2X2	Pass	5/10/11
R 68	PT	5/10/11	VC	30 / 36	NEOS		Patch	1X2	Pass	5/10/11
R 69	ADDON	5/10/11	VC	21 / 25	SW. COR. P21		Patch	10X15	Pass	5/10/11
R 70	COR.	5/10/11	VC	36 / 37 R69			Patch	4X4	Pass	5/10/11
R 71	COR.	5/10/11	VC	35 / 31	NW.COR P35		Patch	2X7	Pass	5/10/11
R 72	COR.	5/10/11	VC	35	SW.COR		Patch	2X3	Pass	5/10/11
R 73	PT	5/10/11	VC	34 / 35	10' F EEOS	10'E	Patch	2X3	Pass	5/10/11
R 74	COR.	5/11/11	VC	34	S.E. COR		Patch	6X8	Pass	5/11/11
R 75	COR.	5/11/11	VC	34	SEOP		Patch	4X10	Pass	5/11/11
R 76	COR.	5/11/11	VC	33 / 34	SEOS		Patch	2X4	Pass	5/11/11
R 77	COR.	5/11/11	VC	32	SEOP	10' F WEOP	Patch	2X4	Pass	5/11/11
R 78	COR.	5/11/11	VC	32	SEOP	15' FWEOP	Patch	2X4	Pass	5/11/11
R 79										
R 80										
R 81										
R 82										
R 83										
R 84										
R 85										
R 86										
R 87										
R 88										
R 89										
R 90										
R 91										
R 92										

* See Abbreviation Sheet



LEGEND

P-## PANEL IDENTIFICATION NUMBER

△ PD-## DESTRUCTIVE SAMPLE LOCATION

○ R## REPAIR LOCATION

⊗ R-## PIPE BOOT LOCATION

PROJECT NO.: 11008	GEOMEMBRANE PANEL AS-BUILT	29 Arbutus Road Johnson City, NY 13790		
SCALE: 1"=20'		CHENANGO CONTRACTING, INC.		
DRAWN BY: PRM	Brookhaven N.L.	JOHNSON CITY, NEW YORK		
SHEET: 1 OF 1	Brookhaven, New York	Phone 607.729.8500 Fax 607.729.2415	DATE	STATUS

Appendix E

EnviroTrac

SUBSOIL
INVESTIGATIONS

SOIL MECHANICS DRILLING CORP.

3770 MERRICK ROAD • SEAFORD, L.I., NEW YORK 11783
(516) 221-2333 • FAX (516) 679-4373

118.6 / 1.101 = 107.72

Date: 4/27/11

PROJECT: BNL - EASTSIDE (NORTH)

TEST # 1

Depth of test from final grade: ____

FIELD DENSITY TEST

1. Wt. of Sand & Cone (a)= 16.22
2. Wt. of Sand & Cone (b)= - 6.49
   Wt. of Sand = 9.73
   Sand in Cone = - 4.27
   NET SAND = 5.46 (c)

3. Volume of Soil= 0.0562

$$\frac{\text{Net Sand (c)}}{\text{Sand Volume}} = \frac{5.46}{97} =$$

4. Wt. of Soil & Can = 6.67
   Wt. of Can = - .65
   Wt. of Soil = 6.02 (d)

5. Moist. Density=

$$\frac{\text{Wt. of Soil (d)}}{\text{Vol. of Soil (3)}} = \frac{6.02}{0.0562} =$$

6. WET
   Cup & Soil= 142
   Cup = 66
   Soil Wet = 76 (e)

   DRY
   Cup & Soil= 135
   Cup = 66
   Soil Dry = 69 (f)

   Soil Wet 76
   Soil Dry 69
   Moisture= 7.0

7. Moisture=

$$\frac{\text{Wet (e) - Dry (f) X100}}{\text{Dry (f)}} = \frac{700}{69} =$$

(7) % 10.1

8. Dry Density =

$$\frac{\text{Moist. Density (5)}}{1. + \frac{\text{\% Moist. (7)}}{100}} = \frac{107.117}{1.101} =$$

9. % Compaction = $\frac{\text{Dry Density}}{\text{Max. Density}} = \frac{97.291}{107.72} =$ .903 % 90

10. Req. Density: 85 %

11. Pass ✓ Fail ____

LOCATION: ____

SUBSOIL INVESTIGATIONS

118.6 / 1.101 = 107.72

SOIL MECHANICS DRILLING CORP.

3770 MERRICK ROAD • SEAFORD, L.I., NEW YORK 11783
(516) 221-2333 • FAX (516) 679-4373

Date: 4/27/11

PROJECT: BNL - WESTSIDE (NORTH)

TEST # 2

Depth of test from final grade: ____

FIELD DENSITY TEST

1. Wt. of Sand & Cone (a)= 16.30
2. Wt. of Sand & Cone (b)= - 6.45
   Wt. of Sand = 9.85
   Sand in Cone = - 4.27
   NET SAND = 5.58 (c)

3. Volume of Soil= 0.0575

   Net Sand (c) / Sand Volume = 5.58 / 97 =

4. Wt. of Soil & Can =
   Wt. of Can = - 6.55
   Wt. of Soil = .65 (d)

5. Moist. Density=

   Wt. of Soil (d) / Vol. of Soil (3) = 5.9 / 0.0575 =

6. WET
   Cup & Soil= 142
   Cup = 66
   Soil Wet = 76 (e)

   DRY
   Cup & Soil= 135
   Cup = 66
   Soil Dry = 69 (f)

   Soil Wet 76
   Soil Dry 69
   Moisture= 7.0

7. Moisture=

   Wet (e) - Dry (f) X100 / Dry (f) = 700 / 69 = (7) % 10.1

8. Dry Density =

   Moist. Density (5) / (1. + % Moist. (7) / 100) = 102.608 / 1.101 =

9. % Compaction = Dry Density / Max. Density = 93.195 / 107.72 = .865 % 87

10. Req. Density: 85 %

11. Pass X Fail ____

LOCATION: ____

SUBSOIL INVESTIGATIONS

$\frac{118.6}{1.101} = 107.72$

SOIL MECHANICS DRILLING CORP.

3770 MERRICK ROAD • SEAFORD, L.I., NEW YORK 11783
(516) 221-2333 • FAX (516) 679-4373

Date: 4/27/11

PROJECT: BNL - ROADWAY (S-1)

TEST # 3

Depth of test from final grade: ____

FIELD DENSITY TEST

1. Wt. of Sand & Cone (a) = 16.25
2. Wt. of Sand & Cone (b) = - 6.55
   Wt. of Sand = 9.70
   Sand in Cone = - 4.27
   NET SAND = 5.43 (c)

3. Volume of Soil = 0.0559

   Net Sand (c) / Sand Volume = 5.43 / 97 =

4. Wt. of Soil & Can = 6.60
   Wt. of Can = - .65
   Wt. of Soil = 5.95 (d)

5. Moist. Density =

   Wt. of Soil (d) / Vol. of Soil (3) = 5.95 / 0.0559 =

6. WET
   Cup & Soil = 142
   Cup = 66
   Soil Wet = 76 (e)

   DRY
   Cup & Soil = 135
   Cup = 66
   Soil Dry = 69 (f)

   Soil Wet 76
   Soil Dry 69
   Moisture = 7.0

7. Moisture =

   Wet (e) - Dry (f) X100 / Dry (f) = 700 / 69 = (7) % 10.1

8. Dry Density =

   Moist. Density (5) / 1.+ % Moist. (7)/100 = 106.440 / 1.101 =

9. % Compaction = Dry Density / Max. Density = 96.675 / 107.72 = .897 % 90

10. Req. Density: ____________ %

11. Pass X Fail _______

LOCATION: ______________________________

SUBSOIL INVESTIGATIONS

SOIL MECHANICS DRILLING CORP.

3770 MERRICK ROAD • SEAFORD, L.I., NEW YORK 11783
(516) 221-2333 • FAX (516) 679-4373

Date: 4/27/11

PROJECT: BNL - ROADWAY (S.2)

TEST # 4

Depth of test from final grade: ____

FIELD DENSITY TEST

1. Wt. of Sand & Cone (a) = 16.31
2. Wt. of Sand & Cone (b) = - 6.48

Wt. of Sand = 9.83

Sand in Cone = - 4.27

NET SAND = 5.56 (c)

3. Volume of Soil = 0.0573

$$\frac{\text{Net Sand (c)}}{\text{Sand Volume}} = \frac{5.56}{97} =$$

4. Wt. of Soil & Can = 6.45

Wt. of Can = - .65

Wt. of Soil = 5.80 (d)

5. Moist. Density =

$$\frac{\text{Wt. of Soil (d)}}{\text{Vol. of Soil (3)}} = \frac{5.80}{0.0573} =$$

6. WET

Cup & Soil = 142

Cup = 66

Soil Wet = 76 (e)

DRY

Cup & Soil = 135

Cup = 66

Soil Dry = 69 (f)

Soil Wet 76

Soil Dry 69

Moisture = 7.0

7. Moisture =

$$\frac{\text{Wet (e) - Dry (f) X100}}{\text{Dry (f)}} = \frac{700}{69} =$$

(7) % 10.1

8. Dry Density =

$$\frac{\text{Moist. Density (5)}}{1. + \frac{\text{\% Moist. (7)}}{100}} = \frac{101.221}{1.101} =$$

9. % Compaction =

$$\frac{\text{Dry Density}}{\text{Max. Density}} = \frac{91.936}{107.72} = .853$$

% 85

10. Req. Density: 85 %

11. Pass X Fail ____

LOCATION: ____

SUBSOIL INVESTIGATIONS

SOIL MECHANICS DRILLING CORP.

3770 MERRICK ROAD • SEAFORD, L.I., NEW YORK 11783
(516) 221-2333 • FAX (516) 679-4373

$\frac{118.6}{1.101} = 107.72$

Date: 4/27/11

PROJECT: BNL - WESTSIDE (SOUTH)

TEST # 5

Depth of test from final grade: ____

FIELD DENSITY TEST

1. Wt. of Sand & Cone (a) = 16.27
2. Wt. of Sand & Cone (b) = - 6.51
   Wt. of Sand = 9.76
   Sand in Cone = - 4.27
   NET SAND = 5.49 (c)

3. Volume of Soil = 0.0565

   Net Sand (c) / Sand Volume = 5.49 / 97 =

4. Wt. of Soil & Can = 6.62
   Wt. of Can = - .65
   Wt. of Soil = 5.97 (d)

5. Moist. Density =

   Wt. of Soil (d) / Vol. of Soil (3) = 5.97 / 0.0565 =

6. WET
   Cup & Soil = 142
   Cup = 64
   Soil Wet = 76 (e)

   DRY
   Cup & Soil = 135
   Cup = 66
   Soil Dry = 69 (f)

   Soil Wet 76
   Soil Dry 69
   Moisture = 7.0

7. Moisture =

   Wet (e) - Dry (f) X100 / Dry (f) = ~~105.663 / 1.101~~ = 700 / 69 (7) % 10.1

8. Dry Density =

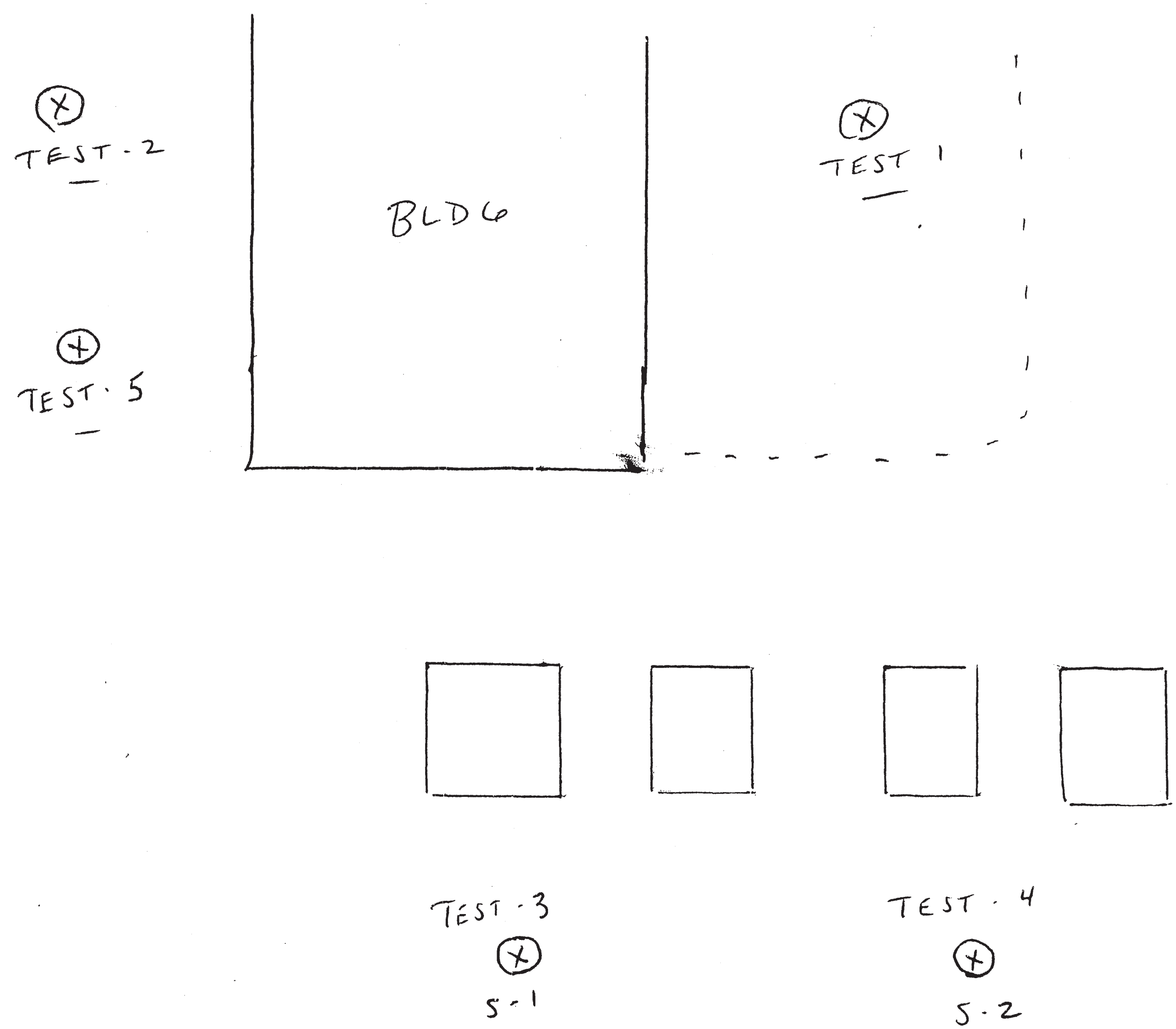
   Moist. Density (5) / 1.+ % Moist. (7) / 100 = 105.663 / 1.101 =

9. % Compaction = Dry Density / Max. Density = 95.970 / 107.72 = .890 % 89

10. Req. Density: 85 %

11. Pass X Fail ____

LOCATION: ____


TEST · 2
TEST · 5
BLDG
TEST 1
TEST · 3
S · 1
TEST · 4
S · 2

JOB #

SOIL MECHANICS DRILLING CORP.

3770 MERRICK ROAD • SEAFORD, L.I., NEW YORK 11783
(516) 221-2333 • FAX (516) 679-4373

DATE 4/27/11

FIELD REPORT

CLIENT BROOKHAVEN LAB

CONTRACTOR ENVIROTRAC

PROJECT BROOKHAVEN NAT'L LAB

	AM	PM
AIR TEMP.	50	55
WEATHER	CLO	DY

AREA WORKED BLDG 701

CONCRETE ☐

ASPHALT ☐

OTHER ☒ COMPACTION

TOTAL MATERIAL PLACED ______ PLANT INSPECTION YES ☐ NO ☐

CONCRETE

NO. OF CYLINDERS CAST ______ SLUMPS ______ CONCRETE TEMP. ______

AIR CONTENT ______ ADMIXTURES ______

REINFORCING STEEL INSPECTION

LOCATION INSPECTED & APPROVED TYPE RE-BAR USED ______ GRADE ______

A) SAME AS ABOVE LOCATION ☐

B) ADDITIONAL OR DIFFERENT LOCATION ☐

REJECTIONS ☐ EXPLANATION ______

SOILS

REMARKS TESTED SUBGRADE AROUND BLDG 701
(5) TESTS TOTAL. DENSITY TESTS WERE
TAKEN USING SAND & CONE METHOD. ALL
TESTS WERE 85%

INSPECTED BY C DITECKI

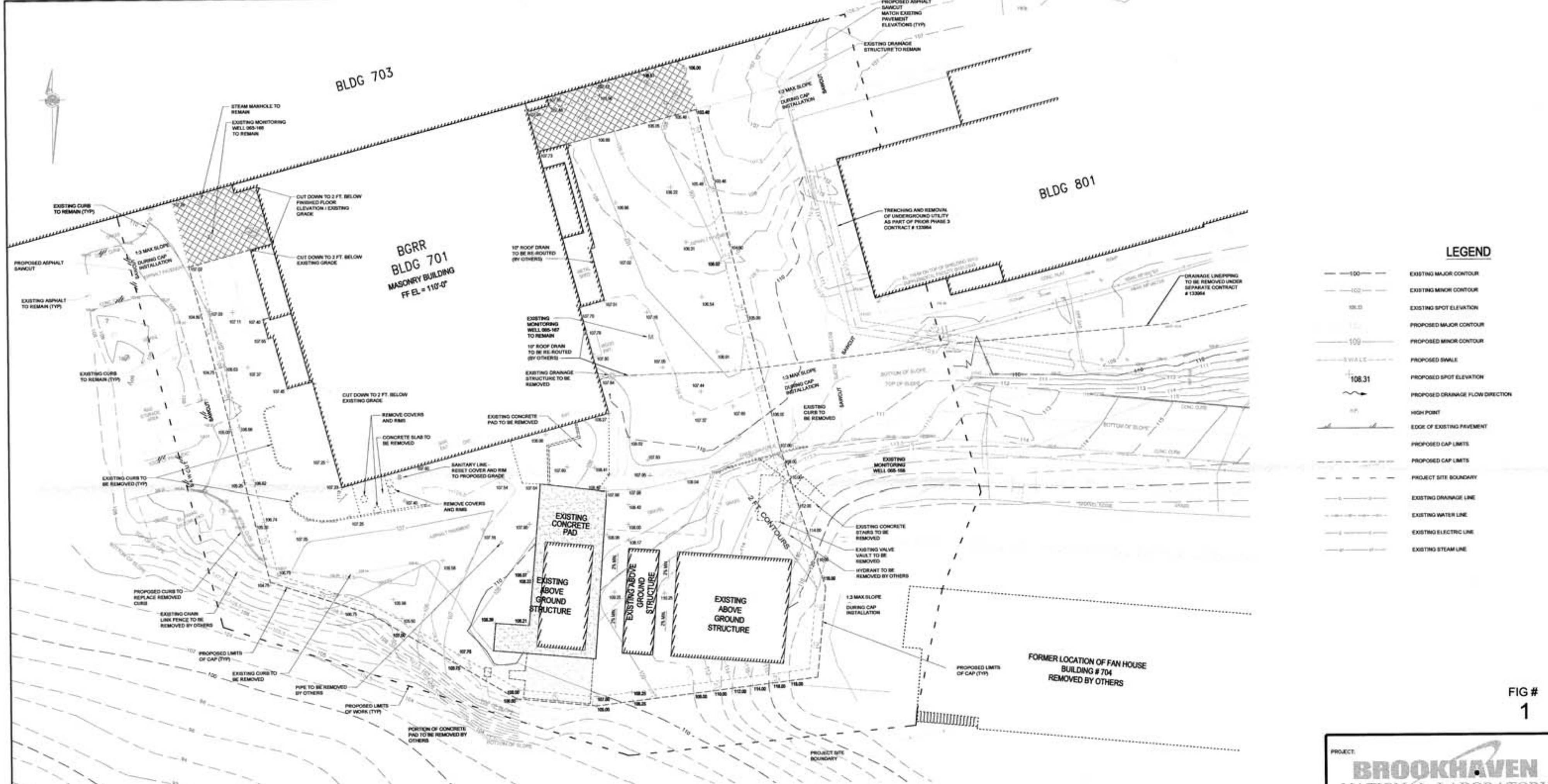


FIG # 1

CAP EXCAVATION PLAN

SCALE: 1" = 20'

0 20 40

SCALE: 1" = 20'

MAP BASED ON P.W. GROSSER CONSULTING INC.
DRAWING DATED SEPTEMBER 22, 2011

PROJECT:

