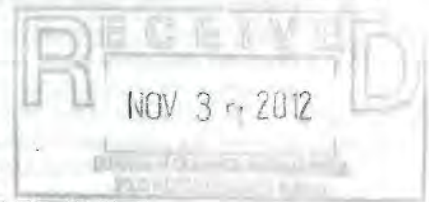




For Office Use Only:	
WMD Log #:	_____
Date Rec'd.:	_____
No. of Copies:	_____
Fee: \$	_____ / Check # _____



**APPLICATION FORM FOR
TYPE I MODIFICATION
TO SOLID WASTE MANAGEMENT
FACILITY PERMIT**

pursuant to
RSA 149-M and New Hampshire Administrative Solid Waste Rule Env-Sw 315

SECTION I. FACILITY IDENTIFICATION

(1)	Facility name: Merrimack Station Coal Ash Landfill
(2)	Functional classification: <input type="checkbox"/> collection/storage/transfer <input type="checkbox"/> processing/treatment <input checked="" type="checkbox"/> landfill
(3)	Mailing address: Public Service of NH, 780 North Commercial Street, P.O. Box 330, Manchester, New Hampshire 03105
(4)	Permit number: DPHS-SW-85-012
(5)	Location, by street address and municipality: 95 Johnson Road, Bow, New Hampshire

SECTION II. PERMITTEE IDENTIFICATION

(1)	Permittee/applicant name: Public Service of New Hampshire		
(2)	Mailing address: Same as above		
(3)	Telephone number:		
(4)	If different than above, identify the individual associated with and designated by the permittee/applicant to be the contact individual for matters concerning this application:		
	(a) Name: Allan Palmer	(b) Title: Senior Engineer	
	(c) Mailing address: 780 North Commercial Street, P.O. Box 330, Manchester, New Hampshire 03105		
	(d) Telephone number: 603-634-2439	(e) E-Mail: allan.palmer@nu.com	

SECTION III. DESCRIPTION OF PROPOSED MODIFICATION

Describe the proposed modification by answering each of the following questions. Use additional paper as necessary.

(1)	Provide a BRIEF description of the proposed modification. [Check box if response is provided on separate paper <input checked="" type="checkbox"/>		
(2)	Identify whether the proposed modification is a "type I-A" or "type I-B" modification. (If uncertain, use the worksheet provided with the instructions for this form): <input type="checkbox"/> Type I-A <input checked="" type="checkbox"/> Type I-B		
(3)	Identify, either below or on separate paper, each written permit condition that will require amendment to effect the proposed modification and provide draft language for the same. [Check box if response is provided on separate paper <input type="checkbox"/>		
	We are not aware of any conditions requiring amendment.		
(4)	Identify, below, each "last approved plan of record" identified in the permit which will be affected by the proposed modification and will therefore require amendment/revision:		
	Check here if affected	TYPE OF PLAN	DES APPROVAL DATE
	<input type="checkbox"/>	Facility design plans/specifications	
	<input checked="" type="checkbox"/>	Facility operating plan	
	<input checked="" type="checkbox"/>	Facility closure plan	
	<input type="checkbox"/>	Facility financial assurance plan	
	<input type="checkbox"/>	Other plan (specify):	
			WMD LOG # (Find this number on your copy of the approval)

SECTION VIII. OTHER PERMITS

Complete the following table to identify and provide the status of all other permits or approvals necessary to effect the proposed modification.

Type of Permit/Approval Required	Date the Application was/will be Submitted	Status/Comments
None known		

SECTION IX. LEGAL NOTICES

Submit proof of having provided certain legal notifications and filings, as follows:

- (1) You must send by certified mail, or deliver in hand, a complete copy of this application to the host municipality, host solid waste management district and other affected entities, with a "notice of filing," as specified by Env-Sw 303.
- (2) For a type I-A modification, you must send by certified mail, or deliver in hand, a "notice of filing" to each owner of property abutting the facility site, as specified by Env-Sw 303. If the applicant/permittee or the owner of the facility site owns any abutting parcel of land, the "notice of filing" must be sent to the owner(s) of the next parcel(s) not owned by the permittee/applicant or facility site owner.
- (3) You must also provide a "notice of filing" to the New Hampshire Department of Justice/Office of the Attorney General (NH DoJ/AGO) if, pursuant to Section X(2) of this form, you are required to submit business and personal disclosure information.
- (4) You must attach to this application "proof" that notification has been provided as required by (1) through (3) above. Therefore, attach a copy of the notice(s) of filing and the signature(s) of all required recipients, acknowledging receipt.

SECTION X. CERTIFICATION OF COMPLIANCE/COMPLIANCE REPORT

All applications for permit modification must be submitted with either certification of compliance or a compliance report, as follows:

- (1) If you are ABLE to certify that each of the statements numbered (1) - (8) below are true, do so by your signature.
- (2) If you are UNABLE to certify that each of the statements numbered (1) - (8) below are true, you must:
 - Prepare and submit a separate Compliance Report as specified by Env-Sw 303.15; and
 - If the proposed modification involves a change in organizational structure, or a change in individuals/entities holding 10% or more of the permittee's debt or equity, or a change in officers, directors, partners or key employees, none of which constitutes a change in operational control of the facility or a change in ownership per Env-Sw 315.02(f), also submit completed "business and personal disclosure forms" for each non-compliant individual and entity involved in the change. Obtain the required forms from the P&DRS at (603) 271-2925. Submit the completed forms, with the notice of filing referenced by Section IX(3) of this form and a copy of the Compliance Report, direct to the New Hampshire Department of Justice/Office of Attorney General, Environmental Protection Bureau, 33 Capitol Street, Concord, NH 03301-6397. [Note: Copies of the completed disclosure forms should NOT be attached to this application when it is submitted to DES or to the host municipality, host solid waste management district and other effected entities, pursuant to Section IX(1) above. Only the NH DoJ/AGO should receive copies of the disclosure forms].

COMPLIANCE STATEMENT

The applicant shall certify that each of the statements listed in (1)-(8) below are true for each of the following individuals and entities:

- The applicant, and
- The facility owner, and
- The facility operator, and
- All individuals and entities holding 10% or more of the applicant's debt or equity, and
- All of the applicant's officers, directors, and partners, and
- All individuals and entities having managerial, supervisory or substantial decision making authority and responsibility for the management of the facility operations or the activity(s) for which approval is being sought.

- (1) No individual or entity listed above has been convicted of or plead guilty or no contest to a felony in any state or federal court during the 5 years before the date of the application.
- (2) No individual or entity listed above has been convicted of or plead guilty or no contest to a misdemeanor for a violation of environmental statutes or rules in any state or federal court during the 5 years before the date of the application.
- (3) No individual or entity listed above has owned or operated any hazardous or solid waste facility which has been the subject of an administrative or judicial enforcement action for a violation of environmental statutes or rules during the 5 years before the date of the application.

Type I-B Permit Modification Application
Supplemental Information
Merrimack Station Coal Ash Landfill
Bow, New Hampshire
Permit No. DPHS-SW-85-012

SECTION III: DESCRIPTION OF PROPOSED MODIFICATION

1. Brief Description of Proposed Modification

Public Service of New Hampshire (PSNH) owns and operates the Merrimack Station Coal Ash landfill as a disposal facility for ash generated at the Merrimack Station electrical generation facility in Bow, New Hampshire. With this modification, PSNH is proposing to modify the cover system to be constructed in those portions of the landfill that have not yet received final cover.

2. Demonstration that the Proposed Modification Meets the Applicable Requirements of the Solid Waste Rules

The current approved cover system consists of 12 inches of Sand Bedding overlain by 36-mil Hypalon geomembrane, which is in turn overlain by 18 inches of Sand Cover and 4 inches of topsoil. The cover system proposed to be used in the remainder of the landfill includes the following layers in vertically ascending order:

- 12 inches of Sand Bedding;
- 40-mil textured high density polyethylene (HDPE) geomembrane;
- Drainage geocomposite;
- 12 inches of Sand Cover;
- 6 inches of Moisture Retention Soil; and
- 4 inches of topsoil, which is fertilized and seeded.

Cover section details are provided on Sheets 1 and 2 prepared by Sanborn, Head and Associates, Inc. (Sanborn Head) and included in Appendix A of the Closure Plan. Technical specifications for the closure construction work are included in Appendix B of the Closure Plan.

