Commonwealth of Virginia

VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

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SOLID WASTE FACILITY PERMIT
PERMIT NUMBER 573

Facility Name: Cascades Containerboard Packaging- Bear Island Industrial Mill

Facility Type: Industrial Landfill **Latitude:** N 37° 49’ 11"

Site Location: Hanover County **Longitude:** W 77° 25' 46"

Location Description: The facility is located on State Routh 738, approximately two miles east of Interstate 95 in northern Hanover County. The facility is bounded to the north by the Little River, the south by State Route 738, the west by the Doswell Power Plant, and to the east by the North Anna River. The landfill site is located to the east of the existing Bear Island Paper plant.

Background: The facility is a captive industrial landfill for the wood processing operations on-site. The facility accepts only non-hazardous wastes from normal plant operations. The wastes accepted include those wastes identified in Module II, which is based on the information provided on DEQ Form SW PTB dated March 6, 2024.

The waste management boundary is approximately 41.7 acres, of which 28.6 acres are used for waste disposal. The facility was issued solid waste permit (SWP) 528 on October 21, 1988, which included a lined trench fill of approximately 3.4 acres. SWP 573 was issued on May 5, 1995, which included new Cells 1-7, and incorporated SWP 528, totaling approximately 23 acres. There is also one unlined cell, Cell 0, which was previously capped with a soil cover. The activities authorized under SWP 528 for closure and post closure care are incorporated in SWP 573. The estimated site life for Cells 1-7 is approximately 32.9 years, based on receiving approximately 27,500 cubic yards per year.

The total capacity of Cascades Containerboard Packaging- Bear Island Industrial Mill, Cells 1 through 7, 7A, 7B, and 8, as provided in the Design Report, Part B Attachment III, is approximately 2,865,000 cubic yards. The estimated site life for this area is approximately 3 to 23 years, from March 2023, depending on the waste stream from the facility. This landfill life is based on 100 tons per day up to the daily disposal limit of 650 tons per day, operating 360 days/year with an estimated in-place waste density of 1000 tons/cubic yard.

Permit Modification*:* This permit modification involves a horizontal expansion (Cell 8), which horizontally connects Cells 1, 2, and 3 to Cells 5 (partial), 6, and 7. The other portion of Cell 8 connects a piggyback liner system on Cell 0 to the liner on Cell 1, and to the liner on Cell 4 and partial Cell 5 to the south. This modification also addresses the alternate weekly cover requirements in Module II. All previous permit modifications are outlined in detail in Module I, Section I.G.

THIS IS TO CERTIFY THAT:

Cascades Holdings US Inc. dba Containerboard Packaging-Bear Island
10026 Old Ridge Road
Ashland, VA 23005

is hereby granted a permit to construct, operate, and maintain the facility as described in the attached Permit Modules I, II, V, X, XI, XII, and XIII, and Permit Documents incorporated by reference. These Permit Modules and Permit Documents are as referenced hereinafter and are incorporated into and become a part of this permit.

The herein described activity is to be established, modified, constructed, installed, operated, used, maintained, and closed in accordance with the terms and conditions of this permit and the plans, specifications, and reports submitted and cited in the permit. The facility shall comply with all regulations of the Virginia Waste Management Board. In accordance with Chapter 14, § 10.1 - 1408.1(D) of the Code of Virginia, prior to issuing this permit or major modification, any comments by the local government and general public have been investigated and evaluated and it has been determined that the facility poses no substantial present or potential danger to human health or the environment. The permit contains such conditions and requirements as are deemed necessary to comply with the requirements of the Virginia Code, the regulations of the Board, and to prevent substantial or present danger to human health or the environment.

Failure to comply with the terms and conditions of this permit shall constitute grounds for the revocation or suspension of this permit and for the initiation of necessary enforcement actions.

The permit is issued in accordance with the provisions of 10.1-1408.1.A, Chapter 14, Title 10.1, Code of Virginia (1950) as amended. Variances that have been approved for this facility are included in Permit Attachment I-1.

Issued: May 5, 1995
Temporary Authorization: September 19, 1995
Modification No. 1: June 4, 1997 (major)
Modification No. 2: August 12, 1998 (minor)
Modification No. 3: June 15, 2004 (minor)
Modification No. 4: April 24, 2007 (minor)
Modification No. 5: May 18, 2009 (minor)
Modification No. 6: August 15, 2012 (minor)
Modification No. 7: September 13, 2012 (minor)
Modification No. 8: August 27, 2014 (minor)
Modification No. 9: April 15, 2020 (minor)
Modification No. 10: February 22, 2023 (minor)

APPROVED: _____

Shawn Weimer
Land Protection Program Manager

DATE: _____

Modification No. 11

PERMIT MODULES
REFERENCE LIST

PERMIT MODULE I – GENERAL PERMIT CONDITIONS
PERMIT ATTACHMENT I-1, PREVIOUS PERMIT APPROVAL LETTERS

PERMIT MODULE II - CONDITIONS OF OPERATION

PERMIT MODULE V – INDUSTRIAL LANDFILL DESIGN

PERMIT MODULE X - FIRST DETERMINATION MONITORING

PERMIT MODULE XI - PHASE II MONITORING

PERMIT MODULE XII – CLOSURE

PERMIT MODULE XIII – POST CLOSURE CARE

PERMIT DOCUMENTS

The documents listed below are hereby incorporated into this permit and the permittee is subject to all conditions contained therein. It is the responsibility of the permittee to properly maintain and update these documents. Any version with a revision date other than as listed below is not considered to be the official approved version and is subject to Department review and approval prior to being recognized as the "permitted" version.

1. Part B Application:
   a. *Design Plans, Cell 8 - Major Permit Modification*, prepared by TRC Engineers, Inc. (TRC), last revised March 18, 2024 (Attachment III).
   b. *Closure Plan*, prepared by TRC, last revised April 15, 2024 (Attachment IV).
   c. *Post-Closure Plan*, prepared by TRC, last revised May 12, 2023 (Attachment V).
   d. *Design Report*, prepared by TRC, last revised April 15, 2024 (Attachment VI).
   e. *Construction Quality Assurance Plan and Technical Specifications*, prepared by TRC, last revised November 16, 2023 (Attachment VII).
   f. *Leachate Management Plan*, prepared by TRC, last revised May 12, 2023 (Attachment VIII).
   g. *Landfill Gas Management Plan*, prepared by TRC, dated March 28, 2024 (Attachment IX).
   h. *Groundwater Monitoring Plan*, prepared by TRC, last revised March 22, 2024 (Attachment X).

The following documents have been submitted to satisfy permit or regulatory requirements; however, are considered reference documents and are not incorporated into Permit No. 573. This list may not be all-inclusive.

1. *Part A Permit Application, Bear Island Company Industrial Landfill*, prepared by Resource International, LTD., dated September 12, 1991.

PERMIT MODULE I
GENERAL PERMIT CONDITIONS

I.A. EFFECT OF PERMIT

The permittee is allowed to dispose solid waste on-site in accordance with the conditions of this permit. Any disposal of solid waste not authorized by this permit is prohibited. Compliance with the terms of this permit does not constitute a defense to any order issued or any action brought under Sections 10.1-1402(18), 10.1-1402(19), or 10.1-1402(21) of the Virginia Waste Management Act (Chapter 14, Title 10.1, Code of Virginia (1950), as amended); or any other law or regulation for protection of public health or the environment. The provisions of this permit are severable, and if any provision of this permit, or the application of any provision of this permit to any circumstances is held invalid, the application of such provision to other circumstances and the remainder of this permit shall not be affected thereby. For purposes of this permit, terms used herein shall have the same meaning as those in the Virginia Waste Management Act, and Part I and other pertinent parts of the Virginia Solid Waste Management Regulations (VSWMR, 9VAC20-81), unless this permit specifically provides otherwise; where terms are not defined in the regulations or the permit, the meaning associated with such terms shall be defined by the generally accepted scientific or industrial meaning of the term or a standard dictionary reference. "Director" means the Director of the Department of Environmental Quality, or his designated or authorized representative.

I.B. DUTIES AND REQUIREMENTS

The permittee shall comply with all conditions of this permit and 9VAC20-81. The effect of this permit is detailed in 9VAC20-81-490, and it shall be the duty of the permittee to ensure the applicable requirements are met. Additionally, the permittee is subject to the recording and reporting requirements detailed in 9VAC20-81-530. In addition to these requirements, the following additional conditions are invoked per 9VAC20-81-430, and shall be complied with:

I.B.1. Noncompliance may be authorized by a schedule of compliance [9VAC20-81-490.D. and 9VAC20-81-490.H.]. Any other permit noncompliance constitutes a violation of Virginia Waste Management Act and is grounds for enforcement action, or for permit revocation, revocation and reissuance, or modification [9VAC20-81-570 and 9VAC20-81-600].

