

C O A L

C O M B U S T I O N

B Y P R O D U C T S

A Report on Southern Company's
Production and Safe Management of CCBs

ABOUT THIS REPORT

With public interest growing about the production and management of coal combustion byproducts (CCBs) from electricity generation, Southern Company has prepared and updated this report to summarize the activities of its operating subsidiaries.*

Consistent with Southern Company's commitment to environmental responsibility, this report provides customers, investors, and other stakeholders with relevant information on the broad range of steps the company is taking in the area of CCB management to ensure that the priorities of public safety and the security of its facilities are met.

An extensive system is in place to meet or exceed all regulations governing CCB management and ensure safe operation. In addition, a significant amount of CCBs from Southern Company's coal-based power generation plants are safely recycled for beneficial use such as concrete production and road building.



A surface impoundment in Georgia.

This report details operations related to CCBs, including how the different types of byproducts are generated, procedures for safe handling, the beneficial use market, and research efforts. We hope this report contributes to greater public understanding about Southern Company's management of CCBs, which represents an important part of the process to provide reliable, affordable, and environmentally responsible energy.

**The power plants in the Southern Company system referred to in this report are owned and operated by the subsidiaries Alabama Power, Georgia Power, Gulf Power, and Mississippi Power.*

A COMMITMENT TO SAFE AND SECURE MANAGEMENT OF CCBs

Because of its abundance and proven effectiveness as an energy source, coal continues to be the fuel source for almost half the electricity produced in the United States. Southern Company, which serves 4.4 million customers in the Southeast, utilizes a diverse mix of fuel sources that in a typical year includes coal for about 68 percent of generation.

When coal is burned to make the steam that drives electricity generators, ash is the non-combustible mineral matter that is left behind. Ash is the most prevalent of what are called coal combustion byproducts. It takes the form of fly ash (fine, smaller particles) or bottom ash (coarse, larger particles that settle at the bottom of a boiler). Depending on the coal type, the amount of ash that remains is generally about 10 percent of the coal that is burned as fuel. Essentially all of the ash is collected by emission control technologies, which maintain air quality by preventing these ash particles from being emitted into the air.

Some metals which occur naturally in the coal in very small amounts – such as arsenic, mercury, and lead – remain in the ash. They can be safely managed using proper procedures. Collected ash generally is contained and managed in facilities on site at the power plants. The two most common types of these facilities are surface impoundments, sometimes called wet ponds (in which ash settles at the pond bottom), and landfills, which are used to dispose of dry ash.

Not all of the ash stays on site. A market exists for ash to be safely recycled for concrete, road building and other beneficial uses. Although the amount varies from year to year because of economic conditions and other factors, on average about 30 percent of Southern Company's CCBs are sold for re-use. Safe and beneficial re-use of CCBs also conserves natural resources and reduces the amount that must be managed at power plants or disposed of in landfills.

Another type of CCB is gypsum. Gypsum is a byproduct from operating an emission control technology called a scrubber. Because gypsum is not produced directly from coal, it is different than coal ash; it is similar in composition to naturally-mined gypsum. It too has a number of beneficial uses. Among the most common uses for power plant gypsum are as ingredients in commercial wallboard and cement manufacturing. It also has been demonstrated to safely promote the growth of certain plants, such as turf grass, peanuts, cotton, and a variety of vegetables.

Southern Company's operating companies produced 4.9 million tons of ash and about 728,000 tons of gypsum in 2009.* The company and its subsidiaries currently own and operate 22 power plants in four states (Alabama, Florida, Georgia, and Mississippi) with CCB management facilities for fly ash and bottom ash and, in some cases, gypsum.** Power plants may manage ash wet, in ponds, or dry, in landfills.



A CCB landfill in Georgia.

Some plants may have both types of facilities. About half of the total CCB production is either handled dry or sold for beneficial re-use. Regardless of the management technology utilized, public safety and the security of the company's facilities are the highest priorities. Plants are in compliance with all applicable state regulations, and Southern Company has a rigorous program in place to ensure that its CCBs are managed safely. For example, Southern Company Generation dam safety engineers inspect containment structures at least once a year, and trained plant personnel do so at least once a week. The annual inspections are in-depth, including sophisticated evaluations of the containment structures to ensure that the integrity of the containments is fully maintained. Furthermore, procedures are continually evaluated to ensure the use of best practices. Southern Company also is involved in research, both independently and in partnerships, to improve and expand beneficial re-use.

