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OPERATIONS MANUAL
HALIFAX COUNTY ASH MONOFILL

HALIFAX COUNTY SOLID WASTE DEPARTMENT

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HALIFAX COUNTY ASH MONOFILL

OPERATIONS MANUAL

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SECTION 1

CONSTRUCTION

INTRODUCTION

The Halifax County Ash Monofill will be receiving approximately 120,000 tons of coal fly ash annually. This equates to approximately 360 tons or about 30 truck loads per day. This manual is intended for use in the construction and day to day operations of the facility. This document, combined with the Contract Drawings and specifications, details all aspects of this operation.

1.0 CONSTRUCTION

1.1 Berms

The ash facility utilizes berms having four (4) different design functions; the perimeter berm defines the outer limit of the ash; the perimeter roadway berm defines the outer limit of the ash and supports a roadway; the intermediate berm used for short-term containment of the ash between cells; and the soil/ash vertical expansion berm. The purpose of all the berms is to provide containment for the ash and ash runoff.

All berms are to be constructed to the elevation and location as shown on the pertinent Contract Drawings. They will be built to the dimensions and specifications indicated here, on the Contract Drawings and in the Contract Specifications.

The first three berm types will be constructed using on-site soils which shall be free from waste, organics or other deleterious materials and which shall be approved by the engineer. The soil will be placed in loose lifts which will not exceed 12-inches in thickness. The soil will be compacted to 95 percent Standard Proctor Maximum Dry Density (ASTM D-698). Field Soil Density Testing (ASTM D-1556) will be performed on the berms at a rate of one test per lift per 250 linear feet of berm.

The vertical expansion berm will be constructed of select fly ash and on-site soils. Each material will be free from waste, organics and other deleterious materials and will be approved by the engineer. The berm will be constructed to dimensions as indicated by detail B.4 on sheet 23 of the Contract Drawings. The select fly ash will be placed in loose lifts not to exceed 12-inches in thickness and will be compacted to 95 percent Standard Proctor Maximum Dry Density (ASTM D-698). Approximately 250 linear feet of ash will be placed and tested at a rate of one test per lift per 250 feet prior to placing the soil portions of the berm. The soil will be placed in loose lifts not to exceed 12-inches in thickness and will be compacted to 95% Standard Proctor Maximum Dry Density. The soil will be tested at the rate of 1 test per lift per 250 linear feet.

The berms shall be built to the following dimensions:

BERM TYPE	OVERALL HEIGHT	CREST WIDTH	OUTSIDE SLOPE	INSIDE SLOPE
Perimeter	Varies	10′	3H: IV	2H: IV
Perimeter Roadway	Varies	35′	3H: IV	2H: IV
Intermediate	10′	8′	Varies	2H: IV
Soil/Ash	10′	10′	4H: IV	2H: IV

The perimeter berms vary in height from 10 to 24 feet. The exact height of a section is indicated on the appropriate grading plan. The intermediate berm is constructed with an outside slope of 4H: IV. This slope is cut back to 2H: IV during construction of the next phase prior to lining.

1.2 Subgrade

The landfill subgrade will be prepared to accept the liner system with minimal

damage. The area to be prepared will first be cleared of vegetation and grubbed to remove the rootmat. Areas to receive fill will be proofrolled with a loaded pan to evaluate structural integrity. Structural fill will be placed in these areas in loose lifts not to exceed 12-inches in thickness. The fill will be compacted to 95 percent Standard Proctor Maximum Dry Density (ASTM D-698). Field soil density tests (ASTM D-1556) will be performed at a rate of 1 test per lift per five thousand square feet. Any fill area which fails a field density test will be reworked and retested until an acceptable test result is obtained. Areas to be cut will be graded to the elevations shown on the contract documents then proofrolled to evaluate structural integrity. Any area, cut or fill, which is deemed unacceptable by a qualified geotechnical engineer will be undercut to sufficient depth, then backfilled with clean structural fill. This fill will be compacted and retested as set forth above.

Once the subgrade has been graded, all rocks greater than one inch in any dimension as well as any other potentially damaging material will be removed from the subgrade. The engineer will accept the subgrade and approve it for lining.