The proposed cover system is being revised to meet the requirements of the solid waste rules and represents an improvement over the currently approved cover system. The Sand Bedding is a granular soil with 100 percent of the material passing a 1-inch sieve. The 36-mil Hypalon in the current cover system is proposed to be replaced with 40-mil textured HDPE. HDPE geomembrane is more commonly used in landfill applications, and the 40-mil thick material satisfies the requirements of Env-Sw 805.10 (e)(3)(b). Textured geomembrane is proposed to enhance stability.

(2) The effect the modification will have on the environment, public health and safety;

As discussed in Section V, the proposed modification represents an improvement in the cover system for the landfill and in that way, should have a positive effect on the environment, public health and safety.

(3) The effect the modification will have on the state's ability to achieve the goals and objectives specified in RSA 149:M:2;

The modification does not affect the state's ability to achieve the goals and objectives specified in RSA 149:M:2.

(4) The effect the modification will have on establishing and maintaining integrated waste management systems consistent with the hierarchy of waste management methods in RSA 149-M:3;

The modification does not involve operational changes that affect the hierarchy of waste management methods in RSA 149:M:3.

(5) Information that demonstrates that the facility, as modified, will be consistent with the state solid waste management plan and the applicable district plan, pursuant to RSA 149-M:12, 1(b);

The proposed modification will not affect the facility in relation to the state solid waste management plan or district plans in that no changes to facility capacity, accepted waste type or facility service area are proposed.

TABLE OF CONTENTS

1.0	FACILITY IDENTIFICATION	1
2.0	AUTHORIZED AND PROHIBITED WASTE	1
2.1	Authorized Waste	1
2.2	Prohibited Waste	2
3.0	ROUTINE OPERATIONS PLAN	2
3.1	General	2
3.1	Management Organization	3
3.2	Hours of Operation	3
3.3	Access	3
3.4	Ash Management.....	4
3.5	Fill Sequence Plan	4
3.6	Equipment	4
3.7	Leachate Management Plan	4
3.7.1	Leachate Collection System.....	4
3.7.1.1	1986 System	4
3.7.1.2	Station 4+00 to 8+00 (End Berm).....	5
3.7.2	Leachate Quantities	5
3.7.3	Leachate Removal and Processing.....	6
3.8	Surface Water Management.....	6
4.0	RESIDUAL WASTE MANAGEMENT PLAN	7
5.0	FACILITY MAINTENANCE, INSPECTION AND MONITORING PLAN	7
5.1	Inspections	7
5.2	Groundwater Monitoring Program.....	7
5.3	Leachate Analysis.....	7
5.4	Gas Vent Monitoring.....	7
5.5	Closure and Post Closure Monitoring	8
6.0	CONTINGENCY PLAN.....	8
6.1	General	8
6.2	Leachate.....	9
6.3	Other Contingency Events	9
6.3.1	Fire	9
6.3.2	Explosion.....	9
6.3.3	Operator Injury.....	9
6.4	Identification of Emergency Contacts.....	10
7.0	EMPLOYEE TRAINING	10
8.0	RECORDKEEPING AND REPORTING	10
8.1	Operating Records.....	10
8.2	Reporting Requirements.....	11
8.3	Annual Report	12

1. Flyash, bottom ash and slag;
2. Dewatered Wastewater Treatment Facility sludge;
3. Ash pond dredgings;
4. Waste coal and soil contaminated coal;
5. Waste demineralizer resins;
6. Waste activated carbon from well water filters;
7. Waste limestone and waste gypsum;
8. Catch basin grit;
9. Intermittent and minor quantities of construction and demolition debris; and
10. Intermittent and minor quantities of waste sandblasting grit that pass metals limits per TCLP.

Additional wastes have been disposed of at the site occasionally, when authorized by the NHDES. These wastes include:

1. Flyash, bottom ash and slag produced while co-firing refuse derived fuel (RDF); and
2. Spent silica gel, a drying agent used in air and hydrogen systems.

The site has also been authorized to dispose of coal ash from Schiller Station, on a contingency basis. Use of the Merrimack Station facility in this manner requires prior notification to the NHDES.

2.2 Prohibited Waste

The following materials are unacceptable and may not be disposed of at the landfill:

1. No oil ash or oil ash sludges;
2. No liquid wastes;
3. No oil-contaminated wastes;
4. No rubbish, garbage or putrescible wastes;
5. No asbestos or asbestos-contaminated wastes;
6. No solvent-contaminated wastes; and
7. No PCBs, toxic, chemical or hazardous wastes.

3.0 ROUTINE OPERATIONS PLAN

3.1 General

This plan provides an outline of the procedures for the operation of the landfill. Operations are outlined to be environmentally sound, in accordance with the standards, regulations, and guidelines of the NHDES Waste Management Division.

Specific information is presented herein on waste delivery, handling and placement, compaction, cover systems, staffing and general maintenance, site management, leachate management and other issues.

Merrimack Station Coal Ash Landfill

Bow, New Hampshire

Permit No. DPHS-SW-85-12

Last Revised November 21, 2012

Page 2 of 12

3.4 Ash Management

Merrimack Station positions dumpsters at specific locations to collect coal ash, e.g., beneath the SCR hoppers. Only these dumpsters and ash vacuum trucks are routinely accepted at the landfill. All other wastes, e.g., waste slag, are managed on a case-by-case basis to control the flow and monitor the waste stream. The Facilities Supervisor is responsible for monitoring all transportation of wastes from the station to the landfill, and has complete authority to reject prohibited waste. Each load is recorded on the log maintained at the landfill by the Facilities Supervisor. All wastes are directly disposed of in the landfill within the grades shown on the drawing located in Appendix A. There is no temporary storage or treatment of the coal ash prior to landfiling.

3.5 Fill Sequence Plan

Trucks enter through a gate on the west side of the landfill and drive down to the landfill base or onto a working lift elevation. The liner cover at the perimeter of the landfill is a minimum of 4 feet thick in the area where trucks drive. Care is taken so that sufficient fill materials are located between the equipment and liner, and equipment does not operate within 18 inches of the liner. The trucks dump their loads in a designated work area, and periodically a loader or dozer places the ash on top of the active lift. Lifts are constructed in 10 to 20 foot heights and compacted by equipment traffic. The toe of the ash fill is safely maintained within the cell division berm.

For filling above the perimeter grades of the landfill, a similar filling method is employed. Trucks drive to the top of the landfill as near to the active fill area as possible and a dozer or loader grades the ash to the final landfill slopes. Alternative filling procedures may occasionally be necessary to properly locate ash and achieve design grades. Site access is sometimes achieved through a gate on the east side of the landfill. On a weekly basis, sand cover is layered over the recently placed ash.

3.6 Equipment

Typical equipment required to operate the site include front end loaders and bulldozers. These machines have the flexibility for grading, providing compaction, placing the cover, and operating during inclement weather. During construction of final cover, additional equipment may be required and may be contracted as necessary.

3.7 Leachate Management Plan

3.7.1 Leachate Collection System

3.7.1.1 1986 System

The leachate collection system for the portion of the landfill constructed to Station 4+00 consists of a single, 36-mil Hypalon liner overlain by drainage sand. Grades at the base of the original lined landfill are nearly flat. Leachate drains into a leachate pipe located in a trench which extends approximately 5 feet below the surrounding base of the landfill in the

3.7.3 Leachate Removal and Processing

Leachate collected within the portion of the landfill constructed up to Station 4+00 (1986) drains to the fiberglass 4,500-gallon tank. Leachate collected within the active cells from Station 4+00 through the remainder of the landfill drains to the two 6,000-gallon steel tanks. Leachate levels in the tanks are monitored and recorded on a daily basis, Monday through Friday. A precipitation gauge is also monitored and recorded. Tank level readings are measured from a fixed reference point marked on the tank access manway. The leachate levels are recorded in terms of actual site elevations so that head build-up on the liner can be monitored. The Contingency Measures specified in Section 6.2 will be implemented whenever leachate backs up on the liner.

Leachate is pumped from the underground holding tanks into tanker trucks and transported to the Merrimack Station Wastewater Treatment Facility for treatment and discharge. Tankers are available as required and the tanks are pumped down to a level that leaves adequate capacity for the average daily leachate flow. Both sets of leachate collection tanks are equipped with high level sensors that are connected to an alarm in the Merrimack Station Control Room. The control room is manned 24 hours per day, 365 days per year. On a monthly basis the tank level sensors are inspected and the functionality of the alarm is tested. On an annual basis, the Instrumentation & Controls Department inspects the systems and calibrates the equipment. If the alarm is activated, operators follow a notification procedure that initiates the Contingency Measures specified in Section 6.2. Treatment at the wastewater treatment facility includes settling, metals precipitation and pH adjustment. The treated leachate is discharged in compliance with the Station's NPDES permit.

