EPA's Proposal to Regulate Coal Combustion Waste Disposal: Issues for Congress

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Summary

Coal combustion waste (CCW) is inorganic material that remains after pulverized coal is burned for electricity production. A tremendous amount of the material is generated each year—industry estimates that approximately 135 million tons were generated in 2009. On December 22, 2008, national attention was turned to issues regarding the waste when a breach in an impoundment pond at the Tennessee Valley Authority's (TVA's) Kingston, TN, power plant released 1.1 billion gallons of coal ash slurry. The cleanup cost has been estimated to reach $1.2 billion.

While the incident at Kingston drew national attention to the potential for a sudden catastrophic release of waste, it is not the primary risk attributed to CCW management. An April 2010 risk assessment by the Environmental Protection Agency (EPA) indicated that CCW disposal in unlined landfills and surface impoundments presents substantial risks to human health and the environment from releases of toxic constituents (particularly arsenic and selenium) into surface and groundwater. That risk is largely eliminated when the waste is disposed of in landfills and surface impoundments equipped with composite liners. In addition to *potential* risks, EPA has reported numerous cases of *actual* surface and groundwater contamination when CCW was deposited into unlined disposal units or used as construction fill.

CCW disposal is essentially exempt from federal regulation. Instead, it is regulated in accordance with individual state requirements. Inconsistencies among state regulatory programs were identified by EPA in a May 2000 regulatory determination as one reason that national standards to regulate CCW were needed. More recently, EPA called into question the effectiveness of some state regulatory programs in protecting human health and the environment. For example, EPA cited state survey data that showed that over 60% of states do not require liners or groundwater monitoring for surface impoundments (the disposal units with the highest potential for contaminant spread).

To establish national standards intended to address risks associated with potential CCW mismanagement, on June 21, 2010, EPA proposed two regulatory options to manage the waste. The first would draw on EPA's existing authority to identify a waste as hazardous and regulate it under standards established under Subtitle C of the Resource Conservation and Recovery Act (RCRA). The second option would establish regulations applicable to CCW disposal units under RCRA's Subtitle D solid waste management requirements. Under Subtitle D, EPA does not have the authority to implement or enforce its proposed requirements. Instead, EPA would rely on states or citizen suits to enforce the new standards.

The proposal generated comment from industry groups, environmental and citizen groups, state agency representatives, individual citizens, and some Members of Congress. Concerns regarding the Subtitle C proposal relate to its ultimate impact on energy prices, state program implementation costs, and CCW recycling opportunities. Concern about the Subtitle D proposal primarily relates to whether it would sufficiently protect human health and the environment, given EPA's lack of authority to enforce it. Commenters have proposed various legislative options in response to the varied concerns over EPA's existing regulatory options. Possible legislative options include an explicit directive to EPA to regulate or prohibit CCW regulation under Subtitle C or Subtitle D or the creation of a new subtitle under RCRA that requires EPA to develop an entirely new set of disposal criteria specific to CCW management. Another option, proposed in the Coal Residuals Reuse and Management Act (H.R. 2273), would use existing landfill municipal solid waste landfill criteria as the basis for a state CCW permit program.

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Introduction

Coal combustion waste (CCW) is inorganic material that remains after pulverized coal is burned for electricity production. A tremendous amount of the material is generated each year—industry estimates that as much as 135 million tons were generated in 2009, making it one of the largest waste streams generated in the United States.

Disposal of CCW[1] onsite at individual power plants may involve decades-long accumulation of the waste—with hundreds of thousands, if not millions, of tons of dry ash (in a landfill) or wet ash slurry (in a surface impoundment) deposited at the site. On December 22, 2008, national attention was turned to risks associated with managing such large volumes of waste when a breach in a surface impoundment pond at the Tennessee Valley Authority's (TVA's) Kingston, TN, plant released 1.1 billion gallons of coal fly ash slurry. The release covered more than 300 acres and damaged or destroyed homes and property. TVA estimates that cleanup costs may reach $1.2 billion.

The incident at Kingston brought attention to the potential for a sudden, catastrophic release related to the structural failure of a surface impoundment. However, a more common threat associated with CCW management is the leaching of contaminants likely present in the waste, primarily heavy metals, resulting in surface or groundwater contamination. For example, the Environmental Protection Agency (EPA) has determined that arsenic, selenium, lead, and other contaminants can leach into groundwater and exceed safe limits when CCW is deposited in unlined disposal units. This risk was particularly high at unlined surface impoundments. While new disposal units are likely to be built with a liner, 75% of surface impoundments in use today are greater than 25 years old and are unlikely to have a liner or groundwater monitoring.

To address potential threats to human health and the environment associated with improper management of CCW, on June 21, 2010, EPA proposed for public comments two regulatory options applicable to the management of CCW.[2] Under the first option, EPA would draw on its existing authority to identify a waste as hazardous and regulate it under the hazardous waste management standards established under Subtitle C of the Resource Conservation and Recovery Act (RCRA, 42 U.S.C. § 6901 et seq.). The second option would establish criteria applicable to landfills and surface impoundments accepting CCW under RCRA's Subtitle D solid waste management requirements. Under Subtitle D, EPA does not have the authority to enforce its proposed requirements. Instead, EPA would rely on states or citizen suits to enforce its standards.

Over 11,000 public comments were received before the November 19, 2010, deadline. Commenters included those representing industry, environmental and citizen organizations, state government representatives, individuals, and some Members of Congress.[3] Those stakeholders

[1] In its June 2010 regulatory proposal, EPA refers to the material as coal combustion *residuals*. It is also commonly referred to as coal combustion *byproducts* or *materials*. How the material is referred to generally depends on the context in which it is being discussed. For example, coal combustion *waste* is generally destined for disposal, while coal combustion *byproducts* are likely destined for some use such as a component in gypsum wallboard or cement. Regardless of what it is called, these terms refer to the same substances. Since this report primarily discusses issues associated with the materials' disposal, it will be referred to as coal combustion *waste* (CCW).

[2] U.S. EPA, "Hazardous and Solid Waste Management System; Identification and Listing of Special Wastes; Disposal of Coal Combustion Residuals From Electric Utilities," 75 *Federal Register* 35127-35264, June 21, 2010.

[3] Public comments, as well as all other publicly available documents associated with this rulemaking, are accessible through the "Regulations.gov" website at http://www.regulations.gov/. To access documents, in the "Enter Keyword or (continued...)

expressed a host of concerns over EPA's proposal. Broadly, industry groups argue that the Subtitle C option is not justified and would be too costly to implement. Further, they argue that regulating the waste as hazardous under Subtitle C would stigmatize it, potentially limiting recycling opportunities. State representatives are concerned about the costs of implementing a Subtitle C regulatory program. They further argue that EPA has not demonstrated that existing state regulatory programs are in fact deficient in protecting human health and the environment. Environmental and citizen groups argue that new data demonstrate that the waste meets the regulatory criteria necessary to list it as hazardous under Subtitle C and that EPA lacks the authority to enforce the disposal criteria it proposes under Subtitle D.

Some Members of Congress have expressed concern over EPA's ultimate decision to regulate CCW.[4] They have expressed some of the same concerns expressed by interested stakeholders, primarily questions and concerns regarding the impact that Subtitle C regulations may ultimately have on coal-producing states, state regulatory agencies, energy prices, and CCW recycling opportunities, and concern that human health and the environment would not be sufficiently protected under the Subtitle D option given EPA's limited authority to enforce it.

Several legislative options have been discussed and proposed that would direct EPA to select one regulatory option over the other. For example, two bills proposed on April 6, 2011 (H.R. 1391, the Recycling Coal Combustion Residuals Accessibility Act of 2011, and H.R. 1405), would prohibit EPA from regulating CCR as hazardous waste under RCRA Subtitle C.[5] In addition to prohibiting EPA from regulating the waste under Subtitle C, other legislative options are available to Congress. Congress may also choose to give EPA additional authority to regulate the waste under Subtitle D. Specifically, it might direct EPA to revise existing criteria, applicable to municipal solid waste (MSW) landfills under Subtitle D, to include landfills and surface impoundments that receive CCW. For example, Congress could authorize EPA to establish minimum national standards, such as a requirement to have composite liners on new disposal units or to install groundwater monitoring at existing units.

To address issues associated with EPA's lack of enforcement authority under Subtitle D and the desire for industry to avoid labeling the material as "hazardous" waste, Congress could also choose to create a new subtitle under RCRA that would specifically address issues unique to the management of CCW. Such a proposal could include a number of legislative provisions, but, broadly, could direct EPA to develop waste management standards applicable to disposal facilities that accept CCW (similar to Subtitle D), but also provide EPA with federal enforcement authority to require states to implement those standards (similar to Subtitle C).

