TAB 5

Plan of Operation
(Checklist Item #5)

Cherry Island Landfill
Sanitary Landfill Permit Renewal

Delaware Solid Waste Authority

Cherry Island Landfill
Wilmington, Delaware

Plan of Operation

March 2016

DELAWARE SOLID WASTE AUTHORITY

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Section 1
Introduction

1.1 Purpose

This operation plan for the Delaware Solid Waste Authority (DSWA) Cherry Island Landfill (CIL) is intended to provide the necessary information to operate the facility in a manner that is protective of health, safety and the environment.

1.2 Facility Location and Description

The CIL is a Solid Waste Landfill owned and managed by the DSWA. The facility is permitted to accept Municipal Solid Waste (MSW) and Non-hazardous industrial waste or sludges and other related waste that have been accepted in accordance with the DSWA Special Waste Policy. CIL is also permitted to accept asbestos containing materials which are managed in accordance with the DSWA Asbestos Policy.

The facility is located in the City of Wilmington, Delaware on the north side of the Christina River at its junction with the Delaware River. The landfill is readily accessible from I-495 and 12th Street in Wilmington.

The CIL consist of approximately 368 acres, and is used for the disposal of municipal waste. Each phase within the CIL consists of approximately 30-40 acres. The facility began to receive municipal waste in 1985. The facility includes scalehouse(s), maintenance/office facilities, a small load drop-off area, and pumping station(s).

The disposal area was previously constructed by the Army Corps of Engineers for containment of dredge spoil. Dredge spoil now serves as a natural base liner for the CIL. DNREC regulations require a minimum of 5-foot thick natural liner with a permeability of less than or equal to 1 x 10-7cm/sec. Corps of Engineers operations have resulted in a dredge spoil thickness ranging from 10 to 55 feet thick in the area, which have been constructed. In conjunction with this a Mechanically Stabilized Earth (MSE) wall was constructed along three sides of the disposal area to both stabilize the subsoils as well as provide additional disposal volume. The internal slopes of the MSE wall were lined with a synthetic geomembrane liner which was tied into the natural base liner system.

Section 2
Hours of Operation

CIL is operated six days per week, Monday through Friday, from 7:00 a.m. to 5:00 p.m., and Saturdays, from 7:00 a.m. to 3:00 p.m. Additionally, CIL may be open to facility users an hour earlier on the next operating day following the holidays listed below. Facility users are allowed to weigh in during operating hours. Operating personnel stay as long as necessary to properly landfill and cover waste delivered each day.

The landfill may also close in emergency situations, when faced with inclement weather, or for other reasons as determined by DSWA. In addition, CIL may open on Sundays or extend normal operating hours to accommodate emergency situations such disaster debris disposal.

The landfill is closed on the following holidays:

New Year's Day

Memorial Day

Independence Day

Labor Day

Thanksgiving Day

Christmas Day

Section 3
Landfill Operating Staff

CIL maintains a qualified work force that operates the site in accordance with the operations plan, the Department of Natural Resources and Environmental Control (DNREC) permit, and applicable state and federal regulations. Personnel working at CIL are provided with health and safety training and equipment as discussed in Section 8.

3.1 Positions and Responsibilities

The following personnel are generally available at the facility during operating hours to perform the duties as described below. This list may be modified as needed to reflect the personnel required to effectively operate the landfill:

1. Landfill Manager

   The landfill manager is responsible for oversight of all facility operations. The landfill manager ensures that operations are in compliance with permit terms and conditions.

2. Facility Engineer

   The facility engineer assists the landfill manager with oversight of various projects and tasks associated with landfill operations.

3. Site Supervisor

   The landfill site supervisor oversees all activities associated with waste disposal. The landfill site supervisor manages the tasks performed by the operators and laborers.

4. Weighmaster

   The weighmaster records the weights of all hauling vehicles and waste loads entering the landfill.

5. Heavy Equipment Operator(s)

   The heavy equipment operators operate the equipment used to place, compact, and cover the waste. The heavy equipment operators are trained and capable of operating on-site equipment.

6. Skilled Laborer

   Skilled laborers perform a variety of tasks at the facility and are trained to operate power tools, lawn mowers, trimmers, tractors, and related tools, equipment, and machinery. All skilled laborers must receive health and safety training that is pertinent to their assigned tasks.

7. Unskilled Laborer

   Unskilled laborers will be used for daily litter control and grounds maintenance. They will be qualified to run equipment such as tractors, lawn mowers, roadway sweepers, centrifugal and trash pumps and the water truck.

8. Inspector/Spotters

   The inspector/spotters shall be responsible for inspecting waste, waste screening and spotting vehicles. They shall direct vehicles at the working face, monitor dumping and identify non-acceptable waste.

Section 4
Landfill Operating Equipment

4.1 Equipment

The equipment used at CIL is intended to provide safe and efficient operation of the site. The following equipment has been demonstrated to be of sufficient quantity and type to maintain the operation in accordance with the permit conditions and applicable state and federal regulations.

If site conditions warrant, the equipment list below may be modified to reflect amount and type of equipment necessary for the effective operation of the landfill. It is anticipated that the following equipment will be maintained on site:

1. Three (3) landfill compactors, two-Model 826H and one-Model 836H as manufactured by Caterpillar Corporation or approved equal

2. Two (2) bulldozers:

   One (1) Model D-6R as manufactured by the Caterpillar Corporation, or approved equal. Wide tracks are required.

   One (1) Model D-4K as manufactured by Caterpillar Corporation or approved equal. The dozer shall have an airtight cab equipped with an outside source of oxygen or a HEPA filter. It will be utilized at the asbestos disposal area. The dozer shall have wide tracks.

3. One (1) rubber-tired loader, Model 966 as manufactured by Caterpillar Corporation or approved equal with a 5-1/2 yard bucket.

4. One (1) water truck with a minimum 3,000 gallon capacity tank, pump and spray bar for watering haul roads, fighting fires, and hose for watering trees, flowers and shrubs.

5. One (1) Model 325 excavator as manufactured by the Caterpillar Corporation, or approved equal.

6. One (1) portable Hydrotek 30005 high pressure hot water cleaner, or approved equal, for cleaning equipment and scales.

7. One (1) articulated, all-terrain end dump truck, Model 730 as manufactured by Caterpillar Corporation or approved equal for hauling cover materials and aggregate to the landfill working face or other locations on the landfill as necessary.

8. Automatic Tarping Machine - Two (2) standard 40' automatic tarping machines including spool assembly as manufactured by Tarp-o-matic, or approved equal.

The Contractor shall also have available for use as necessary: trash pumps, small generator, power tools, conductivity meters, four gas meter (Oxygen, hydrogen sulfide, methane and carbon monoxide), etc.

4.2 Equipment Maintenance

Landfill equipment is to be maintained in good working order. Maintenance is performed in accordance with recommendations of the equipment manufacturer and the equipment is cleaned periodically.

4.3 Back-up Equipment

Back-up equipment will be available to ensure continuous operation of CIL in compliance with this operations plan, conditions of the DNREC permit and applicable state and federal regulations. Generally, back-up equipment for required tasks will be available within twenty-four hours of the breakdown of any piece of equipment.

Section 5
Waste Acceptance Requirements

5.1 Acceptable Waste

The CIL will accept the following wastes:

1. Municipal solid waste defined as household waste and solid waste that is generated by commercial, institutional, and industrial sources and is similar to household waste.
2. Non-hazardous industrial wastes or sludges, oil spill debris or other related wastes not included in the municipal solid waste stream which have been accepted in accordance with the Board of Directors most current approved *The Delaware Solid Waste Authority Policy on Special Solid Wastes* (see Appendix A).
3. Dry waste.
4. Asbestos Containing Material (ACM) which have been accepted in accordance with the current approved provisions of the Asbestos Policy and Procedures established by the DNREC and DSWA (see Appendix B). ACM shall be landfilled in the designated area of Phase IA.

5.2 Bulky Waste

Care will be taken when bulky waste is received to ensure adequate compaction and coverage of the waste is achieved.

5.3 Prohibited Waste

DSWA shall exercise reasonable care to ascertain whether waste accepted at the facility is prohibited waste, and shall not knowingly landfill the following prohibited waste.

1. Hazardous waste.
2. Infectious waste.
3. Bulk or non-containerized liquid waste, unless the waste is a household waste other than septic waste.
4. Whole tires in quantities greater than ten (10) per truckload.
5. Licensed radioactive material (as described in the Delaware Radiation Control Regulations), and any radioactive material considered source, special nuclear, or by-product material as defined by Atomic Energy Act of 1954.
6. Liquid waste as restricted by 40 CFR Part 258.28.

5.4 Waste Screening Program

The purpose of the waste screening program is to detect, intercept, and remove to the extent possible, prohibited waste from the incoming waste stream. The requirements are outlined in the Delaware Solid Waste Authority, Solid Waste Screening Program, September 19, 1997 (Appendix C) or modified or replacement approved by DNREC.

5.5 Construction and Demolition Material Recycling

Construction and Demolition material (C&D) may be recycled at the landfill. If utilized the C&D area is to be maintained in a clean and orderly manner. C&D material is loaded for removal from the facility when directed by the landfill manager. The location of the C&D material area is to be maintained near the active working face and will be moved as necessary to coincide with the location of the working face. Recyclable gypsum wallboard may be separated to the extent practicable to reduce generation of hydrogen sulfide gas from the C&D cover material used at the facility. C&D material may be picked up from the CIL at DSWA's discretion and transported to a facility for recycling.

The screening of C&D material will follow the DSWA's approved Waste Screening Program. The maximum stockpile area will be one acre in size (approximately 15 feet tall). Blown litter from the stockpile area will be picked up by onsite personnel on a routine basis. Access to the stockpile area will be controlled by onsite personnel. Weighmasters or an onsite operator will direct facility users to the correct unloading location. The operators at the working face will monitor the traffic to the stockpile area. A sign will be posted describing the area and instructing the users not to unload at the recycling area without permission. The stockpiles will be inspected at least once each operating day by onsite personnel. Transporters hauling C&D material from the facility shall have solid waste transporters permits.

Section 6
Cover Material Requirements

6.1 Daily Cover

The operator will place a minimum of six inches of daily cover soil over the solid waste at the end of each work day in accordance with permit requirements. The cover soil shall be capable of controlling odors, vectors, and litter; as well as reduce the chance of fire. The soil shall not promote leachate perching or seeps and solid waste shall not remain exposed after the end of an operating day. Stockpiles of cover soil may be maintained on site to provide an adequate amount available to sustain daily operations.

6.2 Alternate Daily Cover

Alternate daily cover(s) (ADC), such as thermally treated soils or ground construction and demolition debris, as approved by DNREC may be used as site conditions permit. ADC shall be stored, handled, and maintained in a manner to protect health, safety, and the environment. ADC shall be applied in a manner similar to daily cover soil unless the ADC approval letter, issued by DNREC, stipulate otherwise. ADC approval letters shall be maintained in Appendix D of this Plan of Operation which shall dictate any special requirements or conditions pursuant to utilizing a particular ADC.

6.3 Intermediate Cover

The operator will place intermediate cover soil over areas, which will not receive additional lifts of solid waste for periods longer than six months. Intermediate cover will consist of a minimum of 12-inches of cover soil and may include daily cover which had been previously placed. Temporary vegetative cover may be established on slopes to reduce erosion. Intermediate cover areas are to be periodically inspected for erosion rills and repaired as necessary. When a dormant area of the landfill is re-activated intermediate cover is to be removed prior to placing waste.

Alternate intermediate covers as approved by DNREC may be used as site conditions permit. Alternate intermediate cover shall be stored, handled, and maintained in a manner to protect health, safety, and the environment. Alternate intermediate cover shall be applied in a manner similar to intermediate cover unless the approval letter, issued by DNREC, stipulate otherwise. Alternate intermediate cover approval letters shall be maintained in Appendix D of this Plan of Operation which shall dictate any special requirements or conditions pursuant to utilizing a particular alternate intermediate cover.

Section 7
Nuisance and Vector Control

7.1 Litter Control

On a daily basis 12th Street from Hay Road to the 495 interchange, access roads, building perimeters, parking areas, and the area in the vicinity of the working face will be inspected for litter accumulation and remove litter as frequently as necessary to keep these areas clean. Portable fencing is installed in the vicinity of active work areas to assist in the containment of wind-blown litter. Collected litter is placed on the working face prior to application of the daily cover. Additionally, litter at the working face is kept to a minimum by prompt compaction of waste and placement of daily cover.

When high winds have caused large amounts of litter to be scattered on the site, the litter is collected as soon as possible. Additionally, a permanent forty-foot high litter control fence surrounds the active area.

7.2 Vector Control

The application of daily and intermediate cover materials, as well as litter control, and proper housekeeping will limit the vector population at the site. Any vector extermination or control project is carried out under the direction of qualified personnel. Adequate safeguards and warning for the local population and disposal site users is provided.

7.3 Odor Control

Odor control is an important aspect of the landfill operation at CIL. In accordance with DNREC regulation, it is anticipated that the site will be operated such that odors associated with the solid waste will not be detected offsite. Odor control is achieved through normal operations and the active gas collection system.

Landfill operations that will control odors include:

- Operation of a gas collection system during the active phase of a disposal area;
- Consistent and thorough use of cover materials, identifying odorous wastes (i.e., biosolids) and covering immediately;
- Limiting the size of the working face; and,
- Immediate repair of leachate seeps; and,

The gas collection system is designed for phased implementation and operation to provide odor control during active filling. Gas will be collected from the collection system as soon as is practicable, to minimize odors associated with the waste. The gas system operation is discussed in more detail in Section 12.

7.4 Dust Control

On unpaved roads dust may be controlled by the use of water.

On paved surfaces dust is controlled by periodic sweeping and/or cleaning of the pavement. Accessible areas are cleaned with street cleaning equipment. Areas such as the weigh station may be cleaned by hand.

7.5 Noise Control

Where possible, trees may be maintained to help buffer and reduce noise generated at the site. Traffic on the access roads will be held to low speeds by traffic control devices.

Section 8
Access and Safety Requirements

8.1 Site Security and Access

Access to the site is controlled by a perimeter fence with locking gates. All entrances to the site have locking gates for security. The operator will maintain keys to all gates and will be required to open these gates at the beginning of the work day, and lock them at the conclusion of the work day. Certain U.S. Army Corps of Engineers (COE) personnel may have keys to the gates to allow this agency emergency access to the dredge disposal areas south of the landfill. COE personnel also shall be required to lock this gate upon leaving the site.

All visitors or customers must stop at the weigh station either to have their vehicles weighed or to register in a "visitor log". Customers will be directed by signs or the scale operator to the appropriate disposal area. Visitors may also register at the administrative office.

All access roads and walkways will be maintained by the operator in a clean and safe manner. Snow, ice and debris will be removed as necessary, and the road or walkway surface will be maintained in good repair.

8.2 Salvaging/Scavenging

Salvaging operations are controlled so as not to create unsightliness or interfere with the proper disposal of solid waste. Scavenging (uncontrolled removal of waste from the site) is not allowed.

8.3 Employee Health and Safety

Applicable local, state and federal health and safety guidelines are followed by CIL personnel.

Personnel Facilities
Suitable shelter, sanitary facilities, and safe drinking water will be maintained and available for personnel at the site.

First Aid Training
Landfill operating personnel will be trained in first aid procedures. First aid kits are to be located and maintained in the weigh station and the administration office.

Asbestos Training
Only landfill operating personnel who have undergone and passed Asbestos Worker's Training Class A will be qualified to operate the asbestos disposal area.

Protective Clothing
Protective clothing and foot gear are to be worn by all personnel when at the working areas of the landfill, excluding the weigh station and office areas. The working areas

include, but are not limited to, the working face, the maintenance building, stockpile areas, manholes, pump stations, landfill gas plant, gas vents, and areas under construction. Dust masks or suitable breathing equipment should be worn by operating personnel who are exposed to high dust conditions on the landfill.

Communication Equipment

Equipment on site including compactors, bulldozers, and loaders as well as the landfill manager's vehicle will be equipped with radio units. As an alternate hand held units can be used where a piece of equipment does not have a radio. A radio will be maintained in the operator's office and at the weigh station. All units shall be kept in good working order at all times. Communication between the operating personnel and the weigh station will be maintained. Emergency telephone numbers of nearby ambulance, hospital, police and fire services are prominently displayed near telephones in the maintenance office, the scale house and the administrative office.

8.4 Fire Prevention and Control

In the rare event of a collection truck arriving at the CIL with a "hot load", that is, with its contents on fire, the vehicle will be directed to a predetermined point away from the working face. This area will have a minimum twelve inches of soil cover material over the underlying solid waste. The burning material will be dumped at the designated area and extinguished by operator personnel.

Each piece of equipment will be provided and maintained with a fire extinguisher rated for controlling and extinguishing all classes of small fires. In addition, fire extinguishers are to be provided and maintained in the maintenance building, administrative office, and the weigh station.

In the unlikely event of a landfill surface fire, the fire will be isolated or kept from spreading, if possible, by using earth from the daily cover soil stockpile. The soil will be used to either create a fire break by covering solid waste, which has not caught fire, or to smother the solid waste, which is on fire by covering it with clean soil. The weigh station will be notified immediately via site communication equipment.

A water truck which is equipped with suitable apparatus to quell a fire will be dispatched to the location until the nearest fire department has an opportunity to respond. Immediately after dispatching on-site equipment, operating personnel will summon the nearest fire department for help. DSWA's landfill manager will then be notified. The nearest fire department is the City of Wilmington. This fire department should be contacted in an emergency by dialing 911.

The operator may utilize other equipment, if available, to help quell or control a fire at the landfill site, including pumps and the hoses which ordinarily are used for other purposes.

Fires which occur deep within solid waste deposits are rare in a well compacted and covered landfill and are not expected to occur at CIL (no landfill fires have occurred to date). If a deep seated fire is detected within deposited solid waste, DSWA and DNREC shall be notified immediately. Any action to be taken shall be approved by DSWA and DNREC. Removal of overburden materials in a deep fire should not be attempted with standard equipment such as front-end loaders.

8.5 Contingency Plan

The response of personnel to a serious emergency (such as fire, personnel injury, leachate or fuel spill) will be as follows:

1. Notification of the landfill manager and site supervisor.
2. Notification of emergency service (fire department, ambulance).
3. Notification of scale house – The scale house controls incoming and outgoing traffic and in the event of an emergency will direct response personnel to the appropriate locations on site as applicable.
4. Notification of designated official(s) of DSWA.
5. As instructed by the landfill manager or site supervisor, notification of DNREC and other state or federal regulatory agency.
6. There shall be one Emergency Coordinator and at least one alternate Emergency Coordinator appointed at the CIL to ensure that at least one Emergency Coordinator will be available at all times. The Emergency Coordinator shall be responsible for directing all emergency response measures necessary to protect human health and the environment in the event of fire, severe weather, explosion, or release of hazardous materials.

8.6 Training

All employees who fall into one of the positions listed in Section 3, Landfill Operating Staff, shall receive, as a minimum, the training listed below. Unless otherwise specified by a nationally recognized training provider (for example, the American Red Cross as a training provider for First Aid), training shall be required initially and annually thereafter. Initial training for waste screening shall be completed within 60 days of hiring.

1. Operational and contingency procedures.
2. Waste screening.
3. Health and safety procedures.
4. Fire prevention and protection.
5. Emergency first aid.
6. CPR training.

6. CPR training.

8.7 Confined Space Entry

Because there are confined spaces at CIL such as enclosed pump stations, valve pits, and manholes which personnel may have to enter on occasion to perform repairs, an approved confined space entry procedure developed in accordance with local, state, and federal regulations must be followed whenever anyone enters such an area. A confined space entry program that meets the requirements of Title 29 CFR Part 1910.146 Permit Required Confined Spaces shall be utilized.

Section 9
Routine Housekeeping and Maintenance

9.1 CIL Grounds Maintenance

The grounds of CIL are maintained in a neat and clean manner. The maintenance includes, but is not be limited to, the following tasks:

- Cutting all grass on the grounds as directed by the Landfill Manager;
- Grading the access roads as directed by the Landfill Manager;
- Sweeping paved areas as needed;
- Cleaning the surface of scales as needed;
- Picking up litter and debris at the small load collection station every day;
- Watering grass, flowers, and shrubs DSWA has planted at the weigh station, administration building, and watering trees planted by on an as-needed basis as directed by the Landfill Manager;
- Picking up litter on the grounds;
- Controlling vine growth on perimeter fencing as directed by the Authority's Landfill Manager; and
- Applying fertilizer and lime to grassed areas of the site including areas at the scales and along the entry access road as needed.

9.2 Building Maintenance

Buildings at the site will be maintained in good order to promote safe operations and good hygiene. Building and accessory repair will be performed as required.

9.3 Weather Related Maintenance

9.3.1 Wet Weather

A wet weather unloading area is routinely maintained adjacent to the access road within the active operational area for use during rain events, which may adversely affect landfilling operations. Should severe lightning conditions occur, personnel will take shelter immediately, and operations will be suspended until the lightning has subsided.

9.3.2 Winter Conditions

Snow and/or ice accumulations from the entrance road, access roads to the disposal area, the small load collection station, scales, and parking areas will be cleared as needed to maintain access. A stockpile of sand, cinders, salt, and/or other similar suitable material will be maintained for spreading on roadway surfaces to improve traction and prevent accidents. Snow and ice will also be cleared from sidewalks and footpaths, stairs, and other pedestrian accesses.

Section 10
Waste Placement and Filling Progression

10.1 Disposal Area

Disposal operations shall take place within the limits of the lined area, which currently includes Phases I, II, III, IV, V, and Va. Generally landfilling of MSW shall occur in Phases III, IV, V, and Va with Phases I and II being utilized for the landfilling of asbestos containing waste. Filling shall progress in a manner to ensure geotechnical stability of the site is not adversely impacted.

10.2 Traffic Control

All incoming refuse vehicles will be directed by signs to the weigh station and scales for weighing. Incoming and out-going trucks are controlled at the weigh station by traffic signals or other signals located adjacent to the scales. Signs, pylons, and/or barricades are used to direct drivers to the working face of the landfill. The equipment operator is generally responsible for dictating traffic flow at the working face. A spotter may be used during times of high traffic. The operator may use traffic cones or other similar devices to aid in traffic control.

Cars, station wagons, vans, and pick-up trucks with small loads will be directed to the small load collection station, discussed in Section 10.9. Signs and/or the weighmaster will direct the small load customers from the weigh station to the small load collection station. The specific vehicles directed to this area will be determined by the weighmaster.

10.3 Haul Roads

Haul roads will be constructed within the disposal area to route traffic from the access road to the tipping area. Haul roads will be crowned to allow for stormwater runoff and sufficiently wide to safely accommodate traffic. Haul roads will be maintained to provide safe access to users of the facility and provide a sound driving surface under all weather conditions. They will be kept free of debris, ruts, holes, ponded water, and snow and ice. Periodic grading and addition of road materials will be performed on an as-needed basis. When required haul roads will generally be removed down to the level which can be while maintaining sufficient cover over existing waste.

10.4 Working Face and Daily Lifts

Waste lifts will be constructed in approximately two-foot thick compacted layers. Generally, lift heights will not exceed ten feet. The width of each day's working face will be kept as small as practically possible. In no event will the width exceed the maximum that can be covered at the end of the working day. As much as possible, the top of the lift shall be graded to avoid ponding of water.

10.5 Compaction

Compactors will be used to compact the solid waste after it is unloaded. The operator will pass over the waste a sufficient number of times to achieve a minimum density of 1,100 pounds per cubic yard.

10.6 Progression of Stages

Upon completion of the Mechanically Stabilized Earth (MSE) wall around the outer perimeter of Phases III, IV, V, and Va placement of MSW in the disposal area is designed to occur in stages. These stages are sequenced in such a way that the filling first occurs within the wedge area created between the MSE wall and the existing waste mass. As stages are completed subsequent stages are staggered around the disposal area. Once a lower stage has been completed later stages successively progress higher and extend further towards the center of the disposal area until final design grades are achieved.

10.7 Progression of Filling within Stages

10.7.1 Initial Lift Placement over Geomembrane Lined Areas

Special precautions will be taken while placing solid waste in a stage where geomembrane liner is present. Incoming waste will be screened to identify preferential loads to be used for the initial lift overlaying the liner system. Waste which contains materials that may be detrimental to the liner system (i.e.; penetrate the protective layer and damage the liner) will be diverted to an active area where a substantial amount of waste is already in place. A spotter shall be present during the initial lift placement to inspect loads that are placed on the protective layer.

10.7.2 General Progression

After initial lift placement, waste will be placed in lifts across the stage to achieve the desired grade. During filling operations any outside slopes that are created as a result of waste placement are covered with intermediate cover while the interior locations receive daily cover. However if it is anticipated that an interior location will not receive waste within the 180 day period additional soil may be applied to meet the intermediate cover requirements.

10.7.3 Trenching into Previous Lift

When filling occurs along final slopes, the operator will cut a trench at least two-feet wide and two-feet deep through the daily cover prior to commencement of waste filling for that day. The trench will be cut so that there is a direct connection between the solid waste in the lower lift and the new lift, allowing liquids to flow unimpeded between lifts with the intention of minimizing the potential for seeps to occur. This trench will be cut at the beginning of each operating day and will be cut only long enough to coincide with the width of the solid waste cell expected for that day. If the trench is too long, it will be backfilled at the end of the day to cover all exposed solid waste. Under no circumstance will any solid waste be left uncovered at the end of the

operating day. The trenches will be cut only with proper equipment such as backhoes, or excavators. Bulldozers and compactors are not to be utilized for this work.

10.7.4 Wet Weather Drop-Off Area

An area will be maintained in the disposal area for landfilling of waste during wet weather in which vehicle access at the active face is prevented. The wet weather area will have a stone (or other suitable material) ramp for accessibility, and will be relocated as needed to accommodate filling.

10.8 Minimization of Surface Water Run-On

Surface run-on, impacting the working face, will be minimized through the use of grading and the installation of temporary stormwater control measures as needed.

10.9 Small Load Collection Station

A small load collection station is located to the south of the scalehouse and will be operated for use by cars, station wagons, vans, and pick-up trucks with small loads. Roll off containers are to be provided at the facility for the use of the small load customers. As each container approaches capacity, the operator will pick up and empty the contents at the landfill working face.

The small load collection station will be kept clean and free of vectors. Litter will be cleaned routinely, and pavement in the area will be cleaned as needed

10.10 Recycling Storage Areas

A recycling storage area is located on the disposal area. The recycling storage area is used to store materials such as tires, white goods, scrap metals, and dry wall prior to processing. All stockpile areas will be maintained in a clean and neat manner. Maintenance of the stockpile areas will include spraying to control insects if needed, or at the direction of the landfill manager and cleaning of trash as needed. Trash removed from the stockpile area will be landfilled as directed by the Landfill Manager.

10.11 Yard Waste Storage Area

A yard waste storage area is located on the disposal area. The yard waste storage area is used to store yard waste prior to processing and prevent disposal of yard waste materials in the active landfill. All stockpiles shall be maintained in a clean and neat manner. Yard waste measuring greater than six inches (6") in diameter shall be removed from the storage area and disposed of in the active landfill. Maintenance of the stockpile area will include spraying to control insects if needed, or at the direction of the landfill manager and cleaning of trash as needed. Trash removed from the yard waste stockpile will be landfilled as directed by the Landfill Manager.

Section 11
Leachate Collection System

11.1 System Design and Description

The leachate collection system (LCS) utilized at the CIL varies by phase. The first portion of the LCS installed was in Phase I and consisted of aggregate filled leachate collection laterals which intersect with six inch (6") perforated polyethylene leachate collection header pipes. The leachate collection laterals and leachate collection headers combine to form a grid work across the base of Phase I. The leachate collection header pipes were installed in aggregate filled trenches and flowed to the perimeter of Phase I. Larger ten inch (10") or twelve inch (12") diameter pipes running the perimeter of Phase I then convey the leachate to the leachate collection manholes.

The Phase II LCS utilizes leachate collection laterals comprised of six inch (6") perforated polyethylene pipes set in aggregate filled trenches. The laterals combine with the leachate collection headers to form a grid work across the base of Phase II. The headers are constructed in a similar fashion to the laterals and utilize eight inch (8") perforated polyethylene pipes set in aggregate filled trenches. These headers then discharge to an eight inch (8") or twelve inch (12") leachate collection mains around the perimeter of Phase II.

The LCS installed in Phase IA consist of an eight inch (8") perforated polyethylene pipe set in a stone trench overlaid by a twelve inch (12") thick aggregate drainage layer. This collection pipe then discharges into a leachate collection manhole located at its northern end.

In Phase III the LCS is again comprised of six inch (6") leachate collection laterals which intersect with eight inch (8") leachate collection headers to form a grid work across the base of Phase II. As in previous phases the pipes are constructed of polyethylene and are set in aggregate trenches. A twelve inch (12") thick sand drainage layer overlays the piping network.

The Phase IV LCS consists of eight inch (8") perforated high density polyethylene (HDPE) collection pipes set in aggregate trenches. These pipes run parallel to each other along the base of Phase IV. The collection pipes then tie to larger twelve inch (12") conveyance pipes which run along the perimeter of Phase IV. The entire base of Phase IV is covered with a leachate collection zone comprised of twelve inches (12") of rice gravel.

In the Phase V LCS four inch (4") perforated HDPE leachate collection pipes are set in stone trenches and intersect with eight inch (8") perforated HDPE header pipes to form a grid work across the base of Phase V. The header pipes convey the leachate to

the perimeter of Phase V. Again the entire base of Phase V is covered with a leachate collection zone comprised of twelve inches (12") of rice gravel.

The newest portion of the LCS was installed during the landfill expansion project when the mechanically stabilized earth (MSE) wall was constructed around the perimeter of Phases III, IV and IV. During this construction the valley created between the existing Phases and the newly constructed MSE wall was covered with a two foot (2') thick leachate collection/protective cover layer with a permeability of greater than or equal to 1 x 10-5cm/sec. Additionally in the area designated as Phase Va a series of leachate conveyance swales were installed which were lined with tri-plannar geonet. The swales convey leachate to an eight inch (8") perforated HDPE collection pipe which is wrapped in aggregate. This pipe then transports the collected leachate directly to a collection manhole.

