DELAWARE SOLID WASTE AUTHORITY

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SOUTHERN SOLID WASTE MANAGEMENT CENTER
Georgetown, Delaware

PLAN OF OPERATION

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Appendix C – Alternate Daily Cover and Alternate Intermediate Cover

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Appendix G – Operation and Maintenance Manual, Geomembrane Cap, Cells 1 and 2

List of Drawings

See drawing set entitled "Cell 5 Disposal Area"

Section 1
Introduction

1.1 Purpose

The operating procedures for the Southern Solid Waste Management Center (SSWMC) are presented herein. The drawings for Cell 5 are included in this update of the Operations Plan and are to be incorporated with the drawings for Cells 1 through 4 that were included in previous versions of the Operations Plan.

The following equipment manuals are used at the SSWMC to operate, inspect, and maintain leachate and gas collection systems:

- Cell 1 and 2 Cap Landfill Gas Extraction System, prepared by Barbella Environmental Technology
- Equipment Operations and Control Document Cell 1, Prepared by PBS&J
- Leachator Leachate Pumping Systems Cell 3, by Myles Industries
- O&M Manual for Truck Loading Pumps Cell 3, prepared by Greenhorn & O'Mara Inc.
- O&M Manual for Submersible Pumps, Cell 3, prepared by Greenhorn & O'Mara Inc.
- O&M Manual for Submersible Pumps, Cell 4, prepared by CDM
- O&M Manuals (1 through 5) for Cell 5 Pump System, prepared by CDM

Manuals are located in the Facility Manager's Office.

1.2 Facility Location and Description

The SSWMC is located at Jones Crossroads, off Route 20 in Sussex County, Delaware. SSWMC is owned, managed, and operated by the Delaware Solid Waste Authority (DSWA). DSWA may elect to have a contract operator perform certain operational activities discussed herein.

SSWMC currently consists of five disposal areas, Cells 1, 2, 3, 4 and 5. Cells 1 and 2, are 17.5 and 23.3 acres, respectively, and are no longer in operation. An exposed long-term cap has been constructed over Cells 1 and 2.

Cell 3, consisting of 24 acres, was constructed in 1996, incorporating a composite liner system and three leachate storage tanks with a combined capacity of 1,000,000 gallons.

Cell 4 is a 30-acre disposal area constructed in 2000, that is equipped with a dual composite liner system.

Cell 5 consists of approximately 30 acres and is constructed adjacent to Cells 3 and 4. Cell 5 has a capacity estimated to be 3.6 million tons and is equipped with a dual composite liner system.

Section 2
Hours of Operation

The Southern Solid Waste Management Center facility is currently operated on a six day per week basis, Monday through Saturday, from 7:00 a.m. to 5:00 p.m. Operating personnel will work as late as necessary to properly place, compact, and cover received waste material. The SSWMC is closed on the following holidays:

New Year's Day

Thanksgiving Day

Christmas Day

The landfill may also close in emergency situations, when faced with inclement weather, or for other reasons as determined by the Delaware Solid Waste Authority. In addition, DSWA may open on Sundays, holidays, or other days when the landfill is closed or extend normal operating hours to accommodate disaster debris disposal.

Section 3
Landfill Operating Staff

3.1 Introduction

DSWA will provide an experienced work force capable of operating the landfill in accordance with:

- requirements of this operations plan;
- conditions of the Department of Natural Resources and Environmental Control (DNREC) permit; and
- applicable State and Federal regulations.

3.2 Positions and Responsibilities

In general, the following personnel will be at the facility during business hours to perform the duties as describe below:

1. Supervisor (minimum 1)

The Landfill Manager is responsible for the oversight of all facility operations. The Landfill Manager ensures that operations are in compliance with permit terms and conditions. The Landfill Superintendent supervises all activities associated with waste disposal. The Landfill Superintendent oversees the Foreman and Operators. The Landfill Foreman oversees the operators and skilled laborers and completes tasks necessary with waste disposal.

2. Scale Operator (minimum 1)

The Scale Operator records the weights of all waste loads entering the landfill and performs waste screening.

3. Heavy Equipment Operators (minimum 1)

The Heavy Equipment Operator(s) operate the equipment used to place, compact, and cover the waste. The Heavy Equipment Operators are trained and capable of operating on-site equipment.

4. Skilled Laborer (minimum 1)

Skilled laborers perform various tasks using power tools, lawn mowers, trimmers, tractors, and other tools, equipment, and machinery. Knowledge of the hazards and safety precautions associated with this position are required. Skilled laborers typically perform daily tasks such as inspections of leachate collection and storage systems.

3.3 Training

Personnel listed in Section 3.2 Positions and Responsibilities, will receive the following training as a minimum:

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

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 and all other initial training shall be completed within 180 days of hiring.

Section 4
Landfill Operating Equipment

4.1 Equipment

The equipment used at the SSWMC is intended to provide an 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. The equipment for the landfill operation was selected based on:

- ongoing experience with landfill operations at the site;
- estimated volumes of waste to be received at the site; and
- estimated volumes of soil required for cover.

Modification to the following equipment list may occur to provide effective operation of the landfill:

1. Two landfill compactors, Caterpillar Model 826H, or similar.
2. One dozer Caterpillar D5, or similar.
3. One rubber-tired loader with bucket, Caterpillar Model 950, or similar.
4. One water truck with a minimum 2,000-gallon capacity tank for various uses such as for watering haul roads.
5. One backhoe, excavator or skid steer with bucket and attachable forks for various uses such as unloading trucks.
6. One tractor, or other suitable equipment, with mower attachment. The equipment will be capable of safely mowing landfill areas including ditches, swales, and slopes.
7. Four portable pumps with minimum two-inch discharges suitable for pumping stormwater or leachate.
8. One tanker with a minimum capacity of 6,000 gallons.
9. One, high-pressure hot water cleaner for cleaning equipment and scales. Minimally capable of producing 180 degree Fahrenheit and 2,000 psi.
10. One power driven broom capable of removing debris or other similar material from roads.

4.2 Equipment Maintenance

Landfill equipment will be maintained in good working order. Maintenance will be performed in accordance with recommendations of the equipment manufacturer. Refuse moving equipment will be cleaned and washed periodically.

4.3 Back-up Equipment

Back-up or replacement equipment will be available to insure sufficient operation of the SSWMC in accordance with the conditions of the DNREC permit and applicable State and Federal regulations. Back-up or replacement equipment will generally be provided within twenty-four hours, if feasible.

Section 5
Waste Acceptance Requirements

5.1 Acceptable Waste

The SSWMC facility accepts the following wastes:

- municipal solid waste (MSW) defined as household waste and solid waste that is generated by commercial, institutional, and industrial sources and is similar to household waste;
- dry waste and construction and demolition debris (CDD);
- non-hazardous industrial waste or sludge, oil spill debris, and other related wastes not defined as MSW but acceptable in accordance with the Delaware Solid Waste Authority Policy on Special Solid Wastes, approved on December 7, 1995 by the Board of Directors and revised on October 27, 2005 (Appendix A).

5.2 Prohibited Waste

Disposal of the following waste is prohibited at SSWMC:

- hazardous waste;
- infectious waste;
- radioactive waste;
- bulk or non-containerized liquid waste, unless the waste is a household waste other than septic waste;
- whole tires in quantities greater than ten (10) per truckload; and
- asbestos containing materials.

5.3 Waste Screening Program

5.3.1 Requirements

The purpose of the waste screening program is to detect, intercept, and remove to the extent possible prohibited waste from the incoming waste stream. Waste screening procedures will follow the current requirements outlined in DSWA Compliance Section Standard Operating Procedures Manual, Section VII and the *DSWA Solid Waste Screening Program* dated September 19, 1997, or future modifications. These documents are attached herein as Appendix B. In conjunction with this, procedures outlined below will be implemented.

5.3.2 Incoming Inspection

Incoming loads are inspected on a routine basis. Inspections follow the procedures described below:

- Incoming vehicles are to be randomly spot-checked. Operators shall visually screen materials during unloading. Loads may be spread out to allow a closer view of the waste. Operators shall promptly notify the landfill supervisor of any suspect wastes.

5.3.3 Records of Inspection

Random inspections of incoming waste are documented on a standardized form.

5.3.4 Response Procedures

Should prohibited wastes be identified, the following procedures will be followed:

5.3.4.1 Prohibited, Non-Hazardous Waste

If prohibited non-hazardous waste is discovered prior to discharging, the driver will be directed to leave the site. If the waste is already been discharged, the waste may be reloaded back on the truck as rejected material.

5.3.4.2 Hazardous Waste

Should hazardous waste be identified, reasonable efforts shall be used to isolate or contain the material. DNREC, or another appropriate agency, will be notified for guidance in handling the material.

SSWMC personnel may assume that the material is potentially hazardous and may request that it be sampled and classified by the hauler prior to handling or processing at the site.

Section 6
Cover Material Requirements

6.1 Daily Cover

A minimum of six inches of daily cover, or an approved thickness of alternate daily cover material, will be placed over the solid waste at the end of each workday including Saturday. No solid waste shall remain exposed at the end of an operating day. Soil for daily cover will meet the requirements of DNREC regulations. Stockpiles of cover material will be maintained on site.

6.2 Alternate Daily Cover

6.2.1 Approved Alternate Daily Cover

Alternate daily cover (ADC) as approved by DNREC may be used as site conditions permit. Special requirements and conditions detailed in ADC approval letters shall be implemented, and all current and applicable approval letters for the use of the alternate daily covers at the facility shall be maintained in Appendix C of this Operations Plan.

6.2.2 SSWMC Manufactured ADC

DSWA may use ADC produced at SSWMC. ADC produced at SSWMC must meet the requirements of the Plan of Operation for the Production of ADC from Dry Waste attached as Appendix C.

6.2.3 Tarps Used as ADC

Tarps are approved ADC and may be applied manually or mechanically and will be sufficiently weighted or anchored to prevent wind uplift. Tarps will be removed before waste placement resumes.

6.3 Intermediate Cover

Intermediate cover will be placed over areas which will not receive additional lifts of solid waste for periods longer than 6 months. Intermediate cover will consist of an additional six-inch layer of compacted cover placed over the six inches of daily cover. Temporary vegetative cover may be provided on side slopes. Intermediate cover areas will be periodically inspected for signs of erosion.

6.4 Alternate Intermediate Cover

Alternate intermediate covers as approved by DNREC may be used as site conditions permit. Special requirements and conditions detailed in approval letters shall be implemented, and all current and applicable approval letters for the use of the alternate intermediate covers at the facility shall be maintained in Appendix C of this Operations Plan.

Tarps are used as an alternate intermediate cover. The tarp is placed over the six inches of daily cover material, and weighted or anchored sufficiently to prevent wind uplift. The tarps are selected to provide resistance to environmental stresses including wind action and ultraviolet light degradation.

The tarps are inspected periodically and repaired or replaced if necessary. The tarps are removed prior to placement of the next lift of waste or final cover.

6.5 Final Cover

A final cover system will be installed in accordance with DNREC regulations. The final cover system will consist of:

- Vegetative cover;
- 12-inch soil layer to support vegetative cover;
- Composite drainage net (CDN);
- 30-mil geomembrane;
- Filter fabric (nonwoven, 8 oz/sy) for protection of the geomembrane; and
- 12-inch Grading layer.

An independent third party Delaware registered professional land surveyor or professional engineer will survey each closure capping system installation and calculate the area in square yards of capping system installed. The surveyor or engineer shall also identify locations of gas vents, and provide updated drawings after each capping system installation.

6.6 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. A final cover will be installed as described in Section 6.5 above and in accordance with the approved design drawings accompanying this plan.

6.7 Soil Cover Source

Soil material for final cover will be obtained from on- or off-site sources identified by the contractor selected to perform the work.

6.8 Cap-As-You-Go Program

DSWA uses a phased capping program at their disposal facilities that is referred to as Cap-As-You-Go. This program involves installing the final cover in a series of phased installation projects rather than waiting until all final elevations are reached and installing the entire cap as one construction project. The intent of the Cap-As-You-Go

program is to provide timely control of gas emissions and odors and to reduce leachate generation at the landfill sites.

DSWA will submit a certification report to DNREC within 60 days of completion of each phased installation of landfill cap. At the conclusion of all phases of capping, DSWA will submit a final certification report within 60 days of completion.

The limits of the capped areas will be marked with flagging. All capped areas will be maintained during the operation of the landfill including: mowing of grass, revegetation of dead areas, repairs of erosion damage and leachate seeps, and maintenance of stormwater management structures.

Section 7
Nuisance and Vector Control

7.1 Litter Control

An operator or laborer inspects the entrance road, access roads, building perimeters, and parking areas on a daily basis for litter accumulation. Portable or temporary fencing may be installed in the vicinity of active work areas to assist in the containment of wind-blown litter. Collected litter is properly disposed of in accordance with the requirements of this permit. Additionally, litter at the working face is kept to a minimum by prompt compaction of waste and placement of daily cover.

A 40-foot tall litter control fence is used to capture blowing litter. When high winds have caused large amounts of litter, the litter is collected as soon as practical.

7.2 Vector Control

The application of daily and intermediate cover materials, as well as litter control, and proper housekeeping limit the vector population at the site. Any vector extermination or control is carried out under the direction of qualified personnel.

7.3 Odor Control

Odor control is achieved through the use of cover materials, the operation of an active gas collection system, and may include the Cap-As-You-Go program.

Cell 5 is divided into two subcells. The north subcell may be used for construction demolition debris (CDD) waste disposal. DSWA may choose to separate CDD and MSW to exclude CDD from the leachate recirculation process. This is expected to reduce hydrogen sulfide gas emissions. The Cell 5 design also allows for optional installation of a flare station dedicated to combusting gas from the Cell 5 north subcell.

Odor complaints are recorded in writing including the name and address of complainant. A follow-up investigation includes looking for leaks or malfunction of the gas collection system, monitoring the air at the facility to locate the possible source and confirm or dispute the complaint. Repairs are made if leaks are found and a follow-up phone call to the complainant is made to report progress on corrective measures.

7.4 Dust Control

Dust is controlled by applying water, and/or approved moisture-absorbing chemicals such as calcium chloride, to gravel and unpaved road surfaces. Moisture-absorbing chemicals shall comply with appropriate State and Federal regulatory agencies.

On paved surfaces, dust is controlled by applying water, periodic sweeping and/or cleaning of the pavement. Open accessible areas may be cleaned with powered broom cleaning equipment. When necessary, areas such as the weigh station are cleaned by hand.

7.5 Noise Control

Noise control is governed by Occupational Safety and Health Act (OSHA) Standards.

Section 8
Access, Traffic Flow and Safety Requirements

8.1 Site Security and Access

Customer and public access to the site is controlled by a security perimeter fence with locking gates. The gates are opened at the beginning of the work day and locked at the conclusion of each work day. Primary access to the site is through the landfill entrance area gate. Other gates may occasionally be used for vendor, construction or maintenance vehicle access.

8.2 Traffic Routing and Control

Incoming traffic is directed to the scales for weighing. Vehicle movement is controlled at the weigh station through traffic signals and automatic gates. DSWA staff provides traffic control for the landfill working face.

8.3 Salvaging/Scavenging

Salvaging operations are controlled so as not to interfere with the disposal of solid waste. No salvage operations which create unsightliness will be allowed. Scavenging (uncontrolled removal of waste from the site) is not allowed.

8.4 Employee Health and Safety

Applicable local, state and federal health and safety guidelines, including those established by the Occupational Safety and Health Administration, are followed by SSWMC personnel.

Landfill staff receive basic first aid and CPR training. Training is provided by the National Safety Council or American Red Cross or other qualified agency. A comprehensive safety manual encompassing all DSWA facilities is used at the SSWMC. A first aid kit is maintained in Maintenance Building B along with an eye-wash station. A standard shower and eyewash station are also in Maintenance Building A. A secondary first aid kit is kept in the scalehouse.

Personnel Facilities

Suitable shelter, sanitary facilities, and safe drinking water are provided for site personnel.

Emergency Telephone Numbers

Emergency telephone numbers of nearby ambulance, hospital, police and fire services are prominently displayed near telephones.

Protective Clothing

Appropriate Personal Protective Equipment (PPE) is required to be worn by personnel when performing activities at the landfill. Dust masks or suitable breathing equipment are required to be worn by operating personnel exposed to high dust conditions.

8.5 Fire Prevention and Control

DSWA is responsible for reporting, control, and extinguishing fires at the site. Heavy equipment is required to be equipped with a fire extinguisher suitable for all classes of small fires. In addition, extinguishers will be provided and maintained in appropriate structures.

Vehicles arriving with a "hot load" (contents smoldering or on fire) will be directed to a disposal area with a minimum of twelve (12) inches of cover, remote from the working face. The load will then be dumped and extinguished.

Landfill surface fires shall be isolated to the extent possible, using soil cover. The soil may be used to create a fire break by covering solid waste not on fire, or to smother that which is on fire.

An on-site water truck, equipped with suitable apparatus to control a fire will be dispatched to the scene until the nearest fire department responds. Immediately after dispatching on-site equipment DSWA personnel may contact 911 for dispatch of fire department.

If a deep-seated fire is detected within deposited solid waste, DNREC shall be notified as soon as possible. Any action to be taken shall be approved by DNREC unless emergency conditions dictate action prior to DNREC approval.

8.6 Contingency Plan

The response of personnel to a serious emergency (such as fire, personnel injury, leachate release, or fuel spill) which threatens public health, safety, or the environment, shall be as follows. A copy of the Contingency Plan is attached as Appendix D.

1. Notification of Foreman, Landfill Supervisor and Manager.
2. Notification of emergency service (fire department, ambulance).
3. Notification of designated official(s) of DSWA.
4. As appropriate, notification of DNREC and other State or Federal regulatory agency.

8.7 Alarm Systems

The SSWMC is equipped with internal alarms and a communications system. Alarm systems are provided at the leachate storage and transfer areas. Specified alarms are connected to an autodialer which alerts landfill staff of the specific alarm condition. Should an alarm sound, appropriate actions will be implemented.

All sumps and tanks have high level alarms. Response is to verify high level conditions and take corrective action if needed. All pump systems should shut down in event of high level conditions in tanks to prevent spills. Response to some alarm conditions may not require immediate action, such as power failure. The following list details the locations of the alarms.

CELL 1 ALARMS
Sump Level Low

Sump Level High

Pump Station Level High

Power Failure

Communication Failure

CELL 2 ALARMS (2 locations, North and South)
Pump Station Level High

Power Failure

Communication Failure

CELL 3 TANK FARM (1 location)
Power Failure

Gas Detection

Tank Level High (3 Tanks)

Waste Pump Failed

Fire Alarm

Communication Failure

CELL 3 RISER HOUSES (3 locations)
Gas Detection

Power Failure

Communication Failure

Detection Sump Level High

Primary Sump Level High

CELL 4 ALARMS (2 locations)
Primary Sump High Level

Primary Sump Low Level

Secondary Sump High Level

Secondary Sump Low Level

Primary Pump Power Failure

Secondary Pump Power Failure

Condensate Pump High Level

Communication Failure

CELL 5 ALARMS (2 locations)
Primary Sump High Alarm

Secondary Sump High Alarm

Primary Pump Power Failure

Secondary Pump Power Failure

Condensate Pump High Level

Communication Failure

8.8 Communications System

Equipment on-site including compactors, and bulldozers as well as the landfill manager and supervisor vehicles are equipped with radio units. A radio base station is maintained in the supervisor's office and at the weigh station. Radio units are kept in good working order. Communication between the operating personnel, weigh station, and supervisor is maintained throughout the working day. Telephones are installed at the weigh station and in the supervisor's office.

8.9 Confined Space Entry

Because there are confined spaces such as pump stations, sampling pits, valve pits, manholes, and leachate tanks which personnel may have to enter 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.

8.10 Special Precaution Area

SSWMC received notification from DNREC that material reported to contain asbestos (ACM) was delivered to SSWMC on November 5, 2004. NOV 04-SW-10 was subsequently issued by DNREC on December 12, 2004. All material landfilled on November 5, 2004 was mapped and is delineated by data in Appendix E. This volume of waste is not to be disturbed during construction and operation of Cell 5

and during the post closure period, unless adequate precautions are taken to protect staff and the environment.

Section 9
Routine Housekeeping and Maintenance

9.1 General Tasks

The grounds of SSWMC are to be maintained to include, but is not be limited to, the following tasks:

- cutting grass;
- reseeding and fertilizing slopes of the landfill where grass may have died;
- watering grass;
- cleaning out stormwater pipes;
- re-burying waste that may have worked its way to the surface;
- grading and sweeping access roads;
- repairing leachate seeps;
- cleaning the scales; and
- picking up litter and debris.

9.2 Building Maintenance

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

9.3 Weather Related Maintenance

9.3.1 Severe Weather

A stone, or other suitable material, covered area is maintained in the active disposal area for disposal of waste during wet weather when vehicle access to the active face is prevented. The wet weather area is relocated as needed to accommodate the filling progression. Should severe lightning or high wind conditions occur, personnel may be directed by the Foreman to take shelter and operations will be suspended until the severe weather has subsided.

9.3.2 Winter Conditions

Snow is removed from the landfill roads, parking lots, and working areas as required. Sand, cinders, and/or salt are spread on roadway surfaces to improve traction. Snow and ice are cleared as required, from sidewalks, stairs, and pedestrian access ways.

Section 10
Waste Placement and Filling Progression

10.1 Waste Receipt

Vehicles delivering solid waste enter through the front entrance and are weighed at the scale house where the waste is also screened. After weighing and screening, the vehicles are directed to the appropriate disposal area of the landfill based on the quantity and type of waste in their load.

10.2 Traffic Control

All incoming refuse vehicles are directed by signs to the scalehouse. Incoming and out-going trucks are controlled at the weigh station by traffic signals located adjacent to the scales. Signs, pylons, and/or barricades are used to direct drivers to the working face of the landfill. Signs or personnel will direct small load customers from the weigh station to the small load collection station.

10.3 Haul Roads

Haul roads are constructed to provide safe and convenient traffic flows throughout the site and are maintained. The roads are crowned or sloped to drain stormwater and are sufficiently wide to accommodate the vehicles using the facility.

The roads are periodically cleared of debris, ruts, holes, ponding water, snow, and ice. Maintenance includes periodic scarifying, re-shaping, addition, and compaction of road materials.