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ID" search box, enter EPA docket number EPA–HQ–RCRA–2009–0640.

[4] See the House Committee on Natural Resources, Subcommittee on Energy and Mineral Resources hearing, "How Should The Federal Government Address The Health And Environmental Risks Of Coal Combustion Waste?," June 10, 2008. On February 12, 2009, the subcommittee held a legislative hearing regarding H.R. 493, the Coal Ash Reclamation, Environment, and Safety Act of 2009. Also, on March 31, 2009, the House Committee on Transportation and Infrastructure, Subcommittee on Water Resources and Environment, held a hearing, "The Tennessee Valley Authority's Kingston Ash Slide: Potential Water Quality Impacts of Coal Combustion Waste Storage," and on December 9, 2009, the House Committee on Energy and Commerce, Subcommittee on Energy and Environment, held a hearing, "Drinking Water and Public Health Impacts of Coal Combustion Waste Disposal."

[5] For more information, go to the House Energy and Commerce Committee hearing web page, "Fossil Fuel Combustion Waste Regulation," http://republicans.energycommerce.house.gov/hearings/hearingdetail.aspx?NewsID=8474.

An alternative approach to addressing CCW management is provided in the Coal Residuals Reuse and Management Act (H.R. 2273, reported by the Committee on Energy and Commerce on September 26, 2011). The bill would amend Subtitle D of RCRA and establish a "Coal Combustion Residuals Permit Program." The bill would give states the option to adopt and implement a permit program for the management and disposal of CCWs, to the extent that such activities occur in "structures" in the state.[6] Under the bill, states would be given the option of either adopting a permit program or requiring EPA to implement the program in states that notify EPA of their intent not to do so. EPA would not be required to approve the permit program, but would be required to provide notice to the state if EPA found some element of the program to be deficient. EPA would not be directed to establish requirements specifically applicable to the proposed permit program. Instead, permit program requirements would draw upon several elements related to existing MSW landfill criteria and state permit programs (see "Relevant Existing Subtitle D Requirements"). In states that decline to implement a CCW permit program, EPA would be required to implement it.

To assist Members of Congress in understanding the potential and proposed legislative approaches, this report provides an overview of the current rulemaking and relevant background information that applies to that rulemaking. In particular, the report describes the nature of the waste itself and primary methods of managing it; discusses potential risks associated with its mismanagement, particularly as supported by new data EPA has gathered to support the proposed rulemaking; and provides an overview of EPA's current regulatory proposal—including an overview of relevant existing RCRA requirements.

Issues in this report are discussed primarily within the context of EPA's regulatory proposal and associated supporting documents. It generally does not incorporate studies or opinions of interested stakeholders such as industry groups, state agency representatives, or environmental organizations, except as those positions may be reflected in EPA's June 21, 2010, regulatory proposal.

It is unknown when or if EPA will ultimately select one of the two proposals. On March 3, 2011, in testimony at an EPA budget hearing before the House Committee on Appropriations, Subcommittee on Interior, Environment, and Related Agencies, EPA Administrator Lisa Jackson stated that she does not anticipate a final rule to be promulgated in 2011. The cause of the delay was attributed to the large number of public comments received.[7]

[6] A structure is defined in the bill as a "landfill, surface impoundment, or other land-based unit which may receive coal combustion residuals."

[7] Also, in the Office of Management and Budget, Office of Information and Regulatory Affairs, "Unified Agenda of Federal Regulatory and Deregulatory Actions," published on December 10, 2010 (available at http://www.reginfo.gov/public/do/eAgendaMain), the estimated date of final action on this regulatory proposal is listed as "To Be Determined."

Background and Overview of EPA's Proposal

Federal requirements specific to the management of solid and hazardous waste were evolving in the late 1970s and early 1980s. In 1976, Congress enacted the Resource Conservation and Recovery Act (RCRA, 42 U.S.C. § 6901 et seq.).[8] Subtitle C of RCRA created a hazardous waste management program that, among other provisions, required EPA to develop criteria for identifying the characteristics of "hazardous" waste and develop waste management criteria applicable to such waste. Subtitle D of RCRA established criteria applicable to non-hazardous solid waste disposal. It also established state and local governments as the primary regulating and implementing entities for the management of solid waste (i.e., household garbage and non-hazardous industrial solid waste).

As required under Subtitle C, EPA first proposed hazardous waste management regulations in 1978.[9] In these proposed regulations, EPA identified six categories of wastes it deemed "special wastes" that would be deferred from hazardous waste management requirements until further study and assessment could be completed to determine their risk to human health and the environment. These special wastes were identified because they typically were generated in large volumes and, at the time, were believed to pose less risk to human health and the environment than the wastes being identified for regulation as hazardous waste.

In the months before the hazardous waste regulations were finalized in 1980, Congress was debating RCRA reauthorization. In February 1980, Representative Tom Bevill introduced an amendment to the pending legislation that would require EPA to defer the imposition of hazardous waste regulatory requirements for fossil fuel combustion waste and discarded mining waste until data regarding its potential hazard to human health or the environment could be determined. Representative Bevill stated that EPA's intent to regulate such waste as hazardous would discourage the use of coal and constitute an unnecessary burden on the utility industry.[10] In anticipation of the enactment of this legislation, according to EPA, the agency excluded the regulation of fossil fuel combustion waste from its final hazardous waste regulations.[11]

Ultimately, the Solid Waste Disposal Act Amendments of 1980 (P.L. 96-482) included provisions commonly referred to as the "Bevill Amendment" or the "Bevill exclusion." Under those provisions Congress specifically excluded CCW from regulation under RCRA Subtitle C, pending EPA's completion of a report to Congress and regulatory determination on whether hazardous waste regulations were warranted.[12]

Subsequently, EPA published its Bevill regulatory determination in May 2000, retaining the hazardous waste exemption under RCRA. EPA concluded that CCW did not warrant regulation as hazardous waste. However, EPA stated that it was convinced that national regulations under Subtitle D were warranted for CCW disposal in landfills and surface impoundments because (1)

[8] RCRA actually amends earlier legislation, the Solid Waste Disposal Act of 1965, but the amendments were so comprehensive that the act is commonly referred to as RCRA rather than by its official title.

[9] 42 *Federal Register* 58946, December 18, 1978.

[10] *Congressional Record*, February 20, 1980, p. 1087.

[11] 45 *Federal Register* 33084, May 19, 1980.

[12] The exclusion is specified at 42 U.S.C. 6921(b)(3)(A)(i); factors EPA was required to study to make the appropriate regulatory determination are specified at 42 U.S.C. 6982(n).

the composition of the waste had the potential to present danger to human health and the environment in certain circumstances; (2) EPA had identified proven cases of damages to human health and the environment through improper waste management; (3) while industry management practices had improved measurably, there was sufficient evidence the wastes were being managed in a significant number of landfills and surface impoundments without proper controls in place, particularly in the area of groundwater monitoring; and (4) while there had been substantive improvements in state regulatory programs, EPA identified significant gaps either in states' regulatory authorities or in their exercise of existing authorities.[13]

In its 2000 regulatory determination, EPA also stated that it would revise its determination if it found that a need for regulation under Subtitle C was warranted. On October 16, 2009, after 10 years of additional study, debate, and controversy over the appropriate method of regulating CCW, EPA submitted a draft proposal to revise its Bevill regulatory determination and list the material as hazardous waste under Subtitle C of RCRA.[14] EPA sent the draft proposal to the White House Office of Management and Budget's Office of Information and Regulatory Affairs (OIRA). Under the draft proposal, EPA would establish land disposal and treatment standards for CCW. EPA cited several reasons for its determination that regulation under Subtitle C was needed, including the following:[15]

- Using new risk analyses and study data, it was determined that, under plausible management scenarios, CCW samples met the regulatory criteria for identifying and listing the waste as "hazardous" (40 C.F.R. 261.11(a)(3)). Factors required to be taken into consideration to make that determination include a waste's toxicity, constituent concentration, potential for hazardous constituents to migrate, and plausible mismanagement of the waste.
- Recent risk assessments have shown that CCW disposal in *unlined* landfills and surface impoundments presents substantial risks to human health and the environment from releases of toxic constituents (particularly arsenic and selenium) into surface and groundwater. Further, those risks are essentially eliminated when the waste is disposed of in units with composite liners.[16]
- EPA has documented numerous cases of damage to surface and groundwater (e.g., the water exceeded health-based standards for contaminants like lead, arsenic, selenium, and chromium) when CCW was deposited in unlined disposal units or used as construction fill.
- Although *new* disposal units appear to be built with liners and groundwater monitoring, a large amount of waste is still being disposed into units that lack necessary protections.
- Recently collected data regarding existing state regulatory programs call into question whether those programs have sufficiently improved to address the gaps

[13] 65 *Federal Register* 32230, May 22, 2000.

