



Duke Power
526 South Church St.
Charlotte, NC 28202

Mailing Address:
EC13K / P. O. Box 1006
Charlotte, NC 28201

Hand Delivered

March 30, 2006

Carmen Johnson

Fac/Permit No.	Date	Doc ID#
18-09	1/25/12	
	2/2/12	(CP)

NC Department of Environment and Natural Resources
Division of Waste Management
610 East Center Avenue – Suite 301
Mooresville, NC 28115

Attention: Mr. John Murray
Solid Waste Section

Subject: Duke Power – Marshall Steam Station
Catawba County, NC
Industrial Solid Waste Landfill Permit 18-09
Revisions to Operations and Maintenance Plan

Dear Mr. Murray:

Duke Power is herein submitting a revised Operations and Maintenance Plan for the Flue Gas Desulfurization (FGD) Gypsum Landfill at our Marshall Steam Station. The original Plan was submitted with the original Construction Permit Application on April 1, 2004 and a Permit to Construct (No. 18-09) was issued on January 15, 2005. This revised Plan addresses the items discussed during our March 26, 2006 telephone conference.

If you have any questions or require additional information, please feel free to contact me at (704) 382-7161.

Sincerely,

Patrick J. McCabe, PE
Environmental Support

Attachments: Operations and Maintenance Plan – 2 copies

cc: Ed Mussler, NCDENR (w/ 1 copy)
Division of Waste Management
Solid Waste Section
401 Oberlin Road - Suite 150
Raleigh, NC 27605

**NC DEPT. OF ENVIRONMENT
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**MOORESVILLE REGIONAL OFFICE
DIVISION OF WASTE MANAGEMENT, SWS**

**OPERATIONS AND MAINTENANCE PLAN
DUKE ENERGY
MARSHALL STEAM STATION
FLUE GAS DESULFURIZATION (FGD) GYPSUM LANDFILL PHASE 1
CATAWBA COUNTY, NC**

Prepared by:



CHAS. H. SELLS, INC.

Consulting Engineers, Surveyors & Photogrammetrists

128 Overhill Drive, Suite 105
 Mooresville, NC 28117

Prepared by:

Revision 1, March 2006

**DOCUMENT NO. MM6451.00-0000.001
ERN NO. FHS0004Z**

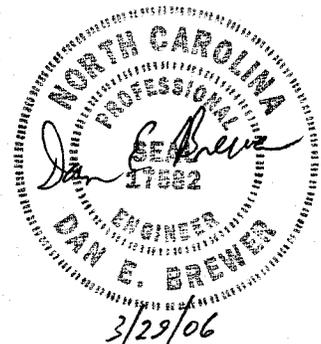


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APPENDIX

Phasing Diagrams

Description of Revision 1 to the Operations and Maintenance Plan

Revision 1 to the Operations and Maintenance Plan was performed to incorporate comments from NCDENR. Revisions to the original document are noted with a vertical line in the right margin. The table below provides a brief description of the revisions.

Section	Revision
1.5	Revised intermediate soil cover requirements. Revised to add limitation on working face slope.
1.6	Added wording concerning SPLP testing of material.
1.7	Added section concerning testing of shear strength and unit weight of material.
2.0	Updated name of person responsible for operations of the landfill.
2.4	Added wording concerning testing for H ₂ S gas.

1.0 LANDFILL OPERATIONS AND MAINTENANCE

1.1 Introduction

The Marshall Steam Station Flue Gas Desulfurization (FGD) system will create a residue generally comprising of gypsum. Residue that cannot meet beneficial use will be landfilled in the proposed FGD Gypsum Landfill located just west of the Marshall Steam Station Plant. The landfill footprint encompasses approximately 33 acres. Phase 1 will be developed in two cells with a minimum capacity of five years.

This Operations and Maintenance Plan has been prepared in accordance with Section 0.0505 of the North Carolina Solid Waste Management Rules.

1.2 Hours of Operation

The FGD landfill will be open seven days a week, as required.

1.3 Landfill Development

The landfill will be developed within the areas shown on the Grading Plan. A 200-foot buffer will be maintained around the entire perimeter. A 500-foot buffer will be maintained from existing residences and water supply wells. The majority of the areas within the buffer will remain in its current condition.

The FGD gypsum landfill will be constructed so that excavated soil can be used for intermediate and final cover. The landfill will be developed in one 5-year phase with two cells. The site will be graded in accordance with the Grading Plan which will provide a minimum of four foot separation from waste to the estimated seasonal high groundwater level or top of bedrock (whichever is shallower). The erosion control devices for each cell as shown on the Erosion and Sediment Control Plan will be constructed prior to excavation within each cell.

Waste will be placed initially from the upgradient to the downgradient end of each cell. An initial 10-foot thickness of waste, placed in 1-foot lifts, will be placed across half the landfill cell floor working from upgradient to downgradient areas. After the initial 10 foot thickness of waste has been placed and intermediate cover installed, subsequent lifts will also proceed from the upgradient end toward the downgradient end. This procedure will continue within a permitted cell until proposed final contours are reached. The downgradient half of the cell will be placed in the same manner as the first half, using ten foot layers in 1 foot lifts from upgradient to downgradient. The final cover will consist of a minimum of 2 feet of vegetative cover soil, a geocomposite drainage layer, a 40 mil textured LLDPE geomembrane, and 18-inch thick compacted soil layer on top of the waste. The final cover will be vegetated with native grasses within six months following closure. Operational phasing diagrams for each phase of development are presented in the appendix of this Plan.

1.4 Training of Facility Personnel

Due to the diversity of job tasks required at landfills and the critical nature of the landfill components, personnel are properly trained to handle the operation and maintenance of the facility. Some of the critical tasks include:

- Equipment operations;
- Inspection and maintenance of storm water and erosion control devices;
- Accurate records of waste loading (quantitative and qualitative);
- Identification of hazardous and liquid wastes;
- Control of accidental fires; and
- Control of dust.

The proposed staff for this facility is properly trained for operation and maintenance of this type of landfill.