10.4 Working Face and Daily Lifts

Spreading and compaction of waste is confined to designated working face(s). The working face width shall not exceed the maximum width that can be covered at the end of the work day. The top of each lift shall be sloped to minimize landfill surface ponding. Solid waste discharged from hauling vehicles is spread into layers which are compacted.

10.5 Compaction

It is anticipated that the equipment on-site will achieve a density of 1,000 pounds per cubic yard.

10.6 Progression of Filling Within Phases

10.6.1 Initial Lift Placement

Special provisions are taken while placing the first two feet of the first lift of solid waste in a new cell. Incoming waste is screened to identify preferential loads to be used for the first two feet of the initial lift and a spotter is present during initial lift placement to identify and remove objects which may cause damage to the liner system.

Waste which contains materials that may be detrimental to the liner system (i.e.; penetrate the protective sand layer and damage the geomembranes) is diverted to an active area where waste is already in place.

A temporary stormwater segregation system, consisting of a tarp, sand berms, and pumps, is used to minimize the amount of stormwater entering the leachate collection system. The tarp is keyed into the sand berms and placed over the top of the leachate collection sand layer so that stormwater can be collected and pumped into the perimeter swale.

10.6.2 General Progression

After initial lift placement, waste will be placed in lifts across the cell to achieve the desired grade. If an area is to be left without receiving waste or final cover intermediate cover will be placed over the waste. Filling may be ongoing in both subcells of Cell 5. For the northern and southern subcells, waste filling operations will generally progress in a southern and northern direction, respectively. Once the two subcells have merged together, waste placement will move primarily in a vertical and eastward direction until final contours are reached.

Waste placement along the western edge of Cell 5 will extend operations slightly above the eastern portion of the Cells 3 and 4 lined area. As waste is placed higher in elevation within the Cell 5, the disposal operations will continue to extend further westward over the Cells 3 and 4 lined area until final closure grades are reached. The filling scheme is presented in the OP drawings. In the event that DSWA chooses to not landfill construction and demolition debris (CDD) separately and not operate the northern portion of Cell 5 separately, then the landfilling sequence may be modified and MSW may be placed in the northern portion of Cell 5.

10.6.3 Trenching into Previous Lift

When filling occurs along final slopes, the operator will generally cut a trench at least two feet wide and two feet deep through the daily cover prior to commencement of waste filling that day.

10.7 Minimization of Surface Water Run-On

Stormwater run-on will be diverted from Cell 5 by several diversion berms constructed at various elevations on the east slope of Cells 3 and 4 (as shown on Drawing G-4). The berms will be removed in stages as the waste disposal operations progress vertically up the eastern slopes of Cells 3 and 4. The staged removal of diversion berms provides an ongoing means for stormwater run-on to continue to be diverted as waste disposal operations move from the Cell 5 disposal footprint onto the Cells 3 and 4 footprint areas.

10.8 Small Load Collection Station

A small load collection station is operated near the entrance of the facility. Roll-off containers are used to contain the waste delivered to this station. The operator empties the containers to provide capacity for the small load collection station customers.

The small load collection station is kept clean and free of vectors. Litter is cleaned routinely.

10.9 Recycling Storage Areas

A recycling storage area is used to temporarily store materials such as tires, white goods, yard waste, drywall, mulch and compost. All stockpile areas are patrolled periodically for litter.

10.10 Dry Waste Recycling

A dry waste management and recycling area may be operated. The management of dry waste will follow the requirements of Appendix C of this Plan of Operation..

Section 11
Leachate Collection System

11.1 System Description

The leachate collection system for Cell 5 is a pipeless design that uses a high capacity, high load drainage net to drain leachate across the bottom of the cell to sumps located in the northwest and southeast corners of the cell. Multiple layers of drainage net are used to convey flow that accumulates along the toe of the containment berm. Trench drains consisting of HDPE pipe embedded in stone are used as contingency conveyance along the toe of berm. Pipeless stone trenches are provided at the midpoints of the subcells to decrease the drainage lengths of flow through the net.

The base liner and drainage net are covered with twenty-four inches of sand having a minimum hydraulic conductivity of $1x10^{-3}$ cm/s. The sand is used to provide vertical drainage and filtration of leachate. It also serves as a protective layer.

A slope riser submersible pump station (PS-5N) is used in the north sump to convey leachate to the leachate storage tanks. The force main uses dual containment piping with leak detection sumps located at low points and connects to the existing Cell 4 force main.

From the Cell 5 south sump, leachate flows out of the cell by gravity pipes through a liner penetration to two external pump stations (PS-5S). One pump station receives primary flow and the other receives secondary flow. The secondary pump station pumps to the primary station wet-well. A force main isinstalled along the south side of Cells 3 and 5 that carries leachate flow from the primary pump station to the leachate tanks. Cell 1, 2, 3, and 4 leachate collection systems will continue to be operated.

The leachate pumps are operated by level controls. Pressure transducers or other suitable level control devices are used to automatically switch the primary pumps on and off based on the liquid level in the sump. A control panel is provided with level meters to monitor the depth of the leachate in the sumps at all times.

Once leachate is pumped to the storage tanks, it may be pumped to the Cell 3, 4, or 5 leachate recirculation system for wetting of waste or pumped into tanker trucks at the truck loading area for delivery to a treatment facility, or another approved treatment or disposal method may be used.

11.2 Diversion of Stormwater for Cell 5

At the beginning of the Cell 5 operation, approximately one half of the cell will be covered with plastic tarp to collect stormwater. The clean stormwater will be diverted from the leachate collection system through the use of pump stations that will pump the water over the containment berm into the stormwater channel. The tarp will

generally remain in place until the area is covered with waste. Cover material will be placed over the waste to divert stormwater as much as practical.

11.3 Maintenance

The perforated leachate collection piping will be pressure cleaned and flushed at a maximum interval of four years 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 clean-out ports. Flow meters shall be flushed clean of grease and debris build-ups on an as needed basis. Pump control panels shall be inspected to check for alarm conditions and normal operations performance.

11.4 Leachate Storage and Disposal

Leachate collected from the landfill will be transported off-site for treatment and disposed or recirculated into Cells 3 through 5. The storage tanks are monitored to ensure that adequate storage is available for high rainfall events. The loading of leachate tanker trucks is generally performed using two people. A laborer or other available landfill staff assists the truck driver. The driver is responsible for monitoring the level of leachate in the truck tank and making sure that no overtopping occurs and that the load is of the proper quantity allowed by state highway weight regulations. The loading area has a pad and sump to collect minor spillage. The laborer operates the pumps to transfer the leachate to the tanker. Quantities are recorded daily.

11.5 Leachate Recirculation

Leachate may be recirculated into Cells 3 through 5 using the pumps located in the pump house adjacent to the storage tanks. DNREC approval must be granted prior to initiating leachate recirculation operations. Valves on the piping network will be manually adjusted to direct leachate to the desired application point.

The pressure of the leachate flow will be monitored at the injection point using a pressure gauge or similar pressure measuring device. The pressure will generally be limited to 15 psi.

11.6 Inspection and Maintenance of Secondary Containment

The secondary containment areas will be inspected for the presence of liquid on weekdays (excluding holidays). Water in the containment area is inspected for color, odor, and conductivity to ensure it is not leachate prior to discharging to the storm water system. Systems are generally pumped out within 48 hours of a storm event to ensure that the holding capacity is not greatly diminished.

Section 12
Leak Detection System

12.1 System Design and Description

The proposed leak detection system is a drainage net installed between the primary and secondary liner systems. The leak detection system grades are parallel to those of the primary leachate collection system and flow to the same sump locations.

12.2 Operation

The leak detection system in Cells 3, 4, and 5 are designed to drain leachate by gravity into the secondary sump. The secondary sump contains submersible pump(s) to convey liquid via forcemain to the leachate storage tanks or to the primary leachate collection sump. Pressure sensors or other suitable monitoring devices will monitor liquid level in the sump at all times. A control panel will be provided with level meters to indicate the depth of the leachate as measured by the pressure sensors. A separate flow meter will be provided for the secondary sump pump. The flow meter will indicate if pumps have removed liquid from the system and will measure and record the amount of liquid removed.

12.3 Maintenance

Accessible leachate collection piping will be pressure cleaned and flushed at a maximum interval of four years 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 clean-out ports. Flow meters shall be flushed clean of grease and debris build-ups on an as needed basis. Pump control panels shall be inspected to check for alarm conditions and normal operations performance.

12.4 Action Leakage Rate

The action leakage rate (ALR) is the flow rate threshold at which response actions are taken. The calculated ALR for Cell 5 is 28 gallons per acre per day (gal/ac/day). The ALR for Cells 3 and 4 are 20 and 20 gal/ac/day, respectively. The leak detection sumps for Cells 3 through 5 will be monitored on a weekly basis. The flow rate from the leak detection layer will be obtained by dividing the total volume of liquid removed from the sump for that monitoring period (as recorded by the flow meter of the secondary sump pump) by the total plan area which contributes flow to that sump by the number of days in that monitoring period to produce an average daily rate in gal/acres/day. This rate is the average flow rate over the monitoring period and assumes that the flow at the beginning of the monitoring period is approximately the same as that at the end of the monitoring period.

In addition to liner leakage, it is possible that some construction water may enter the leak detection system, although it is anticipated that most construction water will dissipate early in the life of the landfill area. It is not anticipated that water will enter

the leak detection system from below the secondary liner since it is a composite liner system. However, in Cell 5 an in gradient groundwater pressure may develop over time due to settlement of this Cell.

If the ALR is exceeded the following steps will be taken:

<u>If the ALR is exceeded once:</u>

1. *Notify DNREC SHWMS in writing and by email within five days of the exceedance.*

<u>If the ALR is exceeded for two consecutive weeks:</u>

1. *Notify DNREC SHWMS in writing and by email within five days of the exceedance,*
2. *Check the pump, level sensors, and hour meter totalizer for any malfunctions or mis-readings,*
3. *Monitor the flows in the leak detection system on a daily basis to assess flaw rate trends,*
4. *Evaluate whether the source of the flow could be stormwater or groundwater by testing the secondary liquid for the parameters required in the facility permit and comparing it to leachate collected from the primary system and measuring groundwater levels in nearby wells,*
5. *Halt leachate recirculation in the affected area,*
6. *Visually inspect the landfill perimeter for signs of infiltrating stormwater and depressions. Make repairs as necessary, and*
7. *Pump out all stormwater in unused cells and visually inspect for signs of damage.*

<u>If the ALR is exceeded for three consecutive weeks:</u>

1. *Notify DNREC SHWMS in writing and by email within five days of the exceedance,*
2. *Begin monthly sampling of the secondary liquid for the parameters required in the facility permit, and*
3. *Review groundwater quality information and the monitoring program downgradient of the affected area.*

<u>If the ALR is exceeded for four or more consecutive weeks;</u>

1. *Notify DNREC SHWMS in writing and by email within five days of the exceedance,*
2. *Evaluate options for additional measures to control liner leachate including but not limited to:*
    a. *Use of tarps to limit infiltration at the working face,*
    b. *Leak location surveys of any areas without waste,*
3. *Calculate the maximum flow capacity of the leak detection system under gravity flow conditions, and*
4. *Submit the results of all leak detection system monitoring to date, a description of all measures taken to reduce liner leakage, the results of the evaluation of possible additional measures to reduce leakage, and a recommended plan for further action to DNREC SHWMS for approval. This recommendation shall be submitted to the*

DNREC SHWMS within 60 days from the date when the ALR was initially exceeded.

Section 13
Landfill Gas Management

13.1 Operational Phase Management

The operational phase landfill gas (LFG) management system for Cell 3, 4, and 5 may include an integrated leachate recirculation system. Cell 1 and 2 have a long-term intermediate cap in place. The Cell 3, 4, and 5 system utilizes a series of permeable blankets or horizontal LFG gas collection trenches installed throughout the waste mound to collect gas for combustion at the Gas-to-Energy facility or for a flare(s). The LFG management system is designed to control gas emissions and odors during the active life of the cell.

Permeable blankets or horizontal LFG gas collection trenches will be installed at designated elevations throughout the waste mass of Cell 5. Perforated and solid piping will be installed to collect and convey LFG to the Gas-to-Energy facility. A vacuum will be applied to produce a negative pressure atmosphere that will promote gas migration to the collection system. Collected LFG will be combusted in the generators of the Gas-to-Energy facility or at a flare station

The landfill gas management plans for the existing Cells 1 through 4 are directed by DSWA's current Title V Operating Permit: AQM-005/00099(R-1), Permit: APC-2006/0179-CONSTRUCTION, et.al.

13.2 Post-Operational Management

Construction of a post-operational LFG management system will be implemented after long-term elevations are achieved. This system may include the installation of vertical wells.

Section 14
Storm Water Management

14.1 Storm Water Management System

Storm water on site is managed through a system comprised of both permanent and temporary structures. Temporary berms, swails, culverts, and pipes direct storm water to perimeter channels surrounding the cells. The channels direct storm water to sedimentation ponds. The sedimentation ponds are designed to settle sediments before releasing the water off-site. Storm water discharges are conducted in accordance with applicable local, State and Federal regulations and permits.

14.2 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.

Erosion control measures include:

- seeding/mulching of disturbed areas;
- installation of erosion matting or sod on slopes and other erosion prone areas;
- use of earthen berms, hay bales, silt fences, 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.

14.3 Maintenance of the Storm Water Management System

14.3.1 Inspection of the Storm Water Management System

The storm water management system and erosion control measures will be inspected monthly. The findings and corrective action will be recorded. Inspection will consist of the following:

- sediment accumulation in ponds and channels;
- erosion of structures or vegetation;
- damaged, missing or nonfunctioning riprap, inlet and outlet structures.

14.3.2 Permanent Storm Water Management System

Permanent stormwater management structures are used to manage the site's stormwater and direct it through channels into ponds. Maintenance of these structures will be performed to provide for their operation in a manner consistent with the intended design. The results of the Inspection will be recorded on an Inspection Form. Maintenance measures include:

- periodic removal of sediment from ponds and channels;
- repair of eroded areas;
- maintenance of riprap, inlet and outlet structures;
- maintenance of swails, culverts and pipes;
- other repairs as needed.

Removal of sediment from the ponds or structural repairs of ponds will be coordinated with DNREC's Sediment and Storm water Program.

14.3.3 Temporary Storm Water Management System

Temporary storm water management measures are used on the active cell to prevent the erosion of the cover and waste, prevent accumulation of standing water, and minimize storm water runoff into the waste. The measures used to maintain the temporary measures include:

- periodic removal of sediment from swails, culverts, and pipes;
- repair of eroded cover and eroded berms;
- maintenance of riprap at pipe inlet and outlet structures;
- other repairs as needed.

Section 15
Record Keeping and Reporting Requirements

15.1 Record Keeping Requirements

Records will be maintained at the DSWA administrative office in Dover, Delaware. 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.

15.2 Reporting Requirements

The reporting requirements outlined in the current regulations and permit requirements shall be followed.

15.2.1 Assessment of Corrective Measures

If the monitoring data indicate that a contaminant release to groundwater or surface water has occurred, DSWA shall notify DNREC within 7 days and proceed to resample for confirmation of a release. Within 90 days of a release, the DSWA shall perform an assessment of corrective measures. This assessment shall include.

- Identification of the nature and extent of the release (which may require construction and sampling of additional wells, geophysical surveys or other measures).
- Re-assessment of contaminant fate and potential contaminant receptors (wells and/or receiving streams).
- Evaluation of feasible corrective measures to:

  1. Prevent exposure to potentially harmful levels of contaminants (exceeding performance standards);
  2. Reduce, minimize or prevent further contaminant releases; and

3. Reduce, minimize or prevent the off-site migration of contaminants.

Section 16
Environmental Monitoring Requirements

Environmental monitoring at the SSWMC is conducted in accordance with an approved environmental monitoring plan. A copy of the environmental monitoring plan is provided in Appendix F.

Section 17
Maintenance of Long Term Intermediate Cover, Cells 1 and 2

The long term intermediate cover on Cells 1 and 2 shall be inspected and maintained according to the Operation and Maintenance Manual, Geomembrane Cap, Cells 1 and 2 attached as Appendix G.

APPENDIX A

Delaware Solid Waste Authority

Policy on Special Solid Wastes

Approved by the Board of Directors on
December 7, 1995
Revised October 27, 2005

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.

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

**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, 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, 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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APPENDIX B

Delaware Solid Waste Authority

Compliance Section
Standard Operating Procedures Manual, Section VII

and

DSWA Solid Waste Screening Program, 1997

Section VII - Solid Waste Screening

A. *Purpose*

To determine that the solid waste received at DSWA Facilities does not conflict with DSWA Regulations, state permit requirements, and/or federal standards.

B. *Basic Information*

1. Sign the facility log book and coordinate with the facility manage or representative and advise that waste screening will be conducted that day. Note the name of the person you advised on the inspection form.

2. Depending on where waste screening will be performed it may be necessary, for safety reasons, to advise the equipment operator(s) of your intent.

3. Wear steel-toed boots/shoes, and safety vest. Coveralls, hardhat, safety glasses, and gloves are optional.

4. Prepare a DSWA Waste Screening Form for use. (Name, Facility, Date)

5. Begin the waste screening by randomly choosing a truck to inspect. **Note the random method chosen on the inspection form.**

6. When the truck backs in and begins to dump in the selected area note the following on the form:
   - The time.
   - The company name on the vehicle.
   - The DSWA License and vehicle number
   - The type of vehicle.

7. As the truck dumps its load, look for any unacceptable wastes such as RED BAG or INFECTIOUS waste, hazardous waste, and PCB waste.

8. When the truck has completed dumping out the load, you can request the compactor driver to spread out the waste and/or you can use a rake to sort through. Identify the waste using the following key:
   - 1 - Household (Bagged residential waste, usually out of a Rear Load truck)
   - 2 - Commercial (Bagged waste, cardboard, paper, etc., usually out of a Front End truck)
   - 3 - Industrial (Manufacturing wastes, etc., can be out of a Front End or a Roll-Off truck)
   - 4 - Dry (Tree stumps, dirt (if tested and approved), leaves, etc., usually out of a dump truck or Roll-Off truck)

- 5 - Construction (Generated from new construction operations. Usually out of a Roll-Off truck)
- 6 - Demolition (Old material generated from demolition operations. Usually out of a Roll-Off truck)
- 7 - Yard (Grass, Leaves, etc. Usually out of a Dump Truck or Rear Load truck)
- 8 - Tires (Customers with more than 4 tires per vehicle will be given the opportunity to weigh in twice to avoid paying tire chare for entire load, and they must move the tires to the tire pile. Licensed Collectors are limited to 10 tires per load to avoid paying the tire rate and having to take them to the tire pile. All tires could go to the tire pile if the customer is willing, and must go if the above limits are exceeded. Sliced tires of any amount is acceptable in the landfill.)
- 9 - Asbestos (Shingles, or insulation... SPECIAL WASTE)
- 10 - Infectious (Red Bagged Hospital waste...ILLEGAL WASTE)
- 11 - Hazardous (Ignitable, Corrosive, Reactive, Toxic...ILLEGAL WASTE)*
- 12 - Out of State (Out of State addresses, Evidence Required...ILLEGAL WASTE)
- 13 - Roadway (Orange bags, usually brought in by DelDot)
- 14 - Transfer (Waste from a DSWA Collection station, usually out of a Roll Off truck)
- 15 – PCB's
- 16 – Radioactive
- 17 – Sludge
- 18 - Other (Any waste not described above. Write a description under comments)

9. Upon completion of the screening, select the next vehicle using the same random method chosen for the screening period.

10. Continue screening for the time period allocated.

11. Submit the completed waste screening form to the Supervisor of Compliance with weekly paperwork or as requested.

* NOTE: Small quantity household hazardous wastes and conditionally exempt small quantity generator wastes are excluded from requirements of the Resource Conservation and Recovery Act (RCRA) Subtitle D.

C. Asbestos

Asbestos is a special waste and requires special preparation prior to disposal.

1. Friable asbestos material – is any material containing more than 1% asbestos as determined using Polarized Light Microscopy (PLM), that when dry, can be crumbled, pulverized, or reduced to powder by hand pressure. This material must be wetted, packaged in leak-proof containers and labeled in accordance with DNREC regulations. It may be landfilled at NSWMC only. Special fees apply.

2. Non-Friable asbestos material – is any material containing more than 1% asbestos as determined using Polarized Light Microscopy (PLM), that when dry, cannot be crumbled, pulverized, or reduced to powder by hand pressure.

   A. Category I – asbestos – containing packings, gaskets, resilient floor covering, and asphalt roofing products. At NSWMC this material must be wetted and may be removed and transported in covered dumpsters or trucks and landfilled unpackaged in this designated asbestos disposal area. At CSWMC and SSWMC this material must be wetted and may be transported in a covered vehicle and off-loaded into a rolloff container specifically dedicated for this purpose. Limit for asbestos contractors is five cubic yards or less. Greater than five cubic yards must be taken directly to NSWMC.

   B. Category II – any material, excluding Category I. For example – Asphalt/vinyl floor tiles, mastic/adhesive, transite materials and house siding. At NSWMC this material must be wetted and packaged in sealed, leak-proof clear plastic wrap or bags with a minimum of two independent layers of 6mil plastic and labeled as asbestos. It is to be placed in the designated asbestos disposal area. At CSWMC and SSWMC the material must be wetted and packaged in leak-proof clear plastic wrap or bags with a minimum of two independent layers of 6mil plastic and labeled as asbestos. It is to be placed in a rolloff container specifically dedicated for this purpose. Limit for asbestos contractors is five cubic yards or less. Greater than five cubic yards must be taken directly to NSWMC.

3. Disposal of all asbestos material at DSWA facilities is subject to the DSWA Asbestos Disposal Procedure which requires at least 24 hour notice to the landfill of any deliveries of asbestos. A copy of DSWA's Asbestos Disposal Form/Waste Shipment Record, properly filled out must accompany each asbestos load. Asbestos will be accepted from 8:00 am to 3:00 pm Monday through Friday only. Unloading must be completed by 4:00 pm

   If Asbestos is delivered other than above, the Compliance Officer should do the following:

   - Do not attempt to handle the waste (except is sampling for a lab test).
   - Secure the area with flags, cones, and/or hazard tape to prevent any type of contact with the material.
   - Ascertain where the load came from. Obtain pull sheet from driver if possible or check through material.
   - Notify the Landfill Manager and the Supervisor of Compliance.
   - Notify DNREC Enforcement Office (1-800-662-8802), Air Quality Management Section (739-4791), and the Solid and Hazardous Waste Branch (739-3689) of what has taken place, and of procedures you will be taking.
   - Comply with DNREC's directions.
   - Take photographs of the material, if it can be done safely.
   - Document all information pertinent to the incident.