I.B.2. In an enforcement action, it shall not be a defense for the permittee that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

I.B.3. In the event of noncompliance with this permit, the permittee shall take all reasonable steps to minimize releases of solid wastes or waste constituents to the

environment and shall carry out measures to prevent substantial adverse impacts on human health or the environment.

I.B.4. The permittee shall at all times properly operate and maintain all units (and related appurtenances) which are installed or used by the permittee to achieve compliance with the operations manual and the conditions of this permit. Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing, and training, and adequate laboratory and process controls, including appropriate quality assurance/quality control procedures. This provision requires the operation of back-up or auxiliary equipment only when necessary to achieve compliance with the conditions of this permit.

I.B.5. The permittee shall furnish to the Director, within a reasonable time, any relevant information that the Director may request to determine compliance with this permit, regulations or the Act. The permittee shall also furnish to the Director, upon request, copies of records required to be kept by this permit by the date specified in the request.

I.B.6. The permittee shall allow the Director, or an authorized representative, at a reasonable time, upon the presentation of appropriate credentials, to:

I.B.6.a. Enter the permitted facility where a regulated unit or activity is located or conducted, or where records must be kept under the conditions of this permit;

I.B.6.b. Have access to and copy any records that must be kept under the conditions of this permit;

I.B.6.c. Inspect any unit, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and,

I.B.7.6. Sample or monitor, for the purposes of assuring permit compliance or as otherwise authorized by Virginia Waste Management Act, any substances or parameters at any location within his control.

I.B.7. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity. The method used to obtain a representative sample to be analyzed must be the appropriate method from the latest edition of Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, EPA Publication SW-846, if available.

Laboratory samples shall be analyzed in accordance with 1 VAC 30-45, Certification for Noncommercial Environmental Laboratories, or 1 VAC 30-46, Accreditation for Commercial Environmental Laboratories.

I.B.8. This permit is not transferable to any person, unless approved by the Director. The Director may require modification or revocation and reissuance of the permit pursuant to 9VAC20-81-490.G. Before transferring ownership or operation of the facility during its operational life, the permittee shall notify the new owner or operator in writing of the requirements of Parts III and V, of the Virginia Solid Waste Management Regulations, the Financial Assurance Regulations, 9VAC20-70, and this permit.

I.B.9 In accordance with § 10.1-1408.2, all facilities must have a Certified Operator as required by the Board of Waste Management Facility Operators-Licensing Regulations, 18 VAC 155-20.

I.B.10. Specifications for all drainage media should specify that the material shall contain no greater than 15% calcium carbonate equivalent. Department literature regarding research on leachate collection media indicates that weight loss greater than 15% results in an unacceptable loss of performance. If a greater percentage is specified or allowed, a demonstration that performance is not adversely affected must be provided to the Department for review and approval.

I.B.11. Recirculation of collected leachate shall not be allowed, in accordance with 9VAC20-81-210.D.3., except when the area to be irrigated is underlain by a composite liner system. Furthermore, in accordance with 9VAC20-81-200.C.3.c., decomposition gas condensate may be recirculated into the landfill provided the facility complies with the composite liner requirement and the leachate control system requirements of Part III of VSWMR. A composite liner system is a system designed to meet the requirements of 9VAC20-81-130.J.1.

I.B.12. The closure cost estimate must reflect the maximum cost of closure at all times. The owner has the responsibility to maintain the closure and post closure cost estimate and associated financial assurance funding as conditions change.

I.B.13. Land-clearing, excavation, and construction activities that involve the disturbance of wetlands or streams shall not commence without authorization from the Virginia Water Protection (VWP) Program and/or Army Corps of Engineers.

I.B.14. The facility shall maintain and follow an approved Erosion & Sediment Control Plan for all land-disturbing activities in accordance with the Erosion and Sediment Control Regulations, 9 VAC 25-840.

I.C. DOCUMENTS TO BE MAINTAINED AT THE FACILITY

The permittee shall maintain a complete copy of the Solid Waste Permit and incorporated Permit Documents at the facility, or another location approved by the director, until post-closure is complete and certified by a professional engineer, and shall maintain amendments, revisions, and modification to these documents. In addition, the facility shall maintain the following additional documents:

I.C.1. Operations Manual with annual certification by Responsible Official.

I.C.2. Detailed, written estimate, in current dollars, of the cost of closing the facility, post-closure care and corrective action measures.

I.C.3. All other documents/records required and applicable from the following:

I.C.3.a. Monitoring records from leachate, gas, and groundwater monitoring.

I.C.3.b. Inspection records as required from construction/installation, operational, closure, post-closure inspection requirements.

I.C.3.c. Personnel training records.

I.C.3.d. Daily operational records (i.e., solid waste received and processed, fill area records, records of special wastes accepted, a logbook which is a daily narrative account of the activities at the landfill).

I.C.3.e. Construction quality assurance reports, record drawings and engineer's certifications for all new liner and/or final cover construction.

I.C.4. An approved copy of the complete Part A permit application.

I.C.5. Documentation of the authorization to discharge leachate into the publicly/privately owned treatment works, leachate volumes sent to the POTW, and periodic leachate sampling analytical results.

I.C.6. Research, Development, and Demonstration Plan documentation and testing data, if applicable.

I.D. DOCUMENTS TO BE SUBMITTED

In addition to the documents/records/reports to be submitted per the requirements of this permit or 9VAC20-81, the permittee shall also submit the following documents to the Director according to indicated schedules:

I.D.1. Prior to expansion into each new phase, the permittee shall submit all required certification documents per 9VAC20-81-490.A., and:

I.D.1.a. Report and supporting documents resulting from quality control/quality assurance activities performed during construction and installation of the liner/drainage systems, including the installation contractor's written acceptance of the surfaces to be lined, synthetic liner manufacturer and installer warranties, laboratory test results of the permeability of the clay liner and the drainage media overlying the liner, and representative copies

(sufficient to demonstrate responsible control) of the accumulated inspection schedules resulting from the professional engineer's oversight of the construction.

I.D.2. In accordance with 9VAC20-81-490.A., certification from a design engineer, who must be a professional engineer licensed to practice in the Commonwealth, that the construction of the facility has been completed in accordance with the permit, approved plans and specifications and is ready to begin operation. A certification will be required for each lined phase of development.

I.D.3. Certification (separate from I.D.2, above) from the Construction Quality Assurance (CQA) officer that the approved CQA plan has been successfully carried out and that the constructed unit meets all requirements of the permitted CQA plan, in accordance with 9VAC20-81-130.Q. A certification will be required for each lined phase of development. The CQA officer must be a professional engineer licensed to practice in Virginia.

I.D.4. The as-built plans of all groundwater and gas monitoring wells shall be submitted as these wells are installed or modified. Information to be included on the as-built plans shall include, but is not limited to, the total depth of the well, the surveyed elevations of the top of casing and ground surface (or apron), and the length and location of the screened interval and annular space seal. All dimensions are to be shown on well construction schematics.

I.E. REPORTS, NOTIFICATIONS, AND SUBMISSIONS TO THE DIRECTOR

All reports, notifications, or other submissions which are required by this permit to be sent or given to the Director should be sent to:

Virginia Department of Environmental Quality
Division of Land Protection & Revitalization
Piedmont Regional Office
4949-A Cox Road
Glen Allen, Virginia 23060

I.F. SITE SPECIFIC CONDITIONS

The provisions of this section are in addition to the permit conditions and regulatory requirements and are specifically developed for this facility. The permittee shall comply with all conditions of this section, as follows:

I.F.1. The final permit is based on permit application submittals (drawings and reports) that may contain the word “proposed’ and similarly tentative language. The documents that are incorporated into Permit No. 573 have been evaluated for administrative and technical adequacy and have been approved as proposed. Therefore, any references to a design, construction, operation,

monitoring or closure criteria are considered to be approved as proposed.

I.F.2. The facility is subject to the conditions listed in the Part A approval letter dated January 29, 1993.

I.F.3. The permittee shall perform a topographic survey of all active portions of the landfill units on an annual basis (at least every 12 months) unless otherwise requested by the Director. The survey shall be certified by a professional engineer or certified land surveyor licensed in the Commonwealth of Virginia, unless exempt pursuant to § 54.1-402. The survey results shall be compared to the landfill permit's final site topography plan. Within 90 days of the survey, the permittee shall submit to the DEQ Piedmont Regional Office Waste Program a drawing comparing surveyed elevations, permitted final elevations, and the disposal unit boundary. The drawing shall note areas that have reached final elevation or lateral extent, and any areas of overfill (waste outside the constructed disposal unit boundary or above the vertical design capacity) including an estimate of total area and volume of overfill. The remaining capacity and estimated life within the permitted disposal unit boundary shall also be included as part of the submittal. Areas that have attained final elevations and slopes must be stabilized in accordance with the permit until final cover is applied within the timeframe specified in the Closure Plan. Except as may be separately permitted or approved in writing by DEQ for exigent or emergency situations, no waste shall be placed outside of the disposal unit boundary and in areas where the elevation exceeds the vertical design capacity that can be derived from Drawing P9.0, Overall Final Cover Grades, dated March 18, 2024.