3.8 Surface Water Management

A primary objective in the development of the landfill is to limit the generation of leachate. To achieve this objective, cell separation berms have been incorporated in the landfill to reduce the exposed area. Clean surface water runoff which falls in constructed, but inactive cells, is directed from the cell through the perforated pipe and discharges to the south either through the perforations in the pipe or at the discharge of the pipe to the south of the constructed portion of the landfill. Surface water runoff infiltrates into the granular soils to the south of the active fill area.

Surface water runoff from the capped portion of the landfill flows as sheet flow from the cap. As the landfill is closed, a swale will be provided as necessary to reduce the overland flow distance down the 4H:1V final slopes. The swale will be constructed around the northwest and south sides of the landfill and will drain to the north and south from a high point located on the west slope of the landfill. The flow to the north of the landfill will be directed to a depression which currently receives sheet flow runoff. The flow to the south will be directed to an existing infiltration area located beyond the landfill area.

1995. Based upon the findings and the nature of the waste materials, PSNH does not plan to perform gas monitoring or install additional gas vents.

5.5 Closure and Post Closure Monitoring

As ash disposal progresses, previously filled areas will reach final grades and will be ready for capping. The proposed final landfill grades are shown on the Closure Plan, Sheet MK-S-7.2. Final landfill slopes will be constructed not steeper than 4H:1V and the maximum elevation of the landfill is proposed to be about 305 feet. Stormwater runoff from the capped landfill is discussed in Section 3.8.

The landfill will be capped as areas are filled to final grades. Final closure will occur when the facility is filled to the permitted capacity or at the time the owner determines the site will no longer be utilized for disposal purposes. Procedures outlined in the Closure Plan will be enacted and the Post-Closure Plan will be initiated upon completion. PSNH maintains an escrow account to ensure the Closure and Post-Closure activities are properly managed.

6.0 CONTINGENCY PLAN

6.1 General

In addition to PSNH's Corporate Safety Program (see NU Employee Safety and Health Handbook located at <http://nunet.nu.com/T2AllPurpose.aspx?id=4294979834>), the following safety rules apply to the site:

1. Maintain maximum slopes at no steeper than 1 horizontal to 1 vertical (1H:1V). The front end loader, bulldozer or other equipment are not to be operated on steeper slopes;
2. Compact waste materials periodically to a level sufficient to promote site stability; and
3. The following steps shall be taken to protect the safety of personnel or persons unauthorized to enter the landfill site;
 - a. Landfill access gates shall be locked at all times unless an operator is present.
 - b. No trespassing signs shall be maintained on the peripheral fence at intervals not to exceed 300 feet.

The integrity of the peripheral fence shall be maintained or other security measures taken at all times.

All individuals working on-site are required to carry a cell phone or to have other means of communication such as a portable radio. Standard emergency response practices will be taken in response to on-site injury, including calling 911 and making arrangements as necessary to transport the injured party to a health care facility.

6.4 Identification of Emergency Contacts

In the event of an emergency event at the landfill, the following contacts will be made, as appropriate:

Bow Police Department:	(603) 228-0511 <u>or</u> 911
Bow Fire Department:	(603) 228-4320 <u>or</u> 911
PSNH Contact:	(603) 224-4081, extension 4140 or 4142
NHDES WMD Compliance Section:	(603) 271-2900

7.0 EMPLOYEE TRAINING

All landfill employees will receive the appropriate training, as relevant for that employee's responsibilities. Landfill operators will be licensed through the NHDES Solid Waste Facility Operator Training and Certification program as a Level IV operator/manager. The landfill is a Level IV facility per Env-Sw 1602.08. The operators will be required to be licensed in accordance with the State's Certification program and renew their operator certification annually.

All operators and supervisors should be familiar with all aspects of operations, including both routine and contingency actions, monitoring and inspections, and record keeping.

The following PSNH employees shall be NHDES-certified Solid Waste Operators; the Facilities Supervisor, the Chemical Department Supervisor, and a Generation Engineer, to ensure proper management of the facility. Equipment operators are trained in accordance with standard company policy.

8.0 RECORDKEEPING AND REPORTING

8.1 Operating Records

PSNH shall compile and maintain records at the facility which document all phases of facility operations, including the following information:

1. Identification of all facility operator(s) by name, address, certificate number, and date(s) of employment at the facility;
2. Quantity, type, and source of all waste received by the facility;
3. Quantity, type, and destination of all waste generated by the facility, if any, including bypass waste and residual waste;
4. Quantity and discharge of leachate, by location, separate records will be maintained for each system, including;
5. Leachate levels measured in the leachate collection tanks; and
6. Leachate quantities transported to the Wastewater Treatment Facility.
7. Quantity, type, and destination of all certified waste-derived products produced by the facility, if any;
8. Record of inspections, maintenance, and repairs;

8.3 Annual Report

An annual report shall be submitted to the department in duplicate for each year of operation and each year of the post-closure monitoring and maintenance period. Each copy of the annual report shall be signed by an authorized official. The signature affirms that the material and information submitted is complete to the best of their knowledge and belief. A copy of the report will be maintained in the landfill records.

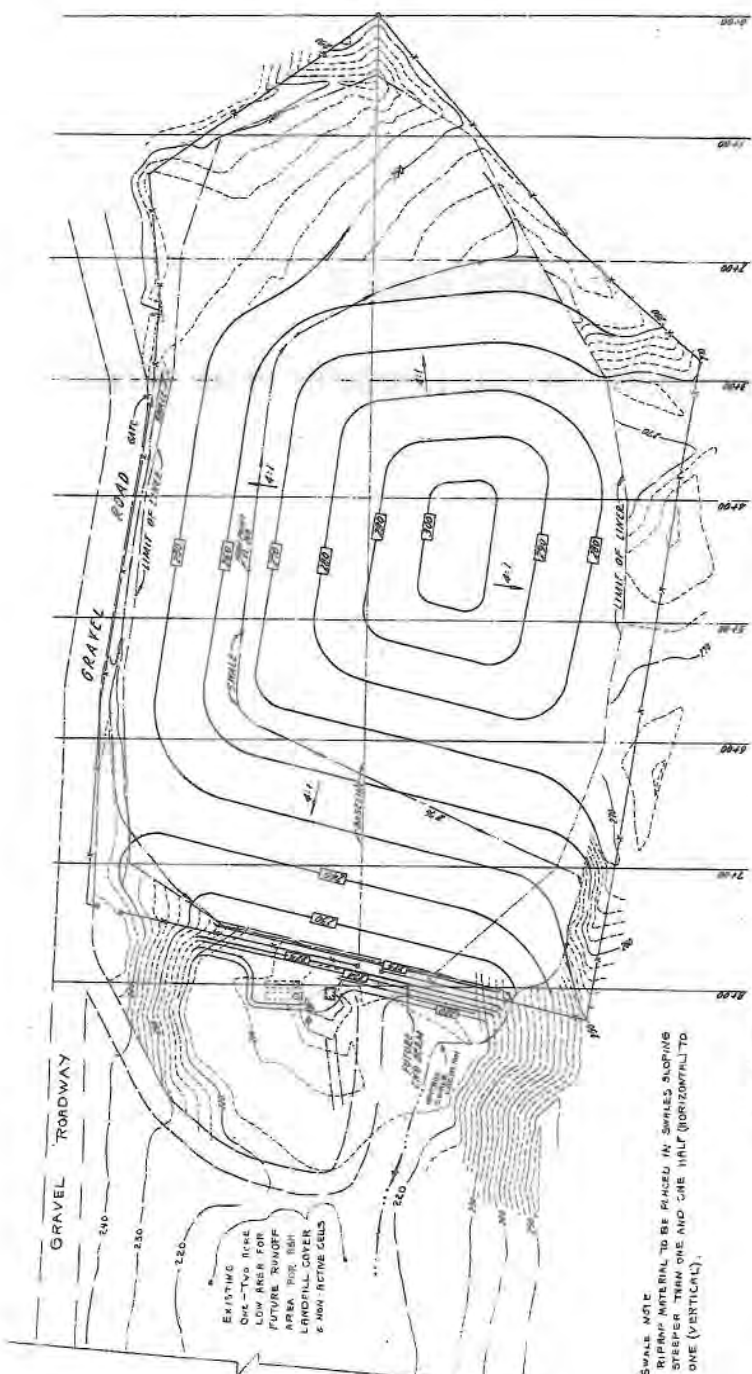
The report shall consist of the Annual Facilities Report for Landfill Facilities provided annually by the NHDES. The annual report shall contain the following information:

1. Facility information, including facility name, location by street and municipality, and permit number;
2. Permittee information, including name, address, email address, and telephone number of the permittee;
3. Facility status, including analysis of remaining capacity based on site survey which identifies the remaining facility capacity;
4. Contact information, including name, address, email address, and telephone number of the contact;
5. Signature;
6. Operator information, including name, address, telephone number, and certification number and expiration date of each operator;
7. Recycling information, as applicable;
8. Waste acceptance information, including type, tonnage, and source of all waste received by the facility;
9. A summary and assessment of environmental monitoring performed at or for the facility, whether required by the solid waste rules or the permit or undertaken voluntarily; and
 - a. Summary of leachate management system monitoring; and
 - b. Summary of groundwater quality monitoring.
10. A discussion, pursuant to Env-SW 1105.13(k), of how facility operations satisfied the public benefit requirements specified in the permit.

If monitoring information was already reported in writing to the NHDES during the calendar reporting year, then it need not be submitted in the annual report if a written statement is provided which identifies:

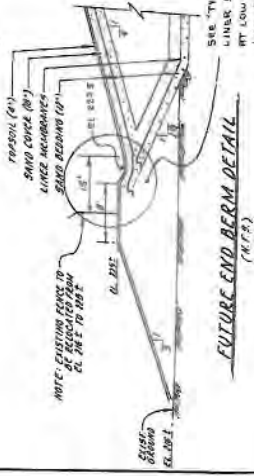
1. nature of information already submitted;
2. date the information was submitted;
3. title of document containing information; if applicable; and
4. name of person who submitted information

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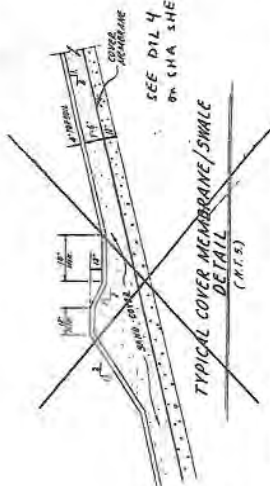
SWALE NOTE
 RIPRAP MATERIAL TO BE PLACED IN SWALES SLOPING
 STEEPER THAN ONE AND ONE HALF (HORIZONTAL) TO
 ONE (VERTICAL).

EXISTING ONE-TWO RISE
 LOW AREA FOR
 FUTURE RUNOFF
 AREA FOR FISH
 LANDFILL COVER
 & NOW ACTIVE CELLS



FUTURE END BEAM DETAIL
 (N.T.S.)

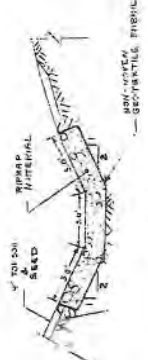
SEE TYPICAL MEMBRANE
 LINER SYSTEM & ANCHORAGE
 AT LOW JOINT FOR DETAILS
 (N.S.-5-10)



TYPICAL COVER MEMBRANE SWALE DETAIL
 (N.T.S.)

SEE DIL 4
 ON CIVIL SHEET #10

NOTES:
 1) BOTTOM MEMBRANE NOTE: FROM STREAM 2'-18" TO THE END BEAM, EXISTING ANCHORAGE MEMBRANE SHALL BE
 RECONSTRUCTED AT PLACE OF THE SWALE ANCHORAGE MEMBRANE AT 18" IN THE FUTURE.
 2) COVER MEMBRANE SWALE: FROM STREAM 2'-18" TO THE END BEAM, ANCHORAGE MEMBRANE SHALL BE
 RECONSTRUCTED AT PLACE OF THE SWALE ANCHORAGE MEMBRANE AT 18" IN THE FUTURE.



LINED RIPRAP SWALE
 (N.T.S.)

NO.	DESCRIPTION	DATE	BY	CHECKED	APPROVED
1	DESIGN				
2	DRAWING				
3	CHECKED				
4	APPROVED				

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
 DIVISION OF WATER

2007 REVISED

3/1/03

Bob Stuchwick

PSNY PUBLIC SERVICE ENGINEERING DIVISION

CLOSURE PLAN

ASH DISPOSAL LANDFILL

MERRIMACK STATION

BOWY, N. H.

SCALE 1" = 50'

DATE 7/16/99

DRAWN BY [Blank]

CHECKED [Blank]

APPROVED [Blank]

SHEET 11 OF 12

PROJECT NO. MK-5-92

**MONTHLY INSPECTION SCHEDULE MERRIMACK STATION
COAL ASH LANDFILL**

Inspector: _____ Time: _____ Date: _____ Month: _____

INSTRUCTIONS

Use ink pen to fill out form.

If any question is answered as "NO", a trouble report must be submitted using the NGSPM. Record a brief description of the deficiency and the trouble report number in the comments section of this form. If a trouble report has already been submitted for a "NO" answer, place an asterisk next to the word "NO" and write the words "TR SUBMITTED" in the comments section. Once a corrective action is complete, record the date and a description of action taken in the comment section.

- 1. Are all gates locked? _____
- 2. Do all gates and locks function properly? _____
- 3. Is landfill peripheral security fence in good condition? _____
- 4. Are "No Trespassing" signs posted at intervals not to exceed 300 feet on the landfill peripheral fence? _____
- 5. Are the leachate tank lids in good condition? _____
- 6. Are the three gas vents on the eastern periphery of the landfill in good condition? _____
- 7. Is the area clear of any trees or shrubs growing on the landfill top cover that may lead to damage of the synthetic cover liner due to root growth? _____
- 8. Is the liner on the top, bottom and side slopes in good condition without visual signs of damage? _____
- 9. Is the area over the top liner in good condition without signs of erosion or loss of vegetative cover? _____
- 10. Is the cover sand over the bottom or slope (except east slope) liner in place without signs of shifting or ruts? _____
- 11. Is the landfill area free of rubbish or disallowed wastes? _____
- 12. Is the landfill area secure with no signs of forced or unauthorized entry? _____
- 13. Are all monitoring wells locked, firmly anchored, and in good exterior condition? _____
- 14. Is access to the leachate tanks secured with locks in good condition? _____
- 15. Is the flyash being properly covered? _____
- 16. Is the area over and around the leachate collection piping free of deep ruts? _____
- 17. Is the landfill area in good condition without signs of potential damage? _____
- 18. Is the area in and immediately around the landfill free of standing water? _____
- 19. Is all the ash well contained within the last active cell? _____
- 20. Does the #1 leachate tank high level alarm function properly as per test procedure? _____
- 21. Does the #2 leachate tank high level alarm function properly as per test procedure? _____

COMMENTS : _____

Return completed original to SDD/Facilities
cc: Environmental Coordinator, AGP / Staff

R NOV 3 2012

CLOSURE PLAN
Merrimack Station Coal Ash Landfill
Bow, New Hampshire

This Closure Plan describes the procedures for closure of the Merrimack Station Coal Ash Landfill. Closure will involve terminating landfilling activities, constructing and maintaining a final cover system over the landfilled material, and continued maintenance of the stormwater management and leachate collection systems. Information required by the Solid Waste Rules is provided in the following Sections.

1.0 FACILITY IDENTIFICATION

Facility Name: Merrimack Station Coal Ash Landfill
Mailing Address: Public Service of New Hampshire (PSNH)
PO Box 330
Manchester, New Hampshire 03105
Location: 95 Johnson Road
Bow, New Hampshire
Permit No.: DPHS-SW-85-012

2.0 CLOSURE SCHEDULE

Closure construction will involve final grading and construction of the final cover system over those areas that have not yet received final cover. The final cover system will be constructed incrementally as the landfill is filled. However, following termination of ash placement, the final portion of the cover will be installed.

Final cover is to be placed over those areas of the landfill that have been filled to final grades. As of 2012, final cover had been constructed over approximately 1.6 acres of the landfill. It is expected that the next phase of cover system construction will take place in 2013 and will involve the construction of about 0.8 to 1.0 acres of final cover. Based on the anticipated incoming waste quantities, PSNH expects that the facility will be filled to capacity near year 2023. Disposal of ash at the facility will cease when final grades have been achieved throughout the entire permitted area. At that time, the final cover system will be constructed over those landfilled areas that have not yet received final cover.