- Remain in the area until relieved by competent personnel or until material is cleaned up.
- If possible, request the driver of the vehicle that delivered the waste to remain on site.

D. Infectious Waste

If Infectious waste is received the Compliance Officer should follow the procedure for Asbestos Waste except do not call DNREC Air Quality Management Section.

E. Hazardous Waste

Hazardous wastes are ignitable, corrosive, reactive, or toxic. Containers may have warning labels or placards identifying them as hazardous. * If hazardous waste is received the Compliance Officer should do the following (check your Department of Transportation Emergency Response Guidebook for additional precautions):

- If Hazardous Waste is received, the Compliance Officer should follow the procedure for Asbestos Waste except do not call DNREC Air Quality Management Section.

* NOTE: Small quantity household hazardous wastes and conditionally exempt small quantity generator wastes are excluded from requirements of the Resource Conservation and Recovery Act (RCRA) Subtitle D.

F. PCB's and Other Waste

If PCB's, Liquids, Radioactive materials, Ash or Contaminated soils are found, follow guidelines for Asbestos Waste (C).

G. Out of State Waste

If out of state waste is found do the following:

- Advise the hauler that out of state waste was found.
- Notify the Landfill Manager and Supervisor of Compliance
- Note the hauler's company name, DSWA License number and vehicle number (if applicable), and the time.
- Take photographs of the load.
- Collect Evidence and document to provide a chain of custody.
- Notify the hauler to remove the waste.
- Issue violation.

H. Other

If the waste is other than those mentioned in items C, D, E, F, or G, do the following:

- Document the waste classification under Type Waste on the Inspection form.
- Add any comments or Violations.

DSWA Solid Waste Screening Form

Inspected By:_____ Date:_____ Facility:_____ Contact Person:_____

NO.	TIME	COMPANY NAME	VEH	DSWA #	TYPE WASTE	VIOLATION	COMMENTS
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							

Random method used:_____

Video tape ID or photo ID for this screening:_____

Type of Waste:

1. Household
2. Commercial
3. Industrial
4. Dry
6. Demolition
7. Yard
8. Tires
9. Asbestos
11. Hazardous
12. Out of State
13. Roadway
14. Transfer
16. Radioactive
17. Sludge
18. Other

5. Construction 10. Infectious 15. PCB

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 739-3689
- 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.
Waste Management Section – 1-302-739-3689

The Waste Management Section 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.

APPENDIX C

Alternate Daily Cover and Alternate Intermediate Cover

Plan of Operation
for the
Production of Alternate Daily Cover from Dry Waste

This operating plan is for the production of a ground material comprised of dry waste delivered to the Delaware Solid Waste Authority (DSWA). The intended use of the product is as alternate daily cover (ADC) in DSWA's landfill operations. Dry waste diverted from disposal and recycled on site or sent to market will extend the life of DSWA landfills and reduce the use of virgin cover.

The maximum amount of recyclable dry waste material expected to be received daily at any one facility is 1,000 tons, the maximum amount of dry waste staged prior to processing is 5,000 tons, and the maximum amount of ADC product stored onsite is anticipated to not exceed 5,000 tons.

I. Dry Waste Identification and Acceptance Procedures

Segregated loads of dry waste material are collected by haulers in anticipation of the material being recycled at DSWA facilities. The dry waste is identified at the scalehouse by the hauler and weighmaster. The dry waste is then directed for acceptance at either a recycling location not on the lined area that meets the requirements of the Department or at the currently permitted active disposal cell.

The attendant at the unloading point must be present at the time of unloading. Material will only be accepted at the processing site following further waste screening and inspection of the material once it is unloaded. No out of state material will be accepted for ADC production. The attendant must be familiar with the dry waste acceptance requirements of this Plan, DSWA's Waste Screening Policy, and the types of dry waste not suitable for processing.

Each segregated load of dry waste will be inspected after it is unloaded. Material that is suitable for processing into ADC will be segregated and processed. Material that is identified as not suitable for ADC processing and identified in the facility's operating permit as acceptable for disposal, may be disposed. Material that is identified as not suitable for ADC processing, not suitable for other recycling markets, or is identified in the facility's landfill permit as not acceptable, will be rejected. Material suitable for other recycling markets may be segregated and recycled. The unloaded material may also require special handling should it be suspected of being hazardous or regulated. In the event that the material is suspected of being hazardous or regulated, DSWA will handle the material according to DSWA's current version of its Waste Screening Policy. A flow diagram labeled ADC Plan of Operations – Waste Acceptance Flow Chart - Appendix A, diagrams these alternatives.

II. Equipment Operation and Maintenance

DSWA will use a combination of equipment and manual labor to segregate and handle material. Personal protective equipment (PPE) and workplace safety equipment will be provided and used as required.

The majority of the dry waste will generally be handled by equipment such as loaders, backhoes, or grapple. However, unacceptable material or material that is suitable for landfilling, recycling, or rejection may be removed by hand when it is desirable and safe to do so.

A combination of grinders, screens, backhoes, loaders, excavators and trucks will also be used as needed. All machines will be operated in accordance with manufacturer's recommendation, permits, and this plan of operation. Equipment will be maintained and operated in a manner that protects the environment and the staff.

III. Visual and Analytical Monitoring of the Product

A. Visual Monitoring

Weighmasters initially screen the segregated loads of dry waste at the scalehouse through use of waste screening techniques. DSWA staff at the dry waste recycling location is responsible for conducting an inspection of each segregated load. Inspection will be done by the attendant when observing trucks unload, when the waste is on the ground, and during the loading of the grinder. The attendant will reject waste identified as not acceptable by the landfill's operating permit, this recycling plan, or other recycling activity. Putricible waste or other material acceptable for disposal at the site but unsuitable for processing into ADC will be removed to the extent practical. Appendix B will be used as a guide to reject unsuitable dry waste materials.

B. Analytical Monitoring & Reports and Corrective Action

The ADC product must have: moisture content of 20% or greater and inert material content equal to or greater than 65%. These are herein called the performance standards. Other requirements are listed in Appendix C, Sampling and Analysis Plan.

The ADC product will be sampled and analyzed in accordance with the requirements of Appendix C, Sampling and Analysis Plan. A representative sample of the product will be tested by a professional licensed firm and the results reviewed by DSWA staff or their representative. This analysis will be used to make appropriate adjustments in the process or to take corrective action.

In the event the result of the analysis do not meet the minimum criteria. The process will be reviewed, appropriate action taken, and the testing resumed as outlined in Appendix C. Actions required to maintain compliance with the Sampling and Analysis Plan will be reported in the annual report to the Department.

Test results will be reviewed in a timely manner and will be requested within seven (7) calendar days of sampling.

IV. Training and Emergencies

DSWA staff will be trained in the proper use of the equipment and the recycling process prior to work in ADC production. The manufacturer's representative or another person specifically knowledgeable in the operation of the equipment will conduct equipment training. This training will include the operation, safety features and hazards that might be encountered. DSWA staff knowledgeable in waste screening and the requirements of the SSWMC Plan of Operations for the Production of ADC from Dry Waste, will train individuals responsible for accepting or rejecting materials, handling unacceptable material, and how to respond to hazards.

The following subjects will be covered in training: the manufacturer's operating and maintenance manual, DSWA waste screening policy, SSWMC Emergency and Contingency Plans, the list of materials unacceptable for processing into ADC, and what types of material constitute dry waste.

No smoking will be permitted in the ADC production area.

V. Dust, Litter, Odor, and Leachate Control

Processing equipment will be selected and operated in a manner to meet air permit standards in effect at the site. Dust may be controlled by the use of water sprays on operating equipment or by the addition of water to the input material, or by other effective means.

The DSWA sites currently have in place methods of controlling litter. These include combinations of a daily litter patrol(s), permanent litter fences, and temporary litter fences. These precautions will be supplemented if necessary.

The proposed operation is not expected to generate odors since the material being processed does not readily generate odors.

Leachate production is expected to be minimized and controlled. The material has a reduced potential for environmental degradation and leachate production. The product and feedstock will be stored on an impervious surface or on the landfill cell.

VI. Product Performance Characteristics

Alternate daily cover production shall be monitored and supplemented so that when produced and applied as directed the product will:

(a) Control odors, disease vector breeding, animal attraction, blowing litter, scavenging, and reduce the potential for fires.

(b) Shall consist of at least six (6) inches of ADC material.

(c) The ADC cover layer which remains in place under waste shall not preclude leachate flow downwards towards the leachate collection system.

(d) Exposed ADC cover which remains in place for more than two days shall be inspected at least weekly and shall be maintained as necessary to control odors, disease vector breeding, animal attraction, blowing litter, scavenging, and fires.

VII. Use of the Product

The ADC product will be transported to the working face and applied in a layer that when compacted is at least six (6) inches thick. The material may be transported by use of a loader and truck, or pushed to the working face by dozer or compactor. Soil or other inert material may be added during the processing or handling of the material.

DSWA may establish volumes or weight ratio of amendments to product, or other operational guidelines for meeting the minimum inert requirements, moisture or other criteria specified herein.

VIII. Coincidental Activities

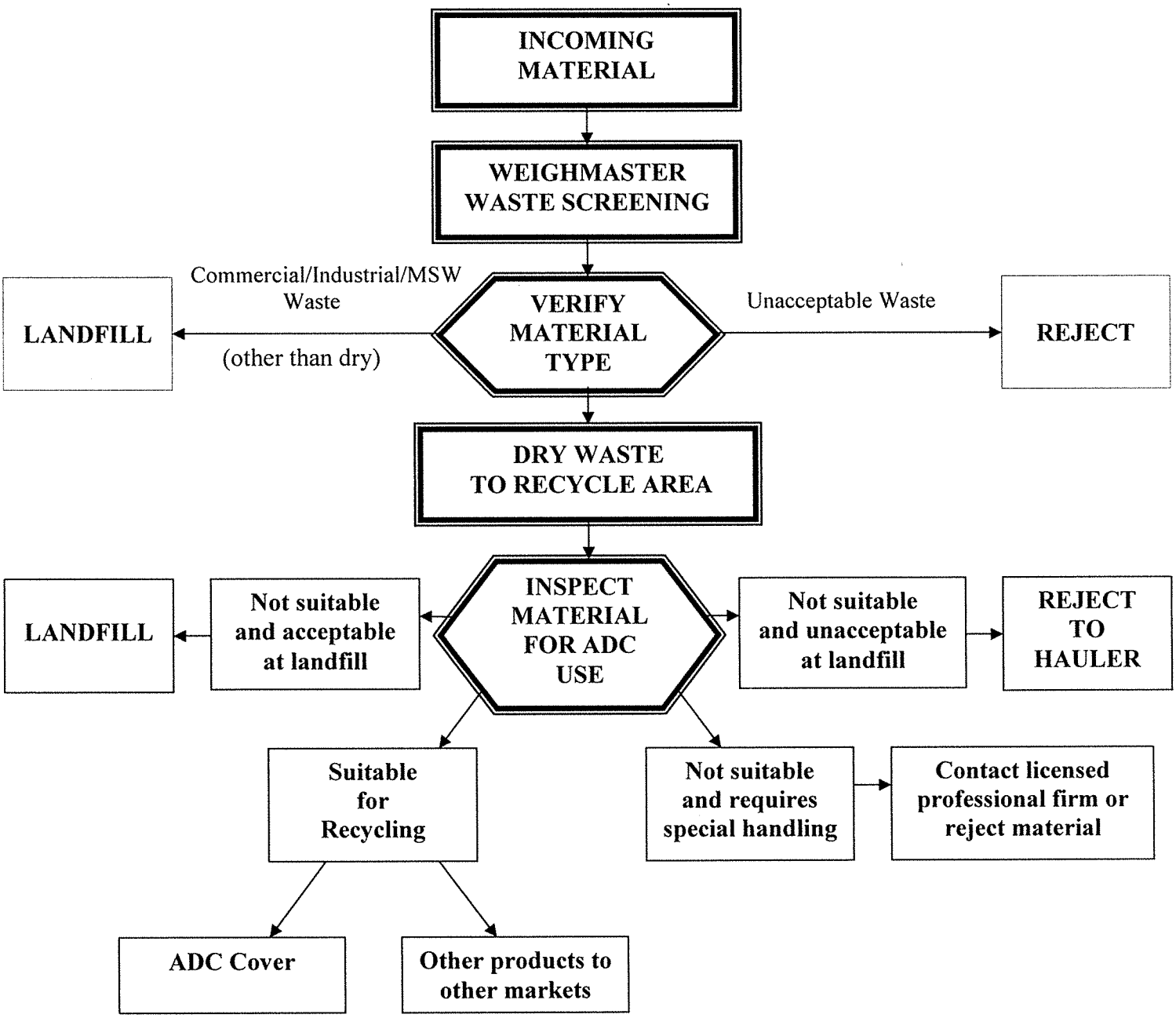
Recyclable materials such as gypsum, cardboard, metal, tires, etc. may be segregated from the dry waste for recycling. Non-recycled components may be processed for volume reduction prior to shipping to disposal, even though ADC processing is not being conducted. Other coincidental activities that do not interfere with ADC production may be conducted.

IX. Record Keeping

DSWA will record the amount of material diverted from the landfill as well as the amount of material recycled to other markets. DSWA will maintain the results of the analytical tests for one year.

WASTE ACCEPTANCE FLOW CHART

APPENDIX A


INCOMING MATERIAL
WEIGHMASTER WASTE SCREENING
VERIFY MATERIAL TYPE
Commercial/Industrial/MSW Waste
(other than dry)
LANDFILL
Unacceptable Waste
REJECT
DRY WASTE TO RECYCLE AREA
INSPECT MATERIAL FOR ADC USE
Not suitable and acceptable at landfill
LANDFILL
Not suitable and unacceptable at landfill
REJECT TO HAULER
Suitable for Recycling
Not suitable and requires special handling
Contact licensed professional firm or reject material
ADC Cover
Other products to other markets

UNACCEPTABLE DRY WASTE

APPENDIX B

Unacceptable Dry Waste for ADC Production

CATEGORIES

Municipal Solid Waste
Infectious Waste
Radioactive Waste
Liquid Waste
Putricible Waste
Hazardous Waste

SPECIFIC MATERIALS[1]

Air Bags
Appliance
Asphalt
Automobile Parts
Batteries
Bedding material for animals
Compressed Gas Cylinders
Creosote Lumber
Dead Animals
Drums and barrels unless open to atmosphere
Electronic Items
Electrical ballasts
Feed for animals
Fire Extinguishers
Fluorescent light bulbs
Fuel tanks unless empty and open to atmosphere
Containers of Paint
Containers of liquids
Manure
Medical Waste
Mobile Homes unless approved under the MHU Recycling Program
Poles from industrial setting
Propane Bottles
Sewage Sludge
Smoke Detectors
Soil contaminated by septic waste
Unapproved Industrial Waste
Unemptied containers of caulk, glazing, adhesive, sealers, solvents, or similar material delivered in containers.
Large loads of plastic film

OTHER MATERIALS [2]

Asbestos
Contaminated Soil

[1]These materials may be rejected and removed by the hauler.
[2]These materials may be removed by the hauler if the hauler have the appropriate means and training.

SAMPLING
AND
ANALYSIS PLAN

APPENDIX C

ANALYTICAL AND PERFORMANCE CRITERIA:

All sampling and analysis shall be done in accordance with the specified analytical method. Where a method is not specified, the methodology of the most current legal edition of "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", EPA Publication Number SW 846.

All samples shall be taken using quality assurance and quality control procedures that ensure samples are representative of the processed dry waste product. Analytical testing of samples will be conducted by a professional licensed firm and the results reviewed by DSWA staff or its representative.

Processed dry waste product from which samples have been collected and await analysis, will not be utilized as ADC until analysis reveal the performance criteria are achieved.

Initial Sampling and Analysis:

The sample for this analysis shall be collected as follows:

During the initial day of operation, grab samples will be collected and a representative daily composite made. The collected composite sample shall be submitted for the full RCRA TCLP, and those in Tables A and B. Performance is achieved when the sample is demonstrated to be non-hazardous and the criteria specified in Tables A and B are fulfilled.

Demonstration Sampling and Analysis:

Upon fulfilling the requirements of Initial Sampling and Analysis, during one operating day each week, for three consecutive weeks, grab samples will be collected and a representative daily composite made. Each collected composite sample shall be submitted for the analysis in Tables A and B. Performance is achieved when the criteria specified in Tables A and B are fulfilled. Upon demonstration the performance criteria of Tables A and B are achieved for the period, less frequent sampling may commence, this being sampling one operating day each month, for two consecutive months. Should analytical results from two consecutive monthly sampling events reveal performance as specified in Tables A and B are achieved, the less frequent sampling and analysis protocols of Verification Sampling and Analysis may be implemented.

Verification Sampling and Analysis:

For one day each quarter, grab samples will be collected and a representative daily composite made. Each collected composite sample shall be submitted for the analysis in Tables A and B. Performance is achieved when the criteria specified in Tables A and B are fulfilled. In the event the performance criteria in Tables A and B are not achieved, following the implementation of corrective measures, DSWA SSWMC shall implement Demonstration Sampling and Analysis to establish the performance criteria in Tables A and B are again achieved.

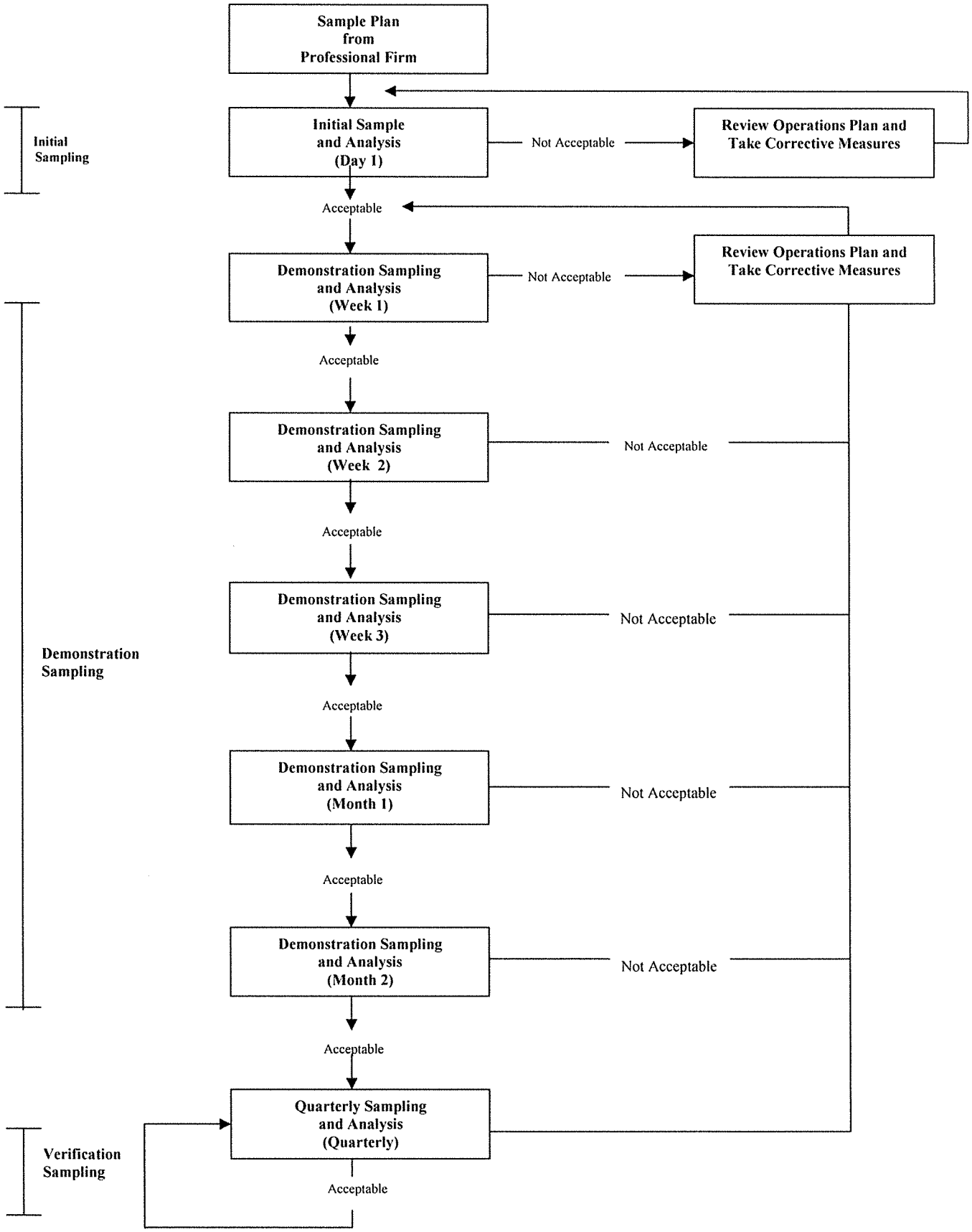
BUD Analytical Requirements

Table A. Analytical and Performance Criteria

Analytical Parameter	Analytical Method	Performance Criteria
Percent Moisture	ASTM D2974	Minimum 20%
Percent Inerts	ASTM D2974 Method C	Minimum 65%
Particle Size	Modified ASTM D422	90% must pass through 2" screen
PCBs	EPA Method 8082	Must not be in excess of 2.3 ppm
Asbestos	PLM Dispersion Staining (40CFR763)	Must contain < 1%
Sulfate Content	EPA Method 9056	Not Applicable

Table B. Analytical and Performance Criteria.
Table B criteria is based on the Site Investigation and Restoration Section's most recent version of Reporting Level Table Values.