I.G. PERMIT MODIFICATIONS

I.G.1. The permit was modified by a major modification on June 4, 1997, approving raised base grades to avoid construction of an underdrain system.

I.G.2. The permit was modified by a minor modification on August 12, 1998, approving the Organic Constituent List in Permit Attachment X-1.

I.G.3. The permit was modified by a minor modification on May 21, 2004, approving revisions to the groundwater monitoring network and incorporating Groundwater Protection Standards.

I.G.4. The permit was modified by a minor modification on April 24, 2007, approving changes to the Technical Specifications and CQA program.

I.G.5. The permit was modified by a minor modification on May 18, 2009, approving a change in the construction material of the outfall structures for Sediment Basin No. 2 to reinforced concrete to comply with Hanover County requirements, and construction of a new reinforced concrete channel below the outfall for Sediment Basin No. 2.

I.G.6. The permit was modified by a minor modification on August 15, 2012, approving the relocation of a soil stockpile to between the Closed Cell and Cell 1.

I.G.7. The permit was modified by a minor modification on September 13, 2012, changing ownership from Bear Island Paper Company LLC to Bear Island Paper WB LLC.

I.G.8. The permit was modified by a minor modification on August 27, 2014, which approved the use of wastewater treatment sludge from the on-site Bear Island WWTP as an alternate daily cover (ADC) material.

I.G.9. The permit was modified by a minor permit modification on April 15, 2020, which changed ownership of the facility from Bear Island Paper WB LLC to 819 Virginia LLC. The facility name was also changed to Bear Island Mill Industrial Landfill.

I.G.10. The permit was modified by a minor permit modification on February 22, 2023, which changed ownership of the facility from 819 Virginia LLC to Cascades Containerboard Packaging-Bear Island, a division of Cascades Holding US Inc., and modified the drainage layer material in the liner design.

I.G.11. This permit modification involves a horizontal expansion (Cell 8), which horizontally connects Cells 1, 2, and 3 to Cells 5 (partial), 6, and 7. The other portion of Cell 8 connects a piggyback liner system on Cell 0 to the liner on Cell 1, and to the liner on Cell 4 and partial Cell 5 to the south. This modification also addresses the alternate weekly cover requirements in Module II.

PERMIT MODULE II
CONDITIONS OF OPERATION

II.A. HOURS OF OPERATION

II.A.1. The normal operating hours are:

- 24 hours per day, seven days per week.

II.B. WASTES ACCEPTED

The Cascades Containerboard Packaging – Bear Island IFL may receive the following wastes, as defined by 9VAC20-81-10, or described below:

II.B.1. Construction, demolition and debris waste.

II.B.2. Fossil Fuel Combustion Products.

II.B.3. Industrial Waste

II.B.4. Stabilized Sludge, containing no free liquids, from the on-site wastewater treatment plant.

Sludges shall be disposed of by mixing with other solid wastes, placed, and compacted at the working face in a manner to prevent localized pockets of sludge or conditions which might result in future instability of the waste mass.

II.B.5. Old corrugated containers (OCC) coarse rejects.

II.B.6. UNAUTHORIZED WASTE – The Cascades Containerboard Packaging – Bear Island IFL may not receive any unauthorized wastes identified in 9 VAC 20-81-140.C.4. or any of the following: waste oil that has not been adequately absorbed through site cleanup; radioactive wastes; lead acid batteries; pressurized tanks or pressurized containers; automobile gas tanks; friable and some non-friable asbestos-containing waste materials as defined by 9VAC20-81-620; regulated medical waste; explosives or other dangerous materials; and junked automobiles.

II.C. PERMIT LIMITS

The facility has a disposal limit of 650 tons per day as specified in DEQ Form SW PTB and the Design Report.

II.D. COMPACTION & COVER

II.D.1. Where necessary for a specific waste, such as Category I or II nonfriable asbestos-containing material, daily soil cover or other approved material shall be placed upon

on all exposed solid waste prior to the end of each operating day. Approved alternate daily cover materials include:

II.D.1.a. Mill process and wastewater treatment sludge.

II.D.1.b. Other alternate materials that have been approved by the Director for use at this facility.

II.D.1.c. The use of an ADC material shall cease if the material is not effective at achieving the purposes of daily cover set forth in 9 VAC 20-81-140.C.1.c., if the use results in nuisances, or if the material is erodible and results in waste being exposed.

II.D.2 Upon the effective date of Amendment 9 to the Virginia Solid Waste Management Regulations, the facility may use the following alternate cover methods in place of the required weekly cover. The alternate cover methods described are specific to the type, nature and quantity of waste disposed and shall be effective to control fires, odors, blowing litter, minimize stormwater infiltration, and prevent erosion and displacement of waste. The use of these alternate methods shall cease if they are not effective in controlling fires, odors, blowing litter, minimizing stormwater infiltration, preventing erosion and displacement of waste, or if it is found to present a threat to human health and the environment. The maximum working face area open at any given time shall be approximately 2,000 square feet and an anticipated work face maximum of 13,098 square feet per week based on the maximum disposal rate of 650 tons per day. Approved alternate cover methods include:

II.D.2.a. Alternate cover consisting of mill process sludge and wastewater treatment sludge shall be placed on internal waste slopes and on top of lifts.

II.D.3. Intermediate cover consisting of one foot of compacted soil shall be applied when an additional lift of refuse is not to be applied within 30 days (or alternate schedule approved by the Director) or waste has reached final grades.

II.D.4. Interim cover systems shall be applied when waste will not be placed for more than a year and final cover will not be installed. Prior to installation of an interim cover system not covered under the permit, the facility shall submit a minor permit modification request for DEQ review and approval. Interim cover systems shall be applied and maintained as outlined below:

II.D.4.a. Soil interim cover systems shall be designed, installed, and maintained to provide positive drainage and control stormwater run-on and run-off.

II.D.4.b. Geosynthetic interim cover systems shall be designed, installed, and maintained per manufacturer's instructions, and to provide positive drainage and control stormwater run-on and run-off.

II.D.4.c. Geosynthetic interim covers systems shall be installed on a minimum 12-inch compacted soil subgrade which is graded to provide positive drainage for the life of the interim cover system, accounting for future settlement.

II.D.4.d. Geosynthetic interim cover systems shall be properly secured and/or anchored to prevent lift and wind damage.

II.D.4.e. All interim cover systems shall be inspected at least monthly, and repairs made in a timely manner, as necessary, to maintain the integrity and effectiveness, correct the effects of damage, settlement, and landfill gas, and remove ponded water.

II.D.4.f. At least 30 days prior to installing any new interim cover system, notify the Department in writing, providing the expected installation date, description of cover, location(s), acreage, and expected duration of use.

II.D.4.g. Information regarding installation, maintenance, and removal of all interim cover systems shall be documented in the facility's Operations Manual prior to installation.

II.D.5 Before placement of new waste in areas with low permeability daily cover soil, alternate daily covers, intermediate cover, or interim cover systems, cover materials shall be removed or penetrated such that leachate can flow downward unimpeded to the leachate collection system. At least 30 days prior to removing an interim cover system, notify the Department in writing, providing the location(s) and acreage to be reopened and a plan for removal and management of the interim cover.

II.D.6. Final cover construction as outlined in Permit Module XII shall be initiated when the requirements of 9 VAC 20-81-140.E.1.e. are met.

II.E. HOUSEKEEPING

II.E.1. The facility shall control odors in accordance with 9VAC20-81-200.D. and/or as necessary to protect human health and the environment.

II.E.2 The facility shall use fencing or other suitable control means to control litter migration. All litter blown from the operations shall be collected on a weekly basis.

II.E.3 Fugitive dust and mud deposits on main offsite roads and access roads shall be limited at all time to limit nuisances. Dust shall be controlled to meet the requirements of 9VAC20-81-140.B.12.

II.E.4. Salvaging may only be performed in areas of the facility designated for salvaging or recycling. Salvaging operations must not interfere with the operations of the

landfill or create hazards or nuisances.

II.E.5. Open burning at active landfills shall comply with the requirements of 9VAC20-81-140.B.4. Open burning is prohibited at areas where waste has been disposed or is being used for active disposal.

II.F. SAFETY PROGRAM

Safety hazards to operating personnel shall be controlled through an active safety program consistent with the requirements of 29 CFR Part 1910. Safety training shall be performed annually, at a minimum.

II.G. SELF-INSPECTION PROGRAM

The landfill shall implement an inspection routine including a schedule for inspecting all applicable major aspects of facility operations necessary to ensure compliance with the requirements of Part III of the VSWMR (9 VAC 20-81-100 through 9 VAC 20-81-260). Records of these inspections must be maintained in the operating record and available for review. At a minimum, the following aspects of the facility shall be inspected on a monthly basis: erosion and sediment controls, storm water conveyance system, leachate collection system, safety and emergency equipment, internal roads, and operating equipment.

