

Industry Incremental Cost Estimate – External Filtration and Water Addition

NRC Public Meeting

June 18, 2014



Cost Estimate Agenda

- Objectives
- Cost estimating
 - Considerations
 - Scope
 - Assumptions
- Non-hardware items in cost estimate
- Plant to Plant Cost Variability
- Cost summary
- Questions

Cost Estimate Objectives

- Conduct industry cost estimate using typical licensee process
- Use estimate that is representative of the expected industry implementation costs – about 2/3 of Mark I and Mark II plants provided input
- This estimate did not attempt to identify the plant with the lowest or highest cost of implementation
- Builds on cost information provided 09/19/13 and 04/30/14
- Industry cost estimate sent to NRC staff on the date requested – 05/31/14

Cost Estimating Considerations

- Use generally accepted project management cost estimating methods
- Same process used to estimate other plant projects with reasonable degree of success based on past project cost performance
- Considering the current conceptual stage of the project, a 50% contingency is included in the overall cost estimate
- Baseline elements of the cost estimate do not include contingency
- Industry uses this cost estimating process as the basis for business decision making and financial planning

Cost Estimating Scope

- Severe accident water makeup
 - Rulemaking analysis scenarios 2A – D, 3A – D
- Small filter with water makeup
 - Rulemaking analysis scenarios 4A and 4B
- Large Filter with water makeup
 - Rulemaking analysis scenarios 5A and 5B
- The cost estimates are based on incremental costs of filter installation relative to current conceptual designs planned for compliance with NRC Order EA-13-109 and do not include previously incurred or planned expenditures related to NRC order compliance.
- Installation and commissioning are included
- O&M and decommissioning costs are not included

Cost Estimating Assumptions

- Modifications to a single water addition source accessible during severe accident conditions
- Modifications to water addition source are mechanical only
- Filters located at grade level
- Small filter 7' diameter, 20' height – 20 tons
- Large filter 15' diameter, 30' height – 60 tons
- 3' high density concrete shielding
- Qualification requirements same as EA-13-109
- Filter inerting system for H₂ control
- Filter bypass needed for anticipatory venting
- Filter makeup system required

Cost Estimating Assumptions

- Valve position, effluent pressure, filter water level and additional radiation instruments required
- Filter makeup pump
- Cost does not include
 - Local control building
 - Containment parameter instrumentation
 - Portable generators
 - Portable pumps for water addition (RPV, Containment)
 - Heat tracing (northern climates)

Non-Hardware Items Included in Cost Estimate

- Project management/project controls
- Installation support
- Engineering
- Installation equipment
- Scaffold and labor
- Tools and consumables
- Laser scanning to confirm pipe routing
- Contingency

Plant-to-Plant Cost Variability

- The cost estimate is based on the most likely installation details.
- The range of costs will vary from plant-to-plant
- Examples
 - Distance to acceptable location for shield building installation
 - Length of piping required to accommodate filter installation
 - Number of fittings and valves needed to support filter installation
 - Pipe supports
 - Additional engineering costs associated with above items
 - Shield building used to house the external filter
 - Seismic design and foundation type (soil/rock site)
 - Wind missile protection
 - Design of HCVS being installed per NRC Order EA-13-109
 - Design of water addition/electrical infrastructure being installed per NRC Order EA-12-049

Cost Summary

Description	Severe Accident Capable Injection (stand-alone)	Small Filter w/make-up	Large Filter w/make-up
Project Management (including planning and construction oversight)	\$295,000	\$1,500,000	\$1,800,000
Project/Installation Support	\$95,000	\$468,000	\$468,000
Filters (vendor)	N/A	\$7,000,000	\$13,000,000
Materials (excluding filter)	\$140,000	\$3,400,000	\$5,675,000
Engineering	\$315,000	\$2,700,000	\$3,150,000
Equipment	\$20,000	\$104,000	\$160,000
Install piping/valves/filter	\$1,423,000	\$3,600,000	\$6,150,000.00
Install filter building/shielding	N/A	\$2,100,000	\$3,450,000
Severe Accident Capable Injection	N/A	\$2,000,000	\$2,000,000
Scaffold/labor support	\$50,000	\$275,000	\$275,000
Tools and consumables	\$22,000	\$203,000	\$203,000
Scanning	\$35,000	\$82,000	\$82,000
Procedures & training	\$85,000	\$175,000	\$175,000
	\$2,480,000	\$23,607,000	\$36,588,000
Total with 50% Contingency added	\$3,720,000	\$35,410,500	\$54,882,000

- Questions?