Final Report

ESTIMATION OF COSTS FOR REGULATING FOSSIL FUEL COMBUSTION ASH MANAGEMENT AT LARGE ELECTRIC UTILITIES UNDER PART 258

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2.4.4 Design Standard Option 4 - Liner and Leachate Collection/Detection Controls, Financial Assurance, Cap Controls, Groundwater Monitoring, and Post-Closure Groundwater Monitoring

This option assumes full Subtitle D type municipal sold waste landfill requirements for landfills and similar Subtitle D-like requirements for surface impoundments to control the release of leachate to groundwater. The option assumes groundwater monitoring (within 150 meters), cap (synthetic), liner (synthetic-clay composite), leachate collection system, post-closure monitoring, and financial assurance. These design and operating requirements for landfills and impoundments only apply to new construction. However, compliance with groundwater monitoring and post-closure monitoring are effective the date the rule becomes final. The cost analysis assumes that groundwater monitoring compliance will begin in 2006. The addition of a liner provides added short- and long-term avoided cost benefits by physically preventing leachate leakage and migration via a groundwater pathway exposing nearby receptors and creating third-party damages. A leachate collection system provides additional physical prevention of short-term and long-term leachate leakage and migration via groundwater pathway exposing nearby receptors and creating third party damage.

See Exhibit 4-8, page 4-40 for cost of this alternative = $521 million/year. ($304 million/year for new facilities)

4.5.2 Corrective Action - Remediation Costs

The three corrective action cost estimates below include costs for conducting a hydrogeologic study and a corrective measures study:

1.) One corrective action option is to *construct a cap* over the unit to prevent further releases along above ground pathways and further infiltration through the ash to groundwater. Corrective action cost estimates were developed for constructing a synthetic cap. The number of monitoring wells is assumed to be equivalent to the calculated number of unit boundary monitoring wells. Some of these wells will be pre-existing and some will be newly constructed during the hydrogeologic study and part of the cost of the study. The well depth is assumed to be 30 feet. Semi-annual sampling for metals for 30 years is assumed.

Assuming an average-sized on-site landfill of 176,771 tons per year with uncompacted ash and unit boundary monitoring, the annualized before-tax capital cost for a synthetic cap is estimated at $3.7 million per year over a 30-year remediation (borrowing) period using linear interpolation of the estimates presented in Exhibit 4-5a. The total net present value is $33.8 million. Similarly, assuming an average-sized on-site surface impoundment of 159,865 tons per year with unit boundary monitoring, the annualized before-tax capital cost for a cap is estimated at $6.8 million per year or total present value cost of $63.6 million (Exhibit 4-5b).

2.) A second corrective action option is to *construct a slurry wall surrounding the unit in addition to the cap* to prevent any further migration of contaminants via groundwater. Corrective action cost estimates were developed for constructing a synthetic cap and a bentonite slurry wall encircling the unit. A 70 percent probability was assigned to a 20-foot deep slurry wall and a 30 percent probability was assigned to a 50-foot deep wall. The groundwater monitoring assumptions are the same as those described above in the first corrective action option.

Assuming an average-sized on-site landfill of 176,771 tons per year with uncompacted ash and unit boundary monitoring, the annualized before-tax capital cost a cap and slurry wall is estimated at $4.0 million per year over a 30-year remediation (borrowing) period using linear interpolation of the estimates presented in Exhibit 4-5a. The total net present value is $35.4 million. Similarly, assuming an average-sized on-site surface impoundment of 159,865 tons per year with unit boundary monitoring, the annualized before-tax capital cost for a cap and slurry wall is estimated at $7.2 million per year or total present value cost of $65.7 million (Exhibit 4-5b).

3.) A third corrective action option is to *install groundwater remediation (pump and treat) in addition to the cap* to prevent any further migration of contaminants via groundwater.

Corrective action cost estimates were developed for constructing a synthetic cap and a groundwater pump and treat system. A 70 percent probability was assigned to a 20-foot

deep collection well, a 10 percent probability was assigned to a 100-foot deep collection well and a 20 percent probability of installing a shallow french drain system. The number of extraction wells is assumed to be equal the half the number of estimated unit boundary monitoring wells. The french drain system is assumed to be operated on two sides of the disposal unit. A 50 percent probability is assigned to a 5 gallon per minute (gpm) per well collection rate and a 50 percent probability is assigned to a 10 gpm per well collection rate. Metals precipitation is the assumed groundwater treatment technology. It is assumed that 5 percent of the flow rate entering the metals precipitation unit will exit as precipitant and go to a dewatering unit. It is assumed that 20 percent of the quantity being dewatered will become sludge to be transported 200 miles off site to a non-hazardous Subtitle D landfill for industrial waste. The operating duration of the pump and treat system is assumed to be 30 years. The groundwater monitoring assumptions are the same as those described above in the first corrective action option. 4-29

Assuming an average-sized on-site landfill of 176,771 tons per year with uncompacted ash and unit boundary monitoring, the annualized before-tax capital cost is estimate at $4.2 million per year over a 30-year remediation (borrowing) period using linear interpolation of the estimates presented in Exhibit 4-5a. The total net present value is $34.2 million. Similarly, assuming an average-sized on-site surface impoundment of 159,865 tons per year with unit boundary monitoring, the annualized before-tax capital cost is estimated at $7.5 million per year or total present value cost of $64.2 million