Regulation of CCBs has for many years been under the purview of individual states, which each have their own distinct requirements. The state environmental agencies in the four states in which Southern Company operates its retail electric utilities have provided effective oversight of operations to ensure the safe management of CCBs. For example, each state environmental agency requires a wastewater permit for any discharge from a surface impoundment, including pollutant limits and monitoring and reporting requirements. The results are reported to the appropriate regulatory agency on a regular basis. The states also have the authority to impose additional restrictions, if necessary, to protect human health or the environment. Each of Southern

Company's four operating companies work closely with their respective state regulatory agencies to ensure that the companies meet their state's requirements for environmental protection. If site-specific issues are identified, state regulatory agencies assess the site to determine what, if any, additional actions or requirements are needed.

At the federal level, the U.S. Environmental Protection Agency (EPA) in 2010 proposed regulating CCBs either as hazardous waste or as solid waste. Southern Company [filed comments to EPA](#) in response to the proposal in November which, based on a preliminary pre-screening cost analysis, indicate compliance costs would substantially exceed EPA's estimates and would not provide added environmental benefits.

Compliance with environmental laws and regulations is a cornerstone of Southern Company's operating philosophy. Safe and secure CCB management is part of a broad commitment to conducting business in an environmentally responsible manner. A more detailed discussion of Southern Company's activities relating to CCB management follows.

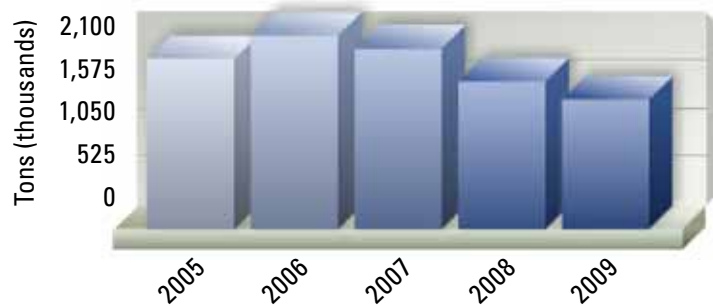
Southern Company CCB Production, 2009 (tons)

| Fly Ash | Bottom Ash | Gypsum |
|-------------|-------------|---------|
| 3.9 million | 1.0 million | 728,000 |

Southern Company Ash Managed, 2009 (tons/percent of total)

| Fly Ash | Bottom Ash |
|--------------------------|---------------------|
| Wet - 1.11 million / 29% | Wet - 747,000 / 74% |
| Dry - 2.73 million / 71% | Dry - 269,000 / 26% |

Southern Company CCB Recycling (e.g. Ash, Gypsum)



Recycled ash and gypsum demand has declined with recession.

*Because of the economy's downturn, there was a decrease in 2009 in the generation of coal-based electricity compared with recent years, thus decreasing CCB production. CCB recycling also decreased for the same reason in 2009, the latest year for which data is currently available.

**One additional plant in Georgia has been retired and its CCB management facilities are considered as a regulatory matter to be closed.

ENSURING DAM INTEGRITY

A key to safe and secure CCB management is ensuring the integrity of the containment system. Southern Company’s dam safety program is comprehensive and includes inspections, reporting, analysis, regulatory compliance, emergency response, and vegetation control standards.



Plant personnel who conduct inspections are trained annually.

Inspections of dams and dikes are critical components, and are conducted on a regular basis – annually by dam safety engineers and weekly by trained plant personnel. In addition, inspections are performed after unusual events such as storms. The inspections provide assurance that the structures are sound; action is taken, as needed, based on the findings.

Safety inspections include numerous checklist items. Specific items vary from site to site but may include observations of such things as pond levels, weather conditions, rainfall since the prior inspection, instrument readings, conditions of slopes and drains, erosion, animal damage, ant hills, alignment of retaining structures, and more. Dam safety engineers assess instrument readings, inspect any maintenance or remediation performed since the previous inspection, check the status of work recommended at prior inspections, make sure that the posting of emergency notification information is up to date, and evaluate any items noted during the plant personnel inspections. Among the other actions taken at Southern Company plants to ensure dam safety:

- **Emergency Response** – Each plant has a dedicated dam safety referral phone number to notify appropriate company personnel rapidly in the event of an emergency. Emergency equipment and materials are available at each plant to provide immediate repair work.

- **Training** – Plant personnel who conduct inspections are trained by dam safety engineers annually.
- **Vegetation Control** – Vegetation must be maintained and managed properly to facilitate adequate inspections. Dikes are kept free of trees and woody brush unless specific exceptions are made for beneficial vegetation or other situations as determined by a dam safety engineer.
- **Instrumentation** – Dam safety instrumentation is installed at sites as needed and can provide early warning for potential problems. Water level and other readings are taken on a specific schedule by trained personnel. Any abnormal readings are evaluated immediately.
- **Structural Modifications** – Any proposed new structure, modification to an existing structure, or change in the water level itself must be reviewed and approved by professional engineers at Southern Company Generation prior to and during design and construction.



Frequent inspections are a key part of the dam safety program.

