# Proposed Plan for Outfall 200 (OF200) Mercury Treatment Facility (MTF)

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Site Specific Advisory Board Meeting

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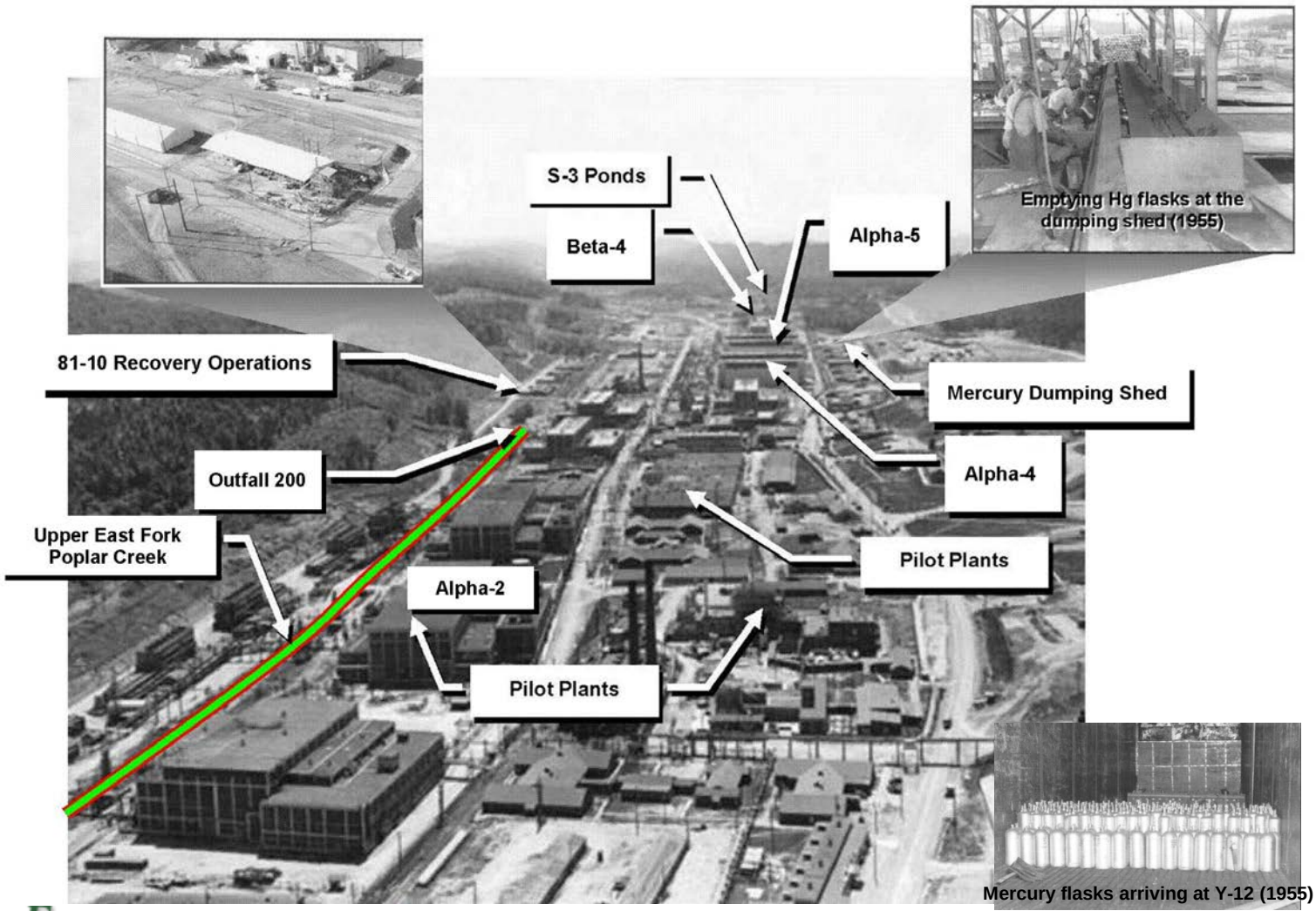
# Background – Mercury at Y-12