11.2 Operation of the Leachate Collection System

The leachate collection piping network located within the various Phases conveys collected leachate, by gravity, to a series of pumping stations located around the perimeter of the landfill. These pumping stations are controlled automatically and work together to sequentially move leachate around the landfill. Pressure sensors are used to monitor the depth of leachate and automatically switch the pumps on and off based on the liquid level within a given sump. The pumping stations are also capable of communicating between one another with downstream pumps able to lock out upstream pumps should they be unable to keep up with incoming flows. This allows the downstream pump time to lower the liquid levels in its associated sump and once caught up the lockout is removed again allowing the upstream pump to send leachate downstream.

The forcemain connecting the individual pump stations is comprised of a dual containment pipe system. This allows staff to periodically inspect for leaks in the forcemain. In the unlikely event of a leak, the leak will be located and the forcemain repaired.

All collected leachate eventually reaches the master pump station which is located adjacent to the administration building. From this point the leachate is sent via forcemain to the City of Wilmington's Wastewater Treatment Plant which is located directly north of CIL.

Additionally leachate collected at DSWA's Central Solid Waste Management Center (CSWMC) and Southern Solid Waste Management Center (SSWMC) may also be delivered to CIL via tanker truck and unloaded into the master pump station. This leachate then combines with CIL's flow and is similarly sent to the City of Wilmington's Wastewater Treatment Plant through the forcemain.

11.3 Inspection and Maintenance of the Leachate Collection System

The leachate piping will be pressure cleaned and flushed periodically to remove any accumulation of debris, sediment, or organic growth. This will be achieved by inserting a self-propelled, high pressure jetting system into the collection pipes by way of the cleanouts. The flow meter will be flushed clean of grease and debris on an as-needed basis. Valves shall be manually operated to check for proper operation and control. The control panels shall be fully inspected at the same time, to ensure normal operations performance. The controls, instrumentation, and manual valving will be monitored regularly for proper operation.

The CIL uses autodialers to monitor the leachate collection system at the facility. When an autodialer is activated, it calls a list of operating personnel to alert them of the condition (including home phones and cellular phones). The autodialer continues to call until a call is acknowledged or until the condition is repaired. Should the autodialer call during facility operating hours the onsite operators can investigate the condition. During non-facility operating hours, the operators come to the facility upon receiving a call from the autodialer. The maintenance of the autodialer system is performed by an outside contractor.

Section 12
Landfill Gas Management

12.1 Existing Gas Collection System

Phases I and II contain vertical LFG collection wells and buried lateral lines. Phases III, IV, and V have both vertical and horizontal LFG collection wells. Landfill gas collection wells are connected to the header pipe via smaller lateral pipes. The lateral pipes are constructed of various sizes of HDPE. Most laterals in Phases III, IV and V are above ground due to continued MSW filling in these areas.

The system also utilizes a buried LFG header throughout the facility. The header is comprised of 24" HDPE around Phase I and II and transitions to 18" HDPE around Phases III, IV and V. Passive and active condensate drains remove condensate from the header and discharge either into the leachate collection system (LCS) or directly into the waste mass. There are multiple butterfly control valves to isolate portions of the header as needed for maintenance and repair

12.2 Operation of the Landfill Gas Collection System

The LFG collection system will be operated in compliance with facility Title V and Regulation 2 (Construction/Operation) permits. All collected gas will be directed to a permitted flare for destruction or to an alternate control technology for beneficial use.

Vacuum on the landfill varies and is maintained and adjusted by operating the LFG blowers

12.3 Condensate Management

Condensate is managed through collection and discharge via the leachate collection system (LCS). This is done either through direct discharge into LCS structures or by passive drainage into the waste mass. There are currently two condensate drains (CD), CD15 and 16, that drain to the waste mass and two CDs, CD5 and 8, that are auto-sumps and discharge to a force main that is buried in the MSE wall. The force mains discharge to leachate MH20 and South East Pump Station, respectively. CD14, 13, 12, 11, 10, 9, 7, 6, 3, 2 and 1 all discharge directly to LCS structures (manholes or pump stations). Around Phases I and II there are drains connected to the gravity manholes however only those connected to MH7, 11 and 13 are operated continuously. The other manhole drains can be opened if necessary but they were not constructed for continuous operation.

12.4 Expansion of the Landfill Gas Collection System

The gas collection system will be expanded as filling progresses to maintain compliance with Title V and Regulation 2 permits (from the State of Delaware) as well as with Federal regulations. Expansion activities may include installation of new horizontal or vertical wells, installation of lateral gas piping, installation of passive flares or other similar activities.

12.5 Maintenance of the Landfill Gas Collection System

DSWA manages the maintenance and repair of the LFG well field as well as the associated controls which comprise the LFG collection system. This is done as required by permits and with the intention to control LFG. Well field maintenance includes raising gas wells, and replacing worn items such as well heads, monitoring ports and kanaflex hose as needed. Grading of above ground collection pipes is also an ongoing maintenance item to ensure positive drainage of condensate to drains.

The control system includes components such as LFG flares, knock out pots, pumps and the LFG compression plant and blower skid. Performance of these components will be monitored regularly to assure proper operation and performance. Maintenance will occur in accordance with the manufacturer's directions.

Additionally a portion of the collected LFG may be sent offsite for use as a renewable energy fuel source.

12.6 Post-Operational Management

The LFG collection and control systems will be operated as required by Title V and Regulation 2 permits (from the State of Delaware) as well as in compliance with Federal regulations. This includes operation after the closure of the landfill facility as necessary.

Section 13
Storm Water Management

13.1 Storm Water Management System

Storm water on site is managed through a system comprised of both permanent and temporary structures. Temporary berms, swales, culverts, and pipes direct storm water to peripheral stormwater drainage ditches surrounding the disposal area. The drainage ditches direct storm water to discharge points which release the water off-site. Storm water discharges are conducted in accordance with the approved Stormwater/Surface Water Monitoring Program, Erosion and Sediment Control Plan for Cherry Island Landfill and other applicable local, State and Federal regulations and permits.

The ultimate goal of the storm water management system and the various erosion and sediment control measures is to prevent pollution and sediment from leaving the site. The primary line of defense is to stabilize all soil surfaces. Once stabilization is established, erosion of the surface soils on the landfill will be minimized. Therefore, the stabilization of soil surfaces should be accomplished as soon as conditions permit. Seeding and mulching operations, including application of necessary nutrients, should follow the Delaware Erosion and Sedimentation Control Handbook (October 2006, or the latest revision thereof). Other stabilization methods such as spray on binders, installation of membrane liners, erosion matting, or others techniques which may be utilized shall be installed using appropriate procedures.

The secondary line of defense to prevent pollution and sediment from leaving the site is to maintain the individual storm water management system structures. Before the soils are stabilized, erosion of soils may occur and the subsequent sediment load can be carried and deposited in the storm water management system, including swales, ditches, culverts, piping and storm-drain structures. This sedimentation will diminish the intended design capacity of the storm water management system structures. Later rain events, including less severe rain events, can then overflow various structures and cause additional erosion and downstream sedimentation. Therefore, DSWA shall remove the deposits of excess sediment from storm water management system structures as soon as possible after deposition to insure that their flow-paths are clear from obstructions.

13.2 Erosion and Sediment Control

The storm water management system is designed to control erosion and sediment transport. Adequate erosion control measures shall be utilized to prevent excessive erosion of slopes and roadways. The storm water management system will be inspected at a minimum of monthly, and in a timely manner following severe rainfall events, for damage and, if necessary, repaired as soon as practicable.

Erosion control measures and storm water management system may include, but are not limited to:

- seeding/mulching or hydroseeding of disturbed or unstabilized areas;
- installation of erosion matting, straw wattles or sod on slopes and other erosion prone areas;
- use of earthen berms, hay bales, silt fences, check dams, riprap or equivalent devices down-gradient of disturbed areas, stockpiles, around drainage pipe inlets and outlets and at intervals along grassed waterways, until such time as permanent vegetation is established; and
- placement of riprap at the outlets of storm water piping.
- inspection of in place cover materials (weekly) to ensure stormwater controls are adequate to hinder erosion of both daily and intermediate covers preventing underlying waste from being exposed.

13.3 Maintenance of the Surface Water Management System

13.3.1 Permanent Storm Water Management System

Permanent stormwater management structures are used to manage the site's stormwater and direct it to discharge points. Maintenance of these structures will be performed to provide for their operation in a manner consistent with the intended design. Maintenance measures may include:

- periodic removal of sediment and debris from stormwater management structures, including pipes, pipe inlets, storm water basins and sediment traps;
- repair of eroded areas;
- maintenance of riprap, inlet and outlet structures;
- maintenance of swales and ditches to include removal of sediment build up, regrading and establishment of vegetation as necessary ;
- reestablishment of vegetation on final slopes where existing vegetation may have died, which may include seeding/mulching, hydroseeding, fertilizing and/or watering,
- other repairs as needed.

13.3.2 Temporary Storm Water Management System

Temporary storm water management measures used in active areas are used to inhibit the erosion of the cover and waste, minimize accumulation of standing water, and minimize storm water runoff into the waste. The measures used to maintain the temporary measures may include:

- installation of temporary stormwater control devices such as silt fence, straw wattles, hay bales, earthen berms, check damns, or other similar devices as needed.
- periodic removal of sediment from storm water management system structures including sediment traps, swales, culverts, and pipes;
- repair of eroded cover and eroded berms;
- maintenance of riprap at pipe inlet and outlet structures,
- other repairs as needed.

13.4 Inspection of the Storm Water Management System

The storm water system will be inspected at a minimum of monthly, and immediately as practicable based on hours of operation, following severe rainfall events for damage and the results of the inspection recorded. If repairs are necessary they shall be made as soon as practicable. Items inspected may include, but are not limited to:

- inspection of berms, sediment traps, ditches and swales for erosion, sedimentation and debris;
- landfill slopes and vegetation shall be inspected for erosion gullies, rills and excessive sheet flow surfaces
- inspection of structures for unintended bypass of stormwater
- inspection of silt fence for damage, accumulated debris and to ensure that fencing is firmly anchored
- inspection of culverts and pipes for siltation, blockage and debris
- inspection of control structures, including drop inlets, for siltation, debris, and damage.
- inspection for damaged, missing or nonfunctioning riprap, inlet and outlet structures

- inspection of discharging stormwater for visible color, sheen, floating debris or notable odor
- inspection of the protective cover soils along the inside of the MSE Berm and associated temporary membrane cover

Section 14
Record Keeping Requirements

Records will be maintained by DSWA either on site or at the main DSWA administrative office. Records will be kept of:

- Monitoring, testing, or analytical data required by the current permit and DNREC regulations.
- The quantity and type of wastes received quarterly.
- Locations of monofilled wastes.
- Records demonstrating that liners, leachate control systems, gas control systems, capping systems, and monitoring systems are constructed or installed in accordance with the design criteria of DNREC regulations.

This information will be recorded and maintained until the end of the postclosure period. Reporting requirements may change in accordance with permit as approved or directed by DNREC.

Section 15
Environmental Monitoring Requirements

Environmental monitoring at the CIL is conducted in accordance with an approved environmental monitoring plan as described in DNREC Operations Permit. The monitoring plan for the landfill is provided in Appendix E.

Section 16
Closure Requirements

In accordance with DNREC regulations, DSWA will notify DNREC in writing of the intent to close the facility at least 180 days prior to the projected date when waste will no longer be accepted. Finished portions of the landfill will receive a final cover as described in the closure report, submitted to DNREC under separate cover for approval.

APPENDIX A

DELAWARE SOLID WASTE AUTHORITY

POLICY ON SPECIAL SOLID WASTE

Policy Adopted 12/07/95
Revised Adopted 1/22/03
Revised Adopted 10/27/05

DELAWARE SOLID WASTE AUTHORITY
POLICY ON SPECIAL SOLID WASTES

All Generators of Special Solid Wastes* in Delaware who wish to dispose their Special Solid Waste at a Delaware Solid Waste Authority (DSWA) facility shall meet the requirements of this policy.

*Special Solid Wastes are defined by the Department of Natural Resources and Environmental Control's Regulations Governing Solid Waste as "...those wastes that require extraordinary management. They include, but are not limited to, abandoned automobiles, white goods, used tires, waste oil, sludges, dead animals, agricultural and industrial wastes, infectious waste, municipal ash, septic tank pumpings, sewage residues."

1. Generators shall not deliver and DSWA will not approve disposal of any waste from a Federal Superfund site.
2. Generators shall not deliver and DSWA will not approve disposal of any Special Solid Waste that is hazardous excepting household hazardous waste.
3. Generators shall not deliver and DSWA will not approve disposal of any Special Solid Waste, which is strictly prohibited by any applicable law, regulation, or permit.
4. Generators may deliver and DSWA will approve disposal of NON-HAZARDOUS solid waste from State of Delaware Hazardous Substance Cleanup Act (HSCA) sites in accordance with the Memorandum of Agreement between DSWA and DNREC dated November 15, 2002.
5. Generators may deliver and DSWA will approve disposal of Asbestos-Containing Material in accordance with the most current revision of the Asbestos Policy and Procedures adopted and signed by the Delaware Solid Waste Authority and the Department Natural Resources and Environmental Control.
6. Generators shall request, in writing, approval for disposal of the Special Solid Waste and shall provide, at a minimum, the following information in this order:
    a. The location of the Special Solid Waste generation site
    b. A description of the Special Solid Waste
    c. A statement that the waste is not from a Federal Superfund Site
    d. A statement that the waste is also not hazardous as provided herein
    e. A description of how and where a representative sample(s) of the Special Solid Waste was taken
    f. A copy of all required test results as further described in this policy below
    g. Documentation that the laboratory is duly certified to perform the required environmental analysis
    h. An estimate of the total quantity of Special Solid Waste to be disposed of (in tons)
    i. A proposed delivery schedule for the Special Solid Waste disposal (tons per day) and frequency (days per week, month, and year)

7. At his own expense, the Generator shall arrange to have the sampling, testing, and reporting completed in accordance with the conditions and requirements of this Special Solid Waste Policy and as directed by DSWA.
8. All sampling and testing shall be done in accordance with the most recent version of U.S. EPA Test Methods for Evaluating Solid Waste, SW-846 or, as approved by DSWA, the Generator may use knowledge based on the materials and processes used to make a hazardous waste determination as afforded by the Delaware Regulations Governing Hazardous Waste (DRGHW). . Testing must be performed by a duly certified laboratory.
9. A representative sample of the Special Solid Waste shall be subjected to the following testing:
    a. The Toxicity Characteristic Leaching Procedure (TCLP). The resulting leachate must be tested for the TCLP constituents listed in SW-846 or others required by DSWA. No constituent can exceed its respective regulatory level to obtain approval for disposal. The Special Solid Waste must be determined to be non-toxic in accordance with the DRGHW 261.24
    b. Ignitibility - The Special Solid Waste must be determined to be non-ignitable in accordance with the DRGHW 261.21.
    c. Corrosivity - The Special Solid Waste must be determined to be non-corrosive in accordance with the DRGHW 261.22.
    d. Reactivity - The Special Solid Waste must be determined to be non-reactive in accordance with the DRGHW 261.23.
    e. Benzene, Toluene, Ethylbenzene, Xylene (BTEX) - The Special Solid Waste must not have a concentration greater than any of the following:
    Benzene 0.5 ppm
    Toluene 10 ppm
    Ethylbenzene 5 ppm
    Xylene 5 ppm
    f. Polychlorinated biphenyls (PCBs) - The Special Solid Waste must have a concentration of PCBs less than 50.0 mg/kg. Generators of Special Solid Waste containing detectable PCB levels below 50 mg/kg shall certify in writing that the resulting PCB concentration is not the result of dilution, or leaks and spills of PCBs in concentrations of 50 mg/kg or greater.
    g. Solids Content - The Special Solid Waste must be a minimum of 20% solids by weight and not contain free liquids (as determined by the Paint Filter Liquids Test (SW-846)).
10. At DSWA's request the Generator shall provide DSWA with split samples of the Special Solid Wastes. DSWA or its designated representative shall be allowed to be present when such split samples are taken.
11. DSWA, at its sole discretion, reserves the right to require additional testing of the Special Solid Waste at the Generator's expense or may, at its sole discretion, waive certain testing or other requirements.
12. DSWA reserves the right to accept or reject the Special Solid Waste regardless of whether the above requirements are met. Consideration and approval will be made on a case-by-case basis. Approval/denials shall be issued by DSWA in letter form.

13. For all approved Special Solid Wastes that will be disposed of on a continuous basis, the Generator shall follow the sampling, analysis, and reporting requirements established by the DSWA for their Special Solid Waste. At a minimum, the Generator shall sample and analyze their Special Solid Waste in the manner described in this Special Solid Waste Policy at least once annually. In addition, the generator shall notify the DSWA immediately and request a new Special Solid Waste approval whenever changes to materials or processes result in a change to the waste characteristics of the Special Solid Waste.
14. Generators of approved Special Solid Wastes shall be responsible for ensuring that each delivery of their Special Solid Waste to the designated DSWA facility be accompanied by a copy of DSWA's approval letter.
15. DSWA, at its sole discretion, for any reason whatsoever, reserves the right to withdraw approval given to a Generator of Special Solid Waste.

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Policy Adopted 12/07/95
Revised 1/22/03

JAN 23 2003

DELAWARE SOLID WASTE AUTHORITY

POLICY ON

SPECIAL SOLID WASTES

All Generators of Special Solid Wastes* in Delaware who wish to dispose their Special Solid Waste at a Delaware Solid Waste Authority (DSWA) facility shall meet the requirements of this policy.

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2. Generators shall not deliver and DSWA will not approve disposal of any Special Solid Waste that is hazardous excepting household hazardous waste.

3. Generators shall not deliver and DSWA will not approve disposal of any Special Solid Waste, which is strictly prohibited by any applicable law, regulation, or permit.

4. Generators may deliver and DSWA will approve disposal of NON-HAZARDOUS solid waste from State of Delaware Hazardous Substance Cleanup Act (HSCA) sites in accordance with the Memorandum of Agreement between DSWA and DNREC dated November 15, 2002.

5. Generators may deliver and DSWA will approve disposal of Asbestos-Containing Material in accordance with the most current revision of the Asbestos Policy and Procedures adopted and signed by the Delaware Solid Waste Authority and the Department Natural Resources and Environmental Control.

6. Generators shall request, in writing, approval for disposal of the Special Solid Waste and shall provide, at a minimum, the following information in this order:

   a. The location of the Special Solid Waste generation site
   b. A description of the Special Solid Waste
   c. A statement that the waste is not from a Federal Superfund Site
   d. A statement that the waste is also not hazardous as provided herein
   e. A description of how and where a representative sample(s) of the Special Solid Waste was taken
   f. A copy of all required test results as further described in this policy below

**Special Solid Wastes are defined by the Department of Natural Resources and Environmental Control's Regulations verning Solid Waste as "...those wastes that require extraordinary management. They include, but are not limited to, abandoned automobiles, white goods, used tires, waste oil, sludges, dead animals, agricultural and industrial wastes, infectious waste, municipal ash, septic tank pumpings, and sewage residues."*

g. Documentation that the laboratory is duly certified to perform the required environmental analysis
h. An estimate of the total quantity of Special Solid Waste to be disposed of (in tons)
i. A proposed delivery schedule for the Special Solid Waste disposal (tons per day) and frequency (days per week, month, and year)

7. At his own expense, the Generator shall arrange to have the sampling, testing, and reporting completed in accordance with the conditions and requirements of this Special Solid Waste Policy and as directed by DSWA.

8. All sampling and testing shall be done in accordance with the most recent version of U.S. EPA Test Methods for Evaluating Solid Waste, SW-846 or other method, which shall be approved by DSWA. Testing must be performed by a duly certified laboratory.

9. A representative sample of the Special Solid Waste shall be subjected to the following testing:

a. The Toxicity Characteristic Leaching Procedure (TCLP). The resulting leachate must be tested for the TCLP constituents listed in SW-846 or others required by DSWA. No constituent can exceed its respective regulatory level to obtain approval for disposal.
b. Ignitibility – The Special Solid Waste must be determined to be non-ignitable.
c. Corrosivity – The Special Solid Waste must be determined to be non-corrosive.
d. Reactivity – The Special Solid Waste must be determined to be non-reactive.
e. Benzene, Toluene, Ethylbenzene, Xylene (BTEX) – The Special Solid Waste must not have a concentration greater than any of the following:
   Benzene 0.5 ppm
   Toluene 10 ppm
   Ethylbenzene 5 ppm
   Xylene 5 ppm
f. Polychlorinated biphenyls (PCBs) - The Special Solid Waste must have a concentration of PCBs less than 50.0 mg/kg.
g. Solids Content - The Special Solid Waste must be a minimum of 20% solids by weight and not contain free liquids (as determined by the Paint Filter Liquids Test (SW-846)).

10. At DSWA's request the Generator shall provide DSWA with split samples of the Special Solid Wastes. DSWA or its designated representative shall be allowed to be present when such split samples are taken.

11. DSWA, at its sole discretion, reserves the right to require additional testing of the Special Solid Waste at the Generator's expense or may, at its sole discretion, waive certain testing or other requirements.

12. DSWA reserves the right to accept or reject the Special Solid Waste regardless of whether the above requirements are met. Consideration and approval will be made on a case-by-case basis. Approval/denials shall be issued by DSWA in letter form.

13. For all approved Special Solid Wastes that will be disposed of on a continuous basis, the Generator shall follow the sampling, analysis, and reporting requirements established by the DSWA for their Special Solid Waste.

14. DSWA, at its sole discretion, for any reason whatsoever, reserves the right to withdraw approval given to a Generator of Special Solid Waste.

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APPENDIX B

ASBESTOS POLICY AND PROCEDURES

DEPARTMENT OF NATURAL RESOURCES
AND ENVIRONMENTAL CONTROL

DELAWARE SOLID WASTE AUTHORITY

ASBESTOS POLICY AND PROCEDURES

Effective Date: April 1, 1995
Revised: April 15, 2002

The Department of Natural Resources and Environmental Control (*"DNREC"*) and the Delaware Solid Waste Authority (*"DSWA"*) have established the following Policy concerning the handling and disposal of Asbestos-Containing Material (*"ACM"*).

ANY TYPE OF ASBESTOS-CONTAINING MATERIAL MAY BE TRANSPORTED TO AN AUTHORIZED ASBESTOS LANDFILL OUT-OF-STATE, OR DISPOSED OF AT AN APPROVED DSWA FACILITY.

Asbestos-Containing Material to be landfilled out of State:

- The asbestos material must be packaged in accordance with State of Delaware regulations or the regulations of other affected states, whichever are the more stringent. Furhtermore, the out-of-state destination must be approved by *DNREC* as part of the permitting procedure for a transporter Permit.

Asbestos-Containing Material to be landfilled in Delaware:

- *Friable*[1] asbestos material must be wetted, packaged in leak-proof containers and labeled in accordance with *DNREC* regulations. This material may be landfilled at the Northern Solid Waste Management Center, *only*. The *DSWA* charges a special disposal fee for this material.

- Category I *non-friable* Asbestos-Containing Material *ACM* and Category II *non-friable* Asbestos-Containing Material *ACM* may be landfilled at any of the Delaware Solid Waste Authority Facilities at DSWA's standard disposal fee with the following packaging requirements:

  - Northern Solid Waste Management Center: Category I *non-friable ACM*[2] must be wetted and may be removed and transported in covered dumpsters or trucks and landfilled unpackaged in the designated asbestos disposal area. Category II *non-friable ACM*[2] must be wetted and packaged in sealed, leakproof clear plastic wrap and labeled as asbestos. At the landfill it must be placed in the designated asbestos disposal area. Disposal of *bulk* shipments of Category I & II *non-friable* asbestos will be accepted at the Northern Solid Waste Management Center *only*.

  - Central and Southern Solid Waste Management Centers: Category II *non-friable ACM*[2] destined for these Facilities must be wetted and packaged in sealed, leak-proof clear plastic wrap, and labeled as asbestos. At the landfill, it must be placed in a roll-off container specifically dedicated for this purpose. Category I *non-friable ACM*[2] may be transported to these Facilities *unpackaged* in a covered vehicle, and off-loaded into a roll-off container specifically dedicated for this purpose.

Packaging of Category I, ***non-friable*** *ACM*[2] in the same manner as Category II non-friable *ACM*[3] is preferred but is not required.

In order to be exempt from the packaging requirements, any *ACM* classified and handled as Category I ***non-friable*** *ACM* [2] must be certified as such by a licensed Delaware Certified Professional Service Firm. This certification shall include a description of the material, where the sample originated and the date the material was sampled. This certification must be sent along with the **NOTIFICATION OF DEMOLITION/RENOVATION** to the Department of Natural Resources and Environmental Control. A copy of the Category I, ***non-friable*** *ACM*[2] certification must accompany the material to the landfill. All *ACM* must be removed by a licensed Delaware Asbestos Abatement Contractor[4], unless a written waiver has been issued by the Department of Natural Resources and Environmental Control, Air Quality Management Section, Engineering and Compliance Branch. A copy of this waiver must accompany the material to the landfill.

In addition to the above requirements, disposal of all asbestos material at *DSWA* Facilities is subject to the *DSWA* Asbestos Disposal Procedures, which require at least 24-hour prior notice to the landfill of any deliveries of asbestos.

Nicholas A. DiPasquale, Secretary
Department of Natural Resources and
Environmental Control

N.C. Vasuki
Delaware Solid Waste Authority

[3]***Friable*** asbestos material means any material containing more than one (1) percent asbestos, as determined using the method specified in Appendix A, Subpart F, 40 CFR, Part 763, Section I, *Polarized Light Microscopy*, that, when dry, can be crumbled, pulverized or reduced to powder by hand pressure. If the asbestos content is less than ten (10) percent, as determined by a Method other than point-counting by *Polarized Light Microscopy* ("PLM"), verify the asbestos content by point-counting using "PLM."

[2]Category I ***non-friable*** Asbestos-Containing Material ("ACM") means asbestos-containing packings, gaskets, resilient floor covering and asphalt roofing products containing more than one (1) percent asbestos, as determined using the method specified in Appendix A, Subpart F, 40 CFR, Part 763, Section I, *Polarized Light Microscopy*.

[3]Category II ***non-friable*** Asbestos-Containing Material ("ACM") means any material, excluding Category I, ***non-friable*** ACM, containing more than one (1) percent asbestos as determined using the methods specified in Appendix A, Subpart F, 40 CFR, Part 763, Section I, *Polarized Light Microscopy* ("PLM") that, when dry, cannot be crumbled, pulverized, or reduced to powder by hand pressure.

NOTE: asphalt/vinyl floor tiles, mastic/adhesive, transite materials and house siding are considered Category II materials.

[4]Homeowners are exempt from this requirement.

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Modification Synopsis

March 18, 2002: The Asbestos Policy was modified to allow for the removal of category I non-friable ACM by a general contractor, provided a licensed Delaware certified Professional Service Firm has certified that the material is Category I non-friable ACM. A written waiver would be issued by the Department of Natural Resources and Environmental Control, Air Quality Management Section, Engineering and Compliance Branch to allow for this.

APPENDIX C

DELAWARE SOLID WASTE AUTHORITY

SOLID WASTE SCREENING PROGRAM

DELAWARE SOLID WASTE AUTHORITY
SOLID WASTE SCREENING PROGRAM
SEPTEMBER 19, 1997

PURPOSE: Owners and Operators of Municipal Solid Waste facilities are required by the "Delaware Regulations Governing Solid Waste" (DRGSW) to implement procedures to detect and prevent the disposal of regulated hazardous waste, infectious waste and polychlorinated biphenyl (PCB) waste in their facilities. Compliance with this requirement is accomplished by training the appropriate personnel and implementing the procedures described in this document which are designed to help prevent and detect to the maximum extent possible, the improper disposal of hazardous, PCB and infectious waste in DSWA facilities. This program must include as a minimum:

1) Random inspection of incoming loads.
2) Records of any waste screening inspections performed.
3) Training of facility personnel to recognize hazardous, PCB and other prohibited waste.
4) Notification of the Department of Natural Resources and Environmental Control (the Department) if a regulated hazardous waste or PCB waste is discovered at the facility. Notification regarding the discovery of "other prohibited waste," as described later in this text, should also be made when they are discovered.

DEFINITIONS

Hazardous Waste - means a solid waste, or a combination of solid wastes, which because of its quantity, concentration, or physical characteristics may cause or significantly contribute to an increase in mortality or an increase in serious irreversible or incapacitating irreversible illness, or pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported or disposed of, or otherwise managed. A waste is hazardous if it is listed as a hazardous waste or if it meets one or more of the following criteria: ignitability, corrosivity, reactivity, toxicity as defined by the "Delaware Regulations Governing Hazardous Waste." Any material contaminated by a hazardous waste is also deemed a hazardous waste and must be managed as such.

Infectious Waste - means those solid waste which may cause human disease and may reasonably be suspected of harboring human pathogenic organisms, or may pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of or otherwise managed.

Municipal Solid Waste (MSW) Facilities - are landfills, transfer stations and material recovery facilities which are permitted to accept solid waste.

PCB Waste - PCBs belong to a family of chlorinated organic compounds called Polychlorinated biphenyls (PCBs). PCBs are a mixture of chemicals that are clear to yellow oily liquids or solids. They were sold for use as dielectric fluids (insulating liquids) in electrical transformers and capacitors and have several names including: Arclor, Askarel, Pyroclor, Sanotherm and Pyranol. Although federal law prohibits the manufacture of PCBs, many electrical transformers and capacitors filled with PCBs are still in service.

Solid Waste - means any garbage, refuse, rubbish, sludge from a waste treatment plant, water supply treatment plant or air pollution control facility and other discarded material, including solid, liquid, semi-solid or contained gaseous material resulting from industrial, commercial, mining and agricultural operations, and from community activities, but does not include solid or dissolved material in domestic sewage, or solid or dissolved material in irrigation return flows or industrial discharges which are point sources subject to permits under 7 Del. Code, Chapter 60, as amended, or source, special nuclear, or by-product material as defined by the Atomic Energy Act of 1954, as amended.