[14] The original draft proposal is available at http://www.regulations.gov/search/Regs/home.html#documentDetail?R=0900006480ae5de2.

[15] The reasons cited in its October 16, 2009, draft proposal are also included in the June 2010 proposal. See 75 *Federal Register* 35149-35150.

[16] A composite liner is a system consisting of two components—an upper component that consists of a flexible membrane liner and a lower component that consists of at least a two-foot layer of compacted soil. It is defined more specifically at 40 C.F.R. § 258.40(b).

that EPA identified in its May 2000 regulatory determination and whether those programs are adequate to protect human health and the environment in the absence of national minimum standards. While industry practices may be improving, EPA continues to see cases of inappropriate management or cases in which key protections (e.g., groundwater monitoring at existing units) are absent.

- Changes in air pollution control technology at coal-fired power plants are anticipated to further increase both the overall amount of waste and the contaminants, particularly heavy metals, in the waste.

Further, EPA noted that while corrective action has been taken at sites with proven damage cases, the federal waste management regulatory program is designed to *prevent* contamination in the first place, if at all practicable, rather than simply remedy it after discovery. Its regulatory proposal sought to implement such preventive requirements.

After the OIRA review, EPA's draft proposal underwent substantial changes. The final proposal, published on June 21, 2010, stated that the determination to revise the Bevill regulatory determination had not yet been made and proposed an additional regulatory option for consideration. The second option would keep the Bevill exclusion in place, but establish national criteria applicable to landfills and surface impoundments under RCRA's Subtitle D non-hazardous solid waste requirements. The primary reason EPA cited for including the proposal to regulate CCW under Subtitle D's solid waste requirements was industry's argument that the "hazardous waste" label would stigmatize beneficial uses of the material and ultimately increase the amount that must be disposed.

Both options in the June 2010 regulatory proposal would establish design and operating criteria for landfills and surface impoundments, such as a requirement for composite liners, groundwater monitoring, corrective action, closure of units, and post-closure care, and to address the stability of surface impoundments. Under the Subtitle C option, EPA would also establish land disposal restrictions, financial assurance requirements, and a federal permit program under which the standards would be implemented (that program could ultimately be implemented by authorized states). Requirements to retrofit existing surface impoundments with a liner, coupled with land disposal restrictions that would require the removal of solids from wet disposal units, would effectively phase out surface impoundment disposal of the waste.

An important distinction between the two proposals is EPA's authority under RCRA to enforce them. Under the existing Subtitle C requirements, EPA has the authority to reverse the Bevill exclusion, identify the waste as hazardous, and establish appropriate waste management standards. Under Subtitle D, EPA has limited authority to revise existing regulations applicable to solid waste disposal facilities. Instead, any criteria it develops under Subtitle D would be enforceable by states that choose to do so or through existing citizen suit provisions. Under current authority, EPA could regulate CCW if it deems the material hazardous under Subtitle C, but would not have the authority to implement or enforce requirements applicable to CCW landfills or surface impoundments under Subtitle D. (A discussion of EPA's existing authority under RCRA is discussed in the "RCRA Provisions Relevant to EPA's Proposal" section, below.)

In its proposal, EPA acknowledges that there are differing views on the meaning of the data and analyses collected to support its rulemaking and the course of action EPA should take to address that information. Among state regulatory agencies, industry groups, citizen groups, and environmental organizations, there has been both strong support and opposition for each option.

Included among the arguments in favor of regulating the waste under the solid waste requirements (generally supported by state regulatory agencies and industry groups) are the following: there is not enough evidence that the material poses a significant threat to human health or the environment to warrant regulation as hazardous waste; regulating it as hazardous would be unnecessarily costly and burdensome to both industry and state regulators; and current state regulation of the material is sufficiently protective of human health and the environment. Also, as mentioned previously, industry groups argue that labeling the material as "hazardous" or regulating it under Subtitle C requirements would stigmatize the material, thus limiting potential options for reuse and ultimately increasing the amount of waste sent for disposal.

Environmental and citizen groups in favor of regulating the material under the hazardous waste requirements argue that recently completed waste characterization studies demonstrate that the material can have toxicity characteristics that could qualify it to meet the regulatory definition of hazardous waste. Also, recent risk assessments have shown that improperly managed waste poses a substantial threat to human health or the environment. Further, they argue that recycling may actually increase if disposal becomes more costly under the Subtitle C requirements. Their arguments against the Subtitle D-related proposal hinge on EPA's lack of authority to enforce it. They argue that sufficient protections must involve restrictions on land disposal that include enforceable federal requirements (including the implementation of a permit program to clearly document facility compliance). Considering EPA's limited authority to require states to implement its solid waste regulations, the Subtitle D option would essentially continue to manage the material in accordance with inadequate state requirements, they say. Further, they argue that reliance on citizen suits to enforce EPA's disposal standards (particularly if states do not choose to implement them) is burdensome on the public and an unreliable method of implementing national disposal standards. Finally, under the Subtitle D proposal, EPA has no authority to require financial assurance to insure cleanup if contamination is discovered.

As stated previously, the public comment period for EPA's proposal ended on November 19, 2010. It is unclear when, or if, final regulations will be promulgated. According to testimony by EPA Administrator Lisa Jackson, EPA received over 450,000 comments to its regulatory proposal. Further, she anticipated that evaluating such a large volume of comments would be time-consuming and that final regulations were not expected in the calendar year (2011).[17]

The Nature of CCW

Coal combustion waste consists of inorganic residues that remain after pulverized coal is burned. At various stages of the coal combustion process, different types of waste are generated. Bottom ash and boiler slag are generated at the base of the furnace. Electrostatic precipitators remove solids from the stack exhaust, generating fly ash. Also, power plants often add lime to flue stacks, through wet or dry processes, to remove sulfur dioxide from exhaust gas (a contributor to acid rain). This process creates flue gas desulfurization (FGD) products. These residues include both coarse and fine particles. See **Table A-1** in the **Appendix** for a more detailed description of the different types of CCW generated.

[17] House Committee on Appropriations, Subcommittee on Interior, Environment, and Related Agencies, March 3, 2011, EPA budget hearing.

The physical and chemical characteristics of each type of CCW have bearing on both its potential for use (e.g., as a component in concrete or gypsum wallboard or as a soil amendment) and its potential to present some level of risk to human health or the environment. In the 30 years that EPA has been studying CCW, many stakeholders have argued that the waste is largely benign. In recent years, EPA has sought to further characterize the waste. Recent data on CCW composition have identified more than 40 constituents. Contaminants of most environmental concern are antimony, arsenic, barium, beryllium, cadmium, chromium, lead, mercury, nickel, selenium, silver, and thallium.[18]

The chemical composition of CCW generated at a given plant will depend on the type and source of coal, the combustion technology used at the power plant, and the air pollution control technology used. Recently, EPA has focused particularly on the potential for changes in hazardous constituent levels as a result of the increased use and application of advanced air pollution control technologies in coal-fired power plants. These technologies are expected to reduce air emissions of metals and other pollutants. However, they are expected to transfer those pollutants to the fly ash and other air pollution control residues. As part of its regulatory proposal, EPA discusses research and information it has gathered in an effort to more accurately characterize the toxicity levels of CCW; determine how those toxicity levels may change with changes in air pollution control technology; and more accurately determine the potential for those constituents of concern to leach from their deposition site.[19]

In its regulatory proposal, EPA notes that the agency's Science Advisory Board and the National Academy of Sciences have raised concerns about the accuracy of test methods traditionally used to determine toxicity. Specifically, EPA states that considerable evidence has emerged indicating that the traditional test method, the Toxicity Characteristic Leaching Producer (TCLP), alone is not a good indicator of the mobility of metals in CCW under realistic disposal conditions.[20]

Research results discussed in the regulatory proposal used leach test methods determined to more accurately assess expected CCW management conditions (disposal or beneficial use).[21] Among other findings, it was determined that CCW samples exceed the toxicity characteristic (the threshold over which it would be deemed a hazardous waste under RCRA) and drinking water standards for various constituents including for arsenic, selenium, lead, cobalt, barium, and chromium. Also, leach rates appear to be impacted more by the pH over the range of field conditions at the deposition site, rather than the total of amount of contaminants in the waste. This finding is particularly relevant in determining how contaminants may be safely managed for disposal or beneficial use.

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[18] 75 *Federal Register* 35138.