Southern Company Plants with Ash Surface Impoundments

| Alabama | Florida | Georgia | Mississippi |
|---------|---------|---------|-------------|
| 6 | 3 | 11 | 2 |

Following the December 2008 ash spill at the Tennessee Valley Authority’s Kingston plant, EPA requested detailed information from the electric utility industry on coal ash surface impoundments to evaluate their structural integrity. Southern Company and its subsidiaries received and [responded to all of EPA’s requests for information](#).

“Dam safety engineers inspect containment structures at least once a year. Trained plant personnel do so at least once a week.”

EPA followed up these information requests with on-site inspections at a number of plants nationwide, including 14 Southern Company plants. Of those for which EPA has [issued final reports](#), Plant Gorgas in Alabama and Plants Bowen, McDonough, Scherer and Mitchell in Georgia were found to be **satisfactory, the highest rating available**. Three of four ponds inspected at Plant Branch in Georgia and five of six ponds inspected at Plant Yates in Georgia also were found to be **satisfactory**. One pond each at Branch and Yates received a fair rating, with minor concerns noted.



A surface impoundment in Alabama.

In addition, EPA compiled a list of 50 “high hazard potential” impoundments nationwide. “High hazard potential” is a technical term based on the height, volume, and proximity of a structure to people and property – it does not refer to the current condition of the dam itself. One ash pond at Plant Branch was included on the EPA list; in addition, one pond at Plant McDonough received a similar rating by the state of Georgia.

TURNING CCBs INTO USEFUL PRODUCTS

A number of beneficial uses for CCBs have been identified, and a strong market for recycled coal ash and power plant gypsum has developed. On average about 30 percent of the CCBs produced by Southern Company are re-used. A variety of applications are in use or under development.

In all cases, the applications represent instances where the CCB material provides equal or greater technical performance, value, and safety compared with other natural and byproduct materials. The environmental, economic, and performance benefits of CCB re-use have been recognized by EPA in its creation of the Coal Combustion Products Partnership to encourage beneficial use. EPA has twice – in 1993 and 2000 – determined that beneficial uses of CCBs pose no significant risk and that no additional national regulations for beneficially used CCBs were needed.

Southern Company ensures the safe use of CCBs by targeting applications which have a proven safety record, and purchasers are bound by contract to use these products only for intended purposes.

Among the most common beneficial uses of CCBs:

Cement and Concrete

The largest user of fly ash is the concrete industry. Concrete is the most widely-used man-made building material in the world. It is used in sidewalks, roads, bridges, parking structures, and in building structures such as foundations, floors, and walls. Concrete is a mix of gravel, sand, cement, and water. Cement is the “glue” that binds the material together to form a hardened product. It is also the most expensive component in concrete; it has to be manufactured by mining several raw materials which are burned in a kiln.

In cement manufacturing, fly ash is used to replace typical raw feed materials such as limestone, sand, clay, and iron. Because fly ash is largely silica, alumina, and iron (plus calcium in some cases), it can replace a portion of these raw materials, resulting in less mining of natural resources and avoiding the associated carbon footprint of mining equipment and quarrying activities.*



The biggest market for fly ash is the concrete industry.

* One ton of fly ash used as a replacement for cement conserves enough landfill space to hold about 1,200 pounds of waste, the same amount of solid waste produced by one American over 270 days, reduces the equivalent of two months of an automobile’s carbon dioxide emissions, and saves enough energy to provide electricity to an average American home for 19 days. (U.S. Environmental Protection Agency. April 2005. *Using Coal Ash in Highway Construction: A Guide to Benefits and Impacts*. EPA-530-K-05-002).

Gypsum constitutes approximately 5 percent of the weight of cement, and helps keep the concrete from hardening too quickly. It is a standard component of cement manufacturing, and power plant gypsum is a well-established and cost-effective substitute for mined gypsum.

Fly ash also is a standard component in ready-mix concrete. This is a very large application, where ash replaces up to 50 percent of the finished cement and offers multiple benefits, including reducing carbon dioxide emissions related to conventional cement manufacture. Technical benefits include increased strength, workability, and durability, as well as lower cost.

Concrete Blocks

Bottom ash is primarily used as a lightweight aggregate to replace expanded natural aggregates such as clay and shale. The use of bottom ash to replace these mined aggregates saves natural resources and provides another opportunity to reduce CO₂ emissions related to mining. This use also provides some of the same technical benefits seen in the use of fly ash for concrete.

Wallboard

Gypsum represents more than 95 percent of the solids weight in wallboard. Use of synthetic gypsum to replace mined gypsum is an established technology, with scrubber gypsum having advantages such as higher purity and finer particle size. Other environmental and economic benefits include reduced CO₂ emissions compared with mining natural gypsum, and lower raw material and shipping costs.



Wallboard manufacturing is a major market for gypsum.



Power plant gypsum is similar in composition to naturally mined gypsum.

