

# Proposed CCP Disposal Regulations: Groundwater Monitoring and Recordkeeping

Tammy L. Rauen<sup>1</sup> and Michelle Nordwald<sup>2</sup>

<sup>1</sup>Project Engineer, Golder Associates Inc., 44 Union Boulevard, Suite 300, Lakewood, Colorado 80228; <sup>2</sup>Senior Project Engineer, Golder Associates Inc., 44 Union Boulevard, Suite 300, Lakewood, Colorado

**KEYWORDS:** Groundwater, Regulations, CCP management, Coal Combustion Products, Detection Monitoring, Assessment Monitoring, Corrective Action

## ABSTRACT

Forthcoming coal combustion product (CCP) disposal regulations as proposed by the EPA will require CCP management facilities to monitor and characterize groundwater and meet specific recordkeeping requirements. In the proposed rule (40 CFR Parts 257, 261, 264 et al.), the EPA provided two options for regulating CCP management practices: Subtitle D (non-hazardous) and Subtitle C (hazardous). While the two options have differing containment requirements, all CCP management facilities will have the same groundwater monitoring and reporting requirements. The EPA's proposed rule contains a three-phased approach to the required CCP groundwater monitoring program, modeled primarily after the Municipal Solid Waste Landfill (MSWLF) regulations in 40 CFR Part 258. The three phases of the groundwater monitoring program are: 1) detection monitoring, 2) assessment monitoring, and 3) a corrective action program.

The proposed CCP regulations will require owners and/or operators of coal combustion product (CCP) containment facilities to post information and notifications related to the CCP facility's groundwater monitoring program. Making this information publically available poses some challenges and concerns in that the general public and third parties will have access to complex technical information that could be interpreted incorrectly and conceived as adversely impacting human health and the environment. This article will summarize the proposed requirements of groundwater quality monitoring programs at CCP facilities, identify potential implications of the new regulations, and provide strategies to guide and manage public perception of CCP facilities.

## INTRODUCTION

On June 21, 2010, in an effort to renew the EPA's 2000 determination for development of national regulations for coal combustion product (CCP) disposal, the EPA published a proposed rule for Disposal of Coal Combustion Residuals from Electric Utilities (40 CFR Parts 257, 261, 264 et al.). The date for final rule promulgation is unknown, but expected in 2012. In the proposed rule, the EPA provided two options to regulate CCP management practices:

- RCRA Subtitle C (hazardous)
- RCRA Subtitle D (non-hazardous)

Under Subtitle C, CCPs would be regulated as hazardous from the point of generation to ultimate disposal (cradle-to-grave), with the exception of CCPs destined for beneficial re-use. Beneficially re-used CCPs would be excluded from hazardous regulations. CCPs regulated under the Subtitle D regulations would be classified as non-hazardous wastes. The EPA or states authorized to administer the RCRA Subtitle C program would enforce CCP regulations under Subtitle C, whereas states or citizen suits would be the enforcement mechanism if Subtitle D regulations are approved.

Both proposed regulations (Subtitle C and D) will require owners and operators of CCP containment facilities and surface impoundments to comply with groundwater monitoring requirements. If groundwater monitoring is currently performed at a CCP facility, the program must be compliant with the requirements specified in the proposed regulations. Groundwater monitoring for CCP facilities is not a new concept for the coal-fired energy generation industry. The most recent data provided by the EPA in 2000 reported that 85 percent of CCP containment units and 38 percent of surface impoundment units currently monitor groundwater quality.

This paper will focus on groundwater quality monitoring and associated public notifications required in the proposed regulations. The proposed requirements for groundwater quality monitoring programs at CCP facilities will be summarized; potential implications of the new regulations on CCP facility owners/operators will be discussed; and strategies for managing public perception as a result of the technical information available for public and third party review will be presented. Only Subtitle D regulations are summarized in this article because industry opinion is that Subtitle D regulations are more likely to be approved than Subtitle C.

## SUMMARY OF PROPOSED REGULATIONS

Both proposed regulations include a groundwater monitoring program because the EPA considers groundwater monitoring the single most important measure to protect human health and the environment. As part of the groundwater monitoring program, specific notifications and postings to a publically accessible internet site will be required. The EPA is requiring that information related to the groundwater monitoring program be posted on the internet to provide states and citizens a mechanism to monitor the CCP unit so that, when appropriate, intervention can occur.