Waste Screening - is the daily process of examining waste coming into a MSW facility to detect and prevent the improper disposal of hazardous, regulated medical and PCB wastes.

PREPARATION FOR WASTE SCREENING

Training

In order to detect and exclude hazardous, infectious and PCB waste from disposal at DSWA facilities, incoming waste must be subject to thorough inspections by trained personnel. These personnel include facility managers, landfill supervisors, compliance officers, equipment operators, weigh masters and spotters. At a minimum, the training shall comply with the SWANA Waste Screening course. The SWANA Waste Screening course to be given to DSWA staff, by DSWA staff, must incorporate field training into the course work. All facility managers, landfill supervisors and compliance officers will be Manager of Landfill Operations (MOLO) certified. **A complete list of trained personnel, with the dates of the most recent training must be submitted to the DNREC's Solid Waste Management Branch by January 30 each year.** The training program shall focus on appropriate health and safety procedures, identification of hazardous waste labels and containers, appropriate waste handling and record keeping requirements and proper operation, maintenance and decontamination of field equipment and instrumentation. Documentation of personnel training shall be maintained as part of the facility records.

General Site Safety

There are four routes of entry by which chemicals and infectious waste can gain access to the body:

1. Ingestion
2. Inhalation
3. Skin Absorption
4. Injection

Protective clothing to aid in the prevention of exposure during waste screening must include a hard hat, steel toe boots, eye protection, orange vest, coveralls, gloves, and dust masks. Cleanliness and common sense will help avoid exposures. Ingestion can be prevented by washing exposed parts of the body thoroughly after work and always before eating. Chemicals and infectious waste can be introduced directly into the bloodstream through the contamination of wounds. This can be prevented from occurring by protecting cuts and broken skin while working. In the event of an exposure, immediately leave the area, warn others, decontaminate the personal area of exposure and contact emergency personnel as described in this document.

POTENTIAL HAZARDS AND OTHER PROHIBITED WASTE

Personnel responsible for waste screening must be aware of the potential hazards they may be faced with when encountering hazardous waste. They are:

1) PCB Wastes

The Toxic Substance Control Act (TSCA) is a federal law which is designed to manage the phase-out and safe disposal of PCBs; however, as a result of the historic PCBs, their presence is still prevalent. PCBs persist in the environment and take decades to slowly decompose. PCBs are an environmental and health threat even at low concentration. Health effects include cancer, damage to reproductive systems, liver and nervous systems. PCBs must be handled with extreme caution. Regulated PCB waste does not include small quantities of PCBs found in fluorescent light ballast, capacitor, household appliances or other common consumer electrical products. **Any liquid or solid with a PCB concentration greater than or equal to 50 parts per million (ppm) is a regulated material and must be disposed of at a facility permitted to accept PCB wastes. The DSWA's "Special Waste Policy" prohibits the acceptance of waste with a PCB concentration greater than 1 ppm.**

2) Hazardous Waste may present one or more of the following hazards.

A. Explosives and Compressed gases

The possible hazards of explosives are:

1. Blast-over pressure
2. Shock Waves
3. Scattering fragments
4. Fires

The possible hazards of compressed gases are:

1. Explosion
2. Asphyxiation
3. Toxicity
4. Corrosiveness
5. Frost bite
6. Reactivity

B. Ignitable Liquids, Solids, Oxidizers and Poisons

The possible hazards of ignitable liquids are:

1. Fire
2. Combustion explosion
3. Toxicity
4. Corrosiveness
5. Reactivity
6. Contamination of water

The possible hazards of ignitable solids are:

1. Ignite easily and burn explosively
2. Reactive with air and water
3. Spontaneously Combustible
4. Toxicity and Corrosiveness

The possible hazards of oxidizers are:

1. Supply oxygen as a reactive or fire fuel source. In a fire driven by pure oxygen almost anything, including steel, will burn.
2. Sensitive to heat, shock and friction
3. Spontaneously react with organic material
4. Can form ignitable mixtures

The possible hazards of corrosives are:

1. Destroys living tissue
2. Violent ruptures can occur
3. Can splatter in contact with water
4. Vapors may be toxic or irritating

Note: In the case of a chemical fire do not assume that the fire can be extinguished with water. Water may react with the material or spread the fire. Remember, make no assumptions when managing a potentially hazardous waste. If in doubt, exercise extreme caution and seek expert help.

Other Prohibited Waste:

Infectious Waste - As defined, infectious waste are those solid waste which may cause human disease. Some examples of infectious waste are: blood and blood products, human tissue, cultures and serums, animal bedding and tissue, sharps such as syringes, scalpels, IV tubing and glassware, and discarded or outdated pharmaceuticals. All infectious waste, other than sharps, must be double bagged and disposed of in red bags which are marked biohazard and carry the universal biological hazard symbol or words infectious waste; however, **red bag waste may not be disposed in a MSW facility.** All infectious waste must then be enclosed in a double-walled corrugated box before transportation off of the site of generation. All infectious waste must be properly labeled as infectious or pathological waste. Sharps must be contained in a leakproof, rigid, puncture resistant containers that are tightly lidded. No infectious waste may be disposed of in a sanitary landfill unless it has been rendered non-infectious and non-recognizable by a permitted infectious waste treatment facility. Infectious waste discovered during waste screening must be removed from the waste stream and properly managed.

Radioactive Waste - Inspection personnel should be properly trained in the use of radiation detection equipment if screening for radioactive waste is going to occur.

Asbestos - See existing procedure.

Pesticides - are prohibited from landfill disposal except for those generated at the household level. Disposal of empty containers is prohibited unless they have been triple rinsed and punctured.

Liquids-that fail the paint filter test are prohibited from disposal in the landfill.

Lead Acid Batteries - should be recycled whenever possible through existing means.

Used oil - is prohibited from disposal in the landfill and should be recycled at igloos or collection centers.

Ash and Incinerator Residue - must be verified as non-hazardous through TCLP testing before it can be disposed of in the landfill.

Other items to look for include:

- transformers and capacitors
- fluorescent light fixtures in quantities greater than 24
- cathode ray tubes
- filters
- compressors
- electric circuit boards

Other hazards include traffic, exposure to dust, and avoiding injury from slips, trips, or falls and jagged or sharp objects in the waste which could cause injury. These hazards also require that appropriate caution be taken to avoid injury.

Hauler Notification

The DSWA will continue to notify all haulers that hazardous, infectious and PCB waste are not accepted at DSWA facilities. Haulers will be notified of the consequences of delivering inappropriate waste to these facilities, (i.e. fines, remedial and disposal cost, loss of DSWA facility use, etc.) Each hauler will also be notified that they will be subject to random screening of their waste loads for hazardous, regulated medical and PCB waste.

Signs

Notification that mandatory random waste screening is practiced at DSWA facilities and that hazardous wastes are unacceptable shall be made by posting signs throughout the facility. The signs should state the consequences of disposal of hazardous waste and that any questionable waste should be pre-approved before bringing it to a DSWA facility.

Source Identification

All waste screening personnel shall be aware of the attached hazardous and infectious waste generator list. Evidence of an inappropriate waste found as a result of waste screening and the information found in these lists may lead to the identification of the generator.

A "last stop" or "origin" survey may be used to identify the generator when trying to determine the origin of an inappropriate waste. This survey is conducted by asking the hauler to identify the origin of his waste. This survey should include the haulers:

- Vehicle type.
- Time of arrival and departure.
- Vehicle identification (company and license).
- Area of collection, weight of load and date.

With experience, facility personnel may be able to identify the potential for hazardous waste by knowing the origin and characteristics of the wastes from previously know problem areas.

Note: **An unfamiliar hauler should always be subject to greater scrutiny.**

Laboratory Contract - DSWA will maintain a laboratory contract with a laboratory to have waste data analyzed and data reported. This contract should provide for rush analyses, i.e. 24 to 48 hour turn around time for samples submitted.

WASTE SCREENING

Weigh Masters - The first line of defense is the weigh masters ability to identify a questionable hauler. Signs to look for include but are not limited to:

- DNREC Solid Waste Transporters permit. Vehicles with a gross vehicle weight of 26,000 pounds or greater must have a valid solid waste transporters permit issued by the Solid Waste Management Branch of the DNREC. Permits are issued by the DNREC's Solid Waste Management Branch and can obtained by calling 739-3820.
- Large cash payments
- If possible, view the waste vehicle for signs such as obviously inappropriate waste, waste with an unusual odor, waste leaking from the vehicle or waste with a large amount of soil mixed with it.

Any evidence of the aforementioned signs should result in further investigation before allowing the vehicle in question to unload. The weigh masters should notify the landfill supervisor or facility manager and a determination regarding the acceptability of the waste must be made.

Equipment and Instrumentation

The DSWA must provide waste screening personnel training in the proper operation, maintenance and decontamination of all waste screening equipment and instrumentation. Basic equipment and instrumentation will include the following:

EQUIPMENT	INSTRUMENTATION
Rake	Explosive gas meter
Trowel or large spoon to obtain samples *	Volatile Organic meter
Sample jars and labels for transport to lab	pH meter
Flags to mark locations of inappropriate waste	PCB indicator
Camera	HAZMAT analysis kit
Field notebook to record findings	Heavy metals analysis kit
Updated list of hazardous and infectious waste generators and transporters.	Radioactivity measurement device

* Must be decontaminated between samples.

Random Load Selection

The waste screening effort should focus on commercial and industrial sources of waste. While household waste loads should still be inspected, they are less likely to contain wastes of concern. At a minimum, 1% of the vehicles using the facility should be screened on a monthly basis. One percent of all vehicles using a facility must be screened on an annual basis. It is very important that the load selected for inspection is totally random. The random method used will be

determined by the DSWA Compliance Officer conducting the waste screening and noted on the inspection form. Vehicles from companies under investigation or those vehicles deemed to be of suspicious nature may be inspected without following a random method.

Waste Screening Area

The waste screening area shall be located to prevent interference with vehicles in the main dumping area. For example, the use of the edge of the working face could serve as the screening location at the DSWA landfills. The tipping floor can be used at the Pine Tree Corners Transfer Station.

Physical and Sensory Examination of the Waste

Sensory examination relies on visual and olfactory (smell) observations of the waste. Watch the waste as it is being unloaded. After the waste has been spread out using hand tools and/or heavy equipment, the waste must be inspected for possible prohibited materials. The basic clues used in detecting hazardous waste are:

Location - where did the truck come from?
Containers - are the containers drums, cylinders, canisters, or lead boxes?
Markings- do any of the containers contain hazard labels, placards, markings or colors? Refer to the attached hazard placard marking information to determine what the coding means; however, never assume that a container label accurately indicates its contents.
Senses- Are there any hissing noises, do you see vapors or smoke, feel hot or cold sensations or smell unusual odors, are your eyes, nose or skin irritated?

The risk of personal exposure to a waste runs from low to high based on the above levels of detection. When the above senses detect a waste the risk of exposure is very high and the appropriate cautionary measures and notifications must be implemented immediately. Never deliberately inhale vapors from a suspicious material. Anyone that is conducting waste screening that becomes dizzy, feels sick to their stomach, or their skin, eyes, nose or throat itches, burns or become irritated or if unusual symptoms of illness develop, should notify the supervisor immediately and seek medical attention if necessary.

Waste that has an unusual appearance, creates an offensive odor, or appears to contain high moisture levels are good candidates for closer examination. Enclosed containers such as barrels, drums, pails, and cans with hazard shipping placards indicating explosive, flammable or poisonous contents require closer, yet cautious, examination. Empty containers should be punctured in the top, bottom and sides prior to disposal. Loads or mixed loads of finely divided or granular materials, powders, dusts, bright or unusual colors or dried solids should also be closely investigated. Most toxic heavy metals are found in powders or granular materials. Special consideration should be given to loads of soil or waste mixed with soil. Any stained soils should have the source identified and samples taken to verify the material as non-hazardous. Large quantities of small containers should always be investigated.

Notification of the delivery of pre-approved industrial waste and communication between the scale house and the working face may avoid potential confusion regarding the examination of approved industrial waste. This notification can also serve as preparation for obtaining samples from an industrial waste stream.

Liquids

Unknown liquids are also a major concern. Liquids in containers, sludges or saturated soils should be flagged for investigation. Ignitable, explosive and corrosive wastes are usually found in liquid form. Toxic organic wastes occur as liquids and PCBs are commonly found in oils. The air above liquids can be monitored using a gas explosion meter or volatile organic meter by personnel who have been properly trained in the use of this equipment. Caution should be used to make sure the visible or audible indicators used on the gas meters can be detected under the conditions they are being used (i.e. Noise, bright sun, etc.). If explosive levels in the area of the waste pile are detected at 25 percent or greater of the lower explosive limit, the area should be evacuated and emergency personnel contacted.

Testing for free liquids

The DRGSW prohibit the disposal of free liquids in DSWA facilities. Paint filter test method 9095 should be used to determine if a waste contains free liquids. The procedure is as follows:

- Obtain standard 400 micron paint filters
- Place a properly sized funnel in a ring stand or similar holding device
- Fold the paint filter and line the funnel with it
- Place a 100 milliliter sample of the waste into the funnel
- Place a clean dry container under the funnel
- Check in exactly 5 minutes to see if there any liquids in the container

If liquid passes through the filter in 5 minutes or less, it is considered to contain free liquids and may not be disposed of in the landfill.

Odors

Fresh MSW has a slightly citrus odor while older MSW has a rotten egg or hydrogen sulfide odor. Chemical and unusual odors warrant further investigation. It is important for waste screening personnel to know that some landfill gasses have no odor but in confined spaces can and have resulted in suffocation and explosion hazards.

Hazardous Characterization for Unknown Materials.

If a material is detected which cannot be identified, a technique known as HAZMAT is used for field categorization to identify the hazards of a suspicious material according to RCRA or DOT categories. HAZMAT can be used to identify basic physical and chemical characteristics of an unknown waste. To set up a HAZMAT program at least one person per DSWA facility must be

trained. Safety is the most important consideration when performing HAZMAT testing. If you do not know what it is, assume it is hazardous.

Managing Unacceptable Wastes

If regulated hazardous, infectious or PCB containing wastes are found, the generator or transporter has violated federal and/or state law by sending these wastes to a facility not permitted to accept them. These wastes cannot simply be returned to the hauler. State law requires notification of the Department when such wastes have been found. **DSWA and/or its contracted personnel must contact the State Emergency Response Team (SERT) at 1-800-662-8802 immediately after unacceptable wastes have been detected. Detailed procedures are in Attachment 'A'; Section VII - Solid Waste Screening from DSWA's Compliance SOP.**

The regulated wastes and all other contaminated wastes will have to be handled in the appropriate manner and disposed of at a permitted facility. If the generator can be identified, the generator will be responsible for providing management and disposal of the waste including all associated costs, as well as possibly being subject to criminal and civil penalties. The responsibility of the hauler will vary depending on the situation; however, the hauler is responsible for providing maximum assistance in identifying and locating the generator. In cases where the hauler does not cooperate in attempting to identify the generator, then the burden for the cost of managing the unacceptable waste must be placed on the hauler.

The landfill owner and operator has the responsibility to:

- Provide the required notification to the DNREC SERT
- Secure the waste to keep the contamination from spreading
- Unknown materials that are still undergoing analysis need to be properly segregated and protected against the weather, secured from unauthorized removal and isolated from other waste activities.
- Maintain the necessary records
- Cooperate with state and federal agencies
- The screening area must be appropriately cleaned whenever a regulated waste is found.
- Hazardous waste storage must comply with RCRA subtitle C requirements.

If the generator cannot be found or does not have the resources to properly manage the waste it may be the responsibility of the hauler or of the DSWA.

When an inappropriate waste is discovered and the generator cannot be determined, all future loads from that collection route should be inspected to try and determine the source of the waste and to assure that the problem has been corrected.

Event Reporting

In the event that a regulated waste is discovered, the agencies that must be contacted are:

Medical Emergency - To be provided by DSWA and be facility specific.
State Emergency Response Branch - 1-800-662-8802. Contact should be immediate.
Solid Waste Management Branch - 1-302-739-3820.
Hazardous Waste Management Branch - 1-302-739-3689.

The Solid and Hazardous Waste offices should be contacted as soon as emergency plans have been implemented and contact must be made as soon as practical and no later than the close of the next business day.

At minimum, the following information should be recorded in the event that a hazardous material is discovered:

- Drivers name, company name, vehicle license number and transporters permit number
- Waste(s) detected
- Generators if identifiable
- Date and time of Department notification
- Efforts taken if an extremely toxic or hazardous substance was discovered
- Landfill employee in charge

Record Keeping

Records of the number of inspections, procedures employed, findings and actions taken should be kept on file by DSWA. These records must be maintained in good condition for 30 years or for the interval approved by DNREC and shall include the signature of the person responsible for conducting the waste screening activity.

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APPENDIX D

ALTERNATE DAILY COVER (ADC)

APPROVAL LETTERS

STATE OF DELAWARE
DEPARTMENT OF NATURAL RESOURCES
& ENVIRONMENTAL CONTROL
DIVISION OF AIR & WASTE MANAGEMENT
89 KINGS HIGHWAY
DOVER, DELAWARE 19901

SOLID & HAZARDOUS WASTE
MANAGEMENT BRANCH

TELEPHONE: (302) 739-9403
FAX NO.: (302) 739-5060

August 22, 2006

Working Copy
☐ Public ☐ Non-Public

Ms Robin Roddy
Facility Manager
Northern Solid Waste Management Center-2
Delaware Solid Waste Authority
1128 South Bradford Street
P.O. Box 455
Dover, Delaware 19903-0455

Subject: Approval of Alternate Daily Cover – Barrier® at Cherry Island Landfill
Reference: Permit SW-06/01 and DSWA Letters dated May 25 and June 29, 2006

Dear Ms Roddy:

This approval revises and replaces the previous approval issued on August 2, 2006 for the use of Barrier® as alternate daily cover at the Delaware Solid Waste Authority's Cherry Island Landfill (CIL).

In accordance with the *Delaware Regulations Governing Solid Waste* (DRGSW) Section 5.I.2.c.(4), approval is hereby granted to the DSWA to use Barrier® as alternate daily cover at the Delaware Solid Waste Authority's Cherry Island Landfill. Use of Barrier is approved also for the construction of wet weather pads over the lined area.

This approval shall expire upon the revocation or expiration of the Permit for Solid Waste Disposal and/or Processing Facility, Form No. 8, Permit Number 101429 issued to Richard S. Burns and Company, Inc. on May 27, 2005 by the Pennsylvania Department of Environmental Protection, Bureau of Waste Management. This approval shall expire upon the revocation or expiration of the Solid Waste Facility Permit, SW-06/01, issued by the SHWMB.

This approval is based upon the following documents:

1. *Cherry Island Landfill (CIL) Permit SW-06/01, Request for Renewal of Alternate Daily Cover Approvals* (with attachments, including *Barrier® Sampling and Analysis Plan*), DSWA letter dated May 25, 2006.
2. *Cherry Island Landfill (CIL) Permit SW-06/01, Request for Renewal of Alternate Daily Cover Approvals – Supplemental Information* (with attachments), DSWA letter dated June 29, 2006.

3. *Permit for Solid Waste Disposal and/or Processing Facility, FORM NO. 8*, Permit Number 101429, issued to Richard S. Burns and Company, Inc. on May 27, 2005 by the

Pennsylvania Department of Environmental Protection (PADEP), Bureau of Waste Management.

4 *Richard S. Burns and Company, Inc, Barrier® Quality Control,* Shaw Environmental & Infrastructure, Inc, letter submitted on behalf of Richard S. Burns and Company, Inc, and dated August 17, 2006.

This approval is subject to the following conditions:

1. Each shipment of Barrier must be accompanied by a certificate or manifest, dated and signed by an authorized representative of Richard S. Burns and Company Inc. (the Company). The certificate or manifest shall state whether or not the material in the shipment has been produced and sampled in compliance with PADEP Permit 101429. The certificate or manifest shall state whether or not the material was sampled in accordance with the *Barrier® Sampling and Analysis Procedures* (an attachment to the DSWA letter dated May 25, 2006). The certificate or manifest shall state how the material was screened to exclude petroleum contamination. DSWA shall review this compliance certificate or manifest and shall not allow the material to be unloaded if the certificate is not available or if the material has not been produced or sampled in accordance with PADEP Permit 101429 and the *Barrier® Sampling and Analysis Procedures* for daily composite samples.

2. Each shipment of Barrier must be accompanied by a copy of the results of the daily composite sampling taken from the "Bin" being delivered. DSWA shall review this analysis prior to allowing the Barrier material to be unloaded. DSWA shall not allow the Barrier material to be unloaded unless the results of the daily composite sampling demonstrate that the material:

    a. contains a minimum content (dry weight) of 65 % inert material.
    b. does not contain levels of PCBs in excess of 3 ppm.
    c. contains a minimum moisture content (total weight) of 20%.

3. Each shipment of Barrier must be accompanied by a copy of the laboratory results of the daily composite sampling for asbestos, sampled from the Bin being delivered. DSWA shall review the asbestos analysis results representing each load of Barrier prior to allowing the material to be unloaded. In the event that the laboratory analysis certificate recommends TEM analysis (transmission electron microscopy) or Matrix Reduction, then DSWA shall ensure that that the results of that additional analysis are provided as well. DSWA shall not allow the Barrier material to be unloaded unless the results of the sampling have been provided and demonstrate that the material **contains less than 1% asbestos.**

4. DSWA shall notify the SHWMB anytime that a load of Barrier has been rejected because it does not meet the requirements for moisture or inert content. DSWA shall provide formal notification in writing within five business days of the arrival of the non-complying shipment and shall describe the reason for rejecting the material.

5. DSWA shall notify the SHWMB immediately (or the Environmental Complaint Line at 1-800-662-8802 if the SHWMB is not available) upon discovery that the Barrier material exceeds the specified limits for asbestos or PCBs and shall provide formal written notification within two business days. In the event that the Barrier material exceeds the specified limits for asbestos or PCB's, DSWA shall reject the shipment, and shall not accept any further shipment of Barrier until DSWA can demonstrate, to the satisfaction of the Department, that the reasons causing the failures have been identified and corrected.

6. In addition to the daily composite Bin sampling, the Company must provide the DSWA with the results of their quarterly sampling for TCLP. The Company must certify in writing that the samples were collected in accordance with the quarterly composite sampling specified in the Company's letter of June 27, 2006 (an attachment to the DSWA's letter dated June 29, 2006), and DSWA shall be responsible for verifying that this certification is provided with each round of quarterly analytical results. Each January, April, July, and October, DSWA shall review the most recent (from the quarter just ending) results of quarterly composite sampling of the Barrier material for TCLP. In the event that the quarterly composite sample results are not submitted for DSWA's required review, or if the results fail to meet the following criteria, the DSWA shall discontinue accepting Barrier immediately. Barrier shall meet the following criteria:

   a. The Barrier material must be non-hazardous as determined by the Toxicity Characteristic Leaching Procedure (TCLP).

7. DSWA shall notify the SHWMB immediately (no later than the next business day) upon discovery if the Barrier material fails to meet the requirements of condition 6 above and shall provide formal written notification to the SHWMB within two business days. In the event that the Barrier material fails to meet the requirements of condition 6 above, DSWA shall not accept any further shipment of Barrier until DSWA can demonstrate, to the satisfaction of the Department, that the reasons causing the failures have been identified and corrected.

8. DSWA shall notify the SHWMB immediately if the material is found to be unsuitable for use as alternate daily cover.

9. DSWA shall limit the on-site storage of the Barrier material to the quantity of material that can be used in two weeks. Storage shall be within the lined area of the landfill.

10. The material shall be unloaded and moved in such a manner to prevent the migration of dust beyond the boundary of the landfill.

11. DSWA shall apply the Barrier material to such a depth that when compacted, it produces a cover layer at least 6 inches in depth.

12. Barrier shall not be used on exterior side slopes or placed where it can be carried off of the landfill by stormwater.

13. Recordkeeping:

    a. For purpose of Department review, DSWA shall maintain all certifications and records of analysis required by this approval for a period of at least three years. After providing reasonable notice, the Department shall have access to all such records. This requirement does not relieve the DSWA of responsibility for maintaining records that may be required by other agencies.

    b. DSWA shall comply with the recordkeeping requirements for approvals of alternate covers specified in Permit SW-06/01.

This approval may be revoked in the event that any of these conditions are not met. Any violation of the conditions of this approval, regulations promulgated by DNREC, Secretary's Orders, or provisions of 7 Del. C. Chapter 60 shall be grounds for immediate termination of the approval.

If you have any questions concerning the approval, you may contact Robert Hartman at 302.739.9403.

Sincerely,

for Nancy C. Marker
Environmental Program Manager II
Solid & Hazardous Waste Management Branch

NCM. RH.dtd
DSWA\Approvals\RH06045

cc: Bryan Ashby, Environmental Program Manager I, SHWMB
Ting Guo, Engineer, SHWMB
Allen T. Burns, Richard S. Burns and Company Inc.

STATE OF DELAWARE
DEPARTMENT OF NATURAL RESOURCES
& ENVIRONMENTAL CONTROL
DIVISION OF AIR & WASTE MANAGEMENT
89 KINGS HIGHWAY
DOVER, DELAWARE 19901

SOLID & HAZARDOUS WASTE
MANAGEMENT BRANCH

TELEPHONE: (302) 739-9403
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August 22, 2006

Ms Robin Roddy
Facility Manager
Northern Solid Waste Management Center-2
Delaware Solid Waste Authority
1128 South Bradford Street
P.O. Box 455
Dover, Delaware 19903-0455

Subject: Approval of Alternate Cover – Clean Earth of New Castle Treated Soil at Cherry Island Landfill
Reference: *Request for Renewal of Alternate Daily Cover Approvals*, Letter dated May 25, 2006

Dear Ms Roddy:

In accordance with the *Delaware Regulations Governing Solid Waste* (DRGSW) Section 5.1.2.c.(4), approval is hereby granted to the Delaware Solid Waste Authority (DSWA) to use Clean Earth of New Caslte's treated petroleum contaminated soils as alternate daily and intermediate cover at the DSWA's Cherry Island Landfill (CIL).

This approval shall expire upon the revocation or expiration of Clean Earth of New Castle, Incorporated's Resource Recovery Facility Permit No. SW-97/07, renewed on July 1, 2005. This approval shall expire upon the revocation or expiration of the Solid Waste Facility Permit, SW-06/01, issued to the DSWA by the Solid & Hazardous Waste Management Branch.

This approval is based upon the following documents:

1. *Cherry Island Landfill (CIL) Permit SW-06/01, Request for Renewal of Alternate Daily Cover Approvals* (with attachments), DSWA letter dated May 25, 2006.

2. Clean Earth of New Castle, Resource Recovery Facility Permit No. SW-95/07, renewed on July 1, 2005.

3. Sanitary Landfill Permit SW-06/01 issued to the DSWA on January 6, 2006.

This approval is subject to the following conditions:

1. DSWA must review the Clean Earth of New Castle (CENC) Lot Certification for each numbered lot of soil prior to that lot's delivery to CIL for use as a daily or intermediate cover. The CENC Lot Certification shall state the results of the post-production composite analytical sampling and include those laboratory results for DSWA review. The CENC Lot Certification shall state whether or not the lot was sampled in accordance with *Clean Earth Sampling Plan for Reuse at DSWA's Cherry Island Landfill* (attached to CENC Letter, *Sampling and Analysis Plan*, dated March 1, 2006). The CENC Lot Certification shall state whether or not the soils originated from any State or Federal Superfund Site. The CENC Lot Certification shall also state whether or not the material was screened and treated in accordance with Resource Recovery Permit SW-95/07. DSWA shall review this CENC Lot Certification and shall not allow the lot to be delivered to the CIL if any of the required submittals are missing, if the materials have not been sampled in accordance with the *Sampling and Analysis Plan*, or if the material does not meet the standards required by this approval and Permit SW-95/07. Standards required by this approval include:

    a. The soil must be non hazardous as determined by the Toxicity Characteristics Leaching Procedure (TCLP). The soil must not be ignitable, corrosive or reactive.
    b. The soil must not contain levels of total petroleum hydrocarbon (TPH) in excess of 1000 ppm.
    c. The soil must not contain levels of PCBs in excess of 3 ppm.
    d. The soil must not contain levels of total BTEX in excess of 10 ppm (with specific maximum limits of 0.5, 10, 5, and 5 ppm for benzene, toluene, ethylbenzene, and xylene respectively).

2. In the event that the TCLP analysis required by condition 1.a above indicates that any metal is within 75% of the regulatory limit, CENC must complete an analysis (on the same composite sample) for inorganic compounds specified by Table 5.2. DSWA shall review this additional sampling and shall not allow the CENC soil to be unloaded unless it meets the applicable "Final Max." limits specified by Table 5.2. (reference Permit SW-95/07, condition III.D.).

3. Each shipment (i.e. truckload) of treated soils arriving at the CIL must be accompanied by a CENC manifest which references the lot number of the pile being delivered to CIL. The manifest must be dated and signed by an authorized representative of Clean Earth of New Castle, Inc. DSWA shall review this manifest and shall not allow the soil to be unloaded if the manifest is not available or if the CENC Lot Certification for the specific lot has not been reviewed and approved by the DSWA CIL facility manager or their designated representative.

4. DSWA shall notify the SHWMB immediately (or the Environmental Complaint Line at 1-800-662-8802 if the SHWMB is not available) upon discovery that the CENC soil

exceeds the limits specified by this approval, and DSWA shall provide formal written notification within 5 business days. In the event that the CENC soil exceeds the specified limits, DSWA shall reject the shipment, and shall not accept any further shipment of CENC soil until DSWA can demonstrate, to the satisfaction of the Department, that the reasons causing the failures have been identified and corrected.