1.3 Liner

The liner selected for this project is smooth, 60 mil thick high density polyethylene which meets the performance criterion set forth in the specifications. The particular liner selected by the liner installer will be subject to approval by the engineer.

The liner will be anchored in continuous 1 foot wide by 1 foot deep trenches excavated parallel to the crest of the perimeter berms. The trench will be set back from the crest towards the centerline approximately 2 feet. Eighteen to twenty four inches of liner will be placed in the trench. Trenches will be backfilled in 2 equal lifts, approximately 8 inches thick loose, which will be compacted by hand to 95 percent

Standard Proctor Maximum Dry Density. Field soil density tests (ASTM D-1558) will be performed at a frequency of 1 test per lift per 250 feet of trench.

The liner installer will place only as much sheet as can be seamed during the work day. Seaming will be accomplished by one of two heat methods; extrusion welding or double hot wedge. Extrusion welding will be used in tight (limited access) areas and on patches. Double hot wedge seams will be used on long, straight seams such as between sheets. All seams will be installed and tested as set forth in the contract specifications. Any seam which fails a test will be replaced or repaired in accordance with the applicable specification. During the installation of the liner, no vehicles will be allowed on the sheet to reduce the risk of puncturing. Any unseamed edges that must be left overnight will be secured with 50 pound (minimum) sandbags placed every 5 feet along the edge.

The liner will be anchored in the intermediate berm with the same trench detail used in the perimeter berm. Dimension and backfill specifications are identical also. The anchor trench in the intermediate berm will continue up the perimeter berm sideslope and will intersect the main anchor trench. When the facility expands across the intermediate berm, the new liner will be anchored in the intermediate berm in a new trench. This new liner will also be anchored up the perimeter berm sideslope. This will leave an unlined gap approximately four feet across between the two trenches. A 60 mil HDPE cap sheet will be placed over the gap and extrusion welded to both the old and new sheets. This cap sheet will extend up the sideslope and will be anchored with the main lines in the perimeter berm anchor trench. A 60 mil hdpe slip sheet will be placed above the cap sheet to protect both the liner and cap sheet.

1.4 Operational Cover

The operational cover will consist of soil and ash placed directly on the liner. Sheet 5 of the contract drawings indicates where each material will be placed within

a given cell. The cover will be placed using a small, low contact pressure dozer such as a CAT D-3 or equivalent to minimize rise of liner damage. It will be placed a minimum of 12 and a maximum of 16 inches thick and will be compacted by the dozer as it moves across the material. Cover thickness will be checked and verified by a surveyor.

The soil cover will be select material as indicated by the engineer. The ash cover will be constructed of select fly ash. Both cover materials will be free from any materials capable of damaging the liner as well as any rocks or clumps greater than 1" in diameter. Special care will be exercised during the installation of this cover to minimize the risk of damage to the synthetic liner

1.5 Internal Stormwater Control System

The internal stormwater control system consists of settling basins located within each cell. These internal settling basins are connected by a series of sumps and pipes to a secondary settling basin located outside of the facility. Each internal basin contains one sump connected to two remote risers by a non-perforated hdpe pipe. A main header pipe connects the sumps in cells 1, 2, and 3 to the secondary basin, a second header pipe connects the sump in cell 4 to the secondary basin and a third header pipe connects the upper phases of cell 4 to the secondary basin. The header pipe serving cells 1, 2, and 3 will be installed with the sumps during the construction of cell 1. Sumps 2 and 3, which will not be put into service until the construction of their respective cell, will be covered with the protection detailed on sheet 25 of the contract drawings. The sump and piping for cell 4 will be installed during the construction of cell 4.

The sumps are prefabricated thirty inch diameter, 36 inch deep, 1 inch thick HDPE. Sumps 1, 2, and 3 contain a twelve inch HDPE pipe extending through the

sump with 1 foot of pipe outside the sump on either end to allow for connections. Sump 4 contains an 18 inch HDPE pipe in place of the 12" pipe. The sections of pipe within the sump are perforated with half inch diameter holes. The pipes have bolt flanges on either end to facilitate connection to the header pipes. Each sump will be placed at the location and elevation indicated on the contract documents. The sump excavation will be backfilled with a cement/bentonite slurry (see monitor well detail for mix) in order to minimize backfill compaction problems around the sump. The fabricator will submit shop drawings of the proposed sump for approval by the engineer prior to fabrication. Each sump will be filled with NCDOT #57 washed stone. A sixteen ounce geotextile will be placed above the sump to act as a cushion for the riser and as a filter for the ash sediments.

