Strategic Plan for Mercury Remediation at Y-12

Laura Wilkerson
Portfolio Federal Project Director for Y-12 Projects

ORSSAB Meeting
April 9, 2014
Y-12 National Security Complex (Y-12)
Mercury Contamination Resulted from Historical Operations

- Hg Recovery Furnace
- Alpha-2
- Alpha-4
- Alpha-5
- Beta-4
Historical Mercury Releases

• From 1950s – 1963 more than 20 million pounds of mercury were used at Y-12 in a process that separated lithium isotopes for weapons production.

• Approximately 2 million pounds of mercury were unaccounted for.

• Of the 2 M pounds, over 700,000 pounds suspected to have been released to the environment (air, surface water, soils/sediments).

Y-12 workers unload and dump mercury flasks circa 1955.
Mercury Cleanup Objectives at Y-12

- Reduce mercury flux leaving site and entering public waters
- Remove or stabilize mercury sources (buildings and soil/sediment)
- Remove and dispose of excess, deteriorating facilities
- Remediﬁe land and make available for future needs and missions
Draft Strategic Plan submitted March 2013, followed by Mercury Workshop in August 2013; Strategic Plan updated and final issued January 2014

Mercury contamination is a complex problem that requires a phased deliberate, and multi-pronged approach that is responsive and adaptive

Strategy includes near term and long term actions to complete mercury remediation at Y-12
Near-Term Goal: Reduce Mercury Discharges to Surface Water

- Mercury, (µg/g (fish), µg/L (water))

**Average Daily Hg Flux (g/d) leaving UEFPC**

- **Mercury Flux (kg/yr)**
  - 2009: 3.90
  - 2010: 7.00
  - 2011*: 12.20
  - 2012: 11.10
  - 2013: 5.20

*WEMA Storm Sewer Cleanout*
Regulatory Standards for Mercury in Water

- **Federal Drinking Water Standard (2,000 ppt)**
- **State AWQC Continuous Discharge Aquatic Life (770 ppt)**
- **Interim ROD Goal (200 ppt)**
- **State AWQC Recreational Use (51 ppt)**

**Average Mercury Concentration at Station 17:**
- 0 ng/L ppt
- 500 ng/L ppt
- 1000 ng/L ppt
- 1500 ng/L ppt
- 2000 ng/L ppt
Near-Term Plan
Proposed Mercury Treatment Facility

- Revised conceptual design to be submitted for regulatory review in April
- Conceptual Design
  - To treat flow at OF 200
  - Capacity 3,000 gallons per minute
  - Allows for further expansion – modular and scalable design
- FY 2014/15: Studies to refine treatment parameters, examine storm and process flows for possible diversion, characterize site
- Mercury remediation goals
  - Reduce mercury flux leaving creek and entering public waters
  - Provide future mercury reduction capabilities for wastewater projected to be generated during large-scale demolition
- Line Item Capital Project
  - Preliminary design planned to begin in FY 2015
  - Operational by FY 2020
### Mercury Treatment Facility Schedule

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Review and approvals under CERCLA.  = FFA Appendix E Milestones.
Ongoing Studies/Actions

- **UEFPC flow augmentation to be eliminated**
  - Began in 1996, 4.5 M gal per day flow added per NPDES permit requirement
  - Increases mercury flux due to re-suspension of sediment

- **Ongoing field studies in EFPC and related laboratory studies**
  - Fish mercury/population studies and trends
  - Methylation studies
  - Mercury sources in LEFPC (bank erosion studies, sediment characterizations)
  - Floodplain mercury bioaccumulation studies (spiders)

...in the FIELD

...in the Laboratory
Additional Near-Term Studies Proposed

- Proposed studies outlined in Mercury Strategic Plan planned to begin this FY, based on sufficiency of funding and priorities
  - Field Research Station
  - Eco-Enhancement
  - Water Chemistry Manipulations
  - LEFPC Sediment/Bank Stabilization
  - UEFPC Sediment Stabilization/Removal
  - Reclassification of UEFPC (OF200 to St. 17)
Near-Term Approach

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- Implement Feasible Diversions
- OF200 Mercury Treatment Facility Design and Construction
- OF200 MTF Operation Evaluation of:
  - Hg removal efficiency
  - Effluent discharge 1200 ft downstream

Flow Augmentation (reduce, relocate, eliminate)

EFPC Field Studies
- Fish mercury/populations/other
- Methylation studies
- Mercury sources; sediment/bank studies (Action Plan 1)

CERCLA Alternatives Evaluation

Alternative Action(s); duration TBD

Year 1 Year 2 Year 3 Year 4 Year 5 Year 6
(proposed studies will float within this 6-year time frame)

- Field Research Station [2 years]
- Eco-Enhancement [2 ½ + years]
- Water Chemistry Manipulations [2 years]
- LEFPC Sediment/Bank Stabilization [3 years]
- UEFPC Sediment Stabilization/Removal [1 year]
- Reclassification of UEFPC (OF200 to Station 17) [1 + year]

Planned Actions/studies – currently in budget
Proposed Actions/studies – not currently in budget
Long-Term Goal: Mercury Source Remediation

- Four large former mercury use buildings to be demolished
- Local soil remediation to follow each building demolition
- Cleanup to occur along side ongoing missions and within high security footprint
- Remediation to include UEFPC sediments and Lake Reality
## Y-12 Mercury Clean-up Schedule

### Oak Ridge Environmental Management Planning Baseline – Y-12

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<th>Mercury-Related D&amp;D and RA Scope</th>
<th>Fiscal Years (2014 – 2046)</th>
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<td>Outfall 200 Mercury Treatment Facility Planning, Construction (□) and Operation ( )</td>
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<td>Ongoing/Proposed Field/Laboratory Studies ( □ )</td>
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<td>Possible Follow-on Actions ( , duration?)</td>
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= CERCLA Alternatives Evaluation
Summary of Strategic Plan

• Plan presents phased approach to reaching goals, including in-stream AWQC for mercury, 51 ppt

• Near-Term Plans (Interim Actions)
  – Outfall 200 Mercury Treatment Facility design, construction, operation
  – Ongoing fish-mercury studies, bank studies, flow augmentation modification
  – Proposed eco-enhancement, water chemistry, stabilization studies

• Long-term plans for source removal
  – Building demolition
  – Soil remediation
  – UEFPC sediment and Lake Reality remediation