5. DSWA shall notify the SHWMB immediately if the CENC soil is found to be unsuitable for use as alternate cover.

6. DSWA shall limit the on-site storage of the CENC soil to the quantity of material that can be used in two weeks. Storage shall be within the lined area of the landfill.

7. DSWA shall ensure that the CENC soil is unloaded and handled in a manner to prevent the migration of dust beyond the boundary of the landfill.

8. DSWA shall limit the use of CENC soil to daily and intermediate cover on the relatively flat slopes atop the expansion area. DSWA shall not use CENC soil on exterior side slopes.

9. DSWA shall apply the CENC soil used as daily cover to such a depth that when compacted, it produces a cover layer at least 6 inches in depth.

10. DSWA shall apply and maintain the CENC soil used as intermediate cover so that the thickness of the intermediate cover layer (which may include 6 inches of daily cover) is at least 12 inches. To enable vegetation, DSWA shall test and amend treated soils used as intermediate cover in accordance with the CIL Plan of Operations, section 1.09. 5.C.

11. Recordkeeping:

    a. For purpose of Department review, DSWA shall maintain all certifications and records of analysis required by this approval for a period of at least three years. After providing reasonable notice, the Department shall have access to all such records. This requirement does not relieve the DSWA of responsibility for maintaining records that may be required by other agencies.

    b. DSWA shall comply with the recordkeeping requirements for approvals of alternate covers specified in Permit SW-06/01.

This approval may be revoked in the event that any of these conditions are not met. Any violation of the conditions of this approval, regulations promulgated by DNREC, Secretary's Orders, or provisions of 7 Del. C. Chapter 60 shall be grounds for immediate termination of the approval.

If you have any questions concerning the approval, you may contact Robert Hartman at 302.739.9403.

Sincerely,

James D. Short

for Nancy C. Marker
Environmental Program Manager II
Solid & Hazardous Waste Management Branch

NCM: RH: dtd
DSWA\Approvals\RH06039b

cc: Bryan Ashby, Environmental Program Manager I, SHWMB
Ting Guo, Engineer, SHWMB
Paul A. Lane, Clean Earth of New Castle
Karen J'Anthony, Environmental Program Manager I, SHWMB
Jim Short, Environmental Program Manager I, SHWMB

STATE OF DELAWARE
DEPARTMENT OF NATURAL RESOURCES
AND ENVIRONMENTAL CONTROL
DIVISION OF WASTE AND HAZARDOUS SUBSTANCES
SOLID AND HAZARDOUS WASTE MANAGEMENT SECTION

89 KINGS HIGHWAY
DOVER, DELAWARE 19901

TELEPHONE: (302) 739-9403
FAX: (302) 739-5060

February 12, 2016

Mr. Jason M. Munyan
Facility Manager
Cherry Island Landfill
Delaware Solid Waste Authority
1128 South Bradford Street
Dover, Delaware 19904

Subject: Approval of Alternate Daily Cover – Clean Earth of Philadelphia Treated Soil at Cherry Island Landfill

Dear Mr. Munyan:

In accordance with the *Delaware Regulations Governing Solid Waste* (DRGSW) Section 5.9.2.3.4, and Permit Conditions (SW-06/01) II.L.5, II.M.5. and V.C., approval is hereby granted to the Delaware Solid Waste Authority (DSWA) to use Clean Earth of Philadelphia (CEP)'s treated petroleum contaminated soils as alternate daily and intermediate cover at the DSWA's Cherry Island Landfill (CIL). This approval modifies and replaces our previous approval dated February 29, 2008.

This approval shall expire immediately in the event of the revocation or expiration of Clean Earth of Philadelphia, Incorporated's (CEP) Permit for Solid Waste Disposal and/or Processing Facility, Form No. 8, Permit No. 301220, issued on March 30, 2012; or upon the revocation or expiration of the Solid Waste Facility Permit, SW-06/01, issued to the DSWA by the Solid & Hazardous Waste Management Branch on January 6, 2006 (Revised September 11, 2013).

A. This approval is based upon the following documents:

1. Clean Earth of Philadelphia, LLC's *Application for Alternate Cover For Use at Cherry Island Landfill*, December 28, 2015.
2. Sanitary Landfill Permit SW-06/01 issued to the DSWA by the Solid & Hazardous Waste Management Branch on January 6, 2006 (Revised September 11, 2013).
3. The *Delaware Regulations Governing Solid Waste,* Last Revised February 2, 2010.

B. This approval is subject to the following conditions:

1. DSWA shall review the Clean Earth of Philadelphia, LLC pile certification submittals for each numbered pile of soil prior to that pile's delivery to CIL for use as a daily or intermediate cover. The CEP Pile Approval Letter must be signed by an authorized representative of CEP. The DSWA shall verify the following certifications are provided as part of the submittal:

   a. The CEP Pile Approval Letter must state whether or not the materials in the lot were screened, processed, sampled, and deemed acceptable for beneficial use in accordance with *Permit for Solid Waste Disposal and/or Processing Facility, Form No. 8*, Pennsylvania DEP Permit No. 301220.
   b. The CEP Pile Approval Letter must state whether or not the soils originated from any State or Federal Superfund Site.
   c. The CEP Pile Approval Letter must state whether or not the processed soils were sampled in accordance with the *Batch Soil and Analysis Plan* dated February 27, 2006.
   d. The CEP Pile Approval Letter must state whether or not the processed soils exceeded any of the limits imposed by Section B.2 of this approval (TCLP, Pennsylvania regulated fill limits for metals, TPH, PCBs and BTEX).
   e. The pile certification submittal package must include the results of the post-production composite analytical sampling results for DSWA review.
   f. The CEP Pile Approval Letter must state whether or not the material included in the lot has been limited to processed soil and other non-combustible solid material as defined in Condition 6 of the PADEP issued *permit for Solid Waste Disposal and/or Processing Facility Permit No. 301220,* and whether or not any other wastes, including soil amendments, are included in the lot.

2. DSWA shall review the CEP pile certification submittals and shall not allow the pile to be delivered to the CIL if any of the required submittals are missing; if the soil is from a State or Federal Superfund site; if the soil has not been screened, processed, sampled and deemed ready for use as for beneficial use in accordance with the PA-DEP *Permit for Solid Waste Disposal and/or Processing Facility Permit 301220*; if the soil has not been sampled in accordance with the *Batch Soil and Analysis Plan*; or if the material does not meet the standards required by the Permit No. 301220, and this approval. Standards required by this approval include:

   a. The soil must be non hazardous as determined by the Toxicity Characteristics Leaching Procedure (TCLP). The soil must not be ignitable, corrosive or reactive.
   b. Except for Boron, the soil must not exceed the metal concentration limits set for regulated fill established by the Pennsylvania Management of Fill Policy, document 258-2182-773. Boron concentrations in the soil shall be limited to 60 mg/kg.
   c. The soil must not contain levels of total petroleum hydrocarbon (TPH) in excess of 1000 ppm as measured by DRO (EPA Method SW-846 8015 M)
   d. The soil must not contain levels of PCBs in excess of 3 ppm.

e. The soil must not contain levels of total BTEX in excess of 10 mg/kg (with specific maximum limits of 0.5, 10, 5, and 5 mg/kg for benzene, toluene, ethylbenzene, and xylene respectively).

3. Each shipment (i.e. truckload) of treated soils arriving at the CIL must be accompanied by a CEP manifest which references the pile number being delivered to CIL. The manifest must be dated and signed by an authorized representative of CEP. DSWA shall review this manifest and shall not allow the soil to be unloaded if the manifest is not available or if the CEP pile certification submittal for the specific lot has not been reviewed and approved by the DSWA CIL facility manager or their designated representative.

4. DSWA shall notify the Solid and Hazardous Management Section (SHWMS) immediately (or the Environmental Complaint Line at 1-800-662-8802 if the SHWMS is not available) upon discovery that the CEP soil exceeds the limits specified by this approval, and DSWA shall provide formal written notification within 5 business days. In the event that the CEP soil exceeds the specified limits, DSWA shall reject the shipment, and shall not accept any further shipment of CEP soil until DSWA can demonstrate, to the satisfaction of the Department, that the reasons causing the failures have been identified and corrected.

5. DSWA shall notify the SHWMS immediately if the CEP soil is found to be unsuitable for use as alternate cover.

6. DSWA shall limit the on-site storage of the CEP soil to the quantity of material that can be used in two weeks. Storage shall be within the lined area of the landfill with the intent being that all runoff from the stored CEP material will be treated as leachate.

7. DSWA shall ensure that the CEP soil is unloaded and handled in a manner to prevent the migration of dust beyond the boundary of the landfill.

8. DSWA shall limit the use of CEP soil to daily and intermediate cover on the relatively flat slopes atop the expansion area. DSWA shall not use CEP soil on exterior side slopes.

9. DSWA shall apply the CEP soil used as daily cover to such a depth that when compacted, it produces a cover layer at least 6 inches in depth.

10. DSWA shall test and amend treated soils used as intermediate cover in accordance with the Plan of Operations, section 1.09. 5.C.

11. DSWA shall determine that CEP soils are sampled at least every 4,000 tons (composite of grab samples taken at least every 1,000 tons).

12. DSWA shall monitor stormwater for TPH (DRO) and for benzene, toluene, ethylbenzene and xylene as part of the stormwater monitoring required by permit SW-06/01, condition III.A.1.

13. Recordkeeping:

a. For purpose of Department review, DSWA shall maintain all manifests, certifications and records of analysis required by this approval for a period of at least three years. After providing reasonable notice, the Department shall have access to all such records. This requirement does not relieve the DSWA of responsibility for maintaining records that may be required by other agencies.

b. DSWA shall comply with the recordkeeping requirements for approvals of alternate covers specified in Permit SW-06/01.

This approval may be revoked in the event that any of these conditions are not met. Any violation of the conditions of this approval, regulations promulgated by DNREC, Secretary's Orders, or provisions of 7 Del. C. Chapter 60 shall be grounds for immediate termination of the approval.

If you have any questions concerning the approval, you may contact Brad Richardson at 302.739.9403.

Sincerely,

Jason W. Sunde
Environmental Program Manager I
Solid & Hazardous Waste Management Section

JWS: ABR: drb
16 0212 02-C CIL ADC Approval CEP SW-06-01/ABR16006

cc: A. Brad Richardson, Environmental Scientist, SHWMS
Frank Gavis, Hydrologist, SHWMS
Mark Lyon, Environmental Compliance Specialist, SHWMS
Dan Fluman, Manager of Environmental Monitoring and Testing, DSWA
Thomas J. Kushnir, Clean Earth of Philadelphia

APPENDIX E

MONITORING PROGRAM

FOR

THE NORTHERN SOLID WASTE MANAGEMENT CENTER

AT

CHERRY ISLAND

Monitoring Program
For
The Northern Solid Waste Management Center
At Cherry Island

Revision 1 – October 10, 1012

Modification 1 – January 21, 2014

Modification 2 – December 10, 2014

MONITORING PROGRAM
FOR THE
NORTHERN SOLID WASTE MANAGEMENT CENTER AT CHERRY ISLAND

Revision 1 – October 10, 2012

This monitoring program supercedes the "Monitoring Program for the Northern Solid Waste Management Center (May 2005) as submitted in "Volume 12: Operations and Maintenance Manual" by Geosyntec Consultants as part of the Cherry Island Permit Application for SW-06/01, This document covers monitoring plans for groundwaters, surface waters/stormwaters and leachates from Cherry Island. Any modifications to this program approved by the Delaware Department of Natural Resources and Environmental Control's (DNREC) Solid and Hazardous Waste Section (S&HWS) are noted on page 4 of this document.

DSWA reserves the right to perform additional monitoring, or subject samples to additional analysis not covered by this Program as necessary to facilitate or otherwise aid various operational and research projects, studies, or investigations without the permission of the S&HWS. DSWA also reserves the right to update all topographic base maps to reflect current conditions without notifying the S&HWS, as these are not considered modifications to the "Plans" or Environmental Monitoring Program.

Whenever a modification to this document becomes necessary, DSWA will inform the S&HWS in writing of all changes to the program, and provide a revised copy of the Program for their approval.

The format of the comprehensive monitoring program is as follows:

I.	General Field and Laboratory Protocols
II.	Leachate Monitoring Program
III.	Stormwater/Surface Water Monitoring Program
IV.	Groundwater Monitoring Program
Attachment A:	Stormwater/Surface water Monitoring Plan for the Cherry Island Landfill
Attachment B:	Leachate Monitoring Plan for the Cherry Island Landfill
Attachment C:	Groundwater Monitoring Plan for the Cherry Island Landfill
Attachment D:	May 23, 2000 Memorandum on Future Cherry Island Monitoring Requirements

I. FIELD & LABORATORY PROTOCOLS

All samples shall be collected, prepared, shipped, and analyzed using the methods provided in the following publications:

A. SW-846 (Most Recent Edition)	**To be used first;**
B. 40 CFR-136 (Most Recent Edition)	**to be used only if methods are not available in A above;**
C. Standard Methods (Most Recent Edition)	**to be used only if methods are not available in A or B above;**
D. Other methods as jointly approved by DSWA and DNREC	**to be used only if methods are not available in A, B, or C above.**

All groundwater and surfacewater samples shall be collected in a manner that minimizes sample turbidity. All wells shall be maintained as necessary so that they will produce low turbidity water. All groundwater samples exceeding 10 NTUs shall be field filtered.

(Modification 1 - January 2, 2014)
(Modification 2 – December 2014)

II. Stormwater/Surface Water Monitoring Program

A. Surface water samples shall be collected from the surface water monitoring locations shown in Attachment A, Figure 1. These samples shall be analyzed in accordance with the schedules provided in Attachment A, Tables 1 and 2. Sample collection, preservation, Chain-of-Custody, labeling, shipment, and equipment decontamination, shall follow the same procedures as outlined in Attachment A.

B. Stormwater samples shall be collected from the stormwater monitoring locations shown in Attachment A, Figure 1 on a semi-annual basis. Sample collection, preservation, Chain-of-Custody, labeling, shipment, and equipment decontamination, shall follow the same procedures as outlined in Attachment A. These samples shall be analyzed in accordance with the schedules provided in Attachment A, Table 3.

III. Leachate Monitoring Program

A. Leachate Monitoring

1. DSWA shall monitor all collection systems, wet-wells, pumps, flow meters, controls and recording devices each operating day to insure proper operation. DSWA shall inspect all connections to valves, pipes, and flow meters at riser houses and pump stations for leaks. The results of monitoring and inspections shall be recorded in the facility log.

2. DSWA shall measure and record the quantities of leachate pumped to the City of Wilmington's wastewater treatment plant on a weekly basis. DSWA shall also record the quantity of all leachates being transferred from the CSWMC and SSWMC to CIL for disposal. These records shall include the date of the event, the origin of the leachate, quantity of leachate, and the destination of the leachate.

3. Leachate samples from the CIL Master Pump Station (Attachment B, Figure 1) shall be collected and analyzed in accordance with the schedules provided in Attachment B, Tables 1, 2, 3, 4 and 5. Sample collection, preservation, Chain-of-Custody, labeling, shipment, and equipment decontamination, shall follow the same procedures as outlined in Attachment B.

B. Collection Line Maintenance

1. Annually, all accessible primary leachate collection pipes shall be cleaned with a self propelled, high pressure jetting system. DSWA shall identify and assess any blockages or areas that are inaccessible during the annual cleanings.

2. At least once every four years, DSWA shall have all accessible leachate collection systems video inspected to assess their condition. Upon completion DSWA shall generate a report discussing the condition of the leachate collection pipes including the condition of the pipes, clogging of the pipe perforations, locations and cause of blockages, and any effects the blockages had on operation of the system.

C. Spill Contingency

1. DSWA shall immediately notify DNREC regarding any incident of a leachate release over 10 gallons.
2. DSWA shall immediately cleanup any and all areas impacted by the leachate release.
3. Should the spill be of a quantity or in an area that poses a potential release from site, the DSWA shall:

a. Estimate the quantity of the release;
b. Generate a map showing the location of the release;
c. Sample free liquids in the impacted area and the closest surfacewater to the release;
d. Test the samples listed in II.C. above for the analytes and measurements listed in Attachment B, Table 6.
e. Report the results of analysis to the Solid and Hazardous Waste Section of the Department of Natural Resources and Environmental Control within 45 days of the release.

IV. Groundwater Monitoring Program

Groundwater samples shall be collected from the groundwater monitoring locations shown in Attachment C, Figure 1. These samples shall be analyzed in accordance with the schedules provided in Attachment C, Table 1. Sample collection, preservation, Chain-of-Custody, labeling, shipment, and equipment decontamination, shall follow the same procedures as outlined in Attachment C.

Modifications

Modification 1 – January 21, 2014

This modification to the CIL monitoring program includes the following minor changes:

- Clarifications to Attachment B - Background: Permits and Compliance;
- Clarifications to Attachment B.VIII: Sample Collection Methodology
- Addition of decontamination methods required by the DRBC throughout Attachment B;
- Deletion of groundwater monitoring wells LC-114, LC115A, P-105A and P-108A, from Attachment C that were found to be damaged when video-inspected;
- The addition of replacement groundwater monitoring wells LC-114A, LC-115B, P-105B, and P-108B, to Attachment C that were installed in April 2013;
- Moving the Cherry Island quarterly monitoring events from January, April, July, and October to March, June, September and December in order to better coordinate and facilitate environmental monitoring activities between Cherry Island and Pigeon Point;
- Updates of the topography on all maps throughout this document.

Modification 2 – December 10, 2014

This modification to the CIL monitoring program includes the following minor changes:

- Deletion of groundwater monitoring wells LC-104A and P-105B in Attachment C which were found to be damaged when video-inspected in April 2014;
- The addition of replacement groundwater monitoring wells LC-104B and P-105C to Attachment C, which were installed in June 2014;
- Move from 24-hour discrete sampling methodology to 24-hour bulk composite methodology. Our reasons for this request are as follows:
    - The discrete samples require compositing upon collection, so it makes no sense to collect 24 bottles and then have to composite them;
    - During our semi-annual monitoring events, the 24-hour discrete samplers cannot collect enough leachate for duplicate bottles required in case a bottle breaks in transit or at the lab, while the bulk composite samplers can be retrofitted with larger sample collection vessels;
    - All other contractors that collect samples from the Main Pump Station use bulk samplers and their samples yield statistically similar results of analysis to those collected using the 24-hour discrete sampling method;
    - The bulk composite samplers are more reliable and are easier to maintain.

- Move from collecting leachate samples from the wet well of the Main Pump Station to collecting samples from an in-line sample port installed on the main discharge line from the site. Our reasons for this request are as follows:
    - Under normal operating conditions, the wet well of the Main Pump Station only receives leachate from Phase I, condensate from the landfill gas system, and wastewater from the buildings on site. Leachates from Phases IA through V bypass the wet well and pass directly through the main discharge line to the City's wastewater treatment plant. During sampling events, a 3-way valve must me thrown to divert this flow to the wet well, resulting in aeration and double handling of the leachate;
    - Solids tend to build up and restrict or block the flow in the sample tubes of the wet well. This can result in sample contamination and frequent sample tube maintenance or replacement;
    - The design of the in-line sample port allows samples to be collected from the center of the pipe, which should provide more uniform samples;
    - Using the sample port would reduce or eliminate sampling procedure errors by contractors not associated with DSWA.

MONITORING PROGRAM
FOR THE
NORTHERN SOLID WASTE MANAGEMENT CENTER AT CHERRY ISLAND

Revision 1 – October 10, 2012

Attachment A: Stormwater/Surface water Monitoring Plan for the Cherry Island Landfill

ENVIRONMENTAL MONITORING PROGRAM
FOR THE
NORTHERN SOLID WASTE MANAGEMENT CENTER AT CHERRY ISLAND

(Revision 1 - October 10, 2012)

ATTACHMENT A: Stormwater/Surface Water Monitoring Plan for the Cherry Island Landfill

Background: Stages of Stormwater Management System Monitoring

The stormwater and quarterly Surface water Monitoring Plan for CIL has been divided into three stages, namely: (i) Initial Stage (Stage I) corresponds to the stormwater monitoring that will take place between the construction of the foundation enhancement and prior to filling of waste to the elevation of the top of the perimeter mechanically stabilized earth (MSE) berm; (ii) Transitional Stage (Stage II) corresponds to the stormwater monitoring that will take place after waste elevation in the vicinity of the perimeter MSE berm has reached and exceeded the elevation of the top of the perimeter MSE berm; and (iii) Final Stage (Stage III) corresponds to stormwater monitoring that will take place after all the stormwater runoff is directed towards the perimeter discharge points SW-1 through Drop Inlet 5. This stormwater monitoring plan for CIL will be modified as operations move into different stages of waste filling. The following describes Stages I through III as outlined above:

Stage I (Initial Stage)

This stage represents the stormwater and surface water monitoring that will take place during the construction of the MSE berm and before waste elevations in the vicinity of the MSE berm reaches the top of the MSE berm. During Stage I, grading of the landfill will direct stormwater to the following locations:

- Two (2) toe drains that direct stormwater to the Northern Stormwater Management Basin;
- Two (2) toe drains that direct stormwater to the Delaware River;
- Three (3) toe drains that direct the stormwater to the Christina River;
- Stormwater Swale Discharge Pipe (SW-6 as shown on page 9, Figure 1 of this Plan).

During Stage I, the concrete channel at the base of (four) 4 drop inlets that will go into operation after landfilling has reached the top of the MSE berm will be outfitted with:

- A weir system comprised of a square or v-notch weir, vault, visual scale and/or electronic data logging float system capable of measuring the flow of the stormwater exiting the site.

or

- A discharge pipe outfitted with a flow meter/data logging system capable of measuring the flow of the stormwater exiting the site.

During Stage I, the DSWA will continue quarterly monitoring of the Northern Stormwater Management Basin, the Delaware River (R1 and R2), the Christina River (SW-5) and the stormwater outlet on 12th Street (SW-6) for the measurements and analytes listed in Tables 1 and 2 on pages 10 and 11 of this Plan. Additionally, semi-annual stormwater samples will be collected at LP-1, LP-2, LP-3 along the Christina River, LP-4, LP-8, SW-1 along the Delaware River, R-1 and R-2 along the Delaware River, and SW-6 on 12th Street. These samples shall be collected at least 90 days apart, be collected within 12-hours of the beginning of a significant precipitation event, and shall undergo analysis for the analytes listed in Table 3 on page 12 of this Plan. Figure 1 on page 9 of this Plan shows the location of the final monitoring points.

Stage II (Transitional Stage)

At this stage, the landfill has reached the top of the MSE berm and surface water runoff is being directed into one of the MSE berm stormwater discharge points (Drop Inlets 1, 1A, 2,3,4 and 5) shown on page 9, Figure 1 of this Plan. During this time, the LPs in the drainage area will be pressure grouted shut, and the FML sealed so that landfilling can take place in that area. As each LP in a drainage area is abandoned, it will be removed from the monitoring schedules, and the corresponding Drop Inlet will be added. Each of these new locations will be outfitted with flow monitoring instrumentation consistent with that listed for Stage I. Sampling at each new stormwater monitoring location will begin during the next scheduled stormwater sampling event.

Stage III (Final Stage)

At this stage, all of the stormwater runoff is being directed towards the six (6) Drop Inlets located along the perimeter of the MSE berm. During Stage III, six (6) stormwater discharge points and three surface water locations will be monitored. Page 9, Figure 1 of this Plan shows the location of the current and final monitoring points. Quarterly monitoring will continue at R1 and R2, SW-1, SW-5 and SW-6 for the measurements and analytes listed in Tables 1 and 2 on pages 10 and 11 of this Plan. Additionally, the semi-annual stormwater monitoring described under Stage I will continue. These samples shall be collected at least 90 days apart, and shall undergo analysis for the analytes listed in Table 3 on page 12 of this Plan.

It should be noted that stormwater sampling will only take place Monday through Friday due to security and access issues, health and safety issues, as well as holding times for some analytes.

I. Monitoring Requirements

Depending on the "Stage" of landfilling as listed above, surface water and stormwater samples shall be collected from the monitoring locations shown on page 9, Figure 1 of this Plan. These samples shall be analyzed in accordance with the schedules provided in Tables 1, 2, and 3 on pages 10 through 12 of this Plan. Sample collection, preservation, Chain-of-Custody, labeling, shipment, and equipment decontamination, shall follow the same procedures as outlined in this Plan.

II. Analytical Methodology

All samples shall be analyzed using the methods provided in the following publications:

A. SW-846 (Most Recent Edition) to be used first;
B. 40 CFR-136 (Most Recent Edition) to be used only if methods are not available in A above;
C. Standard Methods (Most Recent Edition) to be used only if methods are not available in A or B above;
D. Other methods as jointly approved by DSWA and DNREC to be used only if methods are not available in A, B, or C above.

III. Control of Stormwater Runoff and Sedimentation

As part of the CIL Stormwater Monitoring Plan, landfill operations staff will minimize suspended solids (i.e., sediment transport) from the stormwater runoff by constructing and maintaining berms and grading swales to direct stormwater running off the working surface along specific flow paths. Sediment basins and check dams will be used to reduce sediments in runoff reaching stormwater discharge points from CIL. In addition, areas that are not actively landfilled will be seeded and mulched.

IV. System Maintenance

The stormwater conveyance and discharge system (SCDS) shall be kept free of debris, waste, and sediment build-up. When discovered, ponding water on the landfill surface shall be diverted to the SCDS. The SCDS shall be visually inspected at a minimum frequency of once per month, and immediately after severe meteorological events such as hurricanes or floods. SCDS Inspection/Maintenance forms shall be completed on a monthly basis and included in the facility log. Inspections shall include the following:

- Berms and swales shall be inspected for erosion and sedimentation;
- Silt fences shall be inspected for holes, tears or separation from anchor posts;

- Culverts and pipes shall be inspected for siltation and blockage;
- Control structures shall be inspected for siltation, debris, and damage such as erosion.

All sediments, waste or debris removed from the SCDS shall be placed back on the operational portion of the landfill surface. Any needed repairs discovered during SCDS inspections shall be noted in the SCDS inspection/maintenance forms, and reported to the facility manager or designated DSWA representative. Any repairs or other remedial actions taken shall be scheduled by the facility manager and completed as necessary. Upon completion of repairs or remedial action, the facility manager or designated DSWA representative shall note the repairs on the original SCDS Inspection/Maintenance log along with the date of repairs or remedial action. A copy of the Inspection/Maintenance forms can be found on pages 13 through 15 of this Plan.

Swales designed to convey runoff to stormwater discharge points should be maintained to provide the necessary depth to hold stormwater within the confines of the taper and necessary fall to keep stormwater from backing up within the SCDS. To reduce erosion and filter out sediments, in areas that will not be impacted by landfilling activities for six months, DSWA personnel shall install an intermediate cover, seed and mulch.

V. Meteorological Monitoring

DSWA shall maintain a meteorological weather station at CIL. Data from this weather station shall be maintained in an electronic database. Pertinent meteorological data shall accompany stormwater sample data upon submission to DNREC.

VI. Field Preparation: Mobilization/Demobilization

The following outlines those procedures DSWA requires of its environmental monitoring contractors for preparation for the sampling of surface waters and stormwaters at the DSWA facilities:

A. Standard QA/QC required by the sampling contractor include:

1. External audits through certification programs.
2. External audits through acceptance of blind samples and round robin testing.
3. Internal audits through splitting samples and shipping samples to other local and regional laboratories.
4. Performance audits of all laboratory personnel and stations.

B. Many times, the bottles used by a contractor for sample collection, shipment, and storage are purchased pre-cleaned and (some with preservatives added) by an independent company. However, all sampling and field equipment is usually cleaned and maintained by the contractor. Therefore, as a part of standard quality checks, all bottle shipments should be tested by the contracted monitoring company on a routine basis for contamination. If the sampling company elects to clean their own bottles, quality checks should be standard protocol, and should be run on every lot washed. As a minimum, the following should be done prior to any bottles going into the field:

1. Fresh disposable Nitrile gloves should be worn whenever handling the glassware (prior to and after cleaning).
2. All labels should be affixed to the bottles prior to issuance to field teams.
3. All sample preservatives which can be placed in bottles prior to sample collection should be done so before the bottles are issued to the field teams. The type and amount of preservative should be placed on the label immediately prior to or after addition to the bottle.

4. Specific analytes and sample locations should be placed on the labels in indelible ink prior to the bottles leaving the laboratory. Note that all caps for volatile organic samples should be screwed down tightly prior to labeling to eliminate any airborne volatile contaminants from the label glues or ink from indelible markers, pens, or type.

C. Preparation of field equipment should include cleaning of all manual sampling equipment using the following procedures:

1. A general rinse with water to remove debris and solids.
2. An Alconox or Citrinox Wash.
3. Sterile rinses with deionized/distilled water.
4. Acid Wash.
5. Sterile rinses with deionized/distilled water.
6. Hexane Wash.
7. 3 sterile rinses with deionized/distilled water.

All acids and chemical rinses used should be GCMS grade or better. The field sampling team is required to carry the necessary chemicals and deionized/distilled water into the field in order to clean any materials that may become contaminated during sampling.

D. All pumps and field meters should be cleaned and calibrated prior to each sampling event using chemicals and standard procedures recommended by the manufacturer. The equipment should undergo the same protocols when it is returned to the lab.

E. Maintenance and parts replacement should be performed as required by the manufacturers suggested schedule.

F. The sampling company is required to retain records of maintenance and calibration certification. These records are periodically checked by the DSWA.

G. All field equipment should be inspected and tested for proper operation prior to being sent into the field.

H. The sampling team is required to carry duplicates of all major pieces of sampling equipment.

VII. Surface Water Samples

All surfacewater samples shown on Page 9, Figure 1 of this Plan shall be collected using methodology described in this Plan. These samples shall undergo the analysis provided in Tables 1 and 2 on pages 10 and 11 of this Plan.

VIII. Stormwater Flow Monitoring

During Stage III monitoring, DSWA shall maintain automated stormwater monitoring systems designed to measure the flow of stormwater during precipitation events. Either direct data transfer or remote logging capabilities shall be the basis for data collection.

