

CLOSURE PLAN

PLANT BOWEN COAL COMBUSTION RESIDUALS (CCR) LANDFILL BARTOW COUNTY, GEORGIA

FOR



Georgia Power

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Consulting Engineers

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1. GENERAL

The ten (10) disposal cells at the Plant Bowen CCR Landfill will be closed by leaving coal-combustion residuals (CCR) in place and installing a final cover system meeting the requirements of Solid Waste Rule 391-3-4-.10(7). The Plant Bowen CCR Landfill has a disposal capacity of approximately 11,409,900 cubic yards, and the landfill covers a total combined area of approximately 147.5 acres that will require final cover. Georgia Power will close this CCR landfill in a manner that minimizes the need for further maintenance and minimizes the potential of post-closure release of CCR to ground or surface waters.

The closure of the Plant Bowen CCR Landfill will commence when Georgia Power ceases placing waste in the cells and begins implementation of this closure plan.

2. WRITTEN CLOSURE PLAN [391-3-4-.10(7)(b)]

Georgia Power prepared an initial site-specific written closure plan to comply with 40 CFR §257.102. The plan includes a written certification from a qualified professional engineer registered in Georgia that the written closure plan meets the requirements of 40 CFR §257.102 certification of closure. The initial certified written closure plan for the existing cells at the Plant Bowen CCR landfill was prepared and uploaded to the Georgia Power website under Environmental Compliance prior to October 17, 2016.

This closure plan is being prepared as required by Georgia Solid Waste Rule 391-3-4-.10(7)(b) and will replace the initial written closure plan once it is approved by the Georgia Environmental Protection Division (EPD).

Once this closure plan is approved by EPD and placed in the facility's operating record, Georgia Power may amend the permitted closure plan if needed, as follows:

- at least sixty (60) days prior to a planned change in the operation of the landfill that substantially affects the written closure plan in effect;
- no later than sixty (60) days after unanticipated events necessitate a revision of the written closure plan, before or after closure activities have commenced; or
- if revised after closure activities have commenced, no later than thirty (30) days.

A qualified professional engineer must certify that the amended written closure plan meets the requirements of 391-3-4-.10(7)(b). The amended closure plan will be placed in the facility's operating record once it has been approved by the Georgia Environmental Protection Division (EPD) in accordance with 391-3-4-.10(7)(b).

3. CERTIFICATION OF CLOSURE [391-3-4-.10(7)(e)]

Within thirty (30) days of completion of all closure activities, Georgia Power will submit a notification of closure to EPD that includes certification from a qualified professional engineer registered in Georgia verifying that closure has been completed in accordance with this closure plan. The submittal to EPD will also include a closure report prepared by a qualified professional engineer registered in Georgia. The closure report will include documentation that the materials used to close the landfill meet the requirements specified in the permit drawings and CQA Plan and an as-built drawing of the grades at the time of closure.

Concurrent with the submission of the closure report to EPD, Georgia Power will submit confirmation that a notation on the property deed has been recorded. This recording will notify any potential purchaser of the property, in perpetuity, that the land has been used as a CCR landfill and that its use is restricted under the post-closure care requirements of Georgia Rules of Solid Waste Management Chapter 391-3-4.10.

4. DIRECTIONAL INFORMATIONAL SIGNS

Signs will be posted at the entrance gate notifying users of the CCR landfill of its closure and a telephone number will be included for contact in case of emergency.

5. REMOVAL OF CCR

If Georgia Power chooses to remove CCR, Georgia Power will request and receive written approval from EPD prior to conducting any such activity.

6. FINAL COVER SYSTEM

Upon closure, all CCR received at the landfill will be graded, compacted and capped with the final cover system as described on the permit drawings.

Final cover soil will be secured from on-site excavation of cell areas, stockpiles or off-site borrow source areas as necessary. Any off-site borrow areas used to provide soil for the final cover system will meet applicable requirements of EPD's Surface Mining Rules.

The Final Cover System will meet the following standards in accordance with Rule 391-3-4-.10(7)(b):

1. Control, minimize or eliminate, to the maximum extent feasible, post-closure infiltration of liquids into the waste and releases of CCR, leachate, or contaminated run-off to the ground or surface waters or to the atmosphere;
2. Preclude the probability of future impoundment of water, sediment, or slurry;
3. Include measures that provide for veneer slope stability to prevent the sloughing or movement of the final cover system during the closure and post-closure care period;
4. Minimize the need for further maintenance of the CCR landfill; and

5. Complete the closure in the shortest amount of time consistent with recognized and generally accepted good engineering practices.