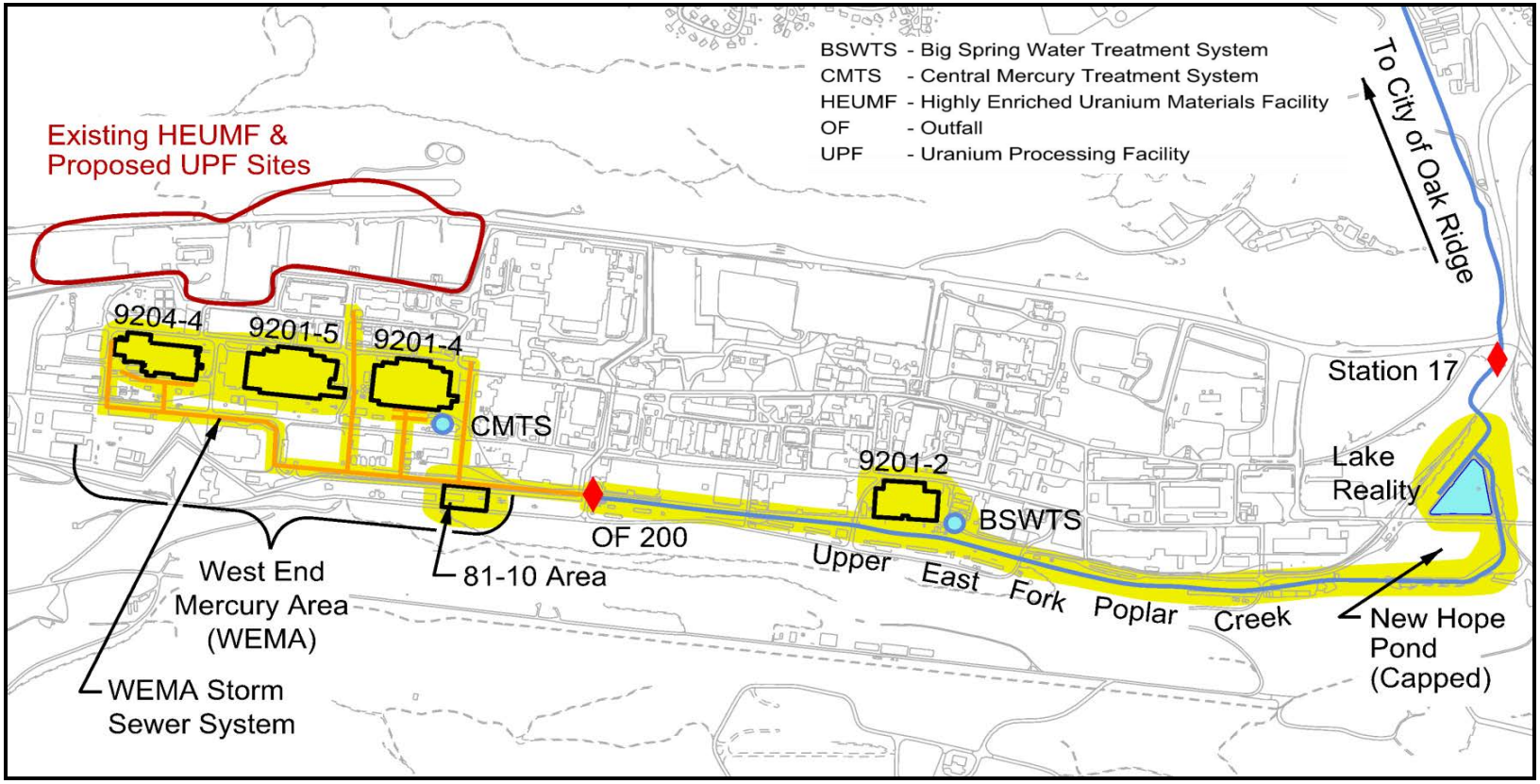
Large quantities of mercury were used at the Y-12 National Security Complex (Y-12) during the Cold War era for nuclear weapons research and development from 1950 to 1963.

- 24 million pounds was brought to Y-12 (General Services Administration estimate).
- Over 2 million pounds was spilled, lost, or unaccounted for.
- Approximately 700,000 pounds was lost to the environment.
  - Contamination in process buildings and soils – 428,000 pounds
  - Releases to Upper East Fork Poplar Creek (UEFPC) – 239,000 pounds
  - Contamination in New Hope Pond sediment – 15,000 pounds
  - Airborne releases – 51,000 pounds
- Approximately 1.3 million pounds is unaccounted for.