IX. Stormwater Sample Collection

A. Sampling of discharges from the CIL stormwater control system shall take place on a semi-annual basis. Stormwater samples shall be tested for those analytes listed in Table 3 on page 12 of this Plan. Stormwater samples shall be bulk samples. Scow float or precipitation actuated auto

samplers shall be placed at the stormwater discharge boxes a maximum of 24 hours prior to an expected meteorological event that will exceed 1" of precipitation over a 24-hour period.

B. Calibration for scow float actuated samplers shall be set so that the auto samplers activate when discharge reaches approximately 50 gpm. Calibration can be to a set point estimated by simulating elevation of discharge over a V-notch or square weir.

C. Activation of a precipitation actuated auto sampler shall be tested for functionality by simulation of a 0.10" precipitation event.

D. The auto samplers shall be programmed to begin collection of a bulk sample at the calibrated actuation point. Bulk samples shall be the quantity necessary to perform testing for the analytes listed below.

E. Bulk samples shall be picked up and transported to an independent contracted laboratory within 18 hours of collection. Upon completion of sample collection, the auto samples shall be cleaned, inspected for damage, repaired as necessary, and placed in storage until the next sampling event. Sampling events shall be at least 60 days apart. No sampling event shall take place until after 72 hours of dry weather has occurred.

X. Sampling Protocols - General

A. All monitoring events shall be overseen by an individual with a minimum of three years field experience in the collection, preparation, and shipping of stormwater samples.

B. A minimum of one pair of Nitrile gloves (two are recommended) are to be used while handling equipment during all phases of the collection, preparation, and shipment of samples. Gloves are changed between sampling locations. (e.g. gloves are changed prior to sample collections and after equipment decontamination.) This insures minimal opportunity for contamination through handling of samples and equipment by operators.

XI. Health and Safety

A. During stormwater and surface water monitoring events at DSWA facilities, field sampling teams are required to follow the OSHA regulations governing personal health and safety. Personal protection shall be maintained at Level D requirements. Hard hats (when overhead danger exists), safety glasses, safety shoes with steel toes, and protective gloves are the only safety equipment required at the present time. However, should samples show any indication of being hazardous, the sampling team would be required to move to more stringent health and safety protocols before going further in the sampling event.

B. Field teams shall carry a basic first aid kit and a cell phone at all times to facilitate communications when needed. Any injuries sustained during sampling activities shall immediately be reported to the facility manager or authorized DSWA representative. An accident/incident report shall be filled out immediately upon reporting an accident or incident at a DSWA facility.

C. Field teams shall sign in at the appropriate location when entering the facility, and sign out immediately prior to leaving the site. At least one member of the sampling team collecting stormwater samples at DSWA facilities must carry the following valid certifications:

1. 40 hour OSHA Emergency Response Program
2. First Aid and CPR.

XII. Sample Collection Methodology – Surface Waters

A. Surface water samples shall be collected using grab methods.

B. Grabs may be collected using direct immersion of the sample bottles, prepackaged disposable ewers or dippers, or reusable ewers or dippers that have undergone decontamination as per Section VI.C. above.

C. Samples will be collected in a manner as to minimize solids and turbidity.

D. Due to the fluidic conditions of the surfacial soils on the bottom of the Christina River, no samples will be collected from SW-5 until tidal conditions allow sample collection from the shore line.

E. Field measurements and observations shall include those listed in Tables 1 and 2 (pages 10 and 11) of this Plan.

XIII. Sample Collection Methodology - Stormwaters

A. When retrieved from the auto sampler, the sampling team shall move the bulk storage sample vessel(s) to a working surface away from any airborne emissions. The field team shall then gently swirl the bulk storage sample vessel (s)containing the stormwater sample and then extract 1 liter into a clean sterile vessel for collection of field measurements. Field measurements and observations shall include those listed in Tables 1 and 2 (pages 10 and 11) of this Plan.

B. These measurements and observations shall be entered into a bound field log along with the time and date of sample collection. This field log book shall be carried by the field team whenever they are on site.

C. Upon completion of field measurements, the sampling team shall separate out the remaining sample into pre-sterilized, pre-labeled bottles. Each bottle shall contain the necessary preservative required for the specified analysis. The field team shall fill in all pertinent information as necessary to fully identify the sample. As a minimum, the label on each bottle shall identify the following:

1. Contracting Lab or Sampling Contractor
2. DSWA
3. Name of Person Collecting the Samples
4. Sample Location
5. Time and Date of Sample Collection
6. The preservatives present in the bottle

After samples have been collected, all pertinent data regarding the samples shall be transcribed onto the proper Chain of Custody. Samples will then be placed in coolers along with ice, dry ice, or cold packs, and chilled to ~4° C for transportation to the laboratory.

D. If samples are to be shipped by a separate shipping company, all coolers shall be sealed with a custody seal to insure tampering has not occurred between the time the samples left the site and the time they are received at the contracted laboratory. Each time the samples change hands, the receiver shall inspect the condition of the shipping containers and sign off on the Chain of Custody to acknowledge receipt of the samples. Any aberrations in the custody seal or shipping container shall be noted on the Chain of Custody by the receiver of the samples.

XIV. Quality Control/Quality Assurance Samples

A. In addition to the stormwater/surface water samples, the field team will prepare two QC/QA samples per monitoring event. These samples will be submitted to the contracted laboratory for the same analysis that is required for the stormwater/surface water samples. The QC/QA samples shall include:

1. Laboratory prepared trip blank/monitoring event. The trip blank will accompany the stormwater/surface water sample bottles from preparation at the laboratory through the sampling process. This sample will be analyzed to evaluate if contamination was introduced during bottle preparation, sample handling or analytical procedures.

2. Equipment blank sample per monitoring event. The equipment blank will be prepared by pumping laboratory supplied deionized water through the same decontaminated sampling apparatus used during the collection of actual stormwater/surface water samples. This sample will be analyzed to evaluate the effectiveness of the decontamination process.

B. QA/QC samples will be analyzed for the same suite of analytes as the surface water and/or stormwater samples.

XV. Additional Samples

During each stormwater monitoring event, the sampling team shall grab one upstream and one downstream sample from the Delaware River. The upstream sample shall be collected at the Northernmost property boundary just below the City of Wilmington wastewater treatment plant outfall. The downstream sample shall be collected at the confluence of the Delaware and Christina Rivers. These samples shall be tested for the same analytes as the stormwater samples.

XVI. Supply Disposal

Non-hazardous expendable supplies and equipment used in the collection of samples can be disposed of at the small load collection station prior to the sampling team leaving the site. Unused or excess sample that has not contacted sample preservatives can be disposed of at the sample location. Disposal of hazardous expendable supplies such as excess preservatives are to be taken back to the laboratory by the sampling team for proper disposal.

XVII. Reporting

Stormwater sample results must be received by DSWA and DSWA's environmental monitoring contractor within 30 days of the completion of the stormwater sampling event. Results of analysis and discussion of the stormwater and surface water monitoring activities shall be included and discussed in the first quarterly groundwater and surface water monitoring report generated following reception of the stormwater monitoring data. The CIL historical surface water monitoring database will be transferred to DNREC by way of electronic media or direct file transfer on a quarterly basis.

As a final note, the environmental monitoring contractor and contracted laboratory providing analysis of samples is/are required to retain all field and laboratory records in hard copy format for a minimum of five years, with magnetic media storage for thirty years.

Figure 1

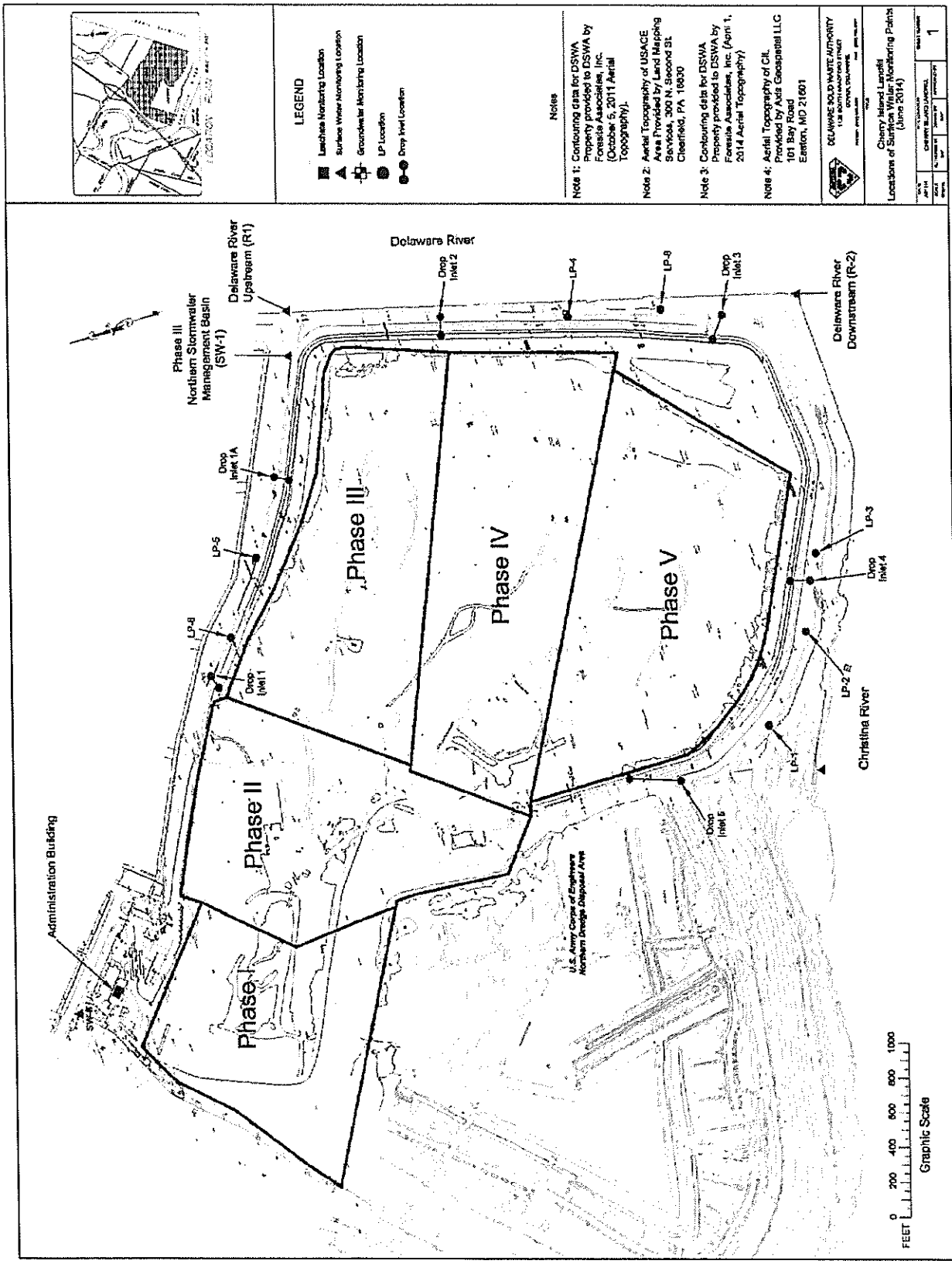

LEGEND
Leachate Monitoring Location
Surface Water Monitoring Location
Groundwater Monitoring Location
LP Location
Drop Inlet Location
Notes
Note 1: Contouring data for DSWA Property provided to DSWA by Forensic Associates, Inc. (October 5, 2011 Aerial Topography).
Note 2: Aerial Topography of USACE Area Provided by Land Mapping Services, 300 N. Second St. Clearfield, PA 16830
Note 3: Contouring data for DSWA Property provided to DSWA by Forensic Associates, Inc. (April 1, 2014 Aerial Topography)
Note 4: Aerial Topography of CIL Provided by Axis Geospatial LLC 101 Bay Road Easton, MD 21601
DELAWARE SOLID WASTE AUTHORITY
Cherry Island Landfill
Locations of Surface Water Monitoring Points
(June 2014)
Delaware River
Delaware River Upstream (R1)
Delaware River Downstream (R-2)
Phase III Northern Stormwater Management Basin (SW-1)
Drop Inlet 1A
Drop Inlet 1
Drop Inlet 2
Drop Inlet 3
Drop Inlet 4
Drop Inlet 5
LP-4
LP-5
LP-6
LP-8
LP-3
LP-2
LP-1
Phase I
Phase II
Phase III
Phase IV
Phase V
Administration Building
SW-1
U.S. Army Corps of Engineers Northern Dredge Disposal Area
Christina River
FEET
0 200 400 600 800 1000
Graphic Scale

Table 1: CIL Monitoring Requirments For Surface Waters Under Permit SW-06/01

June and December

Analyte	Northern Stormweater Management Basin	Delaware River Upstream (Low Tide) See Note 1	Delaware River Downstream (Low Tide) See Note 1	Delaware River Upstream (High Tide) See Note 2	Delaware River Downstream (High Tide) See Note 2	Christina River (SW-5)	12th Street (SW-6)	Phase V Sedimentation Basin (LP-8)
River Elevation/Flow over Wier	X	X	X			X	X	X
Temperature (Field)	X	X	X			X	X	X
pH (Field)	X	X	X			X	X	X
Specific Cond. (Field)	X	X	X			X	X	X
REDOX (Field)	X	X	X			X	X	X
D. O. (Field)	X	X	X			X	X	X
Turbidity	X	X	X			X	X	X
pH (Lab)	X	X	X			X	X	X
Specific Cond. (Lab)	X	X	X			X	X	X
Alkalinity (Total)	X	X	X			X	X	X
Alkalinity (Phenolphth.)	X	X	X			X	X	X
Total Hardness	X	X	X			X	X	X
Ammonia-N	X	X	X			X	X	X
Total Organic-N	X	X	X			X	X	X
Total Kjehdahl-N	X	X	X			X	X	X
B.O.D.	X	X	X			X	X	X
C.O.D.	X	X	X			X	X	X
T.O.C.	X	X	X			X	X	X
Chlorides	X	X	X			X	X	X
Nitrate-N	X	X	X			X	X	X
Orthophosphate	X	X	X			X	X	X
Total Phosphorus	X	X	X			X	X	X
Dissolved Silica	X	X	X			X	X	X
Sulfate	X	X	X			X	X	X
T.D.S.	X	X	X			X	X	X
T.S.S.	X	X	X			X	X	X
Arsenic	X	X	X			X	X	X
Cadmium	X	X	X			X	X	X
Calcium	X	X	X			X	X	X
Chromium	X	X	X			X	X	X
Chromium (Hexovalent)	X	X	X			X	X	X
Copper	X	X	X			X	X	X
Iron	X	X	X			X	X	X
Lead	X	X	X			X	X	X
Magnesium	X	X	X			X	X	X
Manganese	X	X	X			X	X	X
Mercury	X	X	X			X	X	X
Nickel	X	X	X			X	X	X
Potassium	X	X	X			X	X	X
Sodium	X	X	X			X	X	X
Tin	X	X	X			X	X	X
Zinc	X	X	X			X	X	X
Aroclor-1016	X	X	X			X	X	X
Aroclor-1221	X	X	X			X	X	X
Aroclor-1232	X	X	X			X	X	X
Aroclor-1242	X	X	X			X	X	X
Aroclor-1248	X	X	X			X	X	X
Aroclor-1254	X	X	X			X	X	X
Aroclor-1260	X	X	X			X	X	X
Oil and Grease (Hexane Extractable	X	X	X			X	X	X
Oil and Grease (Silica Gel Treated)	X	X	X			X	X	X
BTEX	X	X	X			X	X	X
Diesel Range Organics	X	X	X			X	X	X
alpha Terpineol	X	X	X			X	X	X
Benzoic Acid	X	X	X			X	X	X
m/p Cresol	X	X	X			X	X	X
Total Phenolics	X	X	X			X	X	X

Note 1: Contractor shall use the USGS Staff Gauge on the Delaware & Christina Rivers for this measurement. River samples shall be collected at low tide.

Note 2: Contractor shall use the USGS Staff Gauge on the Delaware & Christina Rivers for this measurement. River samples shall be collected at High tide.

Table 2: CIL Monitoring Requirments For Surface Waters Under Permit SW-06/01 (Continued)
March and September

Analyte	Northern Stormwater Management Basin	Delaware River Upstream (Low Tide) See Note 1	Delaware River Downstream (Low Tide) See Note 1	Delaware River Upstream (High Tide) See Note 2	Delaware River Downstream (High Tide) See Note 2	Christina River (SW-5)	12th Street (SW-6)	Phase V Sedimentation Basin (LP-8)
River Elevation/Flow over Wier	X	X	X	X	X	X	X	X
Temperature (Field)	X	X	X	X	X	X	X	X
pH (Field)	X	X	X	X	X	X	X	X
Specific Cond. (Field)	X	X	X	X	X	X	X	X
REDOX (Field)	X	X	X	X	X	X	X	X
D. O. (Field)	X	X	X	X	X	X	X	X
Turbidity	X	X	X	X	X	X	X	X
pH (Lab)	X	X	X	X	X	X	X	X
Specific Cond. (Lab)	X	X	X	X	X	X	X	X
Alkalinity (Total)	X	X	X	X	X	X	X	X
Alkalinity (Phenolphth.)	X	X	X	X	X	X	X	X
Total Hardness	X	X	X	X	X	X	X	X
Ammonia-N	X	X	X	X	X	X	X	X
Total Organic-N	X	X	X	X	X	X	X	X
Total Kjehdahl-N	X	X	X	X	X	X	X	X
B.O.D.	X	X	X	X	X	X	X	X
C.O.D.	X	X	X	X	X	X	X	X
T.O.C.	X	X	X	X	X	X	X	X
Chlorides	X	X	X	X	X	X	X	X
Nitrate-N	X	X	X	X	X	X	X	X
Orthophosphate	X	X	X	X	X	X	X	X
Total Phosphorus	X	X	X	X	X	X	X	X
Dissolved Silica	X	X	X	X	X	X	X	X
Sulfate	X	X	X	X	X	X	X	X
T.D.S.	X	X	X	X	X	X	X	X
T.S.S.	X	X	X	X	X	X	X	X
Arsenic	X	X	X	X	X	X	X	X
Cadmium	X	X	X	X	X	X	X	X
Calcium	X	X	X	X	X	X	X	X
Chromium	X	X	X	X	X	X	X	X
Chromium (Hexovalent)	X	X	X	X	X	X	X	X
Copper	X	X	X	X	X	X	X	X
Iron	X	X	X	X	X	X	X	X
Lead	X	X	X	X	X	X	X	X
Magnesium	X	X	X	X	X	X	X	X
Manganese	X	X	X	X	X	X	X	X
Mercury	X	X	X	X	X	X	X	X
Nickel	X	X	X	X	X	X	X	X
Potassium	X	X	X	X	X	X	X	X
Sodium	X	X	X	X	X	X	X	X
Tin	X	X	X	X	X	X	X	X
Zinc	X	X	X	X	X	X	X	X
Aroclor-1016	X	X	X	X	X	X	X	X
Aroclor-1221	X	X	X	X	X	X	X	X
Aroclor-1232	X	X	X	X	X	X	X	X
Aroclor-1242	X	X	X	X	X	X	X	X
Aroclor-1248	X	X	X	X	X	X	X	X
Aroclor-1254	X	X	X	X	X	X	X	X
Aroclor-1260	X	X	X	X	X	X	X	X
Oil and Grease (Hexane Extractable)	X	X	X	X	X	X	X	X
Oil and Grease (Silica Gel Treated)	X	X	X	X	X	X	X	X
BTEX	X	X	X	X	X	X	X	X
Diesel Range Organics	X	X	X	X	X	X	X	X
alpha Terpineol	X	X	X	X	X	X	X	X
Benzoic Acid	X	X	X	X	X	X	X	X
m/p Cresol	X	X	X	X	X	X	X	X
Total Phenolics	X	X	X	X	X	X	X	X

Note 1: Contractor shall use the USGS Staff Gauge on the Delaware & Christina Rivers for this measurement. River samples shall be collected at low tide.
Note 2: Contractor shall use the USGS Staff Gauge on the Delaware & Christina Rivers for this measurement. River samples shall be collected at High tide.

Table 3: CIL Monitoring Requirments For Surface Waters and Storm waters Under Permit SW-06/01

Location →	LP-1 Southwest of Phase V (Note 1)	LP-2 South of Phase V (Note 1)	LP-3 South of Phase V (Note 1)	LP-4 East of Phase IV (Note 1)	LP-5 East of Phase V (Note 1)	Drop Inlet 2 East of Phase III (Note 2)	Drop Inlet 3 East of Phase V (Note 2)	Drop Inlet 4 South of Phase V (Note 2)	Drop Inlet 5 West of Phase V (Note 2)	Northern Stormwater Management Basin (SW-1)	Confluence of the USACE Area and Phase V (SW-5)	12th Street behind Gas Plant (SW-6)	Delaware River Upstream (R-1)	Delaware River Downstream (R-2)
	Phase I	Phase I	Phase I	Phase I	Phase I	Phase II	Phase II	Phase II	Phase II	Phase I &II	Phase I &II	Phase I &II	Phase I &II	Phase I &II
Measurement or Analyte	Frequency													
River Elevation/Flow over Wier	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
Temperature (Field)	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
pH (Field)	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
Specific Cond. (Field)	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
REDOX (Field)	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
D. O. (Field)	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
Turbidity	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
Inches Below Wier	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
Color and Clarity of Sample	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
Odor of Sample	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
Condition of Sampling Point	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
Presence/Absence of Debris	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
pH (Lab)	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
Specific Cond. (Lab)	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
Alkalinity (Total)	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
Alkalinity (Phenolphth.)	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
Total Hardness	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
Ammonia-N	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
Total Organic-N	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
Total Kjehdahl-N	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
B.O.D.	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
C.O.D.	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
T.O.C.	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
Chlorides	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
Nitrate-N	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
Orthophosphate	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
Total Phosphorus	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
Dissolved Silica	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
Sulfate	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
T.D.S.	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
T.S.S.	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
Arsenic	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
Cadmium	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
Calcium	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
Chromium	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
Chromium (Hexovalent)	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
Copper	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
Iron	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
Lead	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
Magnesium	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
Manganese	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
Mercury	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
Nickel	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
Potassium	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
Sodium	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
Tin	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
Zinc	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
Aroclor-1016	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
Aroclor-1221	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
Aroclor-1232	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
Aroclor-1242	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
Aroclor-1248	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
Aroclor-1254	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
Aroclor-1260	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
Oil and Grease (Hexane Extractable)	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
Oil and Grease (Silica Gel Treated)	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
BTEX	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
Diesel Range Organics	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
alpha Terpineol	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
Benzoic Acid	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
m/p Cresol	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
Total Phenolics	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA

Note 1: Phase I Monitoring - Locations to be monitored until landfilling reaches the top of the MSE wall. To be abandoned once waste reaches the top of MSE wall.

Note 2:Phase II Monitoring - Locations to be monitored once landfilling reaches the top of the MSE wall.

DSWA Cherry Island Landfill
Stormwater Conveyance and Discharge System Inspection Form

Date: ____________ Time: ___________

Meteorological Data ate the Time of Inspecion

24-Hour Precipitation (Inches): ___________ Duration of Event: ___________ Hours

Temperature (°F): ___________

Relative Humidity (%): ___________ Total Precipitation: __________ Inches

Barometric Pressure (Inches of Hg): ___________

Solar Radiation (Watts/M^2): ___________

Wind Speed (MPH): ___________

Wind Gust (MPH): ___________

Wind Direction (°True): ___________

Location Codes: LP-1, LP-2, LP-3, LP-4, LP-5, LP-6, LP-8, DI-1, DI-1A, DI-2, DI-3, DI-4, DI-5, SW-1

Location: _________

Presence of: Debris/Waste/Sediment? Yes ____ No ____ Obstructions/Blockages? Yes ____ No ____ Damage to Outfall Structure? Yes ____ No ____

Has remediation taken place or have repairs been made? Yes ____ No ____

If "Yes", Explain below what actions have taken place to correct the problem, and when the actions took place.

Action Taken:	
Date of Action	

Location: _________

Presence of: Debris/Waste/Sediment? Yes ____ No ____ Obstructions/Blockages? Yes ____ No ____ Damage to Outfall Structure? Yes ____ No ____

Has remediation taken place or have repairs been made? Yes ____ No ____

If "Yes", Explain below what actions have taken place to correct the problem, and when the actions took place.

Action Taken:	
Date of Action	

Location: _________

Presence of: Debris/Waste/Sediment? Yes ____ No ____ Obstructions/Blockages? Yes ____ No ____ Damage to Outfall Structure? Yes ____ No ____

Has remediation taken place or have repairs been made? Yes ____ No ____

If "Yes", Explain below what actions have taken place to correct the problem, and when the actions took place.

Action Taken:	
Date of Action	

Location: _________

Presence of: Debris/Waste/Sediment? Yes ____ No ____ Obstructions/Blockages? Yes ____ No ____ Damage to Outfall Structure? Yes ____ No ____

Has remediation taken place or have repairs been made? Yes ____ No ____

If "Yes", Explain below what actions have taken place to correct the problem, and when the actions took place.

Action Taken:	
Date of Action	

DSWA Cherry Island Landfill
Stormwater Conveyance and Discharge System Inspection Form

Location Codes: LP-1, LP-2, LP-3, LP-4, LP-5, LP-6, LP-8, DI-1, DI-1A, DI-2, DI-3, DI-4, DI-5, SW-1

Location: _____

Presence of:	Debris/Waste/Sediment?	Obstructions/Blockages?	Damage to Outfall Structure?
	Yes ____ No ____	Yes ____ No ____	Yes ____ No ____

Has remediation taken place or have repairs been made? Yes No

If "Yes", Explain below what actions have taken place to correct the problem, and when the actions took place.

Action Taken:	
Date of Action	

Location: _____

Presence of:	Debris/Waste/Sediment?	Obstructions/Blockages?	Damage to Outfall Structure?
	Yes No	Yes No	Yes No

Has remediation taken place or have repairs been made? Yes No

If "Yes", Explain below what actions have taken place to correct the problem, and when the actions took place.

Action Taken:	
Date of Action	

Location: _____

Presence of:	Debris/Waste/Sediment?	Obstructions/Blockages?	Damage to Outfall Structure?
	Yes ____ No ____	Yes ____ No ____	Yes ____ No ____

Has remediation taken place or have repairs been made? Yes ____ No ____

If "Yes", Explain below what actions have taken place to correct the problem, and when the actions took place.

Action Taken:	
Date of Action	

Location: _____

Presence of:	Debris/Waste/Sediment?	Obstructions/Blockages?	Damage to Outfall Structure?
	Yes ____ No ____	Yes ____ No ____	Yes ____ No ____

Has remediation taken place or have repairs been made? Yes ____ No ____

If "Yes", Explain below what actions have taken place to correct the problem, and when the actions took place.

Action Taken:	
Date of Action	

Inspection Completed By: _____
Signature and Company

I herby certify that all actions listed above have been completed as of: _____.

Authorized DSWA Representative or Facility Manager _____
Signature and Date

MONITORING PROGRAM
FOR THE
NORTHERN SOLID WASTE MANAGEMENT CENTER AT CHERRY ISLAND

Revision 1 – October 10, 2012

Attachment B: Leachate Monitoring Plan for the Cherry Island Landfill

ENVIRONMENTAL MONITORING PROGRAM
FOR THE
NORTHERN SOLID WASTE MANAGEMENT CENTER AT CHERRY ISLAND
(Revision 1 – October 10, 2012)

ATTACHMENT B: Leachate Monitoring Plan for the Cherry Island Landfill

Sampling Protocols for Leachates at the Cherry Island Landfill

(Revision 1 – October 10, 2012)

Background: Permits and Compliance

Monitoring of the Cherry Island Master Pump Station (CI-MPS) falls under two permits, the City of Wilmington's (City) permit W-88-02 (Rev.8) and the Department of Natural Resources and Environmental Control's (DNREC) Permit SW-06/01. Between the two permits, a minimum of 18 monitoring events take place per calendar year. To avoid duplication, DSWA has merged the monitoring requirements for both permits.

The monthly sample collected for both permits is comprised solely of CIL leachate from all pump stations on site, wastewaters from the buildings and liquids from the landfill gas collection system. This is designated as the "Unmixed" sample for reporting purposes.

The remaining six monitoring events take place in January, March, May, July, September and November. Samples collected during these months are comprised of leachate from all pump stations at Cherry Island, as well as wastewater from buildings, liquids from the landfill gas collection system, and leachates from DSWA's Central and Southern Solid Waste Management Centers. For reporting purposes, these are designated as "Mixed" samples.

All data generated from these monitoring events is made available to both DNREC and the City. With the exception of cyanide (which is a grab sample), and VOCs (a composite 4 grabs over an 8-hour period) all samples collected during these monitoring events are 24-hour flow-weighted composite samples collected from the Cherry Island Master Pump Station (CI-MPS).

I. Monitoring Requirements

Leachate samples shall be collected from the Cherry Island Master Pump Station (CI-MPS) as shown in Figure 1 on page 8 of this Plan. All samples shall be collected and analyzed in accordance with the schedules provided in Tables 1, 2, 3 and 4 on pages 12 through 15 of this Plan. In March and September, leachate shall be undergo analysis for "Table 5 - *DNREC's Supplemental Listing for Semi-Annual Analysis of Leachates*" found on page 16 of this Plan. Sample collection, preservation, Chain-of-Custody, labeling, shipment, and equipment decontamination, shall follow the same procedures as outlined in this Plan.

II. Analytical Methodology

All samples shall be analyzed using the methods provided in the following publications:

A. SW-846 (Most Recent Edition) to be used first;
B. 40 CFR-136 (Most Recent Edition) to be used only if methods are not available in A above;
C. Standard Methods (Most Recent Edition) to be used only if methods are not available in A or B above;
D. Other methods as jointly approved by DSWA and DNREC to be used only if methods are not available in A, B, or C above.

III. Leachate System Maintenance and Operation

A. Leachate System Operation

1. DSWA shall monitor all collection systems, wet-wells, pumps, flow meters, controls and recording devices each operating day to insure proper operation. DSWA shall inspect all connections to valves, pipes, and flow meters at riser houses and pump stations for leaks. The results of monitoring and inspections shall be recorded in the facility log.