The riser will be fabricated from a nine foot section of 48 inch diameter HDPE pipe. A 2 to 3 foot wide, 1 inch thick HDPE flange will be extrusion welded to the bottom of each pipe section to provide for anchorage. Each riser will be perforated with one half inch diameter holes spaced 2 inches on center. The risers will be placed as indicated by the excavation plans in the contract drawings.

All piping for this system will be smooth walled HDPE. The hydraulic analyses were performed assuming ADS N-12 pipe. A hydraulically equivalent pipe may be substituted as approved by the Engineer. Only 12 and 18 inch diameters will be used in this system. The 12" pipe will be utilized for the header line which serves sumps 1, 2, and 3. Eighteen inch pipe will be utilized for the header pipe for sump 4 as well as for the internal piping from riser to sump.

All bolted pipe connections will be made using stainless steel hardware as indicated by the sump details located on sheets 24 and 25 in the contract drawings. Any pipe to pipe connections will be butt-fusion welded in the field during installation.

The different header pipe will be installed during the operation of cell four. It

will be constructed segmentally beginning with the first lift above the perimeter berm. The system consists of risers installed at the toe of the expansion berms connected to lateral pipes which are connected to the header pipe. The system is repeated every 10 feet vertically as the facility is filled. Previous risers and laterals will be buried and left in place but will not be functional. The header pipe will be extended up the outside slope as necessary to connect with the new lateral.

The riser consists of an eleven foot section of 24 inch HDPE pipe set in a concrete anchor. The riser will be set flush with the bottom of a five foot by five foot by one foot thick concrete block. A pipe stub will be extrusion welded to the riser leaving approximately 1 foot of clearance between the bottom of the pipe and the top of the blocks. The stub will extend approximately 1 foot from the riser and will have a bolt up flange extrusion welded to the end. The riser will be perforated with one half inch diameter holes spaced two inches on center. The riser will be placed at the toe of the expansion berm at the south central corner of the facility. Exact locations will be determined by the engineer prior to installation.

The lateral pipes will be 18" diameter HDPE. They will be Advanced Drainage Systems N-12 or equivalent and will be approved by the engineer prior to installation. The pipe will be bolted to the riser assembly using stainless steel hardware and a neoprene gasket. Intermediate joints will be butt fusion welded according to the specifications. The pipe will be connected to the header pipe using a specially fabricated HDPE "Y". They will be bolted together as specified above.

The lateral to header connector "Y" will be fabricated from two 18" diameter HDPE pipes welded together to form a fourteen degree angle. A bolt flange will be welded to each end. The upstream header end will be covered with a HDPE plate until the header is extended.

The header pipe will be constructed from 18 inch diameter HDPE pipe. It will

be placed in segments as the soil and ash expansion berms are built. It will be located as shown on the Contract Drawings on the south central corner of the facility. A minimum of 2 feet of cover will be maintained over the pipe at all locations. The pipe will be routed to the secondary basin as directly as possible.

The secondary basin will be constructed adjacent to the southwest corner of the facility. It will be constructed of clean structural fill as detailed in the specifications. The basin will be 180 feet by 115 feet by 9 feet deep which yields a total volume of approximately 136,000 cubic feet. It will be drained using a 21 inch corrugated metal riser and a 15 inch corrugated metal barrel. The basin will be constructed during construction of cell one and will be operational through the life of the landfill.

1.6 Stormwater and Erosion Control

The stormwater and erosion control system will be installed as construction of the facility warrants. The Contract Drawings indicate which components of the system will be installed during construction of a cell and which components should be in place at the close of a given cell. The operator will be responsible for adding to the components installed during construction as parts of the facility reach finished grade. All materials used will be approved by the engineer prior to installation.