The EPA proposed a three-phased approach to the CCP groundwater monitoring program. The program is modeled after the Municipal Solid Waste Landfills (MSWLF) criteria in 40 CFR Part 258 criteria, and tailored to meet environmental goals at CCP management facilities. The three-phases of the groundwater monitoring program are:

- Detection Monitoring
- Assessment Monitoring
- Corrective Action Program

The intent of the groundwater quality program is to provide a means of early detection of constituents migrating from the disposal unit and protect human health and the environment. Detection Monitoring achieves this objective. In the event that indicator parameters are observed at irregular levels, further investigations can be performed during Assessment Monitoring and the CCP unit can be evaluated to verify if the containment structure is functioning as intended. Should there be risk that human health and the environment is or could be adversely impacted, a Corrective Action Program will be implemented.

For Subtitle D, EPA will require a minimum of one upgradient well and three downgradient wells. Semiannual sampling is currently proposed, and the constituents for detection and assessment monitoring are listed below. The proposed regulations do not give states authority to remove constituents from the lists, but do allow for additions.

#### Detection Monitoring (Appendix III 40 CFR Part 257)

- Boron
- Chloride
- Fluoride
- pH
- Sulfate
- Sulfide
- Total Dissolved Solids

#### Assessment Monitoring (Appendix IV 40 CFR Part 257)

- |                    |                          |
|--------------------|--------------------------|
| ■ Aluminum         | ■ Lead                   |
| ■ Antimony         | ■ Manganese              |
| ■ Arsenic          | ■ Mercury                |
| ■ Barium           | ■ Molybdenum             |
| ■ Beryllium        | ■ pH                     |
| ■ Boron            | ■ Selenium               |
| ■ Cadmium          | ■ Sulfate                |
| ■ Chromium (total) | ■ Sulfide                |
| ■ Copper           | ■ Thallium               |
| ■ Fluoride         | ■ Total Dissolved Solids |
| ■ Iron             |                          |

The proposed rules call for groundwater monitoring systems at existing landfills and surface impoundments to be in compliance within one year of the effective date of the regulation. The post-closure period would continue for 30 years and consist of semi-annual groundwater quality monitoring/ reporting and general site inspections.

These reports and results will be required to be placed in the facility operating record and posted on a publicly accessible website. Additional reporting requirements follow (Federal Register, Vol. 75, No. 118, p35195):

- Demonstrations of no adverse effects to human health or the environment
- Compliance with groundwater provisions annually

- Monitoring well documentation
- Certifications of the groundwater monitoring system
- Placement of groundwater monitoring, sampling, and analysis program documentation in the operating record
- Usage of alternative statistical methods
- Statistically significant increases over background
- Start/completion of assessment monitoring
- Intent to close facility
- Certification of post-closure completion

## IMPLICATIONS OF PROPOSED REGULATIONS

Posting data related to the groundwater quality at CCP units will likely be a cause of concerns for owners/operators of CCP units. The increased transparency that will result from this information being publically accessible will allow for increased public scrutiny and potentially third party litigation. Although providing a mechanism for citizen suits is one of EPA's intentions for establishing the program with the requirement of publically posting groundwater quality information, CCP unit owners/operators may be challenged with managing public perception and will likely want to be strategic in the manner that this information is made available and presented to the public.

Recommendations to manage the public's perception of the CCP facility and mitigate concerns are presented in the following section; however, additional considerations towards the implications of the proposed rules are the technical concepts that will be available for public review. Examples of these concepts are: statistical significant increases (SSIs), groundwater quality exceedances above groundwater quality standards, the importance of comparing compliance (downgradient) monitoring wells with background (upgradient) monitoring wells, natural variability in groundwater, various statistical analysis methods such as intrawell versus interwell analysis, hydraulic conductivity, advection, diffusion, dispersion, retardation, and natural attenuation. For those of us in the industry, these principals are common for evaluating groundwater quality; however, these analyses and concepts are involved technical science practices and the general public will likely need additional information and guidance to better understand the data and analysis available for review on the website.

## SOLUTIONS FOR DATA PRESENTATION AND PUBLIC PERCEPTION

The general public will have access to data and information related to groundwater quality at CCP facilities. The basis for groundwater quality monitoring needs to be made, in that groundwater monitoring programs are a means of protecting human health and the environment, and evaluating and monitoring the potential risk of any adverse effects. Because the public will have access to previously undisclosed information, the CCP owner/operator may want to provide additional educational and informational documents to prevent confusion or misunderstandings, avoid potential litigation, and ensure the public understands that:

- a) The facility is being monitored to proactively assess potential impacts to groundwater (Detection Monitoring).

- b) If impacts are observed, further investigations will occur to gain an understanding of the extent of the impacts (Assessment Monitoring).
- c) Evaluations of risk are being conducted with regard to the potential for impacts to adversely affect human health or the environment.
- d) If risk evaluations demonstrate that potential adverse impacts to human health or the environment exist, a remedy will be selected and implemented to prevent and/or minimize impacts (Corrective Action).