1.5 Waste Placement

The gypsum residue will initially be loaded at the plant onto dump trucks. Alternatively, a conveyor system will transport the waste and stockpile it adjacent to the landfill. The waste will then be loaded onto dump trucks and hauled to the landfill active face. As waste is dumped from trucks, the waste shall be spread with a dozer in lifts no greater than 12 inches. Landfilling shall proceed until half of a cell is filled to the proposed final cover elevation for that cell. The downgradient end of each cell will then be landfilled in the same manner. Soil berms will be constructed as necessary to divert run-on from entering the working face or allowing runoff to drain from active areas.

Waste shall be compacted in thin lifts with a dozer and placed on the smallest active face as feasible. Loads of waste that exhibit higher moisture content than anticipated shall be placed no closer than 50 feet from the active face in thin lifts and dozed into place. No waste shall be placed in areas of accumulated water.

The surface of the working face of the landfill is limited to a slope no steeper than 3:1 (H:V) for fill heights of greater than 10 feet.

Due to the recycling potential for the FGD residue, daily or intermediate soil cover is not required. Soil cover may contaminate the FGD residue and cause its reuse potential to be eliminated. Also, the surface of the gypsum creates a crust that aids in stormwater runoff and prevents blowing of dust.

No intermediate soil cover is required; however, intermediate soil cover may be placed on areas needed for equipment access. Soil cover may be required for control of erosion. As final closure grades are reached, the 18-inch thick compacted soil layer shall be placed over the gypsum.

1.6 Waste Acceptance

The permit requirements for the FGD gypsum landfill will allow the facility to accept the following waste types:

1. FGD residue material that is not needed to meet the production needs of any beneficial use options.
2. FGD residue material that does not meet the specifications required for beneficial use.
3. FGD residue material that is removed from settling or clarifier stages of the associated waste water treatment facility.

The Operations Manager shall notify the Division within 24 hours of attempt to dispose of any other waste products. No hazardous, liquid, or infectious waste shall be accepted or disposed of in the FGD residue landfill.

Prior to the initial placement of FGD residue material (gypsum and clarifier sludge), the material will be subjected to leaching by EPA Method 1312 Synthetic Precipitation Leachate Procedure. The material will also be subjected to Method 9095B Paint Filter Liquids Test to determine if free liquids are present.

1.7 Initial Testing of Density and Strength Properties

Slope stability of the landfill material was performed in the Construction Plan Application, dated December 15, 2005. The purpose of the evaluation was to determine the stability of the final side-slopes of the landfill and the stability of the working face of the landfill.

This evaluation found that the Factors of Safety for slopes constructed at 3:1 (H:V) or less are acceptable for gypsum and a mixture of gypsum and clarifier sludge (one-to-one by volume). The following properties were used in that evaluation:

Material	Unit Weight Dry/Saturated (pcf)	Cohesion Intercept (psf)	Friction Angle (degrees)
Clarifier Sludge	66/66	600	6
Clarifier Sludge: Gypsum (1:1 mixture by volume)	60/60	See below	See below
UU - Unconsolidated – Undrained Test Results	-	370	26.9
UU - Unconsolidated – Undrained Test Results	-	630	21.1

This evaluation found that based on these properties, it is not acceptable to place clarifier sludge without mixing with gypsum at a minimum mix of one part gypsum and one part clarifier sludge.

Within 30 days after the initial placement of gypsum and clarifier sludge material in the landfill, the following tests will be performed on the in-place, compacted material:

- Grain Size Distribution
- Atterberg Limits
- Specific Gravity
- Natural Moisture
- Standard Proctor Compaction
- Remolded Permeability
- Consolidation
- Triaxial Shear Strength (UU and CU)

The results of these tests will be evaluated against the properties used in the global stability evaluation "Marshall FGD Landfill Slope Stability Evaluation" contained in the Construction Plan Application, dated December 15, 2005. After that evaluation, the requirements for compaction, mixing material, and the slope limitations for the working face will be reviewed.

2.0 SITE OPERATIONS AND MAINTENANCE

The Duke Energy Marshall Steam Station FGD Gypsum Landfill is owned and operated by Duke Energy Corporation. Operation and maintenance of the landfill will be the responsibility of Mr. Aaron Kitzmiller, Plant Material Handling Area Coordinator.

2.1 Access and Security Requirements

The site lies entirely within Duke Energy property. Security is currently in place that includes fencing, wooded buffers and security check stations.

Access roads to the site shall be of all weather construction and maintained in good condition.

Directional signs shall be placed along the access road to the landfill. A sign shall also be posted at the landfill that includes the permit number, hours of operation, and a statement reading, "NO HAZARDOUS OR LIQUID WASTE PERMITTED."

2.2 Erosion/Sedimentation Control Maintenance

The site is designed with erosion and sedimentation control in accordance with the requirements of the Sedimentation Pollution Control Law (15A NCAC4). Erosion/sedimentation control structures include sediment basins, outlet protection aprons and diversion ditches. Sediment basins shall be checked after periods of significant runoff and as specified in the Technical Specifications and Erosion and Sedimentation Control Plans. Sediment shall be removed to its original dimensions when the sediment accumulates to one half of the design depth. Excavated sediment shall be transported to the soil stockpile area. The sediment basins, embankments, and outlets

shall also be inspected for erosion damage after each significant rainfall event. All necessary repairs shall be made immediately.

Diversion ditches shall be inspected for damage after each significant rainfall event, as specified on the Erosion and Sediment Control Plan. Riprap channels and outlet protection aprons shall be inspected for wash outs. Riprap shall be added to these areas as needed.

Embankment slopes shall be periodically inspected for erosion. These areas shall be mowed at least twice a year. The embankment slopes shall be refertilized in the second year unless vegetation growth is fully adequate. Reseed, fertilize, and mulch damaged areas immediately. Seeding, fertilizing and mulching shall be in accordance with the seeding specifications in the Erosion and Sediment Control Plan.