Benches will be constructed around the facility every 20 feet vertically. They will be constructed to the locations, elevations and dimensions indicated on the Contract Drawings.

Swales will be constructed on the benches as shown on the Contract Drawings. The swales will be graded to drain to the indicated drop inlet using the elevations and slopes provided on sheet seventeen of the Contract Drawings.

Drop inlets will be Stay Right Tank Company 4 foot by 4 foot by 4 foot precast drop inlet or equivalent. The contractor shall submit shop drawings of the proposed drop inlet for approval prior to construction. Drop inlets must be able to accept 18 and 24 inch pipes at either end. They will be located both horizontally and vertically as indicated on sheet 17 of the Contract Drawings.

The stormwater system pipes will be Advanced Drainage Systems N-12, or equivalent. Pipes will be set to the grades and elevation indicated on the Contract Drawings. A minimum of two feet of cover will be maintained over the pipes at all times. Any damaged sections will be replaced immediately.

The temporary piping indicated on certain construction documents will be 24 inch corrugated HDPE pipe. It will be anchored to the side slopes and will be routed to the lowest available drop inlet or swale. These pipes will be required where the bench swales have not been completed to a drop inlet. The temporary piping will be removed as soon as the permanent components are in place and functioning.

The stormwater basins will be built to the elevations and specifications as outlined in the design report and Contract Drawings. They will be built with 3H:1V outside slopes, 2.5H:1V inside slopes with 2 feet of freeboard. The principal spillway in each will be a riser and barrel system. Dimensions details and locations are located on the Contract Drawings. An emergency spillway will be constructed in each basin as noted. The basins will be cleaned out when the sediment reaches 1 foot in depth. The basins will be kept free from waste, weeds or other foreign materials.

Silt fences will be used during construction to control surface transport of sediments. The fences will be placed in the approximate locations shown on the grading plans. The fences will be maintained and cleaned as indicated by the specifications and the silt fence detail.

1.7 Cap Profile

The landfill cap will be constructed from a 1 foot layer of compacted on-site soils and a 1 foot vegetative layer. The compacted layer will be compacted to 95 percent Standard Proctor Maximum Dry Density (ASTM D-198). Field soil density tests (ASTM D-1558) will be performed at a rate of 1 test per 5000 square feet to verify the compaction of the layer. This layer will be placed as an area of the landfill in filled to final grades.

The vegetative layer will be on-site soils suitable for growing vegetative cover. This layer will be placed over the compacted layer and will be seeded and fertilized according to the schedule which is included in this document as an Appendix and is shown on the Contract Drawings.

1.8 Monitoring System

The groundwater monitoring system will be installed according to North Carolina regulations during construction of Cell One. The system will consist of seven wells; five permanent and two temporary.

The five permanent wells will be installed at locations around the perimeter of the facility. The locations are shown on the Contract Drawings and will be approved by the State. This group includes one upgradient and four downgradient wells.

The two temporary wells will be installed immediately south of the intermediate berm. The wells will be monitored during the operation of that cell. They will be replaced by two new temporary wells downgradient of the new intermediate berm and abandoned prior to construction of the new cell. These wells will be dropped from the monitoring program after cell three has been filled.

The unnamed creek will be monitored during the life of the facility as well. Two locations on the stream will be identified; one upstream and one downstream of the ash facility. The creek will be sampled at these locations when the wells are being sampled.

The seven wells and two surface water locations will be sampled annually by a person trained in the sampling of monitor wells. Correct protocol will be followed during each sampling. The results of this sampling will be submitted to the State as required.

1.9 Access Roads and Ramp

Access roads and permanent ramps will be constructed as follows. All roadways will be twenty five feet wide with a normal crown of .1 feet per foot. The roadways will be constructed of 12 inches of aggregate base course over a stabilizing geotextile. The subgrades will be prepared similarly to the landfill subgrade, explained above.

The access ramp will be constructed of select structural soil fill compacted of 95% Standard Proctor Maximum Dry Density. The fill will be tested as previously outlined. Aggregate base course will be placed above the fill to form an all weather surface.

