ORNL Hg Summit

Vanderbilt University
October 22nd - 23rd, 2009

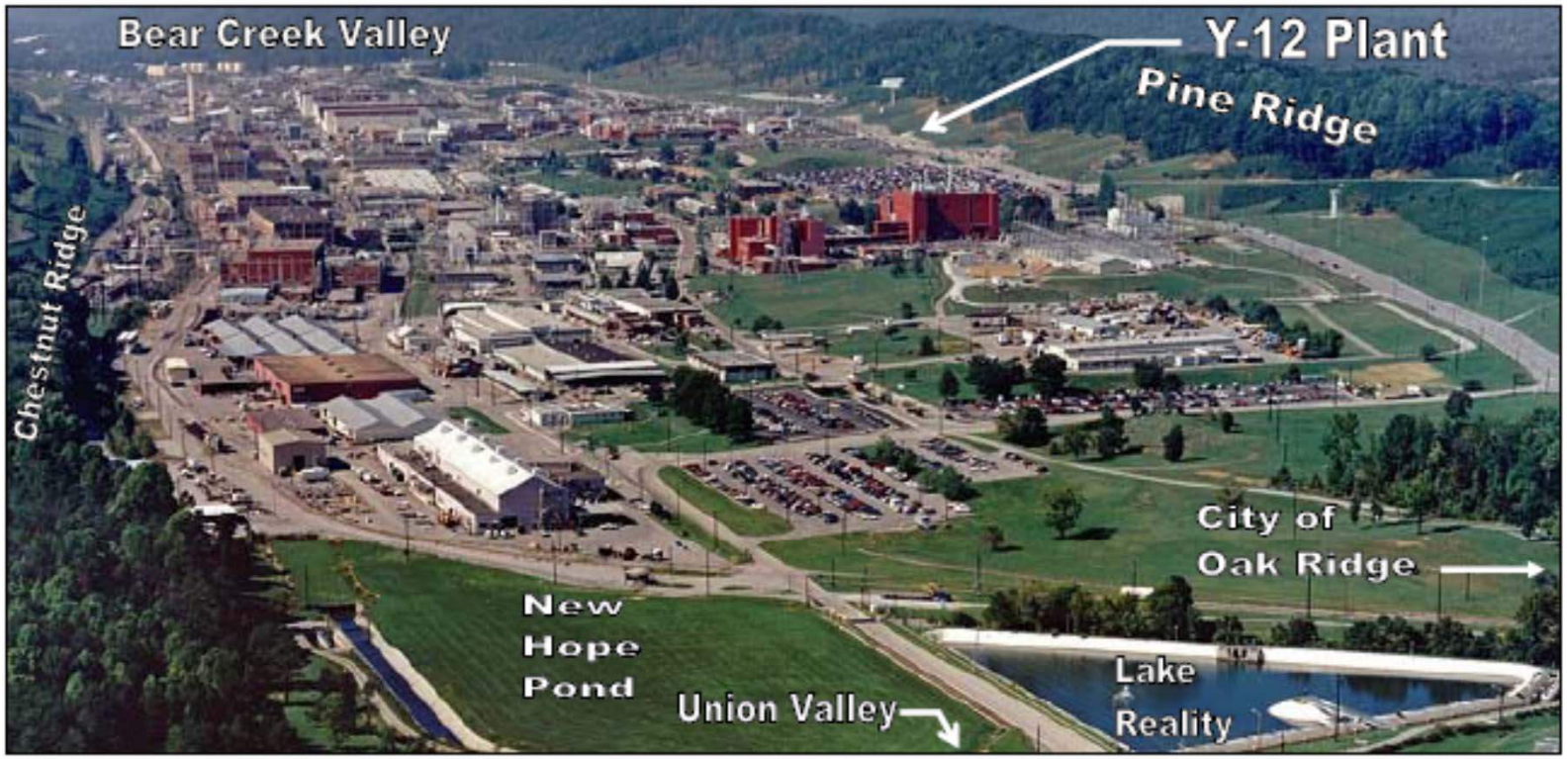
DOE Hg Summit Overview

- Sponsored by DOE EM32
- Focus was on ORNL's on-site Hg issues
- Attended by roughly 50 people
- Brought together researchers from the government, academia, industry, regulators, and consultants working on Hg related issues
- Over 30 presentations were made over the course to the two days
- Nancy Grosso reviewed the ROPs and the Innovative ROPs team's efforts for the South River
- Other technologies that were presented include:
  - Nano particles (Thiol SAMMS, Sulfur polymer stab. / Solid., Sorbents, and Nano-FeS)
  - SediMite
  - Biochar