# Y-12 Process Buildings and Mercury Use Areas



# WEMA & UEFPC Major Features




**Mercury contamination originates in the West End Mercury Area (WEMA), flows through storm drains, and enters Upper East Fork Poplar Creek (UEFPC) at Outfall 200.**

# Chronology of Key Mercury Remediation Actions at Y-12

1980's-1990's – National Pollutant Discharge Elimination System Permit Actions
- Identification and reduction of point source discharges, process pipe rerouting, water treatment, storm sewer inspection & cleaning

1995-2000 – Lower East Fork Poplar Creek Floodplain Soil Removal

2002 – Upper East Fork Poplar Creek (UEFPC) Phase I Record of Decision (ROD)
- Big Spring Water Treatment System, BSWTS (2005)
- WEMA Storm Sewer Cleanout/Relining (2009-2011)
- Sediment removal from UEFPC & Lake Reality (Future implementation)

2006 – UEFPC Phase II ROD
- Remediation of onsite soils and scrapyards (ongoing)
- Old Scrapyard Cleanup (2009-2012)

2010-2013 – Mercury Reduction Project
- Actions under the American Recovery and Reinvestment Act of 2009 (ARRA), including mercury tank removal, MTF conceptual design.

2013 – Strategic Plan for Mercury Remediation at Y-12

2015 – Proposed Outfall 200 Mercury Treatment Facility (MTF)
(Amendment to UEFPC Phase I ROD)

Future – Process Building Demolition & Soil Remediation

Bank Stabilization

Big Spring Treatment

WEMA Storm Sewer Cleanout

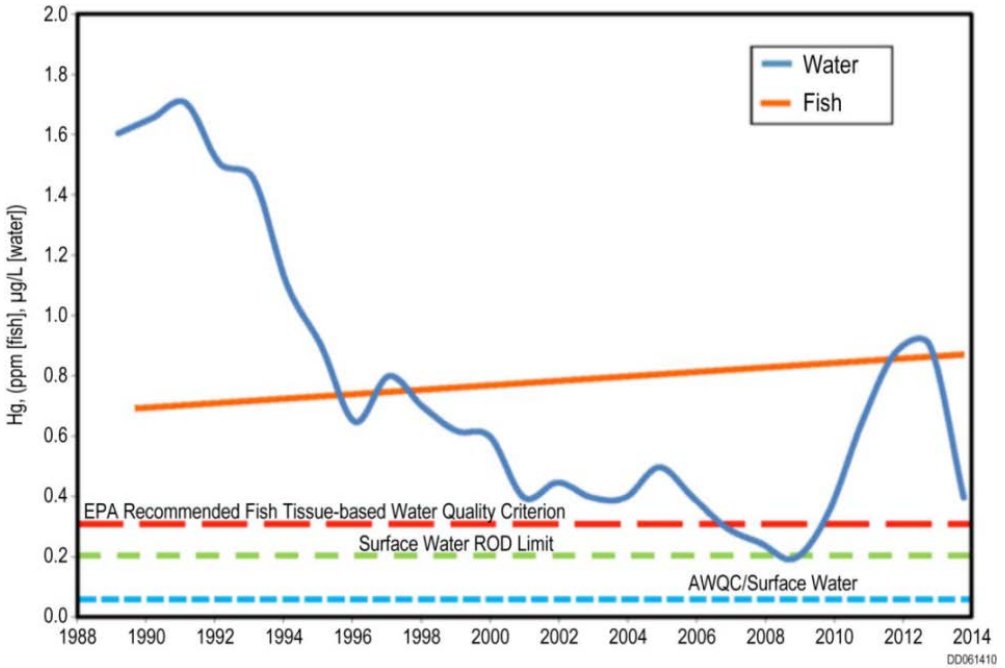
# UEFPC Phase I ROD

- Record of Decision for Phase I Source Control Actions issued 2002.
  - Selected Remedy focused on a series of source control actions designed to reduce release of mercury to UEFPC.
  - Selected Remedy has been modified by Non-Significant Change Notices in 2006 & 2014, and Explanation of Significant Differences (ESD) in 2012.