2. DSWA shall measure and record the quantities of leachate pumped to the City of Wilmington's wastewater treatment plant on a weekly basis. DSWA shall also record the quantity of all leachates being transferred from the CSWMC and SSWMC to CIL for disposal. These records shall include the date of the event, the origin of the leachate, quantity of leachate, and the destination of the leachate.

B. System Maintenance

1. Annually, all accessible primary leachate collection pipes shall be cleaned with a self propelled, high pressure jetting system. DSWA shall identify and assess any blockages or areas that are inaccessible during the annual cleanings.

2. At least once every four years, DSWA shall have all accessible leachate collection systems video inspected to assess their condition. Upon completion, DSWA shall generate a report discussing the condition of the leachate collection pipes including the condition of the pipes, clogging of the pipe perforations, locations and cause of blockages, and any effects the blockages had on operation of the system.

C. Spill Contingency

1. DSWA shall immediately notify DNREC regarding any incident of a leachate release of 10 gallons or more.
2. DSWA shall immediately cleanup any and all areas impacted by the leachate release.
3. Should the spill be of a quantity or in an area that poses a potential release from site, the DSWA shall:

   a. Estimate the quantity of the release;
   b. Provide a map showing the location of the release;
   c. Sample free liquids in the impacted area and the closest surfacewater to the release;
   d. Test the samples for the analytes and measurements listed in Table 6 on Page 14 of this Plan;
   e. Report the results of analysis to the Solid and Hazardous Waste Section of the Department of Natural Resources and Environmental Control within 45 days of the release.

IV. Meteorological Monitoring

DSWA shall maintain a meteorological weather station at CIL. Data from this weather station shall be maintained in an electronic database. Pertinent meteorological data shall accompany leachate sample data upon submission to DNREC.

V. Field Preparation: Mobilization/Demobilization

The following outlines those procedures DSWA requires of its environmental monitoring contractors for preparation for the sampling of leachates from Cherry Island:

A. Standard QA/QC required by the sampling contractor include:

1. External audits through certification programs.

2. External audits through acceptance of blind samples and round robin testing.
3. Internal audits through splitting samples and shipping samples to other local and regional laboratories.
4. Performance audits of all laboratory personnel and stations.

B. Many times, the bottles used by a contractor for sample collection, shipment, and storage are purchased pre-cleaned and (some with preservatives added) by an independent company. However, all sampling and field equipment is usually cleaned and maintained by the contractor. Therefore, as a part of standard quality checks, all bottle shipments should be tested by the contracted monitoring company on a routine basis for contamination. If the sampling company elects to clean their own bottles, quality checks should be standard protocol, and should be run on every lot washed. As a minimum, the following should be done prior to any bottles going into the field:

1. Fresh disposable Nitrile gloves should be worn whenever handling the glassware (prior to and after cleaning).

2. All labels should be affixed to the bottles prior to issuance to field teams.

3. All sample preservatives that can be placed in bottles prior to sample collection should be done so before the bottles are issued to the field teams. Reagents used for preservation should be GCMS grade or better when used for the preservation of samples. The type and amount of preservative should be placed on the label immediately prior to or after addition to the bottle.

4. Specific analytes and sample locations should be placed on the labels in indelible ink prior to the bottles leaving the laboratory. Note that all caps for volatile organic samples should be screwed down tightly prior to labeling to eliminate any airborne volatile contaminants from the label glues or ink from indelible markers, pens, or type.

C. Preparation of field equipment should include cleaning of all manual sampling equipment using the following procedures:

1. A general rinse with water to remove debris and solids.
2. An Alconox or Citrinox wash.
3. Sterile rinses with deionized/distilled water.
4. Acid Wash.
5. Sterile rinses with deionized/distilled water.
6. Hexane Wash.
7. Three (3) sterile rinses with deionized/distilled water.

All reagents used should be GCMS grade or better. The field sampling team is required to carry the necessary chemicals and deionized/distilled water into the field in order to clean any materials that may become contaminated during sampling.

D. All pumps and field meters should be cleaned and calibrated prior to each sampling event using chemicals and standard procedures recommended by the manufacturer. The equipment should undergo the same protocols when it is returned to the lab.

E. Maintenance and parts replacement should be performed as required by the manufacturers suggested schedule.

F. The sampling company is required to retain records of maintenance and calibration certification. These records are periodically checked by the DSWA.

G. All field equipment should be inspected and tested for proper operation prior to being sent into the field.

H. The sampling team is required to carry duplicates of all major pieces of sampling equipment.

VI. Sampling Protocols - General

A. All monitoring events shall be overseen by an individual with a minimum of three years field experience in the collection, preparation, and shipping of environmental samples.

B. A minimum of one pair of fresh Nitrile gloves (two are recommended) are to be used while handling equipment and during all phases of the collection, preparation, and shipment of samples. Gloves are to be changed between samples and sampling locations. (e.g. gloves are changed prior to sample collection, for equipment/rinsate blanks, and after equipment decontamination.) This insures minimal opportunity for contamination through handling of samples and equipment by operators.

VII. Health and Safety

A. During leachate monitoring events at DSWA facilities, field sampling teams are required to follow the OSHA regulations governing personal health and safety. Personal protection shall be maintained at Level D requirements. Hard hats (when overhead danger exists), safety glasses, safety shoes with steel toes, and protective gloves are the only safety equipment required at the present time. However, should samples or the sampling location show any indication of being hazardous, the sampling team will be required to contact DSWA prior to continuing. Under no circumstances will sampling teams undertake normal sampling if hazardous conditions exist at the sampling location.

B. Sampling teams shall carry a basic first aid kit and a cell phone at all times to facilitate communications when needed. Any injuries sustained during sampling activities shall immediately be reported to the facility manager or authorized DSWA representative. An accident/incident report shall be filled out immediately upon reporting an accident or incident at a DSWA facility.

C. At least one member of the sampling team collecting leachate samples at DSWA facilities must carry the following valid certifications:

1. 40 hour OSHA Emergency Response Program
2. First Aid and CPR.

VIII. Sample Collection Methodology – Leachate

The following are step-by-step instructions for collection of 24-hour bulk composite leachate samples from the CIL Main Pump Station sample port using a standard ISCO 3700 bulk composite sampler.

A. General

1. With the exception of cyanide, (which is a grab sample) & VOCs (4 grab samples over an 8-hour period) the field technician will collect a 24-hour composite sample using an ISCO™ 3700 automatic sampler (or equivalent) outfitted with a 2.5 gallon (9.46 L) glass collection vessel. Prior to the initiation of the monitoring event, each auto sampler will be outfitted with fresh, decontaminated sample tubing. During PCB congener monitoring events, all

equipment & collection vessels will be decontaminated & prepped using the procedures outlined by the Delaware River Basin Commission (DRBC) as found on their webpage at DRBC.com.

2. Due to the quantity of leachate required to provide sufficient quantities of leachate for analysis during the semi-annual monitoring events, PCB congener samples will be collected separately from the remaining analytes listed in Permits SW-06/01 and WW-88-02 (Revision 8). PCB congener samples will be collected during the first 24-hour monitoring event using the setup described in I.B. above. Once the samples have been collected and processed as described in Section II below, the glass sample vessel will be replaced by a decontaminated 4-gallon (15,140 mL) polyethylene bulk sample collection vessel, and a second 24-hour sample collection event will be initiated.

3. Each auto sampler will have ice, dry ice, or frozen freezer packs in the bottom of the sampler in an attempt to maintain samples at a temperature of approximately 4°C.

4. Each sample port has been outfitted with two (2) discharge fittings. The primary fitting is "Pass-Thru" fitting to the corporation valve. The secondary fitting jogs off at a 90^0 degree angle and has a barbed end.

B. Sampling Protocols – Day 1

1. Sign in at the front desk and wait until someone is free to escort you to the main pump station.

2. Check the 3-way valve to insure that it is in the proper position. If it is, note it in the field log book. If it is not, contact a DSWA representative to place it in the proper position prior to initiating sampling activities. Note this in the field log book.

3. Install fresh tubing in the ISCO 3700 bulk sampler pump head.

4. Install a decontaminated barbed fitting to the intake of fresh tubing coming from the ISCO 3700 bulk composite sampler.

5. Secure the barbed fitting with a hose clamp.

6. Locate the proper sample port on the leachate discharge line marked "*Line In Use*".

7. Remove the caps to the quick disconnect fitting and "Pass-Thru" fitting.

8. Using a hose clamp, clamp one end of 3-feet of fresh ¼" sample tubing to the barbed fitting on the quick disconnect of the secondary port that jogs off at a 90^0 angle on the port.

9. Using a hose clamp, clamp one end of 3-feet of fresh sample tubing outfitted with a pinch clamp to the decontaminated ¼" stainless steel sample tube.

10. Push the decontaminated stainless steel sample tube into the sample orifice on the sample port, but do not contact the corporation valve.

11. Direct the open ends of both tubes towards the floor drain beside the sample port.

12. Using the valve wrench attached to the sample port, slowly open the corporation valve and slide the sample tube all the way through the opened valve. This should place the receiving end of the sample tube at the center of the pipe.

13. Gently close the corporation valve until it is snug with the stainless steel sample tube. (Make sure that the hose clamps are tight, or the pressure being exerted during a pump cycle could blow the sample out of the fitting).

14. Allow the leachate to flow through the fittings until a minimum of 4 gallons or one full pumping cycle has taken place. This should purge the sample port of unwanted solids that have collected inside. The pumps should cycle a minimum of six times per hour, so it may be necessary to wait a few minutes until a pump cycle begins.

15. Once purging is complete, detach the quick disconnect from the secondary port to stop the flow.

16. Place the fitting on top of the main discharge pipe so that it can be replaced later.

17. Tighten down the pinch clamp to stop the flow through the sample tube coming from the "Pass-Thru" fitting.

18. Connect the sample tube to the barbed fitting on the intake tube coming from the ISCO and secure the connection with a hose clamp.

19. Open up the pinch clamp.

20. Turn on the ISCO 3700 bulk composite sampler and manually cycle leachate through the pump head to insure at all connections are water tight, and good flow has been established.

21. The following settings should be used when reprogramming and configuring ISCO 3700 samplers to collect 24-hour composite samples from the inline sample ports. This programming guide has been field tested using an ISCO 3700 outfitted with a glass 2.5-gallon bulk collection vessel multiple times prior to issuance of this document. No changes to the factory pump calibration have been made prior to determining the appropriate sample volumes. The reprogramming is necessary given the positive line pressures exerted on the ISCO 3700 sampler from the leachate discharge lines. The pressure is not excessive (~15 PSI); however care should be taken to ensure that the leachate sample tubing is securely fastened to the sampler, stainless steel sample tube, and sample port with hose clamps, and that a maximum length of three (3) feet of tubing is used to make the connection between the sample port and the auto-sampler:

ISCO 3700 Setup	Menu Item	2.5 or 4 Gallon Bulk Composite
Program Menu	Program Time	1 hr 0 min
	Multiplex	No
	Sample Volume	275 ml/hour 275 ml/hour **(500 mL/hour for a 4 Gallon Sample)**
	Suction Head	1' (minimum setting)
Configuration Menu	Bottles and Sizes (Portable or Refrigerated)	1 or 1
	-Bottle Volume	9500 mL or 15,140 mL
	Suction Line	3/8 Vinyl or Teflon
	-Suction Line Length	3' (optimal setting)
	Liquid Detector	Disabled
	-Rinse Cycles	0
	-Enter Head Manually	No
	-Number of Retries	3 Times (Maximum)
	Programing Mode	Basic
	Calibrate Sampler	Disable
	Start Time Delay	0 min
	Purge Counts	0 Pre/Post-Sample
	Program Lock	Disable

22. On the control panel keypad, press the "START SAMPLING" button to start the sampling program. The program will run for 24 hours. At a setting of 275 mL, the auto-sampler should collect a 400 mL sample every hour until the bulk sample collection vessel has been filled with a sample.

23. Write down the time, date, and flow from the totalizer on the flow meter in the field log book.

24. Return to the front desk in the CIL Administration Building and sign out.

C. Sampling Protocols – Day 2

1. Sign in at the front desk and wait to be escorted back to the Main Pump Station.

2. Once in the pump station, write down the flow from the totalizer on the flow meter in the field log book.

3. Check the ISCO 3700 bulk sampler to confirm that enough sample has been collected for the complete set of laboratory prepared bottles. (If enough sample has not been collected or there has been a malfunction, contact DSWA and begin the procedures outlined in "B. Sampling Protocols – Day 1".

4. If the required amount of sample has been collected, turn off the ISCO 3700 bulk sampler.

5. Gently withdraw the stainless steel sample tube until it has cleared the corporation valve.

6. Close the corporation valve using the valve wrench attached to the sample port.

7. Withdraw the stainless steel sample tube from the "Pass-Thru" sample fitting.

8. Loosen the hose clamp on the tubing from the ISCO 3700 bulk composite sampler and remove the tubing and fittings (barbed fittings, hose clamps, pinch clamp).

9. Place the stainless steel sample tube and fittings in a 1-gallon plastic bag and set aside (these will be taken back to the contractor's for decontamination and re-use).

10. Replace the cap to the "Pass-Thru" sample fitting.

11. Replace the quick disconnect fitting on the secondary fitting.

12. Remove the 2.5 or 4 gallon sample vessel from the ISCO 3700 bulk composite sampler and gently agitate for 30 seconds.

13. Take an aliquot of the 24-hour composite sample to be used for field measurements in a separate, decontaminated vessel. (The size of the aliquot is dependent on the type of instruments being used to take field measurements.) All instruments used to take field measurements shall undergo decontamination prior to use. If the samples are to be used for PCB congener analysis, the decontamination procedures required by the DRBC and found on their website, DRBC.com will be used.

14. As a minimum, the field technician will record the following on field data sheets:

    a. Contracting lab or sampling contractor
    b. Name of person collecting the samples
    c. Sample location
    d. Time & date of sample collection
    e. Temperature
    f. pH
    g. Specific Conductance
    h. Redox
    i. Odor
    j. Color
    k. Clarity

15. Take field measurements for a minimum of five (5) minutes. Field measurements will be considered representative after measurements have stabilized within +/- 5%.

16. Once the field measurements have been completed & entered onto the field data sheets, dispose of the aliquot used for field measurements by pouring it into the floor drain beside the sample ports.

17. Once the field measurements have been completed, separate out the composited sample into pre-sterilized, pre-labeled bottles. Each bottle will contain the necessary preservative required for the specified analysis.

18. Fill in all pertinent information as necessary to fully identify the sample. As a minimum, the label on each bottle shall identify the following:

    a. Contracting Lab or Sampling Contractor
    b. DSWA – CIL Mixed or Unmixed
    c. Name of Person Collecting the Samples
    d. Sample Location
    e. Time & Date of Sample Collection
    f. The preservatives present in the bottle

19. After all the samples have been collected, transcribe all pertinent data regarding the samples onto the proper Chain of Custody.

20. Place samples in coolers along with ice, dry ice, or cold packs, & chilled to ~4°C for transportation to the laboratory.

21. If the samples are to be shipped by a separate shipping company, all coolers shall be sealed with a custody seal to ensure tampering has not occurred between the time the samples left the site and the time they are received at the contracted laboratory. Each time the samples change hands, the receiver shall inspect the condition of the shipping containers and sign off on the Chain of Custody to acknowledge receipt of the samples. Any aberrations in the custody seal or shipping container shall be noted on the Chain of Custody by the receiver of the samples.

22. Prepare two QC/QA samples. These samples will be submitted to the contracted laboratory for the same analysis that is required for the leachate samples. The QC/QA samples shall include:

    a. Laboratory prepared trip blank per monitoring event. The trip blank will accompany the leachate sample bottles from preparation at the laboratory through the sampling process. This sample will be analyzed to evaluate if contamination was introduced during bottle preparation, sample handling, or analytical procedures.

    b. Equipment/Rinsate blank sample per monitoring event. The equipment blank will be prepared by pumping laboratory supplied deionized or deionized distilled water through the same decontaminated sampling apparatus used during the collection of actual leachate samples. This sample will be analyzed to evaluate the effectiveness of the decontamination process.

QA/QC samples will be analyzed for the same suite of analytes as the leachate samples.

23. Once sampling is complete, inform the receptionist and sign out.

IX. Supply Disposal

It is the responsibility of the contractor to dispose of all expendable supplies and equipment used in the collection of samples can be disposed of at the small load collection station prior to the sampling team leaving the site. Unused or excess sample that has not contacted sample preservatives can be disposed of at the sample location. Disposal of hazardous expendable supplies such as excess preservatives are to be taken back to the laboratory by the sampling team for proper disposal.

X. Reporting

Results of analysis and discussion of the leachate monitoring activities shall be included and discussed in the first quarterly leachate monitoring report generated following reception of the leachate monitoring data. The CIL historical leachate monitoring database will be transferred to DNREC by way of electronic media or direct file transfer on a quarterly basis.

As a final note, the environmental monitoring contractor and contracted laboratory providing analysis of samples is/are required to retain all field and laboratory records in hard copy format for a minimum of five years, with magnetic media storage for thirty years.

Figure 1

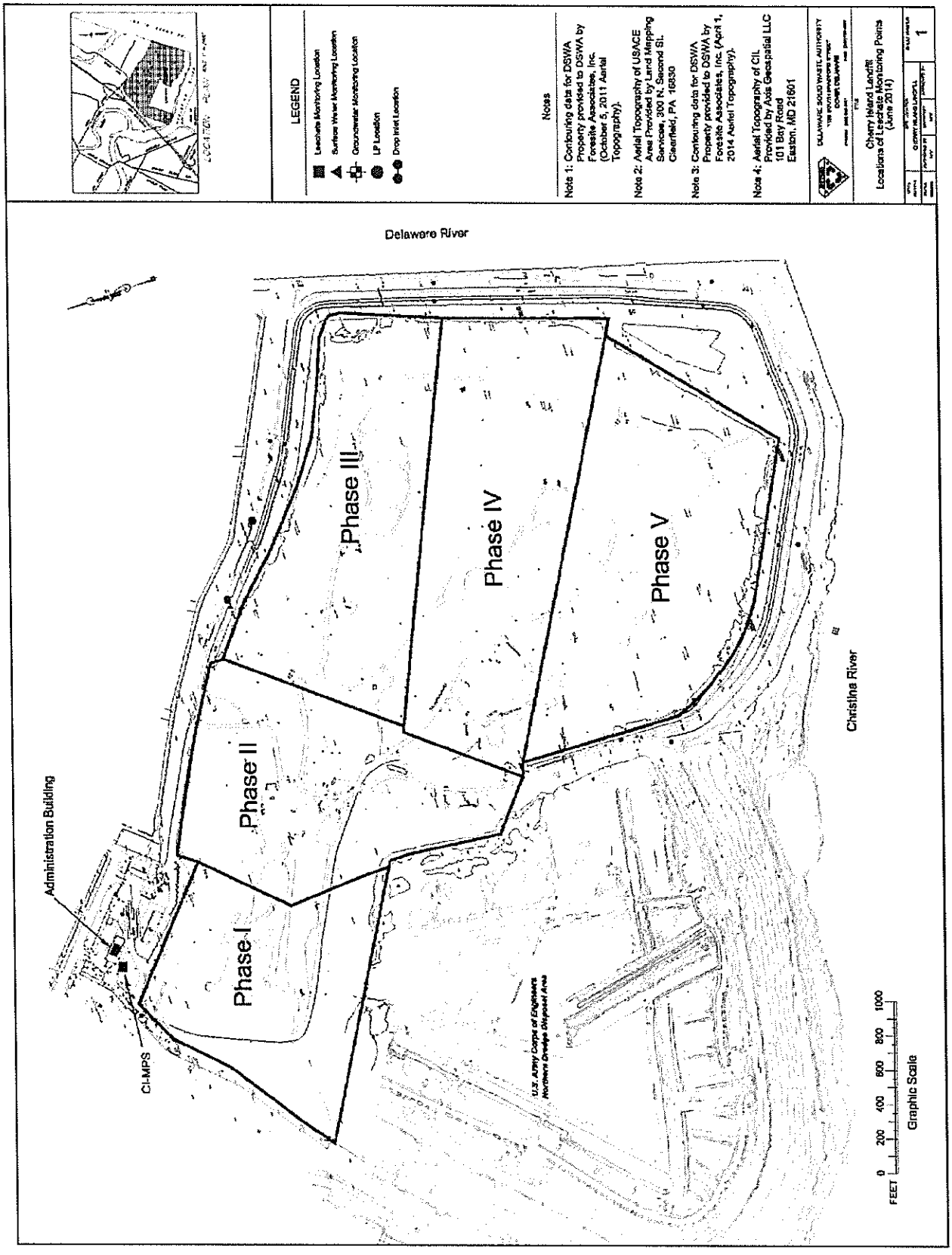

LEGEND
Leachate Monitoring Location
Surface Water Monitoring Location
Groundwater Monitoring Location
LF Location
Drop Inlet Location
Notes
Note 1: Contouring data for DSWA Property provided to DSWA by Foresite Associates, Inc. (October 5, 2011 Aerial Topography).
Note 2: Aerial Topography of USACE Area Provided by Land Mapping Services, 300 N. Second St. Clearfield, PA 16830
Note 3: Contouring data for DSWA Property provided to DSWA by Foresite Associates, Inc. (April 1, 2014 Aerial Topography).
Note 4: Aerial Topography of CIL Provided by Axis Geospatial LLC 101 Bay Road Easton, MD 21601
DELAWARE SOLID WASTE AUTHORITY
Cherry Island Landfill
Locations of Leachate Monitoring Points (June 2014)
Delaware River
Phase I
Phase II
Phase III
Phase IV
Phase V
Administration Building
CI-MPS
U.S. Army Corps of Engineers Northern Dredge Disposal Area
Christina River
0 200 400 600 800 1000
FEET
Graphic Scale

Table 1

CIL Monitoring Requirments for Leachates Under Permits SW-06/01, W-88-02 (Rev 8) & DSWA

January, May, July and November

Measurement/Analyte	Location I.D. Units	CI-MPS Mixed w/ CSWMC & SSWMC (24 Hr. Comp.)	CI-MPS Unmixed (24 Hr. Comp.)
Temperature (Field)	(Centigrade)	X	X
pH (Field)	(SU)	X	X
Specific Cond. (Field)	(umhos/cm)	X	X
REDOX (Field)	(mV)	X	X
pH (Lab)	(SU)	X	X
Specific Cond. (Lab)	(umhos/cm)	X	X
Alkalinity (Total)	(mg/L)		X
Alkalinity (Phenolphth.)	(mg/L)		X
BOD-5	(mg/L)	X	X
Chloride	(mg/L)		X
C.O.D.	(mg/L)		X
Cyanide	(mg/L)	X	X
Nitrogen (Ammonia)	(mg/L)	X	X
Nitrogen (Nitrate)	(mg/L)		X
Nitrogen (Organic)	(mg/L)		X
Nitrogen (Kjeldahl)	(mg/L)		X
Phenols (Total)	(mg/L)	X	X
Phosphate (Ortho)	(mg/L)		
Phosphorus (Poly Hydro)	(mg/L)		
Phosphorus (Soluble)	(mg/L)		
Phosphorus (Total)	(mg/L)		
Silica (Dissolved)	(mg/L)		X
Sulfate	(mg/L)		X
Sulfide	(mg/L)		
Total Organic Carbon	(mg/L)		X
Total Dissolved Solids	(mg/L)		X
Total Suspended Solids	(mg/L)	X	X
Acetic Acid	(mg/L)		
Propionic Acid	(mg/L)		
Isobutyric Acid	(mg/L)		
Butyric Acid	(mg/L)		
Isovaleric Acid	(mg/L)		
Valeric Acid	(mg/L)		
Fluoride	(mg/L)		
Aluminum	(mg/L)		
Arsenic	(mg/L)	X	X
Boron	(mg/L)		
Calcium	(mg/L)		X
Chromium	(mg/L)	X	X
Copper	(mg/L)	X	X
Iron	(mg/L)		X
Lead	(mg/L)	X	X
Lithiun	(mg/L)		
Magnesium	(mg/L)		X
Manganese	(mg/L)		X
Nickel	(mg/L)	X	X
Potassium	(mg/L)		X
Sodium	(mg/L)		X
Zinc	(mg/L)	X	X
DNREC Supplimental Analysis for Leachates/TTO Do Not Duplicate Metals Listed Above	Anayte Dependent		
209 PCB Congeners	ng/L		
Perimeter Cell Seep Inspecion	None		X

Table 2

CIL Monitoring Requirments for Leachates Under Permits SW-06/01, W-88-02 (Rev 8) & DSWA

February, April, August, October

Measurement/Analyte	Location I.D. Units	CI-MPS Mixed w/ CSWMC & SSWMC (24 Hr. Comp.)	CI-MPS Unmixed (24 Hr. Comp.)
Temperature (Field)	(Centigrade)		X
pH (Field)	(SU)		X
Specific Cond. (Field)	(umhos/cm)		X
REDOX (Field)	(mV)		X
pH (Lab)	(SU)		X
Specific Cond. (Lab)	(umhos/cm)		X
Alkalinity (Total)	(mg/L)		X
Alkalinity (Phenolphth.)	(mg/L)		X
BOD-5	(mg/L)		X
Chloride	(mg/L)		X
C.O.D.	(mg/L)		X
Cyanide	(mg/L)		X
Nitrogen (Ammonia)	(mg/L)		X
Nitrogen (Nitrate)	(mg/L)		X
Nitrogen (Organic)	(mg/L)		X
Nitrogen (Kjeldahl)	(mg/L)		X
Phenols (Total)	(mg/L)		X
Phosphate (Ortho)	(mg/L)		
Phosphorus (Poly Hydro)	(mg/L)		
Phosphorus (Soluble)	(mg/L)		
Phosphorus (Total)	(mg/L)		
Silica (Dissolved)	(mg/L)		X
Sulfate	(mg/L)		X
Sulfide	(mg/L)		
Sulfide	(mg/L)		X
Total Organic Carbon	(mg/L)		X
Total Dissolved Solids	(mg/L)		X
Total Suspended Solids	(mg/L)		X
Acetic Acid	(mg/L)		
Propionic Acid	(mg/L)		
Isobutyric Acid	(mg/L)		
Butyric Acid	(mg/L)		
Isovaleric Acid	(mg/L)		
Valeric Acid	(mg/L)		
Fluoride	(mg/L)		
Aluminum	(mg/L)		
Arsenic	(mg/L)		X
Boron	(mg/L)		
Calcium	(mg/L)		X
Chromium	(mg/L)		X
Copper	(mg/L)		X
Iron	(mg/L)		X
Lead	(mg/L)		X
Lithiun	(mg/L)		
Magnesium	(mg/L)		X
Manganese	(mg/L)		X
Nickel	(mg/L)		X
Potassium	(mg/L)		X
Sodium	(mg/L)		X
Zinc	(mg/L)		X
DNREC Supplimental Analysis for Leachates/TTO Do Not Duplicate Metals Listed Above	Anayte Dependent		
209 PCB Congeners	ng/L		
Perimeter Cell Seep Inspecion	None		X

Table 3

CIL Monitoring Requirments for Leachates Under Permits SW-06/01, W-88-02 (Rev 8) & DSWA

June and December

Measurement/Analyte	Location I.D. Units	CI-MPS Mixed w/ CSWMC & SSWMC (24 Hr. Comp.)	CI-MPS Unmixed (24 Hr. Comp.)
Temperature (Field)	(Centigrade)		X
pH (Field)	(SU)		X
Specific Cond. (Field)	(umhos/cm)		X
REDOX (Field)	(mV)		X
pH (Lab)	(SU)		X
Specific Cond. (Lab)	(umhos/cm)		X
Alkalinity (Total)	(mg/L)		X
Alkalinity (Phenolphth.)	(mg/L)		X
BOD-5	(mg/L)		X
Chloride	(mg/L)		X
C.O.D.	(mg/L)		X
Cyanide	(mg/L)		X
Nitrogen (Ammonia)	(mg/L)		X
Nitrogen (Nitrate)	(mg/L)		X
Nitrogen (Organic)	(mg/L)		X
Nitrogen (Kjeldahl)	(mg/L)		X
Phenols (Total)	(mg/L)		X
Phosphate (Ortho)	(mg/L)		X
Phosphorus (Poly Hydro)	(mg/L)		X
Phosphorus (Soluble)	(mg/L)		X
Phosphorus (Total)	(mg/L)		X
Silica (Dissolved)	(mg/L)		X
Sulfate	(mg/L)		X
Sulfide	(mg/L)		X
Total Organic Carbon	(mg/L)		X
Total Dissolved Solids	(mg/L)		X
Total Suspended Solids	(mg/L)		X
Acetic Acid	(mg/L)		X
Propionic Acid	(mg/L)		X
Isobutyric Acid	(mg/L)		X
Butyric Acid	(mg/L)		X
Isovaleric Acid	(mg/L)		X
Valeric Acid	(mg/L)		X
Fluoride	(mg/L)		
Aluminum	(mg/L)		
Arsenic	(mg/L)		X
Boron	(mg/L)		
Calcium	(mg/L)		X
Chromium	(mg/L)		X
Copper	(mg/L)		X
Iron	(mg/L)		X
Lead	(mg/L)		X
Lithiun	(mg/L)		
Magnesium	(mg/L)		X
Manganese	(mg/L)		X
Nickel	(mg/L)		X
Potassium	(mg/L)		X
Sodium	(mg/L)		X
Zinc	(mg/L)		X
DNREC Supplimental Analysis for Leachates/TTO Do Not Duplicate Metals Listed Above	Anayte Dependent		
209 PCB Congeners	ng/L		
Perimeter Cell Seep Inspecion	None		X

Table 4

CIL Monitoring Requirments for Leachates Under Permits SW-06/01, W-88-02 (Rev 8) & DSWA