[19] EPA, Office of Research and Development, and Vanderbilt University reports: *Characterization of Mercury-Enriched Coal Combustion Residues from Electric Utilities Using Enhanced Sorbents for Mercury Control*, EPA-600/R-06/008, February 2006, http://www.epa.gov/ORD/NRMRL/pubs/600r06008/600r06008.pdf; *Characterization of Coal Combustion Residues from Electric Utilities Using Wet Scrubbers for Multi-Pollutant Control*; EPA-600/R-08/077, July 2008, http://www.epa.gov/nrmrl/pubs/600r08077/600r08077.pdf; *Characterization of Coal Combustion Residues from Electric Utilities - Leaching and Characterization Data*, EPA-600/R-09/151, December 2009, http://www.epa.gov/nrmrl/pubs/600r09151/600r09151.htm.

[20] 75 *Federal Register* 35139.

[21] For more information, see EPA's *Improved Leaching Test Methods for Environmental Assessment of Coal Ash and Recycled Materials Used in Construction*, presented at the Twelfth International Waste Management and Landfill Symposium, October 5-9, 2009, available through EPA's "Science Inventory" website at http://cfpub.epa.gov/si/index.cfm.

CCW Management Methods

Of the 135 million tons of CCW generated in 2009, approximately 94 million tons (69%) was disposed of. Disposal occurred in landfills, surface impoundments, and as minefill.[22] The remaining 40.7 million tons was beneficially used in some capacity, primarily as an ingredient in certain building materials (e.g., concrete, cement, or gypsum wallboard), as structural fill, as a waste stabilization ingredient, and as blasting grit.[23]

Disposal

CCWs are managed in either wet or dry disposal systems. In wet systems, the waste is generally sluiced directly from a power plant to a surface impoundment pond, where solids settle out, leaving relatively clear water at the surface (which may be re-circulated into the plant or discharged to surface water). Surface impoundments involve a natural topographic depression, man-made excavation, or diked area formed primarily of earthen materials (although it may be lined with man-made materials) designed to hold an accumulation of CCWs containing free liquids. Solids may accumulate until the impoundment unit is full, or they may be dredged periodically and taken to another disposal unit such as a landfill.

Landfill disposal involves the deposition of dry waste into an engineered area of land or an excavation for permanent disposal. EPA's June 2010 regulatory proposal includes piles, sand and gravel pits, quarries, and/or large-scale fill operations in its definition of landfills.

EPA estimates there are approximately 300 CCW landfills and 629 CCW surface impoundments or similar management units in use at roughly 495 coal-fired power plants. The number of surface impoundments was determined from survey data gathered by EPA after the Kingston release.[24] In March 2009, in an attempt to avoid catastrophic releases such as that in Kingston, EPA sent a request for information to the owners and operators of CCW impoundment units. The survey was intended to gather information necessary to determine the structural integrity of surface impoundment units. EPA identified 629 surface impoundments or similar management units in 42 states.[25] EPA did not request data regarding landfills in its 2009 survey.

[22] In its June 2010 proposal, EPA does not propose to address placement of CCW in mines. That disposal option is not addressed in this report.

[23] See the American Coal Ash Association (ACAA), "Corrected 2009 Coal Combustion Product (CCP) Production & Use Survey Results (Revised)," available at http://www.acaa-usa.org/displaycommon.cfm?an=1&subarticlenbr=3. The ACAA considers "mining applications" a beneficial use of CCW. The extent to which such applications are actually minefill is not defined. In this report, the use of CCW as minefill is considered another method of disposal and therefore is not included in statistics regarding "beneficial use."

[24] EPA requested this information pursuant to its authority under § 104(e) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, 42 U.S.C. § 9604(e)), which provides that when the agency has reason to believe that there may be a release or threat of a release of a pollutant or contaminant, it may require any person who has or may have information about the release to furnish information relating to the matter to EPA. For more information about EPA's request for information, and the response from utilities, see EPA's "Coal Combustion Residuals" page at http://www.epa.gov/osw/nonhaz/industrial/special/fossil/coalashletter.htm.

[25] In its June 2010 regulatory proposal, EPA identified 584 surface impoundments; on its web page "Information Request Responses from Electric Utilities," EPA stated that there are 629. EPA notes on that web page that the numbers changed as a result of new information. The most recent data and a full list of impoundments are available at http://www.epa.gov/osw/nonhaz/industrial/special/fossil/surveys/index.htm.

While EPA's estimate of surface impoundments is based on recent data, the estimated number of landfills is taken from its May 2000 regulatory determination (which, incidentally, also estimated that there were 300 surface impoundments). In 2006, in a joint agency effort, EPA and the U.S. Department of Energy (DOE) conducted a study to determine state regulatory requirements applicable to CCW landfills and surface impoundments built between 1994 and 2004.[26] At the time, it was estimated that roughly two-thirds of the waste was disposed of in landfills and the remainder in surface impoundments. However, it is unknown how accurate *that* estimate was. Based on the age of the data, the 2006 estimate regarding the proportion of landfills to surface impoundments, and the inaccuracy of the estimate of surface impoundments (before the 2009 survey), it is unlikely that the estimated number of landfills is accurate.

Although CCW landfills and surface impoundments are generally not regulated under federal law, that does not mean they are entirely unregulated. Landfills and surface impoundments may be regulated under state solid waste management programs. Surface impoundments may be subject to state dam safety requirements and federal wastewater discharge requirements (under the Clean Water Act in accordance with parameters specified in a National Pollutant Discharge Elimination System (NPDES) permit).[27]

In its May 2000 regulatory determination, EPA cited inconsistencies in state requirements as a reason to propose national standards to regulate CCW disposal. In its current proposal, EPA again cites a lack of progress in state regulation of CCW disposal units. Primarily, after identifying risks associated with CCW disposal in unlined landfills and surface impoundments in 2000, states have still not adequately implemented CCW regulatory programs, according to EPA. In particular, according to recent survey data, with regard to CCW disposal units, 36% of responding states do not have minimum liner requirements for landfills, 67% do not have liner requirements for surface impoundments, 19% of the responding states do not have minimum groundwater monitoring for landfills, and 61% do not have minimum groundwater monitoring for surface impoundments.[28] EPA states that the survey results are "particularly significant as groundwater monitoring for these kinds of units is a minimum for any credible regulatory regime."[29] Further, EPA asserts that, while the states seem to be regulating landfills to a greater extent, given the significant risks associated with surface impoundments, survey results suggest that there continue to be significant gaps in state regulatory programs for the disposal of CCWs.

"Beneficial Use"

The size, shape, and chemical composition of CCW lend it to certain potential beneficial uses—as a component of building materials (cement, concrete, gypsum wallboard) or as a replacement for other virgin materials such as sand or gravel. Beneficial uses can be in either encapsulated form, such as in concrete, or unencapsulated form, such as in fill or agricultural applications. In 2009, of the approximately 134.7 million pounds of CCW produced, approximately 40.7 million pounds (30%) was beneficially used. Of that total, approximately 36% was used in an encapsulated form, and the remainder for an unencapsulated use.

[26] EPA and the U.S. Department of Energy report, *Coal Combustion Waste Management at Landfills and Surface Impoundments, 1994-2004*, August 2006.

[27] 40 C.F.R. 122.

[28] 75 *Federal Register* 35152.

[29] Ibid.

In its regulatory proposal, EPA draws the distinction between uses of CCW that are truly beneficial and uses that, for all intents and purposes, are disposal. EPA considers the use of CCW to be "beneficial" when it used in a manner that

- **provides some functional benefit**—for example, the use can increase the durability of concrete, serve the same function in wallboard as gypsum ore, or can be used as a soil amendment to adjust pH levels to promote plant growth;
- **conserves natural resources**—the material may act as a substitute for a virgin material that would otherwise need to be obtained through practices such as extraction (e.g., it can be used in wallboard, decreasing the need to mine gypsum); or
- **meets relevant product specifications or regulatory standards**—for example, when used in certain commercial products, it may be used in controlled amounts according to a product standard or specification (where available).

EPA does not consider coal combustion byproducts (e.g., fly ash or FGD material) used in these three ways to be a *waste*. However, there are uses that EPA has specifically identified in its regulatory proposal as *not* being beneficial.[30] Those include disposal in sand and gravel pits and large-scale fill operations. Both types of use have resulted in proven environmental damages and would be considered disposal. For example, construction sites that are excavated so that more coal ash can be used as fill would be considered CCW landfills (and, hence, subject to regulation under Subtitle C or D, depending upon the final regulatory option selected).

In its regulatory proposal, EPA identified an array of environmental issues and concerns associated with unencapsulated uses of CCW, and requested comment on whether such uses warrant tighter federal control.[31] Prior to its proposal, EPA's Office of Resource Conservation and Recovery (formerly known as the Office of Solid Waste) promoted various beneficial uses of CCW through its Coal Combustion Products Partnership (C^2P^2). Following the May 2010 preliminary release of its regulatory proposal, EPA stopped promoting beneficial use through the C^2P^2. Subsequently, the EPA Office of Inspector General determined that EPA did not follow accepted and standard practices in determining whether the categories of CCW beneficial uses that it was promoting were, in fact, safe for those proposed uses.[32] As a result, the Inspector General's report stated that the C^2P^2 presented an incomplete picture regarding actual damage and potential risks that can result from large-scale placement of unencapsulated CCWs and other beneficial uses.