Analytical Parameter	Performance Criteria mg/kg	Analytical Method
Arsenic	< 11	SW-846 6010B
Barium	< 15,000	SW-846 6010B
Cadmium	< 71	SW-846 6010B
Copper	< 3,100	SW-846 6010B
Chromium	< 214	SW-846 6010B
Lead	< 400	SW-846 6010B
Mercury	< 11	SW-846 6010B
Selenium	< 390	SW-846 6010B
Silver	< 390	SW-846 6010B


Sample Plan from Professional Firm
Initial Sampling
Initial Sample and Analysis (Day 1)
Not Acceptable
Review Operations Plan and Take Corrective Measures
Acceptable
Demonstration Sampling and Analysis (Week 1)
Not Acceptable
Review Operations Plan and Take Corrective Measures
Acceptable
Demonstration Sampling and Analysis (Week 2)
Not Acceptable
Acceptable
Demonstration Sampling and Analysis (Week 3)
Not Acceptable
Demonstration Sampling
Acceptable
Demonstration Sampling and Analysis (Month 1)
Not Acceptable
Acceptable
Demonstration Sampling and Analysis (Month 2)
Not Acceptable
Acceptable
Quarterly Sampling and Analysis (Quarterly)
Verification Sampling
Acceptable

APPENDIX D

Contingency Plan

CONTINGENCY PLAN

The response of personnel to a serious emergency (such as fire, personnel injury, leachate or fuel spill), that threatens public health, safety, or the environment, shall be as follows:

1. Notify Landfill Supervisor/Supervisor/Facility Manager
2. Notify emergency service (fire department, ambulance).
3. Notify designated official(s) of DSWA.
4. As instructed by supervisor or manager, notify DSWA, DNREC and other State Agency.

EMERGENCY PHONE CONTACTS:

Ambulance: 911

Hospital: 629-6611 – Nanticoke Memorial Hospital, Seaford, DE

Police: 911 Non-Emergency: 855-2980

Fire: 911

911 Address:		Mailing Address:
Administration Office:	28560 Landfill Lane	28560 Landfill Lane
Scalehouse:	28575 Landfill Lane	Jones Crossroads (Rt. 20)
Maintenance Shop:	29074 Landfill Lane	Georgetown, DE 19947

EMERGENCY CO-ORDINATOR: Contact in order listed below.

	FAX	CELL	OFFICE	HOME
Landfill Supervisor				
Adolf Korosec	875-5638	242-0811	875-3448	335-8490
Facilities Operations Supervisor				
Shawn Lovenguth	875-5204	381-4133	875-3448	684-3323
Facility Manager				
James Vescovi	875-5204	542-8276	875-3448	228-1430
Chief of Facilities Management				
Logan V. Miller	739-4287	242-2439	739-5361	736-1911
Safety Coordinator				
Joe Kosciuszko	739-4287	270-5487	739-5361	531-6551

FIRE PROCEDURE:

1. Notify Landfill Supervisor.
2. Dispatch water truck.
3. Call 911 and request Fire Department.
4. Call Facility Manager.
5. Complete incident report or accident report and notify appropriate supervisor.

INJURY TO PERSONNEL:

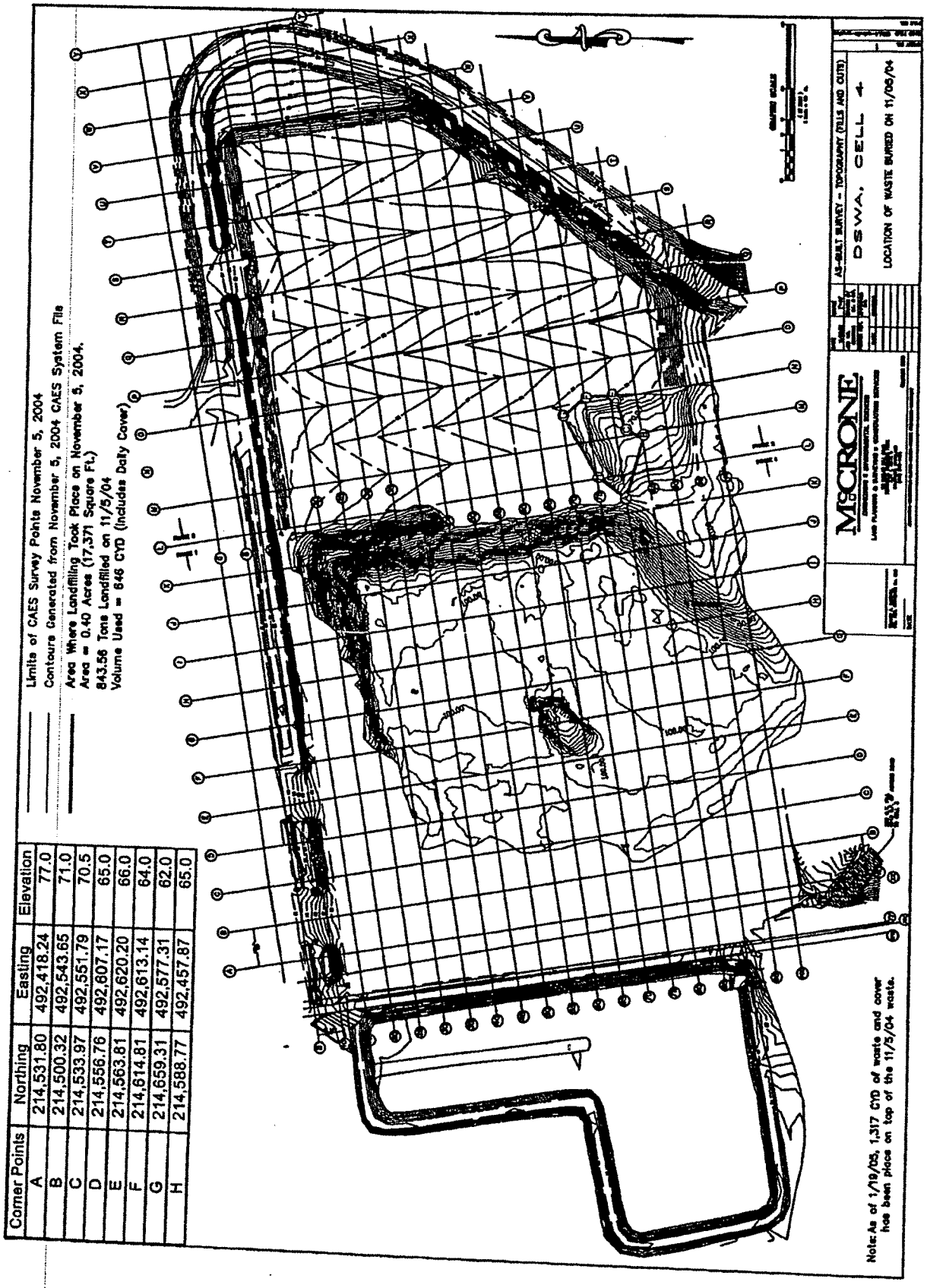
1. Notify Landfill Supervisor.
2. Call 911 and request ambulance.
3. Call Facility Manager if patient is transported to hospital.
4. Complete accident/injury report and notify appropriate Supervisor.

APPENDIX E

Special Precautions Area

Special Precautions Area Information

- The date of reported disposal was November 5, 2004.
- The material was described as C&D waste material reported by DNREC to contain non-friable asbestos.
- The tons landfilled from the load reported to contain the material was
- recorded on ticket 407460 as 8.22 tons

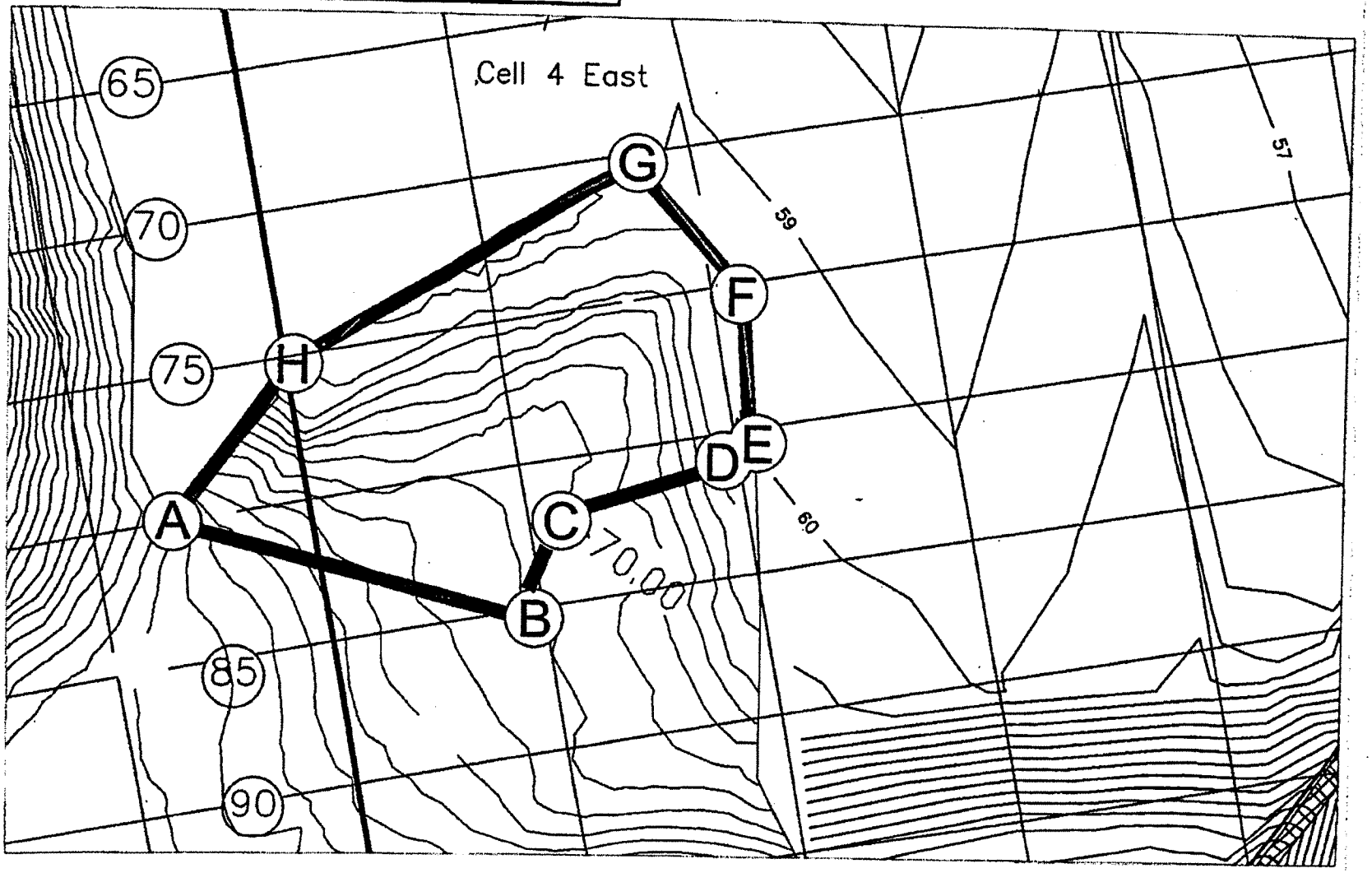

Limits of CAES Survey Points November 5, 2004
Contours Generated from November 5, 2004 CAES System File
Area Where Landfilling Took Place on November 5, 2004.
Area = 0.40 Acres (17,371 Square Ft.)
843.56 Tons Landfilled on 11/5/04
Volume Used = 646 CYD (Includes Daily Cover)
Corner Points | Northing | Easting | Elevation
A | 214,531.80 | 492,418.24 | 77.0
B | 214,500.32 | 492,543.65 | 71.0
C | 214,533.97 | 492,551.79 | 70.5
D | 214,556.76 | 492,607.17 | 65.0
E | 214,563.81 | 492,620.20 | 66.0
F | 214,614.81 | 492,613.14 | 64.0
G | 214,659.31 | 492,577.31 | 62.0
H | 214,588.77 | 492,457.87 | 65.0
Note: As of 1/19/05, 1,317 CYD of waste and cover has been place on top of the 11/5/04 waste.
McCRONE
AS-BUILT SURVEY - TOPOGRAPHY (FILLS AND CUTS)
DSWA, CELL 4
LOCATION OF WASTE BURIED ON 11/05/04

Cover Points	Northing	Easting	Elevation
A	214,531.80	492,418.24	77.0
B	214,500.32	492,543.65	71.0
C	214,533.97	492,551.79	70.5
D	214,556.76	492,607.17	65.0
E	214,563.81	492,620.20	66.0
F	214,614.81	492,613.14	64.0
G	214,659.31	492,577.31	62.0
H	214,588.77	492,457.87	65.0

Limits of CAES System Survey Points from 11/[illegible]/04.
Contours Generated from 11/5/04 CAES System File.

Location of Landfilling on November 5, 2004.
Area = 0.40 Acres (17,371 Sq. Ft.)
843.56 Tons MSW Landfilled in this area.
Volume Used = 646 CYD (Includes Daily Cover).

Note: As of 1/19/05, 1,317 CYD of waste and cover has been place on top of the 11/5/04 waste.



APPENDIX F

Monitoring Plan for the Southern Solid Waste Management Center

MONITORING PLAN
FOR THE
SOUTHERN SOLID WASTE MANAGEMENT CENTER
September 2008 (Revision 6 – January 2017)

This monitoring plan has been designed to update the SSWMC Monitoring Plan for use after landfilling began in Cell 5.

I. FIELD & LABORATORY PROTOCOLS

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

B. Sample crews shall retain and carry field logs documenting their monitoring activities for review by DSWA and the Department. Field records may be in either paper or electronic format.

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

1. SW-846 Most Recent Edition – <u>to be used first</u>;

2. Standard Methods - Most Recent Edition – <u>to be used if methods are not available in I.C.1. above;</u>

3. Other methods as jointly approved by DSWA and DNREC - <u>to be used if methods are not available in I.C.1. or I.C.2. above.</u>

II. HEALTH AND SAFETY

A. With regards to environmental monitoring, no person shall enter any location deemed a confined space.

B. A minimum of two (2) individuals shall be present during all quarterly sampling events.

III. LEACHATE AND SECONDARY DETECTION SYSTEM MONITORING

A. Primary Leachate Collection System (PCS)

1. The PCS shall be designed to measure the rate and quantity of liquids flowing from each subcell on a weekly basis.

2. The PCS shall be designed so that a discreet liquid sample can be collected from each sump.

3. The PCS shall be monitored as described below.

a. DSWA shall measure and record the quantities of liquids pumped from each sump, recirculated, and/or shipped on a weekly basis. These records shall

include the time and date of the event, the origin of the leachate, quantity of leachate, and the destination of the leachate.

b. Leachate samples shall be collected from the PCS of landfill Cells 1, 2, 3, 4, and 5 in accordance with the monitoring schedules and analysis as provided in Exhibit B, Table A.

c. DSWA shall perform quality monitoring of liquids coming into the PCS in accordance with the schedules for monitoring and analysis presented in Exhibit B, Table A.

B. Secondary Detection System (SDS)

1. The SDS shall be designed to measure the rate and quantity of liquids flowing from each subcell on a weekly basis.

2. The SDS shall be designed so that a discreet liquid sample can be collected from each sump.

3. The SDS shall be monitored as described below.

a. DSWA shall measure and record the quantities of liquids pumped from each sump, recirculated, and/or shipped on a weekly basis. These records shall include the time and date of the event, the origin of the leachate, quantity of leachate, and the destination of the leachate.

b. Samples shall be collected from the SDS of landfill Cells 3, 4, and 5 in accordance with the monitoring schedules and analysis as provided in Exhibit B, Table B.

c. After landfilling in a new subcell of Cell 5 has begun, the DSWA shall begin quarterly quality monitoring of liquids coming into the SDS in accordance with the schedules for monitoring and analysis presented in Exhibit B, Table B.

IV. SURFACE WATER MONITORING

A. All surface water staff gauges and surveyed elevation marks shall be maintained.

B. Surface water samples shall be collected and analyzed in accordance with the monitoring schedules provided in Exhibit B, Table C.

C. Quarterly during January, April, July and October, perimeter drainage ditches around the landfill shall be inspected for seeps and discolored liquids. Any seeps or discolored liquids noted shall be reported to DNREC immediately.

D. Discharge from retention basins shall be in compliance with the DRGSW, and *Section 9, Part 6* of the "*Delaware Regulations Governing Stormwater Discharges Associated with Industrial Activity*".

V. GROUNDWATER MONITORING

A. All groundwater monitoring wells shall be constructed, protected and maintained as set forth in the latest version of "*Delaware Regulations Governing the Construction and Use of Water Wells*" (DRGCUWW).

B. Abandonment of any groundwater monitoring wells due to construction activities or inability to provide low turbidity samples will be performed in accordance with the DRGCUWW.

C. The top of inner casings of all groundwater monitoring wells shall be surveyed into established benchmarks for groundwater elevation mapping.

D. Groundwater samples shall be collected in accordance with the Exhibit B: Supplemental Document 1 – DSWA GROUNDWATER SAMPLING PROCEDURES - Procedures adopted by DSWA for collection, preparation, and shipping of groundwater samples collected from DSWA landfill facilities (Revised March 2009)

E. Groundwater samples shall be collected and analyzed according to the schedules provided in Exhibit B, Table D.

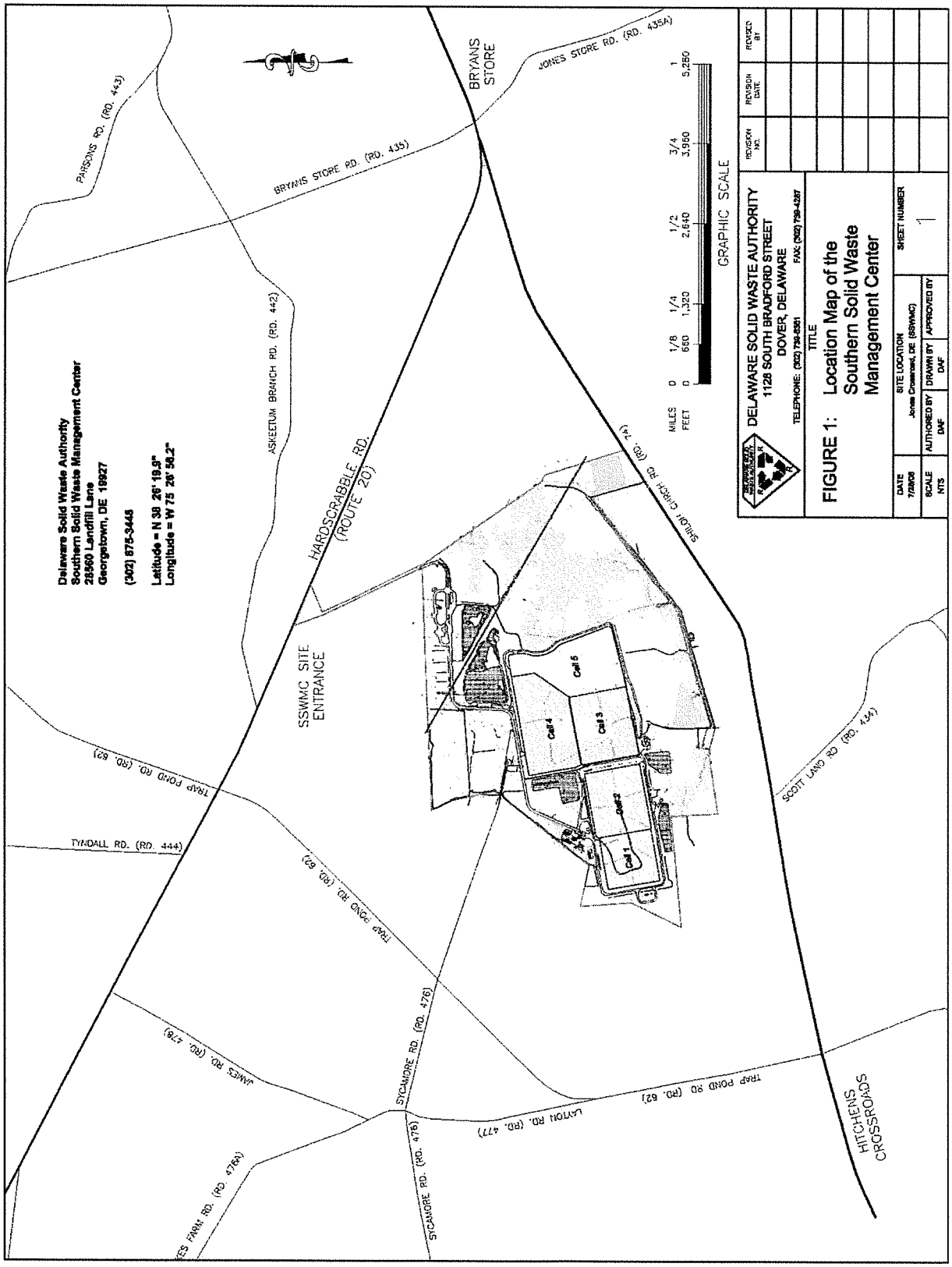
VI. LANDFILL GAS MIGRATION MONITORING

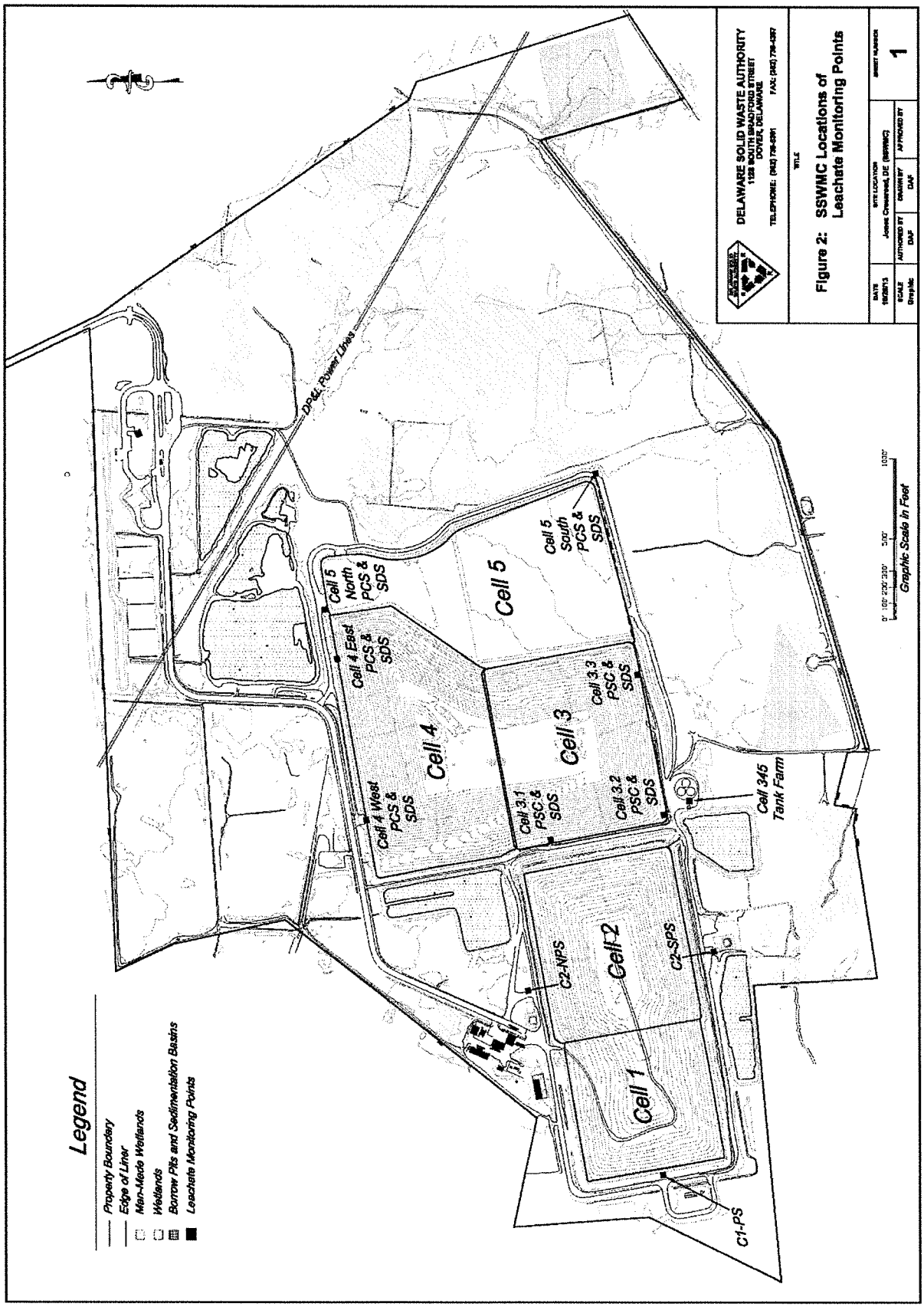
See Exhibit C.

