Equipment and Facility Testing Program

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U.S. Nuclear Waste Technical Review Board

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Equipment and Facility Testing Program

- **Content**
  - **Prototype/factory tests**
  - **Preoperational test program**
  - **Startup test program**

Purpose of Testing Program

- **Ensure components and equipment can be operated safely and dependably and will not adversely affect health and safety**
  - **Have been properly constructed and installed**
  - **Fulfill their operational and safety functions in accordance with their respective design basis requirements, including a hot test to confirm radiation levels and associated exposure times involving actual radiological sources**
  - **Meet regulatory and licensing requirements and are capable of complying with applicable license specifications**

Prototype/Factory Tests

- **Prototyping**
  - **Program defined, directed, and controlled by OCRWM**
  - **Conducted by program contractor (INL for waste package closure system)**
  - **Audited or observed through QA Program**
  - **Results evaluated by OCRWM**
- **Prototyping waste package closure system**
  - **Full-size waste package top and closure system**
  - **Two-machine concurrent welding**
  - **Demonstration of analyzed performance needs**
  - **Schedule – in-progress now and will complete before equipment performance specification development**

Prototype/Factory Tests (cont.)

- **Waste package closure prototyping**
  - **Results are within the expectations**
  - **Should define acceptable process to meet closure performance requirements**
    - **Demonstrate non-destructive examination techniques**
    - **Demonstrate stress-mitigation techniques**
  - **Largest gain in throughput resulted from middle lid elimination (iterative design/analysis process)**
  - **Realized reduction in weld times**
    - **More reductions expected as processes validated**

Prototype/Factory Tests (cont.)

- **Waste package, waste package emplacement pallets and drip shields prototyping**
  - **To confirm manufacturability**
  - **To measure relationship between defects and residual stresses**
  - **To fine-tune non-destructive examination testing procedures**
  - **Schedule –**
    - **These prototyping activities are deferred until work prioritization dictates their start**
    - **Complete before procurement of components**
- **Dual-Purpose Canister (DPC) cutting machine prototyping**
  - **To demonstrate functionality and demonstrate ability to remotely perform the steps**
  - **Schedule –flexible schedule before procurement.**

Prototype/Factory Tests (cont.)

- **Factory Tests**
  - **Engineering products define structures, systems, and components' performance**
  - **Specifications identify needed factory tests**
    - **Pulled from codes and standards**
    - **Pulled from design performance specifications**
  - **Contractor deliverables provide factory test results**
    - **Reviewed for acceptance**
    - **Allows baselining operating speeds**
  - **OCRWM audits or observes selected factory tests**
    - **Quality Assurance, Engineering, or both organizations audit or observe tests per NQA Program**

Prototype/Factory Tests (cont.)

- **Factory Tests**
  - **Schedule**
    - **Starts based on receipt schedules for procurement activities**
    - **Completes before equipment delivery to OCRWM**
    - **Will not be specified until detailed construction or procurement design is completed**
  - **Opportunity to refine throughput studies / capabilities**
    - **Such as for Transportation, Aging, and Disposal canister closure and DPC cutting**
  - **Factory testing will augment component, pre-operational testing**

Preoperational Test Program

- **Program parts**
  - **Starts with installation inspections**
  - **Continues through**
    - **Turnover for testing**
    - **Initial preparation and conduct of component functional tests**
    - **Component testing of performance**
- **Dry-run of equipment with mockup waste containers**

Preoperational Test Program (cont.)

- **Schedule will be defined in a Testing Program Plan**
  - **Initial Handling Facility (IHF) starts first**
  - **Canister Receipt and Closure Facility (CRCF)-1 starts after IHF testing**
  - **Wet Handling Facility (WHF) after CRCF-1 testing**
  - **High-level project schedule in License Application Figure 2-1**
- **Details will not be specified until detailed construction or procurement design is completed**
- **Plan includes using IHF for operator training**
  - **Available year before operations**

Startup Test Program

- **Startup program parts**
  - **Picks up from preoperational tests**
    - **System performance tests**
    - **Integrated system testing**
  - **Cold testing include dry-run of each waste stream**
  - **Operational readiness review bridges the cold and hot testing**
  - **Hot testing (is initial startup operations) after the Receive and Possess License is issued**
  - **Schedule will be defined in a Testing Program Plan**
    - **IHF testing is first**
    - **CRCF-1 follows IHF**
    - **WHF follows CRCF-1**
    - **High-level project schedule in License Application Figure 2-1**

Startup Test Program (cont.)

- **Details will not be specified until detailed construction or procurement design is completed**
- **Transition from startup testing through authorization to operate**
  - **Timing and coordination are NRC License dependent**
- **Testing program will be based on startup and operating experiences from:**
  - **Other NRC-licensed facilities (through *NRC Inspection Manual* and the Institute for Nuclear Power Operations (INPO) programs)**
  - **DOE-operated, similar facilities, including the Waste Isolation Pilot Project (DOE startup programs)**

Confidence in Results

- **Waste package closure prototyping is developing adequate processes and defining safe methods**
- **Waste package, waste package emplacement pallet, and drip shield prototyping will prove fabrication, but does not have relationship with throughput inputs**
- **Each step in prototyping and factory testing builds confidence in design adequacy**
- **Preoperational and startup testing results will confirm design execution in construction and procurement**

- **Current prototyping results support what is modeled in throughput studies**