Description of Final Cover System:

1. The CCR subgrade for the final cover system in each disposal cell will be graded and compacted to create a stable surface for the final cover system.
2. The final cover system will include an 18-inch thick low-permeability ($k \leq 1 \times 10^{-5}$ cm/sec) soil layer, overlying the prepared subgrade of CCR material;
3. The low permeability soil layer will be overlain with a minimum 40-mil textured LLDPE geomembrane and a geosynthetic drainage material (GDM or geocomposite).
4. The GDM overlying the LLDPE geomembrane, will be covered with a minimum 18-inch protective cover soil layer and a minimum 6- inch topsoil layer capable of sustaining vegetative growth.

Final Cover System Configuration:

1. Maximum slopes of 3H:1V;
2. Minimum slopes of 3%; and
3. 20-ft wide drainage benches every 20 vertical feet.

The final cover system described above meets the requirements of Rule 391-3-4-.10(7)(b).

7. CLOSURE SCHEDULE

Closure activities must commence within no later than thirty (30) days after the date on which the landfill receives the known final receipt of waste or removes the known final volume of CCR from the CCR landfill for the purpose of beneficial re-use of CCR. Additionally, Georgia Power must commence closure of the CCR landfill if the landfill has not received waste or if CCR is not being removed for beneficial re-use for a period not to exceed two (2) years from the last receipt of CCR in the landfill. If needed, Georgia Power may provide written documentation notifying EPD that the landfill will continue to accept CCR or will start removing CCRs for the purpose of beneficial re-use and request a two- (2) year extension to initiate closure of the landfill.

Once the decision has been made by Georgia Power to close the CCR landfill, the following schedule will be followed over a six (6) month period:

1. Submit notice of intent to close the landfill (or cell) to EPD after receipt of the final load of CCR and with the date of final CCR receipt.
2. Commence closure activities within thirty (30) days of final receipt of CCR.
3. Prepare accurate legal description of final CCR management boundary.
4. Prepare final topographic as-built survey.
5. Obtain written permission from EPD to remove CCR, if required.

6. Construct all erosion and sediment control systems serving disturbed areas, but not previously built.
7. Install final cover system.
8. Initiate vegetative plan.
9. Remove all accumulated sediments from ponds, ditches and other drainage structures.
10. Within thirty (30) days of closure completion of closure activities, prepare and submit the Closure Report to EPD. The report will be prepared by a professional engineer registered in Georgia.
11. On all deeds of real property that has been used for landfilling, include notice of landfill operations, the date the landfill operation commenced and terminated, an accurate legal description of the actual location of the CCR landfill, and a description of the type of CCRs that have been deposited in the landfill.
12. Concurrent with the Closure Report, submit to EPD confirmation that the information required above has been noticed on the property deed.
13. Place the required notifications and records on the Georgia Power website under Environmental Compliance.

Georgia Power will complete all closure activities of the CCR landfill in accordance with this Closure Plan within six (6) months. If additional time to complete closure is required, GPC will provide a written request to EPD detailing the need for additional time and the revised completion date.

8. VEGETATIVE PLAN

All disturbed areas will be grassed and maintained in accordance with the following schedules. Final surfaces will be seeded and mulched within thirty (30) days of finished grading activity with a temporary and permanent seed mixture. The fertilizer requirements are suggested. The operator may submit soil samples to the County Extension Agent or private laboratory for analysis and determination of proper soil conditioners including lime. This analysis will become part of the facility's operating record. Planting dates, fertilizer rates, and seeding rates will meet the requirements in the Manual for Erosion and Sediment Control in Georgia.

VEGETATION SCHEDULE														
BROADCAST														
SPECIES	RATES	PLANTING DATES												COMMENTS
		J	F	M	A	M	J	J	A	S	O	N	D	
Wilimington Bahia alone	60 lbs./ac			█	█	█								Low growing.
Wilimington Bahia w/ other perennials	30 lbs./ac			█	█	█								Mix with service alespedeza. Low growing.
Tall Fescue alone	50 lbs./ac			█	█				█	█				
Tall Fescue w/ other perennials	30 lbs./ac			█	█				█	█				Mix with service alespedeza.
Reed Canary alone	50 lbs./ac								█	█				
Reed Canary w/ other perennials	30 lbs./ac								█	█				
Ambro Virgataor Appalow Lespedeza scarified	60 lbs./ac				█	█								Mix with bahai or tall fescue. Do not mix with service alespedeza.
Ambro Virgataor Appalow Lespedeza unscarified	75 lbs./ac	█	█							█	█	█	█	Mix with bahai or tall fescue. Do not mix with service alespedeza.

