

Before the
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HOUSE OF REPRESENTATIVES
SUBCOMMITTEE ON ENERGY AND ENVIRONMENT

TESTIMONY OF
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Thank you for the opportunity to speak to you today. I am Dawn Santoianni, senior engineer with Veritas Economic Consulting (Veritas Economics). Veritas Economics is an interdisciplinary small business that specializes in environmental policy analysis, benefit-cost analysis, and assessing the economic and electric reliability impacts of proposed environmental regulations. The results of Veritas Economics' analyses have been used to inform policy decisions, support regulatory compliance, and for strategic decision making. I have been invited here today to present the results of our analysis on the costs to the coal-fired electric generating industry from the Environmental Protection Agency's (EPA's) proposed rule regulating coal combustion residuals (CCRs) under Subtitle C of the Resource Conservation and Recovery Act (RCRA). This research was sponsored by the Electric Power Research Institute (EPRI).

The analysis we conducted quantifies the incremental cost for the additional compliance requirements under the Subtitle C option, compared to the baseline, or current operations. Costs for this analysis were developed at the individual generating unit and plant level, and aggregated to develop a national industry

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cost estimate. Because the regulatory requirements for any individual power plant or generating unit would be a function of the current technical systems and operating practices, compliance costs will vary across units and plants. A variety of publicly available and site-specific information was collected to develop a generating-unit level database that contained data on the relevant characteristics and CCR management practices that would determine compliance costs. Veritas Economics designed a survey that was distributed to coal-fired generating unit owners, and compiled survey response data to accurately assess compliance costs. The analysis used engineering cost estimates for Subtitle C compliance developed by EPRI and its contractors. The final cost report prepared for EPRI, “*Cost Analysis of Proposed National Regulation of Coal Combustion Residuals from the Electric Generating Industry*” is publicly available online at epri.com/ccp.

COMPLIANCE REQUIREMENTS UNDER SUBTITLE C

Under the Subtitle C proposal, EPA would list CCRs destined for disposal under a new waste category as a “special waste” under RCRA. The Subtitle C proposal would reverse the Beville exemption for CCRs destined for disposal, but retain the exemption for CCRs that are beneficially used. Coal combustion products destined for disposal “would be regulated from the point of their generation to the point of their final disposition, including during and after closure of any disposal unit” (75 Fed. Reg. 35133). The requirements of RCRA Subtitle C include disposal unit siting requirements, design requirements for liners, groundwater monitoring, and dust control; financial assurance, facility-wide corrective action, disposal unit closure and post-closure care; generator permits, monitoring and reporting; as well as secondary containment for tanks and structural requirements for storage buildings. All impoundments that do not meet the minimum technology criteria would need to cease receiving CCRs within five years of the state implementation of the rules, and close within seven years. As stated by EPA, the “combined requirements under Subtitle C would effectively phase-out all wet handling of CCRs and prohibit the disposal of CCRs in surface impoundments” (75 Fed. Reg. 35157). Because surface impoundments are not only used for final disposal, but also of settling of CCR waste streams and wastewater treatment, coal-

fired power plants would therefore also require new tank-based wastewater treatment systems. Our analysis included the costs associated with conversion to dry handling systems and new wastewater treatment systems.

Although the proposed Subtitle C rule would apply only to CCRs destined for disposal, the technical operations of coal-fired power plants makes the separation and distinction of CCRs destined for beneficial use and CCRs destined for disposal virtually impossible. Our analysis quantified several costs that have been previously difficult to estimate, including the “upstream” costs associated with collection, handling, and storage of CCRs from the point of generation to disposal. These costs pertain only to the Subtitle C option, which would regulate CCRs from the point of generation to final disposition (i.e., cradle to grave). In assessing the point of generation and the required engineering retrofits and compliance requirements, we applied concepts codified by EPA. Specifically, when one makes the determination to discard or dispose of materials that are not subject to exclusion or variance from solid waste, those materials are regulated as solid wastes under RCRA; a solid waste that is a listed RCRA waste is a hazardous waste under RCRA (40 CFR 261.2(a)(1) and 40 CFR 261.3). Further, 40 CFR 260.10 defines disposal as “the discharge, deposit, injection, dumping, spilling, leaking, or placing of any solid waste or hazardous waste into or on any land or water so that such solid waste or hazardous waste or any constituent thereof may enter the environment or be emitted into the air or discharged into any waters, including ground waters.” Therefore, disposal may be an active decision (e.g., placing materials in a landfill for disposal) or passive (e.g., discharge, spilling, leaking solid waste or constituents of solid waste into the environment, air, or water). If CCRs are contained, the point of generation occurs at the point when the decision is made to discard or dispose of the CCRs. However, if the CCRs are spilled, leaked, or discharged, then the point of generation occurs at the place of the discharge. It is important to note that in their Regulatory Impact Analysis (RIA), EPA did not include or quantify these upstream costs or wastewater treatment costs.