1.10 Equipment

The equipment used in the construction of the landfill components will be consistent with standard construction techniques. Equipment will be supplied by the contractor or subcontractor responsible for the construction. Typical equipment of

this type of construction will include bulldozers, pans, tracked excavators, tracked loaders, self-propelled sheepsfoot compactors and other general grading equipment. All equipment will be subject to approval by the engineer.

1.11 Layout and Survey Control

The contractor will be responsible for assuring the construction is built to the lines and grades indicated by the Contract Drawings. Permanent benchmarks will be established near the construction area. All elevations and locations will be set and checked using these benchmarks as references. Temporary benchmarks can be used, but will be verified periodically. All surveying will be performed by qualified surveyors using standard methods.

SECTION 2

LANDFILL OPERATIONS

2.0 LANDFILL OPERATIONS

2.1 Equipment and Personnel

Coal ash will be transported to the monofill using either tandem axle dump trucks or tractor trailers. An independent hauling contractor will be responsible for hauling the ash from the plant to the landfill.

A track mounted dozer (Caterpillar D-5 or equivalent) will be used to place and compact the ash within the monofill. It will be responsible for placing the ash as outlined in this document.

The dozer will be dedicated to the ash monofill and will not be removed from ash placement operations except for routine maintenance or repairs. Maintenance should be carried out in such a way as to not interfere with the continued operation of the facility. If the dozer is down for repairs for more than one day, another dozer or suitable piece of equipment will be supplied to assure continuous operation of the facility.

Other equipment will be required on a part time basis to maintain the efficient operation of the monofill. A pan will be required to haul and place stockpiled cover soil and top soil. Another dozer or loader will be required to assist in construction of the final soil cover. A water truck will be required to control dust on the access roads and within the facility itself.

A full time employee will be required to operate the monofill. This person will be responsible for operating the dozer, and placing the ash. They may also be required to operate the water truck within the facility when possible.

2.2 Overall Monofill Concept

The monofill will be constructed and operated in four segments or cells. The cells will be constructed sequentially from north to south and will be constructed to the lines and grades depicted on sheets 6, 9, 12, 15 of the contract drawings. Each cell will be built in phases to an interim cover configuration. Each phase is a 10 foot vertical ash lift. When a cell is completed to its interim cover configuration, a new adjacent cell will be activated. The new cell will build laterally and vertically on the previous cell's interim cover to reach a new interim cover configuration. Cell four, the final cell, builds on the previous cells to bring the facility to the final closed cover configuration. The contract drawings contain three drawings for each cell which depict the construction and filling sequence of that cell.

2.3 Access

Access to the monofill will change during the operation of each phase. An all weather access road will be constructed from a point just east of the operations and maintenance building to the northwest corner of the monofill. The road will be constructed according to detail R.1 on sheet of the contract drawings. It will be kept in good condition at all times in order to maintain access to the monofill. Any rutting or other damage will be repaired by placing more aggregate base course in the damaged area.

The monofill has two access points: a ramp constructed as part of the northern perimeter berm and a roadway built into the top of the western perimeter berm. The perimeter berm roadway will provide initial access to each cell. A ramp, either down, to the bottom of the cell, or, up to the current filling phase, will be constructed from a convenient point along this roadway. When ash placement has progressed sufficiently in a given cell (i.e. far enough to make a ramp from the western berm impractical) access will be moved to the ramp on the northern side of the facility. This

ramp is, unlike the ramps from the western berm, a permanent part of the facility. It will be constructed as the north side of the facility expands.

Temporary ramps will be constructed from the western perimeter berm. When a new cell is activated, a ramp will be built down from the perimeter berm roadway to the floor of the facility. This ramp will be constructed from either structural soil fill or select ash. The ramp will be 20 to 25 feet wide and will have a maximum slope of 10 percent. It is anticipated that soil will only be used in Cell 1. Enough ash will be available once Cell 1 is operating to construct any remaining temporary ramps. Any ramp constructed from structural soil will be used only until an ash ramp can be constructed. At that point, the soil ramp will be removed. Once ash placement has progressed to the top of the perimeter berm, the access ramps will be graded up into the ash monofill. These ramps will operate until they become impractical due to height of the ash. At this point, access will be moved to the northern ramp.