2.3 Stormwater Structures

All culverts and inlets shall be inspected quarterly for signs of damage, settlement, clogging, siltation build-up or washouts. Repairs to the stormwater structures shall be made as soon as possible.

2.4 Dust, Litter, Odors and Vectors

Dust generated due to landfill activities will be controlled through the application of water by truck or other approved dust control products, if necessary. Additionally, final cover will be vegetated as soon as is practical in order to minimize the blowing of dust on-site. Odors and vectors are typically not a problem at FGD gypsum landfills.

Due to the possibility of minor hydrogen sulfide (H_2S) gas production at the gypsum/soil interface, a passive gas system has been designed for the final cover system of the FGD gypsum landfills. During landfilling activities H_2S gas measurements will be taken at the leachate collection cleanout pipes located along the landfill perimeter and the sump discharge pipe inverts in the stormwater basin. In the event that H_2S gas is detected, the levels will be evaluated and the necessary mitigation measures will be undertaken.

Following landfill closure activities, H_2S gas measurements may also be taken from the gas vents. In the event that H_2S gas is detected, the proposed passive gas system can be converted into an active gas system with gas control devices if required.

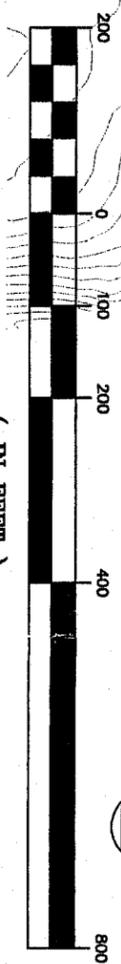
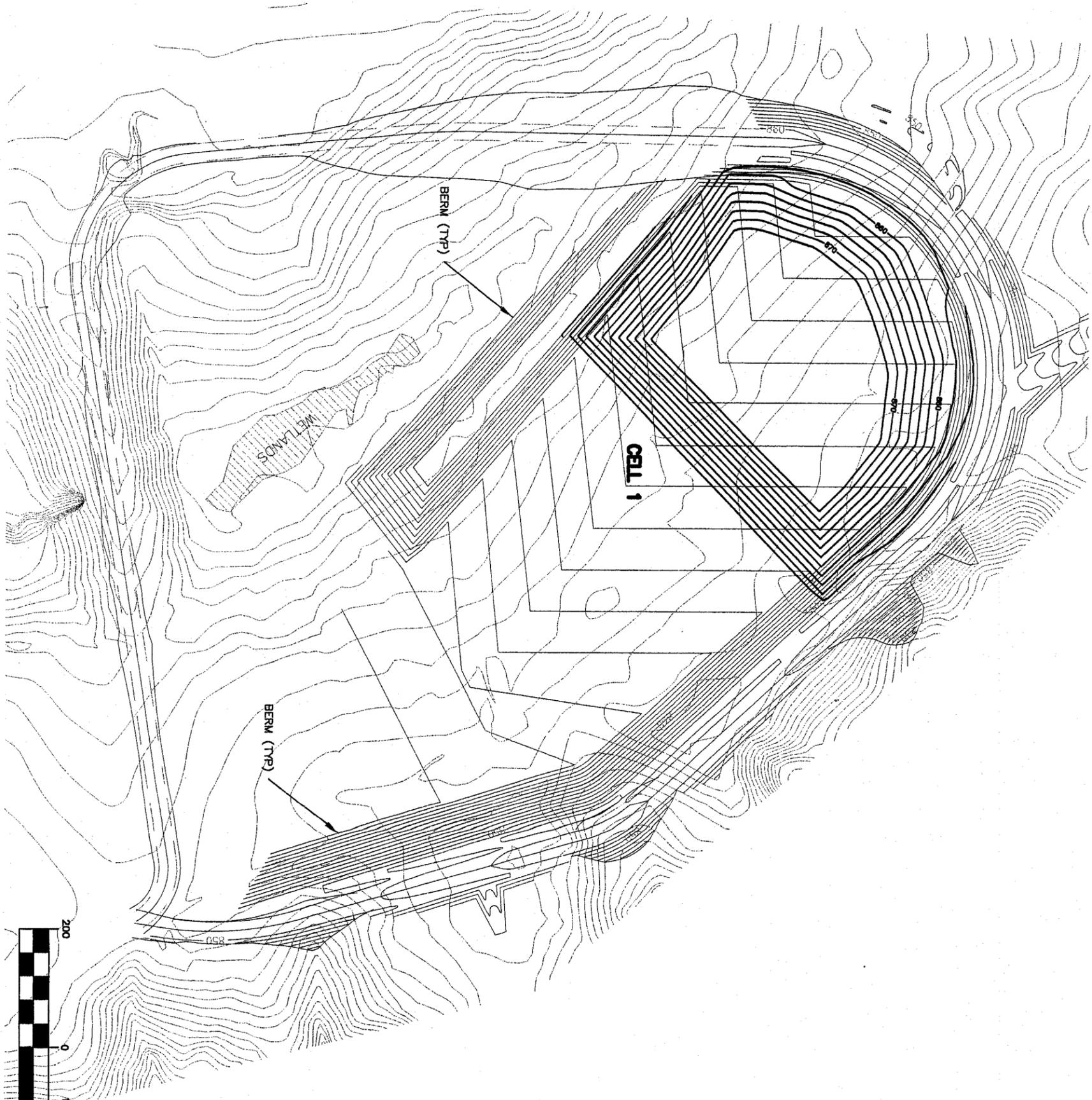
2.5 Fire Control

There are no explosive gas concerns with the gypsum waste.

The Marshall Steam Station has employees trained in fire control at the plant. In the event of fire to equipment at the landfill site, Duke's fire control personnel will be immediately dispatched.

2.6 Groundwater Monitoring Wells

Groundwater monitoring wells will be located around the landfill perimeter. Care must be taken around the wells to prevent any damage to the wells. The proposed groundwater monitoring plan including well locations, screened intervals, depths and construction details is included in the Groundwater Monitoring Plan.



