Update on Reactor Segmentation Developments

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Past Reactor Segmentation Experience

- **Big Rock Point**
  - Major Component Removal Project at the Big Rock Point Restoration Project

- **Millstone Unit 1**
  - Segmentation of the Greater than Class C Upper Grid Assembly for On-Site Storage

- **Rancho Seco**
  - Reactor Vessel Internals Segmentation

- **Fermi Unit 1**
  - Segmentation of Reactor Vessel and Internals

- **Zion Station**
  - Reactor Vessel Internals and Vessel Segmentation

- **Humboldt Bay**
  - Reactor Vessel Internals and Vessel Segmentation
Reactors Project Philosophy and Approach

- Identify and deliver safe, proven, and reliable methods and processes to perform the segmentation activity.
- Deliver a segmentation approach that minimizes the number of segments and Class B/C waste while optimizing packaging efficiency.
- Minimize radiation exposure to workers.
- Minimize generation of secondary waste.
- Execute the project in the most cost-effective manner.
- Minimize the technical, schedule, and cost risks to the project.
Segmentation Tooling Timeline
Previous Segmentation Equipment Deployment

- Big Rock Point
- Millstone Unit 1
- Fermi
- Zion Station
- Rancho Seco
- Parr CVTR
- Humboldt Bay RV
- Humboldt Bay RVI
Multi-Purpose Segmentation Station (Reciprocating Configuration)

- Removes up to 0.007” of material per cut pass.
- This configuration can be expected to execute approximately 2” of vertical cut per hour.
- Each reciprocating blade includes several replaceable consumable cutter segments.
Multi-Purpose Segmentation Station (Vertical Configuration)

- This configuration can achieve single pass cutting rates of up to 1 3/4” per minute on 2” thick material.

- Single configurations can cut material up to 11” thick.
**Multi-Purpose Segmentation Station** (Horizontal Crossbeam Config.)

- The Horizontal Crossbeam saw, used similar to a radial arm saw, effectively removes control rod guide tubes and support columns associated with most upper internals assemblies.

- Can also be used to volume reduce grid-shaped patterns up to 11” deep.
Baffle Plate Removal

- Removes bolts that fastened the baffle plates to the former plates.
- Removes 16 to 48 bolts per set-up position.
- 20 bolts can be milled per shift.
- GTCC material.
Baffle Former Plate Removal

- Totally dependent on geometry, the existing flow holes found in the baffle former plates may allow removal using a tool similar to the BeaST as was deployed at Rancho Seco.

- Most Westinghouse PWR are void of flow holes in the upper elevation of baffle former plates and the geometry is not sufficiently consistent. Milling solutions have been deployed in these cases.
Internal Barrel Cutter

- Used to sever the common right cylinders found within all PWRs.
- Can be configured to perform sweeping multi-pass cutting or staggered complete plunge cutting.
- Produce right cylindrical segments for further processing by the Multi-Purpose Segmentation Station.
Reactor Vessel Cutting

- SONGS 1 – Type B Package
- Rancho Seco – Abrasive Water Jet
- Fermi Unit 1 – Mechanical
- Humboldt Bay – Mechanical
- Zion – Oxy-Propane
Remaining PWR Fleet

51 Westinghouse (~like Zion)
7 Babcock & Wilcox (~like Rancho Seco)
14 Combustion Engineering (~like SONGS 2&3)

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...complete, mature, executable approach
No Full Scale Segmentation of a Mark Type BWR

Big Rock Point – complete
Humboldt Bay – complete
Millstone Unit 1 - partial

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