It is anticipated that construction of the landfill cover system will take place during the spring through fall construction seasons. Closure construction will involve fine grading followed by the construction of landfill cap over areas filled to final grade. A general summary of work items and associated times frames to complete each phase of closure construction is provided below. It is noted that the construction-related work items and their associated time frames will typically overlap during actual construction.

- Drainage geocomposite;
- 12 inches of Sand Cover;
- 6 inches of Moisture Retention Soil; and
- 4 inches of topsoil, which shall be fertilized and seeded.

The Sand Bedding is a granular soil with 100 percent of the material passing a 1-inch sieve. The geomembrane component of the cover system is proposed to consist of 40-mil HDPE. HDPE geomembrane is more commonly used in landfill applications, and the 40-mil thick material satisfies the requirements of Env-Sw 805.10 (e)(3)(b). Textured geomembrane is proposed to enhance stability.

Drainage geocomposite has been incorporated in the cover system to promote drainage of water infiltrating through the cover system soils and to limit the potential for head to build up on the geomembrane. Water flowing in the cover section above the geomembrane will discharge at the toe of slope. To stabilize the toe, a crushed stone drain constructed over 10-ounce non-woven geotextile will be provided. This drain provides a high permeability zone allowing water within the cover section to discharge freely at the toe of slope.

Twelve inches of Sand Cover will be placed above the geocomposite followed by 6 inches of Moisture Retention Soil and 4 inches of topsoil. Sand Cover is a granular soil with 100 percent of the material passing a 1-inch sieve and not more than 12 percent silt. The Moisture Retention Soil has a specified permeability less than 1×10^{-4} centimeters per second (cm/sec), which is expected to be 1 to 2 orders of magnitude lower than that of the Sand Cover. This layer has been incorporated to promote moisture retention in the root zone to better support vegetative growth.

Cover section details are provided on Sheets 1 and 2 prepared by Sanborn Head. These sheets are provided in Appendix A for ease of reference. Relevant technical specifications for the closure construction work are included in Appendix B.

Prior to placing final cover materials existing grades are to be surveyed to ensure proper elevations. In areas that are below final design grade, additional ash fill is to be placed prior to final capping. The surface should be fine graded in preparation for cover system construction. After grading, a minimum of 12 inches of Sand Bedding soil is to be placed in the area to receive final cover. The geomembrane cap, consisting of textured 40-mil HDPE, is to be installed over the subgrade and overlain by drainage geocomposite followed by the placement of a minimum of 12 inches of Sand Cover. A drainage swale is to be constructed on the landfill in the location indicated on Sheet MK-S-7.2. This swale is to be shaped using Sand Cover soil. Following placement of the Sand Cover, the 6-inch Moisture Retention layer soil is to be placed followed by a minimum of 4 inches of topsoil, which is to be seeded. The crushed stone drain is to be provided at the toe of the north slope and in other areas where swales are to be constructed at the landfill perimeter to allow water above the cap to drain freely to the perimeter swale.

Following closure, facility records are to be maintained at PSNH's offices. Records are not to be moved or destroyed unless such action is approved by NHDES pursuant to a Type V Permit modification.

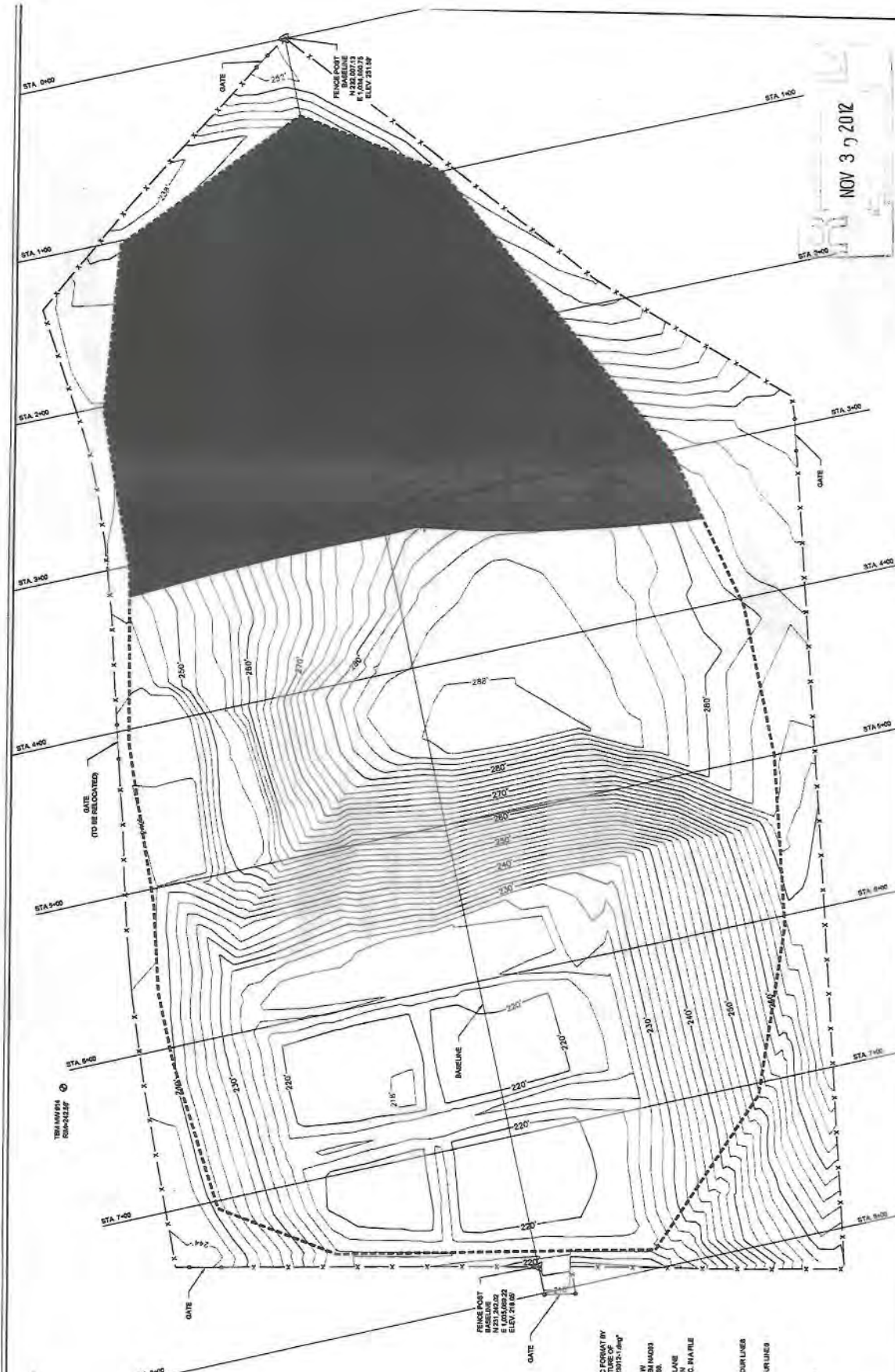
8.0 OTHER PERMITS

A Type II Permit Modification is required prior to closure construction. At this time, it is not anticipated that any other post-closure permits will be required. The facility has a Groundwater Permit that is to be renewed as required.

9.0 CLOSURE COST ESTIMATE

A cost estimate developed for closure and post-closure activities in accordance with this Closure Plan was prepared and submitted to the NHDES in November 2012. This estimate was based on the current operating area of the facility. The costs used in the estimate are based on a third party performing the work. Post-closure costs for the existing facility were also prepared and submitted to the NHDES in November 2012 and were calculated for a 30-year post-closure period. These costs are required to be updated annually by the NHDES.