OVERVIEW OF COST ANALYSIS

To quantify the costs of the proposed Subtitle C regulation, EPRI undertook a comprehensive engineering cost analysis, which included developing engineering estimates to comply with Subtitle C requirements, undertaken in a separate project.¹ These costs were developed using site visits to coal-fired generating facilities to determine system upgrades and technological changes that would be required to comply with a Subtitle C rule. The objective of the site visits was to assess the range of CCR management practices, plant configurations, and the retrofits required for Subtitle C compliance “upstream” of disposal units. For example, bottom ash hoppers, hydrobins, and flue gas desulfurization (FGD) system dewatering areas could require secondary containment, and truck-loading facilities from fly ash storage silos could require negative pressure enclosures. These engineering cost estimates were used in our analysis based on plant-specific configuration data obtained through an extensive survey of generating unit owners. The survey responses covered 561 coal-fired units at 225 plants, representing 60.3 percent of the coal-fired generating capacity (60.2 percent of generation) in the U.S. subject to the rule. Respondents included large utilities with numerous coal-fired plants, independent power producers, and small, municipal-owned facilities. These site-specific parameters were used in a Monte Carlo statistical model to generate unit- and plant-specific compliance cost estimates for each of the regulated facilities, accounting for the uncertainty in input cost estimates.

Since disposal costs would constitute a large percentage of the compliance costs, the location where facilities would choose to dispose of CCRs is an important factor. The decision on where to dispose of CCRs under a Subtitle C regulation would be a function of numerous site-specific parameters. These parameters include whether the plant currently has a landfill on-site (or nearby) with remaining capacity that could meet Subtitle C siting and design criteria, land availability, proximity to commercial hazardous waste landfills, concerns about the permitting and public involvement process, and potential legal or

¹ Electric Power Research Institute. 2010. *Engineering and Cost Assessment of Listed Special Waste Designation of Coal Combustion Residuals Under Subtitle C of the Resource Conservation and Recovery Act*. 1020557. EPRI, Palo Alto, CA.

liability issues. Site-specific restrictions may preclude many plants from siting new land disposal units. These restrictions include seismic, fault area, unstable topology, floodplain, watershed, and state-level restrictions. Some states currently have statutes more restrictive than federal Subtitle C rules. For example, Florida prohibits the land disposal of hazardous waste (2010 Florida Statutes, sec. 403.7222, Prohibition of hazardous waste landfills).

If a plant does not currently have a landfill on-site (or has limited capacity), that facility would be faced with a decision to permit and construct a new landfill on-site, transport CCRs for disposal at an off-site company-owned landfill, or transport CCRs to a commercial hazardous waste landfill for disposal.

Lacking site-specific data, disposal choice is difficult to assess and can lead to gross inaccuracies in estimating disposal costs. Further, current disposal patterns are a poor predictor for future disposal choice under Subtitle C due to the more restrictive requirements of the regulation. In the RIA, EPA assumes that current disposal practices continue and facilities that currently dispose of CCRs on-site would continue to do so under Subtitle C. Survey data confirms not all facilities would be able to, or would choose to, site a new on-site landfill under the Subtitle C rules. Due to siting restrictions and other factors, survey responses indicated that 42 percent of plants would choose on-site disposal, 29 percent would choose to transport CCRs off-site to another company-owned landfill, and 28 percent would choose commercial landfill disposal. In terms of percentage of CCRs, 67 percent of CCRs produced by the surveyed plants would be disposed on-site, 21 percent of CCRs would be disposed off-site, and 12 percent of CCRs would be disposed of in commercial hazardous waste landfills.