[30] 75 *Federal Register* 35162-35163.

[31] 75 *Federal Register* 35163-35165.

[32] U.S. Environmental Protection Agency Office of Inspector General, "Evaluation Report: EPA Promoted the Use of Coal Ash Products With Incomplete Risk Information," Report No. 11-P-0173, March 23, 2011, available at http://www.epa.gov/oig/reports/2011/20110323-11-P-0173.pdf.

Risks Associated with CCW Mismanagement

The fact that hazardous constituents are present in a waste does not in itself mean that it poses a risk to humans. The degree to which there is actual risk depends on whether those constituents can find a pathway of human exposure and whether the resulting level of exposure is likely to be high enough to cause harm.

Stakeholders have long debated the extent to which the hazardous constituents actually can or do migrate from the point of deposition (e.g., a landfill or surface impoundment or a site where it may be used as a structural or embankment fill) and subsequently harm or pose a threat to human health or the environment. In its regulatory proposal, EPA identifies the following primary pathways of exposure:

- **contaminant leaching to groundwater**—when water or other liquid is able to percolate through the waste and transport contaminants off-site;
- **the discharge, run-on, or run-off of liquid waste to surface water**—this may occur accidentally or pursuant to the provisions of an NPDES permit; or
- **fugitive dust emissions**—when fine particulates associated with the dried ash become airborne.

Human exposure to contaminants has been demonstrated through each of these pathways, but has most commonly occurred through contaminant leaching when the waste was deposited in an unlined landfill or surface impoundment.

Under the Bevill Amendment, EPA was statutorily required to provide an analysis of both *potential* risks and *actual* documented damages to human health and the environment from CCW disposal and use.[33] In its June 2010 proposal, EPA re-examines its previous Bevill determination by citing findings and analyses from its revised risk assessment[34] and its updated documented damages from CCW management practices.[35]

EPA's documented damages show evidence of 27 cases of proven damages to surface and groundwater and 40 cases of potential damage associated with the improper management of CCW.[36] In addition to impacts on human health from surface and groundwater contamination, EPA's damage cases document adverse effects to plants and wildlife. Those impacts include elevated selenium levels in migratory birds, wetland vegetative damage, fish kills, amphibian deformities, snake metabolic effects, plant toxicity, mammal uptake, fish deformities, and inhibited fish reproductive capacity.

[33] 42 U.S.C. 6982(n)(3)-(4).

[34] EPA, Office of Solid Waste and Emergency Response, Office of Resource Conservation and Recovery, *Human and Ecological Risk Assessment of Coal Combustion Wastes*, April 2010.

[35] 75 *Federal Register* 35230-35239.

[36] *Proven* damage cases were those with documented maximum contaminant level (MCL, the highest level of a contaminant that is allowed in drinking water under the Safe Drinking Water Act) exceedances "measured in groundwater at a sufficient distance from the waste management unit to indicate that hazardous constituents had migrated to the extent that they could cause human health concerns." *Potential* damage cases were those with documented MCL exceedances that were measured in groundwater beneath or close to the waste source. For more information, 75 *Federal Register* 35131 and 35153.

In April 2010, EPA released its revised study, *Human and Ecological Risk Assessment of Coal Combustion Wastes*. Among other findings, the risk assessment determined that there is a high risk of human exposure to carcinogens, such as lead, selenium, and arsenic, when CCW is deposited into unlined landfills and surface impoundments. Overall, higher risks were observed for surface impoundments compared to landfills due to higher waste leachate concentrations and the higher hydraulic pressure from impounded liquid waste. The assessment noted that this finding was consistent with reported damage cases reporting wet handling as a factor than can increase risks from CCW. Further, the risk assessment confirms that with the use of composite liners, CCWs can be managed safely, but it calls into question the reliability of clay liners, especially in surface impoundments.

Generally, the findings from the damage cases and risk assessment showed that the majority of actual damages and highest potential health risks associated with CCW involved its deposition into *unlined* disposal units or use sites (e.g., for construction or structural fill). However, more recent damage cases (such as the Kingston release and a similar, smaller incident in 2005 in Martins Creek, PA[37]) are evidence that current management practices can pose additional risks that EPA had not previously studied—that is, from catastrophic releases due to the structural failure of surface impoundments.

RCRA Provisions Relevant to EPA's Proposal

RCRA provides the general guidelines under which all waste is managed. It also includes a congressional mandate to EPA to develop a comprehensive set of regulations to implement the law (also commonly referred to as RCRA). The evolution of CCW regulation involves a long and somewhat complicated history. To understand issues associated with CCW disposal regulations and the current rulemaking process, it is useful to understand EPA's current authority under RCRA to regulate solid and hazardous waste and issues associated with the current rulemaking process—particularly questions regarding EPA's potential to regulate CCW as solid or hazardous waste.

Each of EPA's regulatory options would expand upon existing regulatory requirements applicable to "solid waste" or "hazardous waste." RCRA, both the law and its implementing regulations, is complex. This report does not attempt to provide a comprehensive overview of RCRA. Instead, it discusses selected provisions of the law and regulatory requirements that are relevant to the current regulatory proposal. In particular, it discusses requirements EPA would be allowed to implement under the agency's existing RCRA authority.

In debating the appropriate regulatory option for managing CCW, one factor has drawn particular attention. That is, EPA's authority to implement one option or the other. Broadly, EPA currently has the authority to implement its Subtitle C-related option. It has limited authority to implement standards applicable to CCW disposal facilities under Subtitle D. That is, EPA can promulgate regulations under Subtitle D, but can only *encourage* states to implement them.

[37] In this case, a dam failure resulted in the release of over 100 million gallons of coal ash and contaminated water into the Oughoughton Creek and the Delaware River.

Relevant Existing Subtitle C Requirements

Under Subtitle C, EPA has broad authority to regulate hazardous waste from its generation to its ultimate disposal (and beyond, if disposal leads to contamination of air, soil, or water). That authority includes a directive to EPA to

- establish criteria to identify hazardous wastes;
- establish standards applicable to hazardous waste generators;
- establish minimum national standards applicable to owners and operators of hazardous waste treatment, storage, and disposal facilities (TSDFs);
- establish a permit program applicable to TSDFs; and
- establish criteria for states to administer and enforce their own hazardous waste program.

RCRA defines solid waste broadly as any discarded material.[38] The law specifies that solid wastes are not limited to materials that are physically solid. They may include discarded liquids, solids, or semi-solids. A *solid waste* becomes a *hazardous waste*[39] in one of two ways—it may be deemed hazardous because it exhibits certain hazardous characteristics (ignitability, corrosivity, reactivity, or toxicity), or it may be deemed hazardous if EPA specifically lists the waste as such.[40] Hence, hazardous wastes are referred to as "characteristic" or "listed" wastes. Industrial waste generators must determine whether or not a waste exhibits hazardous characteristics by testing the waste or by using knowledge of the process that generated the waste. A common test method is the Toxicity Characteristic Leaching Procedure (TCLP). The TCLP test is intended to simulate conditions that would likely occur in a landfill, and measures the potential for toxic constituents to seep or "leach" into groundwater. TCLP is not the only approved method to determine a waste's toxicity.[41]

EPA may also conduct a more specific assessment of a waste or category of wastes and list them as hazardous if they meet certain regulatory criteria.[42] Under those criteria, a waste will be "listed" if it contains certain toxic constituents and is capable of posing a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of. EPA must also take into consideration various factors, including the presence of toxic constituents, the concentration of those constituents, the potential of any hazardous constituents to degrade and migrate, and the plausible types of improper management to which the waste could be subject. These factors were considered in EPA's regulatory option that would regulate CCW as a hazardous waste.[43] In particular, EPA used data from three recent waste

[38] See 42 U.S.C. § 6903(27) and 40 C.F.R. 261.2.

[39] Hazardous waste is a subset of solid waste. A waste must first be determined to be a solid waste before it can meet the definition of hazardous waste. Hazardous waste is defined at 40 C.F.R. 261.3.

[40] See 42 U.S.C. 6921(a), and implementing regulations at 40 C.F.R 261, "Subpart B—Criteria for Identifying the Characteristics of Hazardous Waste and for Listing Hazardous Waste."

[41] Other test methods may also be acceptable. For more information, see EPA's website regarding various test methods for evaluating solid waste at http://www.epa.gov/waste/hazard/testmethods/index.htm.