GRAPHIC SCALE

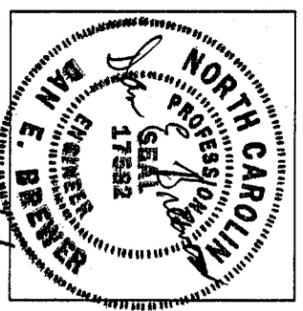


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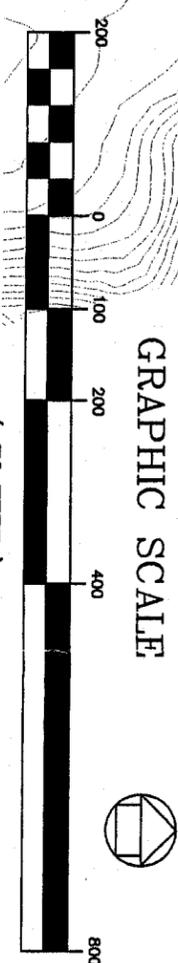
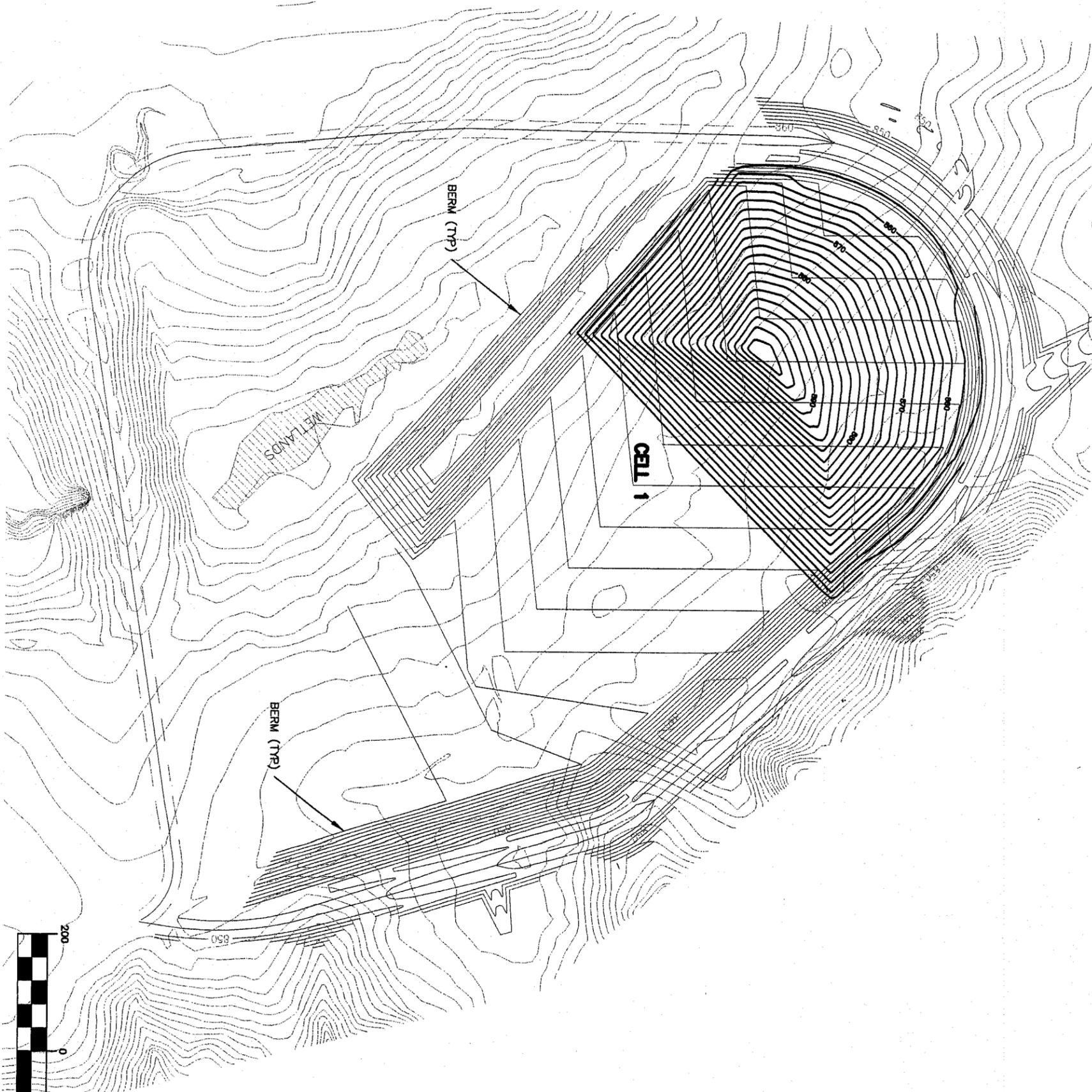
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 FGD GYPSUM LANDFILL
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 NORTH CAROLINA