II.H. OPERATIONS MANUAL REQUIREMENTS

II.H.1. The facility shall be operated in accordance with 9 VAC 20-81-140, Module II, and an operations manual which has been certified by a responsible official and placed in the facility's operating record.

II.H.2. The operations manual shall include the following items as required by 9 VAC 20-81-485:

- A certification page;
- Operations Plan;
- Inspection Plan;
- Health and Safety Plan;
- Unauthorized Waste Control Plan;
- Emergency Contingency Plan; and
- Landscaping Plan.

II.H.3. The operations manual shall be reviewed and recertified annually to ensure consistency with the current operations and regulatory requirements.

II.I. LEACHATE MANAGEMENT

Leachate shall be managed in accordance with 9 VAC 20-81-210, and the facility's Leachate Management Plan. If a leachate seep(s) occurs, the owner or operator shall repair the seep(s) and follow the procedures outlined in 9 VAC20-81-210.F.

II.K. LANDFILL GAS MANAGEMENT

Landfill gas shall be monitored in accordance with 9VAC20-81-200, and the facility's Landfill Gas Management Plan, as applicable.

II.L. GROUNDWATER MONITORING

Groundwater shall be monitored in accordance with 9VAC20-81-250 and 9 VAC 20-81-260; Modules X and XI; and the respective groundwater permit documents, as applicable. The groundwater monitoring system shall be inspected at a rate consistent with the system's monitoring frequency.

PERMIT MODULE V
INDUSTRIAL LANDFILL DESIGN

V.A. LINER DESIGN

Cells 1 through 6, 7A, 7B, and 8 of the landfill shall be underlain by the composite liner system described below:

Cells 1 through 5 of the landfill liner are designed as follows (top to bottom):

- nine-inch protective sand or soil layer;
- 12-inch drainage layer with minimum permeability of 2×10^{-2} cm/sec.
- cushion geotextile;
- 60-mil HDPE;
- and prepared subgrade.

Cells 6, 7A, 7B, and 8 of the landfill liner are designed as follows (top to bottom):

- minimum 6-inch VDOT #57, #7, #78, or #8 stone protective layer with minimum permeability of 2×10^{-2} cm/sec.;
- minimum 12-inch VDOT #57, #7, #78, or #8 stone protective layer with minimum permeability of 2×10^{-2} cm/sec.;
- cushion geotextile;
- 60-mil HDPE;
- and prepared subgrade.

V.B. LINER CONSTRUCTION & CERTIFICATION

The landfill base liner for Cells 7B and 8 shall be constructed in accordance with the approved Design Plans, Technical Specifications, and Construction Quality Assurance Plan.

Prior to expansion into each new Cell, the permittee shall submit all required certification documents as indicated in Permit Module I Section I.D.1 – 3 as required by 9 VAC 20-81-490.A. Once this documentation has been submitted and approved by the Department, and a site inspection of the new Cell has been conducted, a Certificate to Operate (CTO) must be issued by the Regional Office prior to the facility accepting waste in the newly constructed Cell.

V.C. LANDFILL GAS MANAGEMENT SYSTEM

V.C.1. The facility shall implement and maintain a gas management plan in accordance with 9 VAC 20-81-200 to provide for the protection of public health, safety, and the environment during the periods of operation, closure, and post-closure care, in accordance with the following requirements:

V.C.1.a. The concentration of methane gas generated by the facility shall not exceed 25 percent of the lower explosive limit for methane (1.25% methane) in facility structures (excluding gas control or recovery system components); and

V.C.1.b. The concentration of methane gas shall not exceed the lower explosive limit for methane (5.0% methane) at the facility boundary.

V.C.2. The facility shall perform quarterly landfill gas monitoring of the perimeter gas monitoring network and facility structures in accordance with 9 VAC 20-81-200.B.4.

V.C.3. The facility shall make any necessary repairs to the gas monitoring network (including, but not limited to, dewatering if necessary because probes cannot be routinely monitored or making repairs to the concrete pad, cap, lock, or cover) and gas management and remediation systems prior to the next gas quarterly monitoring event unless an alternate repair timeframe is requested and approved.

V.C.4. Perimeter Gas Monitoring Network

V.C.4.a. The facility shall install and maintain perimeter gas monitoring probes at the locations specified in the Design Plans, Drawing P10.0, Site Monitoring Plan once all of the cells have been constructed. The proposed perimeter gas monitoring network consists of a series of 22 landfill gas monitoring probes designated GP-1 through GP-22 located along the facility boundary. Additional perimeter gas monitoring probes shall be added to the network if onsite or offsite property development encroaches within 1000 feet of the waste management boundary along that property boundary.

V.C.4.b. Upon installation of the perimeter gas monitoring network, the facility shall submit copies of the well boring logs and probe as-builts for inclusion in Appendix 4 of the Landfill Gas Management Plan within 30 days following construction completion.

V.C.4.c. All existing and future onsite structures shall be monitored in accordance with condition V.C.2 or have explosive gas monitoring equipment installed.

V.C.5. Landfill Gas Monitoring Response and Remediation

V.C.6.a. Should the results of landfill gas monitoring indicate concentrations of methane in excess of the methane action level (4% methane or 80% of the lower explosive limit (LEL) at the facility boundary or 1.25% methane or 25% LEL in facility structures), the Operator shall:

i. Take all immediate steps necessary to protect public health and safety (safety precautions should include evacuation of occupied

structures, if affected; notifying local fire/safety officials of potential landfill gas migration; and coordinating for off-site monitoring of structures located within 1,000 feet of the facility boundary);

ii. Investigate any active or passive gas control or remediation systems for proper connections and operation and make adjustments to vacuum, flow, or control valves, remove condensate, or make any other adjustments or repairs necessary to ensure proper operation, if applicable;

iii. Provide written notification within 5 working days of the methane action level exceedance indicating what has been done or is planned to be done to resolve the problem; and

iv. Increase the gas monitoring frequency per the requirements of V.C.6.c.

V.C.6.b. Should the results of landfill gas monitoring indicate concentrations of methane in excess of the methane compliance level (5% methane or 100% of the LEL at the facility boundary or 1.25% methane or 25% LEL in facility structures), the Operator shall:

i. Perform the response actions outlined under V.C.6.a.i. and a.ii.;

ii. Provide 24-hour oral notification of the methane compliance level exceedance;

iii. Provide written notification within 5 working days of the methane compliance level exceedance containing a description of the circumstances and its cause; the period of occurrence, including exact dates and times, and, if the circumstance has not been corrected, the anticipated time it is expected to continue. It shall also contain steps taken or planned to reduce, eliminate, and prevent reoccurrence of the circumstances resulting in an unusual condition or noncompliance;

iv. Increase the gas monitoring frequency per the requirements of V.C.6.c.

v. Implement a remediation plan within 60 days and submit the plan to DEQ for approval; and

vi. Assess the spacing of the entire perimeter monitoring network. If the spacing between any probes exceeds 250 foot spacing, the facility shall install additional perimeter probes unless the facility can show that such spacing is unwarranted based on site-specific factors.

V.C.6.c. The facility shall monitor a subset of the perimeter monitoring network consisting of the exceeding probe(s) and structure(s) and

those probes/structures immediately adjacent, such that at least one (1) probe on either side of each exceeding probe/structure is being monitored at the increased frequency.

i. The increased monitoring frequency shall be weekly unless an alternate frequency is approved by the Department.

ii. Weekly monitoring shall continue until four (4) consecutive weekly readings yield methane concentrations below 80% LEL at the facility boundary or 25% LEL in facility structures. At that time, the facility shall implement monthly monitoring of the network subset until three (3) consecutive monthly readings yield methane concentrations below 80% LEL at the facility boundary or 25% LEL in facility structures. At that time, the facility can return to quarterly monitoring.

iii. Once the required minimum number of consecutive monitoring events resulting in gas concentrations below action level are completed per V.C.6.c.ii. to justify returning to a lesser monitoring frequency, the facility shall submit monitoring data for ALL monitoring events since the implementation of the remedial action or remediation plan phase in order to assess progress towards return to compliance. If the return to a lesser monitoring frequency takes longer than six (6) months, monitoring data shall be submitted in tabular form with an accompanying graph to clearly document trends in data over time to justify the change in monitoring frequency.

V.D. LEACHATE MANAGEMENT

Eight-inch collector pipes in Cells 1, 2, and 3 drain north to a gravity pipe along the perimeter of the cells. Leachate then flows to a leachate pump station located at the northern corner of Cells 1 and 2. The leachate is pumped via a two-inch force main to the on-site wastewater treatment plant.

Eight-inch collector pipes in Cells 4 through 7 drain south to a gravity pipe along the perimeter of the cells. Leachate then flows to a leachate pump station located at the southern boundary of Cell 7. The leachate is then pumped via a two-inch HDPE force main to a manhole where it then gravity drains to the treatment plant.

For Cell 8, between existing Cells 1 and 0, leachate will feed into the existing gravity pipe system.