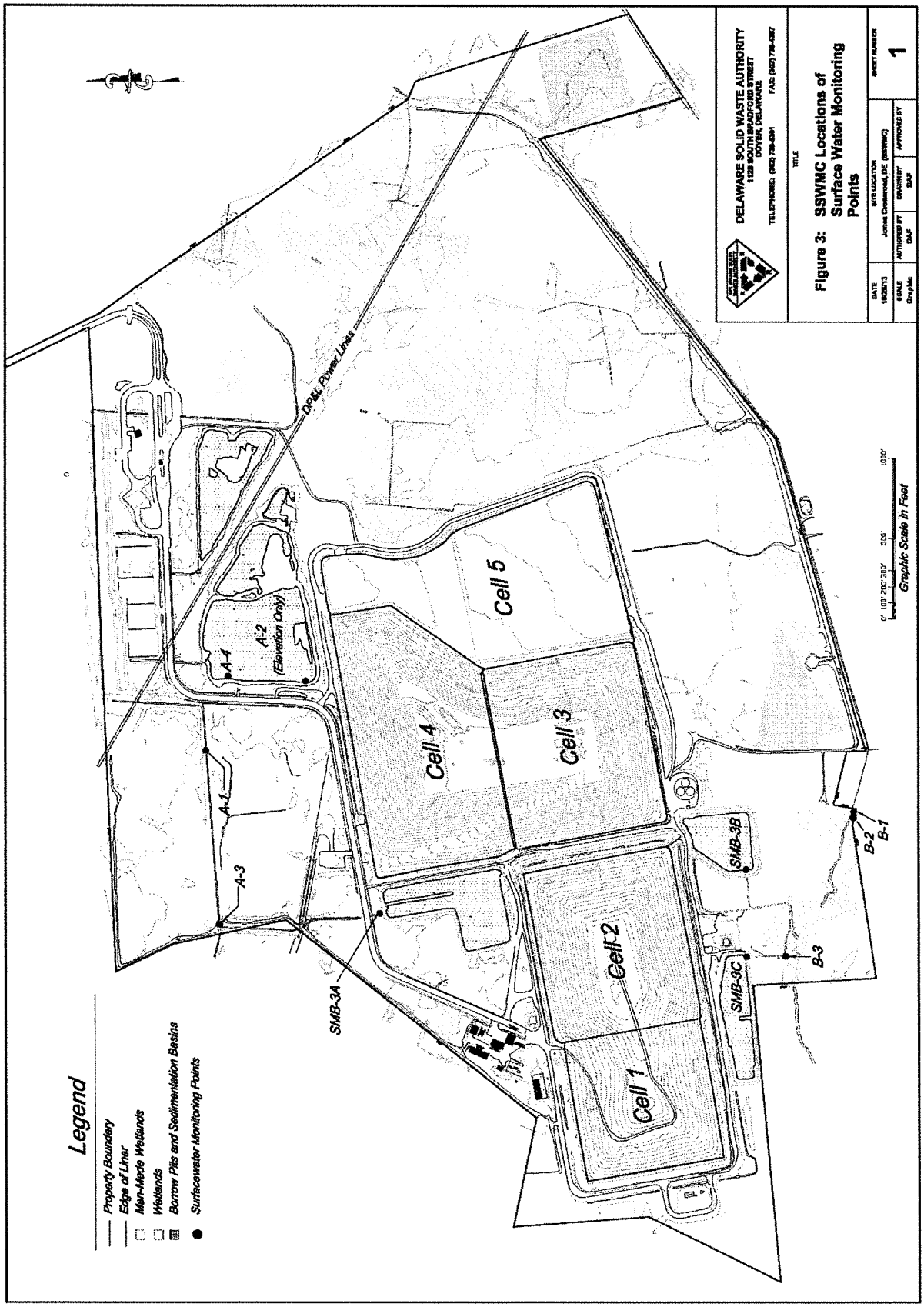
MONITORING PLAN
FOR THE
SOUTHERN SOLID WASTE MANAGEMENT CENTER
September 2008
(Revision Date: January 2017)

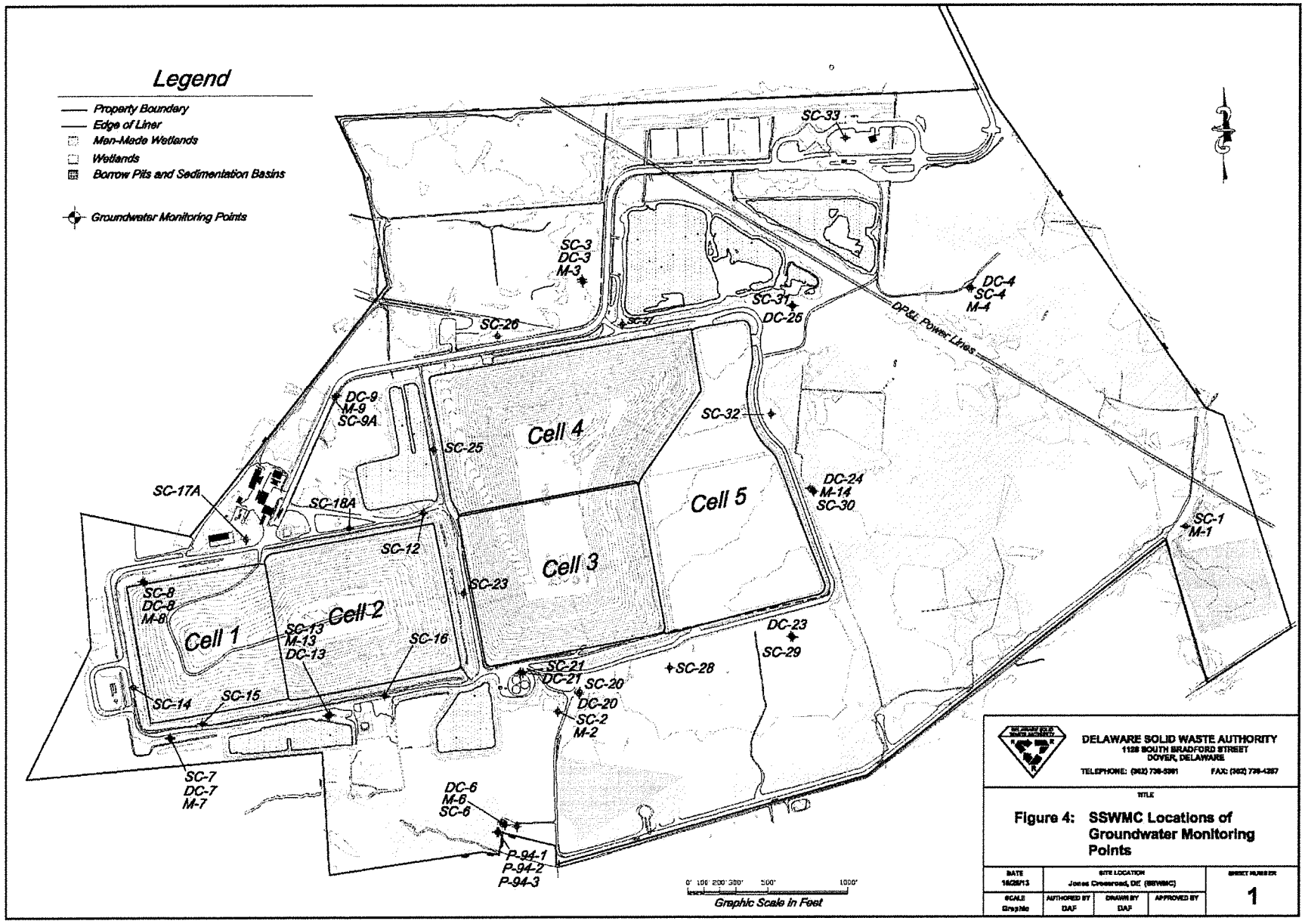
EXHIBIT A:

Figure 1: Location Map of the SSWMC
Figure 2: Location of Groundwater Monitoring Points
Figure 3: Location of Leachate and Secondary Detection System Monitoring Points
Figure 4: Location of Surfacewater Monitoring Points


Delaware Solid Waste Authority
Southern Solid Waste Management Center
28560 Landfill Lane
Georgetown, DE 19927
(302) 875-3445
Latitude = N 38 26' 19.9"
Longitude = W 75 26' 58.2"
PARSONS RD. (RD. 443)
BRYANS STORE RD. (RD. 435)
BRYANS STORE
JONES STORE RD. (RD. 435A)
ASKEETUM BRANCH RD. (RD. 442)
HARDSCRABBLE RD. (ROUTE 20)
SHILOH CHURCH RD. (RD. 74)
SSWMC SITE ENTRANCE
Cell 1
Cell 2
Cell 3
Cell 4
Cell 5
TRAP POND RD. (RD. 62)
TYNDALL RD. (RD. 444)
SCOTT LAND RD. (RD. 434)
JAMES RD. (RD. 476)
SYCAMORE RD. (RD. 476)
LAYTON RD. (RD. 477)
HITCHENS CROSSROADS
MILES 0 1/8 1/4 1/2 3/4 1
FEET 0 660 1,320 2,640 3,960 5,280
GRAPHIC SCALE
DELAWARE SOLID WASTE AUTHORITY
1128 SOUTH BRADFORD STREET
DOVER, DELAWARE
TELEPHONE: (302) 739-5361
FAX: (302) 739-4287
TITLE
FIGURE 1: Location Map of the Southern Solid Waste Management Center
REVISION NO.
REVISION DATE
REVISED BY
DATE 7/22/08
SITE LOCATION Jones Crossroads, DE (SSWMC)
SHEET NUMBER 1
SCALE NTS
AUTHORED BY DAF
DRAWN BY DAF
APPROVED BY


Legend
Property Boundary
Edge of Liner
Man-Made Wetlands
Wetlands
Borrow Pits and Sedimentation Basins
Leachate Monitoring Points
DP&L Power Lines
Cell 1
Cell 2
Cell 3
Cell 4
Cell 5
C1-PS
C2-NPS
C2-SPS
Cell 3.1 PSC & SDS
Cell 3.2 PSC & SDS
Cell 3.3 PSC & SDS
Cell 4 West PCS & SDS
Cell 4 East PCS & SDS
Cell 5 North PCS & SDS
Cell 5 South PCS & SDS
Cell 345 Tank Farm
0' 100' 200' 300' 500' 1000'
Graphic Scale in Feet
DELAWARE SOLID WASTE AUTHORITY
1128 SOUTH BRADFORD STREET
DOVER, DELAWARE
TELEPHONE: (302) 736-4291 FAX: (302) 736-4297
TITLE
Figure 2: SSWMC Locations of Leachate Monitoring Points
DATE 10/28/13
SITE LOCATION Jones Crossroad, DE (SSWMC)
SHEET NUMBER 1
SCALE Graphic
AUTHORED BY DAF
DRAWN BY DAF
APPROVED BY


Legend
Property Boundary
Edge of Liner
Man-Made Wetlands
Wetlands
Borrow Pits and Sedimentation Basins
Surfacewater Monitoring Points
DP&L Power Lines
Cell 1
Cell 2
Cell 3
Cell 4
Cell 5
A-1
A-2
(Elevation Only)
A-3
A-4
SMB-3A
SMB-3B
SMB-3C
B-1
B-2
B-3
0' 100' 200' 300' 1000'
Graphic Scale in Feet
DELAWARE SOLID WASTE AUTHORITY
1128 SOUTH BRADFORD STREET
DOVER, DELAWARE
TELEPHONE: (302) 736-5351
FAX: (302) 736-4267
TITLE
Figure 3: SSWMC Locations of Surface Water Monitoring Points
DATE 10/28/13
SITE LOCATION
Jones Crossroads, DE (SSWMC)
SHEET NUMBER 1
SCALE Graphic
AUTHORED BY DAF
DRAWN BY DAF
APPROVED BY


Legend
Property Boundary
Edge of Liner
Man-Made Wetlands
Wetlands
Borrow Pits and Sedimentation Basins
Groundwater Monitoring Points
SC-33
SC-3
DC-3
M-3
SC-31
DC-26
DC-4
SC-4
M-4
DP&L Power Lines
SC-26
SC-27
DC-9
M-9
SC-9A
SC-25
Cell 4
SC-32
Cell 5
DC-24
M-14
SC-30
SC-1
M-1
SC-17A
SC-18A
SC-12
Cell 3
SC-23
SC-8
DC-8
M-8
Cell 1
Cell 2
SC-13
M-13
DC-13
SC-16
DC-23
SC-29
SC-21
DC-21
SC-28
SC-20
DC-20
SC-2
M-2
SC-14
SC-15
SC-7
DC-7
M-7
DC-6
M-6
SC-6
P-94-1
P-94-2
P-94-3
0' 100' 200' 300' 500' 1000'
Graphic Scale in Feet
DELAWARE SOLID WASTE AUTHORITY
1128 SOUTH BRADFORD STREET
DOVER, DELAWARE
TELEPHONE: (302) 739-5361
FAX: (302) 739-4287
TITLE
Figure 4: SSWMC Locations of Groundwater Monitoring Points
DATE 10/28/13
SITE LOCATION Jones Crossroad, DE (SSWMC)
SHEET NUMBER 1
SCALE Graphic
AUTHORED BY DAF
DRAWN BY DAF
APPROVED BY

MONITORING PLAN
FOR THE
SOUTHERN SOLID WASTE MANAGEMENT CENTER
September 2008
(Revision Date: January 2017)

Exhibit B:

Table A: Schedules For Monitoring Leachates at the SSWMC

Table B: Schedules For Monitoring Liquids from the Secondary Detection Systems at the SSWMC

Table C: Schedules For Monitoring Surfacewaters at the SSWMC

Table D: Schedules For Monitoring Groundwaters at the SSWMC

Table E: DNREC Supplemental List for Semi-Annual Analysis of Leachates from the SSWMC

Table F: Analytical Requirements for Drainage Ditches And Surfacewater Bodies Contacted by Seeps

Table G: DNREC Supplemental List for Annual Analysis of Groundwaters from the SSWMC

Table H: DNREC Supplemental List for Annual Analysis of Groundwaters from SC-28

Supplemental Document 1 –

DSWA GROUNDWATER SAMPLING PROCEDURES - Procedures adopted by DSWA for collection, preparation, and shipping of groundwater samples collected from DSWA landfill facilities (Revised October 2010)

Table A: SSWMC Schedules For Monitoring Leachates at the SSWMC
Field Measurements/Laboratory Measurements and Analysis Required by DSWA SW00/01, and the Cities of Wilmington and Seaford
Revised January 2017

	C1-PS	C2-NPS	C2-SPS	Tanks 3,4,5	Cell 3 PCS 3.1	Cell 3 PCS 3.2	Cell 3 PCS 3.3	Cell 4 East PCS	Cell 4 West PCS	Cell 5 South PCS	Cell 5** North PCS
Analyte/Measurement	Frequency										
Temperature (Field)	M	M	M	M	M	M	M	M	M	M	M
pH (Field)	M	M	M	M	M	M	M	M	M	M	M
Specific Conductance (Field)	M	M	M	M	M	M	M	M	M	M	M
REDOX (Field)	M	M	M	M	M	M	M	M	M	M	M
pH (Lab)	M	M	M	M	M	M	M	M	M	M	M
Specific Conductance (Lab)	M	M	M	M	M	M	M	M	M	M	M
Alkalinity (Total)	M	M	M	M	M	M	M	M	M	M	M
Phenalpthanlein Alkalinity	M	M	M	M	M	M	M	M	M	M	M
Biochemical Oxygen Demand	M	M	M	M	M	M	M	M	M	M	M
Chemical Oxygen Demand	M	M	M	M	M	M	M	M	M	M	M
Chloride	M	M	M	M	M	M	M	M	M	M	M
Ammonia-N	M	M	M	M	M	M	M	M	M	M	M
Nitrate-N	M	M	M	M	M	M	M	M	M	M	M
Nitrite-N	M	M	M	M							
Total Kjeldahl Nitrogen	M	M	M	M							
Total Phosphorus	M	M	M	M							
Sulfate	M	M	M	M	M	M	M	M	M	M	M
Total Dissolved Solids	M	M	M	M	M	M	M	M	M	M	M
Total Organic Carbon	M	M	M	M	M	M	M	M	M	M	M
Total Suspended Solids	M	M	M	M	M	M	M	M	M	M	M
Acetic Acid	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q
Propionic Acid	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q
Butyric Acid	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q
Isobutyric Acid	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q
Valeric Acid	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q
Isovaleric Acid	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q
Arsenic	M	M	M	M	SA	SA	SA	SA	SA	SA	SA
Cadmium *	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
Calcium	M	M	M	M	M	M	M	M	M	M	M
Chromium *	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
Copper	M	M	M	M	SA	SA	SA	SA	SA	SA	SA
Iron	M	M	M	M	M	M	M	M	M	M	M
Lead *	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
Magnesium	M	M	M	M	M	M	M	M	M	M	M
Manganese	M	M	M	M	M	M	M	M	M	M	M
Mercury *	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
Molybdenum	M	M	M	M	SA	SA	SA	SA	SA	SA	SA
Nickel *	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
Potassium	M	M	M	M	M	M	M	M	M	M	M
Selenium *	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
Silver *	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
Sodium	M	M	M	M	M	M	M	M	M	M	M
Zinc	M	M	M	M	M	M	M	M	M	M	M
Cyanide	M	M	M	M	SA	SA	SA	SA	SA	SA	SA
Phenolics (Total)	M	M	M	M	SA	SA	SA	SA	SA	SA	SA
DNREC Supplemental Analysis for Leachates*	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA

M = Monthly Q = Quarterly in January, April, July, and October SA = Semi-Annually in April and October

* See Table E

** Monitoring of Cell 5 North PCS and SDS will not take place until landfill begins within the areas that drain to the pump station.

Revision Date: March 2010
Revision Date: November 2013
Revision Date: January 2017

Table B: SSWMC Schedules For Monitoring Liquids from the Secondary Detections Systems at the SSWMC

Revised January 2017

Field Measurements/Laboratory Measurements and Analysis

Analyte	Temperature (Field)	pH (Field)	Specific Conductance (Field)	REDOX (Field)	Dissolved Oxygen (Field)	Turbidity (Field)	Dissolved Methane	pH (Lab)	Specific Conductance (Lab)	Alkalinity (Total)	Chlorides	Chemical Oxygen Demand	Ammonia-N	Nitrate-N	Sulfate	Total Dissolved Solids	Total Organic Carbon	Arsenic	Calcium	Iron	Magnesium	Manganese	Potassium	Sodium	Zinc
Cell 3 SDSS 3.1	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q
Cell 3 SDSS 3.2	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q
Cell 3 SDSS 3.3	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q
Cell 4 West SDS	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q
Cell 4 East SDS	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q
Cell 5 South SDS	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q
Cell 5 North SDS**	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q

** Monitoring of Cell 5 North PCS and SDS will not take place until landfill begins within the areas that drain to the pump station.