[42] Specified at 40 C.F.R. 261.11(a)(3).

[43] The Bevill Amendment specifically exempted CCW from identification or listing under Subtitle C pending completion of a study by EPA to determine if it should be regulated as a hazardous waste. Now that that study is complete, EPA has the authority to choose to regulate it as it deems appropriate.

characterization studies that determined, among other findings, that under plausible disposal conditions, CCW samples exceeded regulated toxicity levels for selenium, barium, arsenic, and chromium.[44] These studies used toxicity test methods that were deemed more accurate than previous testing methods (i.e., TCLP).[45] (For more information, see discussion regarding "The Nature of CCW," above.)

If a waste is identified as hazardous, then it may be subject to the requirements of RCRA subtitle C and the implementing regulations.[46] These requirements apply to persons who generate, transport, treat, store, or dispose of such waste and establish rules governing every phase of the waste's management from its generation to its final disposition and beyond ("cradle to grave"). Facilities that treat, store, or dispose of hazardous wastes require a permit which incorporates all of the design and operating standards established by EPA rules, including standards for piles, landfills, and surface impoundments.[47] EPA has primary responsibility for that permitting program.

EPA will authorize states to implement their own program that is at least *as stringent* as the federal program.[48] Currently, EPA implements the hazardous waste management program in Iowa, Alaska, Indian Country, and the territories, except Guam. All other states implement their own programs, while EPA maintains oversight of them. If EPA chooses to regulate CCW under Subtitle C, states could choose to implement their own CCW management program in compliance with EPA's Subtitle C requirements.

Under Subtitle C, land disposal of hazardous waste is prohibited unless the waste is first treated to meet certain treatment standards *or* the waste is disposed in a unit from which there will be no migration of hazardous constituents for as long as the waste remains hazardous.[49] Facilities regulated under Subtitle C are required to clean up any releases of hazardous waste or constituents from solid waste management units at the facility, as well as beyond the facility boundary, as necessary to protect human health and the environment. RCRA Subtitle C also requires that permitted facilities demonstrate that they have adequate financial resources (i.e., financial assurance) for obligations, such as closure, post-closure care, necessary cleanup, and any liability from facility operations.

Relevant Existing Subtitle D Requirements

Solid wastes that are neither a listed nor a characteristic hazardous waste, or wastes that are not specifically exempted from regulation as a hazardous waste, are regulated under Subtitle D of RCRA. In contrast to its authority under Subtitle C, EPA's authority to regulate CCW disposal under Subtitle D is limited. Broadly, EPA has the authority to establish enforceable criteria applicable only to municipal solid waste (MSW) landfills. It does not have the authority to

[44] See reports cited in footnote 19 and summary discussion of the report findings in EPA's regulatory proposal at 75 *Federal Register* 35139-35142.

[45] 75 *Federal Register* 35139.

[46] 40 CFR parts 260 through 268, parts 270 to 279, and part 124.

[47] 42 U.S.C. §§ 6924-6925; the regulations implementing RCRA's requirement to develop a hazardous waste permit program and standards for owners and operators of hazardous waste treatment, storage, and disposal facilities are found under 40 C.F.R. 264 and 265.

[48] 42 U.S.C. § 6926.

[49] RCRA land disposal restrictions are specified under 40 C.F.R. 268.

establish enforceable criteria for landfills that accept other types of waste or for surface impoundments that accept any type of waste.

Subtitle D establishes a framework for federal, state, and local government cooperation in controlling the management of nonhazardous solid waste. The federal role is to establish the overall regulatory direction by providing minimum nationwide standards for protecting human health and the environment and technical assistance to states for planning and developing their own environmentally sound waste management programs. However, the actual planning and direct implementation of solid waste programs under Subtitle D remain a state and local function.

Under the authority of sections 1008(a)(3) and 4004 of RCRA, EPA first promulgated "Criteria for Classification of Solid Waste Disposal Facilities and Practices" (40 C.F.R. 257).[50] These regulations established minimum national performance standards necessary to ensure that "no reasonable probability of adverse effects on health or the environment" will result from solid waste disposal facilities or practices. Practices not complying with regulations specified under 40 C.F.R. 257 constitute "open dumping" and are prohibited under section 4005(a) of RCRA. EPA does not have the authority to enforce that prohibition directly. Instead, states and citizens may enforce the prohibition on open dumping using the citizen suit authority under RCRA (discussed below). EPA also may intervene if it is determined that waste disposal practices pose an imminent endangerment to human health or the environment (also discussed below).

The Hazardous and Solid Waste Amendments of 1984 (HSWA, P.L. 98-616) added Section 4010 to RCRA, requiring EPA to revise its existing criteria for evaluating whether solid waste management practices and facilities were conducting open dumping.[51] Under HSWA, EPA was directed to establish criteria applicable to solid waste management facilities that may receive hazardous household waste and hazardous wastes from small quantity generators.[52] Subsequently, EPA promulgated "Criteria for Municipal Solid Waste Landfills" (at 40 C.F.R. 258). Those regulations include location restrictions, operation and design criteria (e.g., liner, leachate collection, run-off controls), groundwater monitoring and corrective action requirements, closure and post-closure care, and financial assurance criteria. The regulations apply only to landfill operations and specifically exclude requirements applicable to surface impoundments.

Also required under HSWA, states were directed to implement a permit program to assure that solid waste management facilities that may receive MSW[53] complied with the revised landfill criteria. EPA was authorized to determine the adequacy of the state permit programs. Further, for states it determined did not have an adequate permit program, EPA was provided with inspection and enforcement authority under Sections 3007 and 3008 of Subtitle C to enforce the prohibition on open dumping.

The Subtitle D provisions added under HSWA are relevant to CCW regulation because they illustrate the limitations on EPA's authority to develop landfill criteria. That is, EPA was

[50] 44 *Federal Register* 53438, September 13, 1979.

[51] Previously established under Sections 1008 and 4004 of RCRA.

[52] "Small quantity generators" (SQGs) are a category of hazardous waste generators. As specified under Section 3001(d) of RCRA Subtitle C, SQGs are those that generate between 100 and 1,000 kilograms of hazardous waste during a calendar month.

[53] The term "municipal solid waste" is referred to in the regulations, but not RCRA itself. In the law, it is referred to as "solid waste management facilities that may receive hazardous household waste or hazardous waste due to the provision of section 3001(d) for small quantity generators."

specifically authorized by Congress to develop landfill criteria applicable to municipal solid waste landfills (referred to in the law as "hazardous household waste and small quantity generator waste"). Beyond that, EPA may only expand upon the prohibition on open dumping.

As mentioned above, open dumping prohibitions, specified under the sanitary landfill regulations (40 C.F.R. 257), are enforced by states or through citizen suits. Citizen suit provisions specified under Section 7002 of RCRA allow for civil action against any entity that is alleged to be in violation of any "permit, standard, regulation, condition, requirement, prohibition, or order."[54] Further, citizen suits are allowed where the disposal of any solid or hazardous waste may present "an imminent and substantial endangerment to health or the environment."[55]

In addition to citizen suit provisions, EPA is authorized to take action if disposal of wastes may present an imminent and substantial endangerment to health or the environment.[56] Under Section 7003 of RCRA, EPA can initiate judicial action or issue an administrative order to any past or present waste generator or owner of a disposal facility who has contributed or is contributing to the disposal. Section 7003 is available for use in several situations where other enforcement tools may not be available. For example, it can be used at sites and facilities that are not subject to Subtitle C of RCRA or any other environmental regulation (as may be the case at CCW disposal or use sites). Specifically, action may be initiated if *each* of the following conditions is met:

- Conditions may present an imminent and substantial endangerment to health or the environment—such conditions generally require careful documentation and scientific evidence. However, the endangerment standard under RCRA has generally been broadly interpreted.
- The potential endangerment stems from the past or present handling, storage, treatment, transportation, or disposal of any solid or hazardous waste.
- The person has contributed or is contributing to such handling, storage, treatment, transportation, or disposal.[57]

Under Section 7003, EPA may take action as deemed necessary, determined on a case-by-case basis. Further, it gives EPA authority to obtain relevant information regarding potential endangerments.

In summary, under existing Subtitle D provisions, EPA could develop criteria applicable to landfills and surface impoundments that accept CCW, but would have no authority to implement or enforce those regulations or require states to implement them. EPA could establish regulations and standards under Subtitle D that would be enforceable by states (that choose to implement them) and private citizens. Since most states argue that their existing solid waste management programs adequately regulate CCW disposal, it is unclear how many states, if any, would adopt EPA's Subtitle D regulations, if finalized.

[54] 42 U.S.C. § 6972.

[55] 42 U.S.C. § 6972(a)(1)(B).

[56] 42 U.S.C. § 6973.