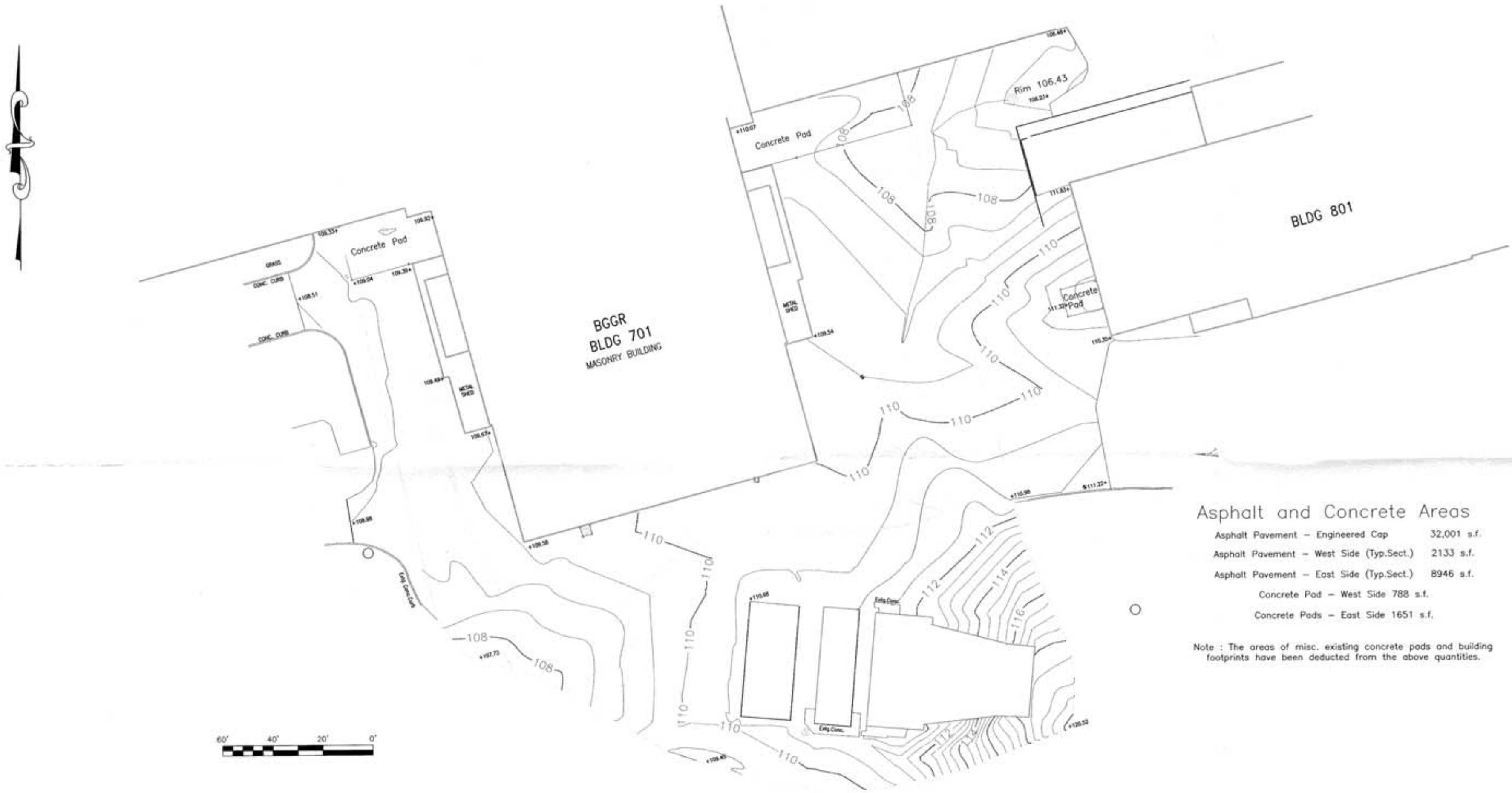
BROOKHAVEN
NATIONAL LABORATORY

UNDER CONTRACT WITH
UNITED STATES DEPARTMENT OF ENERGY
PLANT ENGINEERING DIVISION
UPTON, NEW YORK 11973

DRAWING TITLE:

EXCAVATION BOTTOM SURVEY

EnviroTrac
ENVIRONMENTAL SERVICES
5 OLD DOCK ROAD, YAPHANK, NY 11980
PHONE: (631)924-3001 FAX: (631)924-5001



Asphalt and Concrete Areas

Asphalt Pavement – Engineered Cap	32,001 s.f.
Asphalt Pavement – West Side (Typ.Sect.)	2133 s.f.
Asphalt Pavement – East Side (Typ.Sect.)	8946 s.f.
Concrete Pad – West Side 788 s.f.	
Concrete Pads – East Side 1651 s.f.	

Note : The areas of misc. existing concrete pads and building footprints have been deducted from the above quantities.

No.	Date	Revisions

MUNICIPAL LAND SURVEY P.C.
10 SYLVIA LANE
MIDDLE ISLAND, NEW YORK, 11953
(631) 345-2658

Final Survey
Buildings 701 and 801
Parking Lot Remediation
Brookhaven National Lab , Upton N.Y.

Robert W. Ott L.S.

Proj. No. 11024
Dwg. No. 1/1
Scale : 1"= 20'
Date : 7/18/2011

APPENDIX D

Concrete Strength, Soil Compaction and Asphalt Test Reports

SOIL MECHANICS DRILLING CORP.
3770 MERRICK ROAD • SEAFORD, L.I., NEW YORK 11783 • (516) 221-2333
New York City License No. 28

REPORT NO.: 1

REPORT OF CONCRETE INSPECTION AND TESTING

JOB NO.: 11-091 SM LAB NO.:

CLIENT:
EnviroTrac, 5 Old Dock Road, Yaphank, NY 11980

SHEET: 1 OF 1

PROJECT LOCATION:
Brookhaven National Labs Bldg 701

GENERAL CONTRACTOR:
East Pad

DATE OF INSPECTION: 01/31/11
WEATHER:
AIR TEMP.:

CONCRETE CONTRACTOR:
EnviroTrac

CONCRETE PRODUCER:
Nicolia Ready Mix

BATCH PLANT INSPECTION

BATCH WEIGHTS - LB/CY		SOURCE AND TYPE	SPECIFIED CONCRETE COMPRESSIVE STRENGTH AT 28 DAYS
CEMENT			3500
FINE AGGREGATE			
COARSE AGGREGATE			CUBIC YARDS
WATER (GALS.)			20
ADMIXTURE			

AGGREGATE GRADATION
Cumulative Per Cent Finer

	FINE AGGREGATE	COARSE AGGREGATE	
3/8"			
#4			
#8			
#16			
#30			
#50			
#100			
FM		FM	
MOISTURE		MOISTURE	

FIELD INSPECTION

LOCATION OF CONCRETE PLACEMENT:

Building 701- east loading dock

TEST SPECIMEN 4" WIDTH BY 8" LENGTH
AREA 12.69 SQ.IN. UNLESS NOTED

ASTM	C-143	C-173	C-1064			C-39		
SEAL NO.	SLUMP INCHES	AIR %	TEMP. CONC. (°)	AGE DAYS	TOTAL LOAD	COMPRESSIVE STRENGTH P.S.I.	BREAK TYPE	SPECIFIC LOACATION REPRESENTED BY TEST CYLINDERS
275509	5.00	3.0	60	7				East loading dock
275510				7	54410	4330		
275511				28				
275512				28				
1	--	--	--		111170	3930		Cylinders made by client
2					108750	3840		

REMARKS: Cylinders tested with unbonded caps, top & bottom per ASTM C1231.
*** No defects in test specimens.**

Rob Hill(ACI # 00049686)
CYLINDER TESTED BY

Andrew Prunitis
FIELD INSPECTOR

SOIL MECHANICS DRILLING CORP

SOIL MECHANICS DRILLING CORP.

3770 MERRICK ROAD • SEAFORD, L.I., NEW YORK 11783 • (516) 221-2333

New York City License No. 2E

REPORT NO.: 2

REPORT OF CONCRETE INSPECTION AND TESTING

JOB NO.: 11-091 SM LAB NO.: 7526

SHEET: 1 OF 1

CLIENT:
EnviroTrac, 5 Old Dock Road, Yaphank, NY 11980

PROJECT LOCATION:
Brookhaven National Labs Bldg 701 West Pad

GENERAL CONTRACTOR:

DATE OF INSPECTION: 3/1 & 3/9

WEATHER:

AIR TEMP.:

CONCRETE CONTRACTOR:
EnviroTrac

CONCRETE PRODUCER:

BATCH PLANT INSPECTION

BATCH WEIGHTS - LB/CY		SOURCE AND TYPE	SPECIFIED CONCRETE COMPRESSIVE STRENGTH AT 28 DAYS
CEMENT			3500
FINE AGGREGATE			
COARSE AGGREGATE			CUBIC YARDS
WATER (GALS.)			
ADMIXTURE			

AGGREGATE GRADATION

Cumulative Per Cent Finer

	FINE AGGREGATE	COARSE AGGREGATE	
3/8"			
#4			
#8			
#16			
#30			
#50			
#100			
FM		FM	
MOISTURE		MOISTURE	

FIELD INSPECTION

LOCATION OF CONCRETE PLACEMENT:

West pad

TEST SPECIMEN 4" WIDTH BY 8" LENGTH
AREA 12.69 SQ IN UNLESS NOTED

ASTM SEAL NO	C-143 SLUMP INCHES	C-173 AIR %	C-1064 TEMP CONC (F)	AGE DAYS	TOTAL LOAD	C-39 COMPRESSIVE STRENGTH P.S.I.	BREAK TYPE	SPECIFIC LOACATION REPRESENTED BY TEST CYLINDERS
1	–	–	–	17	132011	4670	Type 4	
2				8	104671	3700	Type 4	

REMARKS: Cylinders tested with unbonded caps, top & bottom per ASTM C1231.
* No defects in test specimens.

Rob Hill(ACI # 00049686)
CYLINDER TESTED BY

Other than SMDC
FIELD INSPECTOR

SOIL MECHANICS DRILLING CORP

JOB #

SOIL MECHANICS DRILLING CORP.
3770 MERRICK ROAD • SEAFORD, L.I., NEW YORK 11783
(516) 221-2333 • FAX (516) 679-4373

DATE 3-29-11

FIELD REPORT

			AM	PM
CLIENT	ENVIRO TRAC	AIR TEMP.	35°	40°
CONTRACTOR	ENVIRO TRAC	WEATHER	SUNNY	

PROJECT BROOKHAVEN LABRATORY
Bldg 701 Engineered CAP

Visited the above refrenced site for the purpose of Density test's For the Subgrade surrounding the Doghouses. There were 2 test's taken on the South Side and 3 test's taken along the North side of the Dog houses. All test's taken PASSed the required 85% As per ASTM D1556. The Area at the low roof of the Dog houses had an area that was pumping. This Area was excavated down to stable soils and recompacted with a Vibratory PLAte tamper to the required 85%. All test's taken were ± 2' FROM Finished grade.

INSPECTOR. Pat Monaga

SUBSOIL INVESTIGATIONS

SOIL MECHANICS DRILLING CORP.

3770 MERRICK ROAD • SEAFORD, L.I., NEW YORK 11783
(516) 221-2333 • FAX (516) 679-4373

Date: 3-29-11

PROJECT: Brookhaven LAB
Bldg # 701

TEST # 1

Depth of test from final grade: ±2'

FIELD DENSITY TEST

1. Wt. of Sand & Cone (a) = 14.61
2. Wt. of Sand & Cone (b) = -7.55
   Wt. of Sand = 7.06
   Sand in Cone = -3.83
   NET SAND = 3.23 (c)

3. Volume of Soil =

$\frac{\text{Net Sand (c)}}{\text{Sand Volume}} = \frac{3.23}{89.7} = .036$

4. Wt. of Soil & Can = 5.28
   Wt. of Can = -.59
   Wt. of Soil = 4.69 (d)

5. Moist. Density =

$\frac{\text{Wt. of Soil (d)}}{\text{Vol. of Soil (3)}} = \frac{4.69}{.036} = 130.2$

6. WET

Cup & Soil = 120.3
Cup = 14.6
Soil Wet = 105.7 (e)

DRY

Cup & Soil = 114.2
Cup = 14.6
Soil Dry = 99.6 (f)

Soil Wet 105.7
Soil Dry 99.6
Moisture = 6.1

7. Moisture =

$\frac{\text{Wet (e) - Dry (f) X100}}{\text{Dry (f)}} = \frac{6.1}{99.6} = 6.1$ (7) %

8. Dry Density =

$\frac{\text{Moist. Density (5)}}{1. + \frac{\text{\% Moist. (7)}}{100}} = \frac{130.2}{1.061} = 122.7$

9. % Compaction = $\frac{\text{Dry Density}}{\text{Max. Density}} = \frac{122.7}{124.7} = 98.42$ %

10. Req. Density: 85 %
11. Pass ✓ Fail ____

LOCATION: ____

SUBSOIL INVESTIGATIONS

SOIL MECHANICS DRILLING CORP.

3770 MERRICK ROAD • SEAFORD, L.I., NEW YORK 11783
(516) 221-2333 • FAX (516) 679-4373

Date: 3-29-11

PROJECT: BRookhaven LAB
Bldg # 701-

TEST # 2

Depth of test from final grade: ± 2'

FIELD DENSITY TEST

1. Wt. of Sand & Cone (a) = 15.15
2. Wt. of Sand & Cone (b) = 7.82

Wt. of Sand = 7.33

Sand in Cone = - 3.83

NET SAND = 3.50 (c)

3. Volume of Soil =

$$\frac{\text{Net Sand (c)}}{\text{Sand Volume}} = \frac{3.50}{89.7} = .039$$

4. Wt. of Soil & Can = 5.51

Wt. of Can = - .59

Wt. of Soil = 4.92 (d)

5. Moist. Density =

$$\frac{\text{Wt. of Soil (d)}}{\text{Vol. of Soil (3)}} = \frac{4.92}{.039} = 126.1$$

6. WET

Cup & Soil = 119.6

Cup = 14.6

Soil Wet = 105.0 (e)

DRY

Cup & Soil = 115.2

Cup = 14.6

Soil Dry = 100.6 (f)

Soil Wet 105.0

Soil Dry 100.6

Moisture = 4.4

7. Moisture =

$$\frac{\text{Wet (e)} - \text{Dry (f)} \times 100}{\text{Dry (f)}} = \frac{4.4}{100.6} = 4.4 \quad (7)\ \%$$

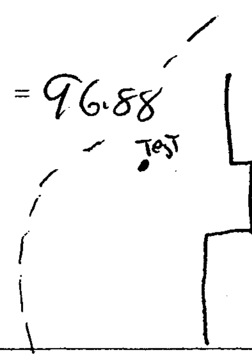
8. Dry Density =

$$\frac{\text{Moist. Density (5)}}{1. + \frac{\%\ \text{Moist. (7)}}{100}} = \frac{126.1}{1.044} = 120.8$$

9. % Compaction = $\frac{\text{Dry Density}}{\text{Max. Density}} = \frac{120.8}{124.7} = 96.88$ %

10. Req. Density: 85 %

11. Pass ✓ Fail ____



LOCATION: NORTHSide of Doghouses - WEST

SUBSOIL INVESTIGATIONS

SOIL MECHANICS DRILLING CORP.

3770 MERRICK ROAD • SEAFORD, L.I., NEW YORK 11783
(516) 221-2333 • FAX (516) 679-4373

Date: 3-29-11

PROJECT: BRookhAven LAB
Area of Bldg 701

TEST # 3

Depth of test from final grade: ±2'

FIELD DENSITY TEST

1. Wt. of Sand & Cone (a)= 15.11
2. Wt. of Sand & Cone (b)= -7.60
   Wt. of Sand = 7.51
   Sand in Cone = -3.83
   NET SAND = 3.68 (c)

3. Volume of Soil=

$$\frac{\text{Net Sand (c)}}{\text{Sand Volume}} = \frac{3.68}{89.7} = .041$$

4. Wt. of Soil & Can = 5.66
   Wt. of Can = - .59
   Wt. of Soil = 5.07 (d)

5. Moist. Density=

$$\frac{\text{Wt. of Soil (d)}}{\text{Vol. of Soil (3)}} = \frac{5.07}{.041} = 123.6$$

6. WET
   Cup & Soil= 123.4
   Cup = 14.6
   Soil Wet = 108.8 (e)

   DRY
   Cup & Soil= 117.6
   Cup = 14.6
   Soil Dry = 103.0 (f)

   Soil Wet 108.8
   Soil Dry 103.0
   Moisture= 5.8

7. Moisture=

$$\frac{\text{Wet (e) - Dry (f) X100}}{\text{Dry (f)}} = \frac{5.8}{103.0} = 5.6 \quad (7)\ \%$$

8. Dry Density =

$$\frac{\text{Moist. Density (5)}}{1. + \frac{\%\ \text{Moist. (7)}}{100}} = \frac{123.6}{1.056} = 117.0$$

9. % Compaction =

$$\frac{\text{Dry Density}}{\text{Max. Density}} = \frac{117.0}{121.6} = 96.20\ \%$$

10. Req. Density: 85 %
11. Pass ✓ Fail ____

LOCATION: South Side of Doghouses - EAST

SUBSOIL INVESTIGATIONS

SOIL MECHANICS DRILLING CORP.

3770 MERRICK ROAD • SEAFORD, L.I., NEW YORK 11783
(516) 221-2333 • FAX (516) 679-4373

Date: 3-29-11

PROJECT: BRookhaven LAB
Area of Bldg 701

TEST # 4

Depth of test from final grade: ±2

FIELD DENSITY TEST

1. Wt. of Sand & Cone (a) = 15.09
2. Wt. of Sand & Cone (b) = - 7.67
   Wt. of Sand = 7.42
   Sand in Cone = - 3.83
   NET SAND = 3.59 (c)

3. Volume of Soil =

$$\frac{\text{Net Sand (c)}}{\text{Sand Volume}} = \frac{3.59}{89.7} = .040$$

4. Wt. of Soil & Can = 5.55
   Wt. of Can = - .59
   Wt. of Soil = 4.96 (d)

5. Moist. Density =

$$\frac{\text{Wt. of Soil (d)}}{\text{Vol. of Soil (3)}} = \frac{4.96}{.040} = 124.0$$

6. WET
   Cup & Soil = 123.4
   Cup = 14.6
   Soil Wet = 108.8 (e)

   DRY
   Cup & Soil = 117.6
   Cup = 14.6
   Soil Dry = 103.0 (f)

   Soil Wet 108.8
   Soil Dry 103.0
   Moisture = 5.8

7. Moisture =

$$\frac{\text{Wet (e)} - \text{Dry (f)} \times 100}{\text{Dry (f)}} = \frac{5.8}{103} = 5.6 \quad (7)\ \%$$

8. Dry Density =

$$\frac{\text{Moist. Density (5)}}{1. + \frac{\text{\% Moist. (7)}}{100}} = \frac{124.0}{1.058} = 117.2$$

9. % Compaction = $\frac{\text{Dry Density}}{\text{Max. Density}} = \frac{117.2}{121.6} = 96.39$ %

10. Req. Density: 85 %
11. Pass ✓ Fail ____

LOCATION: South Side of Dog houses - West

SUBSOIL INVESTIGATIONS

SOIL MECHANICS DRILLING CORP.

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(516) 221-2333 • FAX (516) 679-4373

Date: 3-29-11

PROJECT: BROOKHAVEN LAB

TEST # 5

Depth of test from final grade: ±2'

FIELD DENSITY TEST

1. Wt. of Sand & Cone (a) = 14.89
2. Wt. of Sand & Cone (b) = - 7.20

Wt. of Sand = 7.69

Sand in Cone = -3.83

NET SAND = 3.86 (c)

3. Volume of Soil =

Net Sand (c) / Sand Volume = 3.86 / 89.7 = .043

4. Wt. of Soil & Can = 6.12

Wt. of Can = - .59

Wt. of Soil = 5.53 (d)

5. Moist. Density =

Wt. of Soil (d) / Vol. of Soil (3) = 5.53 / .043 = 128.5

6. WET

Cup & Soil = 121.7

Cup = 14.6

Soil Wet = 107.1 (e)

DRY

Cup & Soil = 114.8

Cup = 14.6

Soil Dry = 100.2 (f)

Soil Wet 107.1

Soil Dry 100.2

Moisture = 6.9

7. Moisture =

Wet (e) - Dry (f) X100 / Dry (f) = 6.9 / 100.2 = 6.9 (7) %

8. Dry Density =

Moist. Density (5) / (1. + % Moist. (7) / 100) = 128.5 / 1.069 = 120.2

9. % Compaction = Dry Density / Max. Density = 120.2 / 124.7 = 96.37 %

10. Req. Density: 85 %

11. Pass ✓ Fail ____

LOCATION: ____

JOB #

SOIL MECHANICS DRILLING CORP.

