South River
South Fork Shenandoah River

Preliminary Conceptual Site Model

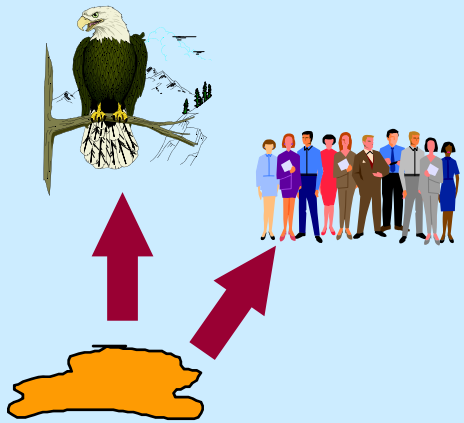
Background

- **Mercuric sulfate used as catalyst at Waynesboro site from 1929-50.**
- **1976 Hg discovered in soils at the site**
- **1976-1982: numerous evaluations performed**
  - **Hg in the South River; most in the flood plain**
  - **Natural recovery chosen as the mechanism to address material already in the river sediment; flood plain materials not available**
  - **Fish advisory put in place in South River and SF Shenandoah**
- **Late 1982 – DuPont & VA sign settlement. Funds for monitoring natural recovery are provided by DuPont.**

Background

- **1983-present: ongoing studies and monitoring**
  - **1984-89: Ecological studies by VA Polytechnic Institute**
  - **1992-96: AMRL performs bi-annual sampling of surface water, sediment and fish**
  - **1999: VA DEP conducts fish sampling**
- **Hg in fish tissue in South River not decreasing**
- **Fish advisory level lowered in 2001**
- **Appropriate to evaluate current conditions**
  - **relative to predictions**
  - **determine potential risks**
- **Preliminary Site Conceptual Model developed**
  - **Basic tool to help assess exposure and determine potential risk**

Site Conceptual Model (SCM)



- An inventory of sources, transport mechanisms, and receptors
- Pathway analysis
  - focus on complete/significant pathways
- Factor in characteristics of the material
  - both toxicity and physical/chemical
- Account for other factors

South River Exposure Considerations Aquatic Medium

- Surface Water
  - Primary focus on human fish ingestion
    - How competent is the fish consumption advisory?
    - Is incidental exposure important?
  - Potential bioaccumulation in aquatic organisms & birds
  - Significance of unique areas like mill ponds, wetlands
- Sediments
  - Address direct exposure & potential bioaccumulation

South River Exposure Considerations Flood Plain

- Identified as a potential source, evaluate:
  - Direct contact during residential-type activity,
    - e.g., frequency of gardening in potentially affected areas
  - Accumulation in food crops or grazing animals
  - Potential effects on grazing animals
  - Potential direct and accumulative effects on wildlife, including invertebrates, mammals and birds