[57] For details on EPA's Office of Enforcement and Compliance Assurance, see "Guidance on the Use of Section 7003 of RCRA," October 1997, available at http://www.p2pays.org/ref/03/02645.pdf. For information on legal requirements for initiating action under Section 7003, in particular, see pp. 9-19.

EPA's Proposed Regulatory Options

In its current regulatory proposal, EPA is reconsidering whether its May 2000 regulatory determination is appropriate and whether its Bevill determination should be revised. EPA has not yet determined whether the waste should be regulated under Subtitle C or D. It is seeking comment on both options. Ultimately, EPA states that its decision must be protective of human health and the environment and be based on sound science.

Each regulatory option draws on existing requirements or authorities specified under Subtitles C and D of RCRA and their implementing regulations (discussed above). The proposals also include regulatory requirements intended to address potential problems unique to managing CCW.

Subtitle C Proposal

EPA's proposal to regulate CCW under Subtitle C would be predicated on its determination that the waste meets the regulatory criteria for listing it as hazardous (discussed above). Under this option, the waste would be regulated under existing Subtitle C requirements (40 C.F.R. Parts 260-268 and 270-272) that specify, among other things, location restrictions; standards for liners, leachate collection and removal systems, and groundwater monitoring; closure and post-closure care requirements; storage requirements; land disposal restrictions and treatment standards; corrective action; financial assurance; and permitting requirements. Selected requirements unique to CCW management are discussed in **Table 1**.

Table 1. Selected Requirements Under Subtitle C Proposal

Provision	Description
Listing CCW as a "special waste"	Instead of designating CCW as a "listed" or "characteristic" waste, EPA would create a new subpart to the regulations regarding the identification and listing of hazardous waste—"Special Wastes Subject to Subtitle C Regulations" (a new Subpart F to 40 C.F.R. 261). This was done primarily to address issues of stigmatization that have been asserted by the coal ash reuse industry.[a]
Design criteria	The regulations would require landfills and surface impoundments to install a composite liner (instead of a double liner) and a leachate collection and removal system. Existing landfills would not be required to be retrofitted with a liner, but would be required to install groundwater monitoring systems and implement corrective action as needed. Surface impoundments receiving CCW would have up to seven years to close the unit or four years to upgrade it to meet new technology standards. To be eligible for the four-year grace period, facilities would be required to comply with groundwater monitoring requirements. Based on previous experience regulating surface impoundments, EPA has stated that it believes that facilities managing surface impoundments will choose to close them rather than retrofit.
Surface impoundment stability requirements	To insure structural integrity, surface impoundments would be required to operate in accordance with regulations similar to those promulgated under the Mine Safety and Health Administration (MSHA) at 30 C.F.R. § 77.216. Among those requirements, facilities must submit to EPA, or an authorized state, plans for the design, construction, and maintenance of existing impoundments; submit closure plans; conduct periodic inspections; and have the unit certified annually by an independent registered engineer.
Land disposal restrictions	Wet (surface impoundment) and dry (landfill) disposal would be required to meet universal treatment standards (UTS) applicable to the land disposal of hazardous waste. Wastewaters would be required to undergo solids removal to meet the UTS. To accommodate new restrictions on wet disposal, facilities would have up to five years to cease receiving wet waste. Dry disposal would meet the UTS if it is managed using new design criteria (e.g., with a composite liner and groundwater monitoring).
Permitting requirements	Facilities that dispose of, treat, or store CCW must obtain a permit from EPA or from a state with an authorized hazardous waste program. Facilities with existing landfills would be eligible for "interim status" under federal regulations (if the facility has submitted an application for the appropriate permit). As such, facilities would be subject largely to self-implementing requirements. Surface impoundments that have not completed closure would be subject to existing hazardous waste permitting requirements.

Source: This table was prepared by CRS based on an analysis of EPA's June 21, 2010, regulatory proposal.

a. Representatives from the coal ash reuse industry have asserted that designating the material as a special waste instead of hazardous would not eliminate the stigma attached to the material. Some have argued that regulating the material under Subtitle C would create the stigma. Also, under Subtitle C, it is unclear whether EPA has the authority to create a separate category of hazardous waste.

Permitting and upgrade requirements applicable to existing surface impoundments, coupled with land disposal restrictions on future wet disposal of CCW, would effectively phase out surface impoundment disposal.

If the Subtitle C option were to be finalized, it would become effective in six months in states where EPA implements the hazardous waste management program. States with an authorized hazardous waste program would be required to adopt the regulations and modify their existing state programs. EPA estimates that this could take those states one to two years, depending on when EPA finalizes the rule.[58] Time to comply with requirements that may take longer than six

[58] For more detail on the potential effect on state authorization, see 75 *Federal Register* 35191-35192.

months is addressed specifically in the regulatory proposal (e.g., facilities may take up to seven years to meet surface impoundment closure requirements).

CCW beneficially used would be specifically excluded from the definition of hazardous waste. That is, it would not be subject to Subtitle C regulation from the point of generation to the point where it is beneficially used (e.g., made into wallboard or concrete).

Subtitle D Proposal

If EPA selects the Subtitle D option, it would leave in place the Bevill exemption from hazardous waste and establish criteria applicable to CCW surface impoundments and landfills within the criteria for classifying open dumps. It would modify existing open dumping requirements under the "Criteria for Classification of Solid Waste Disposal Facilities and Practices" (proposed as a new Subpart D, under 40 C.F.R. Part 257) to specify criteria for determining which CCW landfills and surface impoundments pose a reasonable probability of adverse effects on health or the environment under RCRA.[59] Facilities that fail to satisfy these criteria would be considered in violation of RCRA's prohibition on open dumping.

Although proposed under the regulations related to open dumping, the Subtitle D proposal is more similar to existing regulations applicable to municipal solid waste landfills (40 C.F.R. 258). For example, similar to MSW landfill restrictions, the Subtitle D proposal includes the following:

- **Location restrictions.** New disposal units (landfills or surface impoundments) would be required to be placed above the natural water table and could not be located in wetlands, within 200 feet of a fault zone, or in a seismic impact zone. New or existing disposal units could not be located in an unstable area (e.g., a location susceptible to natural or human-induced events or forces capable of impairing the integrity of the unit). Existing disposal units in an unstable area would be subject to closure requirements.
- **Design requirements.** New landfills and surface impoundments would be required to be constructed with a composite liner. Within five years, existing surface impoundments would be required to have solids removed and be retrofitted with a composite liner. Existing landfills would not be required to be retrofitted with a liner. Similar to the Subtitle C proposal, surface impoundments would be subject to stability requirements similar to those promulgated under MSHA.
- **Operating requirements.** Disposal units would be subject to fugitive dust controls and liquid run-off/run-on control. Facilities would also have recordkeeping requirements that would specify that all records, reports, studies, or other documentation required to demonstrate compliance with the requirements must be made publicly available at the operator's facility or on its publicly accessible Internet site. The availability of information is intended to facilitate citizen suits if necessary.
- **Groundwater monitoring and corrective action requirements.** New and existing disposal units would be subject to groundwater monitoring requirements.

[59] 42 U.S.C. §§ 6907(a)(3) and 6944(a) (criteria for sanitary landfills).

If certain hazardous constituents (including arsenic, cadmium, or selenium) are detected at a level exceeding groundwater protection standards, the facility would have 90 days to assess corrective measures and select a remedy that would protect human health and the environment.

- **Closure and post-closure requirements.** Closure of a disposal unit would be required to be done in accordance with a closure plan.

As discussed previously, the most significant element of this option relates to EPA's lack of authority to implement the requirements or enforce them. EPA states that it would *encourage* states to adopt the criteria, but the agency has no authority to require them to do so or to implement the criteria upon their finalization. Nor does EPA have authority to require federal approval procedures for state adoption of the minimum nationwide criteria (e.g., a permit program). States would be free to develop their own regulations and/or permitting programs using their solid waste laws or other state authorities.[60]

EPA notes that if *states* do not adopt the proposed CCW management standards, *facilities* would still have to comply with the proposed Subtitle D criteria, if finalized. For that reason, EPA has proposed its requirements in a way that would be self-implementing. That is, facilities would be able to implement them without interaction with regulatory officials. Still, if facilities choose not to self-implement the proposed criteria (particularly in a state that chooses not to adopt them), there are limited enforcement mechanisms to require the facility to do so. EPA argues that the requirement to make facility compliance information available to the public would allow citizens to enforce the requirements, if a state chooses not to. However, the ability of citizens to gather necessary information to move forward with a citizen suit could be complicated if a facility does not disclose the specified information. Again, there are limited enforcement options to compel a facility to produce that information.