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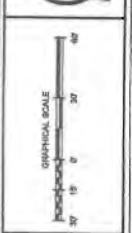
FENCE POST
BASELINE
N 251° 26' 02"
E 105.00±22'
ELEV 218.0'

PUBLIC SERVICE OF NEW HAMPSHIRE
MERRIMACK STATION
BOYL, NEW HAMPSHIRE

EXISTING CONDITIONS PLAN

PROJECT NUMBER: 2025.02
SHEET NUMBER: 1 OF 3

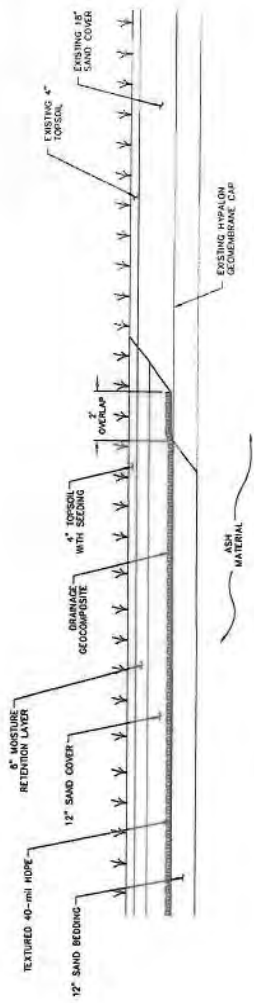
DRAWN BY: C. RIVET / R. CLAY
DESIGNED BY: C. RIVET
REVIEWED BY: R. S. SHILLABER
PROJECT MGR: K. ANDERSON
PIC: R. S. SHILLABER
DATE: SEPTEMBER 2012



SANBORN **HEAD**

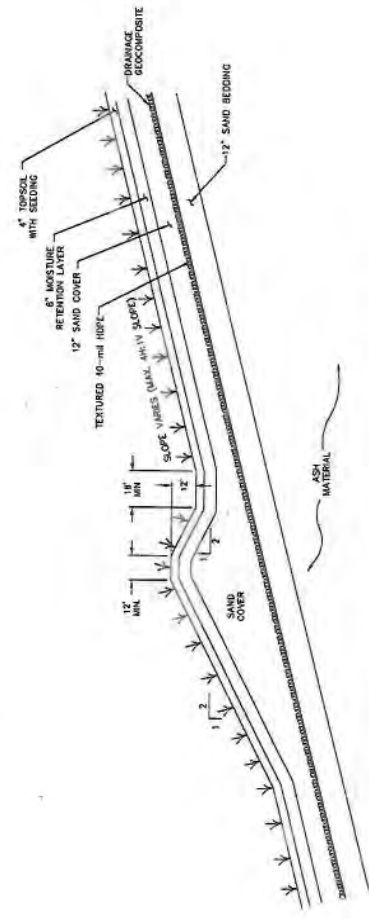
- NOTE:**
1. THE BASE DATA WAS PROVIDED IN ELECTRONIC FORMAT BY WILKIE HILL TRANSPORTATION CONSULTANTS INC. IN BOYL, NEW HAMPSHIRE IN A FILE TITLED "020125_0.mxd" ON FEBRUARY 14, 2012.
 2. THE HORIZONTAL DATUM IS BASED ON THE NEW HAMPSHIRE STATE PLANE AND THE VERTICAL DATUM IS BASED ON NAVD83.
 3. SITE BASELINE TRANSMOURED TO NAD 83 STATE PLANE COORDINATE SYSTEM FROM PLAN PROVIDED IN COORDINATE FORMAT BY GUSOS AND RING INC. IN A FILE TITLED "020125_0.mxd".

- LEGEND:**
- 2.30' — 2.30' — EXISTING 15'-0" CONTOUR LINES
 - — EXISTING 3'-0" CONTOUR LINES
 - — 10% LIMIT OF CUT
 - — EXISTING SHAPED AREA
 - — LIMIT OF USER
 - X- — FENCE LINE
 - △ — CONTROL POINT



- NOTES:**
1. CAREFULLY EXPOSE EDGE OF EXISTING HYPALON GEOMEMBRANE CAP.
 2. SNEED SURFACE IN AREA OF OVERLAP TO REMOVE ALL SOIL.
 3. INSTALL TEXTURED 40-mil HOPE GEOMEMBRANE OVERLAP A MINIMUM OF 2 FEET ON THE EXISTING HYPALON GEOMEMBRANE.
 4. INSTALL REMAINDER OF COVER SYSTEM SOILS.

3
COVER SYSTEM TRANSITION DETAIL
N.T.S.



4
TYPICAL COVER MEMBRANE/SWALE DETAIL
N.T.S.

SANBORN |||| **HEAD**

SCALE: AS NOTED



NO.	DATE	BY

DRAWN BY: C. RIVET/R. CLAY
 DESIGNED BY: C. RIVET
 REVIEWED BY: R. S. SHILLABER
 PROJECT MGR: K. ANDERSON
 P.I.C.: R. S. SHILLABER
 DATE: SEPTEMBER 2012

PUBLIC SERVICE OF NEW HAMPSHIRE
 MERRIMACK STATION
 30TH, NEW HAMPSHIRE
**REVISED COVER SYSTEM
 DETAILS**

PROJECT NUMBER:
 2025.02
 SHEET NUMBER:
 3 OF 3

APPENDIX B

**RELEVANT TECHNICAL SPECIFICATIONS
FOR CLOSURE CONSTRUCTION**

SECTION 02070

CAP GEOMEMBRANE

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. The Contractor shall furnish all labor, materials, tools, equipment, and incidentals, and perform all operations necessary to furnish, deploy, seam and test the double-sided textured high density polyethylene (HDPE) geomembrane.
- B. The Contractor shall be responsible for implementing a quality control (QC) testing program meeting, as a minimum, the requirements specified herein, and coordinating QC procedures with the Quality Assurance (QA) Consultant to assure that materials and installation methods employed are of a quality suitable for use in a secure landfill application.

1.2 DEFINITIONS

- A. Contractor: The Owner will engage a qualified Contractor who is trained and experienced in field handling, storing, deploying, seaming, and QC testing of HDPE liner for secure landfill applications.
- B. Quality Assurance (QA) Consultant: The Owner will engage a qualified QA Consultant to verify the quality of raw materials, the integrity and quality of seams and seaming processes performed on site, and the locations and results of all testing and repair work performed. The QA Consultant shall observe and document the work, and in particular, the QC testing, performed by the Contractor.
- C. Quality Control (QC): The Contractor shall implement QC measures to ensure liner installation is completed in a good workman-like manner and is in compliance with the specifications contained herein. QC procedures include, but are not limited to, providing manufacturer's material QC certifications; providing experienced and competent field staff; performing adequate personnel training; performing QC testing during liner installation; and maintaining records documenting QC items, such as as-built panel layout, locations and identifications of all repairs, locations and test results of all destructive and non-destructive field tests, as specified herein.

1.3 SUBMITTALS

- A. The Contractor shall submit with the Bid Package the following information.
 - 1. Contractor qualifications, including project descriptions.

1. The Contractor shall have successfully installed not less than ten synthetic liners or covers totaling a minimum of 2,000,000 square feet similar in type to that specified herein, now giving satisfactory service in the United States.
 2. The Contractor shall be approved and/or licensed by the geomembrane material supplier.
- B. The manufacturer of the geomembrane shall have manufactured and fabricated not less than 10,000,000 square feet of HDPE for use in liner or cap installations.
 - C. The Contractor shall provide the services of a competent English-speaking field superintendent and QA technical representative throughout the installation of the liner and all appurtenant structures. The superintendent and QA technical representative shall each have personally supervised and directed the installation of a minimum of 2,000,000 square feet of HDPE lining or capping material.
 - D. All personnel performing seaming operations shall be qualified by experience. At least one seamer shall have experience seaming a minimum of 1,000,000 square feet of geomembrane with a similar method. This "Master Seamer" shall provide direct supervision over less experienced seamers. No seaming shall be performed without a Master Seamer present.
 - E. All field seams shall be inspected over their full length per these specifications by the Contractor in the presence of the QA Consultant.
 - F. The manufacturer shall furnish complete written instructions for the storage, handling, installation, seaming, repair, and inspection of the HDPE liner material in compliance with this specification and conforming to the conditions of his warranty. A copy of all manufacturer literature shall be submitted to the QA Consultant upon request.
 - G. The manufacturer or his designated representative shall furnish panel layouts as required for the HDPE liner installation.

1.5 PRE-CONSTRUCTION MEETING

- A. A pre-construction meeting is required between the Owner, Engineer, Contractor, and QA Consultant prior to the start of any work on-site. The intent of the meeting is to discuss the requirements of these Contract Documents to ensure that all parties involved are familiar with their respective responsibilities.

1.6 QUALITY ASSURANCE

- A. The Owner shall retain the QA Consultant to perform liner installation QA procedures. The QA Consultant will be on-site for observation of geomembrane handling, deploying, seaming, testing, and repair work.