DOE Hg Summit

- Objective: Exchange of information regarding best practices for Hg characterization, site assessment and remediation in a way that helps develop research priorities for ORNL
- Product: Prioritization of research needs, improved communications among research teams, site personnel, and regulators; and the potential development of collaborative avenues of research between DOE, regulators, academia, and industry

Upper East Fork Poplar Creek Watershed



EM Environmental Management

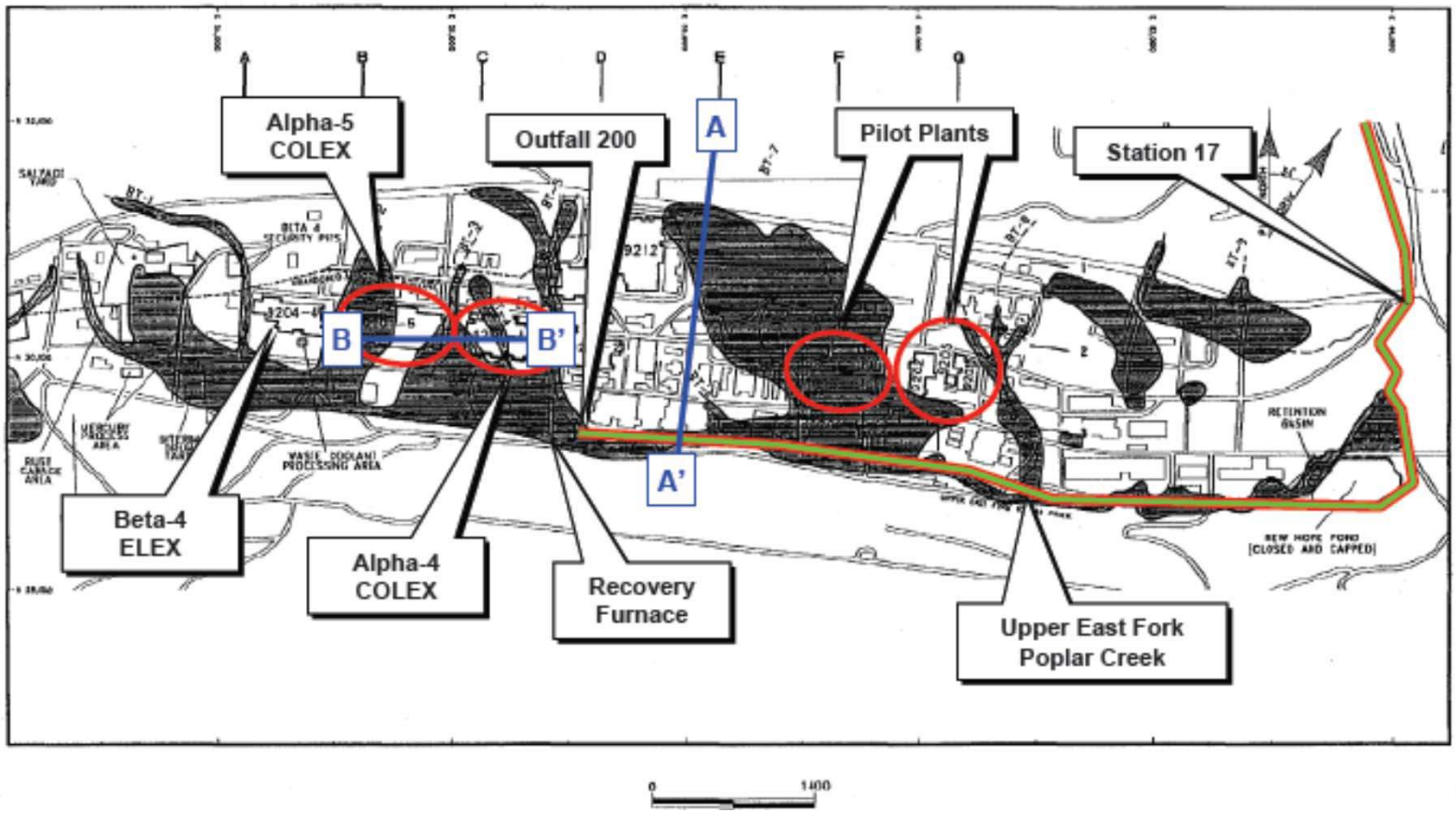
safety ❖ performance ❖ cleanup ❖ closure