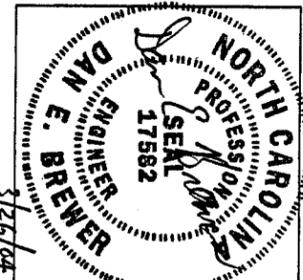
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 Consulting Engineers, Surveyors & Photogrammetrists
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 Fax: 919-678-0206
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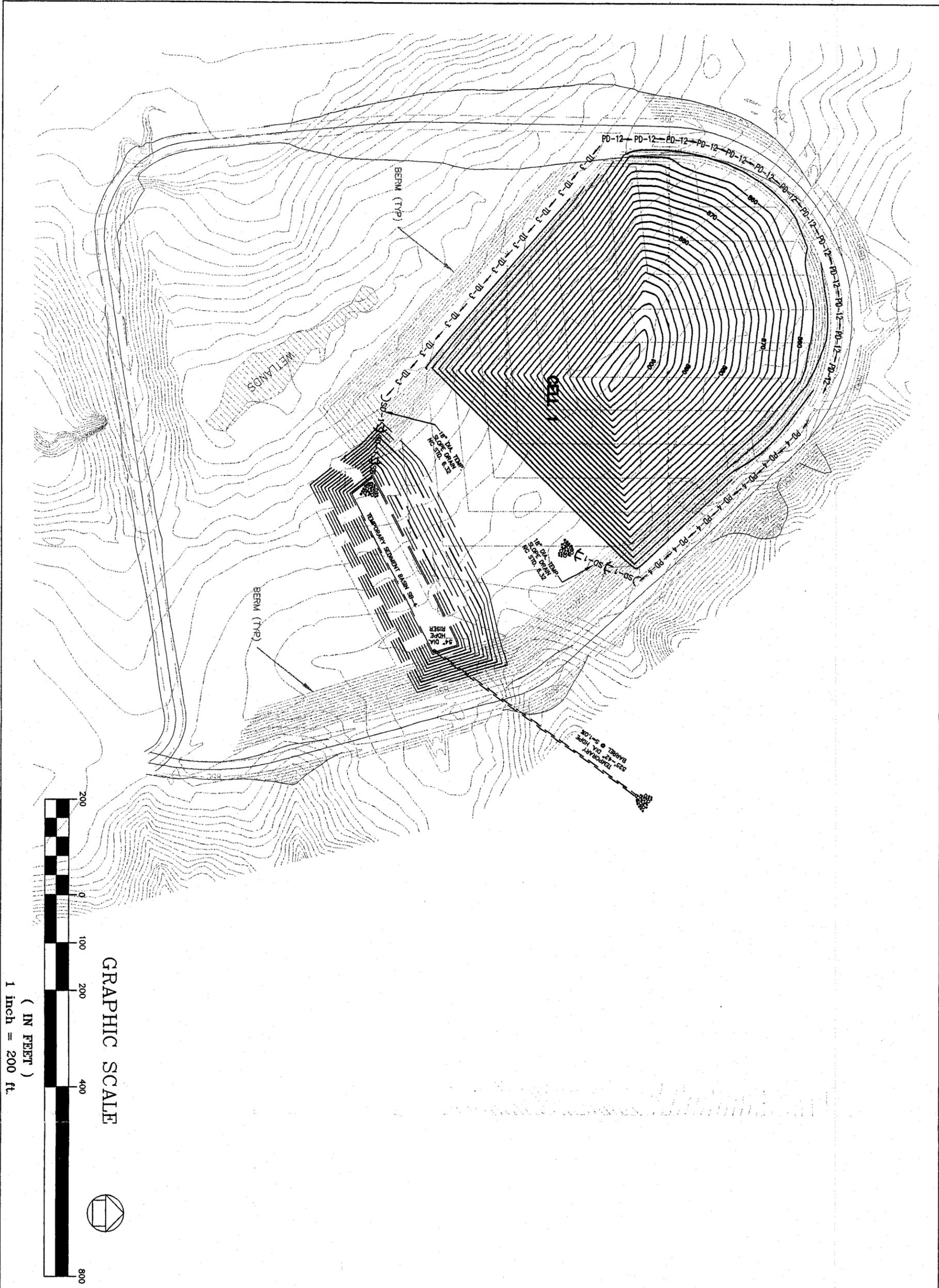
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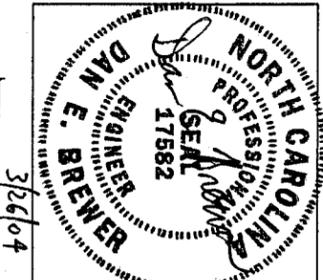
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 Tel: 919-678-0035
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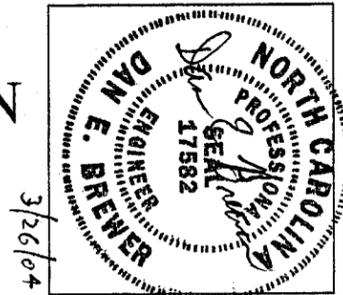
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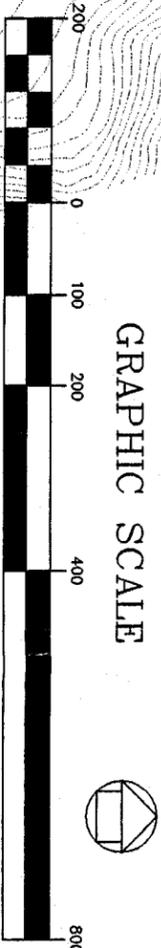
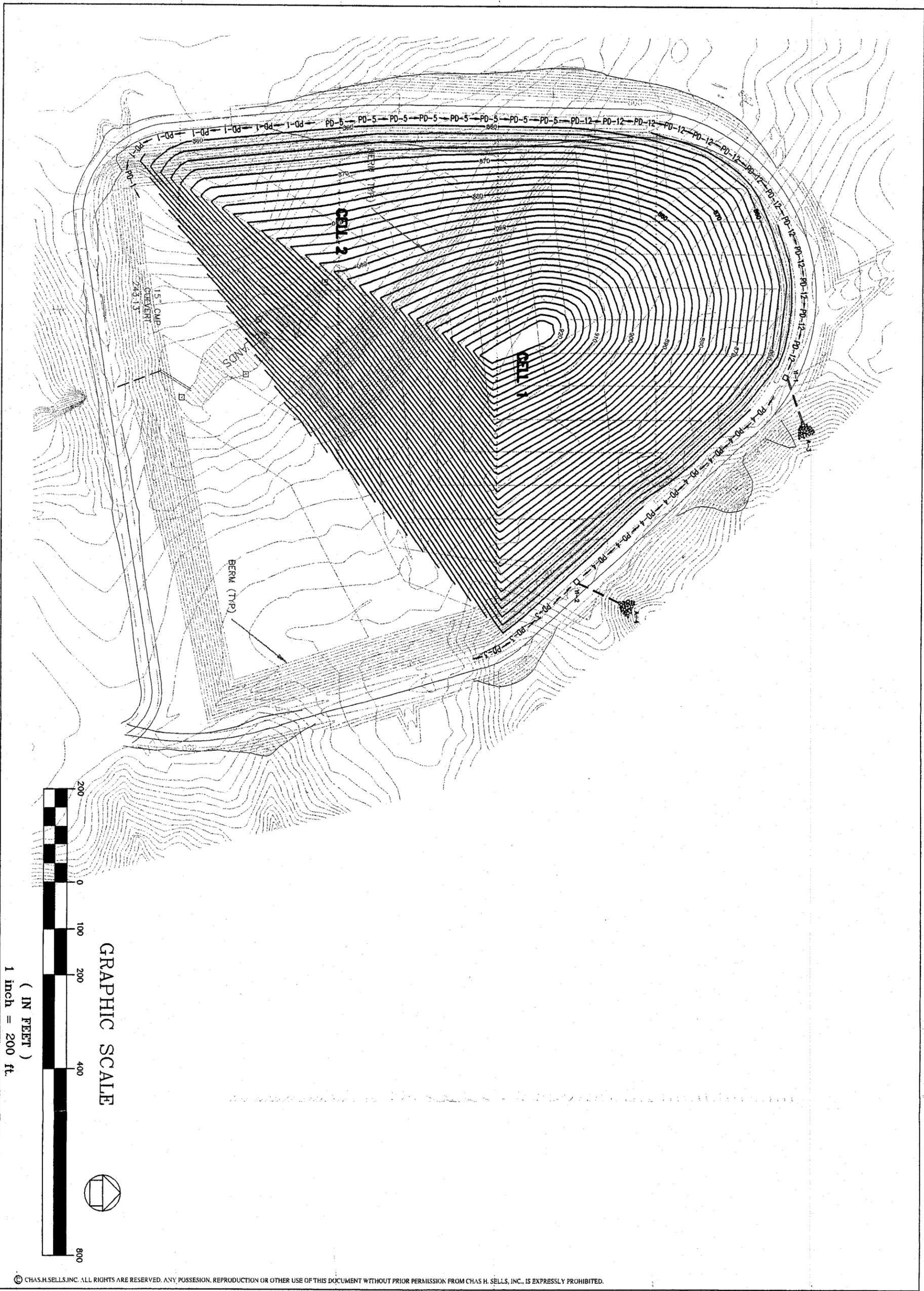
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 Consulting Engineers, Surveyors & Photogrammetrists
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 Suite 106
 Cary, NC 27513
 Tel: 919-678-0035
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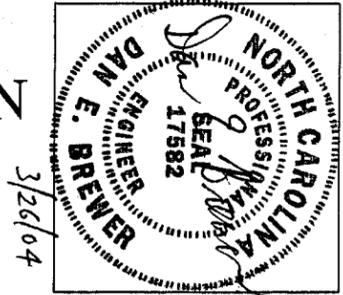