March and September

Measurement/Analyte	Location I.D. Units	CI-MPS Mixed w/ CSWMC & SSWMC (24 Hr. Comp.)	CI-MPS Unmixed (24 Hr. Comp.)
Temperature (Field)	(Centigrade)	X	X
pH (Field)	(SU)	X	X
Specific Cond. (Field)	(umhos/cm)	X	X
REDOX (Field)	(mV)	X	X
pH (Lab)	(SU)	X	X
Specific Cond. (Lab)	(umhos/cm)	X	X
Alkalinity (Total)	(mg/L)		X
Alkalinity (Phenolphth.)	(mg/L)		X
BOD-5	(mg/L)	X	X
Chloride	(mg/L)		X
C.O.D.	(mg/L)		X
Cyanide	(mg/L)	X	X
Nitrogen (Ammonia)	(mg/L)	X	X
Nitrogen (Nitrate)	(mg/L)		X
Nitrogen (Organic)	(mg/L)		X
Nitrogen (Kjeldahl)	(mg/L)		X
Phenols (Total)	(mg/L)	X	X
Phosphate (Ortho)	(mg/L)		X
Phosphorus (Poly Hydro)	(mg/L)		X
Phosphorus (Soluble)	(mg/L)		X
Phosphorus (Total)	(mg/L)		X
Silica (Dissolved)	(mg/L)		X
Sulfate	(mg/L)		X
Sulfide	(mg/L)		X
Total Organic Carbon	(mg/L)		X
Total Dissolved Solids	(mg/L)		X
Total Suspended Solids	(mg/L)	X	X
Acetic Acid	(mg/L)		X
Propionic Acid	(mg/L)		X
Isobutyric Acid	(mg/L)		X
Butyric Acid	(mg/L)		X
Isovaleric Acid	(mg/L)		X
Valeric Acid	(mg/L)		X
Fluoride	(mg/L)		X
Aluminum	(mg/L)		X
Arsenic	(mg/L)	X	X
Boron	(mg/L)		X
Calcium	(mg/L)		X
Chromium	(mg/L)	X	X
Copper	(mg/L)	X	X
Iron	(mg/L)		X
Lead	(mg/L)	X	X
Lithiun	(mg/L)		X
Magnesium	(mg/L)		X
Manganese	(mg/L)		X
Nickel	(mg/L)	X	X
Potassium	(mg/L)		X
Sodium	(mg/L)		X
Zinc	(mg/L)	X	X
DNREC Supplimental Analysis for Leachates/TTO Do Not Duplicate Metals Listed Above	Anayte Dependent	X	X
209 PCB Congeners	ng/L		X
Perimeter Cell Seep Inspecion	None		X

Table 5: DNREC Supplemental Listing for Semi Annual Analysis of Leachates **Modified June 2011**

VOLATILE ORGANICS	DIOXIN SCREEN		WET CHEMISRTY
1) Acetone	55) 2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)		157) Cyanide (Total)
2) Acrolein	SEMIVOLATILES		158) Sulfides
3) Acrylonitrile	56) Acenaphthene	108) Nitrobenzene	METALS
4) Benzene	57) Acenaphthylene	109) 2-Nitrophenol	159) Antimony
5) Bromochloromethane	58) Acetophenone	110) 4-Nitrophenol	160) Arsenic
6) Dichlorobromomethane (Bromodichloromethane)	59) Anthracene	111) N-Nitrosodimethylamine	161) Barium
7) Bromoform	60) Benzidine	112) N-Nitrosodi-n-propylamine	162) Beryllium
8) Bromomethane	61) Benzo (a) anthracene	113) N-Nitrosodiphenylamine	163) Cadmium
9) 2-Butanone	62) Benzo (a) pyrene	114) Pentachlorophenol	164) Chromium (Total)
10) Carbon disulfide	63) Benzo (b) fluoranthene	115) Phenanthrene	165) Cobalt
11) Carbon tetrachloride	64) Benzo (g,h,i) perylene	116) Phenol	166) Copper
12) Chlorobenzene	65) Benzo (k) fluoranthene	117) Phenols (Total)	167) Lead, Total
13) Dibromochloromethane (Chlorodibromomethane)	66) Benzyl Alcohol	118) Pyrene	168) Magnesium
14) Chloroethane	67) 4-Bromophenyl phenyl ether	119) Pyridine	169) Mercury
15) 2-Chloroethyl vinyl ether	68) Butylbenzyl Phthalate	120) 1,2,4-Trichlorobenzene	170) Molybdenum
16) Chloroform	69) 4-Chloro-3-methylphenol	121) 2,4,5 Trichlorophenol	171) Nickel
17) Methyl chloride (Chloromethane)	70) Bis (2-chloroethoxy) methane	122) 2,4,6-Trichlorophenol (2,4,6 T)	172) Selenium
18) 1,2-Dibromo-3-chloropropane	71) Bis (2-chloroethyl) ether	PCBs	173) Silver
19) 1,2-Dibromoethane	72) Bis (2-chloroisopropyl) ether	123) PCB-1016	174) Thallium
20) Methylene bromide (Dibromomethane)	73) 2-Chloronaphthalene	124) PCB-1221	175) Tin
21) trans-1,4-Dichloro-2-butene	74) 2-Chlorophenol	125) PCB-1232	176) Vanadium
22) 1,1-Dichloroethane	75) 4-Chlorophenyl Phenyl Ether	126) PCB-1242	177) Zinc
23) 1,2-Dichloroethane	76) Chrysene	127) PCB-1248	
24) 1,1-Dichloroethene	77) 3/4 Methylphenol (m/p-Cresol)	128) PCB-1254	
25) 1,2-Dichloroethene	78) 2-Methylphenol (o-Cresol)	129) PCB-1260	
26) cis-1,2-Dichloroethene	79) Di-n-Butylphthalate	130) Total Polychlorinated Biphenyl	
27) trans-1,2-Dichloroethene	80) Di-n-octyl Phthalate	PESTICIDES	
28) 1,3-Dichloropropane	81) Dibenz (a,h) anthracene	131) Aldrin	
29) 1,2-Dichloropropane	82) 1,2-Dichlorobenzene (ortho)	132) alpha-BHC	
30) cis-1,3-Dichloropropene	83) 1,3-Dichlorobenzene (meta)	133) beta-BHC	
31) trans-1,3-Dichloropropene	84) 1,4-Dichlorobenzene (para)	134) delta BHC	
32) 1,3-Dichloropropene (Total)	85) 3,3'-Dichlorobenzidene	135) gamma BHC (Lindane)	
33) Diethyl Ether	86) 2,4-Dichlorophenol	136) alpha-Chlordane	
34) Ethylbenzene	87) Diethylphthalate	137) gamma-Chlordane	
35) 2-Hexanone (Methyl butyl ketone)	88) Dimethoate	138) p,p'-DDD	
36) Methyl Iodide (Iodomethane)	89) 2,4-Dimethylphenol	139) 4,4'-DDE	
37) 4-methyl-2-pentanone	90) Dimethylphthalate	140) 4,4'-DDT	
38) Methylene chloride (Dichloromethane)	91) 2,4-Dinitrophenol	141) Dieldrin	
39) Styrene	92) 2,4-Dinitrotoluene	142) alpha Endosulfan	
40) 1,1,1,2-Tetrachloroethane	93) 2,6-Dinitrotoluene	143) beta Endosulfan	
41) 1,1,2,2-Tetrachloroethane	94) 1,2-Diphenylhydrazine	144) Endosulfan Sulfate	
42) Tetrachloroethene	95) Bis(2-ethylhexyl)phthalate	145) Endrin	
43) Tetrahydrofuran	96) Fluoranthene	146) Endrin Aldehyde	
44) Toluene	97) Fluorene	147) Endrin Ketone	
45) Tot. Xylenes	98) Hexachlorobenzene	148) Heptachlor	
46) 1,1,1-Trichloroethane	99) Hexachlorobutadiene	149) Heptachlor epoxide	
47) 1,1,2-Trichloroethane	100) Hexachlorocyclopentadiene	150) Methoxychlor	
48) Trichloroethene	101) Hexachloroethane	151) Toxaphene	
49) Trichlorofluoromethane	102) Ideno (1,2,3-cd) pyrene	HERBICIDES	
50) 1,2,3-Trichloropropane	103) Isophorone	152) 2,4-D	
51) Vinyl Acetate	104) 2-Methyl-4,6-Dinitrophenol	153) Dicamba	
52) Vinyl chloride	105) 2-Methylnaphthalene	154) Dichloroprop	
53) o-xylene	106) 2-Naphthylamine	155) 2,4,5-T	
54) mp-xylene	107) Naphthalene	156) 2,4,5-TP (Silvex)	

Table 6

Analysis For Spills

Temperature (Field)
pH (Field)
Specific Cond. (Field)
REDOX (Field)
D. O. (Field)
Turbidity
pH (Lab)
Specific Cond. (Lab)
Alkalinity (Total)
Alkalinity (Phenolphthalien)
Total Hardness
Ammonia-N
Total Organic-N
Total Kjehdahl-N
B.O.D.
C.O.D.
T.O.C.
Chlorides
Nitrate-N
Orthophosphate
Total Phosphorus
Dissolved Silica
Sulfate
T.D.S.
T.S.S.
Arsenic
Cadmium
Calcium
Chromium
Chromium (Hexovalent)
Copper
Iron
Lead
Magnesium
Manganese
Mercury
Nickel
Potassium
Sodium
Tin
Zinc
Aroclor-1016
Aroclor-1221
Aroclor-1232
Aroclor-1242
Aroclor-1248
Aroclor-1254
Aroclor-1260
Oil and Grease (Hexane Extractable)
Oil and Grease (Silica Gel Treated)
BTEX
Diesel Range Organics
alpha Terpineol
Benzoic Acid
m/p Cresol
Total Phenolics

MONITORING PROGRAM
FOR THE
NORTHERN SOLID WASTE MANAGEMENT CENTER AT CHERRY ISLAND

Revision 1 – October 10, 2012

Attachment C: Groundwater Monitoring Plan for the Cherry Island Landfill

ENVIRONMENTAL MONITORING PROGRAM
FOR THE
NORTHERN SOLID WASTE MANAGEMENT CENTER AT CHERRY ISLAND

(Revision 1 – October 10, 2012)

ATTACHMENT C: Groundwater Monitoring Plan for the Cherry Island Landfill

Background: Implementation of Slow Purge Method

In October of 1991, the United States Environmental Protection Agency (USEPA) promulgated new regulations under RCRA called the "Solid Waste Disposal Facility Criteria - 40 CFR-258". These regulations present the minimum criteria that owners and operators of municipal solid waste landfill units must meet for protection of the surrounding environment. Some of the criteria covered in this document includes:

1. Design
2. Operation
3. Closure
4. Post closure care
5. Monitoring
6. Record keeping
7. Financial Assurance

Although this document explains what criteria owners and operators have to meet to be in compliance with these regulations, the document does not present details concerning the selection and implementation of methodologies to meet compliance.

In 1992, a draft of the "Technical Manual for Solid Waste Disposal Facility Criteria - 40 CFR-258" was released to the State Governments for comment. This DRAFT technical manual discusses methods for selection of sites, materials, testing requirements, acceptance testing, sampling protocols, and monitoring requirements.

Review of this DRAFT technical manual, by the Delaware Department of Natural Resources and Environmental Control (DNREC) and the Delaware Solid Waste Authority (DSWA), raised questions concerning the benefits of implementing certain sampling protocols put forth within the document. Both Agencies felt that upgrading the current groundwater monitoring systems with dedicated equipment necessary to comply with these protocols would:

1. Add excessive and unnecessary costs to the current Environmental Monitoring Program.
2. Increase the time necessary for sample collection.
3. Not yield fully representative samples.

Due to the presence of fine sands, silts, and clays in the aquifers being monitored at all Delaware Solid Waste Authority solid waste management centers, DSWA has Implemented a "Common Sense" approach for the collection and preparation of groundwater samples for analysis. Using guidance provided by DNREC, in 1993, DSWA began using slow-purge or micro-purge techniques to collect groundwater samples. These techniques or sampling protocols were implemented to accomplish the following:

1. Reduce the heavy pieces of field equipment, purge pumps, steam cleaners, and generators needed to purge wells and decontaminate equipment;
2. Reduce the number of wells being sampled;
3. Eliminate hand bailing;
4. Significantly reduce time spent purging wells;
5. Reduce or eliminate field filtering as required by 40 CFR-258;

Both the DNREC and the DSWA understand that these methods may vary significantly from many of the currently accepted methods. However, the hydrogeologic conditions that exist on the Delmarva Peninsula (and many other locations where the primary aquifers were formed by weathering and tidal deposition) make certain requirements of 40 CFR-258 difficult to meet without modification.

I. Monitoring

Groundwater samples shall be collected from the groundwater monitoring locations shown in Figure 1 on page 11 of this plan. These samples shall be analyzed in accordance with the schedules provided in Table 1 on page 14 of this plan. Sample collection, preservation, Chain-of-Custody, labeling, shipment, and equipment decontamination, shall follow the same procedures as outlined in this Plan.

II. Analytical Methodology

All samples shall be collected and analyzed using the methods provided in the following publications:

1. SW-846 (Most Recent Edition) to be used first;
2. 40 CFR-136 (Most Recent Edition) to be used only if methods are not available in A above;
3. Standard Methods (Most Recent Edition) to be used only if methods are not available in A or B above;
4. Other methods as jointly approved by DSWA and DNREC to be used only if methods are not available in A, B, or C above.

III. Well Head Protection/Security

Well heads at all DSWA facilities meet or exceed the standards set forth in *DNREC's Delaware Regulations Governing the Construction and Use of Wells*. All monitoring wells are constructed of PVC or stainless steel with protective outer steel casings and locking caps. Additionally, most DSWA wells have additional outer protective casings made of concrete or steel, or concrete pads enclosed by bollards as shown in Figure 2 on Page 12 of this Plan. All protective steel casings have been outfitted with a locking cap, are kept locked using tamper resistant, hardened steel or brass locks. All locks at the major landfill facilities are keyed alike.

IV. Well Construction

All DSWA wells have been constructed and installed in a manner consistent with the existing specifications required by DNREC at the time of construction.

V. Well Locations

The inner well casings of all GMW's being monitored at DSWA facilities have been surveyed by a land surveyor licensed in the State of Delaware. All groundwater monitoring wells have been tied in to the National Geodetic Vertical Datum and Delaware State Coordinate plane using standard land surveying practices. At the time of this plan the coordinate systems being used are the 1927 Delaware State Plane coordinate system and 1929 National Geodetic Vertical Datum.

VI. Well Modifications for Current Sampling Protocols

A. No modifications have been made to groundwater monitoring wells with average DTWs greater than 25 feet.

B. All wells with an average DTW of 25 feet or less have been modified through the installation of a 3/16" Teflon™ tube extending the entire length of the casing and screen. The tube is plugged at the lower end to prevent uptake of solids during sampling, and is solid except for a liberally perforated 2-3 foot section located at mid screen of the well casing. The tube is secured to the outer steel casing by way of nylon cord and straps as shown in Figure 3 on Page 13 of this Plan.

VII. Sample Collection Procedures

The following presents the methods by which DSWA collects or has it's Environmental monitoring contractors collect groundwater samples from DSWA solid waste management centers. It is believed that these methods allow for uniform sampling of the aquifers without drawing in fine sediments from the surrounding aquifer, or disturbing sediments present in the well casings.

A. Field Preparation: Mobilization/Demobilization

The following outlines those procedures DSWA requires of it's environmental monitoring contractors for preparation for the sampling of groundwaters at the DSWA facilities:

1. Standard QA/QC required by the monitoring contractor include:

    a. External audits through certification programs;
    b. External audits through acceptance of blind samples and round robin testing;
    c. Internal audits through splitting samples and shipping samples to other local and regional laboratories;
    d. Performance audits of all laboratory personnel and stations.

2. Many times, the bottles used by a contractor for sample collection, shipment, and storage are purchased pre-cleaned and (some with preservatives added) by an independent company. However, all sampling and field equipment is usually cleaned and maintained by the contractor. Therefore, as a part of standard quality checks, all bottle shipments should be tested by the contracted monitoring company on a routine basis for contamination. If the monitoring company elects to clean their own bottles, quality checks should be standard protocol, and should be run on every lot washed. As a minimum, the following should be done prior to any bottles going into the field:

    a. Fresh disposable Nitrile gloves should be worn whenever handling the glassware (prior to and after cleaning);
    b. All labels should be affixed to the bottles prior to issuance to field crews;
    c. All sample preservatives that can be placed in bottles prior to sample collection should be done so before the bottles are issued to the field crews. The type and amount of preservative should be placed on the label immediately prior to or after addition to the bottle;

    d. Specific analytes and sample locations should be placed on the labels in indelible ink prior to the bottles leaving the laboratory. Note that all caps for volatile organic samples should be screwed down tightly prior to labeling to eliminate any airborne volatile contaminants from the label glues or ink from indelible markers, pens, or type.

3. Preparation of field equipment should include the following:

    a. Cleaning of all manual sampling equipment should include the following procedures:

        1. A general rinse with water to remove debris and solids.
        2. An Alconox Wash.
        3. Sterile rinses with deionized/distilled water.
        4. Acid Wash.
        5. Sterile rinses with Deionized/distilled water.
        6. Hexane Wash.
        7. 3 sterile rinses with deionized/distilled water.

All acids and chemical rinses used should be GCMS grade or better. The field sampling crew is required to carry the necessary chemicals and deionized/distilled water into the field in order to clean any materials that may become contaminated during sampling.

b. All pumps and field meters should be cleaned and calibrated prior to each monitoring event using chemicals and standard procedures recommended by the manufacturer. The equipment should undergo the same protocols when it is returned to the lab.

c. Maintenance and parts replacement should be performed as required by the manufacturers suggested schedule.

d. The monitoring company is required to retain records of maintenance and calibration certification. These records are periodically checked by the DSWA.

e. All field equipment should be inspected and tested for proper operation prior to being sent into the field.

f. The sampling crew is required to carry duplicates of all major pieces of sampling equipment.

VIII. Groundwater Sample Collection

A. General

During all phases of groundwater monitoring at DSWA facilities, field sampling crews are required to:

1. Follow the OSHA regulations governing personal health and safety. (Since there have been no indication of hazardous constituents present in any of the groundwater samples collected at the DSWA Facilities, personal protection has been maintained at Level D requirements. Hard hats, safety glasses, safety shoes with steel toes, and protective gloves are the only safety equipment required at the present time. However, should samples show any indication of being hazardous, the sampling crew is required to move to a more stringent health and safety program before going further in the monitoring event.)

   Generally, **a minimum of** one pair of Nitrile gloves (two are recommended) are to be used while handling equipment and all phases of the collection, preparation, and shipment of samples. Gloves are changed between monitoring locations. (e.g. gloves are changed prior to sample collections and after equipment decontamination.) This insures minimal opportunity for contamination through handling of samples and equipment by operators.

2. At least one member of the sampling crew collecting samples at DSWA facilities shall carry the following valid certifications:

   a. 40 hour OSHA Emergency Response Program
   b. First Aid and CPR.

3. All monitoring events must be overseen by an individual with a minimum of three years field experience in the collection, preparation, and shipping of groundwater samples.

4. The monitoring company shall conduct annual audits of the procedures and equipment being used by their field crews.

5. DSWA shall conduct random inspections of the field crews sampling protocols during each monitoring event.

B. Gauging

Prior to the collection of any groundwater samples from a DSWA facility, the field sampling crew is required to measure the static groundwater levels to 1/100 of a foot in all groundwater monitoring wells on site. The contractor is required to use an electronic water level indicator dedicated specifically for this purpose. The inner well casings of all groundwater monitoring wells being monitored at DSWA facilities have been surveyed by a land surveyor licensed in the State of Delaware. Each is marked with a reference point that is tied into the National Geodetic Vertical Datum (NGVD). All depth to water readings are to be measured from these reference points.

The following procedures are used by environmental monitoring contractor's field sampling crews for gauging the groundwater monitoring wells prior to collection of samples from DSWA facilities:

1. The following protocols are to be used by the field sampling crew whenever groundwater elevations are taken:

    a. All measurements at a DSWA site are to be taken on the same day.
    b. All GMWs are to be inspected externally and internally for damage, and notations of physical well inspection entered in the field log prior to and after opening the well casing.
    c. Well casings are to be re-locked after measurements have been completed on the well.
    d. Measurements are to be taken from a reference point marked on the inner casing.
    e. A minimum of three measurements are to taken from each well. The location of the well, and the three measurements are to be recorded in a field log along with the time and date. These readings are to be averaged. The average of these measurements will be used for:

        1. Mapping the potentiometric head elevations of each aquifer.
        2. Tracking groundwater elevation fluctuations in the aquifers.
        3. Calculating the flow directions and hydraulic gradients of the aquifers.
        4. Entry into a data base for engineering applications as well as possible fate-transport modeling.

2. Between each well being sampled, the field sampling crew is required to rinse the electronic water level indicator thoroughly with deionized-distilled water. If any procedural or well contamination is suspected, the field sampling crew is required to use the following protocols to decontaminate the water level indicator:

    a. A general rinse with water to remove debris and solids.
    b. An Alconox Wash.
    c. Sterile rinses with deionized/distilled water.
    d. Acid Wash.
    e. Sterile rinses with deionized/distilled water.
    f. Hexane Wash.
    g. 3 sterile rinses with deionized/distilled water.

C. Purging

After all wells have been gauged, the field sampling crew is to use the following procedures to collect the groundwater samples:

1. For wells with depth to water measurements (DTWs) equal to or less than 25 feet:

    The field sampling crew attaches a sterile piece of silicone tubing to the Teflon™ tube installed in the well. The sample crew attaches a fresh piece of dedicated Teflon™ tubing between the

outflow of the peristaltic pump and a decontaminated flow-through sample chamber. The sample chamber contains the following probes and meters:

a. pH
b. Dissolved Oxygen
c. Temperature
d. Specific Conductance
e. Oxidation/Reduction Potential
f. Turbidity (measured initially at the outflow from the sample cell.)

2. For wells with DTWs greater than 25 feet:

   The field sampling crew lowers the pump head of an adjustable speed low flow pump down to the middle of the GMW screen and ties off, clips off, or sets the brake on the hose spool to maintain the preferred depth. The sample crew affixes a piece of Teflon™ tubing between the outlet of the pump and a decontaminated flow-through sample chamber. The sample chamber contains the following probes and meters:

   a. pH
   b. Dissolved Oxygen
   c. Temperature
   d. Specific Conductance
   e. Oxidation/Reduction Potential
   f. Turbidity is also measured initially at the outflow from the sample cell.

3. The field sampling crew begins the purge by recording the following:

   a. Date
   b. Start Time
   c. Location
   d. Location Description:

      1. Well Diameter
      2. Casing Type
      3. Top of Casing
      4. Depth of Well
      5. Depth to Water
      6. Standing Water in Casing
      7. Land Surface Elevation (if necessary)
      8. Sample Methods (Grab, Bailer, Pump, etc...)

4. The field sampling crew starts the purge at a flow rate of 1L/Min or less, and records the following in the field log:

   a. The flow rate setting of the peristaltic pump.
   b. Initial pH
   c. Initial Dissolved Oxygen
   d. Initial Temperature
   e. Initial Specific Conductance
   f. Initial Oxidation/Reduction Potential
   g. Initial Turbidity

   Stabilization of these indicator analytes (except Turbidity) is indicative of uniform water being drawn in from the aquifer. Therefore, the well is considered purged after stabilization has

occurred. The field sampling crew is required to purge at least 5 minutes, and no longer than 10 minutes at each sampling point.

5. After purging is complete, the field sampling crew records the following in the field log.

    a. Final pH
    b. Final Dissolved Oxygen
    c. Final Temperature
    d. Final Specific Conductance
    e. Final Oxidation/Reduction Potential
    f. Final Turbidity
    g. Stop time of purge
    h. Total amount of water purged (Gallons), and the number of well volumes removed
    i. Any problems encountered during purging including:

        1. Mechanical problems/calibration problems.
        2. Any strange color, clarity, or odor problems with the samples.
        3. Any notes on problems with the wells such as the presence of roots, or gravel pack in the wells, or damage to the well and casing.

D. Well Closeout

1. Upon completion of sampling, the field crew is to rinse off the well plug or expansion cap prior to replacement in the inner casing, replace or close the outer protective well lid, and re-lock the well.
2. The field crew shall use decontamination procedures recommended by the equipment manufacturer.

3. Readings from all equipment are verified 3X before final acceptance. If readings cannot be verified, re-calibration is required. If re-calibration does not result in verification, the monitoring company is required to switch to the back-up meter. Although they are generally done more frequently, calibration checks are required every three samples for most field meters.

Note: If the monitoring event only requires field analytes, instruments, sample cells, and sample tubes may be decontaminated between GMWs by flushing thoroughly with deionized-distilled water. All pump heads, and hosing of the variable speed pump must be thoroughly rinsed with deionized-distilled water between monitoring points.

IX. Groundwater Monitoring Well Sampling

If the monitoring event requires indicators or indicators/DNREC Supplemental Analysis for Groundwater Samples to be collected, the sample crew is required to use fresh or decontaminated/dedicated sample tubing in the peristaltic pump. Low flow variable speed pumps must undergo decontamination procedures recommended by the manufacturer. All sample cells are to be decontaminated using the procedures described in VII.A.3.a. above.

The following procedures are to be used by the field sampling crew to collect samples from DSWA GMW wells during a monitoring event that requires indicators or indicator/DNREC Supplemental Analysis for Groundwater Samples analysis to be run on GMW samples:

A. After purging is completed, the field sampling crew shall collect Volatile and Semi-Volatile Organic samples using the peristaltic pump or variable speed pump at a flow rate of 100 mL/Min or less. This is done to insure that:

    1. Volatile Organic Compounds (VOCs) are not stripped from the samples.

2. Light silts, flocculants, and fine precipitates are not drawn into the sample.

B. Samples can be collected directly into the bottles, however no contact is allowed between sample bottle or tubing from the pump. VOC vials are to be checked for air entrainment. If air entrainment occurs, the sample shall be retaken. After the VOC and Semi-Volatile Organic samples have been collected, the field crew can increase the flow rate of the pump to expedite the sampling of the remaining sample types which could include:

1. Heavy Metals and Indicator Metals
2. Cyanide
3. Sulfate and Chloride
4. Nitrate and Ammonia
5. Radionuclides
6. All other analytes of interest

The Metals fraction of the samples is to be collected after the Volatile and Semi volatile samples have been collected. Metals samples are the only type of sample that will be considered for filtration. Filtration of Metal samples is to be used as a last resort, and will only be allowed under the following conditions:

1. The turbidity of the sample is >10 NTU's.
2. Reduction in flow rates fail to decrease the Turbidity below 10 NTU's.

If filtration is necessary, the field crew are required to filter the samples through a 0.45 micron mesh cellulose or glass fiber filter.

C. After the sample is collected, the field crew is to record the flow rate of the peristaltic pump in the field logs.

D. After collection of each type of sample is completed, the field crew is required to add any preservatives not added during the bottle prep.

E. Labels affixed to any extra bottles that were not prepared in the laboratory, shall be filled out in indelible ink. Each label is to include the following information:

1. Customer Name or Identification
2. Facility Location
3. Sample Collection Location
4. Time
5. Date
6. Analysis Required
7. Preservatives Used
8. Flow rates used for sample collection.
9. Name of Person that collected the sample.
10. Analytes being analyzed for.

F. After the labels are completed, all samples are to be wrapped in bubble wrap, and placed in shipping boxes containing ice, dry ice, or freezer packs, and preserved at ~4° C for shipment.

G. Chain of Custody forms (COC's) are to be filled out with the same information listed above. Each time the sample is transferred, the sample must have a signature of the individual who releases the sample, and one for the individual who receives the sample.

H. The field sampling crew then packages the samples and hand delivers, or ships by overnight express to the contracted analytical laboratory for testing.

I. As the samples arrive at the laboratory, they are to be logged into a laboratory information system where:

1. They are given sample identification numbers (This number is to be noted on the COC).
2. Their pH and Specific conductance is measured and noted on the COC.
3. They are stored or dispersed to the various laboratory stations for analysis.

J. After the samples are logged in, copies of all completed Field Data Sheets and Field logs are to be e-mailed to the DSWA via internet in upon completion of the monitoring event.

X. Quality Assurance/Quality Control

As a minimum, during each monitoring event, the following QA/QC samples are collected, or prepared and analyzed for the analytes required by State Permits/Regulatory Requirements and Federal Requirements under 40 CFR-258.

- Trip Blanks: One per sampling day per facility
- Field Blanks: One per sampling day per facility
- Laboratory Duplicates: One per 10 samples analyzed
- Surrogate Standards: One per sample set
- Surrogate Spike: One per 20 samples
- Lab Method Blanks: One per sample set

This analysis is done to insure:

1. Procedures or equipment being used in the sampling, preparation, and shipment train do not cause degradation of the samples.
2. Procedures or equipment being used in the analysis train do not cause degradation of the samples.
3. Samples are not contaminated through outside sources.
4. Methods being used for analysis are conducive to the sample matrix.

XI. Supply Disposal

Non-hazardous expendable supplies and equipment used in the collection of samples can be disposed of at the small load collection station prior to the sampling team leaving the site. Unused or excess sample that has not contacted sample preservatives can be disposed of at the sample location. Disposal of hazardous expendable supplies such as excess preservatives are to be taken back to the laboratory by the sampling team for proper disposal.

XII. Reporting

Results of analysis and discussion of the groundwater monitoring activities shall be included and discussed in the first quarterly groundwater monitoring report generated following reception of the groundwater monitoring data. The CIL historical groundwater monitoring database will be transferred to the Solid and Hazardous Waste Section of the Delaware Department of Natural Resources and Environmental Control by way of electronic media or direct file transfer on a quarterly basis.

As a final note, the environmental monitoring contractor and contracted laboratory providing analysis of samples is/are required to retain all field and laboratory records in hard copy format for a minimum of five years, with magnetic media storage for thirty years.