The permanent ramp will be constructed on the northern side of the facility. It will be built in sections as the facility expands vertically. As the active lift approaches completion, the ramp will be extended over the cover soil to the top of the lift. It will be built to the lines and grades indicated on the contract documents. This ramp will be covered with N.C.D.O.T. spec. aggregate base course and will be maintained throughout the operational life of the facility.

2.4 Ash Placement

Each cell will be divided into two sections, a stormwater retention section and an ash placement section. The stormwater section consists of a strip, approximately 30 feet wide at the bottom, along the intermediate berm. This area will be kept free from ash during the life of the cell. It will be filled during operation of the succeeding cell. The remainder of the cell will be utilized for ash placement. The locations of the stormwater basins can be seen on the interim cover drawings.

Upon arrival at the facility, the trucks hauling the ash will weigh-in at the existing scale house and will then proceed to the ash facility. They will be directed to the active access ramp and will unload at a designated location. The actual location will change during operations but will always be clearly identified and easily accessed. The area will be large enough for at least two trucks to maneuver and unload simultaneously, and will be surfaced with either bottom ash or aggregate base course to assure access in inclement weather. The trafficked surface will be kept a minimum of three feet above the remainder of the facility at all times. Once the trucks have unloaded, the dozer will final place the ash.

The ash will be placed within the ash placement section of each cell in 2 to 3 foot lifts. Each lift will cover the entire active area of a cell. Once the lift has been completed, another 2-3 foot lift will be placed. Each lift will be compacted by passing the dozer across the ash a minimum of 2 times per lift.

Ash faces will be placed at either 3H:1V or 4H:1V depending upon location within the facility. Faces parallel to the stormwater retention basin will be placed at 3H:1V with benches every 10 feet vertically. These faces are internal southward facing slopes. They are shown on the phasing plans and interim cover drawings. Ash faces around the final perimeter of the facility will be placed at 4H:1V with benches every 20 feet vertically in order to reach the final cover configuration. Any temporary faces within a lift, such as faces left at the end of the day, will be dressed to 3H:1V if necessary.

Special care will be exercised during placement in certain phases of the landfill operation. Due to the lack of operational cover on the side slopes, ash will be pushed towards the cell wall, not down the wall. No compaction of ash will take place within 5 feet of the side slope in order to minimize the risk of damage to the liner. Ash placed to final elevations around the perimeter of the facility will be covered with at

least 12 inches of soil cover before the end of that days operation to reduce the risk of ash being eroded and transporting sediment outside of the facility. These areas will receive final cover and seeding within 30 days of reaching final grade.

2.5 Internal Stormwater System

The internal stormwater control system does not require any operational attention during the operation of the first three cells except for periodic inspections and cleaning. The sumps and header piping will be installed during the construction of cells 1 and 4. The risers and lateral pipes will be installed during the construction of the individual cell. The system is a gravity system requiring no pumps or valves. The inspection and maintenance of the system will be covered under the maintenance section of this document. The expansion berms form a basin within the cell which retains the runoff from the ash. The risers collect and drain the retained water into the lateral pipes which drain into the header pipe. The header pipe moves the water down the side slope of the facility to the secondary basin.

Cell four's storm water control system will require operational attention once the cell has been filled to the level of the perimeter berm. The upper level internal stormwater system for this cell requires the use of risers, lateral pipes, header pipes and expansion berms on every phase.

When the facility has been filled to within three feet of the perimeter berm in cell four, a soil and ash expansion berm will be constructed around the perimeter of the cell. Each berm will become part of the final cover and therefore will be constructed to the lines and grades indicated on the Cell 4 Final Cover drawing, Sheet 17 of the contract drawings. During construction of the berm, the riser and lateral will be placed as close as possible to the intersection of the two southern sections of the perimeter berms. This intersection is identified as corner 4 on sheet number 3 of the contract documents. The header pipe will be located near this corner and will be

buried in the perimeter and expansion berms.

The header pipe will be installed from the secondary basin to the first lateral during construction of the initial expansion berm. A "Y" connector will be used to connect the lateral pipe to the header pipe. The header pipe will be extended up the slope as new expansion berms are constructed.

The riser and lateral pipe will be installed along with the header pipe sections as the expansion berm is being constructed. They will operate for the life of the particular phase and then will be covered over by the filling operation.