NOTES:

- (1) All seeding rates are pure live seed rates.
- (2) All seeding will be mulched with clean dry hay at the rate of 2.5 tons per acre. Mulch will be anchored by pressing the mulch into the soil immediately after the mulch is spread using a packer disk or disk harrow or equivalent piece of equipment.
- (3) Temporary seeding should also complement permanent seeding to produce a suitable cover while the permanent grasses germinate.
- (4) Disturbed slopes greater than 3%, including soil stockpiles, are to be mulched immediately.
- (5) D.O.T. or County Extension seed type, seed rates, fertilizer requirements, etc. may also be used in lieu of the table above.

FERTILIZATION (Warm Season Grasses)			
YEAR	N-P-K	RATE	N TOP DRESSING RATE
First	6-12-12	1500 lbs./ac	50 - 100 lbs./ac
Second	6-12-12	800 lbs./ac	50 - 100 lbs./ac
Maintenance	10-10-10	400 lbs./ac	30 lbs./ac

NOTES:

1. Apply in split applications when high rates are used.
2. Apply when plants grow to height of 2"-4".

9. SITE EQUIPMENT NEEDED

Georgia Power will make adequate equipment available to ensure that closure requirements are executed correctly and efficiently. Should said equipment not be available, back up equipment may be obtained from rental companies.

10. EROSION AND SEDIMENTATION CONTROL

At closure, all ditches, diversion berms, channels, culverts, silt fences and other drainage structures not already built, will be constructed and placed. All stormwater run-off from the disposal facility shall be directed to the sediment pond. All disposal areas are confined within perimeter berms which divert all potential run-on away from the disposal facility.

During closure activities, all necessary erosion control measures will be kept cleaned out, repaired and/or replaced as necessary.

11. COST OF CLOSURE AND FINANCIAL ASSURANCE

The estimated cost of closing the largest area of the CCR landfill ever open during the active life of the landfill is approximately \$22,378,136 (in 2018 US dollars) for an open area equal to 147 acres. The Closure Cost Estimate is included in Appendix A.

The closure cost estimate was developed at a level of detail, and from the perspective that, sufficient funding could be set aside in a financial assurance mechanism for a third party (other than GPC) to complete closure. Closure estimates include engineering design, construction, and construction quality assurance support.

The financial assurance estimate in this application for closure was developed by the professional engineers preparing this application. This estimate represents the anticipated financial assurance requirements for the application as submitted.

It is understood that through the review process by the EPD and based on any comments or questions by the EPD, this application may be revised. These revisions could be reason for the financial assurance cost estimates in this application to change. GPC is prepared to make any necessary changes in the financial assurance instruments that result from any changes in the application.

Currently, financial assurance for this facility is provided by the Corporate Financial Test described in 40 CFR Part 258, Subpart G and will be updated annually to account for inflation in accordance with EPD's inflation calculation.

12. RECORDKEEPING/NOTIFICATION/INTERNET REQUIREMENTS

The requirements of this Closure Plan comply with the recordkeeping requirements, closure notification requirements and closure internet posting requirements in of Rule 391-3-4-.10(8). A summary of the specific recordkeeping, notification and internet posting requirements for closure are listed below:

Recordkeeping Requirements [391-3-4-.10(8)]

Georgia Power will maintain these documents in the facility's operating record as soon as the required document/information is available or applicable and approved by EPD:

- (a) The written closure plan, and any amendment of the plan, as required by 40 CFR §257.102(b). Georgia Power may elect to maintain only the most recent closure plan approved by EPD in the facility's operating record.
- (b) If Georgia Power chooses to secure a two- (2) year extension to initiate closure of an idle cell at the Plant Bowen CCR landfill, Georgia Power will place in the operating record a written demonstration(s) meeting the requirements of 40 CFR §257.102(e)(2)(ii). The demonstration must include, at a minimum, the information specified below:
 - i. Demonstration that there is a likelihood that the cell in question will resume receiving CCR or non-CCR materials in the foreseeable future. The documentation will include confirmation that the cell has airspace available and provide an estimated timeframe as to when the cell will resume receiving CCR or non-CCR materials; or
 - ii. Information demonstrating that CCR can be removed for the purpose of beneficial use.
 - iii. A statement signed by an authorized representative of Georgia Power as follows:

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this demonstration and all attached documents, and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.
 - iv. As required by 40 CFR §257.105(i)(5), if Georgia Power seeks more than one time extension, the facility's operating record will be updated with a new demonstration prior to the end of the two- (2) year extension.
- (c) The notification of intent to close a cell(s), as required by 40 CFR §257.102(g).
- (d) The notification of completion of closure of a cell as required by 40 CFR §257.102(h).
- (e) The notification that closure of a cell(s) has been completed as required by 40 CFR §257.102(h).
- (f) A notification that a deed restriction has been added to the property records as required by 40 CFR §257.102(i) will be added to the Plant Bowen CCR landfill facility's operating record after closure of the landfill cells.