- What New Information Has Led to the Proposed ROD Amendment?
  - Treatability study and conceptual design study for Outfall 200 MTF have been completed in support of the Phase I ROD requirement to study the viability of large-scale treatment of mercury-contaminated surface water.
  - Revised site conceptual model now indicates greater contribution from the WEMA storm sewer system at Outfall 200 than previously thought.
  - Operating experience of Big Spring Water Treatment System to treat discharge from Outfall 51 & Building 9201-2 sumps has been very successful.

# UEFPC – Basis for Proposed Action

- While actions completed to date under the UEFPC Phase I ROD and other Y-12 remediation programs have achieved significant reductions in mercury releases from Y-12, levels of mercury in UEFPC surface water and fish tissue continue to exceed target levels.
- The West End Mercury Area storm sewer system, which discharges at Outfall 200, is estimated to be the most important current source of mercury release to UEFPC (~70%).
- Future demolition of former mercury-use buildings and remediation of underlying soils could lead to increased mercury releases to UEFPC.

# Alternatives Evaluated

**Comparing the Proposed Plan alternatives**

- **Alternative 1: No Further Action**
  - Cost: None
  - Outfall 200 mercury flux reduction: None
- **Alternative 2: New Water Treatment System at Outfall 200**
  - Alternative 2a:
    - Influent treatment capacity of 1,500 gallons per minute & no stormwater storage capacity.
    - Outfall 200 mercury flux reduction: 52%
    - Construction cost: $115 million

  - Alternative 2b:
    - Influent treatment capacity of 3,000 gallons per minute & no stormwater storage capacity.
    - Outfall 200 mercury flux reduction: 68%
    - Construction cost: $125 million

  - Alternative 2c: (DOE's preferred alternative)
    - Influent treatment capacity of 3,000 gallons per minute & 2 million gallon stormwater storage.
    - Outfall 200 mercury flux reduction: 84%
    - Construction cost: $146 million

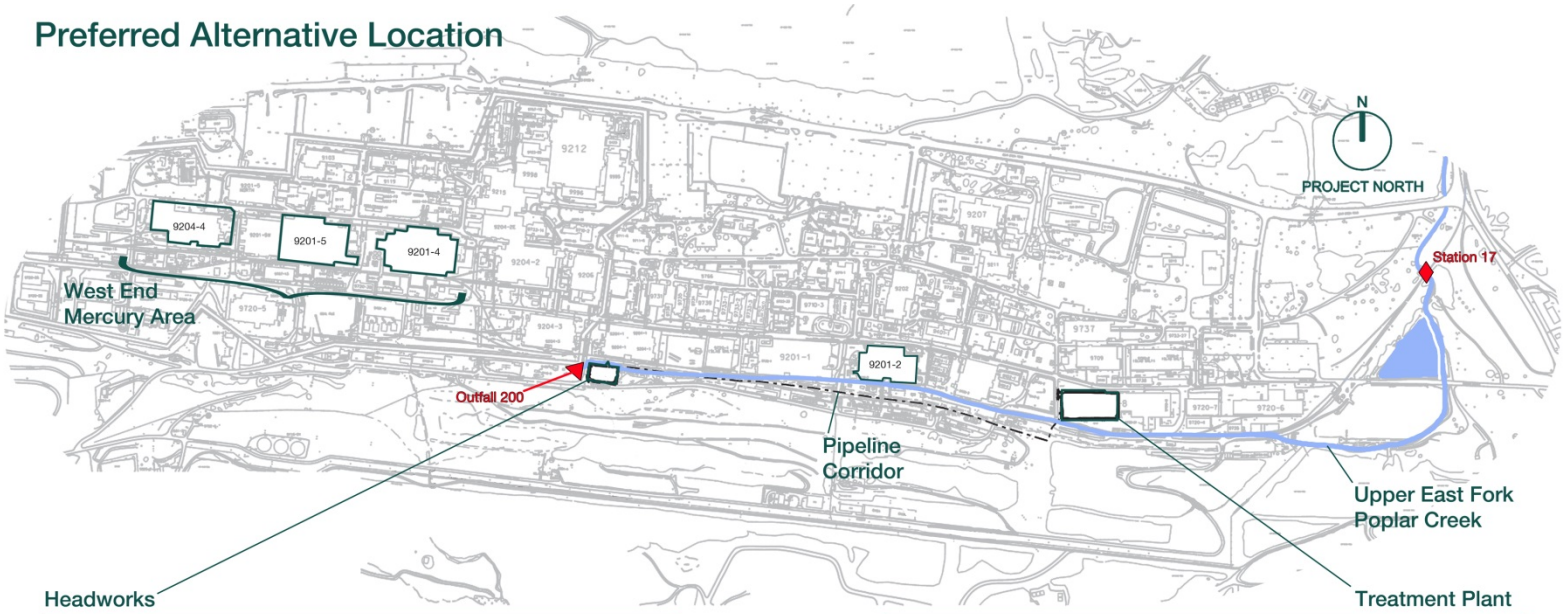
  - Alternative 2d:
    - Influent treatment capacity of 3,000 gallons per minute & 10 million gallon stormwater storage.
    - Outfall 200 mercury flux reduction: 91%
    - Construction cost: $179 million

