



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF
SOLID WASTE AND
EMERGENCY RESPONSE

MEMORANDUM

SUBJECT: Proposed Rule: Hazardous and Solid Waste Management System; Identification and Listing of Special Wastes; Disposal of Coal Combustion Residuals from Electric Utilities (Tier 1; SAN 4470; RIN-2050-AE81)

FROM: Mathy Stanislaus *Ms Stanislaus*
Assistant Administrator
Office of Solid Waste and Emergency Response

THRU: Lisa Heinzerling *Lisa Heinzerling*
Associate Administrator
Office of Policy, Economics, and Innovation

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Associate General Counsel
Solid Waste and Emergency Response Law Office

TO: Lisa P. Jackson
Administrator

A few inadvertent errors were made in the process of preparing the final proposed rule package for the Disposal of Coal Combustion Residuals from Electric Utilities (CCR) that was signed on May 4, 2010. We recommend that these errors be corrected before publication of the proposal in the Federal Register. These corrections will be made expeditiously and should not delay the publication of the proposal. The corrections are made only to the preamble of the proposed rule and are detailed in the following section. You may indicate your approval of these corrections by your signature at the end of this memorandum.

Corrections to the Proposed Rule

There were three categorical sets of errors made to the CCR proposal that should be corrected prior to publication. The first and more important of these are numerical errors to the summary table that compares regulatory benefits to costs of our various options early in the preamble (Table 1). This summary table was included early in the preamble at the urging of OMB as a condition to conclude

review. The changes will correct eight numbers that currently misrepresent the low end value of our benefits range for the three regulatory scenarios. The correct numbers were included in similar tables later in the preamble. The second correction we would like to include was the omission of a statement that a public hearing regarding the proposal was an option available to the public. The third set of corrections are editorial in nature regarding are description of risk in the preamble.

The errors described above translate into the following nine set of specific changes that will be made to the preamble of the CCR proposal. Additionally, the attached redlined pages of the preamble identify these changes show the corrected text.

1. On page 2, in the **DATES** section the following was added: "EPA will provide an opportunity for a public hearing on the rule upon request. Requests for a public meeting should be submitted to EPA's Office of Resource Conservation and Recovery by [insert date 30 days after publication]. See the **FOR FURTHER INFORMATION** section below for contact information. Should EPA receive requests for public meetings within this time frame, EPA will publish a notice in the Federal Register providing the details of such meetings."

2. On page 31, Table 1 was corrected by the eight revised numbers highlighted in the table below.

Table 1
Summary Table Comparison of Regulatory Benefits to Costs - Ranging Over All Three
Beneficial Use Scenarios
(\$Millions @ 2009 \$ Prices and @ 7% Discount Rate over 50-Year Future
Period-of-Analysis 2012 to 2061)

	Subtitle C "Special Waste"	Subtitle D	Subtitle "D prime"
A. Present Values:			
1. Regulatory Costs:	\$20,349	\$8,095	\$3,259
2. Regulatory Benefits:	(\$230,817) to \$102,191	\$1,168 to \$41,761	\$593 to \$17,501
3. Net Benefits (2 - 1)	(\$251,166) to \$81,842	(\$6,927) to \$33,666	(\$2,666) to \$14,242
4. Benefit/Cost Ratio (2 / 1)	(11.343) to 5.022	0.144 to 5.159	0.182 to 5.370
B. Average Annualized Equivalent Values:*			
1. Regulatory Costs	\$1,474	\$587	\$236
2. Regulatory Benefits:	(\$16,725) to \$7,405	\$85 to \$3,026	\$43 to \$1,268
3. Net Benefits (2 - 1)	(\$18,199) to \$5,930	(\$502) to \$2,439	(\$193) to \$1,032
4. Benefit/Cost Ratio (2 / 1)	(11.343) to 5.022	0.144 to 5.159	0.182 to 5.370

* Note: Average annualized equivalent values calculated by multiplying 50-year present values by a 50-year 7% discount rate "capital recovery factor" of 0.07246.

