Agreed Order No. 2692 Overview

- **Initial Agreement – August 15, 2005**
  - Defined the process for the Remedial Investigation/Feasibility Study (RI/FS) scope and schedule

- **Amendment No. 1 – September 26, 2012**
  - Excavation and off-site disposal of contaminated soil in multiple locations throughout the Site
  - Remedial actions for petroleum in groundwater in applicable areas of the Site
  - Capping of contaminated soil in multiple locations throughout the Site
  - Excavation and off-site disposal of soils contaminated with PCBs and petroleum in the West Discharge Ravine
  - Evaluation of the practicability of PCB removal from extracted groundwater using an ex-situ Walnut Shell Filtration treatment system
**Walnut Shell Filtration**

- Walnut Shell Filtration
  - Walnut shell in conjunction with castor oil capture PCBs from extracted groundwater
  - Walnut shells are periodically backwashed to remove castor oil

- Kaiser System
  - 282 gallon unit purchased from Filtra Systems
  - Commissioned in October 2015
  - 24 Test Runs Completed
    - 20,687,099 gallons treated
    - ~20 grams of PCBs captured
    - 21 – 32 gpm process rate
    - Approximately -70% capture efficiency

- Operational capacity limited by discharge pipe to infiltration gallery
Walnut Shell Filtration

Groundwater Treatment System Flow Diagram
Walnut Shell Filtration
Walnut Shell Filtration
Walnut Shell Filtration
Treatment Technologies Evaluated

- **Algae**
  - Removed approximately 89% of PCBs from Backwash Water
  - Media transfer technology – not destructive
  - Algae/PCB generated waste management – landfill/incineration

- **Solvent Exchange Extraction and Zero Valent Metal Destruction**
  - Removed approximately 80% of PCBs from Backwash Water
  - Destroyed approximately 90% of captured PCBs
Algae Based System
Solvent Exchange Extraction System

Solvent Exchange Extraction System (SEES)

Legend:
- Pump
- Sample Port
- Check Valve
- Manual Valve
- Flow Meter
- Purge Valve
- Pressure Gauge
- Flow Control Valve
- Metering Valve
- Borosilicate Filter
Zero Valent Metal Destruction

Reactive Integrated Destruction System (RIDS)

for Contaminated Soil and Groundwater

Legend:
- Pump
- Sample Port
- Check Valve
- Manual Valve

Contaminated Solvent
RIDS Solvent #1
RIDS Powder
RIDS Solvent #2
RIDS Tank (5 gal)
Carbon Filter
Remove Waste Powder
RIDS Solvent

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Treatment Technologies Evaluated

- Ultraviolet/Advanced Oxidation Process (UV/AOP)
  - UV utilized in WWTPs for disinfection activities
  - High flow capability
  - Advanced Oxidation – Hydrogen Peroxide
  - Literature study indicated greater than 95% destruction of PCBs (high concentrations)
  - Had not been proven at any scale only literature
  - CDM Smith performed lab scale batch testing in 2019 on site groundwater (5 L batch)
    - Results consistent with literature
  - Pilot scale testing in development
    - New Build
    - Modification of disinfection unit
    - Continuous flow
Ultra Violet/Advanced Oxidation Process
Phase 1 Interim Actions

- Model and install final groundwater extraction network capable of cutting off the plume and achieving river protection
- Increase size of treated water discharge pipe
- Continue operation of existing Walnut Shell Filtration Pilot Plant
  - Increase to 50+ gpm processing rate
- Continue pilot testing other technologies, as appropriate
- Increase size of treatment building to pilot test UV/AOP on extracted groundwater

Phase 2 Interim Actions

- Complete full scale implementation of the most successful technology
- Extraction rates would be required to achieve river protection
- Evaluation of performance
Agreed Order No. 2692 Amendment No. 2

- Benefits of Interim Action Process
  - Shorter timeframe to begin full-scale remedy
  - More flexibility in technology application at both full-scale implementation and full-scale remedy evaluation (Cleanup Action Plan)
  - UV/AOP offers a potential pathway for PCB destruction vs media transfer
Estimated Schedule of Proposal

- Implement Phase 1 Interim Actions
  - Approximately 18 months from the effective date of Amendment to complete
- Implement Phase 2 Interim Action – Full Scale Cleanup
  - Approximately 12 months after completion of Phase 1 until full scale implementation
Agreed Order No. 2692 Amendment No. 2

- Public Review Period
  - Amended Agreed Order, Scope of Work, and SEPA documents
    - February 24 to March 24, 2020
  - Fact Sheet includes information on making comments
  - Once public review period is complete, Ecology will:
    - Respond to all comments via published Response to Comments
    - If necessary, modify the documents based on public input and initiate second public review period
    - Finalize the documents if public comments do not necessitate changes to the documents
Questions/Discussion