Economic Impact of the Proposed Options

EPA prepared an analysis of the potential costs and benefits associated with its regulatory proposal in its Regulatory Impact Analysis (RIA). The RIA estimated the average annualized regulatory cost to be approximately $1.5 billion a year under the Subtitle C option and $587 million a year under the Subtitle D option.[61] These estimates include the costs of industry compliance and state and federal government oversight and enforcement costs.

In addition to the costs, the RIA also took into consideration potential environmental and public health benefits of regulating CCW. Estimated and monetized benefits in the RIA include

- groundwater protection benefits consisting of human cancer prevention benefits and avoided groundwater remediation costs at CCW disposal sites;
- a reduction in economic impacts or cleanup costs associated with catastrophic surface impoundment failures (i.e., cleanup costs avoided); and

[60] For more information, see EPA's discussions regarding the potential impact of a Subtitle D regulation on state programs at 75 *Federal Register* 35211.

[61] The average annualized equivalent values were calculated by multiplying the 50-year present values by a 50-year 7% discount rate "capital recovery factor" of 0.07246. For more information, see 75 *Federal Register* 35134 and 35211-35213 and 75 *Federal Register* 51435, August 20, 2010, corrections to the June 2010 regulatory proposal.

- induced future increase in industrial beneficial uses of CCWs (e.g., increased recycling due to increased cost of disposal).

Taking into consideration these three potential benefits, EPA estimated annualized "regulatory benefits" under the Subtitle C option. The estimates ranged widely, depending on potential changes in the level of beneficial use of the waste. In addition to induced increases in beneficial uses of CCW (as mentioned above), the RIA also considers potential changes to costs/benefits if recycling levels remained unchanged and if there were a decrease in beneficial use due to "stigma" effects of regulating it under Subtitle C. Depending on those factors, EPA speculates that a decrease in beneficial use could result in increased costs of $16.7 billion, while induced increases in recycling could result in a regulatory benefit of $7.4 billion a year. Under the Subtitle D option, the regulatory benefit is estimated to range from $85 million to $3 billion a year (the RIA did not estimate a potential stigma effect on the Subtitle D option).[62]

Possible Approaches for Congress

States and utilities argue that data gathered to date do not clearly demonstrate that the waste poses a threat to human health and the environment and that to regulate its disposal under Subtitle C would be too costly to implement. States also argue that their current regulatory programs are sufficient to protect human health and the environment. Industries that advocate for the beneficial use of CCW argue that regulating the material under Subtitle C, even if there were exemptions for certain beneficial uses, would stigmatize the material. They are particularly concerned that liability issues would lead to the elimination of certain uses of the material, such as its use as a component in wallboard (end users may potentially equate the use of "hazardous" gypsum wallboard with problems associated with toxic wallboard from China);[63] its use as a component in concrete or cement that is used on bare ground; or as an amendment to regulate pH levels in soil.

Environmental groups argue that EPA has gathered sufficient data to demonstrate that the waste poses significant risks when deposited into unlined disposal units and that states are not consistently regulating the waste in a way that sufficiently minimizes potential threats to humans or the environment. Further, under its existing RCRA authority, EPA has minimal authority to establish disposal criteria under Subtitle D. If it is to be regulated at all in a consistent way, they argue, it must be under Subtitle C.

Members of Congress have several legislative options to address concerns expressed by these groups. Congress may choose to direct EPA to leave the Bevill exemption in place and continue to exempt the material from regulation as hazardous waste. This may be problematic in that the original amendment directed EPA to hold the exemption pending a report to Congress on various factors regarding the waste's volume, disposal, and actual harm and potential risks associated with its disposal. For the past 30 years, EPA has been gathering that information and has determined[64] that improper management poses significant risks to human health and the environment and that those risks could be minimized through some form of national regulation. Congress may also explicitly prohibit the Bevill-exempted CCW from regulation under Subtitle C (as in the proposed H.R. 1391).

[62] For more detail on cost estimates, see 75 *Federal Register* 35134 and 35211-35220.

[63] See EPA data on sampling of drywall imported from China at http://www.epa.gov/oswer/docs/chinesedrywall.pdf.

[64] Particularly in its May 2000 regulatory determination and in data gathered since that determination.

Instead of (or in addition to) prohibiting EPA from regulating the waste under Subtitle C, Congress could choose to give EPA additional authority to regulate it under Subtitle D. It may specifically direct EPA to establish waste management criteria under Subtitle D applicable to solid waste management facilities that receive CCW. Such provisions could potentially draw from the existing distinction between an "open dump" and a "sanitary landfill" (a facility from which there is no reasonable probability of adverse effects on health or the environment from disposal of solid waste).[65] Similar to the HSWA amendments that authorized EPA to establish criteria applicable to MSW landfills, Congress could specifically authorize EPA to revise existing solid waste management criteria to include standards applicable to landfills and surface impoundments that accept coal combustion wastes. Further, Congress could require states to adopt a permit program to assure that coal combustion waste management facilities within the state meet EPA's management criteria.

Congress could also choose to create a new subtitle under RCRA (a Subtitle K) that would specifically address issues unique to the management of CCW. Such a proposal could include a number of legislative provisions, but, broadly, could direct EPA to develop waste management standards applicable to disposal units that accept CCW (similar to Subtitle D), but also provide EPA with federal enforcement authority to require states to implement those standards (similar to Subtitle C) while avoiding labeling the material a "hazardous" waste. Such a proposal could also authorize EPA to specifically regulate certain beneficial uses (such as construction fill).

Congress may also choose to do nothing. That is, Congress may allow the current rulemaking process to continue and allow EPA to select either its Subtitle C- or D-related proposal.

As of this writing, it is unknown when EPA will finalize its proposal. In its fall 2010 "Current Regulatory Plan," the Office of Management and Budget's (OMB's) Office of Information and Regulatory Affairs listed the date of the final action as "To Be Determined."[66] Along with the OMB regulatory plan, EPA published its Unified Regulatory Agenda, in which the agency discusses its regulatory priorities for 2011. The CCW proposal was not among those discussed.

[65] 42 U.S.C. 6944.

[66] See the Office of Management and Budget's Office of Information and Regulatory Affairs individual agency rule information at http://www.reginfo.gov/public/do/eAgendaViewRule?pubId=201010&RIN=2050-AE81, published December 10, 2010.

Appendix. Types of Coal Combustion Waste

Table A-1. Description and Proportions of CCW

Waste Type	Description	Percentage of Total Generated[a]
Fly Ash	A product of burning finely ground coal in a boiler to produce electricity. It is generally captured in the plant's chimney or stack through a particulate control device (e.g., electrostatic precipitators or fabric filters). It consists mostly of silt-sized and clay-sized glassy spheres, giving it a consistency somewhat like talcum powder.	57%
Flue Gas Desulfurization (FGD) Material	Flue gas desulfurization (FGD) is a chemical process implemented in order to meet emission requirements in the Clean Air Act applicable to sulfur dioxide (an emission associated with acid rain). The goal of the process is to chemically combine the sulfur gases released in coal combustion by reacting them with a sorbent, such as limestone (calcium carbonate), lime (calcium oxide), or ammonia. Depending on the FGD process used at the plant, the material may be a wet sludge or a dry powder. The wet sludge is likely predominantly calcium sulfite or calcium sulfate. The dry material generally consists of a mixture of sulfites and sulfates.	24%
Bottom Ash	A coarse, gritty material, these agglomerated ash particles are those that are too large to be carried in flue gases. They impinge on the furnace walls or fall through open grates to an ash hopper at the bottom of the furnace. The material is taken from the bottom of the boiler furnace either in its dry form or as a slurry (via the addition of water). It has a porous surface structure and is coarse, with grain sizes spanning from fine sand to fine gravel.	17%
Boiler Slag	This type of ash collects at the base of certain furnaces that are quenched with water. When molten slag comes in contact with quenching water, it fractures, crystallizes, and forms pellets. This boiler slag material is made up of hard, black, angular particles that have a smooth, glassy appearance. The particles are uniform in size, hard, and durable, with a resistance to surface wear.	<2%

Source: Table generated by the Congressional Research Service (CRS) using information from EPA's "Wastes - Resource Conservation - Reduce, Reuse, Recycle - Industrial Materials Recycling" web page regarding Coal Combustion Products, at http://www.epa.gov/osw/conserve/rrr/imr/ccps/index.htm, and the U.S. Geological Survey, Fact Sheet 076-01, "Coal Combustion Products," at http://pubs.usgs.gov/fs/fs076-01/fs076-01.html.

a. The approximate percentage of total CCW generated was determined using data from American Coal Ash Association (ACAA), "2007 Coal Combustion Product (CCP) Production & Use Survey Results (Revised)," at http://www.acaa-usa.org/displaycommon.cfm?an=1&subarticlenbr=3.

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