V.D.1. Leachate Disposal

Collected leachate is pumped directly to the on-site wastewater treatment plant and is discharged in accordance with the plant's VPDES permit.

PERMIT MODULE X

FIRST DETERMINATION GROUNDWATER MONITORING REQUIREMENTS

The purpose of First Determination monitoring is to ensure the earliest possible recognition of a landfill impact to the uppermost aquifer at levels which may exceed natural site background.

X.A. GROUNDWATER COMPLIANCE POINT

X.A.1. Uppermost Aquifer

The compliance point for groundwater monitoring is the uppermost aquifer **[250.A.2.a]** which encompasses the entire thickness between the first encounter with groundwater (not to include any perched water) and the first encounter with a confining unit forming the lower boundary of the uppermost aquifer. **[250.A.3.f.(1)(b/c)]**.

X.A.2. Monitoring Well Locations

All wells in the monitoring network, including those at the disposal unit boundary, or at an alternate compliance point **[250.A.3.a.(3)]**, shall be installed within the permitted facility boundary and screened within the uppermost aquifer unless a variance **[250.A.3.a.(2)]** meeting the requirements of **740.B** has been granted.

X.A.3. Location Restrictions

No monitoring well serving the function defined under **250.A.3.a.(2)** can be:

X.A.3.a. Located at a distance more than 500 feet away from the disposal unit boundary, or

X.A.3.b. Outside of the facility boundary **[740.A]**.

X.B. MONITORING NETWORK REQUIREMENTS

X.B.1. The following Performance Standards shall be met:

X.B.1.a. Network requirements of **250.A.2.a** and **A.3.a, b, f.**

X.B.1.b. Wells that require replacement due to non-performance shall be reported to the Department within **30** days of recognizing the non-performance. The notification shall include a site plan depicting the

proposed location for the replacement well(s) for Department review **[530.C.1]**.

X.B.1.c. Wells that require replacement must be replaced prior to the next regularly scheduled groundwater sampling event unless the Director has granted an extension to meeting the monitoring system compliance requirements under **250.A.3.a.**

X.B.1.d. Any wells that require abandonment shall be sealed and abandoned in accordance with existing EPA Resource Conservation and Recovery Act (RCRA) guidance, and any other applicable state or local requirements.

X.B.2. Installation, Operations and Maintenance

All wells shall be installed, operated and maintained during the life of the monitoring program in accordance with requirements of **250.A.3.c - e.**

X.B.3. Well Designations

The following wells shall be included in the groundwater monitoring network for the shallow aquifer system in the **Bacon's Castle Formation:**

Upgradient Monitoring Wells	Downgradient Monitoring Wells	Piezometers
MW-12, MW-17	MW-09, MW-10, MW-11, MW-16, MW-13 and MW-14, MW-18, MW-19, MW-20, MW-21, MW-23	MW-04, MW-05, MW-15, MW-02R, MW-22

X.C. AQUIFER INFORMATION

X.C.1. Aquifer Data Acquisition – Requirements

X.C.1.a. Static groundwater elevations **[250.A.4.c]** shall be:

X.C.1.a.(1) Measured in all monitoring wells.

X.C.1.a.(2) Measured to an accuracy of 0.01 foot.

X.C.1.a.(3) Measured each time groundwater is sampled on site.

X.C.1.a.(4) Obtained from all wells in the network within a single 24 hour period to avoid temporal variations/fluctuations in the groundwater table.

X.C.1.b. Groundwater flow rate and direction **[250.A.4.c]** shall be:

X.C.1.b.(1) Determined each time site groundwater is sampled.

X.C.1.b.(2) Calculated using technical methods accepted for use in EPA RCRA groundwater programs.

X.C.2. Aquifer Data Acquisition – Response

X.C.2.a. The Permittee shall evaluate the function of each of the wells included in the monitoring network each time groundwater is sampled. If the evaluation shows that one or more of the wells no longer functions in a manner that meets the requirements of **250.A.3.e**, the Permittee shall:

X.C.2.a.(1) Within **30** days of recognizing the non-performance, notify the Department of the need to modify the number, location, or depth of the monitoring wells, and provide for Department review, proposed locations for new (replacement) monitoring wells keyed to a site plan.

X.C.2.a.(2) Complete additions or modifications to the network, prior to the next regularly scheduled groundwater sampling event, unless an extension has been granted by the Director for meeting the monitoring system compliance requirements under **250.A.3.a.**

X.D. SAMPLING ACTIONS

The permittee shall:

X.D.1. Meet the field sampling and laboratory procedures of **250.A.4.a.**

X.D.2. Use the analytical methods of EPA SW-846, as amended **[250.A.4.b].**

X.D.3. Not filter groundwater samples prior to analysis **[250.A.4.b].**

X.D.4. Sample all First Determination constituents in Table 3.1 Column A **[250.C.2.a., c].**

X.E. SAMPLING FREQUENCY

X.E.1. The Permittee shall, during the active life and post-closure care periods, sample

groundwater and analyze for the required Table 3.1 constituents in all monitoring wells on a semi-annual basis **[250.C.2.(c)]**.

X.E.2. The length of the semi-annual sampling period shall not conflict with the requirements of **9 VAC 20-81-10.**

X.F. DETERMINATION OF BACKGROUND

X.F.1. The Permittee shall establish site background values **[250.A.4.d-f.]** for all First Determination monitoring constituents within the timeframes of **250.C.2.b.**

X.G. STATISTICAL PROCEDURES

Statistical comparisons are not required during the first year of First Determination background data collection **[250.C.2.A.]**. When evaluating the groundwater sampling event results, the Permittee shall:

X.G.1. Within **30** days of completion of the laboratory analysis for each sampling event **[250.A.4.h.(2)]**, determine whether or not there is a statistically significant increase over site background for each monitoring constituent using a method meeting the requirements of **250.A.4.h.(1)** and **250.A.4.g** and **250.D.**

X.G.2. For the purpose of this Permit, laboratory analysis is considered complete upon issuance of the analytical report under laboratory signature.

X.H. BACKGROUND EXCEEDANCE ACTIONS

If the statistical comparisons required under the monitoring program show no exceedances, the Permittee shall continue monitoring groundwater within the current program.

When a Permittee has determined that there has been an exceedance over site background for one or more of the First Determination monitoring constituents, the Permittee shall upon the end of the 30-day SSI determination period allowed by **250.A.4.h.(2)**, notify the Director within the timeframes of **250.C.2.d.(2).** The notification must indicate which groundwater monitoring constituents have shown statistically significant increases over background and describe whether the Permittee shall:

X.H.1. Initiate Phase II monitoring described under **250.C.3** within the timeframes of **250.C.3.a.(1),** or,

X.H.2. Submit an Alternate Source Demonstration meeting the content requirements and timeframes of **250.A.5.a, b.** Unless Director approval of the demonstration is obtained, the Permittee shall follow the sampling requirements and timeframes required of Phase II monitoring.

X.I. RECORD-KEEPING REQUIREMENTS

The Permittee shall retain all records identified under **250.E.1** as well as **530.B.1** and **530.B.2** throughout the active life (including closure) and post-closure care period. The records shall be retained at the facility or another location approved by the Director.

X.J. REPORTING REQUIREMENTS

X.J.1. ***Annual groundwater reports*** containing, at a minimum, content under **250.E.2.a.(2)**, shall be submitted to the Director within the timeframes of **250.E.2.a.(1)**.

X.J.2. ***Semi-annual groundwater reports*** containing at a minimum, groundwater flow rate and direction determinations **[250.A.4.c]**, statistical comparison results **[250.C.2]** and content defined under **250.E.2.b.(1)**, shall be submitted to the Department within the timeframes of **250.E.2.b.(1)**, unless qualifying facilities have received a variance to this requirement.

X.J.3. Within **30** days of establishing facility background in the First Determination program **[250.C.2.b.(2)]**, or re-establishing background due to the installation of new monitoring wells, or a change in sampling technique, the Permittee shall report the background values and statistical computations forming the basis for those values in a report entitled ***Facility Background Determination Report***. While in the Phase 2 program, the background determination results shall be submitted in the timeframe defined under **[250.C.3.b.(2)]**.

X.J.4. Within **44** days of well completion, the Permittee shall supply the Director a ***Well Installation Report*** containing the well number, surveyed elevation, boring log **[250.A.3.d]**, casing length, total depth, and a completion diagram **[250.E.1.c]** for each monitoring well, along with a certification **[250.A.3.g]** from a qualified groundwater scientist that the monitoring wells have been installed in accordance with the submitted plans.

X.J.5. Within **44** days of well abandonment, the Permittee shall supply the Director a ***Well Abandonment Report*** containing information including field methods utilized, and a certification from a qualified groundwater scientist verifying the well abandonment activities met all applicable requirements **[250.E.1.c]**.

X.J.6. Upon issuance of GPS, the Permittee shall place the GPS listing in the operating record **[250.A.6.c]** and update that record as needed upon any changes in GPS.