www.em.doe.gov

Courtesy: Elizabeth Phillips (DOE Oak Ridge Operations)

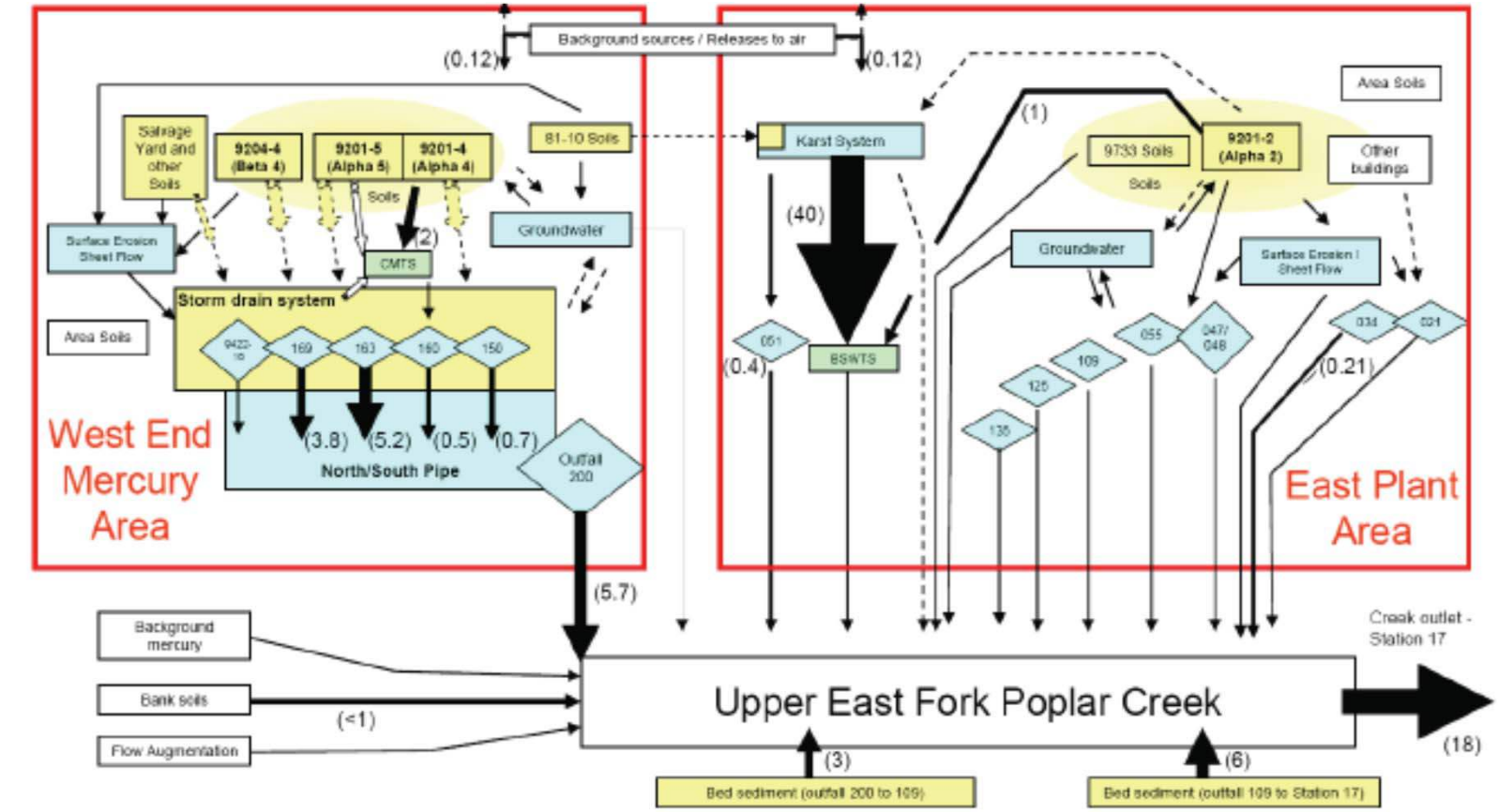
Fill Areas in the Y-12 Plant and Pre-Construction Drainage Features