Agriculture

Synthetic gypsum from scrubbers has a variety of acceptable uses as a soil additive for agronomic applications. Among the proven benefits are drought tolerance, increased water infiltration into soil, a source of calcium and sulfur for certain crops, increased root depth and mass, and reduced soil erosion. The Southeast in particular has abundant soils, crops, and businesses which can benefit from its use.

Ash sold by Southern Company in 2009 was beneficially re-used as follows:

- Concrete – 52 percent
- Raw feed for cement kiln – 26 percent
- Concrete blocks – 12 percent
- Other – 10 percent

Gypsum sold by Southern Company in 2009 was beneficially re-used as follows:

- Wallboard – 64 percent
- Agriculture – 19 percent
- Cement – 16 percent
- Other – 1 percent

EXPLORING NEW HORIZONS

Southern Company is a recognized leader in energy-related environmental research and development. This commitment to advanced technology extends to CCBs.



Gypsum, seen here being applied to a golf course, has many agricultural uses as a soil additive.

Southern Company is involved in several major initiatives to develop new and improved beneficial re-use of CCBs. A sampling of projects during the past five years:

Gypsum in Agriculture – Partnership with the University of Georgia, Pennsylvania State University, and agronomy consultant Malcolm Sumner.

Gypsum for Control of Soil Erosion and Phosphorus Runoff from Poultry Waste – Partnership with U.S. Department of Agriculture to develop use of gypsum to treat highly erodible soils and to prevent excessive phosphorus runoff into surface waters when poultry litter is applied to farmland as a fertilizer.

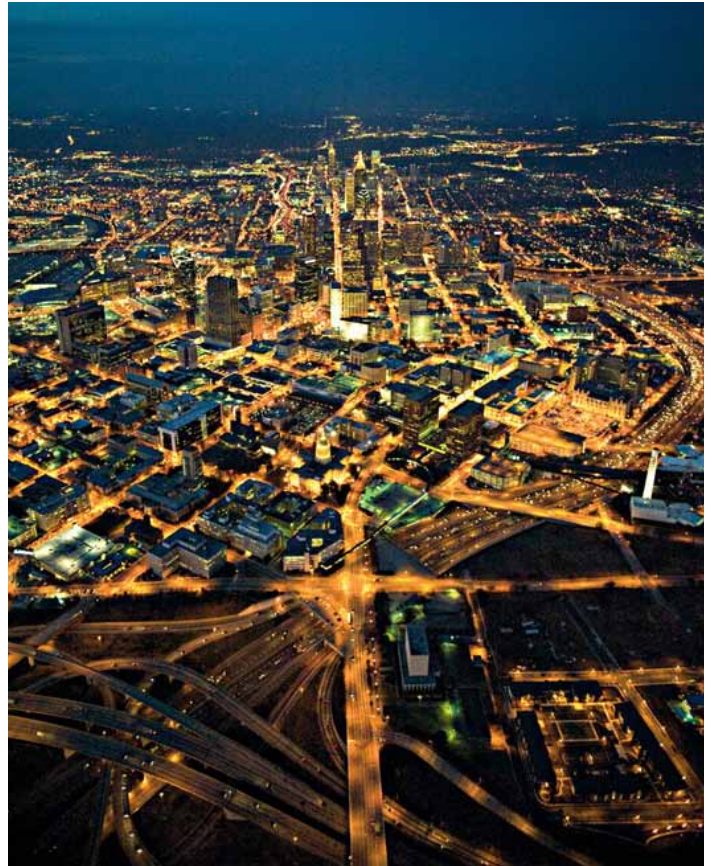
Structural Fill Demonstration for Ash Use in Highway Construction – Partnership with Georgia Department of Transportation, Georgia Environmental Protection Division, and EPA.

Biomass and Coal Ash Use in Concrete and Brick Production – Research projects with Georgia Tech which are investigating the feasibility of using ash from biomass-coal co-fired power generation in concrete and brick products.

Electric Power Research Institute – Membership includes research and development programs related to CCB beneficial use and disposal.

FOR MORE INFORMATION

With 4.4 million customers and more than 42,000 megawatts of generating capacity, Atlanta-based Southern Company is the premier energy company serving the Southeast. A leading U.S. producer of electricity, Southern Company owns electric utilities in four states and a growing competitive generation company, as well as fiber optics and wireless communications. Southern Company brands are known for excellent customer service, high reliability and retail electric prices that are below the national average. Southern Company also is meeting the challenge to serve the ever-growing need for electricity while continuing to minimize the impact of electricity production on the environment. We've managed nearly \$500 million in research and development over the past decade, seeking innovative ways to improve the generation, delivery and use of electricity. For more information, visit our website at www.southerncompany.com.



Proper management of CCBs is an important part of the process of providing reliable, affordable, and environmentally responsible energy.