Tensile strength at break	ASTM D 6693 Type IV, 2 ipm	≥60 lb/in of width
Elongation at break	ASTM D 6693 Type IV, 2 ipm 2.0-inch Gauge Length	≥100%
Tear resistance	ASTM D-1004 Die C	≥28 lbs.
Puncture Resistance	ASTM D 4833	≥60 lbs.

In addition, the membrane shall:

2. Contain a minimum of 2 percent, but not more than 3 percent, carbon black according to ASTM D 4218, and have a carbon black dispersion rating of Category 1 or 2 with no more than 1 view in 10 of Category 3 according to ASTM D 5596.
 3. Consist of unreinforced high density polyethylene (HDPE) containing 3% by weight maximum additives, fillers or extenders including carbon black;
 4. Have no striations, pinholes or bubbles on the surface;
 5. Be produced so as to be free of holes, blisters, undispersed raw materials, or any sign of contamination by foreign matter.
 6. Geomembrane shall have 6 inches of smooth, non-textured material along both edges of the rolls. The texturing of the geomembrane shall be regular and uniform. Rolls of geomembrane containing irregular texturing (bald areas or clumps of texturing material) will be rejected by the QA Consultant and removed from the Site by the Contractor.
 7. Synthetic liner material delivered to the site shall be accompanied by a QC Certificate for each roll and shall be identified with a distinctive code which will serve as the identification number on the As-Built Drawing.
 8. Samples shall be taken and tested by the manufacturer at a frequency of 1 sample per 50,000 square feet, to assure conformance with the specifications.
 9. Samples shall be taken from the delivered material by the QA Consultant, at a frequency of 1 sample per 250,000 square feet, and shall be sent to an Independent Testing Laboratory to assure conformance with the specifications listed.
- C. The interface strength for the Geomembrane to Drainage Geocomposite and the Geomembrane to Sand Bedding soil interfaces shall equal or exceed strength represented by a friction angle of 21° when measured in general accordance with ASTM D 5321. The testing should include the following:

- B. Installation shall be performed under the direction of a competent field technical representative. The technical representative shall be in charge of the installation and shall be responsible for the work performed.
- C. Subgrade preparation shall be performed by the Contractor according to Section 02200. Surfaces to be lined shall be smooth and free of all rocks, stones, sticks, roots, sharp objects, or debris of any kind. The surface should provide a firm, unyielding foundation for the membrane with no sudden, sharp or abrupt changes or break in grade. No standing water or excessive moisture shall be allowed. Prior to the installation of any synthetic liner material, the Contractor, Contractor, and QA Consultant shall inspect the surface on which the liner will be installed. The Contractor will advise of any remedial work required to bring the surface to the specifications required for liner installation. Upon satisfactory surface preparation the Contractor, Contractor and QA Consultant will issue a Letter of Surface Conformation to the Owner.
- D. The HDPE membrane shall be placed over the prepared surfaces in such a manner as to assure minimum handling. Any portion of HDPE membrane damaged during installation by any cause shall be removed or repaired by using an additional piece of HDPE at no additional cost to the Owner.
- E. Each HDPE membrane panel shall be assigned a simple and logical identification number or letter. In addition, the Contractor and the QA Consultant shall record the roll number, location, and date of installation of each panel placed. The panels shall be marked by their identification number or letters, and shall be recorded on the sets of As-Built Drawings by the Contractor and the QA Consultant. Upon completion of the work, the Contractor shall submit As-Built Drawings with panel identifications to the QA Consultant.
- F. The layout of panels will be decided upon prior to their placement in accordance with the panel layout drawings, in a meeting between the Owner and the Contractor. All efforts will be made to install the liner from the highest area in the landfill to the lower areas to facilitate the protection of the subgrade. No more panels shall be deployed during a single day than can be seamed together that same day.
- G. All deployed HDPE membrane panels shall be protected from uplift by wind by placing suitable ballast that will not damage the membrane during its placement or removal.
- H. All damaged subgrade or other underlying material shall be repaired prior to deploying HDPE membrane panels. The Contractor is expected to manage stormwater runoff from installed liner in a manner to limit damage of subgrade or other underlying materials previously prepared by the Earthwork Contractor.
- I. Vehicle traffic shall not be allowed directly on HDPE membrane panels. Equipment shall not damage panels by handling, leakage, transporting across panels, or any other means. Personnel working on or with HDPE membrane

tensiometer for bonded seam strength (shear) and peel adhesion. Two (2) samples will be tested for shear, and five (5) samples for peel (10 peel tests total for fusion welds since both edges of the weld must be tested.) Two (2) passing shear tests and 4 out of 5 passing peel tests (9 out of 10 for fusion welds) are required for an acceptable trial seam. Each sample failure must consist of a ductile break that is film tearing bond, and must meet the following strength requirements:

		40-mil Textured HDPE
Peel Strength	ASTM D 6392	≥60 lb/in
Shear Strength	ASTM D 6392	≥80 lb/in

The criteria for field seams passing in shear and peel is the same as that for the destructive testing described below. The Contractor is responsible for providing and operating an on-site tensiometer and corresponding sample cutting equipment to perform all trial seam testing. If either test fails, another trial seam shall be performed and tested. If any test seams fail on the second trial seam, the seam welder shall not be used until it is repaired, or faulty conditions or operator are corrected and two consecutive trial seams pass the destructive tests as outlined above.

A record of the date, time, ambient weather conditions, test results, operator, and equipment number shall be maintained by the Contractor, and submitted to the QA Consultant on a weekly basis. A properly identified unused section of the trial weld seam will be retained by the Owner.

- F. Immediately prior to seaming, surfaces to be seamed shall be overlapped a minimum of 4 inches and cleaned of moisture, grease, dust, dirt, debris and any other foreign material. No solvent or adhesive shall be used for seaming or cleaning without approval from the manufacturer, the QA Consultant, Engineer, and Owner.
- G. A sample shall be cut from the end of every seam (extrusion or fusion) greater than 75 feet in length. The sample shall be cut into two (2) coupons which will be tested for peel adhesion in each direction (4 peel tests for fusion welds.) The QA Consultant shall observe the coupon testing prior to starting a new seam with that piece of welding equipment or technician. If any test fails, new trial seams shall be created and tested.
- H. Where moisture or dirt causes seaming difficulty, a protective sheet of plastic shall be placed below the seam overlap to protect the panels being seamed. This may consist of a "scrub sheet" of plastic that is pulled along beneath the seaming apparatus.
- I. For extrusion welding, surfaces to be seamed shall be cleaned of oxidation by disc grinder not more than one hour before extruding the seam. Abrasion of the seam area with the disc grinder shall not extend beyond the extrusion bead area unless inspected and approved by the QA Consultant. Tack welding of the panels to be seamed shall not damage the membrane or adversely affect the

- B. Vacuum box testing shall be performed on extrusion welds using a vacuum box with a rigid housing, transparent viewing window, a soft rubber gasket on the bottom edge and a valve assembly with a vacuum gauge. The vacuum box must be approved by the QA Consultant prior to use. The QA Consultant has the right to reject any vacuum box that he feels may not provide accurate results.
- C. Vacuum box testing shall be performed in accordance with ASTM D 5641 by applying a soap and water solution to the seam, placing the box over the seam and applying a vacuum of 5 psi (min.) to the box so a leak-tight seal is obtained. The seam shall be examined through the viewing window for at least 10 seconds or as directed by the QA Consultant for the presence of soap bubbles. If soap bubbles are detected in the viewing window, the location will be marked and repaired in accordance with Section 3.4 of these specifications.
- D. Air pressure testing shall be performed on double-fusion seams having an air channel between the seams. Both ends of the seam shall be heat-sealed and a hollow needle with a pressure gauge and valve attached shall be inserted into the air channel. A pump shall be attached to the needle and an initial air pressure of between 20 to 30 psi shall be applied to the air channel. The valve shall be closed and the pressure shall be observed for a minimum of 2 minutes. If the gauge pressure drops more than 4 psi or doesn't stabilize, the defective area shall be located, marked, and repaired in accordance with Section 3.4 of these specifications. The QA Consultant will witness the entire test, including the release of pressure or vacuum, to monitor for a defective pressure or vacuum gauge. Air pressure testing shall be performed in accordance with ASTM D 5820. After completing the air pressure test, the needle shall be removed and the hole shall be sealed and tested with the vacuum box.
- E. Destructive seam strength testing shall be performed at a minimum frequency of one per 500 linear feet of seam per welding machine or technician. The QA Consultant will select the locations for destructive seam samples and, at his discretion, may take samples more frequently than one per 500 feet. The QA Consultant reserves the right to increase the frequency of destructive testing if deemed necessary. Destructive seam strength testing shall be performed as work progresses to obtain test results before seams are covered. Destructive seam strength test samples shall be cut by noon of the following workday, or no additional deployment or seaming shall occur until the sample is cut.
- F. The Contractor shall cut destructive test samples at the locations designated by the QA Consultant. The destructive test samples shall be 12 inches wide and 42 inches long with the seam centered lengthwise. Each test sample shall be assigned an identification number and the locations shall be recorded on the As-Built Drawings.
- G. All holes resulting from destructive test samples shall be repaired immediately and tested within 24 hours of patch completion with the vacuum box in accordance with these specifications.