M = Monthly
Q = Quarterly in January, April, July, and October
SA = Semi-Annually in April and October

Revision Date: March 2010
Revision Date: November 2013
Revision Date: January 2017

Table C: Schedules for Monitoring Surfacewaters at the SSWMC

Location	Measurement or Analyte	DTW	Depth To Water in Outfall Pipe	Temperature (Field)	pH (Field)	Specific Conductance (Field)	ORP (Field)	Dissolved Oxygen (Field)	Turbidity (Field)	pH (Lab)	Specific Conductance (Lab)	Alkalinity	Total Hardness	Chloride	Chemical Oxygen Demand	Ammonia-N	Nitrate-N	Sulfate	Total Dissolved Solids	Total Suspended Solids	Total Organic Carbon	Calcium	Iron	Magnesium	Manganese	Potassium	Sodium	Zinc
Askeetum-1	Frequency	Q																										
Askeetum-2 (borrow Pit)		Q																										
Askeetum-3		Q																										
Askeetum-4 (Borrow Pit)				Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q
Beaverdam-1		Q																										
Beaverdam-2		Q																										
Beaverdam-3		Q																										
SMB-3A		Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q
SMB-3B		Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q
SMB-3C		Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q

Q = Quarterly in January, April, July, and October

Table D: Schedules for Monitoring Groundwaters at the SSWMC

Revised: November 19, 2013

Measurement or Analyte	DTW (Field)	Temperature (Field)	pH (Field)	Specific Conductance (Field)	ORP (Field)	Dissolved Oxygen (Field)	Turbidity (Field)	pH (Lab)	Specific Conductance (Lab)	Total Alkalinity (lab)	Chloride (Lab)	C.O.D. (Lab)
Location	Frequency											
SC-1	Q	A	A	A	A	A	A					
SC-2	Q	Q	Q	Q	Q	Q	Q	A	A	A	A	A
SC-3	Q	Q	Q	Q	Q	Q	Q	A	A	A	A	A
SC-4	Q	A	A	A	A	A	A					
SC-5	Q	A	A	A	A	A	A					
SC-6	Q	Q	Q	Q	Q	Q	Q	A	A	A	A	A
SC-7	Q	Q	Q	Q	Q	Q	Q	A	A	A	A	A
SC-8	Q	Q	Q	Q	Q	Q	Q	SA	SA	SA	SA	SA
SC-9A	Q	Q	Q	Q	Q	Q	Q	SA	SA	SA	SA	SA
SC-12	Q	Q	Q	Q	Q	Q	Q	SA	SA	SA	SA	SA
SC-13	Q	Q	Q	Q	Q	Q	Q	SA	SA	SA	SA	SA
SC-14	Q	Q	Q	Q	Q	Q	Q	SA	SA	SA	SA	SA
SC-15	Q	Q	Q	Q	Q	Q	Q	SA	SA	SA	SA	SA
SC-16	Q	Q	Q	Q	Q	Q	Q	SA	SA	SA	SA	SA
SC-17A	Q	Q	Q	Q	Q	Q	Q	SA	SA	SA	SA	SA
SC-18A	Q	Q	Q	Q	Q	Q	Q	SA	SA	SA	SA	SA
SC-20	Q	Q	Q	Q	Q	Q	Q	SA	SA	SA	SA	SA
SC-21	Q	Q	Q	Q	Q	Q	Q	SA	SA	SA	SA	SA
SC-23	Q	Q	Q	Q	Q	Q	Q	SA	SA	SA	SA	SA
SC-25	Q	Q	Q	Q	Q	Q	Q	SA	SA	SA	SA	SA
SC-26	Q	Q	Q	Q	Q	Q	Q	SA	SA	SA	SA	SA
SC-27	Q	Q	Q	Q	Q	Q	Q	SA	SA	SA	SA	SA
SC-28	Q	Q	Q	Q	Q	Q	Q	SA	SA	SA	SA	SA
SC-29	Q	Q	Q	Q	Q	Q	Q	SA	SA	SA	SA	SA
SC-30	Q	Q	Q	Q	Q	Q	Q	SA	SA	SA	SA	SA
SC31	Q	Q	Q	Q	Q	Q	Q	SA	SA	SA	SA	SA
SC32	Q	Q	Q	Q	Q	Q	Q	SA	SA	SA	SA	SA
P94-1	Q											
P94-2	Q											
P94-3	Q											
DC-3	Q	Q	Q	Q	Q	Q	Q	A	A	A	A	A
DC-4	Q	A	A	A	A	A	A					
DC-5	Q	A	A	A	A	A	A					
DC-6	Q	Q	Q	Q	Q	Q	Q	A	A	A	A	A
DC-7	Q	Q	Q	Q	Q	Q	Q	A	A	A	A	A
DC-8	Q	Q	Q	Q	Q	Q	Q	A	A	A	A	A
DC-9	Q	Q	Q	Q	Q	Q	Q	A	A	A	A	A
DC-13	Q	Q	Q	Q	Q	Q	Q	A	A	A	A	A
DC-20	Q	Q	Q	Q	Q	Q	Q	SA	SA	SA	SA	SA
DC-21	Q	Q	Q	Q	Q	Q	Q	SA	SA	SA	SA	SA
DC-23	Q	Q	Q	Q	Q	Q	Q	SA	SA	SA	SA	SA
DC-24	Q	Q	Q	Q	Q	Q	Q	SA	SA	SA	SA	SA
DC-25	Q	Q	Q	Q	Q	Q	Q	SA	SA	SA	SA	SA
M-1	Q	A	A	A	A	A	A					
M-2	Q	SA	SA	SA	SA	SA	SA	A	A	A	A	A
M-3	Q	SA	SA	SA	SA	SA	SA	A	A	A	A	A
M-4	Q	A	A	A	A	A	A					
M-5	Q	A	A	A	A	A	A					
M-6	Q	SA	SA	SA	SA	SA	SA	A	A	A	A	A
M-7	Q	SA	SA	SA	SA	SA	SA	A	A	A	A	A
M-8	Q	SA	SA	SA	SA	SA	SA	A	A	A	A	A
M-9	Q	SA	SA	SA	SA	SA	SA	A	A	A	A	A
M-13	Q	SA	SA	SA	SA	SA	SA	A	A	A	A	A
M-14	Q	SA	SA	SA	SA	SA	SA	A	A	A	A	A

Q = Quarterly in January, April, July, and October SA = Semi-annually in April and October A = Annual in April

* See Table G.

** See Table H.

Revision Date: March 2010
Revision Date: November 2013
Revision Date : January 2017

Table D: Schedules for Monitoring Groundwaters at the SSWMC (Continued)

Revised: November 19, 2013

Measurement or Analyte	Ammonia-N (Lab)	Nitrate-N (Lab)	Sulfate (lab)	T.D.S. (Lab)	T.O.C. (Lab)	Calcium (Lab)	Iron (Lab)	Magnesium (Lab)	Manganese (Lab)	Potassium (Lab)	Sodium (Lab)	Zinc (Lab)	DNREC Supplemental Analysis for Groundwaters*
Location													
SC-1													
SC-2	A	A	A	A	A	A	A	A	A	A	A	A	
SC-3	A	A	A	A	A	A	A	A	A	A	A	A	
SC-4													
SC-5													
SC-6	A	A	A	A	A	A	A	A	A	A	A	A	
SC-7	A	A	A	A	A	A	A	A	A	A	A	A	
SC-8	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	A
SC-9A	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	A
SC-12	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	
SC-13	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	A
SC-14	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	A
SC-15	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	A
SC-16	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	A
SC-17A	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	A
SC-18A	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	A
SC-20	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	A
SC-21	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	A
SC-23	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	A
SC-25	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	A
SC-26	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	
SC-27	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	
SC-28	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	A**
SC-29	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	A
SC-30	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	A
SC31	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	
SC32	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	
P94-1													
P94-2													
P94-3													
DC-3	A	A	A	A	A	A	A	A	A	A	A	A	
DC-4													
DC-5													
DC-6	A	A	A	A	A	A	A	A	A	A	A	A	
DC-7	A	A	A	A	A	A	A	A	A	A	A	A	
DC-8	A	A	A	A	A	A	A	A	A	A	A	A	
DC-9	A	A	A	A	A	A	A	A	A	A	A	A	
DC-13	A	A	A	A	A	A	A	A	A	A	A	A	
DC-20	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	A
DC-21	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	A
DC-23	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	A
DC-24	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	A
DC-25	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	
M-1													
M-2	A	A	A	A	A	A	A	A	A	A	A	A	
M-3	A	A	A	A	A	A	A	A	A	A	A	A	
M-4													
M-5													
M-6	A	A	A	A	A	A	A	A	A	A	A	A	
M-7	A	A	A	A	A	A	A	A	A	A	A	A	
M-8	A	A	A	A	A	A	A	A	A	A	A	A	
M-9	A	A	A	A	A	A	A	A	A	A	A	A	
M-13	A	A	A	A	A	A	A	A	A	A	A	A	
	A	A	A	A	A	A	A	A	A	A	A	A	

Q = Quarterly in January, April, July, and October SA = Semi-annually in April and October A = Annual in April

* See Table G.

** See Table H.

Revision Date: March 2010
Revision Date: November 2013
Revision Date : January 2017

Table E: DNREC Supplemental Listing for Semi Annual Analysis of Leachates

Modified January 2017

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) Mercury
14) Chloroethane	67) 4-Bromophenyl phenyl ether	119) Pyridine	169) Molybdenum
15) 2-Chloroethyl vinyl ether	68) Butylbenzyl Phthalate	120) 1,2,4-Trichlorobenzene	170) Nickel
16) Chloroform	69) 4-Chloro-3-methylphenol	121) 2,4,5 Trichlorophenol	171) Selenium
17) Methyl chloride (Chloromethane)	70) Bis (2-chloroethoxy) methane	122) 2,4,6-Trichlorophenol (2,4,6 T)	172) Silver
18) 1,2-Dibromo-3-chloropropane	71) Bis (2-chloroethyl) ether	**PCBs**	173) Thallium
19) 1,2-Dibromoethane	72) Bis (2-chloroisopropyl) ether	123) PCB-1016	174) Tin
20) Methylene bromide (Dibromomethane)	73) 2-Chloronaphthalene	124) PCB-1221	175) Vanadium
21) trans-1,4-Dichloro-2-butene	74) 2-Chlorophenol	125) PCB-1232	
22) 1,1-Dichloroethane	75) 4-Chlorophenyl Phenyl Ether	126) PCB-1242	
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)	

Revision Date: March 2010
Revision Date: June 2011
Revision Date: January 2013

Table F: Analytical Requirements for Drainage Ditches And Surfacewater Bodies Contacted by Seeps.

Measurement or Analyte	
1)	Temperature (Field)
2)	pH (Field)
3)	Specific Conductance (Field)
4)	REDOX (Field)
5)	Dissolved Oxygen (Field)
6)	Turbidity (Field)
7)	pH (Lab)
8)	Specific Conductance (Lab)
9)	Alkalinity (Total)
10)	Biochemical Oxygen Demand
11)	Chlorides
12)	Chemical Oxygen Demand
13)	Nitrogen (Ammonia)
14)	Nitrogen (Nitrate)
15)	Sulfate
16)	Total Dissolved Solids
17)	Total Organic Carbon
18)	Total Suspended Solids
19)	Arsenic
20)	Cadmium
21)	Calcium
22)	Chromium
23)	Copper
24)	Iron
25)	Lead
26)	Magnesium
27)	Manganese
28)	Mercury
29)	Nickel
30)	Potassium
31)	Silver
32)	Sodium
33)	Tin
34)	Zinc
35)	BTEX
36)	Total Hardness
37)	Oil & Grease (Hexane Extractable)
38)	Oil & Grease (Silica Gel Treated)
39)	alpha Terpineol
40)	Benzoic acid
41)	m/p Cresol
42)	Phenol

Revision Date: March 2010

Table G: DNREC Supplemental List for Annual Analysis of Groundwaters from the SSWMC

1) Antimony	33) 1,1-Dichloroethane
2) Arsenic	34) 1,2-Dichloroethane
3) Barium	35) 1,1-Dichloroethene
4) Beryllium	36) cis-1,2-Dichloroethene
5) Cadmium	37) trans-1,2-Dichloroethene
6) Chromium	38) 1,2-Dichloropropane
7) Cobalt	39) cis-1,3-Dichloropropene
8) Copper	40) trans-1,3-Dichloropropene
9) Lead	41) Ethyl Ether
10) Nickel	42) Ethylbenzene
11) Selenium	43) Methyl butyl ketone (2-Hexanone)
12) Silver	44) Methyl bromide (Bromomethane)
13) Thallium	45) Methyl chloride (Chloromethane)
14) Vanadium	46) Methylene bromide (Dibromomethane)
15) Zinc	47) Methylene chloride (Dichloromethane)
16) Acetone	48) Methyl ethyl ketone (2 Butenone)
17) Acrylonitrile	49) Methyl iodide (Iodomethane)
18) Benzene	50) 4-Methyl-2-pentanone
19) Bromochloromethane	51) Styrene
20) Bromodichloromethane	52) 1,1,1,2-Tetrachloroethane
21) Bromoform	53) 1,1,2,2-Tetrachloroethane
22) Carbon disulfide	54) Tetrachloroethene
23) Carbon terachloride	55) Toluene
24) Chlorobenzene	56) 1,1,1-Trichloroethane
25) Chloroethane	57) 1,1,2-Trichloroethane
26) Chloroform	58) Trichloroethene
27) Dibromochloromethane	59) Trichlorofluoromethane (CFC-11)
28) 1,2-Dibromo-3-chloropropane	60) 1,2,3-Trichloropropane
29) 1,2-Dibromoethane	61) Vinyl acetate
30) 1,2-Dichlorobenzene (o-Dichlorobenzene)	62) Vinyl chloride
31) 1,4-Dichlorobenzene (p-Dichlorobenzene)	63) Xylenes
32) trans-1,4-Dichloro-2-butene	

Table H: DNREC Supplemental List for Annual Analysis of Groundwaters from SC-28

	Analyte
1)	Antimony
2)	Arsenic
3)	Barium
4)	Beryllium
5)	Cadmium
6)	Chromium
7)	Cobalt
8)	Copper
9)	Lead
10)	Nickel
11)	Selenium
12)	Silver
13)	Thallium
14)	Vanadium
15)	Zinc

MONITORING PLAN
FOR THE
SOUTHERN SOLID WASTE MANAGEMENT CENTER
September 2008
(Revision Date: March 2010)

Exhibit C:

SSWMC LANDFILL GAS MIGRATION MONITORING

Southern Solid Waste Management Center (SSWMC)
Landfill Gas Migration Monitoring Plan (Rev 1.)
Permit: SW-00/01

March 2010

I. Background

A. This plan has been developed to comply with:

1. Section 5.5.3. of the Delaware Regulations Governing Solid Waste (DRGSW);

2. Permit SW-00/01 Section V.E. dated May 17, 2000.

B. This plan covers landfill gas migration monitoring at the perimeter of the facility and in structures located within the boundaries of the SSWMC property line. The landfill gas migration monitoring is performed to insure the health and safety of all persons on or near the landfill with regards to explosive gas.

II. Gas Monitoring Instrumentation

A. Lantec GEM 500 or 2000, or Foxboro TVA-1000 shall be used for monitoring structures and perimeter gas piezometers. The target gases of concern are:

1. Methane (% by volume)
2. Oxygen (% by volume)

III. Permit Monitoring

A. Quarterly Monitoring

1. DSWA or its contractor(s) shall monitor methane and oxygen in the perimeter gas piezometers (PGPs) stationed along the property boundaries of the site as shown in Inspection Form 1 (Exhibit C, Page 3).

2. Gas measurements shall be recorded on Inspection Form 1.

3. DSWA or its contractor(s) shall monitor for the target gases listed in II.A. above, in structures inside the facility property line as shown in Inspection Form 2 (Exhibit C, Page 4).

4. Measurements of each target gas shall be recorded on Inspection Form 2.

5. During each quarterly monitoring event, meteorological information from the on-site weather station shall be recorded on each inspection form. The minimum information to be recorded shall include:

- Time
- Temperature
- Barometric Pressure
- Wind Speed
- Wind Direction
- % Cloud Cover
- General weather conditions

IV. Exceedances

A. If the explosive gas concentration in SSWMC structures or PGPs exceeds 25% of the lower explosive limit (LEL = 1.25% by volume) of methane, DSWA will follow the Response Actions defined in DRGSW Section 5.E.4.a. Specifically:

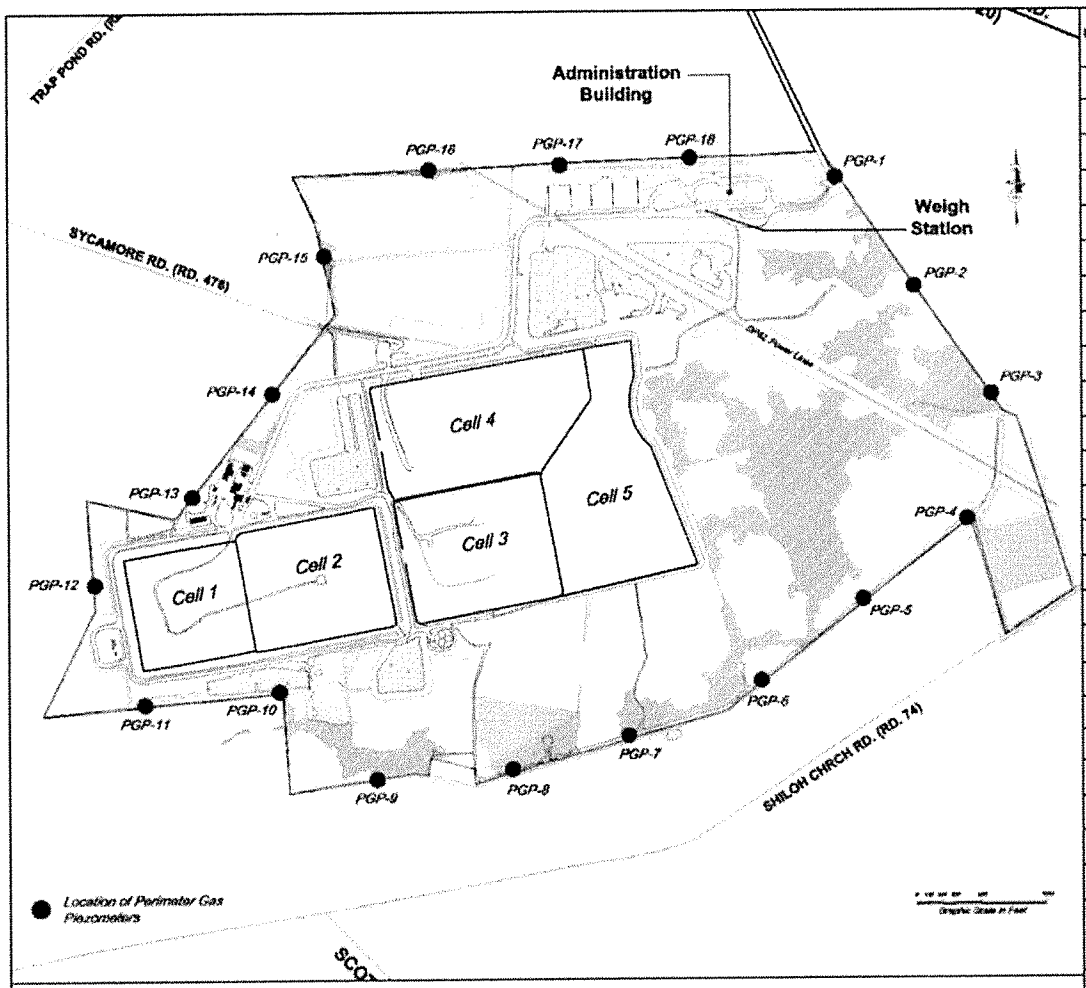
1. Immediately take all necessary steps to ensure protection of human health, and notify the Department.

2. Within seven (7) days of detection, place in the operating record, the levels of methane detected and a description of steps taken to protect human health.

3. Within 60 days of detection, implement a remediation plan for the methane releases, place a copy of the plan in the operating record, and notify the Department that the remediation plan has been implemented. The plan shall describe the nature and extent of the problem, and the proposed remedy.

V. Recordkeeping

A copy of the completed Inspection forms shall be kept as part of the facility records. These forms shall be included as part of the Annual Environmental Monitoring Report submitted to the DNREC Solid and Hazardous Waste Branch by April 30, each calendar year.