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(516) 221-2333 • FAX (516) 679-4373

DATE 4/11/11

FIELD REPORT

AIR TEMP. 52 (AM | PM)

WEATHER Overcast

CLIENT EnviroTrac

CONTRACTOR EnviroTrac

PROJECT BLDG 701 @ Brookhaven National Lab

AREA WORKED Density Test: East side Geo-tech sub-grade

CONCRETE ☐

ASPHALT ☐

OTHER ☐

TOTAL MATERIAL PLACED ______ PLANT INSPECTION YES ☐ NO ☐

CONCRETE

NO. OF CYLINDERS CAST ______ SLUMPS ______ CONCRETE TEMP. ______

AIR CONTENT ______ ADMIXTURES ______

REINFORCING STEEL INSPECTION

TYPE RE-BAR USED ______ GRADE ______

LOCATION INSPECTED & APPROVED

A) SAME AS ABOVE LOCATION ☐

B) ADDITIONAL OR DIFFERENT LOCATION ☐ ______

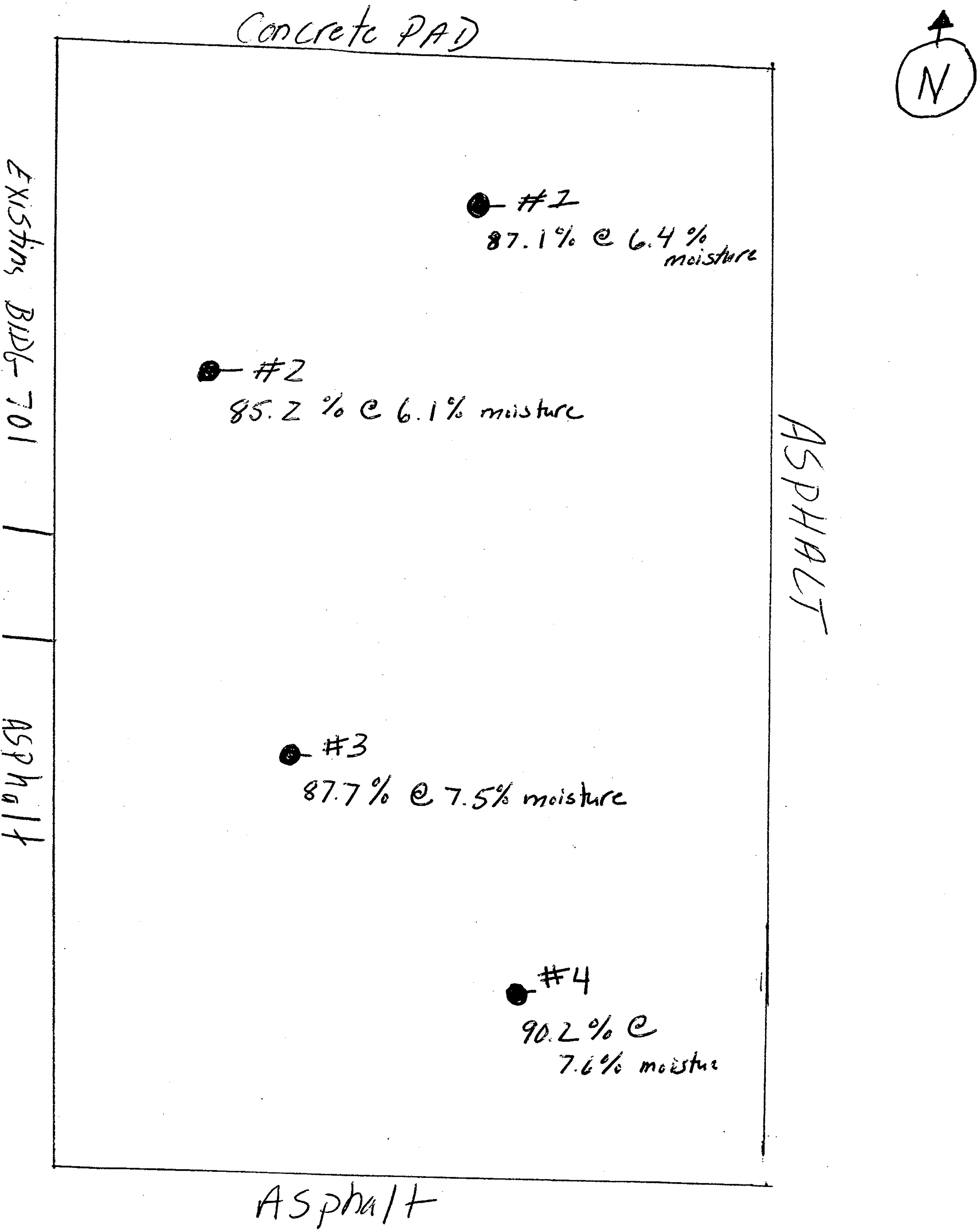
REJECTIONS ☐ EXPLANATION ______

SOILS

REMARKS Sand cone method density test were performed on the sub-grade located in the area noted above. The material consisted of clean sand and gravel. The density test had a prerequisite of 85% of the materials proctor value. The test reached or exceeded the required 85% density. See the attachment for the test results and locations.

INSPECTED BY J. Hill

Density test: East side Geo-tech. sub-grade. The test reached or exceeded the required 85%.



JOB #

SOIL MECHANICS DRILLING CORP.

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(516) 221-2333 • FAX (516) 679-4373

DATE 4/12/11

FIELD REPORT

CLIENT EnviroTrac

CONTRACTOR EnviroTrac

PROJECT BLDG 701 @ Brookhaven National Lab

	AM	PM
AIR TEMP.	58°	
WEATHER	overcast	

AREA WORKED

CONCRETE ☐ Density Test Geotech subgrade. South ~~SIDE~~ West side

ASPHALT ☐

OTHER ☐

TOTAL MATERIAL PLACED ______ PLANT INSPECTION YES ☐ NO ☐

CONCRETE

NO. OF CYLINDERS CAST ______ SLUMPS ______ CONCRETE TEMP. ______

AIR CONTENT ______ ADMIXTURES ______

REINFORCING STEEL INSPECTION

LOCATION INSPECTED & APPROVED TYPE RE-BAR USED ______ GRADE ______

A) SAME AS ABOVE LOCATION ☐

B) ADDITIONAL OR DIFFERENT LOCATION ☐

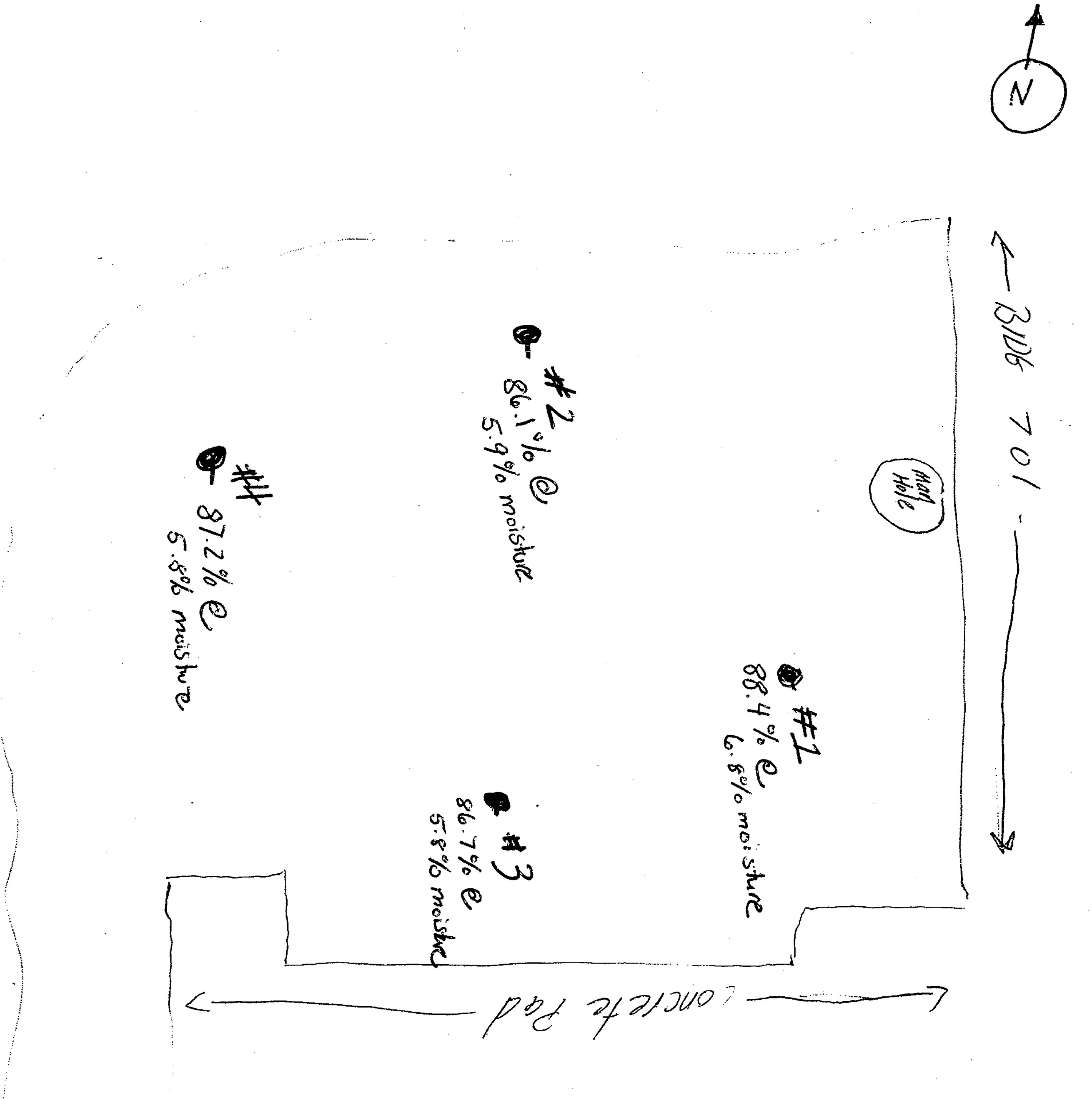
REJECTIONS ☐ EXPLANATION

SOILS

REMARKS Sand Cone density test were performed on the subgrade located in the area noted above. The test had a prerequisite of 85% of the materials modified proctor value. The test exceeded the required 85%. See the attachment for the test results and locations.

INSPECTED BY [signature]

Density Test: sub-grade South ~~SIDE~~ West SIDE



JOB #

SOIL MECHANICS DRILLING CORP.
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(516) 221-2333 • FAX (516) 679-4373

DATE 4/20/11

FIELD REPORT

CLIENT ______ AIR TEMP. AM | PM
CONTRACTOR Envirotrac WEATHER
PROJECT Brookhaven National Labs
Bldg 701
AREA WORKED West Side Building 701
CONCRETE ☐
ASPHALT ☐
OTHER ☒ Sand + Cone Testing.
TOTAL MATERIAL PLACED ______ PLANT INSPECTION YES ☐ NO ☐

CONCRETE

NO. OF CYLINDERS CAST ______ SLUMPS ______ CONCRETE TEMP. ______
AIR CONTENT ______ ADMIXTURES ______

REINFORCING STEEL INSPECTION

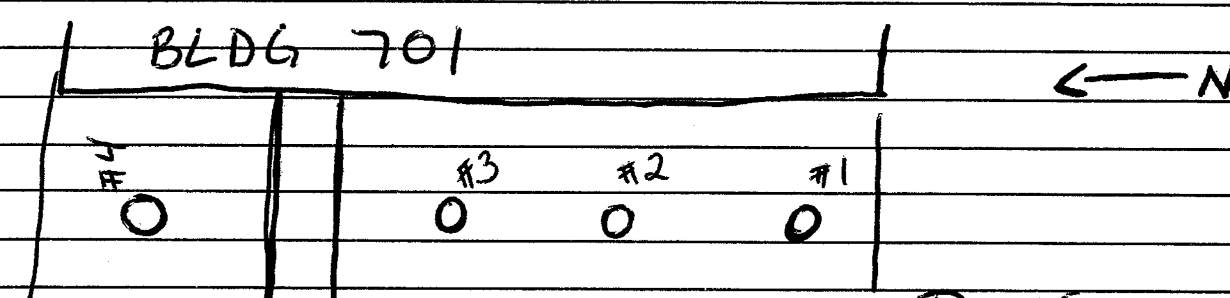
LOCATION INSPECTED & APPROVED TYPE RE-BAR USED ____ GRADE ____
A) SAME AS ABOVE LOCATION ☐
B) ADDITIONAL OR DIFFERENT LOCATION ☐

N/A

REJECTIONS ☐ EXPLANATION ______

SOILS

REMARKS Performed Sand + Cone Test on area preped. All Tests today passed w/ above 85% compaction as per specs.



INSPECTED BY Pat Gambino

①

JOB #

SOIL MECHANICS DRILLING CORP.

3770 MERRICK ROAD • SEAFORD, L.I., NEW YORK 11783
(516) 221-2333 • FAX (516) 679-4373

DATE 5/4/11

FIELD REPORT

	AM	PM
AIR TEMP.		
WEATHER		

CLIENT BROOKHAVEN LAB

CONTRACTOR ENVIROTRAC

PROJECT BLDG 701

AREA WORKED BLDG 701 / PARKING

CONCRETE ☐

ASPHALT ☐

OTHER ☐ COMPACTION OF SUBGRADE

TOTAL MATERIAL PLACED ______ PLANT INSPECTION YES ☐ NO ☐

CONCRETE

NO. OF CYLINDERS CAST ______ SLUMPS ______ CONCRETE TEMP. ______

AIR CONTENT ______ ADMIXTURES ______

REINFORCING STEEL INSPECTION

LOCATION INSPECTED & APPROVED   TYPE RE-BAR USED ______ GRADE ______

A) SAME AS ABOVE LOCATION ☐

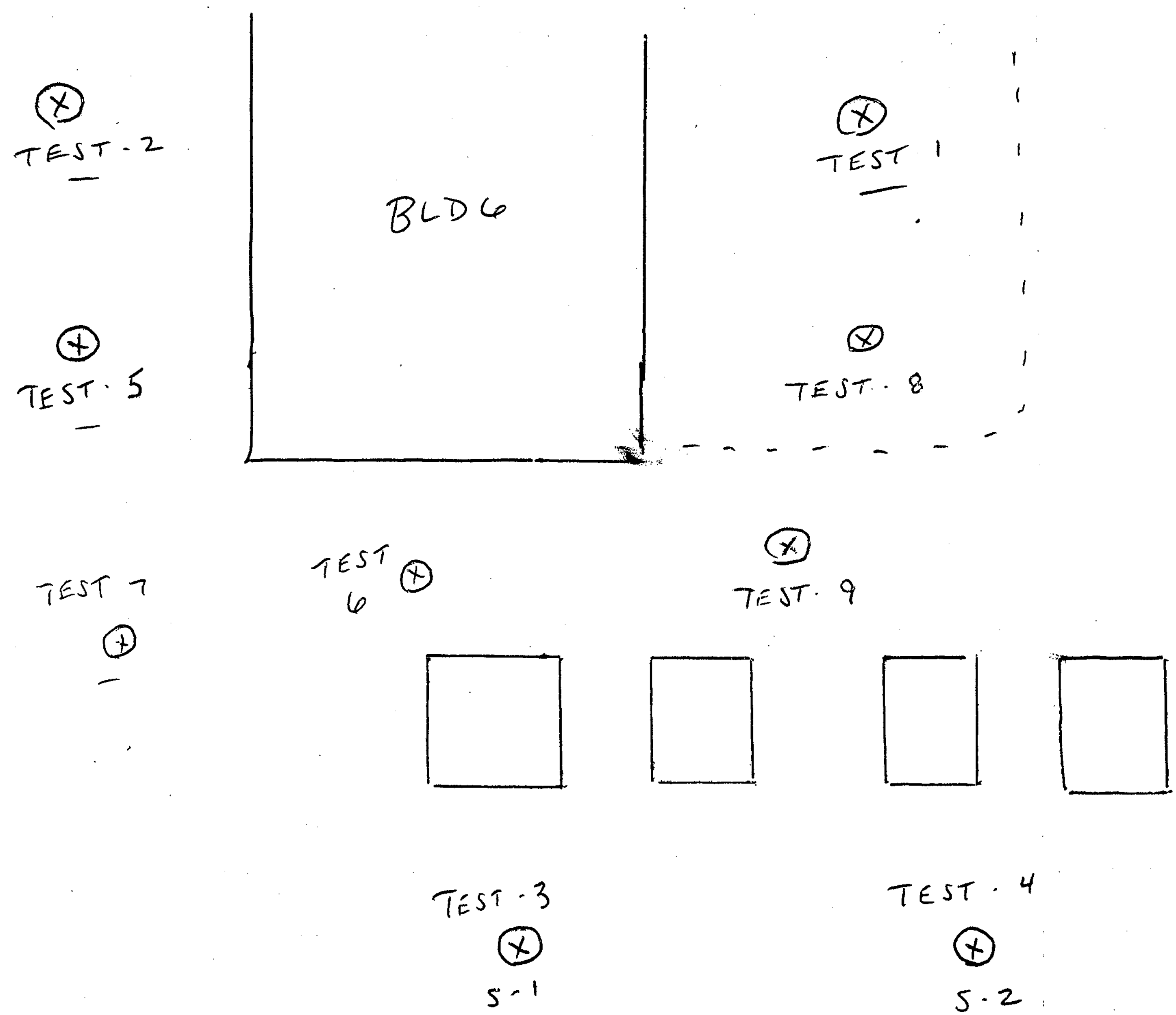
B) ADDITIONAL OR DIFFERENT LOCATION ☐

REJECTIONS ☐ EXPLANATION ______

SOILS

REMARKS ALL FIELD DENSITY TESTS WERE TAKEN USING SAND & CONE METHOD, ALL TESTS WERE 85% OR BETTER.

INSPECTED BY G. DIERCKS.


TEST - 2
BLDG
TEST 1
TEST . 5
TEST . 8
TEST 6
TEST . 9
TEST 7
TEST - 3
S - 1
TEST . 4
S . 2

JOB #

SOIL MECHANICS DRILLING CORP.

3770 MERRICK ROAD • SEAFORD, L.I., NEW YORK 11783
(516) 221-2333 • FAX (516) 679-4373

DATE 4/27/11

FIELD REPORT

			AM	PM
CLIENT	BROOKHAVEN LAB	AIR TEMP.	50	55
CONTRACTOR	ENVIROTRAC	WEATHER	CLOUDY	

PROJECT BROOKHAVEN NAT'L LAB

AREA WORKED BLDG 701

CONCRETE ☐

ASPHALT ☐

OTHER ☒ COMPACTION

TOTAL MATERIAL PLACED ______ PLANT INSPECTION YES ☐ NO ☐

CONCRETE

NO. OF CYLINDERS CAST ______ SLUMPS ______ CONCRETE TEMP. ______

AIR CONTENT ______ ADMIXTURES ______

REINFORCING STEEL INSPECTION

LOCATION INSPECTED & APPROVED TYPE RE-BAR USED ____ GRADE ____

A) SAME AS ABOVE LOCATION ☐

B) ADDITIONAL OR DIFFERENT LOCATION ☐

REJECTIONS ☐ EXPLANATION ______

SOILS

REMARKS TESTED SUBGRADE AROUND BLDG 701, (5) TESTS TOTAL. DENSITY TESTS WERE TAKEN USING SAND + CONE METHOD, ALL TESTS WERE 85%

INSPECTED BY C. DIERCKS

$$\frac{118.6}{1.101} = 107.72$$

SUBSOIL INVESTIGATIONS

SOIL MECHANICS DRILLING CORP.

3770 MERRICK ROAD • SEAFORD, L.I., NEW YORK 11783
(516) 221-2333 • FAX (516) 679-4373

Date: 4/27/11

PROJECT: BNL - EASTSIDE (NORTH)

TEST # 1

Depth of test from final grade: ____

FIELD DENSITY TEST

1. Wt. of Sand & Cone (a) = 16.22
2. Wt. of Sand & Cone (b) = - 6.49

   Wt. of Sand = 9.73

   Sand in Cone = - 4.27

   NET SAND = 5.46 (c)

3. Volume of Soil = 0.0562

   $\frac{\text{Net Sand (c)}}{\text{Sand Volume}} = \frac{5.46}{97} =$

4. Wt. of Soil & Can = 6.67

   Wt. of Can = - .65

   Wt. of Soil = 6.02 (d)

5. Moist. Density =

   $\frac{\text{Wt. of Soil (d)}}{\text{Vol. of Soil (3)}} = \frac{6.02}{0.0562} =$

6. WET

   Cup & Soil = 142

   Cup = 66

   Soil Wet = 76 (e)

   DRY

   Cup & Soil = 135

   Cup = 66

   Soil Dry = 69 (f)

   Soil Wet 76

   Soil Dry 69

   Moisture = 7.0

7. Moisture =

   $\frac{\text{Wet (e) - Dry (f) X100}}{\text{Dry (f)}} = \frac{700}{69} =$ (7) % 10.1

8. Dry Density =

   $\frac{\text{Moist. Density (5)}}{1. + \frac{\text{\% Moist. (7)}}{100}} = \frac{107.117}{1.101} =$

9. % Compaction = $\frac{\text{Dry Density}}{\text{Max. Density}} = \frac{97.291}{107.72} =$ .903 % 90

10. Req. Density: 85 %

11. Pass ✓ Fail ____

LOCATION: ____

118.6 / 1.101 = 107.72

SUBSOIL
INVESTIGATIONS

SOIL MECHANICS DRILLING CORP.