GRAPHIC SCALE
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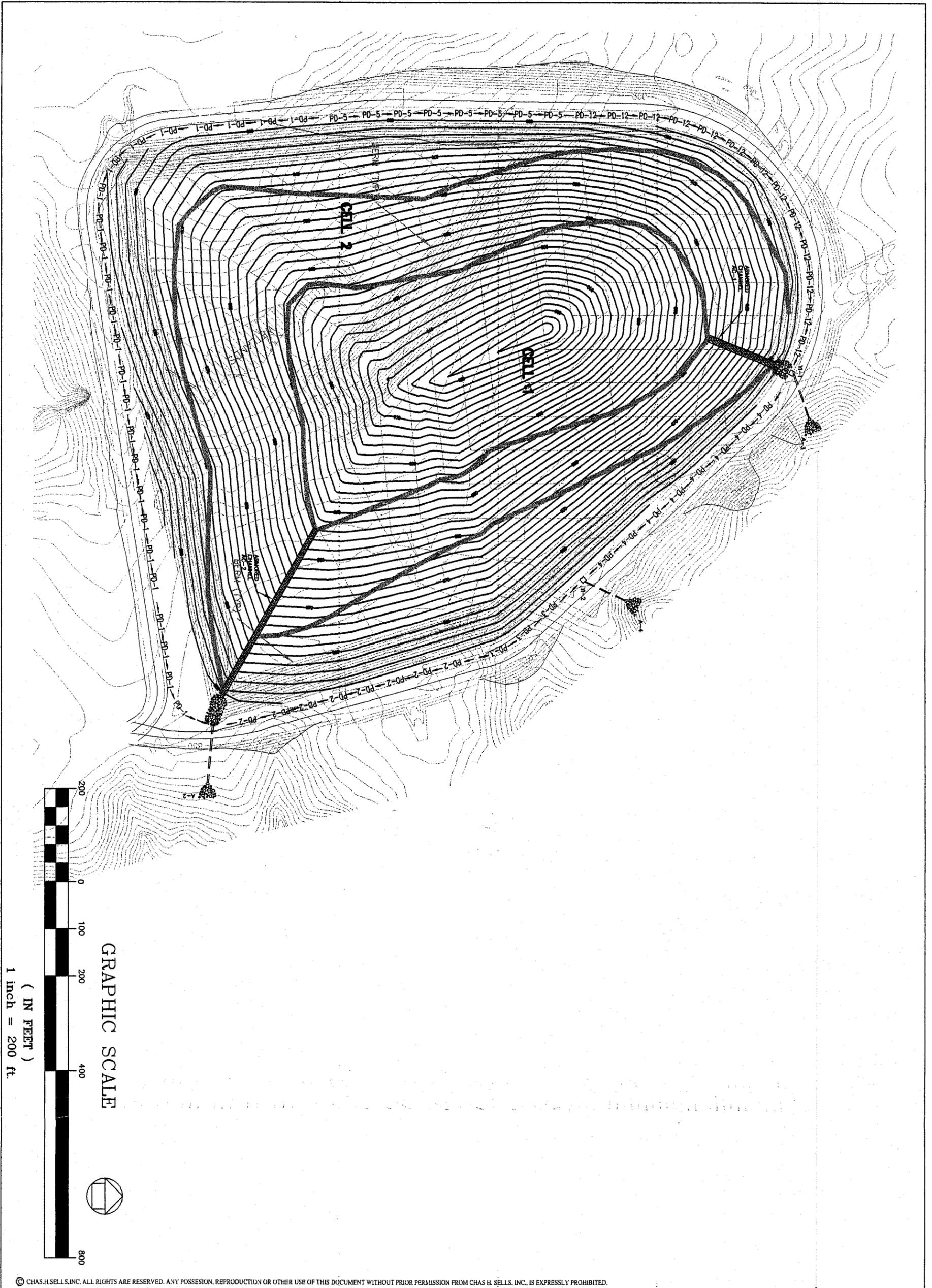
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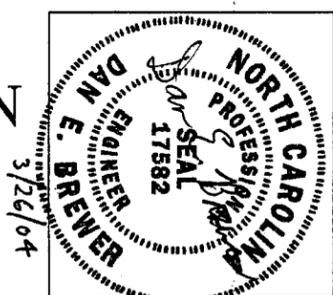
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 Consulting Engineers, Surveyors & Photogrammetrists
 15300 Weston Parkway
 Suite 106
 Cary, NC 27513
 Tel: 919-678-0035
 Fax: 919-678-0206
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ATTACHMENT 1