The first step to communicating and sharing this information with the general public would be to develop an expanded and user friendly website capable of handling groundwater and facility compliance information to efficiently manage data, reports, and other information required by the EPA. The objective of the information posted to the website would be to meet the notification requirements of the proposed CCP rule and guide the user through the posted information. The overall process and several detailed components of groundwater monitoring and CCP design will likely need to be explained to inform the public of the reason and need for the CCP facility. Perhaps even the permit process could be explained so the public understands how and why the CCP facility came to be constructed in its current location.

The information posted to the website would be unique to each CCP facility, and will likely depend on the facility's particular groundwater monitoring phase. As more evaluations are performed and data is collected, more information may be needed to guide the public through the evaluations, assessments, and technical information. In other words, there will likely be more information and sophisticated graphical representations desired for Assessment Monitoring than Detection Monitoring programs.

Provided below is a list of the required information in the proposed regulations and suggestions for additional information that a CCP operator/owner may elect to post on their website to inform and educate the public on the conditions of the CCP facility. The suggested information is categorized by: General Site Information, Detection Monitoring, Assessment Monitoring, and Corrective Action Programs.

### General Site Information

The following notifications are required in the proposed CCP rule:

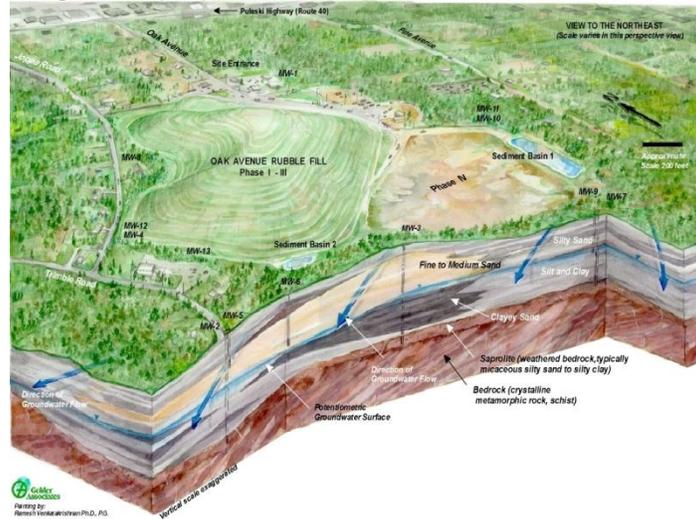
- Monitoring well documentation
- Certification of the groundwater monitoring system
- Placement of groundwater monitoring, sampling, and analysis program documentation in the operating record
- Compliance with groundwater provisions annually
- Intent to close facility
- Certification of post-closure completion

The information needed to fulfill the General Site Information can mostly be achieved through brief fact sheets or listed directly on the website. The fact sheets can either be

uploaded onto the website for direct viewing or a general page of notifications can be created on the website.

Additional general site information that would increase the public's understanding of the groundwater quality monitoring program at the CCP facility could include:

- Description of CCP unit activities, operations, and maintenance
- Discussion and graphics showing site geology and groundwater flow patterns (see following example)



- Discussion of the CCP facility engineering and design
- Discussion of the CCP facility permit application and permit approval process
- Information on the groundwater monitoring network (i.e., design, installation, development, and decommissioning).
- Site photographs