PSCM - South River Summary

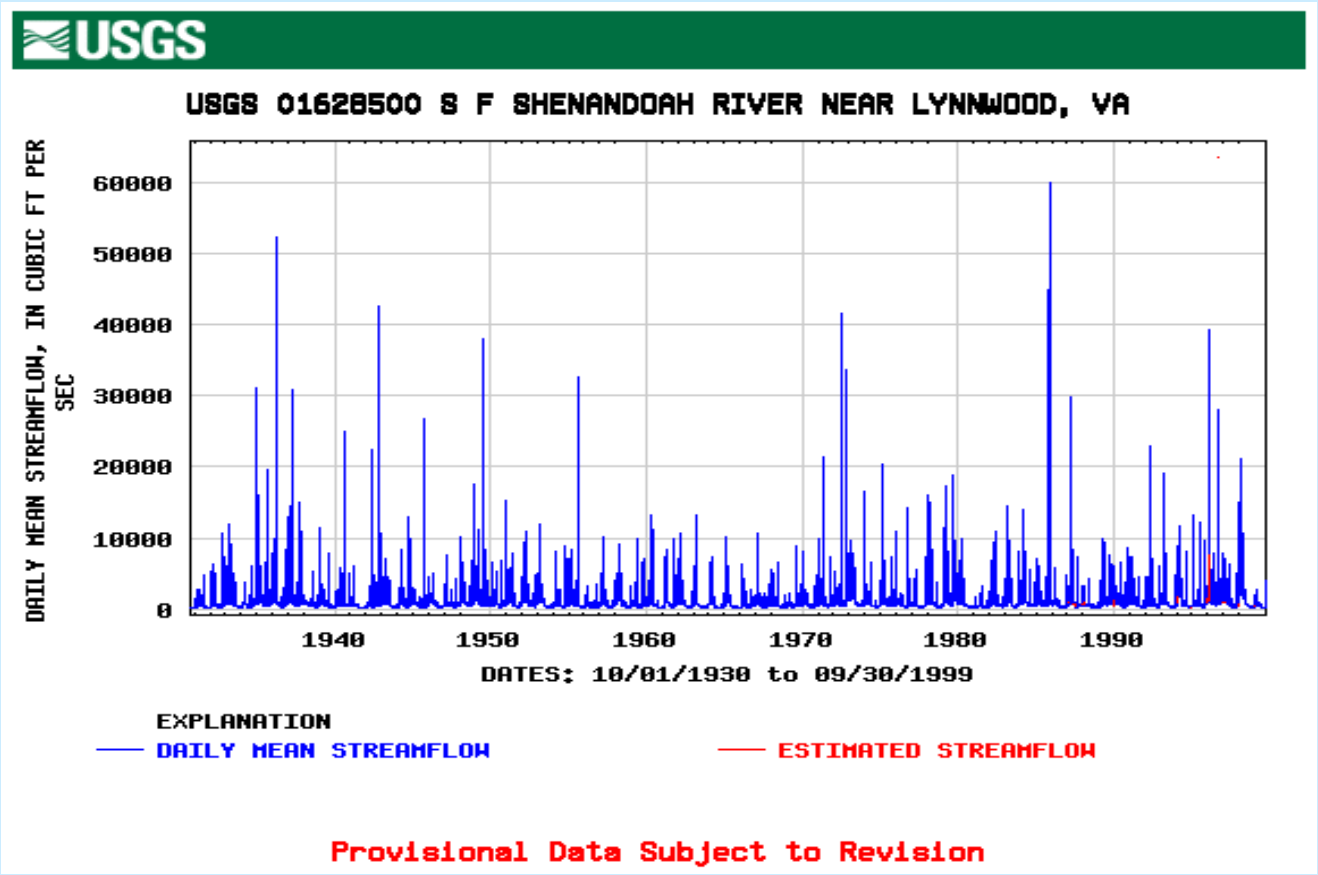
Potential Primary Secondary Sources	Release/transport Mechanisms	Potential Sources Exposure media	Exposure Routes	Potential Receptors
Waynesboro Plant Hg Recovery Unit (1929-1950) **Soil, Storm Sewers, River Bank Soils, Groundwater, Permitted Outfalls**	**Spills, Combustion** **Leaching, Stormwater Runoff, Surface water flow, Sediment movement, Storm events, Biogeo-Chemical changes**	**Soils** **Surface Water, Sediments, Wetland areas, Mill Ponds, Isolated Pools, Floodplain Soils, Upland Soils**	**Direct:** **Ingestion, Inhalation, Dermal** **Indirect:** **Food (fish) Bioaccumlation** **Direct:** **Ingestion, Inhalation, Dermal**	**Workers** **Recreational users, Residents, Livestock, Ecological: aquatic; terrestrial**
Municipal **Landfill, WTP, Sewerage Disposal**				
Other Industry				
Atmospheric background				

Preliminary SCM South River

- Chart is a simplified summary - behind each element is a more specific conceptual model
- Example issues to be addressed:
  - Fish tissue levels, e.g., is there a trend? Role of diet?
  - Sediment levels, e.g., is there a link with fish levels?
  - Hg Transport & Cycling, e.g., factors in production of MeHg
  - Potential contribution from other sources
  - Food chain evaluation
  - Remedial Strategy
- Temporal Aspect to be developed

Temporal Aspects of SCM

major flood events in 1969,1985,1996



Uses of SCM

- Integrate all site data and identify data needs
  - upgrade as new information becomes available
- Identify critical pathways
- Identify remedial strategy options
- Evaluate effectiveness of potential options to reduce exposure of receptors to contaminants
- Evaluate effectiveness of implemented actions
- Communication tool