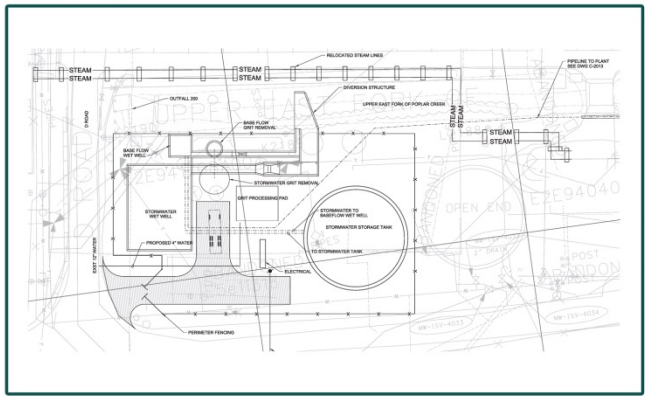
All Alternative 2 options assume modular construction design to facilitate future modifications as needed.
All Alternative 2 options assume same set of unit operations and only differ in treatment capacity and stormwater storage capacity.

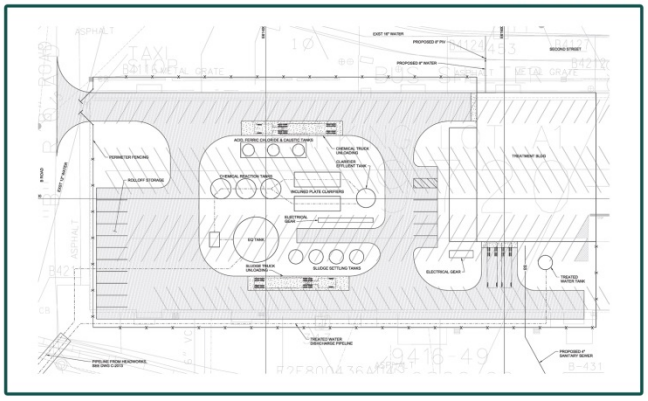
# UEFPC Preferred Alternative

- Alternative 2c:
  - Two-stage headworks designed to manage flows up to 40,000 gpm.
  - Treatment capacity for 3000 gpm of influent flow (~95$^{th}$ percentile UEFPC flow at Outfall 200) plus 1000 gpm of recycle flow.
  - Storage for 2 million gallons of stormwater above treatment capacity. Stormwater storage would be optimized to capture "first flush" runoff.
  - Physical/chemical treatment operations designed to reduce mercury concentrations in system effluent to a goal of 51 ppt.
  - Estimated to achieve 84% reduction in mercury flux at Outfall 200.
  - Modular design would facilitate any future modifications if needed.
  - Capital cost estimated at $146 million; Operations & Maintenance (O&M) cost estimated at $3.1 million/year.
  - Meets CERCLA threshold criteria (protectiveness & ARARs) and provides best mix of tradeoffs among CERCLA balancing criteria.