3770 MERRICK ROAD • SEAFORD, L.I., NEW YORK 11783
(516) 221-2333 • FAX (516) 679-4373

Date: 4/27/11

PROJECT: BNL - WESTSIDE
(NORTH)

TEST # 2

Depth of test from final grade: ____

FIELD DENSITY TEST

1. Wt. of Sand & Cone (a)= 16.30
2. Wt. of Sand & Cone (b)= - 6.45
   Wt. of Sand = 9.85
   Sand in Cone = - 4.27
   NET SAND = 5.58 (c)

3. Volume of Soil= 0.0575

   Net Sand (c) / Sand Volume = 5.58 / 97 =

4. Wt. of Soil & Can =
   Wt. of Can = - 6.55
   Wt. of Soil = .65 (d)

5. Moist. Density=

   Wt. of Soil (d) / Vol. of Soil (3) = 5.9 / 0.0575 =

6. WET
   Cup & Soil= 142
   Cup = 66
   Soil Wet = 76 (e)

   DRY
   Cup & Soil= 135
   Cup = 66
   Soil Dry = 69 (f)

   Soil Wet 76
   Soil Dry 69
   Moisture= 7.0

7. Moisture=

   Wet (e) - Dry (f) X100 / Dry (f) = 700 / 69 = (7) % 10.1

8. Dry Density =

   Moist. Density (5) / 1.+ % Moist. (7) / 100 = 102.608 / 1.101 =

9. % Compaction = Dry Density / Max. Density = 93.195 / 107.72 = .865 % 87

10. Req. Density: 85 %

11. Pass X Fail ____

LOCATION: ____

118.6 / 1.101 = 107.72

SUBSOIL INVESTIGATIONS

SOIL MECHANICS DRILLING CORP.

3770 MERRICK ROAD • SEAFORD, L.I., NEW YORK 11783
(516) 221-2333 • FAX (516) 679-4373

Date: 4/27/11

PROJECT: BNL - ROADWAY (S-1)

TEST # 3

Depth of test from final grade: ____

FIELD DENSITY TEST

1. Wt. of Sand & Cone (a) = 16.25
2. Wt. of Sand & Cone (b) = - 6.55
   Wt. of Sand = 9.70
   Sand in Cone = - 4.27
   NET SAND = 5.43 (c)

3. Volume of Soil = 0.0559

   Net Sand (c) / Sand Volume = 5.43 / 97 =

4. Wt. of Soil & Can = 6.60
   Wt. of Can = - .65
   Wt. of Soil = 5.95 (d)

5. Moist. Density =

   Wt. of Soil (d) / Vol. of Soil (3) = 5.95 / 0.0559 =

6. WET
   Cup & Soil = 142
   Cup = 66
   Soil Wet = 76 (e)

   DRY
   Cup & Soil = 135
   Cup = 66
   Soil Dry = 69 (f)

   Soil Wet 76
   Soil Dry 69
   Moisture = 7.0

7. Moisture =

   Wet (e) - Dry (f) X100 / Dry (f) = 700 / 69 = (7) % 10.1

8. Dry Density =

   Moist. Density (5) / (1. + % Moist. (7) / 100) = 106.440 / 1.101 =

9. % Compaction = Dry Density / Max. Density = 96.675 / 107.72 = .897 % 90

10. Req. Density: ________%

11. Pass X Fail ______

LOCATION: ____________________

SUBSOIL INVESTIGATIONS

SOIL MECHANICS DRILLING CORP.

3770 MERRICK ROAD • SEAFORD, L.I., NEW YORK 11783
(516) 221-2333 • FAX (516) 679-4373

Date: 4/27/11

PROJECT: BNL - ROADWAY
(S-2)

TEST # 4

Depth of test from final grade: ____

FIELD DENSITY TEST

1. Wt. of Sand & Cone (a) = 16.31
2. Wt. of Sand & Cone (b) = - 6.48
   Wt. of Sand = 9.83
   Sand in Cone = - 4.27
   NET SAND = 5.56 (c)

3. Volume of Soil = 0.0573

$$\frac{\text{Net Sand (c)}}{\text{Sand Volume}} = \frac{5.56}{97} =$$

4. Wt. of Soil & Can = 6.45
   Wt. of Can = - .65
   Wt. of Soil = 5.80 (d)

5. Moist. Density =

$$\frac{\text{Wt. of Soil (d)}}{\text{Vol. of Soil (3)}} = \frac{5.80}{0.0573} =$$

6. WET
   Cup & Soil = 142
   Cup = 66
   Soil Wet = 76 (e)

   DRY
   Cup & Soil = 135
   Cup = 66
   Soil Dry = 69 (f)

   Soil Wet 76
   Soil Dry 69
   Moisture = 7.0

7. Moisture =

$$\frac{\text{Wet (e) - Dry (f) X100}}{\text{Dry (f)}} = \frac{700}{69} = \quad (7)\ \%\ 10.1$$

8. Dry Density =

$$\frac{\text{Moist. Density (5)}}{1. + \frac{\%\ \text{Moist. (7)}}{100}} = \frac{101.221}{1.101} =$$

9. % Compaction =

$$\frac{\text{Dry Density}}{\text{Max. Density}} = \frac{91.936}{107.72} = .853\ \%\ 85$$

10. Req. Density: 85 %
11. Pass X Fail ____

LOCATION: ____

SUBSOIL INVESTIGATIONS

SOIL MECHANICS DRILLING CORP.

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$$\frac{118.6}{1.101} = 107.72$$

Date: 4/27/11

PROJECT: BNL - WESTSIDE (SOUTH)

TEST # 5

Depth of test from final grade: ____

FIELD DENSITY TEST

1. Wt. of Sand & Cone (a) = 16.27
2. Wt. of Sand & Cone (b) = - 6.51
   Wt. of Sand = 9.76
   Sand in Cone = - 4.27
   NET SAND = 5.49 (c)

3. Volume of Soil = 0.0565

$$\frac{\text{Net Sand (c)}}{\text{Sand Volume}} = \frac{5.49}{97} =$$

4. Wt. of Soil & Can = 6.62
   Wt. of Can = - .65
   Wt. of Soil = 5.97 (d)

5. Moist. Density =

$$\frac{\text{Wt. of Soil (d)}}{\text{Vol. of Soil (3)}} = \frac{5.97}{0.0565} =$$

6. WET
   Cup & Soil = 142
   Cup = 66
   Soil Wet = 76 (e)

   DRY
   Cup & Soil = 135
   Cup = 66
   Soil Dry = 69 (f)

   Soil Wet 76
   Soil Dry 69
   Moisture = 7.0

7. Moisture =

$$\frac{\text{Wet (e) - Dry (f) X100}}{\text{Dry (f)}} = \frac{\cancel{105.663}}{\cancel{110}} = \frac{700}{69} \text{ (7) \%} \quad 10.1$$

8. Dry Density =

$$\frac{\text{Moist. Density (5)}}{1. + \frac{\text{\% Moist. (7)}}{100}} = \frac{105.663}{1.101} =$$

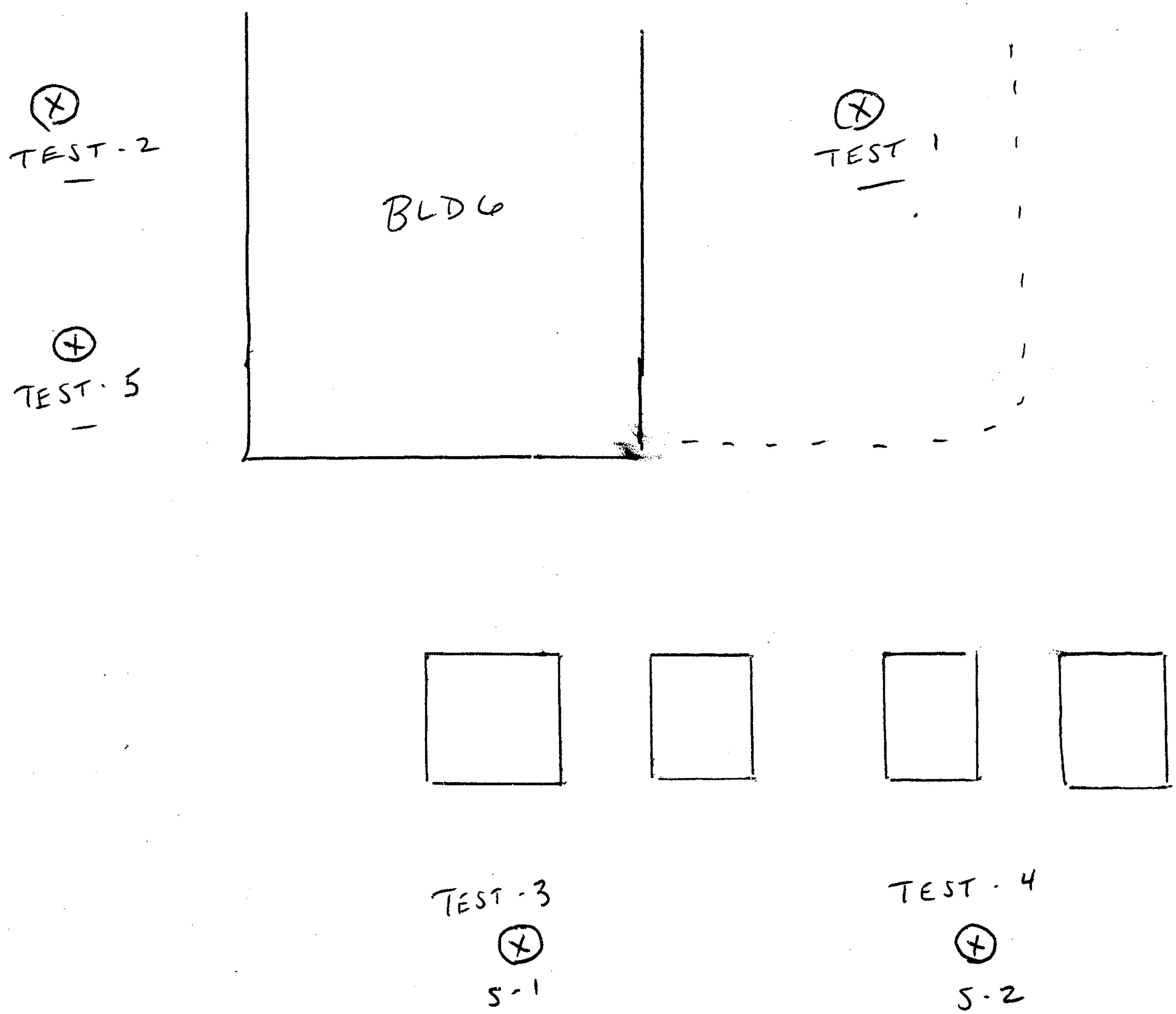
9. % Compaction =

$$\frac{\text{Dry Density}}{\text{Max. Density}} = \frac{95.970}{107.72} = .890 \quad \% \quad 89$$

10. Req. Density: 85 %

11. Pass X Fail ____

LOCATION: ____


TEST-2
TEST-5
BLDG
TEST 1
TEST-3
S-1
TEST-4
S-2

SUBSOIL
INVESTIGATIONS

SOIL MECHANICS DRILLING CORP.

3770 MERRICK ROAD • SEAFORD, L.I., NEW YORK 11783
(516) 221-2333 • FAX (516) 679-4373

118.6 / 1.071

Date: 4/29/11

PROJECT: BROOKHAVEN LAB
SOUTH OF BLDG 701

TEST # 6

Depth of test from final grade: ____

FIELD DENSITY TEST

1. Wt. of Sand & Cone (a) = 16.18
2. Wt. of Sand & Cone (b) = - 6.62
   Wt. of Sand = 9.56
   Sand in Cone = - 4.17
   NET SAND = 5.39 (c)

3. Volume of Soil = 0.0555

   $\frac{\text{Net Sand (c)}}{\text{Sand Volume}} = \frac{5.39}{97} =$

4. Wt. of Soil & Can = 6.54
   Wt. of Can = - .65
   Wt. of Soil = 5.89 (d)

5. Moist. Density =

   $\frac{\text{Wt. of Soil (d)}}{\text{Vol. of Soil (3)}} = \frac{5.89}{.0555} =$

6. WET
   Cup & Soil = 178
   Cup = 66
   Soil Wet = 112 (e)

   DRY
   Cup & Soil = 170.5
   Cup = 66
   Soil Dry = 104.5 (f)

   Soil Wet 112
   Soil Dry 104.5
   Moisture = 7.5

7. Moisture =

   $\frac{\text{Wet (e) - Dry (f) X100}}{\text{Dry (f)}} = \frac{750}{104.5} = 7.17$ (7) %

8. Dry Density =

   $\frac{\text{Moist. Density (5)}}{1. + \frac{\text{\% Moist. (7)}}{100}} = \frac{106.126}{1.071} = 99.090$

9. % Compaction = $\frac{\text{Dry Density}}{\text{Max. Density}} = \frac{99.090}{107.72} = .919$ % 92

10. Req. Density: 85 %
11. Pass X Fail ____

LOCATION: ____

SUBSOIL INVESTIGATIONS

SOIL MECHANICS DRILLING CORP.

3770 MERRICK ROAD • SEAFORD, L.I., NEW YORK 11783
(516) 221-2333 • FAX (516) 679-4373

119.6
1.071

Date: 4/29/11

PROJECT: BROOKHAVEN LAB
SE OF BLDG 701

TEST # 7

Depth of test from final grade: ____

FIELD DENSITY TEST

1. Wt. of Sand & Cone (a) = 16.27
2. Wt. of Sand & Cone (b) = - 6.58
   Wt. of Sand = 9.69
   Sand in Cone = - 4.17
   NET SAND = 5.52 (c)

3. Volume of Soil = 0.0569
   Net Sand (c) / Sand Volume = 5.52 / 97 =

4. Wt. of Soil & Can = 658
   Wt. of Can = - .65
   Wt. of Soil = 5.93 (d)

5. Moist. Density = 104.217
   Wt. of Soil (d) / Vol. of Soil (3) = 5.93 / .0569 =

6. WET
   Cup & Soil = 178
   Cup = 66
   Soil Wet = 112 (e)

   DRY
   Cup & Soil = 170.5
   Cup = 66
   Soil Dry = 104.5 (f)

   Soil Wet 112
   Soil Dry 104.5
   Moisture = 7.5

7. Moisture =
   Wet (e) - Dry (f) X100 / Dry (f) = 750 / 104.5 = 7.17 (7) %

8. Dry Density =
   Moist. Density (5) / (1.+ % Moist. (7) / 100) = 104.217 / 1.071 = 97.308

9. % Compaction = Dry Density / Max. Density = 97.308 / 107.72 = .903 % 90

10. Req. Density: ____________ %

11. Pass X Fail ______

LOCATION: ______________________________

JOB #

SOIL MECHANICS DRILLING CORP.

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(516) 221-2333 • FAX (516) 679-4373

DATE 5/24/11

FIELD REPORT

CLIENT ______

CONTRACTOR ÉNVIRO TRAC

PROJECT Brookhaven National Labs
Bldg #701

	AM	PM
AIR TEMP.	67°	76°
WEATHER	Overcast	Sunny

AREA WORKED Compaction behind Bldg # 701

CONCRETE ☐

ASPHALT ☐

OTHER ☒ Sand + Cone Testing

TOTAL MATERIAL PLACED ______ PLANT INSPECTION YES ☐ NO ☐

CONCRETE

NO. OF CYLINDERS CAST ______ SLUMPS ______ CONCRETE TEMP. ______

AIR CONTENT ______ ADMIXTURES ______

REINFORCING STEEL INSPECTION

LOCATION INSPECTED & APPROVED TYPE RE-BAR USED ______ GRADE ______

A) SAME AS ABOVE LOCATION ☐

B) ADDITIONAL OR DIFFERENT LOCATION ☐

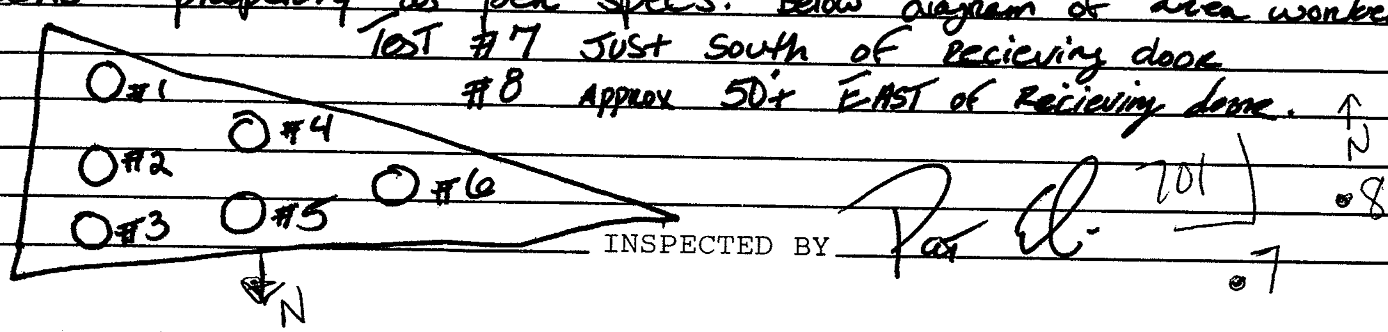
N/A

REJECTIONS ☐ EXPLANATION ______

SOILS

REMARKS Arrived @ the above location to inspect compaction of area behind Bldg #701. Area was already prepped upon my arrival. All Tests taken today passed w/ above 85% compaction as per specs on plans. All work done today was done properly as per specs. Below diagram of area worked.

Test #7 Just South of Recieving door
#8 approx 50'± EAST of Recieving door.



INSPECTED BY [signature]

UNIVERSAL

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Corporate Headquarters
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Page 1 of	**1**
Date:	6/3/2011
Time in / out:	
UTIS Report #:	11-3354 fs

ASPHALT PAVEMENT CORES REPORT

Client: All County Paving
615 Furrows Road , Holtsville, NY
Project: BGRR at Building 701
Job Location: Upton , New York

UTIS Inspector: G. Hungerford
General Contractor: -
G.C. Representative: -
Sub-Contractor: -

Asphalt Pavement Thickness

Core No	Air Dry Weight	Water weight	SSD	Rice Number	Compaction
1	3416.4	2060.2	3421.8	2.628	95.5

Visitors: -
Representing:

Forms Attached: ☐ Yes ☒ No Specify form(s)

Follow-up from prior report: ☐ Yes ☐ No ***Date of prior report:***

Non-conformance corrected:

What, in particular, should be observed, checked, or tested during the next visit?

UTIS Field Representative: **G Hungerford** **Date:** 6/3/11

Reviewed By: **F. Scaldaferri** **Date:** 6/3/11

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LLW#:
DOB#:
FID#:

Page 1 of	**1**
Date:	6/8/2011
Time in / out:	
UTIS Report #:	11-3485 fs

ASPHALT PAVEMENT CORES REPORT

Client: All County Paving
615 Furrows Road , Holtsville, NY
Project: BGRR at Building 701
Job Location: Upton , New York

UTIS Inspector: G. Hungerford
General Contractor: -
G.C. Representative: -
Sub-Contractor: -

Asphalt Pavement Thickness

Core No	Air Dry Weight	Water weight	SSD	Rice Number	Compaction
1	3323.1	1996.1	3327.4	2.628	95.0
2	3092.9	1880.0	3095.0	2.628	96.9
3	4500.0	2770.0	4523.1	2.628	97.7

Visitors: - ***Representing:***

Forms Attached: ☐ Yes ☒ No Specify form(s)

Follow-up from prior report: ☐ Yes ☐ No ***Date of prior report:***

Non-conformance corrected:

What, in particular, should be observed, checked, or tested during the next visit?