Notification Requirements [391-3-4-.10(8)]

The requirements for notification consist of informing EPD when information has been placed in the facility's operating record and on Georgia Power website under Environmental Compliance. EPD reviews and approves the Closure Plan and is also the regulatory agency responsible for providing a closure certificate to the Plant Bowen CCR landfill, therefore, the requirements specified in 40 CFR 257.106(i) are met during the State's CCR landfill permitting process.

Publicly accessible Internet Site Requirements [391-3-4-.10(8)]

Georgia Power will post the information required by 40 CFR §257.105 for the Plant Bowen CCR landfill within thirty (30) days of review and approval by EPD. The information required to be posted on the Georgia Power website under Environmental Compliance will remain available at least five (5) years following the date on which Georgia Power first posts the information.

13. SURVEY CONTROL

Filling and closure activities will be confined to within the limits indicated in the permit drawings. The location and accurate legal description of the disposal boundaries will be noted on and filed with the deed at the Bartow County Courthouse. An "as-built" topographic survey will be provided to indicate the extent and final topography of the disposal area. Other topographic surveys will be conducted as specified in the CQA Plan. Site horizontal and vertical survey control will be provided by a permanent concrete monument as shown on drawing H1C11004. Standard survey practices will be used to establish vertical and horizontal controls during closure.

14. CERTIFICATION

This closure plan meets the requirements of Rule 391-3-4-.10(7).

15. LEGAL DESCRIPTION

The legal description below was taken from a drawing titled "Plant Bowen Coal Combustion By-Product Disposal Facility, Site Disposal Boundary, Property Plat, and Legal Description", Drawing Number H-15314, dated 6/6/2006:

All that parcel of land lying and being in Bartow County, Georgia in Land Lots 685, 686, 687, 754, 755, 756, 757, 758, 759, 760, 825, 826, 827, 828, 830, 831 and 832 of the 17th District - 3rd Section containing 504.10 acres, more or less and being more particularly described as follows:

Beginning at a 2" open top pipe at the Land Lot corner common to Land Lots 827, 282, 829 and 830 and from said POINT OF BEGINNING thence, south 87°56'07" west for a distance of 329.37 feet to an iron pin. Thence south 58° 07' 28" west for a distance of 1871.57 feet to an iron pin. Thence north 89° 18' 04" west for a distance of 848.11 feet to an iron pin. Thence, north 68° 02' 27" west for a distance of 280.25 feet to an iron pin. Thence, north 54° 26' 45" west for a distance of 753.25 feet to an iron pin. Thence, north 11° 34' 02" east for a distance of 646.55 feet to an iron pin. Thence, north 11° 37' 25" west for a distance of 722.96 feet to an iron pin. Thence, north 04° 24' 06" east for a distance of 1130.08 feet to a point on a line at the top bank of the Etowah River. Thence running along the top bank of the Etowah River the following courses and distances; north 83° 45' 43" east for a distance of 297.92 feet, north 71° 34' 28" east for a distance of 217.50 feet, north 56° 17' 48" east for a distance of 191.67 feet, north 43° 55' 05" east for a distance of 205.90 feet, north 44° 11' 48" east for a distance of 271.01 feet, north 33° 39' 01" east for a distance of 301.34 feet, north 31° 01' 57" east for a distance of 260.68 feet, north 39° 38' 03" east for a distance of 347.99 feet, north 26° 38' 48" east for a distance of 213.50 feet, north 51° 50' 56" east for a distance of 137.60 feet, north 23° 54' 26" east for a distance of 251.33 feet, north 32° 47' 25" east for a distance of 229.48 feet, north 23° 15' 10" east for a distance of 384.59 feet, north 22° 45' 08" east for a distance of 263.63 feet, north 20° 42' 42" east for a distance of 65.34 feet, north 10° 37' 35" east for a distance of 491.41 feet, north 52° 20' 51" east for a distance of 172.35 feet, north 65° 25' 25" east for a distance of 210.19 feet, north 82° 08' 45" east for a distance of 249.90 feet, south 75° 36' 29" east for a distance of 311.70 feet, south 59° 34' 46" east for a distance of 132.57 feet, south 47° 28' 17" east for a distance of 452.84 feet, south 58° 24' 52" east for a distance of 170.98 feet, south 45° 26' 46" east for a distance of 316.89 feet, south 49° 13' 43" east for a distance of 181.40 feet, south 36° 59' 45" east for a distance of 314.99 feet, south 33° 08' 44" east for a distance of 296.76 feet, south 28° 14' 14" east for a distance of 380.10 feet, south 31° 31' 27" east for a distance of 568.21 feet, south 34° 26' 16" east for a distance of 159.00 feet, south 28° 03' 05" east for a distance of 471.04 feet, south 04° 00' 18" east for a distance of 529.29 feet, south 17° 12' 34" west for a distance of 382.01 feet, south 14° 07' 27" west for a distance of 360.99 feet, south 12° 45' 38" west for a distance of 278.11 feet, south 11° 34' 49" east for a distance of 311.31 feet to an iron pin. Thence from said pin, south 58° 07' 28" west for a distance of 1525.68 feet to an iron pin. Thence south 87° 56' 07" west a distance of 274.09 feet to the POINT OF BEGINNING.