3. On page 172, under the heading "*Ingestion of Groundwater*," second paragraph, last sentence: the sentence "Thallium is estimated at three times the reference dose in unlined landfills at the 90th percentile, but did not exceed the reference dose at the 50th percentile for any liner type" was corrected to read "For CCRs co-managed with coal refuse, thallium is estimated at two times the reference dose in unlined landfills at the 90th percentile, but did not exceed the reference dose at the 50th percentile for any liner type."

4. On page 173, under the heading "*Ingestion of Groundwater*," fourth paragraph, last sentence: the sentence "Of the contaminated groundwater plumes that are estimated to reach the receptor wells from

composite-lined units, the constituent concentrations were not estimated to reach peak concentrations in the 10,000 year time period that was modeled" was corrected to read "Of the contaminated groundwater plumes that are estimated to reach the receptor wells from composite-lined units, the median time to peak well concentrations was not estimated to occur in the 10,000 year time period that was modeled."

5. On pages 157, 162, 172, and 180, reference to the risk assessment document "Human and Ecological Risk Assessment of Coal Combustion Wastes" as "U.S. EPA 2009a" is corrected to read "U.S. EPA 2010a."

6. On pages 157, 163, 177, and 374, reference to the document "Inhalation of Fugitive Dust: A Screening Assessment of the Risks Posed by Coal Combustion Waste Landfills - DRAFT" as "U.S. EPA 2009b" is corrected to read "U.S. EPA 2010b."

7. On pages 19, 104, 118, 157, 162, 163, and 165, "2009 risk assessment" is corrected to read "2010 risk assessment."

8. On page 89, footnote 39, "September 2009" is corrected to read "April 2010."

9. On page 166, footnote 85, "U.S. EPA (Environmental Protection Agency). 2009. *Human and Ecological Risk Assessment of Coal Combustion Wastes*. Office of Resource Conservation and Recovery, Washington, DC. September" is corrected to read "U.S. EPA (Environmental Protection Agency). 2010. *Human and Ecological Risk Assessment of Coal Combustion Wastes*. Office of Resource Conservation and Recovery, Washington, DC. April."

We recommend that you approve these changes by signing and dating below. If you have any questions, please contact Richard Mattick of OSWER's Policy Analysis and Regulatory Management Staff at 202-566-1926.



Lisa P. Jackson
Administrator

MAY 14 2010

Date

Attachment

EPA is not proposing to change the May 2000 Regulatory Determination for beneficially used CCRs, which are currently exempt from the hazardous waste regulations under Section 3001(b)(3)(A) of RCRA. However, EPA is clarifying this determination and seeking comment on potential refinements for certain beneficial uses. EPA is also not proposing to address the placement of CCRs in mines, or non-minefill uses of CCRs at coal mine sites in this action.

DATES: Comments must be received on or before **[insert 90 days after publication in the Federal Register.]** EPA will provide an opportunity for a ~~hold-public hearing meetings on the rule upon request~~ if sufficient interest is expressed. Requests for such a public meeting should be submitted to EPA's Office of Resource Conservation and Recovery by **[insert date 30 days after publication]**. See the **FOR FURTHER INFORMATION** section below for contact information. Should EPA receive requests for ~~determine that interest is sufficient to warrant public meetings within this time frame~~, EPA will publish a notice in the Federal Register providing the details of such meetings.

ADDRESSES: Submit your comments, identified by Docket ID No. **EPA-HQ-RCRA-2009-0640**, by one of the following methods:

- www.regulations.gov: Follow the on-line instructions for submitting comments.
- Email: Comments may be sent by electronic mail (e-mail) to rcra-docket@epa.gov, Attention Docket ID No. **EPA-HQ-RCRA-2009-0640**. In contrast to EPA's electronic public docket, EPA's e-mail system is not an "anonymous access" system. If you send an e-mail comment directly to the Docket without going through EPA's electronic public docket, EPA's e-mail system automatically captures your e-mail address. E-mail

ratios across these three beneficial use scenarios for each regulatory option. While each of these three scenario outcomes may be possible, EPA's experience with the RCRA program indicates that industrial generators of RCRA-regulated wastes are often able to increase recycling and materials recovery rates after a subtitle C regulation. Section XII in this preamble provides additional discussion of these estimates.