Approved Documents

- 1) *FGD Residue Landfill Permit Application Site Suitability Information* August 29, 2003 Volume 1 15A NCAC 13B .0503 (1) and .0504 (1) Requirements and Responses received Construction Plan Application September 3, 2003.
- 2) *FGD Residue Landfill Permit Application Site Suitability Information* August 29, 2003 Volume 2 Hydrogeologic Study S&ME Project 1264-02-578 received September 3, 2003.
- 3) *Compliance Demonstration Report* dated March 31, 2004 received April 6, 2004. for Phase 1 dated March 2004 received April 2, 2004.
- 4) *FGD Residue Landfill Permit Application Site Suitability Information* October 29, 2004 Volume 1 Addendum 1 Hydrogeologic Study S&ME Project 1264-02-578 received November 18, 2004.
- 5) *FGD Residue Landfill Permit Application Site Suitability Information* October 29, 2004 Volume 2 Addendum 1 Hydrogeologic Study S&ME Project 1264-02-578 received November 18, 2004.
- 6) *FGD Residue Landfill Permit Application .0503(2)(d)(ii)(A) Compliance Demonstration Report.* Addendum November 12, 2004 received November 18, 2004.
- 7) *Response to Comments: Marshall Steam Station FGD Industrial Landfill Permit to Construct* dated January 6, 2005 received January 7, 2005. Including a Drawing set, Sheets M-6024-01.00 through MM6451.01-0004.001.
- 8) *Construction Plan Application (Volume One and Two).* Prepared by: Chas. H. Sells, Inc., Mooresville, NC. Prepared for: Duke Power Marshall Steam Station, Catawba County, NC. December 15, 2005 revised through March 30, 2006. Including Revised Drawing set, MM6451.00-000.001 through MM6451.00-0014.001
- 9) *Flue Gas Desulfurization (FGD) Residue Landfill Permit Application - .0503(2)(d)(ii)(A) Compliance Demonstration Report.* Prepared by Chas. H. Sells, Inc., Mooresville, NC. Prepared for Duke Energy Marshall Steam Station, Catawba County, NC. December 15, 2005 revised through March 23, 2006.
- 10) *Technical Specifications for Construction.* Prepared by Chas. H. Sells, Inc., Mooresville, NC. Prepared for Duke Energy Marshall Steam Station, Catawba County, NC. December 15, 2005.
- 11) *Construction Quality Assurance Program.* Prepared by Chas. H. Sells, Inc., Mooresville, NC. Prepared for Duke Energy Marshall Steam Station, Catawba County, NC. Including revised copy of Drawing MM6451.00-0007.001, Revision B. January 16, 2006.
- 12) *Operation and Maintenance Plan.* Document No. MM6451.00-0000-001. Prepared by: Chas. H. Sells, Inc. Prepared for: Duke Energy Steam Station. Revision 1, March 2006.

ATTACHMENT 2

Conditions of Permit to Construct

PART I: INDUSTRIAL WASTE LANDFILL FACILITY

GENERAL CONDITIONS

1. This permit shall be effective upon compliance with 15A NCAC 13B .0204 and when the certified copy with the page, book number, date of recordation, and Register's seal is returned to the Solid Waste Section (Section).
2. This permit is subject to review every five years as per 15A NCAC 13B .0201(e), according to the issuance date of the Permit to Operate. Modifications to the facility may be required in accordance with rules in effect at the time of review.
3. The approved plans are described in Attachment 1, "Approved Documents". Where discrepancies may exist, the most recent approved submittal and Conditions of Permit shall govern.
4. The landfill is permitted to receive solid waste generated solely by Duke Power as described in the approved plan and as defined in G.S. 130A-290 (a)(35) except where prohibited by North Carolina General Statutes Article 9 of Chapter 130A, and rules adopted by the Commission for Health Services. The Duke Power Company, LLC — Marshall FGD landfill is permitted to receive FGD by-product from Duke Power Company, LLC — Allen Plant located in Gaston County and the Duke Power Company, LLC — Cliffside Plant located in Rutherford County in accordance with the revised zoning letter dated 9 November 2004 from Catawba County.
5. This facility is subject to the requirements of all applicable sections of the most recent version of the North Carolina Solid Waste Management Rules, 15A NCAC 13B and the specific conditions contained herein.
6. This permit is not transferable.
7. Cell 1's gross capacity (volume) is 751,200 cubic yards or 608,472 tons. The daily tonnage should average 950 tons per day or 427,000 cubic yards per year. Cell 1 has a waste footprint of 14.8 acres.