2.6 Changing Active Cell

As the facility fills, it will be necessary to progressively move to newer cells. Due to the way the facility is constructed, this will be very simple. Once a new cell has been constructed, it will be ready to accept ash. The internal stormwater system will be installed and operational. When the previous cell has been filled with ash to its interim cover configuration, ash will be placed in the stormwater retention basin. This will facilitate the placement operations by allowing ash to be spread onto the previous cell ash from the new cell. Once this basin has been filled, the placement activities will move into the new cell and will proceed as detailed previously.

2.7 Closure Operations

Closure of the facility will take place throughout the operational life of the landfill. As ash is placed to the final elevations around the perimeter, a 12 inch cover will be immediately placed. Within thirty days, this intermediate cover will receive final cover and seeding. This sequential closing minimizes the risk of erosion of the ash mass within the facility.

The cap profile for this facility consists of at least 12 inches of compacted soils overlain by a 12 inch agricultural layer. The 12 inch compacted layer will be applied immediately after placing the ash. It will be brought in by pan and will be placed and compacted by a dozer. No testing will be required for the cover. This layer will be continuously maintained to minimize erosion for up to thirty days. By that time, the agricultural layer will be placed and seeded. Any erosion damage to the compacted soil layer will be repaired prior to placing and seeding the agricultural layer. New grass will be developed according to the seeding schedule.

2.8 Erosion and Sedimentation Control System

The erosion and sedimentation control system will be constructed segmentally as the facility expands and final cover develops. The initial pieces will be installed during the construction of Cell 1. Additional pieces will be added as the facility expands. Each cell's excavation plan shows that portion of the erosion and sediment control system which should be installed during construction of that phase. Each cell's interim cover shows the components of the control system which were added during the operation of that cell and which should be present and operating at the start of the subsequent cell. The components should be added as soon as an area of the facility is completed to its final configuration. Temporary piping is indicated on some drawings where the swale is flowing away from an existing drop inlet towards one which has not yet been installed. In this case, a temporary pipe should be installed to carry runoff from the swale to a point where it can be picked up by an operating drop inlet. Sheet 18 of the contract drawings contains the plans and information for the entire erosion and sedimentation control plan. Swale, drop inlet and piping information is contained on and should be obtained from this drawing for installation purposes.

2.9 Groundwater Monitoring Wells

Seven groundwater monitoring wells will be installed during the construction of cell 1. Five of these wells will be permanent, lasting for the life of the facility. Two of the wells will be used until the construction of Cell 2 at which time they will be abandoned and moved.

The five permanent wells will be installed where indicated on sheet 6 of the contract drawings in accordance with North Carolina groundwater regulations and the detail on sheet 27 of the contract drawings. The installation will be monitored by a qualified geologist or engineer to assure proper well installation techniques. Well completion records will be forwarded to the state after construction.

The two temporary wells will be installed down gradient of each intermediate berm for Cells 1,2 and 3. The exact location of the wells will be indicated by the engineer and will be chosen so as to minimize the risk of damage from landfill equipment. The wells will be abandoned immediately prior to the construction of the subsequent cell and will be reinstalled at the appropriate location at the end of construction. The old wells will be grouted from top to bottom using a side discharge tremie to assure complete closure of the well.

All wells will be sampled annually by a third party hired by the county. Results of the testing will be forwarded to the state for inspection. Adequate protection for the wells will be provided by the county to minimize the risk of well loss or damage.

SECTION 3

LANDFILL MAINTENANCE

3.0 LANDFILL MAINTENANCE

3.1 Equipment

Routine inspection and maintenance of the landfill equipment will be performed. The maintenance and inspection program will be consistent with the manufacturer's specifications and recommendations and/or similar programs used at the existing landfill for the current equipment.

3.2 Access Roads

The access roads and ramps will be maintained to assure easy access to the ash facility in inclement weather. Any rutting or other damage will be repaired as soon as possible by placing additional aggregate base course in the damaged area and compacting with tracked equipment. Erosional problems will be repaired with the appropriate material, either soil or aggregate, as soon as possible to reduce the effect of the problem. If an area continues to be a problem, more extensive repairs should be undertaken under the direction of a qualified engineer.