X.K. NOTIFICATION REQUIREMENTS

X.K.1. ***Background SSI Notifications*** shall be submitted to the Director within the timeframes noted under **250.C.2.d.(2).**

X.K.2. ***Well Non-Performance Notifications*** shall be submitted to the Director within **30** days of recognizing the non-performance issue in order to meet **530.C.1-3.**

X.L. MISCELLANEOUS ALLOWANCES

X.L.1. ***Use of Alternate Site Background.*** The Permittee may request the Director allow site background to be developed using wells that are not hydrologically upgradient of the disposal unit as long as the request addresses the technical criteria contained under **250.A.4.e**, and is certified by a qualified groundwater scientist. Until such time as Director approval is obtained, background shall be determined by sampling wells which are upgradient of the disposal unit and meet the requirements of **250.A.3.f.(2)**.

X.L.2. ***Use of Alternate Statistical Method.*** The Permittee may request the Director allow the use of an Alternate Statistical Method as long as the Permittee can demonstrate the alternate method can meet the technical criteria defined under **250.D.2**. Until such time as Director approval is obtained, the statistical test(s) applied to site groundwater data shall be one from **250.D.1**. Whichever method is approved for use at the site, the method should be listed in the facility ***Groundwater Monitoring Plan*** as required under **250.A.4.g.**

X.L.3. ***Verification Sampling***. The Permittee may, at any time within the 30 day statistical determination period defined under **250.A.4.h.(2)**, obtain verification samples. Undertaking verification sampling shall not alter the timeframes associated with determining or reporting a statistically significant increase as otherwise defined under **250.A.4.i.**

X.L.4. ***Data Validation.*** The Permittee may at any time within the 30 day statistical determination period defined under **250.A.4.h.(2)**, undertake third-party data validation of the analytical data received from the laboratory. Undertaking such validation efforts shall not alter the timeframes associated with determining or reporting a statistically significant increase as otherwise defined under **250.A.4.j**.

X.L.5. When the Permittee recognizes a failure to submit any relevant facts or has submitted incorrect information in any groundwater monitoring report to the Director, he shall, within **7** days, submit such omitted facts or the correct information with a full explanation **[530.E.]**.

X.M. MISCELLANEOUS DEMONSTRATIONS

X.M.1. To address an exceedance which is the result of something other than a release of solid waste constituents from the solid waste disposal facility, the Permittee may submit a report entitled ***Alternate Source Demonstration***, certified by a

qualified groundwater scientist, for review by the Director within **90** days of providing the SSI notification unless the submission and approval timeframe has been extended by the Director for good cause **[250.A.5.b].**

X.M.1.a. If a successful demonstration of an alternate source for the noted increase is made by the Permittee and approved by the Director within the 90 day timeframe, the Permittee may continue in the applicable monitoring program as defined in this Permit Module.

X.M.1.b. If a successful demonstration of an alternate source for the noted increase is not made by the Permittee within the 90 day timeframe, the Permittee shall take actions required under **250.A.5.c.(3)** within the Regulatory timeframes unless an extension has been granted by the Director.

X.M.2. The Permittee may submit to the Director, a ***Multi-unit Groundwater Monitoring System Demonstration*** containing the content defined under **250.A.3.b** and certified by a qualified groundwater scientist, when he feels that the implementation of such a monitoring system will be as protective of human health and the environment as individual systems would be.

X.M.2.a. If a successful demonstration is made and approved by the Director, the Permittee may discontinue use of individual monitoring systems and institute the monitoring of a multi-unit system.

X.M.2.b. If a successful demonstration is not made, the Permittee shall initiate (or continue) to monitor individual networks under the applicable monitoring program.

X.M.3. The Permittee may request the Director suspend groundwater monitoring requirements by submitting a ***No-Potential-Migration Demonstration***, certified by a qualified groundwater scientist, meeting the technical requirements of **250.A.1.c.**

X.M.3.a. If a successful demonstration is made and approved by the Director, the Permittee may suspend groundwater monitoring actions.

X.M.3.b. If a successful demonstration is not made, the Permittee shall continue monitoring as required under **250.C.2.**

X.N. PERMIT DOCUMENTS

As required under **470.A.1**, the Permittee must have Design Plans that includes detailed instructions concerning groundwater monitoring **[470.A.1.g]**. These detailed groundwater monitoring instructions must at a minimum cover the items listed under **250.A.4.a** and

applicable information under **250** and **260**. The document containing these instructions, called the ***Groundwater Monitoring Plan***, shall be placed in the file record.

It shall be the responsibility of the Permittee to update this monitoring plan as needed **[250.C.3.d.]**, which may include actions otherwise defined under **600.A - F**, if changes to the monitoring program have taken place since original Plan development.

X.O. LIMITATIONS/AUTHORITIES

X.O.1. Solid waste shall not be deposited in or permitted to enter any surface waters or groundwater **[240.C.10].**

X.O.2. Should information contained in any Permittee authored document referenced in this Module conflict with any requirement or condition of this Module, or requirements found within **9 VAC 20-81-10 et seq**., as amended, the Module condition and/or Regulatory requirement shall prevail over the language in the Permittee supplied attachment **[35.D and 490.E]** unless a Variance from that regulatory requirement has been granted by the Director to the facility following the procedures under **700 et seq.**

X.O.3. The groundwater monitoring and reporting requirements set forth herein are minimum requirements. The Director may require, by amending the Permit, any owner or operator to install, operate, and maintain a groundwater monitoring system and program that contains requirements more stringent than those of the Regulations whenever it is determined that such requirements are necessary to prevent significant adverse effects on public health or the environment **[250.A.2.c]**.

PERMIT MODULE XI

PHASE II GROUNDWATER MONITORING REQUIREMENTS

The purpose of Phase II monitoring is to ensure the earliest possible recognition of a landfill impact to the uppermost aquifer at levels which may exceed groundwater protection standards and trigger potential groundwater remediation.

XI.A. GROUNDWATER COMPLIANCE POINT

XI.A.1. Uppermost Aquifer

The compliance point for groundwater monitoring is the uppermost aquifer **[250.A.2.a]** which encompasses the entire thickness between the first encounter with groundwater (not to include any perched water) and the first encounter with a confining unit forming the lower boundary of the uppermost aquifer. **[250.A.3.f.(1)(b/c)]**.

XI.A.2. Monitoring Well Locations

All wells in the monitoring network, including those at the disposal unit boundary, or at an alternate compliance point **[250.A.3.a.(3)]**, shall be installed within the permitted facility boundary and screened within the uppermost aquifer unless a variance **[250.A.3.a.(2)]** meeting the requirements of **740.B** has been granted.

XI.A.3. Location Restrictions

No monitoring well serving the function defined under **250.A.3.a.(2)** can be:

XI.A.3.a. Located at a distance more than 500 feet away from the disposal unit boundary, or

XI.A.3.b. Outside of the facility boundary **[740.A]**.

XI.B. MONITORING NETWORK REQUIREMENTS

XI.B.1. The following Performance Standards shall be met:

XI.B.1.a. Network requirements of **250.A.2.a** and **A.3.a, b, f.**

XI.B.1.b. Wells that require replacement due to non-performance shall be reported to the Department within **30** days of recognizing the non-performance. The notification shall include a site plan depicting the

proposed location for the replacement well(s) for Department review **[530.C.1]**.

XI.B.1.c. Wells that require replacement must be replaced prior to the next regularly scheduled groundwater sampling event unless the Director has granted an extension to meeting the monitoring system compliance requirements under **250.A.3.a.**

XI.B.1.d. Any wells that require abandonment shall be sealed and abandoned in accordance with existing EPA Resource Conservation and Recovery Act (RCRA) guidance, and any other applicable state or local requirements.

XI.B.2. Installation, Operations and Maintenance

All wells shall be installed, operated and maintained during the life of the monitoring program in accordance with requirements of **250.A.3.c - e.**

XI.B.3. Well Designations

The following wells shall be included in the groundwater monitoring network for the shallow aquifer system in the **Bacon's Castle Formation:**

Upgradient Monitoring Wells	Downgradient Monitoring Wells	Piezometers
MW-12, MW-17	MW-09, MW-10, MW-11, MW-16, MW-13 and MW-14, MW-18, MW-19, MW-20, MW-21, MW-23	MW-04, MW-05, MW-15, MW-02R, MW-22

XI.C. AQUIFER INFORMATION

XI.C.1. Aquifer Data Acquisition – Requirements

XI.C.1.a. Static groundwater elevations **[250.A.4.c]** shall be:

XI.C.1.a.(1) Measured in all monitoring wells.

XI.C.1.a.(2) Measured to an accuracy of 0.01 foot.

XI.C.1.a.(3) Measured each time groundwater is sampled on site.

XI.C.1.a.(4) Obtained from all wells in the network within a single 24 hour period to avoid temporal variations or fluctuations in the groundwater table.

XI.C.1.b. Groundwater flow rate and direction **[250.A.4.c]** shall be:

XI.C.1.b.(1) Determined each time site groundwater is sampled.