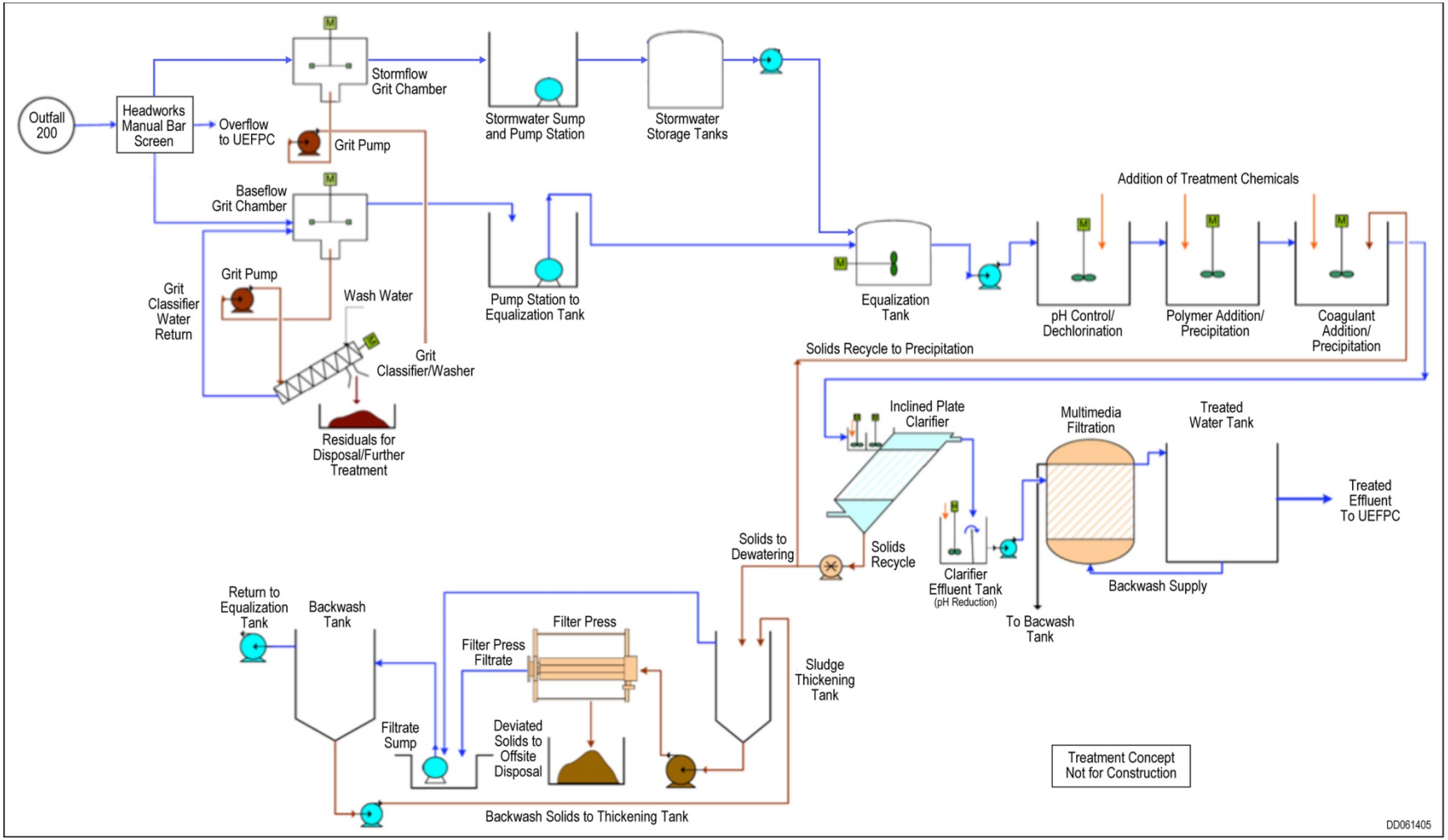
# Preferred Alternative – MTF Proposed Location





# Preferred Alternative – MTF Process Flow Diagram



# Outfall 200 MTF Would Provide Multiple Benefits

- The proposed MTF would achieve immediate reductions in mercury releases from the WEMA storm sewer system to UEFPC surface water and make progress toward achieving compliance with regulatory criteria.
- The proposed MTF would provide a mechanism to control potential increases in mercury releases to UEFPC that might result from future demolition of the WEMA mercury-use buildings.
- The proposed MTF would supplement other response actions already underway or planned for future implementation under the Phase I ROD, as well as other actions under the Strategic Plan for Mercury Remediation, to achieve the ultimate goal of eliminating current fish advisories and use restrictions.