MONITORING STATION	CH_4 (%)	CO_2 (%)	O_2 (%)	BALANCE (%)
PGP-1				
PGP-2				
PGP-3				
PGP-4				
PGP-5				
PGP-6				
PGP-7				
PGP-8				
PGP-9				
PGP-10				
PGP-11				
PGP-12				
PGP-13				
PGP-14				
PGP-15				
PGP-16				
PGP-17				
PGP-18				

WEATHER INFORMATION	
Time:	
Temperature:	°F
RH:	%
Solar Rad.:	Kcals/cm²
Barometric P.:	Inches-Hg
Wind Speed:	MPH
Wind Dir.:	Deg. True
Cloud Cover:	%
IS PRECIPITATION OCCURING? CIRCLE ONE.	YES NO

DELAWARE SOLID WASTE AUTHORITY

SOUTHERN SOLID WASTE MANAGEMENT CENTER

INSPECTION FORM 1

QUARTERLY PERIMETER GAS PIEZOMETER INSPECTION FORM

INSTRUMENTS USED FOR AIR QUALITY MONITORING

METHANE: LANDTEC GEM 500 OR 2000

WEATHER: CSI WEATHER STATION

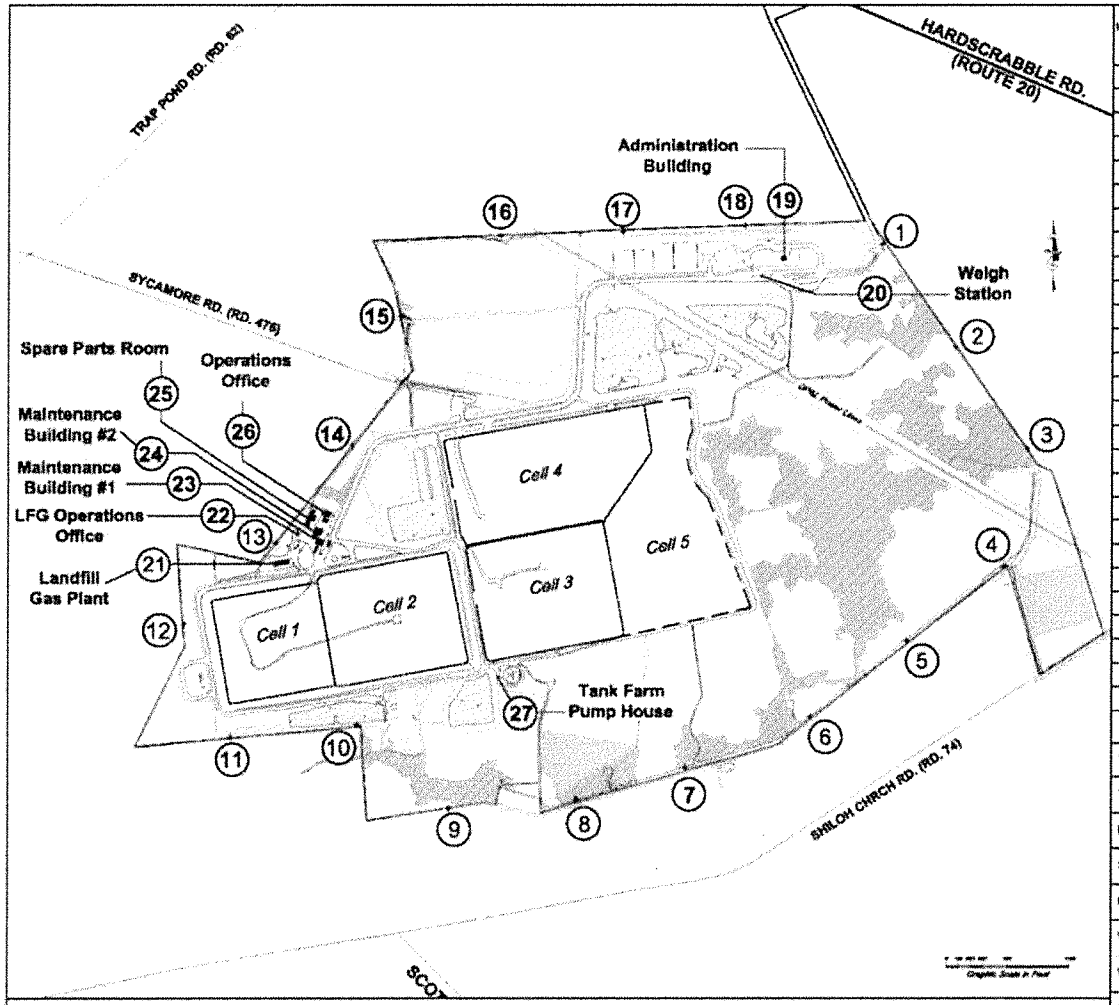
drawn by	approved	drawing no.
DAF		
checked	date 8/12/08	scale No Scale

INSPECTED BY _____ DATE _____

Calibration Log

GEM 500 or 2000

NOTES



MONITORING LOCATION	% CH_4 DETECTED		% CH_4 IF DETECTED	DOORS DETECTED		H_2S DETECTED		ppm H_2S IF DETECTED
	YES	NO		YES	NO	YES	NO	
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
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24								
25								
26								
27								

WEATHER INFORMATION	
Time:	
Temperature:	°F
RH:	%
Solar Rad.:	Kcals/cm²
Barometric P.:	Inches Hg
Wind Speed:	MPH
Wind Dir.:	Deg. True
Cloud Cover:	%
IS PRECIPITATION OCCURING? CIRCLE ONE:	YES NO

DELAWARE SOLID WASTE AUTHORITY

SOUTHERN SOLID WASTE MANAGEMENT CENTER

INSPECTION FORM 2

QUARTERLY FENCELINE/BUILDING INSPECTION FORM FOR MIGRANT LANDFILL GAS

INSTRUMENTS USED FOR AIR QUALITY MONITORING

METHANE:	LANDTEC GEM 500 OR 2000
HYDROGEN SULFIDE:	JEROME 631X
WEATHER:	CSI WEATHER STATION

drawn by	approved	drawing no.
DAF		
checked	date	scale
	MR0510	No Scale

INSPECTED BY _____ DATE _____

Calibration Log

GEM 500 or 2000

Jerome 631X

DSWA GROUNDWATER SAMPLING PROCEDURES

(Revision 1 – October 10, 2012)

Exhibit B – Supplemental Document 1

Background	Implementation of the Slow Purge Method
Section I	Monitoring
Section II	Analytical Methodology
Section III	Well Head Protection/Security
Section IV	Well Construction
Section V	Well Locations
Section VI	Well Modifications for Current Sampling Protocols
Section VII	Sample Collection Procedures
Section VIII	Groundwater Sample Collection
Section IX	Groundwater Monitoring Well Sampling
Section X	Quality Assurance/Quality Control
Section XI	Supply Disposal
Section XII	Reporting

Modification 1 – March 2009
Modification 2 – October 2012

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 12 of these procedures. These samples shall be analyzed in accordance with the schedules provided in Table 1 on page 17 and 18 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 working pads enclosed by bollards as shown in Figures 2 through 4 on Pages 13 through 16 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

All wells 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 2 through 4 on Pages 13 through of this Plan. If the static head is beyond 25' in depth, a variable speed 2" sampling pump may be used for purging and sample collection.

VII. Sample Collection Procedures

The following presents the methods by which DSWA collects or has its 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 its 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 manufacturer's suggested schedules.

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 facilities, 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 is 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.

K. After sampling has been completed, the sample crew is required to cap off the well, closed the locking well lid and secure the well by locking the lid.

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 facility 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

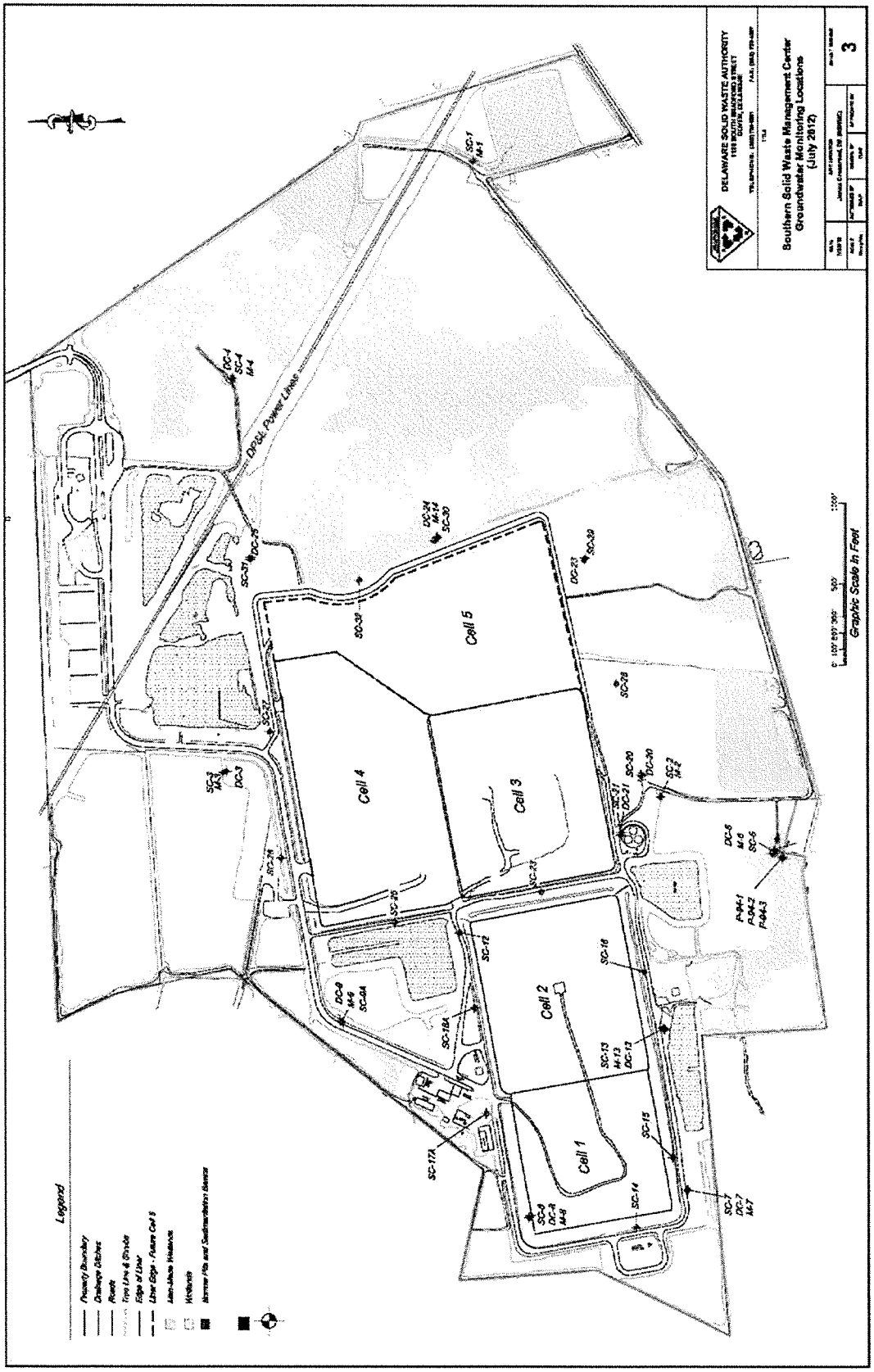
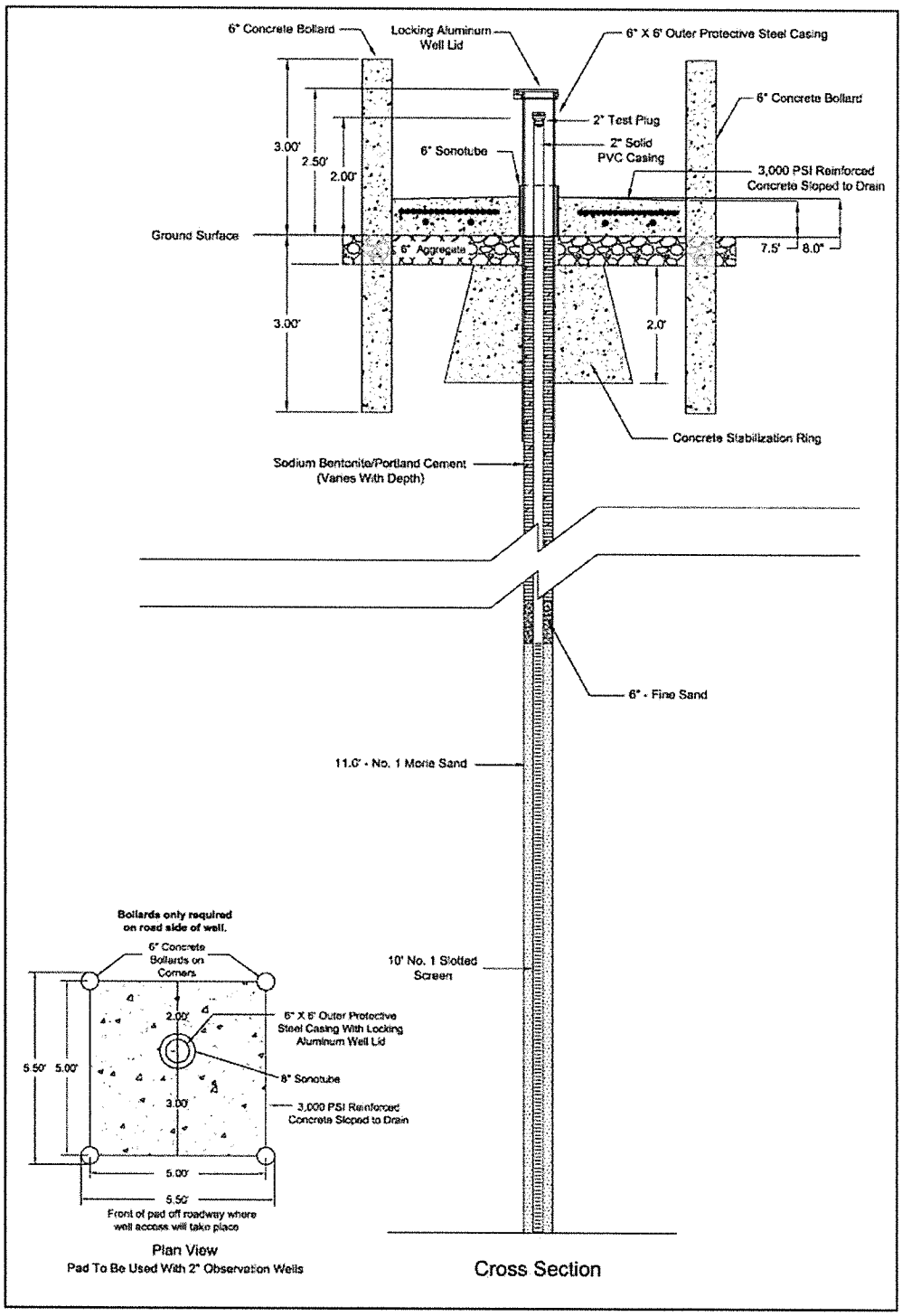

DELAWARE SOLID WASTE AUTHORITY
Southern Solid Waste Management Center
Groundwater Monitoring Locations
(July 2012)
3
Cell 1
Cell 2
Cell 3
Cell 4
Cell 5
DP&L Power Lines
Graphic Scale in Feet
Legend

Figure 2

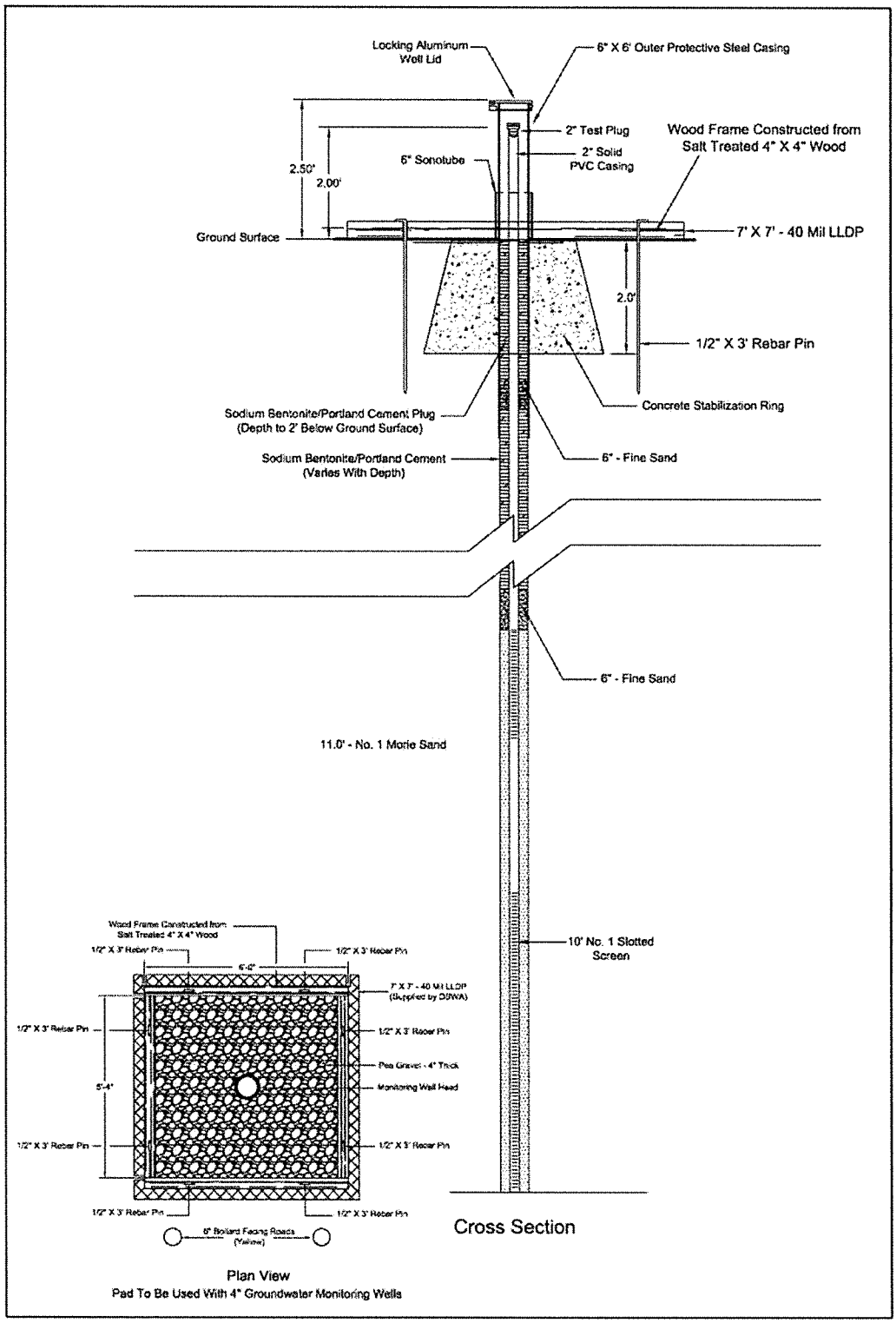


Construction Details

2" Observation Wells/Groundwater Monitoring Wells

(Monitoring Wells Down To 30' Below Grade With Rock or Sandy Subsoils)

Figure 3

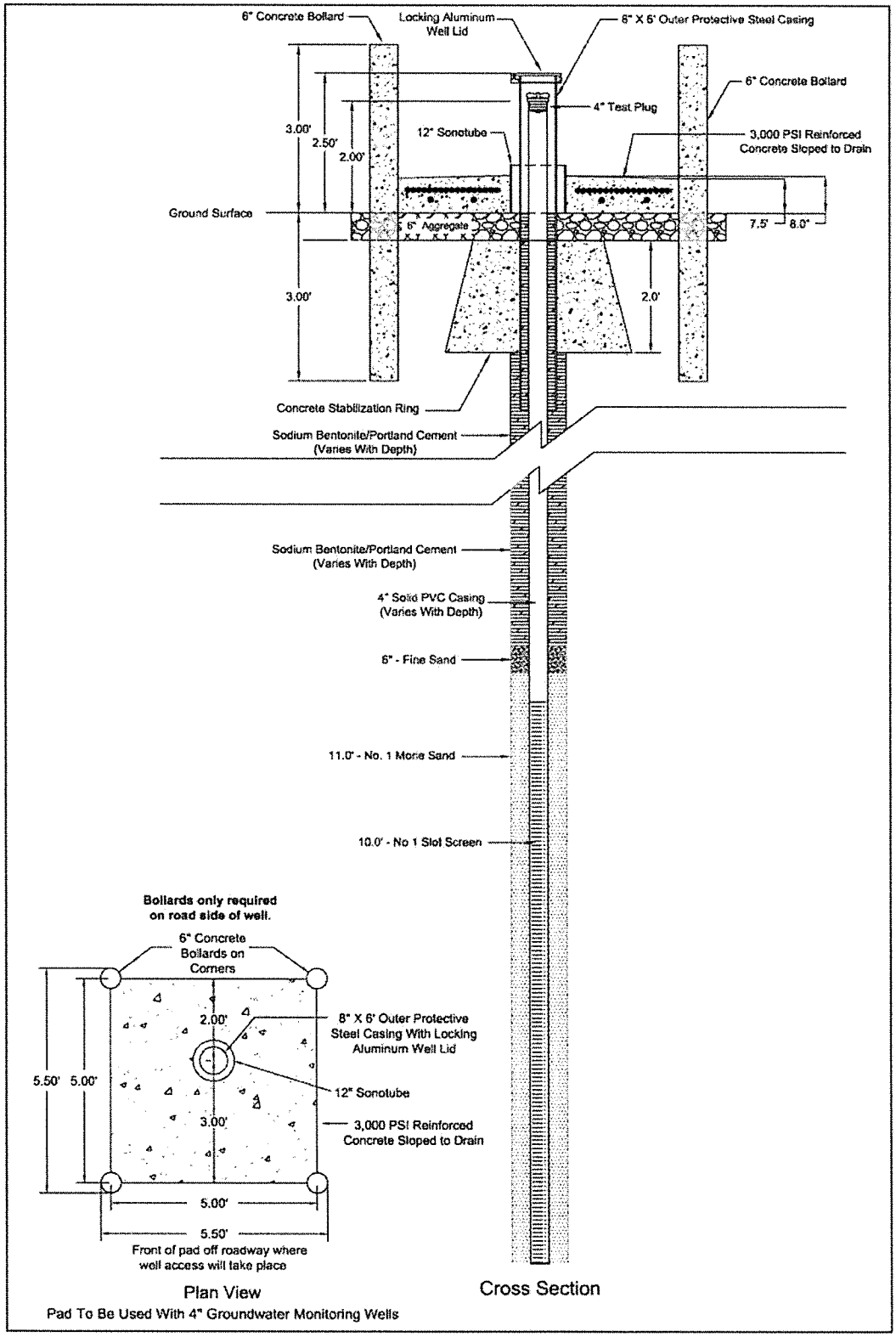


Construction Details

2" Observation Wells/Groundwater Monitoring Wells

(Monitoring Wells Down To 30' Below Grade With Clay and Silt Subsoils)

Figure 4

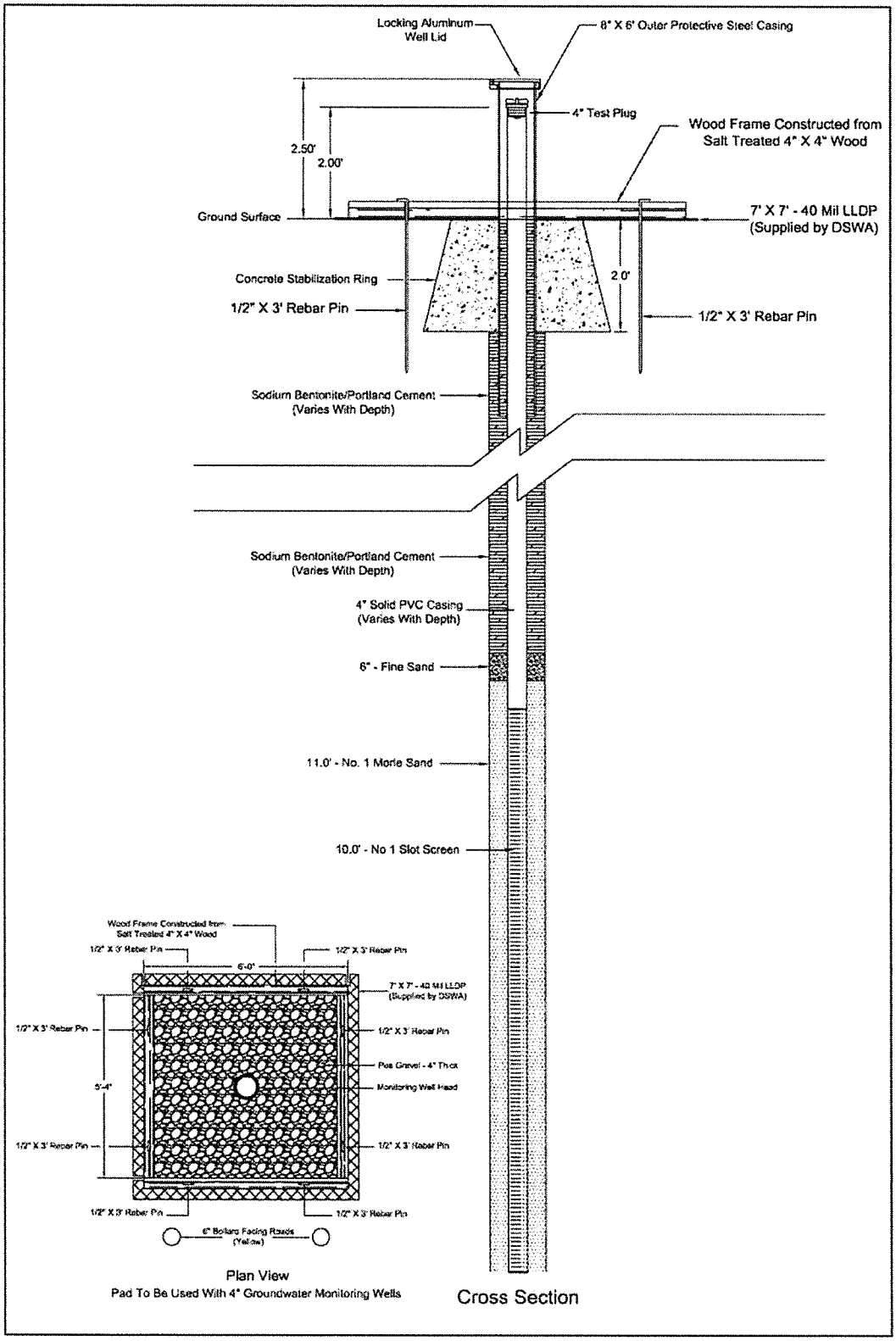


Construction Details

4" Groundwater Monitoring Wells

(Monitoring Wells Deeper Than 30' Below Grade With Rock or Sandy Subsoils)