The amount of CCRs destined for disposal would be impacted by any changes to beneficial use rates. In the proposal, EPA has expressed concerns about “unencapsulated” uses, such as large-scale structural fill, road embankments, sand and gravel pits, and agricultural uses (75 Fed. Reg. 35155, 35160). In addition, stakeholders have raised concerns about a stigma on beneficial uses associated with Subtitle C regulation. Regulation that restricts the beneficial use of CCRs will have significant impacts to the electric generation industry by increasing the amount of CCRs that must be disposed. In the RIA, EPA assumes that

unencapsulated use drops by 80 percent. Our analysis assumed that unencapsulated uses are eliminated entirely through regulation or due to liability concerns and stigma. We also performed a sensitivity analysis mirroring EPA's assumptions for potential increases or decreases in encapsulated use rates. A moderate increase or decrease in encapsulated beneficial use does not affect total costs significantly. This is because encapsulated uses are only 31.5 percent of the total CCRs produced annually. The majority of CCRs will still require disposal under the Subtitle C rule, regardless of stigma impacts to encapsulated beneficial uses.

SUMMARY OF FINDINGS

The analysis estimates that the total incremental cost to the coal-fired electric generating industry for Subtitle C regulation of CCRs over a 20-year period is between \$54.66 billion and \$76.84 billion present value (at a discount rate of seven percent). The range in costs accounts for uncertainty in compliance cost estimates and uncertainty in disposal decisions. If upstream Subtitle C compliance costs are not included, and if disposal costs are calculated based on current disposal patterns, the incremental compliance costs would be underestimated by approximately \$30 billion. EPA's estimate of the Subtitle C regulatory cost does not include wastewater treatment system costs to replace impoundments; the "upstream" costs of bottom ash, fly ash, and FGD solids management to meet RCRA standards; increased maintenance, spill prevention and response costs; or off-site (and commercial) disposal costs except for those plants that currently dispose of CCRs off-site. This largely accounts for the difference between our cost estimate, and EPA's \$20.35 billion estimate for Subtitle C regulation.

The analysis also estimated the total tons of CCRs that would be sent to commercial disposal under the Subtitle C rule, based on restrictions identified from survey data and regression analysis of characteristics of non-surveyed plants. The analysis predicts between 14,970,000 and 20,550,000 tons of CCRs would be sent to commercial hazardous waste landfills each year. This volume of waste would exceed the entire

current capacity of the commercial hazardous waste market, estimated at 34,000,000 tons, within two years.

The implications for compliance deadlines can exacerbate this situation. Siting, designing, permitting, and constructing landfill capacity to replace impoundments that must close under the rule is expected to take at least five to seven years (and possibly longer for Subtitle C landfills or where state agencies are confronted with a large number of permit applications). These timelines will affect compliance costs, particularly for plants that currently utilize only surface impoundments for disposal. These difficulties could increase compliance costs, and send more CCRs to commercial landfills.

Although we did not specifically estimate costs for the Subtitle D option, due to the permitting, reporting, handling, storage, and disposal requirements for RCRA-listed wastes, the costs incurred under Subtitle C would be significantly greater than the costs incurred under the Subtitle D option.

Finally, compliance decisions for each plant would be made in context of compliance with other regulations affecting the coal-fired generating industry, including national emission standards for hazardous air pollutants (NESHAP), the Transport Rule, greenhouse gas regulation, and 316(b) regulation of once-through cooling intake structures. The technological requirements to comply with one rule could also affect the compliance strategy and costs for another regulation. A good example of this is the addition of scrubbers to control sulfur dioxide emissions, which would then affect the amount of CCRs generated and overall CCR rule compliance costs. The cumulative impacts of multiple regulations, from both an economic standpoint as well as a technological standpoint, will ultimately affect compliance decisions and costs.

My objective today was to inform you of the potential financial impacts to the coal-fired electric generating industry from the proposed Subtitle C regulation of CCRs. The analysis we prepared for EPRI quantified costs that had not been previously estimated. However, the full economic impact of the proposed regulation would be borne not just by the coal-fired electric generating industry, but also by the

CCR beneficial use industry, consumers of products made from CCRs, and electricity customers. Thus, a thorough benefit-cost analysis should include the economic impact to the beneficial use industry, as well as impacts to energy supply, electricity prices, and electric reliability.