3.3 Internal Stormwater Control System

Maintenance of the internal stormwater control system will consist of periodic removal of sediment from both the internal and external settling basins as well as inspecting the active sump and header pipe. The internal basins should be inspected weekly. If any problems with the sumps, risers, or lateral pipes are detected, they should be repaired immediately. The level of sediment present in the basin should be checked during the weekly inspection. When approximately 2 feet of sediment has accumulated in the bottom of the basin, the sediment will be removed from the basin with a tracked excavator or backhoe and placed back on the ash. Extreme care should

be exercised when cleaning the basin. Each basin has received a minimum of 1 foot of soil operational cover to facilitate visual inspection during cleanout operation. The basin should be considered clean when the soil begins to appear throughout the bottom of the basin.

The secondary settling basin should be inspected weekly along with the remainder of the system. The inspection should include the erosion protection at the outlet of the active header pipe, the riser, the barrel, the barrel outlet protection the basin itself, and the accumulated sediment load. Any problems with the basin components discovered during an inspection should be reported immediately to the facility manager who should undertake corrective action as soon as possible. Sediment loading should be considered excessive when 2 feet of sediment have accumulated in the basin. The basin should be cleaned out with a tracked excavator or backhoe and should be considered clean when the accumulated sediment has been completely removed. Ash sediment removed from the basin should be placed back in the ash monofill.

The sumps, risers and header pipe should also be inspected weekly. The inspection should include checking the active sump and risers for clogging, checking the protective covers over the inactive sumps, and checking the output of the header pipe for indications of pipe clogging, or excessive sediment transport. Any problems or abnormalities should be reported and repaired immediately.

3.4 Erosion and Sedimentation Control System

The Erosion and Sedimentation Control System will be inspected monthly to assure proper operation. Swales, drop inlets, piping (where possible), outlet protection, and sediment basins will be included in the inspection.

Swales will be checked for excessive erosion, clogging due to sediment or other

material, and proper operation. Areas which have erosional damage will be repaired and reseeded immediately. Swales which show evidence of excessive sedimentation will be cleaned out and reseeded as necessary. Any foreign materials found in the swales will be removed immediately to assure proper runoff flow in the swale. Any swales which do not appear to be operating properly, i.e. not flowing to the proper drop inlet or not flowing at all, will be repaired immediately.

Drop inlets will be checked for clogging. Any foreign material or sediment in and around the inlet will be removed. Erosion around the inlet, if any will be noted and repaired as soon as possible. The piping in the inlet structure will be inspected to assure it remains in position and operating. Any problems with the piping will be repaired immediately.

Piping and outlet protection devices will be checked for proper operation. Clogged pipes will be noted and cleaned. Outlet devices will be checked for erosion. Any problems will be repaired immediately.

3.5 Cover

The landfill cover will be inspected on a regular basis to check for erosional problems, poor vegetative cover, and inappropriate vegetation. The cover will also be mowed, fertilized and reseeded as needed to maintain a good vegetative cover.

Erosional features which develop on the cover will be filled with on site soils, covered with topsoil, and seeded appropriately for the time of year. If the problems persist, erosion control products may be used to curtail the problem. Any erosion must be repaired immediately to minimize the possibility of ash being removed from the facility.

Poor vegetative cover is grass which is not good enough to reduce soil loss

from a particular area of the cap. Any areas deemed to be in poor condition will be reseeded and fertilized according to the seeding schedule and the suppliers recommendations. Newly seeded areas will be covered with straw secured with an asphalt emulsion. These areas will remain covered until the new grass has been fully established. Maintenance of newly seeded areas will be performed according to the suppliers instructions.

Inappropriate vegetative cover consists of bushes and small trees which could penetrate the cover. Any vegetation of this type will be removed immediately. Voids left in the cover will be repaired as detailed above.

3.6 HDPE LINER

Penetrations of the HDPE liner must be repaired using cap strips formed of the same HDPE liner material and attached using extrusion welding. The extrusion seam should be vacuum box tested to ensure the integrity of the seam. No alternate repair methods should be attempted on the liner.