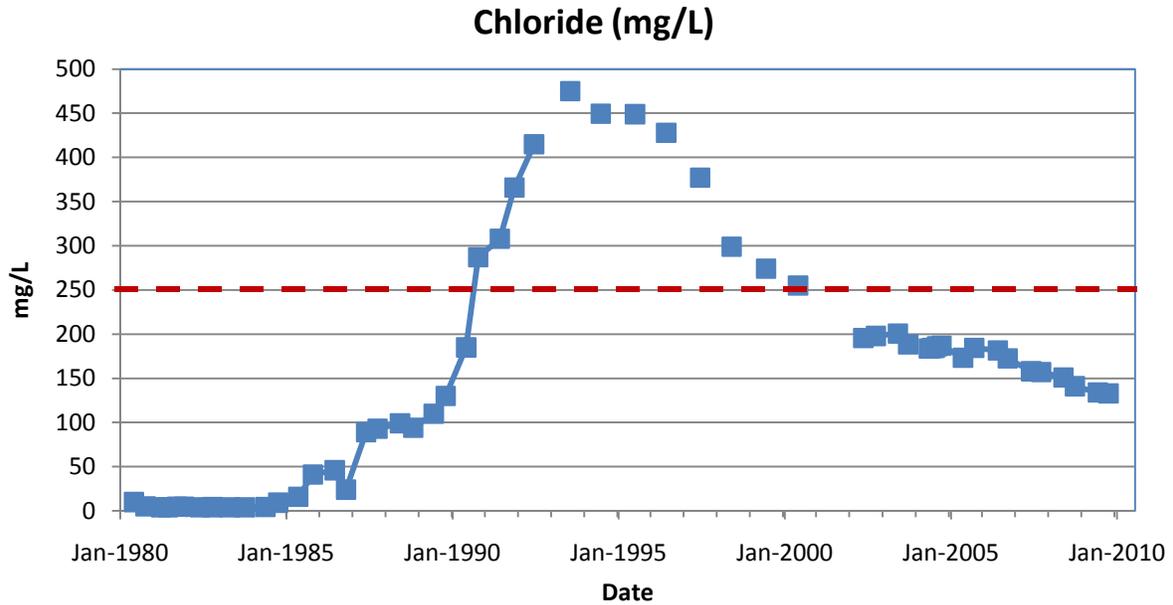
### Detection Monitoring

The following notifications are required in the proposed CCP rule:

- Usage of alternative statistical methods
- Statistically significant increases over background
- Demonstration that reported SSIs are either from a source other than the CCP facility or resulted from error in sampling, analysis, statistical evaluation or natural variation in the groundwater quality.

Suggested documents to inform the public and guide public perception include:

- Time-series graphs including groundwater quality standards to compare the monitored constituents to groundwater health standards or background (upgradient) concentrations.



**Figure 1. Example time-series graph.**

- Potentiometric maps



**Figure 2. Example potentiometric map.**

- Comparison of compliance (downgradient) monitoring wells with background (upgradient) monitoring wells.

Assessment Monitoring

The following notifications are required in the proposed CCP rule:

- Demonstrations of no adverse effects to human health or the environment
- Start/completion of assessment monitoring

Suggested documents to inform the public and guide public perception include:

- Geologic cross-sections including aquifers and potentiometric surfaces
- A “road-map” presenting the current monitoring phase and prospective directions of the groundwater monitoring program
- Information on fate and transport of constituents that triggered assessment monitoring
- Information on toxicity of constituents of concern

### Corrective Action

The following notifications are required in the proposed CCP rule:

- Demonstrations of no adverse effects to human health or the environment

Suggested documents to inform the public and guide public perception include:

- Model results
- Groundwater protection standards for constituents of concern
- Results of risk assessments
- Plans for additional investigation to identify the nature and extent of contamination
- Plume delineations determined from additional investigation
- Information on the potential remedies, the remedy selection process, and ultimately the selected remedy. This may include information about public meetings and comments from the public comment period

Additional concepts could also be included on the website to help the public better understand and interpret data available from the CCP facility website. Some, all or none of these concepts could be provided as supplementary information on the website for the CCP facility. The information posted will be unique to each site and depend on the level of groundwater monitoring conducted at the site. The following list provides a few examples of concepts, terms and questions that could be helpful to manage public perception and data interpretation from the information posted on the website.

### Permit Application and Permit Approval

- Entities involved
- Why are CCP facilities necessary?
- How was the CCP facility sited and constructed in the current location?

### Objectives of:

- Detection Monitoring
- Assessment Monitoring
- Corrective Action Programs

### Explanation of Statistical Analysis

- SSIs
- Intrawell vs. interwell statistical analysis
- Natural variation in groundwater

### Implications of Exceedances

- Comparison of constituents in compliance (downgradient) to background (upgradient) wells.
- Groundwater quality standards and maximum contaminant levels (MCLs)

### General hydrogeology concepts and principles

- Hydraulic conductivity
- Advection
- Diffusion
- Dispersion
- Retardation
- Natural attenuation

## CONCLUSION

This paper summarized the groundwater quality monitoring and associated public notifications required in the proposed rule for Disposal of Coal Combustion Residuals from Electric Utilities (40 CFR Parts 257, 261, 264 et al.). Once this rule is promulgated, coal-fired energy generation facilities will be required to perform groundwater quality monitoring and post related information on a publically accessible internet site. The implications of these two tasks for coal-fired energy generation facilities will be managing public perception. The technical information posted regarding the groundwater monitoring program will require additional explanation and supporting documentation so that the general public understands the science behind evaluating groundwater quality, and that groundwater monitoring is a means to proactively assess the potential of CCP facilities impacts to groundwater.

## REFERENCES

EPRI, 2005. *Groundwater Monitoring Guidance for the Industry Action Plan on Coal Combustion Product Management*. EPRI, Palo Alto, CA, and Utility Solid Waste Activities Group, Washington, DC: 2005. 1010064.

Federal Register, 2010. 40 CFR 264 et al. *Hazardous and Solid Waste Management System; Identification and Listing of Special Wastes; Disposal of Coal Combustion Residuals from Electric Utilities*; Proposed Rule. June 21, 2010.