UTIS Field Representative: **G Hungerford** **Date:** 6/8/11

Reviewed By: **F. Scaldaferri** **Date:** 6/8/11

APPENDIX E

As-Left Radiological Survey and Soil Sample Results

BGRR Engineered Cap Project
As-Left Soil Sample Results
Offsite Soil Radiochemical Analytical Results (Composites)
COC# 31311

Sample ID / Sample Depth / Sample Date	Residential Cleanup Value	BGGR ENG CAP SU-1 COMP (1-10)		BGGR ENG CAP SU-1 (11-20)		BGGR ENG CAP SU-2 (1-15)		BGGR ENG CAP SU-2 (16-30)	
Sample Depth		2.5		2.5		2.5		2.5	
Sample Date		5/7/2011		5/7/2011		5/7/2011		5/7/2011	
Rad Gamma Spec Analysis									
Americium-241	34	0.0205	U	0.0638	U	0.0362	U	0.022	U
Beryllium-7	NA	0.0395	DL	-0.134	U	0.0249	U	0.0588	U
Cesium-134	NA	0.0233	DL	0.020	U	0.0815	UI	0.0409	UI
Cesium-137	23	1.32	J	0.189	J	0.443	J	0.286	J
Cobalt-57	NA	-0.000216	DL	0.00681	DL	-0.00161	U	0.00542	U
Cobalt-60	1,260	-0.0215	U	-0.0046	U	0.00879	U	0.00881	U
Europium-152	51	-0.0211	U	-0.0601	U	-0.0402	U	-0.00603	U
Europium-154	NA	-0.0369	U	0.0279	U	0.0138	U	-0.0308	U
Europium-155	NA	0.0284	U	0.013	U	0.120	J-UI	0.0442	U
Manganese-54	NA	0.00806	U	0.0318	J-UI	0.00166	U	0.00462	U
Radium-226	5	0.243		0.312		0.629		0.460	
Sodium-22	NA	-0.012	U	0.0101	U	0.00444	U	-0.0114	U
Zinc-65	NA	0.0175	U	-0.0125	U	-0.0169	U	0.00057	U
Rad Alpha Spec Analysis									
Plutonium 238	NA	0.0368	U	-0.0295	U	-0.0451	U	0.0159	U
Plutonium 239/240	35	0.286	U	-0.0884	U	0.0488	U	0.0295	U
Uranium-235/236	4.6	-0.0211	U	0.0733	U	0.0698	U	0.0776	U
Uranium-238	4.7	0.497	J	0.327	U	0.707	J	0.143	U
Rad Gas Flow Proportional Counting									
Strontium-90	15	2.03		0.233	U	0.231	U	0.348	U
Rad Liquid Scintillation Analysis									
Carbon-14	NA	-0.884	U	0.114	U	-0.0622	U	-0.486	U
Nickel-63	NA	-1.35	U	-0.48	U	-0.146	U	-2.01	U
Tritium	NA	-4.56	U	32.1	U	32.5	U	-21.8	U

Notes:
DL - Below the detection limit
NA - Not Applicable
NR - Not Reported
J - Indicates an estimated concentration
U - Indicates that the compound was analyzed for, but was not detected
All units are pCi/g
Gamma Spec results only reported for those parameters that were recorded during the analysis

BGRR Engineered Cap Project
As-Left Soil Sample Results
Offsite Metals Data
COC# 31311

Sample ID	Residential Cleanup Value	BGGR ENG CAP SU-1 COMP (1-10)		BGGR ENG CAP SU-1 (11-20)		BGGR ENG CAP SU-2 (1-15)		BGGR ENG CAP SU-2 (15-20)	
Sample Depth		2.5		2.5		2.5		2.5	
Sample Date		5/7/2011		5/7/2011		5/7/2011		5/7/2011	
TAL Metals									
Copper	270	5.32		5.34		5.39		7.96	
Lead	400	9.98		14.9		11.3		11.4	
Mercury	1.84	0.110		0.0109	J	0.0678		0.0225	
Nickel	140	1.24		1.98		3.82		2.24	
Zinc	2,200	14.6		11.6		13.6		11.6	

Notes:
DL - Below the detection limit
NA - Not Applicable
NR - Not Reported
J - Indicates an estimated concentration
U - Indicates that the compound was analyzed for, but was not detected
* - Indicates that a Quality Control paramter was not within specifications
N - Metals - The Matrix Spike sample recovery is not within specified control limits
All units are mg/kg

RADIOLOGICAL SURVEY FORM
FS-SOP-1000

REASON FOR SURVEY

☐ ROUTINE ☐ SPECIAL

☐ RWP # ☒ WP # 324-19

LOCATION & EQUIPT. Bldg. 701 outside grounds

DATE: 3/17-5/5/11 **TIME:** 10:00

FSS Gamma walkover for BGRR Engineered Cap

Started Gamma Walkover for cap project on 3/17/11 and finished on 5/5/11 due to the complexity of keeping access open during project.
Attached is the Gamma data printout from the use of the Trimble GPS Unit.
The following individuals performed this survey over the above mentioned timeframe:

1)Hollander [signature] 5/5/11

2)Dove [signature] 5/9/11

3)Butler [signature] 5/10/11

4)HouseKnecht [signature] 05-10-11

All area's were done with a collimated probe due to shine from Building 801 with the exception of west side and this is noted on Gamma printout.

Area's of East and West concrete pad were performed using Handheld NAI detector and surveys are attached.

Also Attached is Trimble unit GPS coordinates in grid form along with overhead view of sample locations.

All samples points had 1 minute unshielded counts performed.

INSTRUMENT

Model #	Serial #	CAL DUE
L-2221	218587	02/17/12
N/A	→	→
N/A	→	→
N/A	→	→

LEGEND

○ - SMEAR SURVEY LOCATION △ - AIR SAMPLE LOCATION

☐ - MASSLINN SURVEY LOCATION # - DIRECT FRISK LOCATION

XXXY / ZZZ XXX = contact reading Y = radiation type ZZZ = reading @ 30cm

AIRBORNE ACTIVITY SURVEY

Sample #	Duration	Flow Rate	Field Analysis cpm	Field Analysis µCi/cc	% DAC
N/A	→	→	→	→	→

DOSE RATE (HIGHEST)

CONTACT READING	N/A
GENERAL AREA READING	N/A

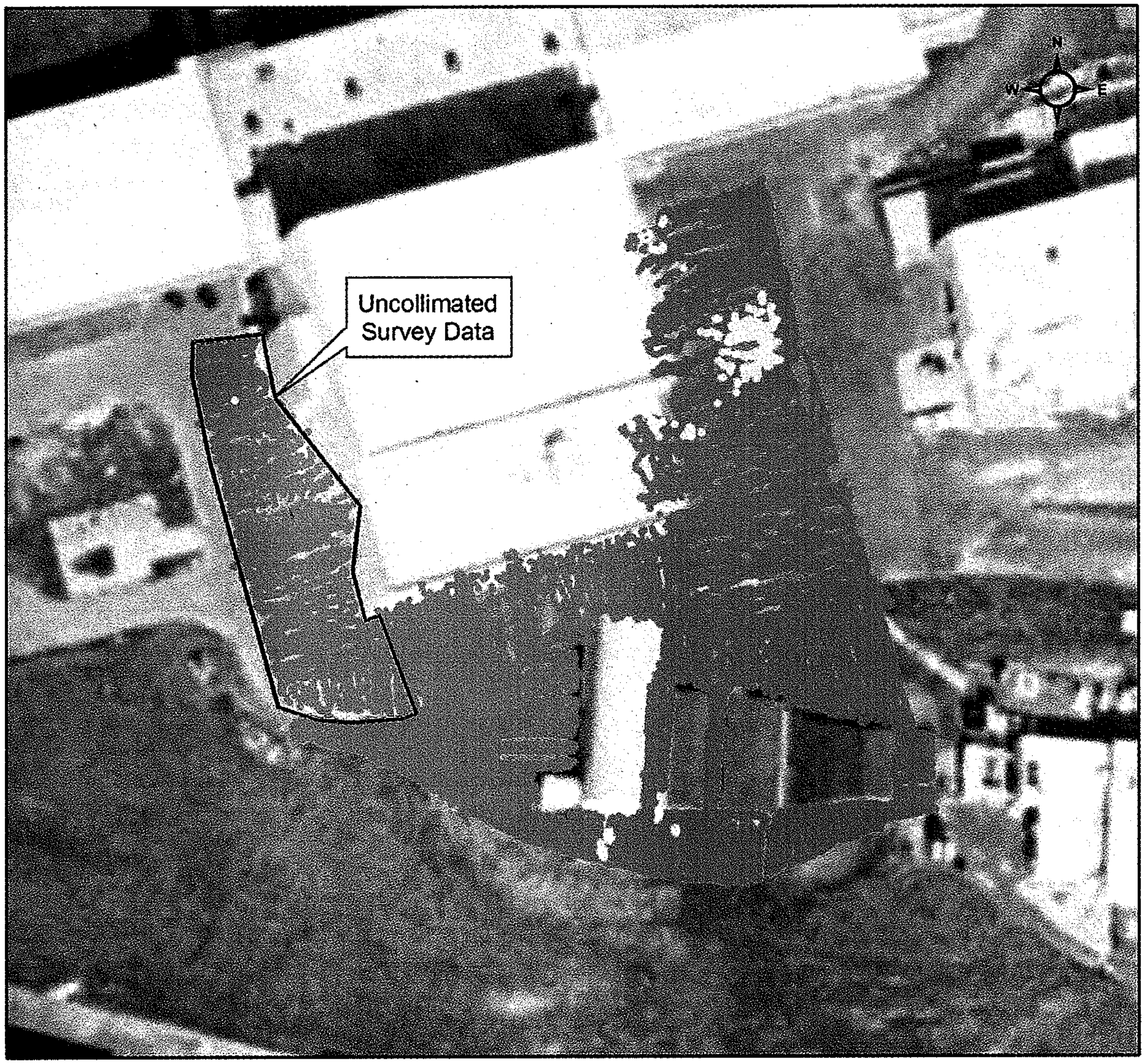
MASSLINN SURVEY RESULTS (in dpm)

1.	N/A	5.	N/A
2.	↓	6.	↓
3.	↓	7.	↓
4.	↓	8.	↓

SMEAR SURVEY RESULTS (dpm/100cm²) α, β-γ, ³H

1.	See	8.	Attached	15.	Results
2.	Batch	9.	Number	16.	N/A
3.	↓	10.	↓	17.	↓
4.	↓	11.	↓	18.	↓
5.	↓	12.	↓	19.	↓
6.	↓	13.	↓	20.	↓
7.	↓	14.	↓	21.	↓

Surveyed By See above box **Date:** 3/17-5/5/11 **Reviewed By:** [signature] **Date:** 5/10/11



Coordinate System: NAD83, New York Long Island - Units: Feet

0 50 100 200 Feet

Legend

Gamma Count Rate

COLLIMATED (cpm)

- < 5,000
- 5,000 - 8,999
- ≥ 9,000

UNCOLLIMATED (cpm)

- < 15,000
- 15,000 - 20,399
- ≥ 20,400

GPS-Based Radiological Survey Brookhaven National Laboratory BGRR Engineered Cap - SU-01/SU-02 as of May 5, 2011

Attachment 2
Survey Units 1 and 2 Sample Locations and Descriptions
Page 2 of 2

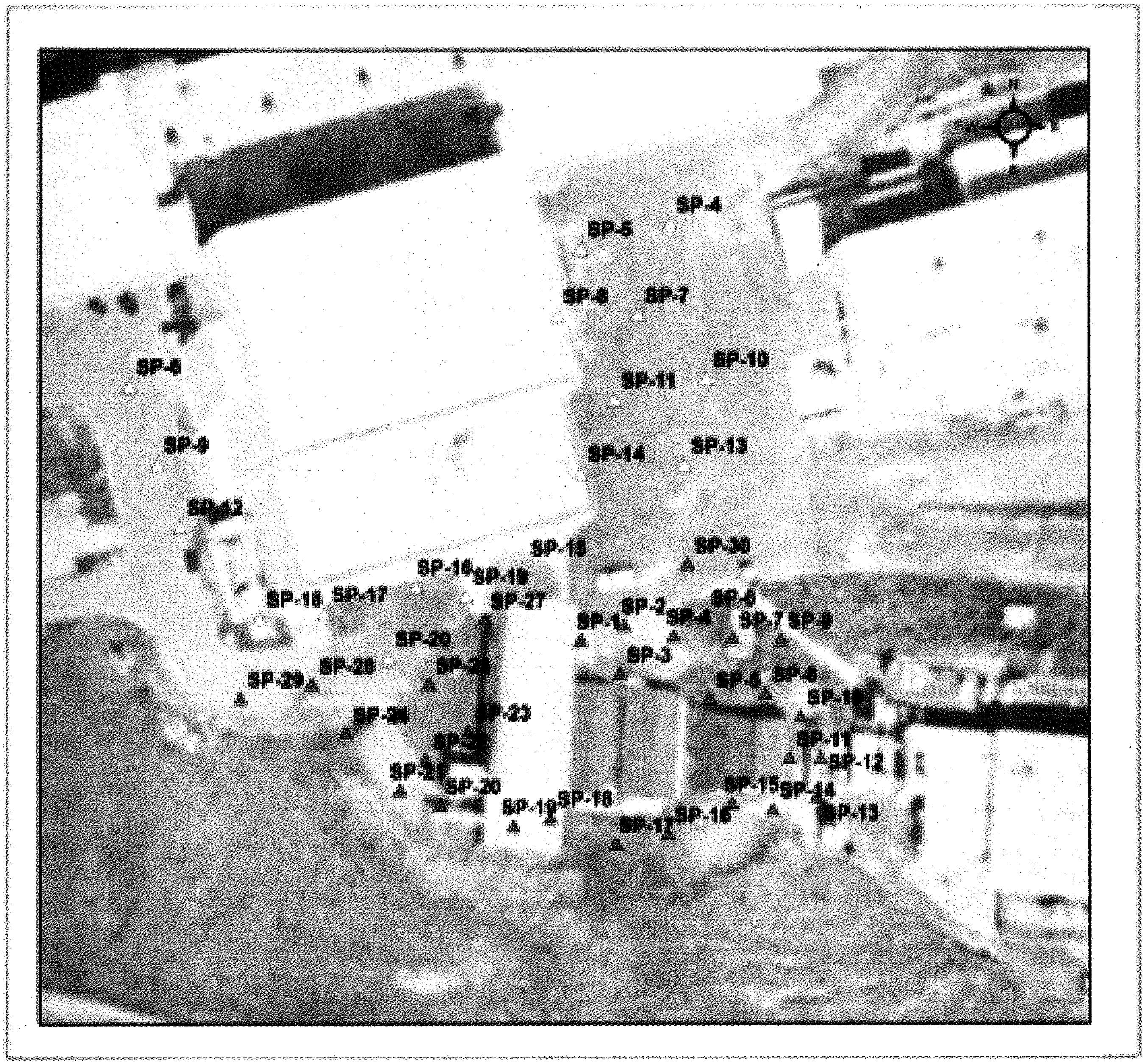
Survey Unit	Survey Point	Northing	Easting
1	SP-04	258715.0	1294738.3
1	SP-05	258705.3	1294702.8
1	SP-06	258650.9	1294522.7
1	SP-07	258679.0	1294725.6
1	SP-08	258678.7	1294693.2
1	SP-09	258620.0	1294533.5
1	SP-10	258653.6	1294752.6
1	SP-11	258645.3	1294716.2
1	SP-12	258594.9	1294542.7
1	SP-13	258619.5	1294744.0
1	SP-14	258616.2	1294702.9
1	SP-15	258578.6	1294680.1
1	SP-16	258571.0	1294636.5
1	SP-17	258560.5	1294600.2
1	SP-18	258558.7	1294574.3
1	SP-19	258567.3	1294656.6
1	SP-20	258542.7	1294625.4

Survey Unit	Survey Point	Northing	Easting
2	SP-01	258549.7	1294702.6
2	SP-02	258555.6	1294719.8
2	SP-03	258536.3	1294718.3
2	SP-04	258551.3	1294739.6
2	SP-05	258526.4	1294754.0
2	SP-06	258559.0	1294752.0
2	SP-07	258550.5	1294763.2
2	SP-08	258528.5	1294776.4
2	SP-09	258549.9	1294782.5
2	SP-10	258519.4	1294790.2
2	SP-11	258502.8	1294785.9
2	SP-12	258503.0	1294798.5
2	SP-13	258487.6	1294796.7
2	SP-14	258482.6	1294779.0
2	SP-15	258484.7	1294762.9
2	SP-16	258472.8	1294737.2
2	SP-17	258468.7	1294716.6
2	SP-18	258479.2	1294690.3
2	SP-19	258475.9	1294675.5
2	SP-20	258484.2	1294646.1
2	SP-21	258490.2	1294630.1
2	SP-22	258501.9	1294640.4
2	SP-23	258513.4	1294657.6
2	SP-24	258512.7	1294608.6
2	SP-25	258520.0	1294629.8
2	SP-26	258532.3	1294641.6
2	SP-27	258557.8	1294664.0
2	SP-28	258532.1	1294595.1
2	SP-29	258526.7	1294566.7
2	SP-30	258579.6	1294745.2

Sample points 1 through 3 and 3A of Survey Unit 1 were not available by GPS. The reference point (0', 0') for the below locations is 75' east of the building 701 truck lock.

1) 5' south/22' west
2) 5' south/58' west
3) 8' south/195' west
3A) 8' south/210' west

Attachment 2
Survey Unit 1 and 2 Sample Locations and Descriptions
Page 1 of 2



Coordinate System: NAD83 New York Long Island - Units: Feet

0 50 100 200 Feet

RADIOLOGICAL SURVEY FORM
FS-SOP-1000

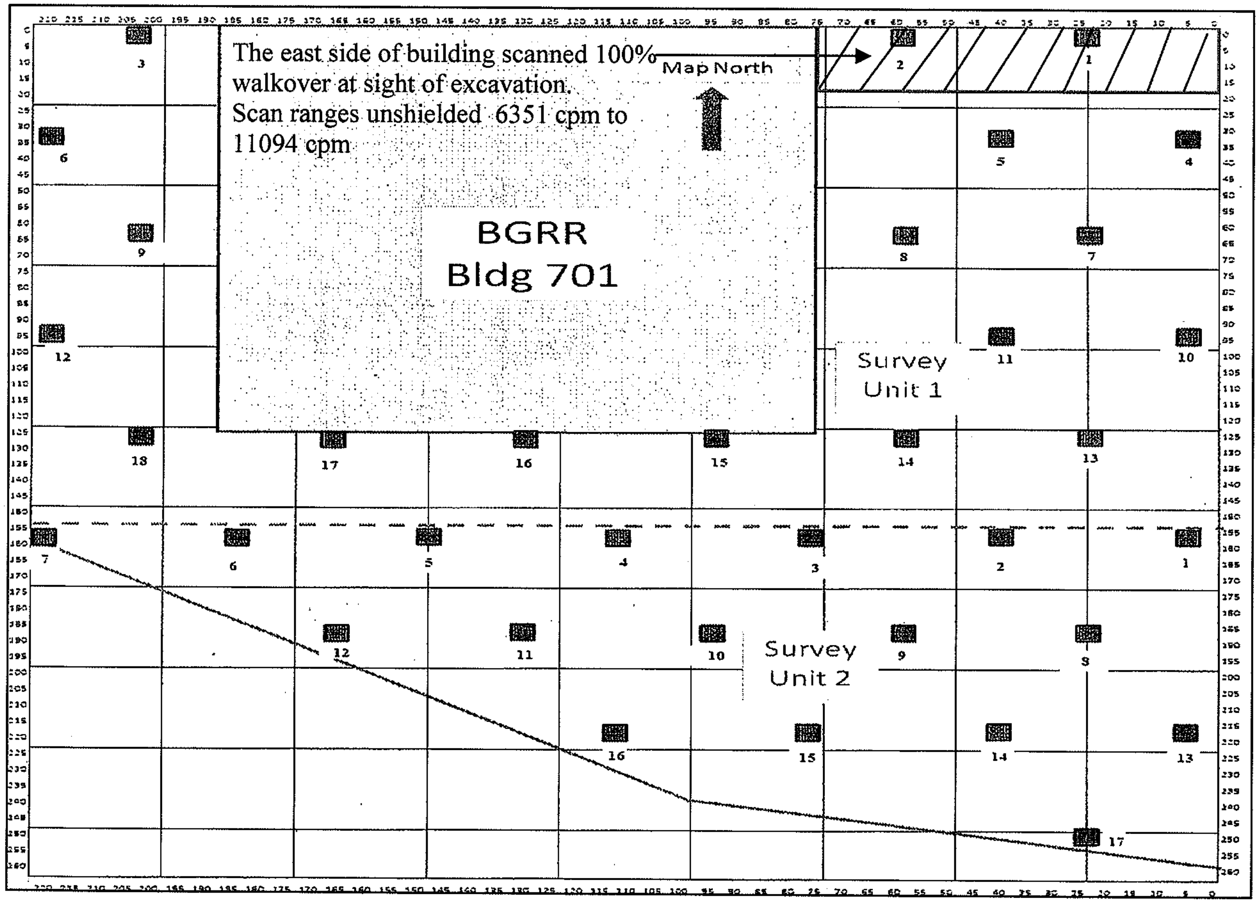
REASON FOR SURVEY

☐ Routine ______ ☐ Special ______
☐ RWP# ______ ☐ WP 324-19

INSTRUMENTS Model #	Serial #	CAL DUE
2221	06572	12/09/11
S5XLB	67705	04/23/11
N/A	N/A	N/A

Location / Equipment: East of Building # 701 | **Date:** 01/18/2011 | **Time:** 11:00

FSS sample locations and assay results



FSS samples #1 and #2 collected at a depth of 0-6 in. Please see attached sheet for analysis summary.
________ = Excavated area for concrete form placement.
1 min. count of sample point #1) 6750 cpm. 1min. Count of sample point #2) 8230 cpm. BKGD=6210 to 9330 cpm
Using unshielded probe.