XI.C.1.b.(2) Calculated using technical methods accepted for use in EPA RCRA groundwater programs.

XI.C.2. Aquifer Data Acquisition – Response

XI.C.2.a. The Permittee shall evaluate the function of each of the wells included in the monitoring network each time groundwater is sampled. If the evaluation shows that one or more of the wells no longer functions in a manner that meets the requirements of **250.A.3.e**, the Permittee shall:

XI.C.2.a.(1) Within **30** days of recognizing the non-performance, notify the Department of the need to modify the number, location, or depth of the monitoring wells, and provide for Department review, proposed locations for new (replacement) monitoring wells keyed to a site plan.

XI.C.2.a.(2) Complete additions or modifications to the network, prior to the next regularly scheduled groundwater sampling event, unless an extension has been granted by the Director for meeting the monitoring system compliance requirements under **250.A.3.a.**

XI.D. SAMPLING ACTIONS

The permittee shall:

XI.D.1. Meet the field sampling and laboratory procedures of **250.A.4.a.**

XI.D.2. Use the analytical methods of EPA SW-846, as amended **[250.A.4.b].**

XI.D.3. Not filter groundwater samples prior to analysis **[250.A.4.b].**

XI.D.4. Sample all Phase II monitoring constituents in Table 3.1 Column A as wells as those detected constituents found in Table 3.1 Column B **[250.C.3.a., b].**

XI.E. SAMPLING FREQUENCY

XI.E.1. The Permittee shall, during the active life and post-closure care periods, sample

groundwater and analyze for the required Table 3.1 constituents in all monitoring wells on a semi-annual basis **[250.C.3.a.(2)]**.

XI.E.2. The length of the semi-annual sampling period shall not conflict with the requirements of **9 VAC 20-81-10.**

XI.E.3. The initial Phase 2 sampling event shall be completed in the timeframe required under **250.C.3.a.(1).**

XI.F. DETERMINATION OF BACKGROUND & GPS

XI.F.1. The Permittee shall establish site-specific Phase II background values **[250.A.4.d-f.]** for all detected monitoring constituents within the timeframes of **250.C.3.b.1.**

XI.F.2. Groundwater Protection Standards (GPS) established using the process defined under **250.A.6.b**, for each detected Phase II monitoring constituent shall be:

XI.F.2.a. proposed within timelines of **250.C.3.c**, and

XI.F.3. Groundwater Protection Standards shall be updated as follows:

XI.F.3.a. Federal Maximum Contaminant Level-based GPS or department approved background by following the process under **250.A.6.d**.

XI.F.3.b. Alternate Concentration Limit-based GPS by following the process under **250.A.6.e.**

XI.G. STATISTICAL PROCEDURES

When evaluating the groundwater sampling event results, the Permittee shall:

XI.G.1. Within **30** days of completion of the laboratory analysis for each sampling event **[250.A.4.h.(2)]**, determine whether or not there is a statistically significant increase over site background and GPS for each monitoring constituent using a method meeting the requirements of **250.A.4.h.(1)** and **250.A.4.g** and **250.D.**

XI.G.1.a. For GPS based on Federal Maximum Contaminant Level or ACLs, the comparison of analytical results from the downgradient wells shall be based on either a point to point comparison to the GPS, or a statistical comparison using 95% Lower Confidence Limit derived from at a minimum four independent sampling events completed during the compliance period.

XI.G.1.b. For GPS based on statistically calculated site background, the comparison of analytical results from the downgradient wells shall be based on a point to point comparison to the GPS.

XI.G.2. For the purpose of this Permit, laboratory analysis is considered complete upon issuance of the analytical report under laboratory signature.

XI.H. GPS EXCEEDANCE ACTIONS

If the statistical comparisons required under the monitoring program show no exceedances, the Permittee shall continue monitoring groundwater within the current program.

When a Permittee has determined that there has been an SSI exceedance over GPS for one or more of the Phase II monitoring constituents, the Permittee shall upon the end of the 30-day SSI determination period allowed by **250.A.4.h.(2)**, notify the Director within the timeframes of **250.C.3.e.(3)(a).** The notification must indicate which groundwater monitoring constituents have shown statistically significant increases over GPS and describe whether the Permittee shall:

XI.H.1. initiate Corrective Actions described under 260.C within the timeframes of **260.C.1** including defining the horizontal and lateral extent of the GPS exceeding release **[260.C.1.a]**, as well as the actions described under **260.C.1.b-e.**, or,

XI.H.2. submit an Alternate Source Demonstration meeting the content requirements and timeframes of **250.A.5.a., b**. Unless Director approval of the demonstration is obtained, the Permittee shall follow the sampling requirements and timeframes required of Corrective Actions in response to a GPS exceedance.

XI.I. RECORD-KEEPING REQUIREMENTS

The Permittee shall retain all records identified under **250.E.1** as well as **530.B.1** and **530.B.2** throughout the active life (including closure) and post-closure care period. The records shall be retained at the facility or another location approved by the Director.

XI.J. REPORTING REQUIREMENTS

XI.J.1. ***Annual groundwater reports*** containing, at a minimum, content under **250.E.2.a.(2)**, shall be submitted to the Director within the timeframes of **250.E.2.a.(1)**.

XI.J.2. ***Semi-annual groundwater reports*** containing at a minimum, groundwater flow rate and direction determinations **[250.A.4.c]**, statistical comparison results **[250.C.2]** and content defined under **250.E.2.b.(1)**, shall be submitted to the Department within the timeframes of **250.E.2.b.(1)**, unless qualifying facilities have received a variance to this requirement.

XI.J.3. Within **30** days of establishing facility background in the First Determination program **[250.C.2.b.(2)]**, or re-establishing background due to the installation of new monitoring wells, or a change in sampling technique, the Permittee shall report the background values and statistical computations forming the basis for those values in a report entitled ***Facility Background Determination Report***. While in the Phase 2 program, the background determination results shall be submitted in the timeframe defined under **[250.C.3.b.(2)]**.

XI.J.4. Within **44** days of well completion, the Permittee shall supply the Director a ***Well Installation Report*** containing the well number, surveyed elevation, boring log **[250.A.3.d]**, casing length, total depth, and a completion diagram **[250.E.1.c]** for each monitoring well, along with a certification **[250.A.3.g]** from a qualified groundwater scientist that the monitoring wells have been installed in accordance with the submitted plans.

XI.J.5. Within **44** days of well abandonment, the Permittee shall supply the Director a ***Well Abandonment Report*** containing information including field methods utilized, and a certification from a qualified groundwater scientist verifying the well abandonment activities met all applicable requirements **[250.E.1.c]**.

XI.J.6. Upon issuance of GPS, the Permittee shall place the GPS listing in the operating record **[250.A.6.c]** and update that record as needed upon any changes in GPS.

XI.K. NOTIFICATION REQUIREMENTS

XI.K.1. ***GPS SSI Notifications*** shall be submitted to the Director within the timeframes noted under **250.C.3.e.(3)(a).**

XI.K.2. ***Well Non-Performance Notifications*** shall be submitted to the Director within **30** days of recognizing the non-performance issue in order to meet **530.C.1 - 3.**

XI.K.3. ***Off-site Plume Notifications*** shall be submitted to the affected landowner **[260.C.1.b]** and copied to the Director within **15** days of identifying the impacts.

XI.L. MISCELLANEOUS ALLOWANCES

XI.L.1. ***Use of Alternate Site Background.*** The Permittee may request the Director allow site background to be developed using wells that are not hydrologically upgradient of the disposal unit as long as the request addresses the technical criteria contained under **250.A.4.e**, and is certified by a qualified groundwater scientist. Until such time as Director approval is obtained, background shall be determined by sampling wells which are upgradient of the disposal unit and meet the requirements of **250.A.3.f.(2)**.

XI.L.2. ***Use of Alternate Statistical Method.*** The Permittee may request the Director allow the use of an Alternate Statistical Method as long as the Permittee can demonstrate the alternate method can meet the technical criteria defined under **250.D.2**. Until such time as Director approval is obtained, the statistical test(s) applied to site groundwater data shall be one from **250.D.1**. Whichever method is approved for use at the site, the method should be listed in the facility ***Groundwater Monitoring Plan*** as required under **250.A.4.g.**

XI.L.3. ***Verification Sampling***. The Permittee may, at any time within the 30 day statistical determination period defined under **250.A.4.h.(2)**, obtain verification samples. Undertaking verification sampling shall not alter the timeframes associated with determining or reporting a statistically significant increase as otherwise defined under **250.A.4.i.**

XI.L.4. ***Data Validation*.** The Permittee may at any time within the 30 day statistical determination period defined under **250.A.4.h.(2)**, undertake third-party data validation of the analytical data received from the laboratory. Undertaking such validation efforts shall not alter the timeframes associated with determining or reporting a statistically significant increase as otherwise defined under **250.A.4.j**.