Figure 5



Construction Details

4" Groundwater Monitoring Wells

(Monitoring Wells Deeper than 30' with Clay and Silt Subsoils)

Table 1: Schedules for Monitoring Groundwaters at the SSWMC

Revised: November 19, 2013

Measurement or Analyte	DTW (Field)	Temperature (Field)	pH (Field)	Specific Conductance (Field)	ORP (Field)	Dissolved Oxygen (Field)	Turbidity (Field)	pH (Lab)	Specific Conductance (Lab)	Total Alkalinity (lab)	Chloride (Lab)	C.O.D. (Lab)
Location	Frequency											
SC-1	Q	A	A	A	A	A	A					
SC-2	Q	Q	Q	Q	Q	Q	Q	A	A	A	A	A
SC-3	Q	Q	Q	Q	Q	Q	Q	A	A	A	A	A
SC-4	Q	A	A	A	A	A	A					
SC-5	Q	A	A	A	A	A	A					
SC-6	Q	Q	Q	Q	Q	Q	Q	A	A	A	A	A
SC-7	Q	Q	Q	Q	Q	Q	Q	A	A	A	A	A
SC-8	Q	Q	Q	Q	Q	Q	Q	SA	SA	SA	SA	SA
SC-9A	Q	Q	Q	Q	Q	Q	Q	SA	SA	SA	SA	SA
SC-12	Q	Q	Q	Q	Q	Q	Q	SA	SA	SA	SA	SA
SC-13	Q	Q	Q	Q	Q	Q	Q	SA	SA	SA	SA	SA
SC-14	Q	Q	Q	Q	Q	Q	Q	SA	SA	SA	SA	SA
SC-15	Q	Q	Q	Q	Q	Q	Q	SA	SA	SA	SA	SA
SC-16	Q	Q	Q	Q	Q	Q	Q	SA	SA	SA	SA	SA
SC-17A	Q	Q	Q	Q	Q	Q	Q	SA	SA	SA	SA	SA
SC-18A	Q	Q	Q	Q	Q	Q	Q	SA	SA	SA	SA	SA
SC-20	Q	Q	Q	Q	Q	Q	Q	SA	SA	SA	SA	SA
SC-21	Q	Q	Q	Q	Q	Q	Q	SA	SA	SA	SA	SA
SC-23	Q	Q	Q	Q	Q	Q	Q	SA	SA	SA	SA	SA
SC-25	Q	Q	Q	Q	Q	Q	Q	SA	SA	SA	SA	SA
SC-26	Q	Q	Q	Q	Q	Q	Q	SA	SA	SA	SA	SA
SC-27	Q	Q	Q	Q	Q	Q	Q	SA	SA	SA	SA	SA
SC-28	Q	Q	Q	Q	Q	Q	Q	SA	SA	SA	SA	SA
SC-29	Q	Q	Q	Q	Q	Q	Q	SA	SA	SA	SA	SA
SC-30	Q	Q	Q	Q	Q	Q	Q	SA	SA	SA	SA	SA
SC31	Q	Q	Q	Q	Q	Q	Q	SA	SA	SA	SA	SA
SC32	Q	Q	Q	Q	Q	Q	Q	SA	SA	SA	SA	SA
P94-1	Q											
P94-2	Q											
P94-3	Q											
DC-3	Q	Q	Q	Q	Q	Q	Q	A	A	A	A	A
DC-4	Q	A	A	A	A	A	A					
DC-5	Q	A	A	A	A	A	A					
DC-6	Q	Q	Q	Q	Q	Q	Q	A	A	A	A	A
DC-7	Q	Q	Q	Q	Q	Q	Q	A	A	A	A	A
DC-8	Q	Q	Q	Q	Q	Q	Q	A	A	A	A	A
DC-9	Q	Q	Q	Q	Q	Q	Q	A	A	A	A	A
DC-13	Q	Q	Q	Q	Q	Q	Q	A	A	A	A	A
DC-20	Q	Q	Q	Q	Q	Q	Q	SA	SA	SA	SA	SA
DC-21	Q	Q	Q	Q	Q	Q	Q	SA	SA	SA	SA	SA
DC-23	Q	Q	Q	Q	Q	Q	Q	SA	SA	SA	SA	SA
DC-24	Q	Q	Q	Q	Q	Q	Q	SA	SA	SA	SA	SA
DC-25	Q	Q	Q	Q	Q	Q	Q	SA	SA	SA	SA	SA
M-1	Q	A	A	A	A	A	A					
M-2	Q	SA	SA	SA	SA	SA	SA	A	A	A	A	A
M-3	Q	SA	SA	SA	SA	SA	SA	A	A	A	A	A
M-4	Q	A	A	A	A	A	A					
M-5	Q	A	A	A	A	A	A					
M-6	Q	SA	SA	SA	SA	SA	SA	A	A	A	A	A
M-7	Q	SA	SA	SA	SA	SA	SA	A	A	A	A	A
M-8	Q	SA	SA	SA	SA	SA	SA	A	A	A	A	A
M-9	Q	SA	SA	SA	SA	SA	SA	A	A	A	A	A
M-13	Q	SA	SA	SA	SA	SA	SA	A	A	A	A	A
M-14	Q	SA	SA	SA	SA	SA	SA	A	A	A	A	A

Q = Quarterly in January, April, July, and October SA = Semi-annually in April and October A = Annual in April

* See Table G.

** See Table H.

Table D: Schedules for Monitoring Groundwaters at the SSWMC (Continued)

Revised: November 19, 2013

Measurement or Analyte	Ammonia-N (Lab)	Nitrate-N (Lab)	Sulfate (lab)	T.D.S. (Lab)	T.O.C. (Lab)	Calcium (Lab)	Iron (Lab)	Magnesium (Lab)	Manganese (Lab)	Potassium (Lab)	Sodium (Lab)	Zinc (Lab)	DNREC Supplemental Analysis for Groundwaters*
Location													
SC-1													
SC-2	A	A	A	A	A	A	A	A	A	A	A	A	
SC-3	A	A	A	A	A	A	A	A	A	A	A	A	
SC-4													
SC-5													
SC-6	A	A	A	A	A	A	A	A	A	A	A	A	
SC-7	A	A	A	A	A	A	A	A	A	A	A	A	
SC-8	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	A
SC-9A	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	A
SC-12	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	
SC-13	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	A
SC-14	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	A
SC-15	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	A
SC-16	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	A
SC-17A	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	A
SC-18A	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	A
SC-20	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	A
SC-21	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	A
SC-23	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	A
SC-25	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	A
SC-26	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	
SC-27	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	
SC-28	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	A**
SC-29	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	A
SC-30	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	A
SC31	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	
SC32	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	
P94-1													
P94-2													
P94-3													
DC-3	A	A	A	A	A	A	A	A	A	A	A	A	
DC-4													
DC-5													
DC-6	A	A	A	A	A	A	A	A	A	A	A	A	
DC-7	A	A	A	A	A	A	A	A	A	A	A	A	
DC-8	A	A	A	A	A	A	A	A	A	A	A	A	
DC-9	A	A	A	A	A	A	A	A	A	A	A	A	
DC-13	A	A	A	A	A	A	A	A	A	A	A	A	
DC-20	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	A
DC-21	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	A
DC-23	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	A
DC-24	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	A
DC-25	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	
M-1													
M-2	A	A	A	A	A	A	A	A	A	A	A	A	
M-3	A	A	A	A	A	A	A	A	A	A	A	A	
M-4													
M-5													
M-6	A	A	A	A	A	A	A	A	A	A	A	A	
M-7	A	A	A	A	A	A	A	A	A	A	A	A	
M-8	A	A	A	A	A	A	A	A	A	A	A	A	
M-9	A	A	A	A	A	A	A	A	A	A	A	A	
M-13	A	A	A	A	A	A	A	A	A	A	A	A	
	A	A	A	A	A	A	A	A	A	A	A	A	

Q = Quarterly in January, April, July, and October SA = Semi-annually in April and October A = Annual in April

* See Table G.

** See Table H.

Revisions to this Monitoring Plan

The original SSWMC dated September 2008 was revised several times to meet DNREC specifications.

Revision: March 2010

This revision was made to combine remove pre-Cell 5 monitoring in Exhibit B Tables.

Revision: November 2013

- Combined all analysis and measurements from all SSWMC Permits (Table A).
- Removed the word "Future" from Cell 5 maps groundwater, surface water, and leachate monitoring location maps.
- Removed all abandoned monitoring points from those same maps.
- Removed tabs referencing Pre Cell 5 Construction analysis.
- Showed the new perimeter and building gas monitoring locations in the Landfill Gas Monitoring Plan.

Revision: January 2017

- Removed the word "Future" from the Landfill Gas Monitoring Plan.
- Updated the groundwater monitoring procedures to clarify groundwater well monitoring procedures and revised the date in the body of Section V.D of this plan to reflect the date the procedures were modified.
- Removed abandoned wells from the groundwater monitoring table (Table D).
- Removed magnesium and zinc from Table E due to their being monitored on a monthly basis (Table A).
- Removed IV.D. *"If any active seeps are detected discharging into a perimeter ditch, a sample shall be collected and analyzed for those field measurements in Exhibit B, Table F. Results of analysis shall be provided to DNREC within seven (7) days of the receipt of the results."* from the monitoring plan. It would better serve both parties if reporting is addressed in the appropriate section of the new permit.
- Removed second set of duplicate analytes that were listed more than once in Table A (Page B-1, Exhibit B) and Table B (Page B-2, Exhibit B).
- Added the footnote *"** Monitoring of Cell 5 North PCS and SDS will not take place until landfill begins within the areas that drain to the pump station."*, and Added Cell 5 North to Table A (Page B-1, Exhibit B).
- Added call-out "*" in the footnotes requiring Table E (Page B-6, Exhibit B) in the row showing *DNREC Supplemental Analysis for Leachates* in Table A, Exhibit B".
- Changed the revision dates for Table A and Table B.
- Changed appropriate titles to reflect Post Cell 5 Construction.
- Changed Table D (Page B-5, Exhibit B) to reflect annual monitoring of well DC-28 for Table H.

APPENDIX G

Operation and Maintenance Manual

Geomembrane Cap
Cells 1 and 2

DELAWARE SOLID WASTE AUTHORITY

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Chief Operating Officer

September 2, 2016

Ms. Alison Kiliszek
Department of Natural Resources and
Environmental Control
Division of Waste and Hazardous Substances
89 Kings Highway
Dover, DE 19901

Re: Southern Solid Waste Management Center
Updated Cells 1 & 2 Exposed Geomembrane Cap Manual
Permit SW-00/01

Dear Ms. Kiliszek:

The Department of Natural Resources and Environmental Control requested an updated *Operation and Maintenance Manual for Cells 1 and 2* in a letter dated August 16, 2016. Delaware Solid Waste Authority (DSWA) has updated the plan and attached a copy for your review. Contact me if you have any questions.

Sincerely,

James Vescovi, P.E., BCEE
Senior Facility Manager

cc: Jason Sunde, DNREC
R. M. Roddy, P.E., BCEE
L. V. Miller, P.E., BCEE
J. M. Munyan, P.E., BCEE
Attachment
ssw16.053

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Operation and Maintenance Manual

Geomembrane Cap
Cells 1 and 2

Southern Solid Waste Management Center
28560 Landfill Lane
Georgetown, Delaware 19947

August 2016

1. INTRODUCTION

1.1 Opening Remark

This document comprises the Operation and Maintenance Manual (O & M) used for the exposed geomembrane cap over Cells 1 and 2 and the associated landfill gas collection and management system at the Southern Solid Waste Management Center located at 28560 Landfill Lane, Georgetown, Sussex County, Delaware 19947.

1.2. Description of the SSWMC facility

The SSWMC is a solid waste landfill located on approximately 570 acres on the south side of Route 20 about 10 miles east of Seaford, Delaware. The landfill is comprised of five (5) Cells. Cells 1 and 2 are no longer accepting waste and were covered with a geomembrane cap in 1997 – 1998. That geomembrane was replaced in 2010-2013.

1.3 Purpose

This O & M manual describes the tasks that Delaware Solid Waste Authority (DSWA) personnel take to maintain the integrity of the geomembrane cap over Cells 1 and 2 and also describes the steps that DSWA personnel take while managing the operation of the landfill gas collection system in Cells 1 and 2. This document is a revision of the July 2007 O & M manual.

1.4 Organization

This O & M manual is organized as follows:

- Section 1 – Introduction
- Section 2 – Geomembrane Cover Description
- Section 3 – Inspection and Maintenance for the Exposed Geomembrane Cap
- Section 4 – Operation and Maintenance of the Landfill Gas Collection System

2. GEOMEMBRANE COVER DESCRIPTION

2.1 Description of Cap System

The geomembrane cap for Cells 1 and 2 is 45-mil scrim-reinforced polypropylene that covers approximately 42 acres. The cap is comprised of the following sequence of materials listed in a top-to-bottom sequence:

- 45-mil, scrim reinforced polypropylene geomembrane cap;
- 6-inch (min.) final grading layer;
- 6-inch (min.) layer of intermediate cover that directly overlies daily cover and solid waste.

Additional components of the cap include a geocomposite gas collection layer, a geocomposite drainage layer, and a geosynthetic clay liner. These additional components were constructed at downslope locations near drainage berms and just upslope from the geomembrane cap anchor trench.

Stormwater runoff from the cap is managed by a series of terraces, downchutes and perimeter ditches which convey the runoff to two (2) stormwater management ponds.

2.2 Description of the Landfill Gas Management System

2.2.1 Overview

The landfill gas management system consists of the following components: gas collection, gas conveyance, condensate removal, two (2) flare stations and a landfill gas-to-energy plant. The landfill gas management system's function can be summarized as follows:

- Control fugitive landfill gas emissions which could contribute to odors;
- Collect landfill gas in a manner that meets the criteria of federal, state and local regulations;
- Convey the landfill gas to a control device;
- Destroy or utilize landfill gas in accordance with federal, state and local regulations; and
- Collect and dispose landfill gas condensate.

2.2.2 Regulatory Requirements

The landfill gas management system operates in accordance with:

- Delaware Regulations Governing Solid Waste (DRGSW)
- Delaware Regulations Governing the Control of Air Pollution (DRGCAP)
- USEPA Clean Air Act (CAA) New Source Performance Standards.

2.2.3 Gas Collection and Conveyance

The current landfill gas collection system for Cells 1 and 2 consists of vertical gas collection wells which extend to a depth of approximately 75% of the thickness of the buried solid waste. Each vertical landfill gas collection well is generally constructed with 4-inch PVC slotted pipe in a 3-foot diameter gravel pack. The landfill gas collected from the gas collection system is conveyed through lateral pipes and header pipes to the control device.

2.2.4 Condensate Management

Condensate generated from the landfill gas collection system drains back into the landfill through the perforations in the vertical extraction wells. The condensate that collects in the lateral pipes and header pipes drain into condensate traps that collect and return the condensate to the landfill.

2.2.5 Components

The components of the landfill gas management system are:

- Vertical gas extraction wells;
- Lateral pipes;
- Header pipes;
- Condensate traps; and
- Control valves.

2.3 Description of the Landfill Gas Flares & Plant

2.3.1 Overview

Landfill gas is sent to one of the two candlestick flare stations or the landfill gas-to-energy plant. The flare station includes a condensate trap, blowers, flame arrestor, flow meter, candlestick flare and a control panel.

The landfill gas-to-energy plant produces electricity with up to five (5) Jenbacher engines. When the volume of landfill gas exceeds the capacity of the operating engines, the surplus landfill gas is flared. Each of the engines can accept up to 400 scfm of landfill gas.

2.3.2 Landfill Gas Pipe

The landfill gas from Cells 1 and 2 is routed via underground pipe to a flare station(s) or landfill gas-to-energy plant. Control valves are used to direct the landfill gas to the appropriate control device. When the volume of landfill gas is more than utilized by the landfill gas-to-energy plant, the excess gas is flared. At times when the landfill gas-to-energy plant is not running the entire volume of landfill gas is flared.

2.3.3 Flare Station Condensate Trap

Condensate that collects in the flare station condensate trap is returned to the Cell 1 and 2 leachate collection system. Condensate collected at the landfill gas-to-energy plant is also returned to the Cell 1 and 2 leachate collection system.

3. INSPECTION AND MAINTENANCE FOR THE EXPOSED GEOMEMBRANE CAP

The exposed geomembrane cap is visually inspected once a month. The inspection is conducted by walking the entire geomembrane cap and noting deficiencies in seams, terraces or berms, drainage chutes and anchor trenches.

3.1 The specific items of concern during a visual inspection are:

- Holes in the geomembrane;
- Uplifted geomembrane areas;
- Stressed geomembrane;
- Boots at the location of geomembrane penetrations such as at gas collection wells;
- Terraces;
- Orientation of geomembrane ballast tubes; and
- Vegetation growing within the cover terraces and within the gabion structures at each downchute.

3.2 Typical maintenance work done in response to visual inspection is:

- Remove vegetation from within the cover terraces and from within the gabion structures;
- Orient ballast tubes so they are parallel to the predominant slope of the geomembrane;
- Mow the vegetation around the perimeter of the landfill based on staff judgment;
- Replace rip-rap and other gravel material that washed away from the landfill access road;
- Remove stones and other sharp objects that have been deposited on the geomembrane;
- Repair seams, holes and tears per geomembrane manufacturer's specifications; and
- Minimize ponded stormwater in swales and on the membrane.

3.3 Physical Properties

3.3.1 Testing

The physical properties of the geomembrane are tested annually or bi-annually as required.

3.3.2 Testing Requirements

The physical property, test method and special instructions required are included in the following table.

Property	Test Method	Comment	Frequency	Specifications[1]
Thickness	ASTM D751 for Type 1		Annual	30 mil (± 2 mil)
Coating Over Fabric Thickness	Microscopy		Annual	250μ
Tensile Strength (Bias)	ASTM D751 Strip Method B	3 Specimens Only	Annual	55 lb/in^2 MD 55 lb/in^2 XD
Wide Width Tensile Strength (MD, XD) (Includes % Elongation at Reinforcement Break and 10% Secant)	ASTM D4885	3 Specimens Only Each Direction	Annual	150 lb/in^2 MD 125 lb/in^2 XD
UV Resistance	ASTM D5885 HPOIT w/o Ozone Portion of Test		Bi-Annual	–

[1] Geosyntec July 2016

3.3.3 Reporting

The results of the required physical property testing are reported annually in the landfill's annual report to DNREC.

OPERATION AND MAINTENANCE OF THE LANDFILL GAS COLLECTION SYSTEM

4.1 Operating the Landfill Gas Collection System

4.1.1 Landfill Gas Monitoring

The landfill gas collection system is monitored on a regular basis. The flow rates are adjusted periodically to ensure adequate negative pressure underneath the geomembrane cap, to match the apparent rate of landfill gas production and to optimize the performance of the landfill collection system.

4.1.2 Wellfield Adjustment Criteria

Landfill gas flow rates are monitored by DSWA on a monthly basis at each landfill wellhead.

DSWA monitors the landfill gas for the amount of methane, carbon dioxide, oxygen and vacuum.

4.1.2.1 Factors considered when performing landfill gas collection system adjustment are:

- Climatic factors such as the amount of precipitation occurring at the landfill site;
- Site topography;
- The condition of the landfill cover including the permeability of the cover material;
- Location of the gas collection wells with respect to sideslopes;
- The landfill configuration, type of waste buried in the landfill and type of leachate control used; and
- The construction configuration of the landfill gas collection wells; i.e. depth, length of slotted pipe and pipe diameter.

4.1.2.2 The following data is recorded during a landfill gas well inspection:

- Name of person taking reading;
- Date and time of reading;
- Wellhead identification or location;
- Weather conditions including barometric pressure;
- Methane content of the landfill gas (percentage by volume);
- Oxygen content of the landfill gas (percent by volume);
- Carbon dioxide content of the landfill gas (percent by volume);
- Balance gases;

- Wellhead gas temperature (flowing and degrees Fahrenheit);
- Static pressure in inches of water; and
- Wellhead gas flow in standard cubic feet per minute (SCFM).

These constituents are also measured at a flare station if landfill gas is routed to a flare.

4.1.2.3 The portable instrument that is generally used to measure the landfill gas constituent concentration is the Landtec GEM Model 2000 or Landtec GEM Model 5000.

4.1.2.4 An abbreviated field inspection is sometimes used to confirm landfill gas wellfield adjustments. The list of measurements includes the following:

- Methane content of the landfill gas (percent by volume);
- Oxygen content of the landfill gas (percent by volume);
- Static pressure in inches of water;
- Differential pressure; and
- Wellhead gas temperatures (flowing and degrees Fahrenheit).

4.1.3 Shutdown of the Landfill Gas Collection System

The landfill gas collection system can be partially or entirely shut down by closing valves. There is a commensurate reduction in gas flow when a section or the entire landfill gas collection system is shut down. The landfill gas-to-energy plant contractor is notified when significant changes to the flow are anticipated.