LEGEND

- ○ - SMEAR SURVEY LOCATION
- ▲ - AIR SAMPLE LOCATION
- ▢ - MASSLINN SURVEY LOCATION
- [#] - DIRECT FRISK LOCATION
- $\overline{C}$ - CONTAMINATION
- * CONTACT
- XXXY / ZZZ: XXX = contact reading Y = radiation type ZZZ = reading @ 30cm

AIRBORNE ACTIVITY SURVEY

Sample #	Duration	Flow Rate	Field Analysis cpm	µCi/cc	% DAC
N\A					

DOSE RATE (HIGHEST)

CONTACT READING	N/A
GENERAL AREA READING	N/A

MASSLINN SURVEY RESULTS (in dpm)

1.	N/A	5.	N/A
2.		6.	
3.		7.	
4.		8.	

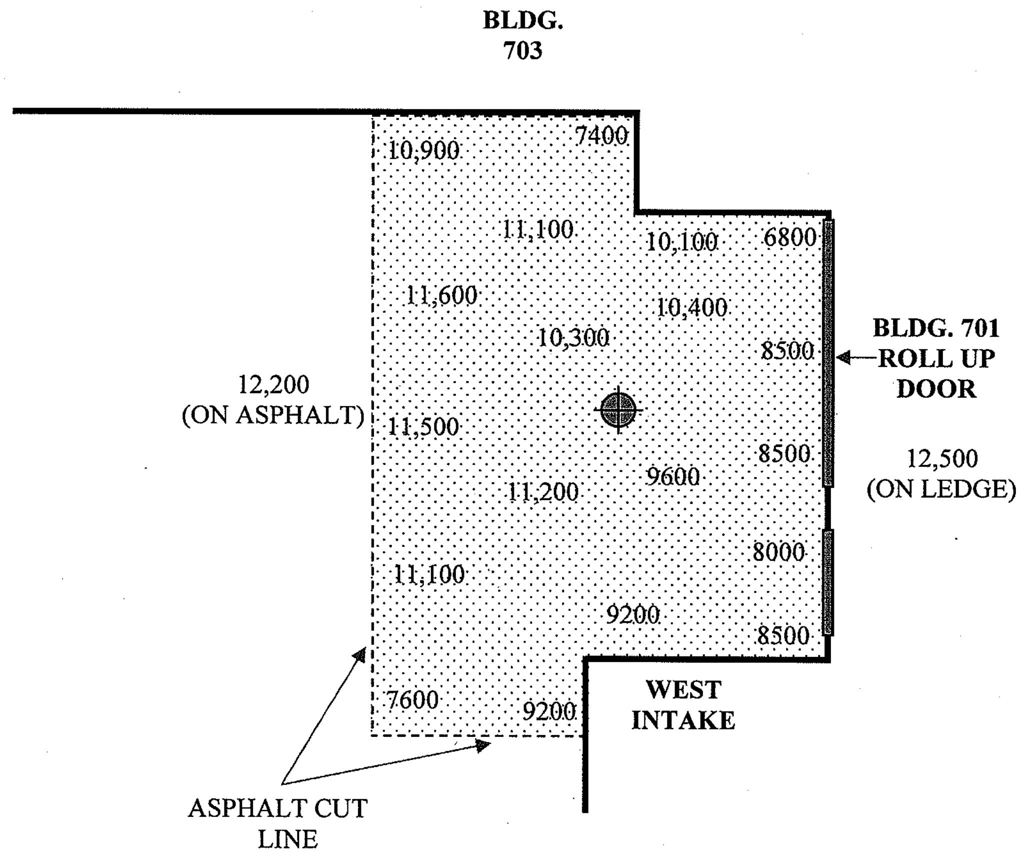
SMEAR SURVEY RESULTS (dpm/100cm²) α, β-γ, ³H

1.	See	8.	Attached	15.	Results
2.	Batch	9.	Number	16.	N/A
3.	N/A	10.	N/A	17.	
4.		11.		18.	
5.		12.		19.	
6.		13.		20.	
7.		14.		21.	

Surveyed By: Tim Long Tim Long **Date:** 1/19/2011 **Reviewed By:** [signature] **Date:** 1/21/11

RADIOLOGICAL SURVEY FORM FS-SOP-1000	REASON FOR SURVEY ROUTINE ____ ■ SPECIAL FINAL STATUS ☐ RWP# ____ ☐ WP# 324-19	
LOCATION / EQUIPMENT: BLDG. 701 / 703 EXTERIOR AREAS	DATE: 02/24/2011	TIME: 1145

FINAL STATUS SURVEY - ENGINEERED CAP SURVEY UNIT 1



ALL READINGS TAKEN IN CONTACT WITH SURFACE OF SOIL, AND SHOWN IN COUNTS PER MINUTE

SURVEYED AREA (EXCAVATED TO APPROX. 24" BELOW ASPHALT)

SAMPLE LOCATION - FSS SU1 003 (1 MINUTE COUNT = 10,200 CPM)

INSTRUMENT

Model #	Serial #	CAL DUE
LUD-2221	211784	12/09/2011
N/A →		
N/A →		
N/A →		

LEGEND

○ - SMEAR SURVEY LOCATION △ - AIR SAMPLE LOCATION

☐ - MASSLINN SURVEY LOCATION # - DIRECT FRISK LOCATION

XXXY / ZZZ XXX = contact reading Y = radiation type ZZZ = reading @ 30cm

AIRBORNE ACTIVITY SURVEY

Sample #	Duration	Flow Rate	Field Analysis cpm	Field Analysis µCi/cc	% DAC
N/A →					

DOSE RATE (HIGHEST)

CONTACT READING	N/A
GENERAL AREA READING	N/A

MASSLINN SURVEY RESULTS (in dpm)

1.	N/A	5.	N/A
2.	↓	6.	↓
3.		7.	
4.		8.	

SMEAR SURVEY RESULTS (dpm/100cm^2) α, β-γ, ^{3}H

1.	N/A	8.	N/A	15.	N/A
2.	↓	9.	↓	16.	↓
3.		10.		17.	
4.		11.		18.	
5.		12.		19.	
6.		13.		20.	
7.		14.		21.	

Surveyed By: P. Sullivan (SULLIVAN) Date: 02/24/2011 Reviewed By: [signature] Holthausen Date: 2/24/11

RADIOLOGICAL SURVEY FORM
FS-SOP-1000

REASON FOR SURVEY

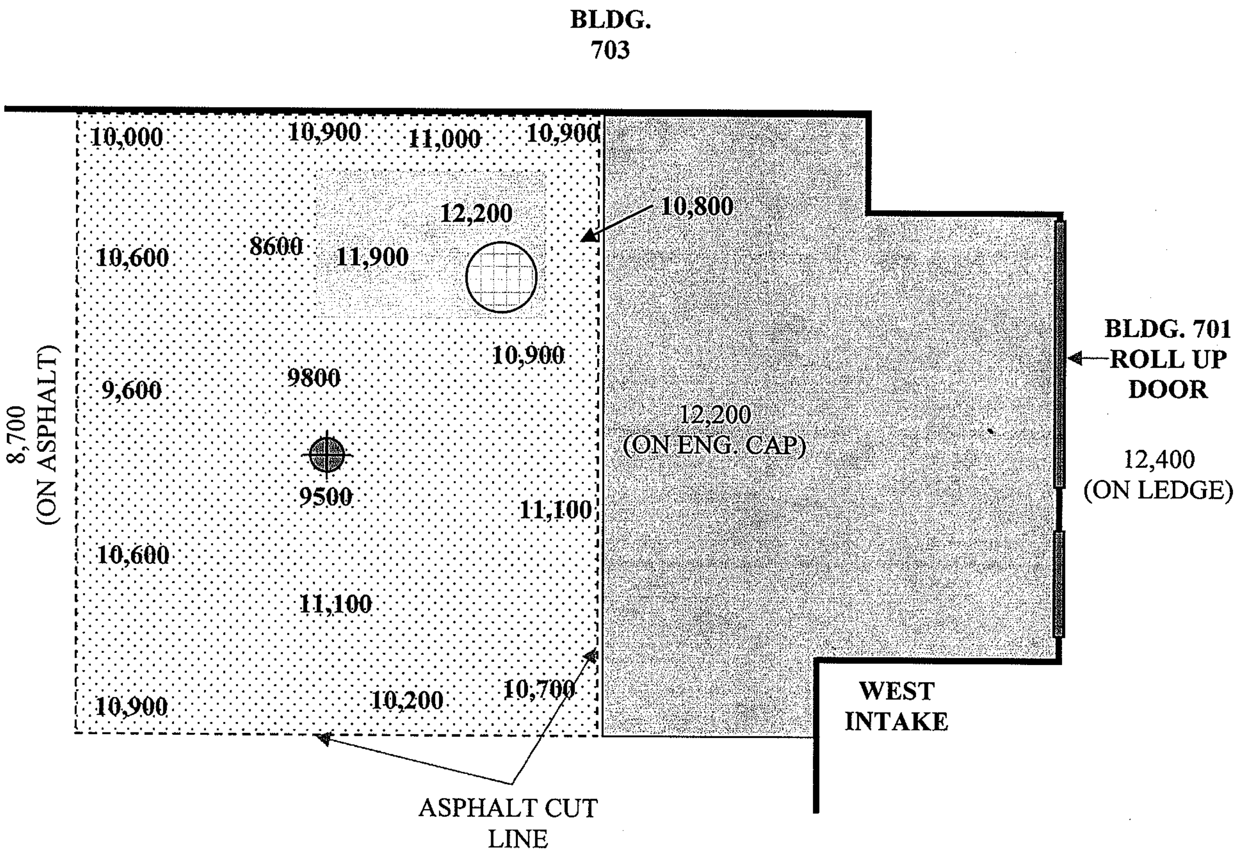
ROUTINE______ ■ SPECIAL FINAL STATUS

☐ RWP# ______ ☐ WP# 324-19

LOCATION / EQUIPMENT: BLDG. 701 / 703 EXTERIOR AREAS

DATE: 03/03/2011 TIME: 0930

FINAL STATUS SURVEY - ENGINEERED CAP, WEST SIDE, SURVEY UNIT 1, SECTION 2



ALL READINGS TAKEN IN CONTACT WITH SURFACE OF SOIL, AND SHOWN IN COUNTS PER MINUTE

SURVEYED AREA (SOIL SURFACE AT FINAL DEPTH)

SAMPLE LOCATION - FSS SU1 003A (1 MINUTE COUNT = 9,548 CPM)

INSTRUMENT

Model #	Serial #	CAL DUE
LUD-2221	211784	12/09/2011
N/A →		
N/A →		
N/A →		

LEGEND

○ - SMEAR SURVEY LOCATION △ - AIR SAMPLE LOCATION

☐ - MASSLINN SURVEY LOCATION # - DIRECT FRISK LOCATION

XXXY / ZZZ XXX = contact reading Y = radiation type ZZZ = reading @ 30cm

AIRBORNE ACTIVITY SURVEY

Sample #	Duration	Flow Rate	Field Analysis cpm	Field Analysis µCi/cc	% DAC
N/A →					

DOSE RATE (HIGHEST)

CONTACT READING	N/A
GENERAL AREA READING	N/A

MASSLINN SURVEY RESULTS (in dpm)

1.	N/A ↓	5.	N/A ↓
2.		6.	
3.		7.	
4.		8.	

SMEAR SURVEY RESULTS (dpm/100cm²) α, β-γ, ³H

1.	N/A ↓	8.	N/A ↓	15.	N/A ↓
2.		9.		16.	
3.		10.		17.	
4.		11.		18.	
5.		12.		19.	
6.		13.		20.	
7.		14.		21.	

Surveyed By: [signature] Date: 03/03/2011 Reviewed By: [signature] Date: 3/7/11

RADIOLOGICAL SURVEY FORM FS-SOP-1000	REASON FOR SURVEY ☐ ROUTINE ☐ SPECIAL ☐ RWP # X WP # 324-19
LOCATION & EQUIPT. O/S BGRR Complex	DATE: 03-26-2011 TIME: 1600
BGRR Engr. Cap FSS Survey	

Survey Unit 2

Sample No.	1 Min. Gamma
001	16404
002	15711
003	12780
004	23883

Note: sample locations denoted on gamma walkover map, done with Trimble unit.

INSTRUMENT

Model #	Serial #	CAL DUE
Ludlum 2221	211748	12-09-11
N/A	N/A	N/A

LEGEND

○ - SMEAR SURVEY LOCATION △ - AIR SAMPLE LOCATION

☐ - MASSLINN SURVEY LOCATION # - DIRECT FRISK LOCATION

XXXY/ZZZ XXX = contact reading Y = radiation type ZZZ = reading @ 30cm

AIRBORNE ACTIVITY SURVEY

Sample #	Duration	Flow Rate	Field Analysis cpm	Field Analysis µCi/cc	% DAC
N/A					

DOSE RATE (HIGHEST)

CONTACT READING	N/A
GENERAL AREA READING	N/A

MASSLINN SURVEY RESULTS (in dpm)

1. N/A	5. N/A
2.	6.
3.	7.
4.	8.

SMEAR SURVEY RESULTS (dpm/100cm^2) α, β-γ, ^{3}H

1. See	8. Attached	15. Results
2. Batch	9. Number	16. N/A
3.	10.	17.
4.	11.	18.
5.	12.	19.
6.	13.	20.
7.	14.	21.

Surveyed By D. Dove [signature] Date: 03-26-2011 Reviewed By: [signature] Date: 3-27-11

FS-SOP-1000
Attachment 9.2

RADIOLOGICAL SURVEY FORM FS-SOP-1000	REASON FOR SURVEY ☐ ROUTINE ☐ SPECIAL ☐ RWP# ☐ WP# 324-19	
LOCATION / EQUIPMENT: Engineered Cap Survey Unit 2	DATE: 03/19/2011	TIME: 1645

Engineered Cap Survey Unit 2

Sample Locations 14 - 27

One Minute Counts taken with Lud 2221 w/ 2X2 NaI detector (Unshielded) at soil surface.

SAMPLE LOCATION	NaI (2X2) COUNTS/MIN
14	12453
15	10510
16	10683
17	12570
18	10844
19	12108
20	11833
21	12769
22	11359
23	10648
24	7879
25	8717
26	10617
27	11711

INSTRUMENT

Model #	Serial #	CAL DUE
LUD-2221	211784	12/09/2011
N/A →		
N/A →		
N/A →		

LEGEND

○ - SMEAR SURVEY LOCATION △ - AIR SAMPLE LOCATION

☐ - MASSLINN SURVEY LOCATION # - DIRECT FRISK LOCATION

XXXY / ZZZ XXX = contact reading Y = radiation type ZZZ = reading @ 30cm

AIRBORNE ACTIVITY SURVEY

Sample #	Duration	Flow Rate	Field Analysis cpm	Field Analysis µCi/cc	% DAC
N/A →					

DOSE RATE (HIGHEST)

CONTACT READING	N/A
GENERAL AREA READING	N/A

MASSLINN SURVEY RESULTS (in dpm)

1.	N/A	5.	N/A
2.	↓	6.	↓
3.		7.	
4.		8.	

SMEAR SURVEY RESULTS (dpm/100cm²) α, β-γ, ^{3}H

1.	N/A	8.	N/A	15.	N/A
2.	↓	9.	↓	16.	↓
3.		10.		17.	
4.		11.		18.	
5.		12.		19.	
6.		13.		20.	
7.		14.		21.	

Surveyed By: [signature] (Sullivan) Date: 03/19/2011 Reviewed By: [signature] Date: 3/19/11

RADIOLOGICAL SURVEY FORM
FS-SOP-1000

REASON FOR SURVEY

☐ ROUTINE ☐ SPECIAL
☐ RWP # ☒ WP # 324-19

LOCATION & EQUIPT. Eng. Cap SU-2

DATE: 03-22-2011 TIME: 1630

One minute sodium iodide survey performed over sample locations 5-13 Eng. Cap SU-2

Sample Location	2x2 Counts per minute
5	23577
6	24091
7	30688
8	16719
9	21555
10	14956
11	16171
12	10851
13	12191

Note: Probe was unshielded

Sample locations 5,6,7, and 9 direct shine from building 801

Sample locations shown on gamma walkover map as "SP-#"

INSTRUMENT

Model #	Serial #	CAL DUE
L-2221	211784	12-9-2011
n/a	n/a	n/a
n/a	n/a	n/a
n/a	n/a	n/a

LEGEND

○ - SMEAR SURVEY LOCATION △ - AIR SAMPLE LOCATION
☐ - MASSLINN SURVEY LOCATION # - DIRECT FRISK LOCATION
$\frac{XXXY}{ZZZ}$ XXX = contact reading Y = radiation type ZZZ = reading @ 30cm

AIRBORNE ACTIVITY SURVEY

Sample #	Duration	Flow Rate	Field Analysis cpm	Field Analysis μCi/cc	% DAC
N/A					

DOSE RATE (HIGHEST)

CONTACT READING	N/A
GENERAL AREA READING	N/A

MASSLINN SURVEY RESULTS (in dpm)

1.	N/A	5.	N/A
2.		6.	
3.		7.	
4.		8.	

SMEAR SURVEY RESULTS (dpm/100cm²) α, β-γ ³H

1.	See	8.	Attached	15.	Results
2.	Batch	9.	Number	16.	n/a
3.		10.		17.	
4.		11.		18.	
5.		12.		19.	
6.		13.		20.	
7.		14.		21.	

Surveyed By [signature] MButler Date: 3-22-2011 Reviewed By: Hommora [signature] Date: 3/23/11

FS-SOP-1000
Attachment 9.2

Page 1 of 1

RADIOLOGICAL SURVEY FORM
FS-SOP-1000

REASON FOR SURVEY

☐ ROUTINE ☐ SPECIAL
☐ RWP # ☒ WP # 324-19

LOCATION & EQUIPT. East Side Building 701

DATE: 04-09-11 TIME: 1615

Performed 1minute backgrounds at 8 location at ground level on the East side of Building 701 for Engineering Cap Survey Unit #1.

#004 28943cpm (Background at waist level was 30114cpm)

#005 14700cpm

#007 17211cpm

#008 15313cpm

#010 16330cpm

#011 18313cpm

#013 18036cpm

#014 14051cpm

INSTRUMENT

Model #	Serial #	CAL DUE
LUD-2221	211784	12-09-2011
N/A	N/A	N/A

LEGEND

○ - SMEAR SURVEY LOCATION △ - AIR SAMPLE LOCATION
☐ - MASSLINN SURVEY LOCATION # - DIRECT FRISK LOCATION

$\frac{XXXY}{ZZZ}$ XXX = contact reading Y = radiation type ZZZ = reading @ 30cm

AIRBORNE ACTIVITY SURVEY

Sample #	Duration	Flow Rate	Field Analysis cpm	Field Analysis µCi/cc	% DAC
N/A					

DOSE RATE (HIGHEST)

CONTACT READING	N/A
GENERAL AREA READING	N/A

MASSLINN SURVEY RESULTS (in dpm)

1.	N/A	5.	N/A
2.		6.	
3.		7.	
4.		8.	

SMEAR SURVEY RESULTS (dpm/100cm²) α, β-γ, ^{3}H

1.	See	8.	Attached	15.	Results
2.	Batch	9.	Number	16.	N/A
3.		10.		17.	
4.		11.		18.	
5.		12.		19.	
6.		13.		20.	
7.		14.		21.	

Surveyed By [signature] Eugene E. Houseknecht II Date: 04-09-2011 Reviewed By: [signature] Date: 4/12/11

FS-SOP-1000
Attachment 9.2

RADIOLOGICAL SURVEY FORM FS-SOP-1000	REASON FOR SURVEY ☐ ROUTINE ☐ SPECIAL ☐ RWP # ☒ WP # 324-19
LOCATION & EQUIPT. Eng. Cap SU-1	DATE: 04-12-2011 TIME: 1300

One minute sodium iodide survey performed over sample locations Eng. Cap SU-1 & 2

Engineer cap Survey Unit 1

Sample Locations	2x2 Counts per minute
16	12290
17	12270
18	9145
20	8563

Engineer cap Survey Unit 2

Sample Location	2x2 Counts per minute
28	8376

Note: Probe was unshielded

INSTRUMENT

Model #	Serial #	CAL DUE
L-2221	211780	3-9-2012
n/a	n/a	n/a
n/a	n/a	n/a
n/a	n/a	n/a

LEGEND

○ - SMEAR SURVEY LOCATION △ - AIR SAMPLE LOCATION

☐ - MASSLINN SURVEY LOCATION # - DIRECT FRISK LOCATION

$\frac{XXXY}{ZZZ}$ XXX = contact reading Y = radiation type ZZZ = reading @ 30cm

AIRBORNE ACTIVITY SURVEY

Sample #	Duration	Flow Rate	Field Analysis cpm	Field Analysis µCi/cc	% DAC
N/A					

DOSE RATE (HIGHEST)

CONTACT READING	N/A
GENERAL AREA READING	N/A

MASSLINN SURVEY RESULTS (in dpm)

1.	N/A	5.	N/A
2.		6.	
3.		7.	
4.		8.	

SMEAR SURVEY RESULTS (dpm/100cm²) α, β-γ ^3H

1.	See	8.	Attached	15.	Results
2.	Batch	9.	Number	16.	n/a
3.		10.		17.	
4.		11.		18.	
5.		12.		19.	
6.		13.		20.	
7.		14.		21.	

Surveyed By [signature] MButler Date: 4-12-2011 Reviewed By: [signature] Date: 4/12/11

RADIOLOGICAL SURVEY FORM
FS-SOP-1000

REASON FOR SURVEY

☐ ROUTINE ☐ SPECIAL
☐ RWP # ■ WP # 324-19

LOCATION & EQUIPT. BGRR outside grounds

DATE: 04/19/11 **TIME:** 15:00

Engineering cap Su-1 and Su-2 FSS samples

Samples taken in both SU-1 and SU-2 with results as follows:

006….5667 cpm
009…..7186 cpm
012……6910 cpm
029(SU-2)…..6727 cpm

All samples are 1 minute counts unshielded…..background ranged from 5625-6945 cpm.