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B. Average Annualized Equivalent Values:*			
1. Regulatory Costs	\$1,474	\$587	\$236
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3. Net Benefits (2 - 1)	(\$18,199) to \$5,930	(\$502) to \$2,439	(\$193) to \$1,032
4. Benefit/Cost Ratio (2 / 1)	(11.347,11.343) to 5.022	0.145,0.144 to 5.159	0.182 to 5.370
* Note: Average annualized equivalent values calculated by multiplying 50-year present values by a 50-year 7% discount rate "capital recovery factor" of 0.07246.			

B. What is the Statutory Authority for this Action?

a. *From Disposal.* The contaminants of concern in CCRs include antimony, arsenic, barium, beryllium, cadmium, chromium, lead, mercury, nickel, selenium, silver and thallium. Potential human exposure pathways for these contaminants from the disposal of CCRs are ground water ingestion, inhalation, and the consumption of fish exposed to contaminants. Ecological impacts include surface water contamination, contamination of wetlands, and aquatic life exposure to contaminants of concern. As discussed in section II. B, V., and the Regulatory Impact Analysis, the risks modeled for the 2009¹⁰ risk assessment often exceeded EPA's typical regulatory levels of concern. With very few exceptions, the risks modeled for the 2009¹⁰ risk assessment correspond with ground water exceedances of constituents observed in EPA's damage case assessments (e.g., arsenic, boron, cadmium, lead, molybdenum, and selenium were modeled and found to exceed the risk criteria in at least some instances, and were also found in at least some of the damage cases). Additionally, as discussed in section I.F.2, the potential exists for the chemical characteristics of certain CCRs (e.g., fly ash and FGD) to increase, which could result in increases in releases from management units, particularly if such wastes are placed in old unlined units, as a result of the increased use and application of advanced air pollution control technologies in coal-fired power plants. Further details on the results of EPA's quantitative groundwater risk assessment, and the technical issues that remain to be addressed, and on the unquantified human and ecological risks can be found in section II and in the Regulatory Impact Analysis for today's proposal.

EPA also conducted a population risk assessment for the groundwater-arsenic pathway, as a complement to the individual risk analysis. While the RCRA program necessarily focuses on individual risks, and individual risks have been the basis of previous Bevill and hazardous waste

support for a listing determination. EPA's risk assessment work includes four analyses: (1) U.S. EPA 1998, "Draft Final Report: Non-groundwater Pathways, Human Health and Ecological Risk Analysis for Fossil Fuel Combustion Phase 2 (FFC2)" (June 5, 1998) referred to hereafter as the 1998 Non-groundwater risk assessment (available in docket # F-1999-FF2P-FFFFF in the RCRA Information Center, and on the EPA website at <http://www.epa.gov/osw/nonhaz/industrial/special/fossil/ngwrsk1.pdf>); (2) preliminary groundwater and ecological risk screening of selected constituents in U.S. EPA 2002, "Constituent Screening for Coal Combustion Wastes," (contractor deliverable dated October 2002, available in docket EPA-HQ-RCRA-2006-0796 as Document # EPA-HQ-RCRA-2006-0796-0470); referred to hereafter as the 2002 screening analysis; (3) U.S. EPA 2009¹⁰a, "Human and Ecological Risk Assessment of Coal Combustion Wastes" (September 2009) available in the docket for this proposed rule, and referred to hereafter as the 2009¹⁰ risk assessment; and (4) U.S. EPA 2009¹⁰b, "Inhalation of Fugitive Dust: A Screening Assessment of the Risks Posed by Coal Combustion Waste Landfills - DRAFT" available in the docket for this proposed rule. As explained below, the 2009¹⁰ risk assessment correlates closely with the listing criteria in EPA's regulations.