Figure 1

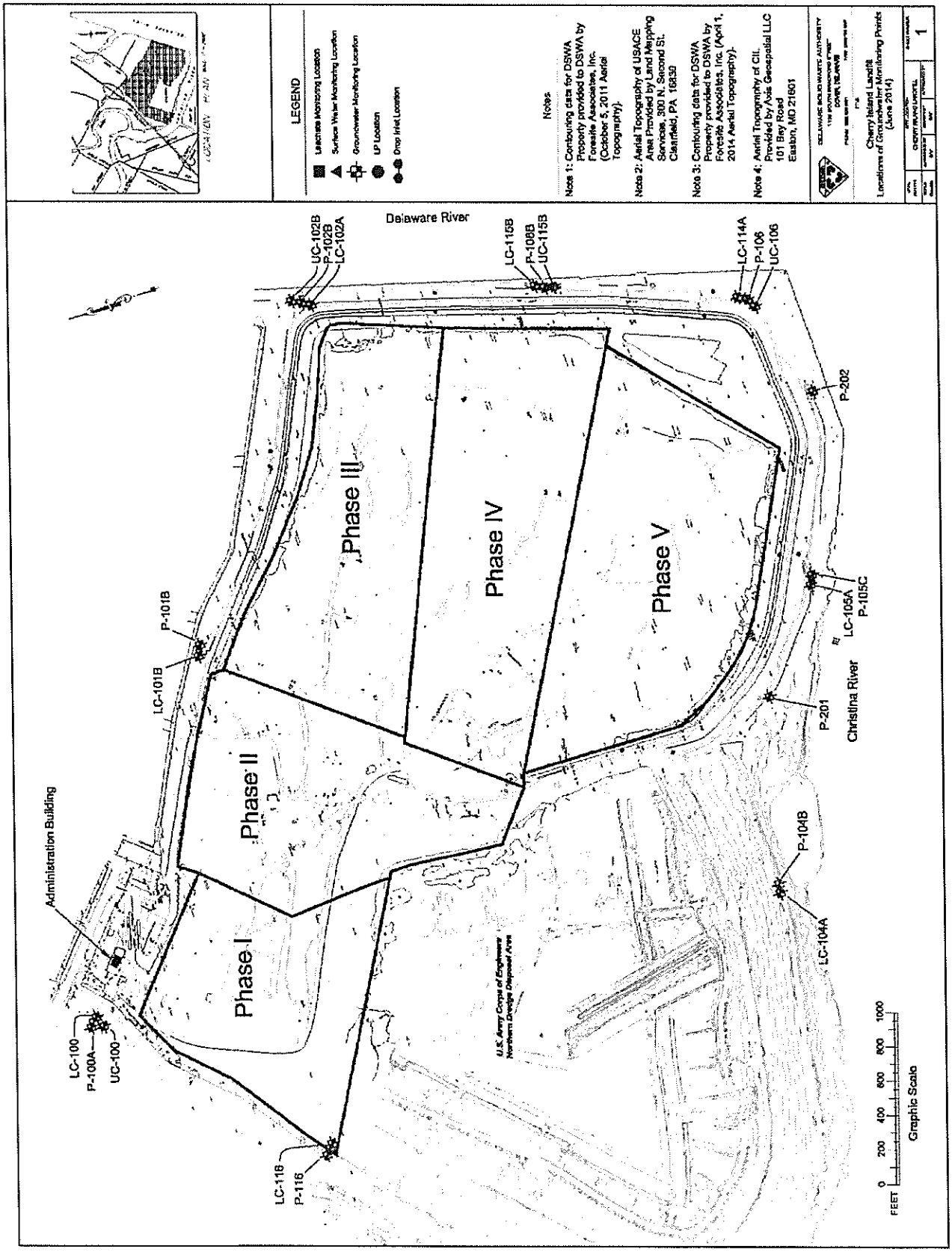
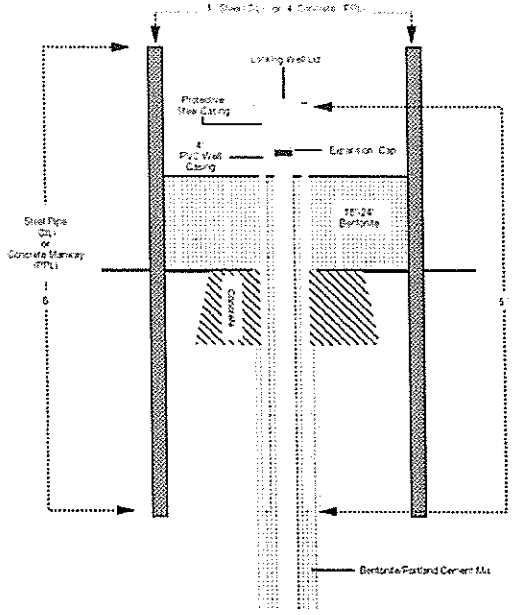
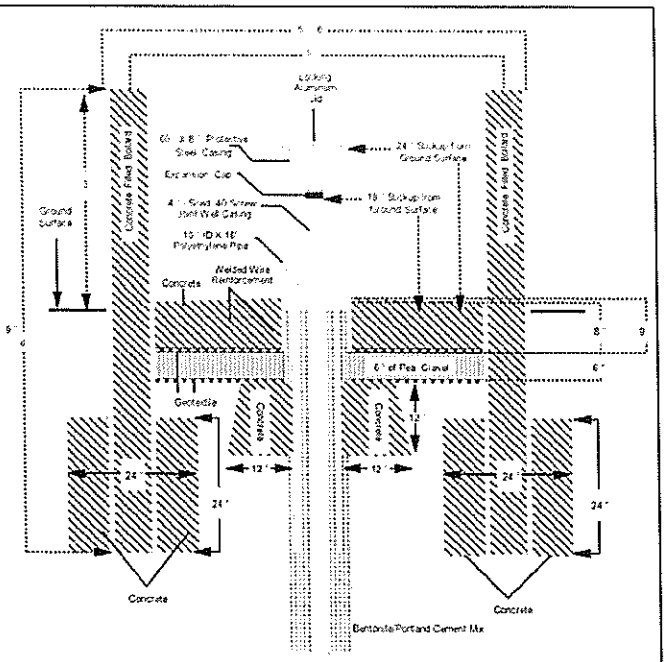

LEGEND
Leachate Monitoring Location
Surface Water Monitoring Location
Groundwater Monitoring Location
LF Location
Drop Inlet Location
Notes
Note 1: Contouring data for DSWA Property provided to DSWA by Forsaite Associates, Inc. (October 5, 2011 Aerial Topography).
Note 2: Aerial Topography of USACE Area Provided by Land Mapping Services, 300 N. Second St. Clearfield, PA 16830
Note 3: Contouring data for DSWA Property provided to DSWA by Forsaite Associates, Inc. (April 1, 2014 Aerial Topography).
Note 4: Aerial Topography of CIL Provided by Axis Geospatial LLC 101 Bay Road Easton, MD 21601
Cherry Island Landfill
Locations of Groundwater/Surface Water Monitoring Points
(June 2014)
Delaware River
Christina River
Phase I
Phase II
Phase III
Phase IV
Phase V
Administration Building
U.S. Army Corps of Engineers Northern Dredge Disposal Area
LC-102B
P-102B
LC-102A
LC-115B
P-108B
UC-115B
LC-114A
P-106
UC-106
P-202
P-101B
LC-101B
LC-105A
P-105C
P-201
P-104B
LC-104A
LC-100
P-100A
UC-100
LC-116
P-116
0 200 400 600 800 1000
FEET
Graphic Scale

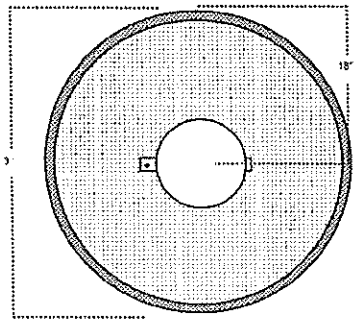
Figure 2



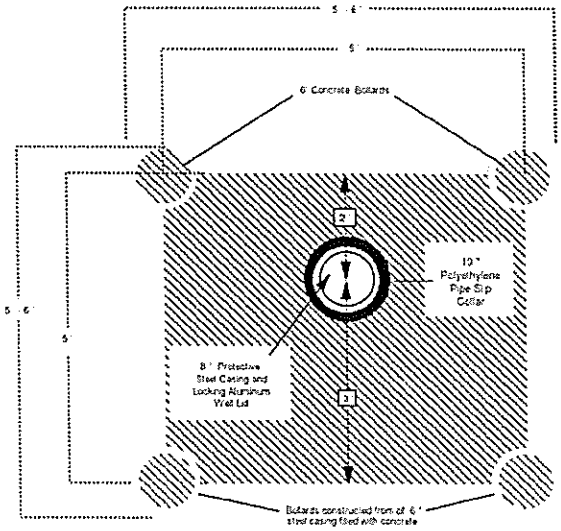
Frontal /Cross-Section View of Older Style Well Terminus - Typical at CIL and PPL only



Frontal /Cross-SectionView of Graded Protective Working Pad Common to All New Well Construction



Plan View of Older Monitoring Well (Typical of CIL and PPL only)



Front of pad off roadway where well access will take place

Plan View of Graded Protective Working Pad

Note: Concrete has a minimum 28 day compressive strength of 3,000 psi The concrete pad is be sloped at least 1/4" per foot away from the well to shed rainwater.

Note: Working pad may have slightly different bollard/concrete set-up depending on surrounding topography and land-use.

Figure 3

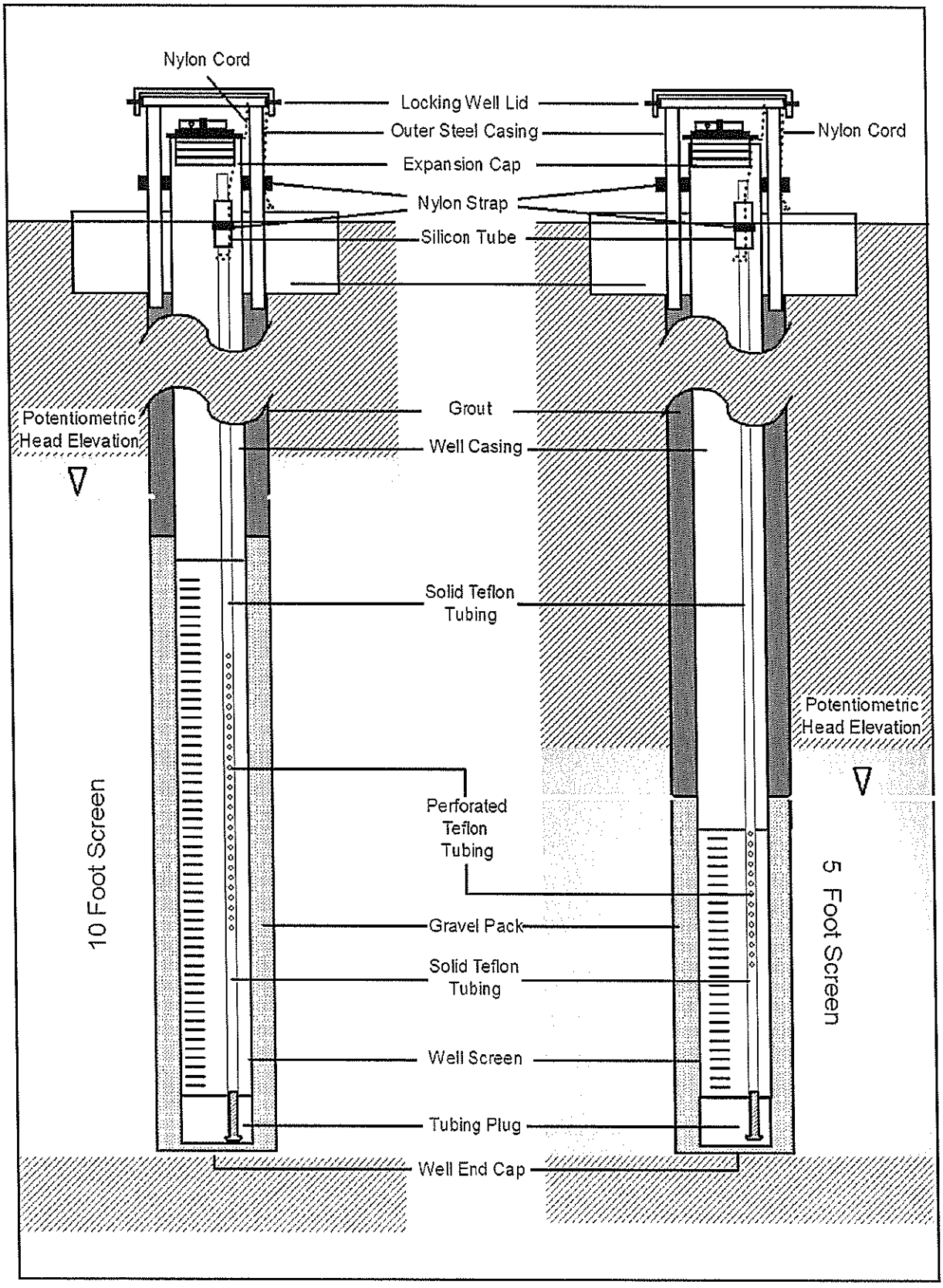

Nylon Cord
Locking Well Lid
Outer Steel Casing
Expansion Cap
Nylon Strap
Silicon Tube
Nylon Cord
Potentiometric Head Elevation
Grout
Well Casing
Solid Teflon Tubing
Perforated Teflon Tubing
Gravel Pack
Solid Teflon Tubing
Well Screen
Tubing Plug
Well End Cap
10 Foot Screen
Potentiometric Head Elevation
5 Foot Screen

Table 1

CIL Monitoring Requirments For Groundwaters Under Permit SW-06/01

Measurement/Analyte	Well I.D.	UC-100	LC-100	LC-101B	UC-102B	LC-102A	LC-104A	LC-105A	UC-106	UC-108A	LC-114A	LC-115B
DTW/Elevation	(0.01 Ft NGVD)	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q
Temperature (Field)	(Centigrade)		Q	Q	Q	Q	Q	Q	Q	Q	Q	Q
pH (Field)	(SU)		Q	Q	Q	Q	Q	Q	Q	Q	Q	Q
Specific Cond. (Field)	(umhos/cm)		Q	Q	Q	Q	Q	Q	Q	Q	Q	Q
REDOX (Field)	(mV)		Q	Q	Q	Q	Q	Q	Q	Q	Q	Q
D. O. (Field)	(mg/L)		Q	Q	Q	Q	Q	Q	Q	Q	Q	Q
Turbidity	(NTU's)		Q	Q	Q	Q	Q	Q	Q	Q	Q	Q
pH (Lab)	(SU)		Q	Q	Q	Q	Q	Q	Q	Q	Q	Q
Specific Cond. (Lab)	(umhos/cm)		Q	Q	Q	Q	Q	Q	Q	Q	Q	Q
Alkalinity (Total)	(mg/L)		A	A	A	A	A	A	A	A	A	A
Alkalinity (Phenolphth.)	(mg/L)		A	A	A	A	A	A	A	A	A	A
Ammonia-N	(mg/L)		A	A	A	A	A	A	A	A	A	A
Bicarbonate	(mg/L)		A	A	A	A	A	A	A	A	A	A
Carbonate	(mg/L)		A	A	A	A	A	A	A	A	A	A
C.O.D.	(mg/L)		A	A	A	A	A	A	A	A	A	A
Chlorides	(mg/L)		A	A	A	A	A	A	A	A	A	A
Nitrate-N	(mg/L)		A	A	A	A	A	A	A	A	A	A
Dissolved Methane	(ug/L)		A	A		A	A	A			A	A
Dissolved Silica	(mg/L)		A	A	A	A	A	A	A	A	A	A
Sulfate	(mg/L)		A	A	A	A	A	A	A	A	A	A
T.D.S.	(mg/L)		A	A	A	A	A	A	A	A	A	A
T.O.C.	(mg/L)		A	A	A	A	A	A	A	A	A	A
Calcium	(mg/L)		A	A	A	A	A	A	A	A	A	A
Iron	(mg/L)		A	A	A	A	A	A	A	A	A	A
Magnesium	(mg/L)		A	A	A	A	A	A	A	A	A	A
Manganese	(mg/L)		A	A	A	A	A	A	A	A	A	A
Potassium	(mg/L)		A	A	A	A	A	A	A	A	A	A
Sodium	(mg/L)		A	A	A	A	A	A	A	A	A	A
Zinc	(mg/L)		A	A	A	A	A	A	A	A	A	A

Measurement/Analyte	Well I.D.	LC-116	P-100A	P-101B	P-102B	P-104B	P-105C	P-106	P-108B	P-116	P-201	P-202
DTW/Elevation	(0.01 Ft NGVD)	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q
Temperature (Field)	(Centigrade)	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q
pH (Field)	(SU)	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q
Specific Cond. (Field)	(umhos/cm)	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q
REDOX (Field)	(mV)	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q
D. O. (Field)	(mg/L)	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q
Turbidity	(NTU's)	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q
pH (Lab)	(SU)	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q
Specific Cond. (Lab)	(umhos/cm)	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q
Alkalinity (Total)	(mg/L)	A	A	A	A	A	A	A	A	A	A	A
Alkalinity (Phenolphth.)	(mg/L)	A	A	A	A	A	A	A	A	A	A	A
Ammonia-N	(mg/L)	A	A	A	A	A	A	A	A	A	A	A
Bicarbonate	(mg/L)	A	A	A	A	A	A	A	A	A	A	A
Carbonate	(mg/L)	A	A	A	A	A	A	A	A	A	A	A
C.O.D.	(mg/L)	A	A	A	A	A	A	A	A	A	A	A
Chlorides	(mg/L)	A	A	A	A	A	A	A	A	A	A	A
Nitrate-N	(mg/L)	A	A	A	A	A	A	A	A	A	A	A
Dissolved Methane	(ug/L)	A										
Dissolved Silica	(mg/L)	A	A	A	A	A	A	A	A	A	A	A
Sulfate	(mg/L)	A	A	A	A	A	A	A	A	A	A	A
T.D.S.	(mg/L)	A	A	A	A	A	A	A	A	A	A	A
T.O.C.	(mg/L)	A	A	A	A	A	A	A	A	A	A	A
Calcium	(mg/L)	A	A	A	A	A	A	A	A	A	A	A
Iron	(mg/L)	A	A	A	A	A	A	A	A	A	A	A
Magnesium	(mg/L)	A	A	A	A	A	A	A	A	A	A	A
Manganese	(mg/L)	A	A	A	A	A	A	A	A	A	A	A
Potassium	(mg/L)	A	A	A	A	A	A	A	A	A	A	A
Sodium	(mg/L)	A	A	A	A	A	A	A	A	A	A	A
Zinc	(mg/L)	A	A	A	A	A	A	A	A	A	A	A

UC = Upper Columbia LC = Lower Columbia P = Potomac
Q = Quarterly A = Annually in March

MONITORING PROGRAM
FOR THE
NORTHERN SOLID WASTE MANAGEMENT CENTER AT CHERRY ISLAND

Revision 1 – October 10, 2012

Attachment D: May 23, 2000 Memorandum on Future Cherry Island Monitoring Requirements

MEMORANDUM

DELAWARE SOLID WASTE AUTHORITY

May 23, 2000

TO: Richard P. Watson, P.E., DEE
Chief of Engineering

FROM: Daniel A. Fluman
Supervisor of Environmental Monitoring and Testing

SUBJECT: Future Cherry Island Monitoring Requirements

I have completed an extensive evaluation of all historical Organics, Pesticides, Cyanide and Metals data for all groundwater samples collected between the October 1983 site investigation and April 2000. The evaluation included filtering out all detects in the historical files, and then verifying these values against the hardcopies retained in our library. The results of this evaluation lead me to conclude that Table 2 analysis of groundwaters is unnecessary for CIL and that we should petition DNREC to remove this analysis from the groundwater monitoring program.

Applicable Regulatory Criteria

Since there are no potable water sources below Cherry Island, and use of any water is limited to industrial withdraw from the Potomac, this review was based on the possible effects of contaminated groundwater discharging to surrounding surfacewaters (i.e. the Christina and Delaware Rivers). DNREC has established surface water criteria in their regulations *State of Delaware Surface Water Quality Standards (amended 8/11/99)* (SWQS). The criteria presented in the SWQS are based on the chronic and acute effects certain organic compounds and metals have on freshwater and marine organisms. In the case of VOCs, SVOC's and BNAs, no discharge limits have been established for any of the organic compounds detected in groundwaters below the CIL. When considering metals, the levels for chronic freshwater criterion was chosen as a basis for data comparison as these levels are lower than many of the marine criterion.

Organics Review

The organics analysis run on groundwater samples over the past 18 years included the USEPA Priority Pollutants listing (prior to 1996) and DNREC Table 2 analytes (1996 – present). Due to the lack of freshwater discharge limits, low percentage of organics which have been detected over the past 18 years, and the low levels at which these have been

detected, evaluation of the data was based solely on presence or absence of the organic compound in the sample and it's concentration. The following summarizes the data review for organics analysis

- Of the 9,230 organics tests run on groundwater samples from 25 existing or now abandoned wells, 9,174 (99.4%) were non-detect.
- 18 organic compounds were detected a total of 56 times of which 6 detects (10.7%) were at their mdl.
- With the exception of two locations (new wells C-113 & C-155) which show rapidly declining trends, there is no consistency to the location or concentration of the organics detected around the site.
- Twenty (20) of the detections (36%) were of common laboratory/field contaminants - Acetone, Methylene chloride and Bis(2-ethylhexyl)phthalate .

- Eight (8) of the detections (14%) probably resulted from weathering of fuels or degreasing agents, (Tetrachloroethylene, Ethylbenzene, Benzene and Toluene).
- Sixteen (16) of the detections (24%) were in locations upgradient to landfill, in areas far away from where landfilling activities were taking place, or were detected too early to be caused by filling activities.
- In only four cases (9%) did the concentration of an analyte exceed 0.1 mg/L. All such detects were common laboratory contaminants.
- 91% of detected analytes were less than 0.05 mg/L.
- 48% of the analytes detected were at or below 0.01 mg/L.

Metals and Cyanide Review

When evaluating metals detected over the past 18 years, the following technique was used to filter and evaluate metals data collected for samples taken from CIL wells:

1. Metals analyses were separated into "Common Metals" and "Criteria Metals" having an established Freshwater Chronic Criterion (FCC) level.

2. Common metals are those which normally show up in soils throughout Delaware. These metals include Ba, Ca, Co, Fe, Mg, Mn, K, and Na. Common metals accounted for 1,973 (32.7%) of the 6,027metals analysis run on groundwater samples from CIL. These were filtered from the data and not considered for this evaluation.

3. Criteria metals included, As, Cd, Cr, Cu, Pb, Hg, Ni, Se, Ag, Zn. Additional metals reviewed and listed as "other metals" below, but which have no limits were Sb, Be, and Mo, Tl and V. Limits given for As, Cr, Cyanide, Hg, and Se were established values. Limits for Cd, Cr, Cu, Pb, Ni, Ag, and Zn were based on equations for each analyte listed in Table 1. The equations are based on the effects of Hardness on the criterion metal. In most cases, the average Hardness was used. In cases where

Hardness data was not available or could not be calculated. Total Alkalinity (as CaCO3) was substituted for Hardness. (comparisons indicate that the averages for Hardness and Total Alkalinity in the nominal range of 4.5 to 8.5 are very close). The following describes the results of the data review:

- After removal of the common metals from the data reviewed, 4,054 Criteria or "other" metals remained for review.
- Review of the Criteria and "other metals" indicated the results for 3,628 (89.5%) were non-detects.
- Of the 428 (10.5%) samples which resulted in detections, only 94 (22%) have concentrations of metals exceeding their FCC.
- Of the 94 values which exceeded their FCC, only 10 values (10.1%) did not have "pre-existing" levels of the metals. Pre-existing means:

  1. metals were detected during the initial site investigation;
  2. metals were detected in wells upgradient from landfilling activities;
  3. metals were detected in wells too far away at the time of detection to be caused by landfilling activities.

- Of the 428 detections, only 10 values (2.3% of the total detections) did not meet the pre-existing criteria above, and exceeded their FCC.
- Of the 4,054 Criteria Metals tests run over 18 years, only 0.25% tests did not meet the pre-existing criteria and resulted in exceedences of the FCC.
- Be and Mo were never detected in any samples tested.
- Sb was only detected once, in the 323 times it was tested for.

- Pre-existing detections of Criteria Metals can be found in data for the Potomac, Columbia Aquifers, and dredge spoils.
- Criteria metals having a FCC have been detected only 11 times in the past five years.
- Historically, seventy-seven (77) CIL groundwater samples have been tested for Cyanide. To date it has been detected 4 times (5%), and has exceeded it's FCC of 0.0052 twice (0.006 and 0.009 mg/L).
- Except for recently installed wells, the background levels of Criteria Metals present in groundwater samples was considerably higher than levels of detects in recent years.

Conclusions

When considering this information, it is unlikely that landfilling activities at CIL are the source of organics detected in groundwater samples taken from Cherry Island. The data indicates that the organics were present prior to the site being used for the disposal of MSW, and are most likely coming from the dredge materials. Metals detected in the wells are most likely coming from the dredge spoils as well. The fine grained sediments making up the dredge spoils are primarily composed of silts, sands, and direct discharge

of waste from industries and POTWs which have been established along the Delaware and Christina Rivers over the past several hundred years. Up until the 1970s very few regulations existed to keep industries from directly discharging waste into the rivers.

Other considerations for elimination of DNREC Table 2 analytes include:

1. One of the reasons Cherry Island was selected for establishing a landfill was the groundwater was of poor quality and not potable.
2. The weight of the landfill is compressing dredge water from the spoil materials and forcing it up into the leachate collection systems of the cells. From there, the dredge water is transported to the Wilmington Wastewater Treatment Plant. Therefore, CIL is actually intercepting and removing potential contaminants from the spoils before they can reach the Delaware and Christina Rivers.
3. This compaction of the underlying spoils by the landfill is establishing the natural liner.
4. Due to the neutral to higher pH and availability of anions in established landfills, the landfill itself acts as a sink for most metals. Therefore, given some retention time, most of the heavy metals which can form salts will become permanently locked up within the landfill mass.
5. Eventually, sometime after landfilling at Cherry Island has been completed, the upward gradient caused by landfilling activities should reverse. The water from the spoils will begin to move downward towards the Columbia and Potomac aquifers again. With the natural liner established, the leachate will continue to be pumped to the City of Wilmington's wastewater treatment plant for disposal.

TABLE 1

WATER QUALITY CRITERIA FOR PROTECTION OF AQUATIC LIFE
(All Values Are Listed or Calculated in Micrograms Per Liter)

Pollutant	Freshwater Criteria	Freshwater Criteria	Saltwater Criteria	Saltwater Criteria
Aldrin	3.0	--	1.3	--
Aluminum	750.	87.	--	--
Arsenic (III)	360.	190.	69.	36
Cadmium	$e^{(1.128[\ln(Hd)]-3.828)}$	$e^{(0.7852[\ln(Hd)]-3.490)}$	43.	9.3
Chlordane	2.4	0.0043	0.09	0.004
Chlorine	19	11.	13	7.5
Chlorpyrifos	0.083	0.041	0.011	0.0056
Chromium (III)	$e^{(0.8190[\ln(Hd)]+3.688)}$	$e^{(0.8190[\ln(Hd)]+1.561)}$	—	--
Chromium (VI)	16.	11.	1,100	50
Copper	$e^{(0.9422[\ln(Hd)]-1.464)}$	$e^{(0.8545[\ln(Hd)]-1.465)}$	2.9	--
Cyanide[1]	22.	5.2	1.0	--

Parameter	Fresh Acute Criterion	Fresh Chronic Criterion	Salt Acute Criterion	Salt Chronic Criterion
DDT and Metabolites	1.1	0.0010	0.13	0.0010
Demeton	--	0.10	--	0.10
Dieldrin	2.5	0.0019	0.71	0.0019
Endosulfan	0.22	0.056	0.034	0.0087
Endrin	0.18	0.0023	0.037	0.0023
Guthion	--	0.01	--	0.01
Heptachlor	0.52	0.0038	0.053	0.0036
Hexachlorocyclohex	2.0	0.08	0.16	--
Iron	--	1000.	--	--
Lead	$e^{(1.273[\ln(Hd)]-1.460)}$	$e^{(1.273[\ln(Hd)]-4.705)}$	140	5.6
Malathion	--	0.1	--	0.1
Mercury (II)	2.4	0.012	2.1	0.025
Methoxychlor	--	0.03	--	0.03
Mirex	--	0.001	--	0.001

Parameter	[illegible]	[illegible]	[illegible]	[illegible]
Nickel	$e^{(0.8460[\ln(Hd)]+3.3612)}$	$e^{(0.8460[\ln(Hd)]+1.1645)}$	75.	8.3
Total PCBs	2.0	0.014	10	0.03
Parathion	0.065	0.013	--	--
Pentachlorophenol	$e^{(1.0035(pH)-4.830)}$	$e^{(1.0035(pH)-5.290)}$	13	7.9
Selenium	20	5.0	300.	71
Silver	$e^{(1.72[\ln(Hd)]-6.52)}$	0.12	2.3	--
Toxaphene	0.78	0.0002	0.21	0.00012
Zinc	$e^{(0.8473[\ln(Hd)]+0.8604)}$	$e^{(0.8473[\ln(Hd)]+0.7614)}$	95.	86.

Notes

Cyanide measured as free cyanide at the lowest pH occurring in the receiving water, or cyanide amenable to chlorination

Specific numerical acute criteria as presented in this table are applied as one-hour average concentrations not to be exceeded more than once in any three-year period. Specific numerical chronic criteria as presented in this table are applied as four-day average concentrations not to be exceeded more than once in any three-year period.

ln = natural log base e

e=2.71828

Hd= hardness is expressed as mg/L as $CaCO_3$

pH is expressed as Standard Units

Example calculation: Fresh acute criterion for silver at hardness of 50 mg/L. Criterion in ug/L = e raised to the [1.72 ln(50)] - 6.52] power. This is equal to e to the 0.21 power, or 1.23 ug/L