HPGE results attached.

INSTRUMENT

Model #	Serial #	CAL DUE
L-2221	211780	03/09/12
N/A		
N/A		
N/A		

LEGEND

○ - SMEAR SURVEY LOCATION △ - AIR SAMPLE LOCATION
☐ - MASSLINN SURVEY LOCATION # - DIRECT FRISK LOCATION

$\frac{XXXY}{ZZZ}$ XXX = contact reading Y = radiation type ZZZ = reading @ 30cm

AIRBORNE ACTIVITY SURVEY

Sample #	Duration	Flow Rate	Field Analysis cpm	Field Analysis µCi/cc	% DAC
N/A					

DOSE RATE (HIGHEST)

CONTACT READING	N/A
GENERAL AREA READING	N/A

MASSLINN SURVEY RESULTS (in dpm)

1.	N/A	5.	N/A
2.		6.	
3.		7.	
4.		8.	

SMEAR SURVEY RESULTS (dpm/100cm^2) α, β-γ ^{3}H

1.	See	8.	Attached	15.	Results
2.	Batch	9.	Number	16.	N/A
3.		10.		17.	
4.		11.		18.	
5.		12.		19.	
6.		13.		20.	
7.		14.		21.	

Surveyed By Hollander [signature] **Date:** 04/19/11 **Reviewed By:** [signature] **Date:**

RADIOLOGICAL SURVEY FORM
FS-SOP-1000

REASON FOR SURVEY

☐ ROUTINE ☐ SPECIAL FSS

☐ RWP # ☒ WP # 324-19

LOCATION & EQUIPT. Engineered Cap SU-1 & SU-2

DATE: 05/05/11 TIME: 1600

Engineered Cap FSS

Survey Unit	Sample No.	1 Min. Gamma
1	015	12050
1	019	13148
2	030	15348

Static Counts taken un-collimated.

~~Performed NaI walk-over survey. Walk-over survey performed collimated (See attached map)~~ 5/5/11

INSTRUMENT

Model #	Serial #	CAL DUE
Ludlum 2221	211784	12-09-11
Ludlum 2221	211780	02-17-12

LEGEND

○ - SMEAR SURVEY LOCATION △ - AIR SAMPLE LOCATION

☐ - MASSLINN SURVEY LOCATION # - DIRECT FRISK LOCATION

XXXY / ZZZ XXX = contact reading Y = radiation type ZZZ = reading @ 30cm

AIRBORNE ACTIVITY SURVEY

Sample #	Duration	Flow Rate	Field Analysis cpm	Field Analysis µCi/cc	% DAC
N/A					

DOSE RATE (HIGHEST)

CONTACT READING	N/A
GENERAL AREA READING	N/A

MASSLINN SURVEY RESULTS (in dpm)

1.	N/A	5.	N/A
2.		6.	
3.		7.	
4.		8.	

SMEAR SURVEY RESULTS (dpm/100cm^2) α, β-γ, ^{3}H

1.	See	8.	Attached	15.	Results
2.	Batch	9.	Number	16.	N/A
3.		10.		17.	
4.		11.		18.	
5.		12.		19.	
6.		13.		20.	
7.		14.		21.	

Surveyed By: D.DOVE Date: 05/05/11 Reviewed By: Date: 5/5/11

ERP GAMMA ANALYSIS SUMMARY

C.O.C. # N/A

Samples #1 & #12 ONLY

COUNT DATE: **01/18/2011-B**

M. ROBLES - 631 708-6343

LINE #	SAMPLE #	WEIGHT (GRAMS)	SAMPLE DESCRIPTION / LOCATION	RESULTS
1	011811-011	1083	BGRR CONCRETE PAD FSS "E" #1	BACKGROUND
2	011811-012	987	BGRR "E" CONCRETE PAD DIRT 01	^{137}Cs (0.15 pCi/gm) + BACKGROUND
3	011811-013	1018	BGRR "E" CONCRETE PAD DIRT 02	^{137}Cs (0.27 pCi/gm) + BACKGROUND
4	011811-014	1010	BGRR "E" CONCRETE PAD DIRT 03	^{137}Cs (0.91 pCi/gm) + BACKGROUND
5	011811-015	1000	BGRR "E" CONCRETE PAD DIRT 04	^{137}Cs (0.18 pCi/gm) + BACKGROUND
6	011811-016	994	BGRR "E" CONCRETE PAD DIRT 05	^{137}Cs (0.77 pCi/gm) + BACKGROUND
7	011811-017	929	BGRR "E" CONCRETE PAD DIRT 06	^{137}Cs (0.27 pCi/gm) + BACKGROUND
8	011811-018	941	BGRR "E" CONCRETE PAD DIRT 07	^{137}Cs (0.23 pCi/gm) + BACKGROUND
9	011811-019	950	BGRR "E" CONCRETE PAD DIRT 08	^{137}Cs (0.12 pCi/gm) + BACKGROUND
10	011811-020	951	BGRR "E" CONCRETE PAD DIRT 09	^{137}Cs (0.41 pCi/gm) + BACKGROUND
11	011811-021	992	BGRR "E" CONCRETE PAD DIRT 10	^{137}Cs (0.14 pCi/gm) + BACKGROUND
12	011811-022	1080	BGRR CONCRETE PAD FSS "E" #2	^{137}Cs (0.3 pCi/gm) + BACKGROUND
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25				

12 SAMPLES TOTAL

ERP GAMMA ANALYSIS SUMMARY

C.O.C. # N/A
M. ROBLES 631 708 6343

COUNT DATE: **02/24/2011-C**

LINE #	SAMPLE #	WEIGHT (GRAMS)	SAMPLE DESCRIPTION / LOCATION	RESULTS
1	022411-017	957	ENG. CAP FSS SU1 003	^{137}Cs (0.09 pCi/gm) + BACKGROUND
2				
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25				

2/24/2011

1 SAMPLES TOTAL

ERP GAMMA ANALYSIS SUMMARY

C.O.C. # N/A
P. SULLIVAN 631 897-3202

COUNT DATE: **03/03/2011-A**

LINE #	SAMPLE #	WEIGHT (GRAMS)	SAMPLE DESCRIPTION / LOCATION	RESULTS
1	030311-001	737	ENG. CAP SU1 FSS 003A	^{137}Cs (0.15 pCi/gm) + BACKGROUND
2				
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25				

1 SAMPLE TOTAL

ERP GAMMA ANALYSIS SUMMARY

C.O.C. # N/A
M. ROBLES 631. 708.6343

COUNT DATE: **03/19/2011-A**

LINE #	SAMPLE #	WEIGHT (GRAMS)	SAMPLE DESCRIPTION / LOCATION	RESULTS
1	031911-001	918	ENG. CAP SU2 #14	BACKGROUND
2	031911-002	955	ENG. CAP SU2 #15	^{137}Cs (0.10 pCi/gm) + BACKGROUND
3	031911-003	990	ENG. CAP SU2 #16	^{137}Cs (0.36 pCi/gm) + BACKGROUND
4	031911-004	978	ENG. CAP SU2 #17	^{137}Cs (0.04 pCi/gm) + BACKGROUND
5	031911-005	952	ENG. CAP SU2 #18	^{137}Cs (0.10 pCi/gm) + BACKGROUND
6	031911-006	878	ENG. CAP SU2 #19	^{137}Cs (0.10 pCi/gm) + BACKGROUND
7	031911-007	961	ENG. CAP SU2 #20	^{137}Cs (0.46 pCi/gm) + BACKGROUND
8	031911-008	1023	ENG. CAP SU2 #21	^{137}Cs (1.78 pCi/gm) + BACKGROUND
9	031911-009	1061	ENG. CAP SU2 #22	BACKGROUND
10	031911-010	996	ENG. CAP SU2 #23	^{137}Cs (0.11 pCi/gm) + BACKGROUND
11	031911-011	1010	ENG. CAP SU2 #25	BACKGROUND
12	031911-012	1004	ENG. CAP SU2 #24	BACKGROUND
13	031911-013	1091	ENG. CAP SU2 #26	^{137}Cs (0.21 pCi/gm) + BACKGROUND
14	031911-014	1065	ENG. CAP SU2 #27	^{137}Cs (0.53 pCi/gm) + BACKGROUND
15				
16				
17				

3/19/2011

14 SAMPLES TOTAL

ERP GAMMA ANALYSIS SUMMARY

C.O.C. # N/A
P. SULLIVAN 631 897-3202

COUNT DATE: **03/23/2011-A**

LINE #	SAMPLE #	WEIGHT (GRAMS)	SAMPLE DESCRIPTION / LOCATION	RESULTS
1	032311-001	1369	ENG. CAP SU2 FSS - 005	BACKGROUND
2	032311-002	1294	ENG. CAP SU2 FSS - 006	^{137}Cs (0.72 pCi/gm) + BACKGROUND
3	032311-003	1138	ENG. CAP SU2 FSS - 007	^{137}Cs (0.10 pCi/gm) + BACKGROUND
4	032311-004	1420	ENG. CAP SU2 FSS - 008	BACKGROUND
5	032311-005	1068	ENG. CAP SU2 FSS - 009	BACKGROUND
6	032311-006	970	ENG. CAP SU2 FSS - 010	^{137}Cs (1.16 pCi/gm) + BACKGROUND
7	032311-007	929	ENG. CAP SU2 FSS - 011	^{137}Cs (0.30 pCi/gm) + BACKGROUND
8	032311-008	979	ENG. CAP SU2 FSS - 012	BACKGROUND
9	032311-009	996	ENG. CAP SU2 FSS - 013	BACKGROUND
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P. Sull 03/23/2011

9 SAMPLES TOTAL

ERP GAMMA ANALYSIS SUMMARY

C.O.C. # N/A
M. ROBLES 631.708.6343

COUNT DATE: **03/27/2011-A**

LINE #	SAMPLE #	WEIGHT (GRAMS)	SAMPLE DESCRIPTION / LOCATION	RESULTS
1	032611-001	1002	ENG. CAP SU-2 FSS 001	BACKGROUND
2	032611-002	975	ENG. CAP SU-2 FSS DUP. 001	BACKGROUND
3	032611-003	984	ENG. CAP SU-2 FSS 002	^{137}Cs (0.46 pCi/gm) + BACKGROUND
4	032611-004	1021	ENG. CAP SU-2 FSS 003	^{137}Cs (0.07 pCi/gm) + BACKGROUND
5	032611-005	1202	ENG. CAP SU-2 FSS 004	^{137}Cs (0.19 pCi/gm) + BACKGROUND
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3/27/2011

5 SAMPLES TOTAL

ERP GAMMA ANALYSIS SUMMARY

C.O.C. # N/A
P. SULLIVAN 631 897-3202

COUNT DATE: **04/11/2011-B**

LINE #	SAMPLE #	WEIGHT (GRAMS)	SAMPLE DESCRIPTION / LOCATION	RESULTS
1	041111-003	1286	ENG. CAP FSS - SU1 - 004	^{137}Cs (5.50 pCi/gm) + BACKGROUND
2	041111-004	1378	ENG. CAP FSS - SU1 - 005	BACKGROUND
3	041111-005	1280	ENG. CAP FSS - SU1 - 007	BACKGROUND
4	041111-006	1301	ENG. CAP FSS - SU1 - 008	BACKGROUND
5	041111-007	1149	ENG. CAP FSS - SU1 - 010	BACKGROUND
6	041111-008	1296	ENG. CAP FSS - SU1 - 011	BACKGROUND
7	041111-009	1205	ENG. CAP FSS - SU1 - 013	BACKGROUND
8	041111-010	1393	ENG. CAP FSS - SU1 - 014	^{137}Cs (0.05 pCi/gm) + BACKGROUND
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P. Sull 04/11/11

8 SAMPLES TOTAL

ERP GAMMA ANALYSIS SUMMARY

C.O.C. # N/A
P. SULLIVAN 631 897-3202

COUNT DATE: **04/12/2011-B**

LINE #	SAMPLE #	WEIGHT (GRAMS)	SAMPLE DESCRIPTION / LOCATION	RESULTS
1	041211-007	1198	ENG CAP SU-1 FSS - 016	BACKGROUND
2	041211-008	916	ENG CAP SU-1 FSS - 017	^{137}Cs (0.09 pCi/gm) + BACKGROUND
3	041211-009	1077	ENG CAP SU-1 FSS - 018	BACKGROUND
4	041211-010	1121	ENG CAP SU-1 FSS - 020	BACKGROUND
5	041211-011	1023	ENG CAP SU-2 FSS - 028	BACKGROUND
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5 SAMPLES TOTAL

ERP GAMMA ANALYSIS SUMMARY

C.O.C. # N/A
P. SULLIVAN 631 897-3202

COUNT DATE: **04/20/2011-A**

LINE #	SAMPLE #	WEIGHT (GRAMS)	SAMPLE DESCRIPTION / LOCATION	RESULTS
1	042011-001	1051	ENG. CAP SU-2 029	BACKGROUND
2	042011-002	1084	ENG. CAP SU-1 012	BACKGROUND
3	042011-003	1109	ENG. CAP SU-1 009	BACKGROUND
4	042011-004	1128	ENG. CAP SU-1 006	BACKGROUND
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P. Sull 04/20/2011

4 SAMPLES TOTAL

ERP GAMMA ANALYSIS SUMMARY

C.O.C. # N/A
P. SULLIVAN 631 897-3202

COUNT DATE: **05/06/2011-B**

LINE #	SAMPLE #	WEIGHT (GRAMS)	SAMPLE DESCRIPTION / LOCATION	RESULTS
1	050611-022	955	ENG. CAP FSS F.D. OF #15	^{137}Cs (0.30 pCi/gm) + BACKGROUND
2	050611-023	913	ENG. CAP FSS SU1 - 015	^{137}Cs (0.35 pCi/gm) + BACKGROUND
3	050611-024	953	ENG. CAP FSS SU1 - 019	^{137}Cs (0.15 pCi/gm) + BACKGROUND
4	050611-025	908	ENG. CAP FSS SU2 - 030	BACKGROUND
5	050611-026	1226	ENG. CAP FSS F.B. SU-2	BACKGROUND
6	050611-027	1202	ENG. CAP FSS F.B. SU-1	BACKGROUND
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6 SAMPLES TOTAL

P. Sull 05/06/2011

Page 1 of 1

Requires EDD ☒

BROOKHAVEN
NATIONAL LABORATORY

SAMPLING CHAIN OF CUSTODY

P.O. #

Chain of Custody No. **31311**

Analysis Requested By	Sampling Contractor	Analytical Laboratory
Name: MIKE HOLLANDER	Name: DAN AQUE	Name: GEL
Life No: NG455 Ext. 4839	Contact: ERP RCT	Address: 2040 SAVAGE Rd.
Acct. No: 65280/65283 Dept: ERP	Phone: X 8252	City: Charleston St: SC Zip: 29407
Email Reports To:	Email/Fax:	Contact: HEATHER SHAFFER
1 hollander@bnl.gov	Sampler: SAME	Phone:
2 pizzulli@bnl.gov		Email/Fax:
Project Name:	Project Manager:	Field Engineer:
BGGR ENGINEERED CAP	Pizzulli	Pizzulli

Comments:

UiD	Smp	Coll	Site ID/Bldg/Life #	Depth/RWP	Date	Time	Matrix	Name/Description	Cont. Vol./Units	Cont. Type	# of Cont	Preservative	Alpha/Beta	Tritium	Gamma	Strontium	524.2	624	Nuclide-specific Alpha U-233/234, Pu-238/239, Am-241	PCBs	Metals Hg, Pb, Cu, Ni, Zn	Ni-63, C-14	
001	E	C	BNL/701/NG455	2.5	5/7/11	0830	S	BGGR ENGD CAP SU-1 COMP. (1-10 ALL)	500ml	P	1	NONE		✓	✓	✓			✓		✓	✓	
002	E	C	↓	↓	5/7/11	0850	↓	BGGR ENGD CAP SU-1 COMP. (11-20)	↓	↓	↓	↓		↓	↓	↓			✓		✓	✓	
003	E	C	↓	↓	5/7/11	0920	↓	↓ SU-2 COMP. (1-15)	↓	↓	↓	↓		↓	↓	↓			✓		✓	✓	
004	E	C	↓	↓	5/7/11	0950	↓	↓ SU-2 COMP. (16-20)	↓	↓	↓	↓		↓	↓	↓			✓		✓	✓	
005	E	G	↓	↓	3/26/11	1550	↓	BGGR ENGD CAP SU-2 # 001	↓	↓	↓	↓		↓	↓	↓							
006	E	G	↓	↓	3/26/11	1553	↓	↓ # 001 (DUP.)	↓	↓	↓	↓		↓	↓	↓							
007	E	G	↓	↓	5/5/11	1602	↓	SU-1 # 015	↓	↓	↓	↓		↓	↓	↓							
008	E	G	↓	↓	5/5/11	1600	↓	SU-1 # 015 (DUP.)	↓	↓	↓	↓		↓	↓	↓							
009	E	G	↓	↓	5/5/11	1615	↓	SU-2 FIELD BLANK	↓	↓	↓	↓		↓	↓	↓							
010	E	G	↓	↓	5/5/11	1620	↓	SU-1 FIELD BLANK	↓	↓	↓	↓		↓	↓	↓							

1 Relinquished By/Date/Time	2 Relinquished By/Date/Time	3 Relinquished By/Date/Time
Print MIKE HOLLANDER 5/9/11 0930	Print	Print
Signature [signature]	Signature	Signature
1 Received By/Date/Time	**2 Received By/Date/Time**	**3 Received By/Date/Time**
Print [illegible] 5/[illegible]	Print	Print
Signature [signature]	Signature	Signature

Contractor Lab Sample Disposal:
- ☐ Return To Client
- ☒ Disposal by Lab
- ☐ Archive For ______ Months

Data Package: ☐ Full ☒ Summary

Turn-Around Time Required:
- ☐ Rush (1 Day)
- ☐ 14 Days
- ☐ 30 Days
- ☒ 7 Days
- ☐ Other ( )

BNL F 3101E (rev. 7/10)

Distribution WHITE (1) - Stays with Sample; PINK (2) - Lab or Other GREEN (3) - Returned to Client with Report GOLDENROD (4) - Field Copy - (Sampler)

APPENDIX F

ORISE Independent Verification Report

ORISE
OAK RIDGE INSTITUTE FOR SCIENCE AND EDUCATION
Managed by ORAU for the U.S. Department of Energy

July 15, 2011

Ms. Terri Kneitel
U.S. Department of Energy
Brookhaven Site Office
53 Bell Avenue, Bldg. 464
Upton, NY 11973

DOE CONTRACT NO. DE-AC05-06OR23100
SUBJECT: TYPE A VERIFICATION REPORT FOR THE BROOKHAVEN GRAPHITE RESEARCH REACTOR ENGINEERED CAP, BROOKHAVEN NATIONAL LABORATORY UPTON, NEW YORK
DCN: 5098-SR-07-0

Dear Ms. Kneitel,

U.S. Department of Energy (DOE) Order 458.1 requires independent verification (IV) of DOE cleanup projects (DOE 2011). The Oak Ridge Institute for Science and Education (ORISE) has been designated as the responsible organization for IV of the Brookhaven Graphite Research Reactor (BGRR) Engineered Cap at Brookhaven National Laboratory (BNL) in Upton, New York. The IV evaluation may consist of an on-site survey (Type A Verification) or a document and data review (Type B Verification). DOE and ORISE determined that a Type A verification for the BGRR Engineered Cap was appropriate based on the initial survey unit classification, the walkover surveys, and the final analytical results provided by the Brookhaven Science Associates (BSA).

The BGRR Engineered Cap surveys began in December 2010 and were completed in May 2011. Survey activities by BSA included gamma walkover scans and sampling of asphalt, concrete, and underlying and excavated soils in accordance with the BSA Work Procedure (BNL 2011a). BSA obtained core samples at depths up to two feet from each survey unit prior to performing soil excavation. BSA then used the core sample results to bound the potential areas of contamination and the engineered cap. Additionally, the core samples were used to quantify the radionuclides of concern (ROC) and to provide an estimate of the potential volume of waste generated during remediation.

BSA stockpiled the excavated soils during remediation to be used as backfill once remediation was completed. Excavated soils were surveyed and sampled to minimize waste disposal volumes. Upon completion of remediation, and if the results of the stockpiled soils met the site cleanup goals, the remediated areas were backfilled using the excavated soils (BNL 2011a).

Gamma walkover scans conducted prior to the final status survey (FSS) identified two isolated soil locations with elevated radioactivity following the removal of concrete from the south side of Building 701 (BNL 2011b). Samples collected from these locations resulted in the removal of additional soil from each location. BSA's post-remediation walkover surveys were expanded to include a 10-foot radius around the excavated locations. Two post-remediation soil samples were collected and analyzed with onsite gamma spectroscopy equipment. These samples were also included with the FSS samples that were analyzed at an offsite facility for the primary ROCs (i.e., cesium-137, strontium-90, and radium-226) (BNL 2011b, c, and d). Analysis included full spectrum gamma spectroscopy and Sr-90 analysis for all samples. Alpha spectroscopy was performed for sample batches and liquid scintillation performed for tritium, carbon-14, and nickel-63 concentrations for FSS samples (BNL 2011e).