1. Criteria for Listing CCRs as a Special Waste and Background on 2009¹⁰ Risk Assessment.

In making listing determinations under subtitle C of RCRA, the Agency considers the listing criteria set out in 40 CFR 261.11. EPA considered these same criteria in making the proposed special waste listing decision.

2002), and of human health effects from breathing windblown particulate matter from CCR landfill disposal operations (the 1998 risk assessment and U.S. EPA 2009~~10~~10b).

Longstanding EPA policy is for EPA risk assessments to include a characterization of the risks at two points on a distribution (i.e., range) of risk estimates: a central tendency estimate that represents conditions likely to be encountered in a typical exposure situation, and a high end estimate that represents conditions likely to be encountered by individuals with higher exposures (U.S. EPA 1995).⁸² Examples of factors that would influence a nearby resident's exposure are the residence's distance from a CCR waste management unit, and an individual's behavior or activity patterns. In the 2009~~10~~10 risk assessment, the high end risk estimates are the 90th percentile estimates from a probabilistic analysis.

The comparisons that EPA used in this rule to judge whether either a high end or central tendency estimated risk is of concern are the risk criteria discussed in the 1995 policy. As noted under that policy, for an individual's cancer risk, the risk criteria are in the range of 1×10^{-6} , or one in one million "excess" (above and beyond pre-existing risk) probability of developing cancer during a lifetime, to 1×10^{-4} (one in ten thousand),⁸³ with 1×10^{-5} (one in one hundred

⁸² *Guidance for Risk Characterization*, U.S. Environmental Protection Agency, 1995; accessible at <http://www.epa.gov/OSA/spc/pdfs/rcguide.pdf>, which states that "For the Agency's purposes, high end risk descriptors are plausible estimates of the individual risk for those persons at the upper end of the risk distribution," or conceptually, individuals with "exposure above about the 90th percentile of the population distribution"). As suggested in the *Guidance*, we also provide 50th percentile results as the central tendency estimate of that risk distribution.

⁸³ See 40 CFR 300.430.

factors outlined in § 261.11(a)(3)(i)-(xi), and the Agency's findings. In the following discussion of the eleven listing factors, we combined factors iii (Migration), iv (Persistence), v (Degradation) and vi (Bioaccumulation); and factors vii (Plausible Types of Mismanagement), viii (Quantities of the Waste Generated), and ix (Nature and Severity of Effects from Mismanagement) for a more lucid presentation of our arguments.

1. Toxicity – Factor (i)

Toxicity is considered in developing the health benchmarks used in risk assessment modeling. The Agency for Toxic Substances and Disease Registry (ATSDR) ToxFAQs™,⁸⁶ the EPA Integrated Risk Information System (IRIS),⁸⁷ and the Toxicology Data Network (TOXNET) of the National Institutes of Health⁸⁸ are all sources of toxicological data on the Appendix VIII hazardous constituents found in CCRs. (The information from these data sources on the toxicity of the metals identified is included in the docket to today's proposed rule.) Two types of ingestion benchmarks are developed. For carcinogens, a cancer slope factor (CSF) is developed. A CSF is the slope of the curve representing the relationship between dose and cancer risk. It is used to calculate the probability that the toxic nature of a constituent ingested at a specific daily dose will cause cancer. For non-carcinogens, a reference dose (RfD) is developed. The RfD (expressed in units of mg of substance/kg body weight-day) is defined as an estimate (with

U.S. EPA (Environmental Protection Agency). 2009~~10~~. *Human and Ecological Risk Assessment of Coal Combustion Wastes*. Office of Resource Conservation and Recovery, Washington, DC. ~~September~~ April.

⁸⁶ www.atsdr.cdc.gov/toxfaq.html

⁸⁷ http://cfpub.epa.gov/ncea/iris/index.cfm?fuseaction=iris.showSubstanceList&list_type=alpha&view=B

⁸⁸ <http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?HSDB>

managed with coal refuse, thallium is estimated at two times the reference dose in unlined landfills at the 90th percentile, but did not exceed the reference dose at the 50th percentile for any liner type.

