Uranium Processing Facility

Dale Christenson
• Mission Need
  “Provide safe, efficient, and secure enriched uranium processing and storage within the Nuclear Weapons Complex to meet the mission of the U.S. Department of Energy’s National Nuclear Security Administration”

• Revised CD-1 approved in June 2012
  – Build a capability sized UPF to replace Building 9212 enriched uranium capabilities
  – Updated cost range to $4.2B to $6.5B
  – Included $2B of contingency
  – Use a build to budget acquisition strategy
Project Challenges

• **Space / Fit Risk Realized**
  – Facility too small based upon mature equipment design
  – Increased cost by ~$500M and one year delay

• **Commodity and Design Cost Increases**
  – Mature design revealed increases in facility commodities
  – Increased project cost by ~ $1 Billion

• **Budget Control Act Cost Increases**
  – Sequestration reduced projected funding
  – Increased project cost by ~ $2 Billion

• **NNSA Evaluation and Decision**
  – NNSA projected cost range to be $10B to $12B
  – NNSA recommended alternative design approaches
NNSA’s Design Policy

• NNSA committed to achieving 90% design completion prior to establishing UPF baseline

• As design matured, and updated estimates are developed, costs monitored against CD-1 range

• NNSA leadership allowed an opportunity to make adjustments
  – Adjust program requirements
  – Consider alternative design approaches
  – Execute build to budget strategy
  – Charter a Red Team to review and validate changes
Design Concept

Original Design Approach
- Single Building

Revised Design Approach
- Multiple Buildings
Revised Design Approach

- Allows tailoring of safety, security, and quality requirements by building
- Maximizes execution flexibility to achieve construction and startup
- Takes maximum advantage of existing process design
- Aligns with revised program requirements
## Requirements Identification

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Requirements Stability

• Design Code of Record (COR)
  – Approved by the FPD
  – Under NNSA Configuration Control

• Senior Management Change Control Board
  – Chaired by UPF FPD
  – Participation by Field Office, Project Office, and Project

COR Change
• NNSA or Project Originated

SMCCB
• NNSA and UPF Membership

Updated Design Criteria
UPF Project Execution Strategy

• Aligned with DOE Order 413.3B and S-1 Project Management Policy
  – Phased approach to execution using subprojects
  – Nuclear subprojects will complete 90% design before baselining (CD-2)
  – Independent Cost estimates/reviews will be performed for all subprojects
  – Technology Readiness of TRL 7 prior to CD-2
  – Annual Peer Reviews
  – Design Management Plan for project engineering and design efforts to achieve CD-2 fully baselined
UPF Design

- **Design Management Plan**
  - Defines all activities to complete design
  - Identifies all activities to achieve CD-2/3
  - Over 11,000 activities in the schedule
  - Performance tracked using Earned Value metrics
  - Technology Readiness activities fully integrated into the schedule
Safety and Security Integration

• Preliminary documents approved by risk acceptance official (Site Office Manager)
  – Preliminary VA and Material Control / Accountability Plan

• Design changes reviewed for safety and security impacts and interfaces
Technology Readiness

Huntsville, Al
Microwave / Glovebox Testing with **Copper**

Microwave Casting System Model

Oak Ridge, TN
Microwave / Glovebox Testing with **Depleted- Uranium (DU)**

Microwave Glovebox Fabrication

- **Design Complete**
  - Oct 2015
- **Cu Testing Start**
  - April 2016
- **DU Testing Start**
  - Aug 2016
- **TRL 7 Complete**
  - Aug 2017
- **MPB CD-2/3 Submittal**
  - Sept 2017
UPF Phased Execution Schedule

---|---|---|---|---|---|---|---|---|---|---
Design Engineering | Safety Basis | Site Readiness (SR)
Site Readiness

Site Readiness Subproject

- Road Work
  - Haul Road
  - Bear Creek Road Bypass
- Civil Work
  - Sedimentation Basin 6
  - Sanitary Sewer (Limited)
  - Jack and Bore
  - Grading
  - West Borrow
  - Wet Spoils
  - Potable Water Line
Site Infrastructure and Services Subproject

- Haul Road Security Features
  - Portal 19
  - Vehicle Arresting System Gate
- Building 9107 Demolition
- Civil Work
  - Sedimentation Basin 4 Construction
  - 9107 Hillside Excavation
  - Site Grading and Asphalt Removal
- Well Plugging and Abandonment
- Concrete Batch Plant
- Construction Support Building

CD 2/3 – March 2015

Concrete Batch Plant
Portal 19
VAS Gate
Bldg 9107 demolition and hillside excavation
Construction Support Building
Sediment Basin 4
Site Preparation and Long Lead for Main Process Building

- Site Preparation
  - Grading and Select Fill
  - Storm & Sanitary Sewer Installation
- Long-Lead Procurements
  - Tower Cranes
  - Rebar
  - Elevator Design

CD 3A – March 2016
Mechanical/Electrical Building Subproject
- MEB Foundation and Structure
- MEB Equipment
  - HVAC Air Handlers & Filters
  - Chillers
  - Electrical Switchgear & Transformers
  - Compressors
  - Pumps and Tanks
- Cooling Towers
- Warehousing and Laydown Area

CD 2/3 – 2nd QTR 2017
Salvage and Accountability

Salvage and Accountability Building Subproject
- SAB Foundation and Structure
- SAB Equipment
- Personnel Support Building
- Balance of Facilities
  - Firewater Tanks & Pumphouse
  - Stand-By Diesel Generators

CD 2/3 – 4th QTR 2017
Main Process Building Subproject

- MPB Foundation and Structure
- MPB Process Equipment
  - HVAC Air Handlers & Filters
  - Maintenance Equipment
  - Electrical Switchgear
  - Cranes/Hoists
- PIDAS
- HEUMF Connector
Acquisition Strategies on UPF

• Use of Management and Operating contract
  – Separate Contract Line Item for UPF Design and Construction
  – Separate Fee Model

• Use of Target Cost on M&O scope
  – Separated by clearly defined scope packages
  – CPIF share line fee model
  – All fee at risk until earned

• Leverage expertise for direct federal contracts
  – United States Army Corps of Engineers
  – Tennessee Valley Authority
Site Infrastructure and Services

USACE/Emerald
Sediment Basin 4 Erosion Control Mat Installation

USACE/Emerald
Installation of New 48” Storm Drains East of the Future Construction Support Building
Site Infrastructure and Services

CNS/Northwind Portal 19 Concrete Pad Placement

CNS/Northwind Erecting Portal 19 Canopy Structure
Site Infrastructure and Services

CNS Construction Concrete Placement for Sanitary Sewer Tie-In