PART II: INDUSTRIAL WASTE LANDFILL UNIT

CONSTRUCTION CONDITIONS

8. The permittee shall conduct an on-site pre-construction meeting prior to initiating construction and shall notify the Solid Waste Section of said meeting. If construction does not begin within 18 months from the issuance date of this permit, then the permittee must obtain written approval from the Section prior to construction and comply with any conditions of said approval.
9. This permit approves the construction of Cell 1, of the FGD monofill. Construction shall be in accordance with the approved plans and only for those phases approved for development as described in Attachment 1, "Approved Documents".

10. Duke Power Company, LLC shall submit an application for amendment to this permit for subsequent phases of development.
11. Additional conditions and revisions of the approved documents or changes during construction require approval by the North Carolina Solid Waste Section.
12. Any modifications in sedimentation and erosion control activities require approval by the Land Quality Section. The Section shall be notified of any sedimentation and erosion control modifications.
13. Abandonment of observation wells shall be in accordance with 15A NCAC 2C. Well abandonment records shall be submitted to the Section Hydrogeologist for review and approval prior to beginning landfill construction.
14. The owner's geologist shall examine the cell excavation and note any pertinent geologic features exposed during the construction process and shall notify the Solid Waste Section Hydrogeologist of these findings prior to the placement of any liner materials.
15. The owner's geologist shall be in the field to supervise all well installations. Any modifications to the approved water quality monitoring plan require approval by the Section Hydrogeologist. Documentation of all changes to the approved plan shall be submitted with the well construction records.
16. For each monitoring well constructed, a well construction record, well schematic, boring log and a description of well development activities shall be submitted to the Section within 30 days upon well completion.

PRE-OPERATIVE CONDITIONS

17. Prior to receiving waste, a Permit to Operate must be obtained from the Solid Waste Section in accordance with 15A NCAC 13B .0201(b).
18. The following requirements shall be met prior to obtaining a Permit to Operate:
 - a. Site preparation shall be in accordance with the approved plans, and the conditions specified herein.
 - b. A representative of the Solid Waste Section shall make a pre-operative site inspection.
 - c. A pre-operative meeting shall be held on-site with key landfill personnel and representatives of the Solid Waste Section.
 - d. Ground water monitoring wells and surface water sampling locations shall be installed and sampled.
 - e. CQA documentation as well as a certification by the project engineer that the landfill was built in accordance with approved plans shall be submitted to the Section.
 - f. Prior to the issuance of a Permit to Operate, Duke Power Company, LLC shall provide documentation addressing the location of the FGD by-product landfill, with respect to the WS-IV watershed designation of Lake Norman, as addressed in the recombination plat dated 1 November 2004 from Lake Norman Surveying and Engineering PLLC.

ATTACHMENT 3

Conditions of Permit to Operate

PART I: INDUSTRIAL LANDFILL FACILITY GENERAL CONDITIONS

1. This permit shall be reviewed, pursuant to 15A NCAC 13B.0201(e), five (5) years from the issuance date of the permit to operate or the latest amendment,
2. In the event of conflicts between the Permit to Operate and previously issued conditions, the conditions of the Permit to Operate shall supersede previously issued conditions.
3. Additional conditions and revision of the approved documents or changes during the operation of the landfill require approval by the North Carolina Solid Waste Section.

PART II: INDUSTRIAL LANDFILL UNIT OPERATIONAL CONDITIONS

4. This permit approves the operation of landfill, Cell 1, as well as the on-site environmental management and protection facilities as described in the approved plans.
5. The solid waste management units within this facility shall conform to all operating requirements described in the approved plans and 15A NCAC 13B .0506.
6. Closure or partial closure of any landfill unit shall be in accordance with the Closure Plans described in the approved plans. Final Closure Plans shall be submitted to the Division at least 90 days prior to implementation.
7. Ground water quality at this facility is subject to the "Classifications and Water Quality Standards Applicable To The Groundwater of North Carolina", 15A NCAC 2L. This includes, but is not limited to provisions for detection monitoring, assessment, and corrective action. Compliance will be determined with ground water monitoring at the landfill.

MONITORING AND REPORTING

8. Ground water monitoring at this unit shall be as described in the approved monitoring plan.
9. A readily accessible unobstructed path shall be cleared and maintained so that four wheel drive vehicles may access monitoring well locations at all times.

10. A field log book which details all development, sampling, repair, and all other pertinent activities associated with each monitoring well and all sampling activities associated with each leachate sampling location shall be kept as part of the permanent facility record.
11. Records of all ground water analytical data and SPLP analytical data, for the FGD by product, shall be kept as part of the permanent facility record.
12. Ground water monitoring wells and surface water sampling locations must be sampled at least semi-annually according to the specifications outlined in the approved water quality monitoring plan and the current policies and guidelines of the Section in effect at the time of sampling.
13. Reports of the analytical data for each water quality sampling event shall be submitted to the Section within 60 days of the respective sampling event. Analytical data shall be submitted in a manner prescribed by the Section.
14. On or before August 1 of each year, the permittee shall report the amount of waste received (in tons) at this facility and disposed of in the landfill units to the Solid Waste Section, on forms prescribed by the Section. This report shall include the following information:
 - a. The reporting period shall be for the previous year, beginning July 1 and ending on June 30.
 - b. The amount of waste received and landfilled at the Lined Ash Monofill, compiled on a monthly basis.
 - c. The completed report shall be forwarded to the Solid Waste Section's Regional Waste Management Specialist for the facility. A copy of the completed report shall be forwarded to the County Manager of each county from which waste was received.

- End of Section -

PART III CONSTRUCTION AND DEMOLITION DEBRIS UNIT SPECIFIC CONDITIONS
(NOT APPLICABLE)

PART IV LAND CLEARING AND INERT DEBRIS UNIT SPECIFIC CONDITIONS
(NOT APPLICABLE)

PART V YARD WASTE UNIT SPECIFIC CONDITIONS
(NOT APPLICABLE)

PART VI MISCELLANEOUS TREATMENT AND PROCESSING UNIT SPECIFIC CONDITIONS (Specify Unit Type) (NOT APPLICABLE)

- End of Section -