BSA submitted the FSS data and analytical results to demonstrate that remediation efforts complied with the specified cleanup goal of less than or equal to 15 millirem per year (mrem/yr) above background to a resident in 50 years (BNL 2011a). ORISE has reviewed the project documentation and FSS data for the BGRR Engineered Cap. The highest concentrations of the primary ROCs reported were 1.32 picocuries per gram (pCi/g) for Cs-137 and 2.03 pCi/g for Sr-90, with both ROCs having the qualifier for the sample result as less than the minimum detectable activity (MDA). For Ra-226, the highest detected concentration was 0.671 pCi/g. Other potential secondary contaminants were below their respective MDAs. Therefore, ORISE is of the opinion that BSA has provided sufficient evidence to demonstrate compliance with the 15 mrem/yr cleanup objectives.

Please contact me via my information provided below, or Evan Harpenau at (865) 241-8793, should you have any questions or require additional information.

Sincerely,

Phyllis C. Weaver
Health Physicist Project Manager
Survey Projects

PCW:bf/jc

Enclosure

cc: S. Roberts, ORISE/IEAV
T. Vitkus, ORISE/IEAV
E. Harpenau, ORISE/IEAV
E. Bailey, ORISE/IEAV
File/5098

Distribution approval and concurrence:	Initials
Technical Review	WCA

Voice: 865.576.5321 Fax: 865.241.3497 E-mail: Phyllis.Weaver@orau.org

P.O. Box 117 | Oak Ridge, TN 37831 | www.orise.orau.gov

TYPE A VERIFICATION REPORT FOR THE BROOKHAVEN GRAPHITE RESEARCH REACTOR ENGINEERED CAP BROOKHAVEN NATIONAL LABORATORY UPTON, NEW YORK

REFERENCES

Brookhaven National Laboratory (BNL). Work Procedure; *Final Status Survey (FSS) Procedure for the BGRR Engineered Cap, Rev. 1*. April 4, 2011a.

Brookhaven National Laboratory. Survey Data; *Remediation surveys during BGRR EC project*. May 26, 2011b.

Brookhaven National Laboratory. E-mail from M. Hollander (BNL) to E. Harpenau (ORISE); *Discrepancies with the BGRR Engineered Cap Data*. June 14, 2011c.

Brookhaven National Laboratory. E-mail from M. Hollander (BNL) to E. Harpenau (ORISE); *Fw: Engineered Cap Soil Samples (050311-008/009/001/002 and 003)*. June 15, 2011d.

Brookhaven National Laboratory. E-mail from M. Hollander (BNL) to P. Weaver (ORAU); *Brookhaven COC#31311 FSS – Follow Up Response*. July 12, 2011e.

U.S. Department of Energy (DOE). DOE Order 458.1, Chg 1, Radiation Protection of the Public and the Environment. Washington, DC. March 8, 2011.

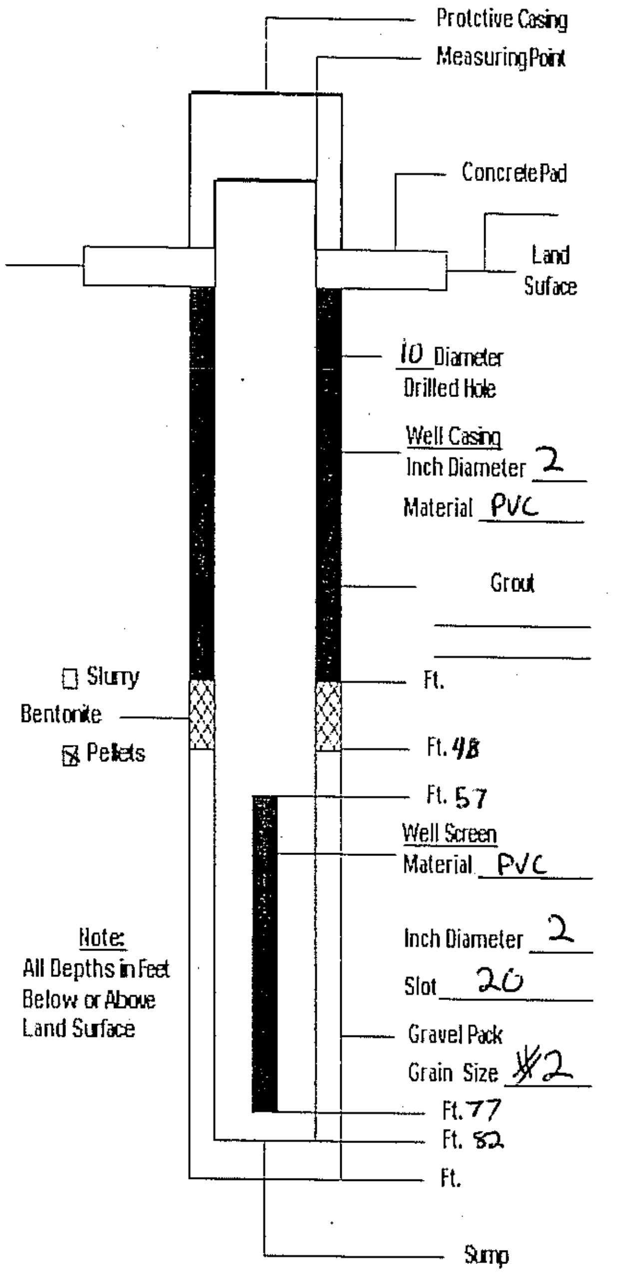
APPENDIX G

Monitoring Well Construction Logs

Attachment 3 – BNL Monitoring Well Construction Log

BROOKHAVEN
NATIONAL LABORATORY

MONITORING WELL CONSTRUCTION LOG



BNL Well No: BGRR-MW-01-2011

NYSDEC Permit No.:

Project: BGRR-CAP-MW Installation

Surveyor: Survey Date:

Land Surface Elevation:

Measuring Point Elevation:

BNL Northing: 258547.77

BNL Easting: 1294822.85

Installation Date: 4/7/11

Drilling Contractor: R+L Well Drilling LLC

Drilling Method: Hollow Stem Auger

Drilling Fluid: ——

Fluid Loss During Drilling: —— Gallons

Development Technique(s) and Date(s): Grundfos Pump 4/11/11

Water Removed During Development: 50 Gallons

Static Depth to Water: 68.3 Feet below M.P.

Pumping Depth to Water: Feet below M.P.

Pumping Duration: 25 min

Yield: GPM: 2 Date: 4/11/11

Specific Capacity: GPM/Ft.

Well Purpose: MW

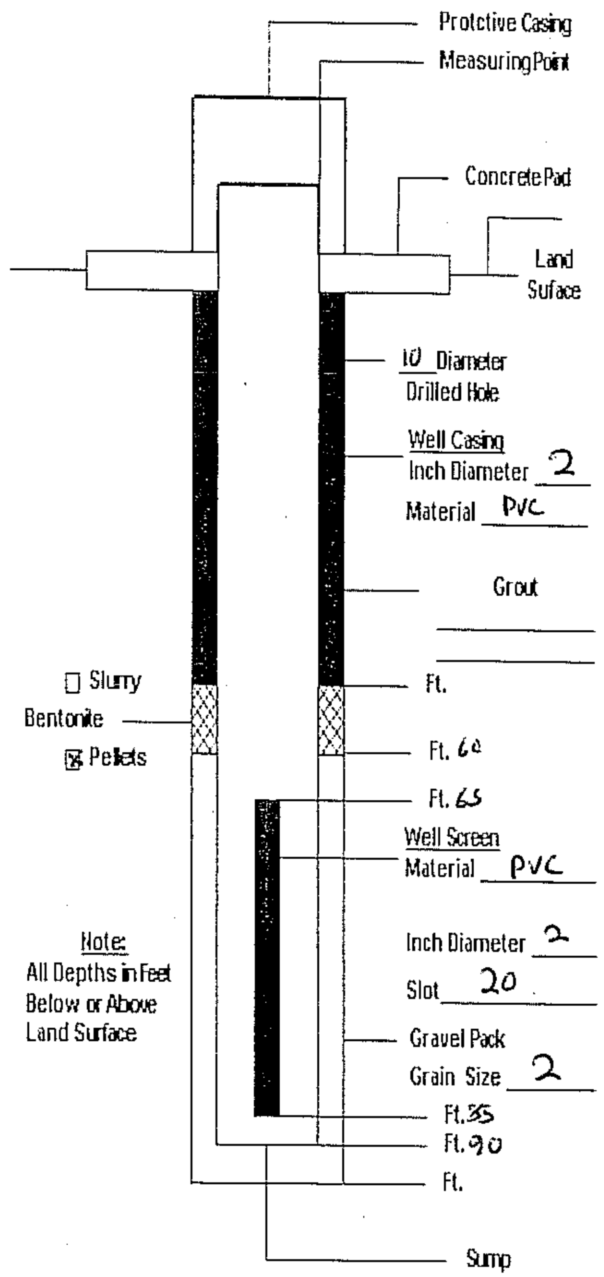
Hydrologist: Nicc Johnson

Company Name: P.W. Grosser

Attachment 3 – BNL Monitoring Well Construction Log

BROOKHAVEN
NATIONAL LABORATORY

MONITORING WELL CONSTRUCTION LOG



BNL Well No: BGRR-MW-02-2011

NYSDEC Permit No.:

Project: BGRR-CAP-MW-Installation

Surveyor: Survey Date:

Land Surface Elevation:

Measuring Point Elevation:

BNL Northing: 258456.92

BNL Easting: 1294825.43

Installation Date: 4/6/11

Drilling Contractor: R+L Drilling

Drilling Method: Hollow Stem Auger

Drilling Fluid: ——

Fluid Loss During Drilling: —— Gallons

Development Technique(s) and Date(s): Grundfos Pump 4/11/11

Water Removed During Development: 60 Gallons

Static Depth to Water: 78 Feet below M.P.

Pumping Depth to Water: Feet below M.P.

Pumping Duration: 30 min

Yield: GPM: 2 Date: 4/11/11

Specific Capacity: GPM/Ft.

Well Purpose: MW

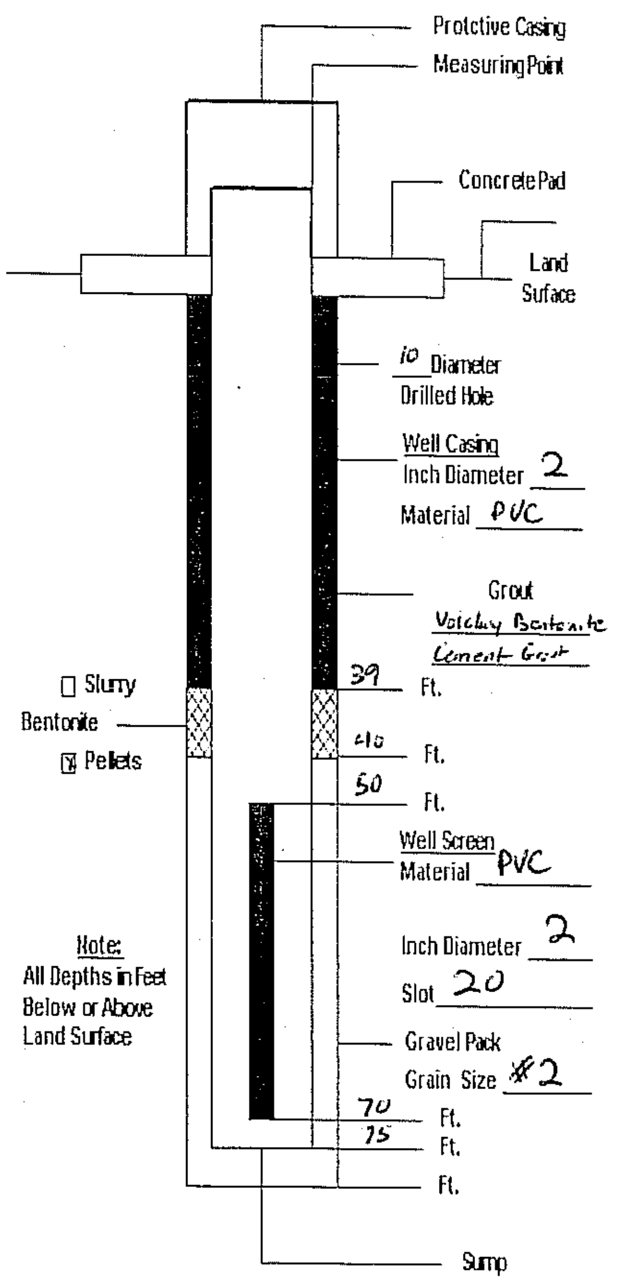
Hydrologist: Nice Johnson

Company Name: P.W. Grosser

Attachment 3 – BNL Monitoring Well Construction Log

BROOKHAVEN
NATIONAL LABORATORY

MONITORING WELL CONSTRUCTION LOG



BNL Well No: BGRR-MW-03-2011

NYSDEC Permit No.:

Project: BGRR-CAP-MW-Installation

Surveyor: Survey Date:

Land Surface Elevation:

Measuring Point Elevation:

BNL Northing: 258407.11

BNL Easting: 1294790.41

Installation Date: 3/31/11

Drilling Contractor: R+L Well Drilling LLC

Drilling Method: HSA

Drilling Fluid: ——

Fluid Loss During Drilling: —— Gallons

Development Technique(s) and Date(s): Grundfos Pump 4/1/11

Water Removed During Development: 50 Gallons

Static Depth to Water: 62.1 Feet below M.P.

Pumping Depth to Water: Feet below M.P.

Pumping Duration: 30min

Yield: GPM: 1.75 Date: 4/11/11

Specific Capacity: GPM/Ft.

Well Purpose: MW

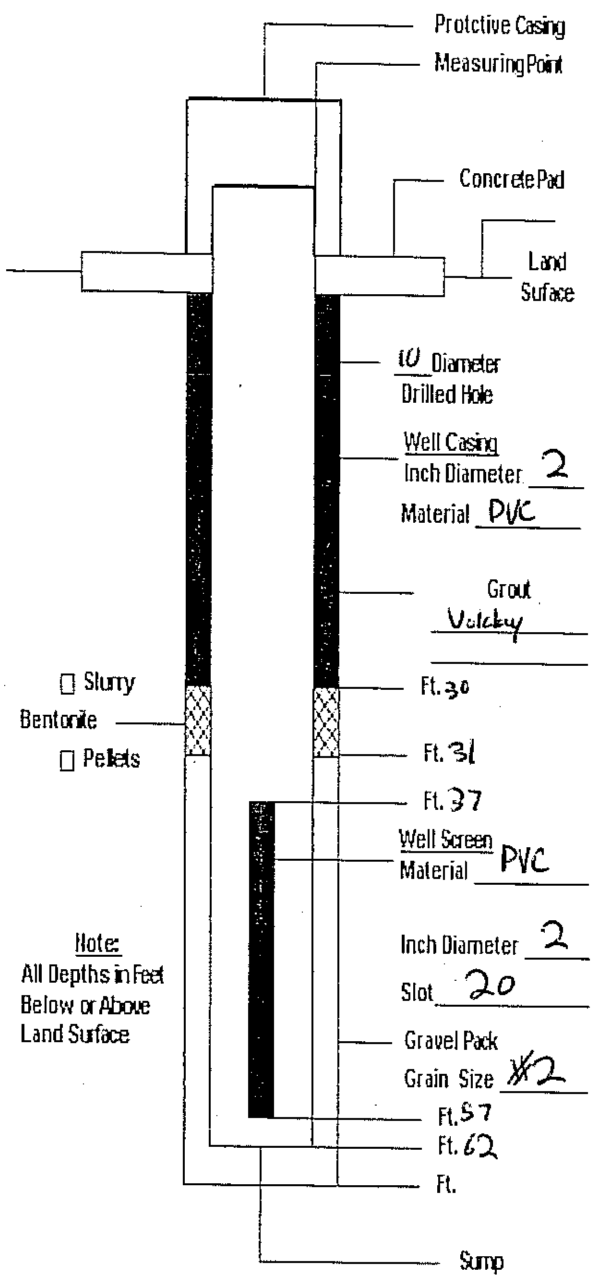
Hydrologist: Brian Barth

Company Name: P.W. Grosser Consulting

Attachment 3 – BNL Monitoring Well Construction Log

BROOKHAVEN
NATIONAL LABORATORY

MONITORING WELL CONSTRUCTION LOG



BNL Well No: BGRR-MW-04-2011

NYSDEC Permit No.:

Project: BGRR-CAP-MW-Installation

Surveyor: Survey Date:

Land Surface Elevation:

Measuring Point Elevation:

BNL Northing: 258909.97

BNL Easting: 1294564.35

Installation Date: 4/4/11

Drilling Contractor: R+L Well Drilling LLC

Drilling Method: Hollow Stem Auger

Drilling Fluid: —

Fluid Loss During Drilling: — Gallons

Development Technique(s) and Date(s): Grundfos Pump 4/11/11

Water Removed During Development: 60 Gallons

Static Depth to Water: 48.5 Feet below M.P.

Pumping Depth to Water: Feet below M.P.

Pumping Duration: 40 min

Yield: GPM: 1.5 Date: 4/11/11

Specific Capacity: GPM/Ft.

Well Purpose: MW

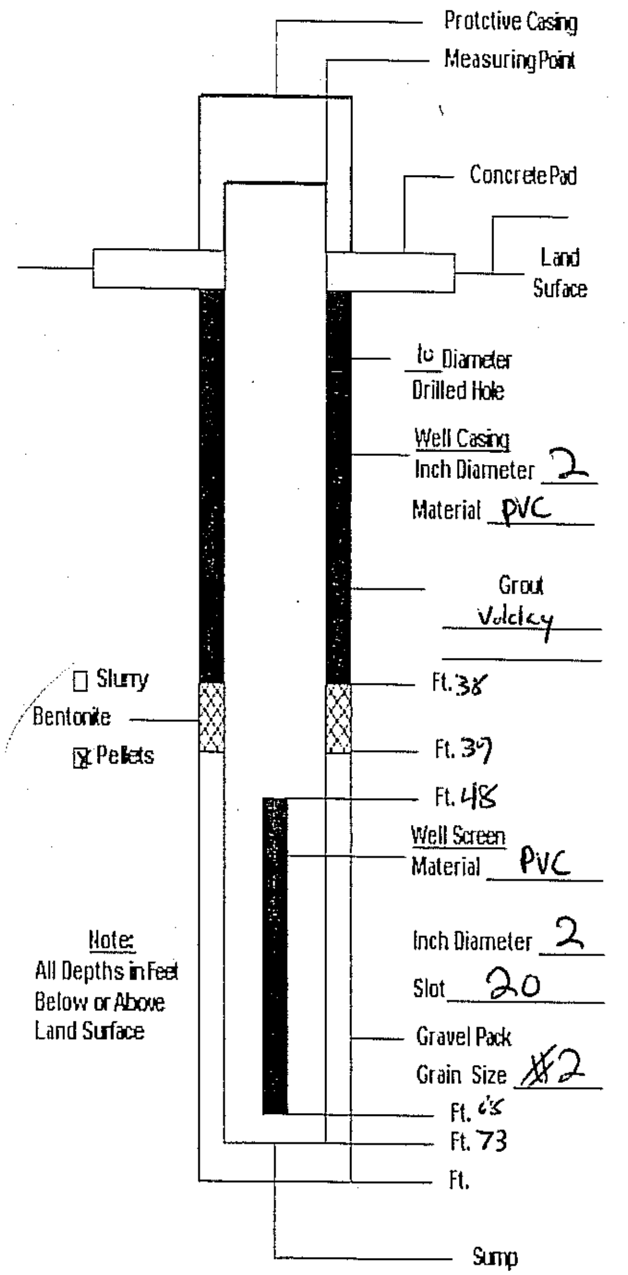
Hydrologist: Nicc Johnson

Company Name: PW Grosser

Attachment 3 – BNL Monitoring Well Construction Log

BROOKHAVEN
NATIONAL LABORATORY

MONITORING WELL CONSTRUCTION LOG



BNL Well No: BGRR-MW-05-2011

NYSDEC Permit No.:

Project: BGRR-CAP-MW-Installation

Surveyor: Survey Date:

Land Surface Elevation:

Measuring Point Elevation:

BNL Northing: 258398.11

BNL Easting: 1294688.14

Installation Date: ~~3/31~~ 3/30/11

Drilling Contractor: R+L Well Drilling LLC

Drilling Method: Hollow Stem Auger

Drilling Fluid: ——

Fluid Loss During Drilling: —— Gallons

Development Technique(s) and Date(s): Grundfos Pump 4/11/11

Water Removed During Development: 50 Gallons

Static Depth to Water: 60.5 Feet below M.P.

Pumping Depth to Water: Feet below M.P.

Pumping Duration: 25min

Yield: GPM: 2 Date: 4/11/11

Specific Capacity: GPM/Ft.

Well Purpose: MW

Hydrologist: Nicc Johnson

Company Name: P.W. Grosser