3.6 FINAL INSPECTION

- A. A final inspection shall be performed by the Contractor, QA Consultant, and Owner prior to the Installers' liner crew moving off the site. All identified problem areas shall be repaired by the Contractor and accepted by the QA Consultant prior to the crew moving off site.

[END OF SECTION 02070]

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2.2 GEOTEXTILES

- A. Nonwoven Geotextile shall be a nonwoven polypropylene or polyester material, which meets or exceeds the minimum average roll values tabulated below:

Fabric Property	Test Method	Minimum Fabric Requirement
Mass per Unit Area, oz/yd ²	ASTM D 5261	10
Grab Tensile Strength, lbs	ASTM D 4632	230
Trapezoidal Tear Strength, lb	ASTM D 4533	95
Puncture Resistance, lbs	ASTM D 4833	120
Water Flow Rate, gpm/ft ²	ASTM D 4491	30

2.3 THREAD

- A. Thread used to seam Nonwoven Geotextiles shall be a polymeric material with chemical resistance properties equal to or exceeding those of the Nonwoven Geotextile. The thread shall be different color than the Nonwoven Geotextile.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Geotextiles shall be installed in accordance with the manufacturer's recommendations, and as shown on the Drawings and specified herein; and,
- B. Where the use of adjacent sheets of a geotextile are required and are not to be sewn, a minimum overlap of 18 inches shall be maintained.
- C. In applications where geotextile surrounds pipe and crushed stone, the geotextile wrap shall be overlapped a minimum of 18 inches.
- D. All holes and tears in the geotextiles shall be noted and repaired as specified by the Engineer.

[END OF SECTION 02074]

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2.2 DRAINAGE GEOCOMPOSITE

- A. Drainage Geocomposite shall consist of a Geonet meeting the specifications described in Section 2.1 to which a geotextile has been heat-bonded to both sides.
- B. The geotextile portion of the Drainage Geocomposite shall meet or exceed the minimum average roll values tabulated below:

Geotextile Property	Unit	Test Method	Required Value
Fabric weight	oz/y ²	ASTM D 5261	5.5
Grab Strength	lbs	ASTM D 4632	≥ 150
Puncture resistance	lbs	ASTM D 4833	≥ 80
Permittivity	sec ⁻¹	ASTM D 4491	1.5 minimum average

- C. The bond strength between the geotextile, Geonet, and the geocomposite shall be greater than or equal to 1.0 pound per inch using ASTM D-7005 methods.
- D. The minimum average roll value transmissivity measured in accordance with ASTM D 4716 (modified) using a gradient of 0.25 under a compressive stress of 300 psf shall meet or exceed 2.2×10^{-4} meters squared per second when tested between steel plate and granular soil. ASTM D 4716 shall be modified to use 100-hour seating time.
- E. The interface strength for the Geomembrane to Drainage Geocomposite and the Sand Cover to Drainage Geocomposite interfaces shall equal or exceed strength represented by a friction angle of 21° when measured in general accordance with ASTM D 5321. The testing should include the following:
 - a. A minimum of three tests at varying normal stresses of 150 psf, 300 psf, and 500 psf shall be run to develop a failure envelope using samples of materials proposed to be used in the cover system.
 - b. The tests should be run in a soaked condition. The shear displacement rate for these tests should not exceed 0.04 inches per minute.

2.3 TIES

- A. Ties used to secure adjacent sheets of Geonet shall be plastic fasteners, or polymer braid. Metallic ties will not be allowed. Ties shall be yellow or white to facilitate inspection.

SECTION 02200

EARTHWORK

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. Furnish all labor, materials, equipment and incidentals necessary to perform all excavation, backfill, fill and grading required to complete the work shown on the contract drawings and specified herein.

1.2 PROTECTION

- A. Sheeting and Bracing

1. Protect excavations to prevent cave-in or loose soil from falling into excavation. Observe all applicable OSHA regulations and standards for trenching and excavation.
2. Protect bottom of excavations from freezing. Do not place fill over frozen soil without first obtaining approval from the Engineer or Owner.
3. Recompact fills subjected to vehicular traffic or other disturbances.

- B. Pumping and Drainage

1. The Contractor shall at all times during construction provide and maintain proper equipment and facilities to remove all water entering the construction area and any excavations created as part of this Work. The Contractor shall keep excavations dry so as to obtain a satisfactory subgrade condition.
2. Dewatering shall at all times be conducted in such a manner as to preserve the undisturbed bearing capacity of the subgrade soils at proposed bottom of excavation.
3. Water entering the excavation from surface runoff shall be collected and pumped from the excavation to maintain a bottom free of standing water.
4. Drainage shall be disposed of in an approved area so that flow or seepage back into the excavated area will be prevented and any fines contained within the water will not be discharged to surface waters.
5. The Contractor shall take all necessary precautions to preclude the accidental discharge of fuel, oil, etc. in order to prevent adverse effects on surface water and groundwater quality. In the event of an accidental spill, the Engineer and Owner shall be immediately notified and all free liquids shall be cleaned up and all contaminated soils shall be excavated and disposed of properly by the Contractor at the Contractor's expense.

3.2 INSTALLATION

- A. The subgrade of all areas to be covered with topsoil and seeded shall be raked and all rubbish, sticks, roots and stones larger than 3 inches shall be removed. Subgrade surfaces in all areas shall be tracked immediately after fine grading and raking has been completed. Tracking is to be performed with bulldozers operating in the direction of water flow. The tracks of the bulldozers are to have grousers of sufficient height to leave visible depressions in the subgrade. The depressions are to be perpendicular to the direction of water flow to reduce erosion potential until topsoil is placed. During the tracking, all depressions caused by settlement or tracking shall be filled with additional topsoil and the surface shall be regraded and tracked until an even finished grade is created.
- B. Subgrades shall be observed and approved by the Engineer before topsoil is placed. After topsoil has been spread and fine graded, all large stiff clods, lumps, brush, roots, stumps, litter and other foreign material shall be removed from the area covered with topsoil and disposed of by the Contractor. The entire area where topsoil has been placed shall then be tracked as indicated in paragraph 3.2.A above.
- C. Application of fertilizer, lime, seed and mulch shall only be performed during those periods within the seasons that are normal for such work as determined by the weather and locally accepted practice, and as approved by the Engineer. Seeding and fertilizing shall be conducted between April 1 and June 1 or between August 15 and October 15, or as directed or permitted by the Engineer. The Contractor shall hydroseed and hay mulch only on a calm day.
- D. Schedules for seeding and fertilizing must be submitted to the Engineer and Owner for approval prior to the work being performed.
- E. Lime and fertilizer are to be spread hydraulically in one operation with the hydroseeding.
- F. Seeding shall be done within five (5) days following soil preparation. Seed shall be applied hydraulically at the rates and percentages indicated. The spraying equipment and mixture shall be so designed that when the mixture is sprayed onto an area, the lime, fertilizer and seed shall be equal in quantity to the specified rates. Prior to the start of work, the Engineer and Owner shall be furnished with a certified statement for approval as to the number of pounds of materials to be used per 100 gallons of water. This statement shall also specify the number of square feet of seeding that can be covered with the quantity of solution in the hydroseeder.
- G. When protection of newly graded areas is necessary at a time that is outside of the normal seeding season, the Contractor shall protect those areas by whatever means necessary (such as straw or erosion control mats) or by other measures as approved by the Engineer and Owner.

APPENDIX C
POST-CLOSURE INSPECTION CHECKLIST