XI.L.5. When the Permittee recognizes a failure to submit any relevant facts or has submitted incorrect information in any groundwater monitoring report to the Director, he shall, within **7** days, submit such omitted facts or the correct information with a full explanation **[530.E.]**.

XI.L.6. **Table 3.1 Column B Detect Deletions**. The Permittee may request the Director allow previously detected Table 3.1 Column B constituents to be dropped from the semi-annual Phase 2 monitoring list as long as the request is certified by a qualified groundwater scientist and verifies that the Table 3.1 constituent(s) in question have not been detected for a period of two years **[250.C.3.b.(3)].**

XI.L.7. **Return to First Determination Program.** The Permittee may request the Director allow a return to First Determination monitoring as long as the request is certified by a qualified groundwater scientist and verifies that all Table 3.1 Column B constituent(s) have been found to be statistically at or below background levels for two consecutive Table 3.1 Column B sampling events **[250.C.3.e.(1)].**

XI.M. MISCELLANEOUS DEMONSTRATIONS

XI.M.1. To address an exceedance which is the result of something other than a release of solid waste constituents from the solid waste disposal facility, the Permittee may submit a report entitled ***Alternate Source Demonstration***, certified by a qualified groundwater scientist, for review by the Director within **90** days of providing the SSI notification unless the submission and approval timeframe has been extended

by the Director for good cause **[250.A.5.b].**

XI.M.1.a. If a successful demonstration of an alternate source for the noted increase is made by the Permittee and approved by the Director within the 90 day timeframe, the Permittee may continue in the applicable monitoring program as defined in this Permit Module.

XI.M.1.b. If a successful demonstration of an alternate source for the noted increase is not made by the Permittee within the 90 day timeframe, the Permittee shall take actions required under **250.A.5.c.(3)** within the Regulatory timeframes unless an extension has been granted by the Director.

XI.M.2. The Permittee may submit to the Director, a ***Multi-unit Groundwater Monitoring System Demonstration*** containing the content defined under **250.A.3.b** and certified by a qualified groundwater scientist, when he feels that the implementation of such a monitoring system will be as protective of human health and the environment as individual systems would be.

XI.M.2.a. If a successful demonstration is made and approved by the Director, the Permittee may discontinue use of individual monitoring systems and institute the monitoring of a multi-unit system.

XI.M.2.b. If a successful demonstration is not made, the Permittee shall initiate (or continue) to monitor individual networks under the applicable monitoring program.

XI.M.3. The Permittee may request the Director suspend groundwater monitoring requirements by submitting a ***No-Potential-Migration Demonstration***, certified by a qualified groundwater scientist, meeting the technical requirements of **250.A.1.c.**

XI.M.3.a. If a successful demonstration is made and approved by the Director, the Permittee may suspend groundwater monitoring actions.

XI.M.3.b. If a successful demonstration is not made, the Permittee shall continue monitoring as required under **250.C.3.**

XI.N. PERMIT DOCUMENTS

As required under **470.A.1**, the Permittee must have Design Plans that includes detailed instructions concerning groundwater monitoring **[470.A.1.g]**. These detailed groundwater monitoring instructions must at a minimum cover the items listed under **250.A.4.a** and applicable information under **250** and **260**. The document containing these instructions, called the ***Groundwater Monitoring Plan***, shall be placed in the file record.

It shall be the responsibility of the Permittee to update this monitoring plan as needed **[250.C.3.d.]**, which may include actions otherwise defined under **600.A - F**, if changes to the monitoring program have taken place since original Plan development.

XI.O. LIMITATIONS/AUTHORITIES

XI.O.1. Solid waste shall not be deposited in or permitted to enter any surface waters or groundwater **[240.C.10].**

XI.O.2. Should information contained in any Permittee authored document referenced in this Module conflict with any requirement or condition of this Module, or requirements found within **9 VAC 20-81-10 et seq**., as amended, the Module condition and/or Regulatory requirement shall prevail over the language in the Permittee supplied attachment **[35.D and 490.E]** unless a Variance from that regulatory requirement has been granted by the Director to the facility following the procedures under **700 et seq.**

XI.O.3. The groundwater monitoring and reporting requirements set forth herein are minimum requirements. The Director may require, by amending the Permit, any owner or operator to install, operate, and maintain a groundwater monitoring system and program that contains requirements more stringent than those of the Regulations whenever it is determined that such requirements are necessary to prevent significant adverse effects on public health or the environment **[250.A.2.c]**.

PERMIT MODULE XII
CLOSURE

XII.A. CLOSURE PLAN MODIFICATION

XII.A.1. The closure plan shall be amended any time changes in operating plans or landfill design affect the closure plan.

XII.A.2. Amended closure plans shall be submitted to the department at least 180 days before the date the facility expects to begin construction activities related to closure.

XII.B. TIME ALLOWED FOR CLOSURE

The facility shall close each unit and install a final cover system in accordance with the timeframes specified in 9 VAC 20-81-140.E.1.e. and 9 VAC 20-81-160.

XII.C. FINAL COVER SYSTEM

The cap design is as follows (top to bottom):

- 6-inch vegetative support layer;
- 18-inch erosion control/protective cover layer;
- Geocomposite drainage net (GDN);
- 40-mil LLDPE geomembrane; and
- 6-inch cap bedding layer.

XII.D. CLOSURE CERTIFICATION

XII.D.1. Following construction of the final cover system for each unit, certification, signed by a registered professional engineer, shall be submitted verifying that closure has been completed in accordance with the permit, approved plans, and specifications. A certification will be required for each capped landfill phase and shall include the results of the CQA/QC requirements under 9VAC20-81-130.Q.1.b.(6).

XII.D.2. Following the closure of all units, certification, signed by a registered professional engineer, shall be submitted verifying that closure has been completed in accordance with the requirements of 9VAC20-81-160.D.5.a. through 5.c., which require posting a sign at the facility entrance and erecting suitable barriers to prevent access; submitting a survey plat to the local land reporting authority; and recording a notation on the deed to the facility property.

PERMIT MODULE XIII
POST-CLOSURE CARE

XIII.A. POST-CLOSURE CARE REQUIREMENTS

XIII.A.1. The facility shall conduct post-closure care of the landfill in accordance with its approved Post-closure Care Plan.

XIII.A.1.a. Leachate shall be managed in accordance with 9 VAC 20-81-210 and the facility's Leachate Management Plan. If a leachate seep(s) occurs, the owner or operator shall repair the seep(s) and follow the procedures outlined in 9 VAC20-81-210.F.

XIII.A.1.b. Landfill gas shall be monitored in accordance with 9VAC20-81-200 and the facility's Landfill Gas Management Plan. The gas management system shall be inspected at a rate consistent with the system's monitoring frequency.

XIII.A.1.c. Groundwater shall be monitored in accordance with 9VAC20-81-250, Module X, and Module XI and the respective groundwater permit documents as applicable. The groundwater monitoring system shall be inspected at a rate consistent with the system's monitoring frequency.

XIII.A.2. Amended Post-closure Care Plans shall be submitted to the department for review and approval by the director.

XIII.B. POST-CLOSURE PERIOD

XIII.B.1. Post-closure care shall be conducted for 10 years.

XIII.B.2. The length of the post-closure care period may be decreased by the director if the owner or operator demonstrates that the reduced period is equally protective of human health and the environment and the demonstration is approved by the director. This demonstration shall contain:

XIII.B.2.a. Certification, signed by the owner or operator and a professional engineer licensed in the Commonwealth, verifying that decreasing the post-closure care period will be equally protective of human health and the environment; and

XIII.B.2.b. An evaluation prepared by a professional engineer or professional geologist licensed in the Commonwealth, which assesses and evaluates the landfill's potential for harm to human health and the

environment in the event that post-closure monitoring and maintenance are discontinued.

XIII.B.3. The facility shall continue post-closure care and monitoring until such time that the department approves termination or the post-closure care and/or monitoring activity.

XIII.B.4. The facility shall maintain financial assurance for the continued post-closure care monitoring and maintenance activities.

XIII.C. CERTIFICATION OF COMPLETION OF POST-CLOSURE CARE

Not less than 180 days prior to the completion of the post-closure monitoring and maintenance period as prescribed by the Board's regulations or by the Director, the owner or operator shall submit to the Director:

XIII.C.1. Certification, signed by the owner or operator and a professional engineer licensed in the Commonwealth, verifying that post-closure monitoring and maintenance have been completed in accordance with the facility's Post-closure Care Plan; and

XIII.C.2. An evaluation prepared by a professional engineer or professional geologist licensed in the Commonwealth, which assesses and evaluates the landfill's potential for harm to human health and the environment in the event that post-closure monitoring and maintenance are discontinued.

If the Director determines that continued post-closure monitoring or maintenance is necessary to prevent harm to human health or the environment, he shall extend the post-closure period for such additional time as the Director deems necessary to protect human health and the environment and shall direct the owner or operator to submit a revised post-closure plan and to continue post-closure monitoring and maintenance in accordance therewith. Requirements for financial assurance shall apply throughout such extended post-closure period.