APPENDIX A – CLOSURE COST ESTIMATE

Plant Bowen
CCR Landfill Largest Open Area Closure Cost Estimate (Cells 1-10)

Activity	Units	Quantity	Unit Cost	TOTAL
Permitting	Ea	1	\$30,000	\$30,000
Engineering and Bidding	Ea	1	\$79,750	\$79,750
Mobilization	Ea	1	\$175,000	\$175,000
Project Management	Ea	1	\$83,000	\$83,000
Surveying	Ea	1	\$52,250	\$52,250
Bonds, Insurance, Etc.	Ea	1	\$105,000	\$105,000
Quality Assurance/Quality Control	Ac	147.0	\$7,500	\$1,102,500
Soil Cap				
Recompact & Reshape to Final Grade	Ac	147.0	\$3,000	\$441,000
Borrow Development	Ea	1	\$60,000	\$60,000
Install Low Permeability Soil Layer	CY	355,740	\$10.75	\$3,824,205
Borrow Reclamation	Ea	1	\$50,000	\$50,000
Erosion Control				
Outlet Protection	SY	500	\$75.00	\$37,500
Temporary Grassing	Ac	147.0	\$1,250	\$183,750
Permanent Grassing	Ac	147.0	\$2,500	\$367,500
Rock Check Dams	Ea	70	\$630	\$44,100
Haybale Check Dams	Ea	70	\$150	\$10,500
Energy Dissipator	Ea	8	\$7,500	\$60,000
Silt Fence	LF	20,000	\$4.50	\$90,000
Construction Exit	Ea	1	\$1,375	\$1,375
NPDES Permit Compliance	Ea	1	\$50,000	\$50,000
Marker Posts	Ea	200	\$65.00	\$13,000
Geosynthetic Cap				
Purchase FML Liner (10% wastage)	SF	7,043,652	\$0.45	\$3,169,643
Install FML Liner	SF	6,403,320	\$0.15	\$960,498
Anchor Trench	LF	22,000	\$50.00	\$1,100,000
Drainage Layer (Geocomposite)				
Purchase Geocomposite	SF	7,043,652	\$0.50	\$3,521,826
Install Geocomposite	SF	6,403,320	\$0.10	\$640,332
Internal Outlet Piping	LF	35,000	\$7.50	\$262,500
Erosion / Topsoil Layer				
Install Protective Cover Material	CY	355,740	\$9.50	\$3,379,530
Install Topsoil	CY	118,580	\$8.25	\$978,285
Erosion Control Mat	SY	711,480	\$2.00	\$1,422,960
Cap Storm Water Control				
Down drain pipes	EA	175	\$1	\$131
Miscellaneous				
Sign(s)	Ea	4	\$500	\$2,000
Improvements				
Clean Sediment Basins	Ea	6	\$15,000	\$90,000
Final Cleanup	Ea	1	\$20,000	\$20,000

Largest Area Open Total Closure Cost: \$22,378,136
Per Acre Closure Cost: \$152,232

Notes:

1. All costs shown include labor, materials, and equipment and are in 2018 dollars.
2. The cost estimate equals the cost of closing the entire Cells 1-10 area (147 ac). These estimates represent 3rd party costs for this geographic area.
3. During the active life of the landfill, the owner and/or operator must annually adjust the closure cost estimate for inflation and for areas that have been permanently closed.