For unlined landfills managing FBC waste, arsenic is estimated to have a cancer risk of three in one hundred thousand at the 90th percentile. For clay-lined landfills managing FBC waste, arsenic is estimated to have a cancer risk of six in one hundred thousand at the 90th percentile, while thallium is estimated to have an HQ of 4, and antimony is estimated to have an HQ of 3.

The Appendix VIII constituents in CCRs managed in landfills are not all estimated to arrive at the drinking water well at the same time. For unlined landfills, the median number of years until peak well water concentrations are estimated to occur is approximately 2,800 to 9,700 years for arsenic, 2,600 to 10,000 years for selenium, and 2,300 years for thallium. For clay-lined landfills, the median estimated time until peak well concentrations is approximately 4,000 to 10,000 years for arsenic, 5,100 to more than 10,000 years for selenium, and 4,300 years for thallium. ~~Of the contaminated groundwater plumes that are estimated to reach the receptor wells from composite-lined units, the constituent concentrations were not estimated to reach peak concentrations in the 10,000 year time period that was modeled.~~Of the contaminated groundwater plumes that are estimated to reach the receptor wells from composite-lined units, the median time to peak well concentrations was not estimated to occur in the 10,000 year time period that was modeled.¹⁰¹

¹⁰¹ The risk model used by EPA evaluates conditions over a 10,000 year period, and considers constituent concentrations during that period. In some cases, peak concentrations do not occur during the 10,000 year period.

(1985),¹⁰⁹ Coutant, et al. (1978)¹¹⁰ and Rowe, et al. (2001),¹¹¹ while examples of studies cited in Rowe, et al. 2002 that illustrates the impact of CCRs on aquatic organisms in water bodies near CCR surface impoundments include Lemly (1993),¹¹² Sorensen, et al. (1982)¹¹³ and (1988).¹¹⁴ This latter category may reflect CCR impacts attributable to three constituent migration mechanisms: 1) NPDES-permitted discharges from impoundments; 2) overtopping of impoundments; and 3) groundwater-to-surface-water discharges (modeled in US EPA 200910a), as well as other, non-CCR-related, sources of pollutants.

Although chromium, beryllium, and silver were not modeled, they were analyzed using dilution attenuation factors developed for the 50th and 10th percentiles in the same manner as described above. The only exceedance of the HQ of 1 was for silver at the 10th percentile under the landfill scenario. The only exceedances of the ecological criteria for surface impoundments of the 40

¹⁰⁹ Benson, W. and Birge, W. "Heavy metal tolerance and metallothionein induction in fathead minnows: results from field and laboratory investigations." *Environ Toxicol Chem* 1985:4(209-217).

¹¹⁰ Coutant, C., Wasserman, C., Chung, M., Rubin, D., Manning, M. "Chemistry and biological hazard of a coal-ash seepage stream." *J. Water Poll. Control Fed.* 1978:50(757-743).

¹¹¹ Rowe C., Hopkins, W., and Coffman, V. "Failed recruitment of southern toads (*Bufo terrestris*) in a trace-element contaminated breeding habitat: direct and indirect effects that may lead to a local population sink." *Arch. Environ. Contam. Toxicol.* 2001:40(399-405).

¹¹² Lemly A., "Guidelines for evaluating selenium data from aquatic monitoring and assessment studies." *Environ. Monit. Assess.* 1993:28(83-100).

¹¹³ Sorensen, E., Bauer, T., Bell, J., Harlan, C. "Selenium accumulation and cytotoxicity in teleosts following chronic, environmental exposure." *Bull. Environ. Contam. Toxicol.* 1982:29(688-696).

¹¹⁴ Sorensen, E. "Selenium accumulation, reproductive status, and histopathological changes in environmentally exposed redear sunfish." *Arch Toxicol* 1988:61(324-329).