- Shaded areas indicate fill thickness > 5 feet
- Industrialized stream channel overlays portions of the original stream bed



Courtesy: Scott Brooks (DOE ORNL)

Concept Model for EFPC



Y-12 Mercury Conceptual Model

Title: Conceptual model for mercury showing primary source areas, transport pathways, and flux (grams/day) at the Y-12 Complex
Authors: Y-12 Mercury Conceptual Model Team
ORNL: Peterson, Southworth, Bogle, Watson
SRNL: Looney, Eddy-Dilek
Data source: Multiple. See accompanying Table
DRAFT date: 7/24/2009

Legend

Primary Source Areas
Secondary Source Areas
Transport paths (sampling locations)
Treatment systems
- Numbers refer to SD outfalls, basins

Flux in grams/day[1]

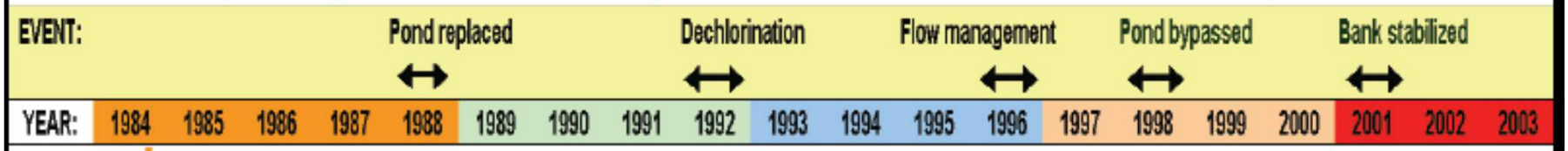
18-40
5-6
2-4
0.5-1.9
0.1-0.4
< 0.1
Potential, but unknown
Flux no longer treated
[1]Fluxes > 0.1 shown in parenthesis.

ORNL Hg Program Overview

- Hg contamination in the UEFPC Watershed including soil, shallow GW, and UEFPC
- Significant historical use Hg and Hg releases from 1955 to 1963 due to the various Lithium separation processes
- Remedial actions (primarily on-site)
  - Removed various sources (sludge and soils)
  - Closed New Hope Pond
  - Removed equipment and decontaminated facilities
  - Partial clean out and relining storm sewer lines
  - Pipeline – rerouting
  - LEFPC floodplain soil removal
  - UEFPC bank stabilization
  - UEFPC flow augmentation
  - Big Springs water treatment system (GAC)

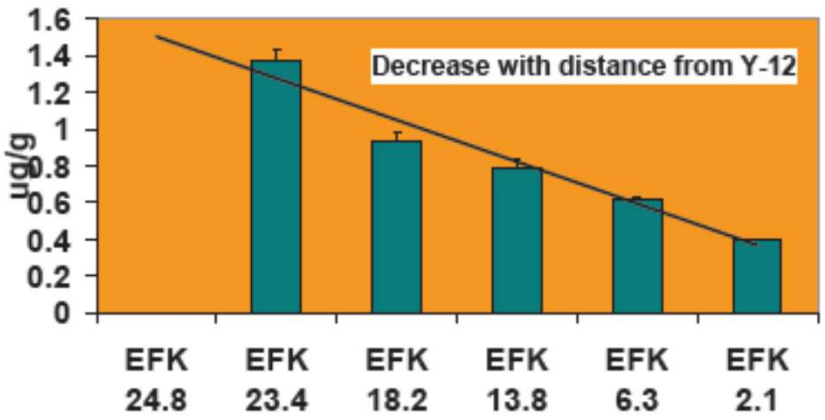
MERCURY TRENDING

(Average seasonal mercury concentrations in redbreast sunfish)

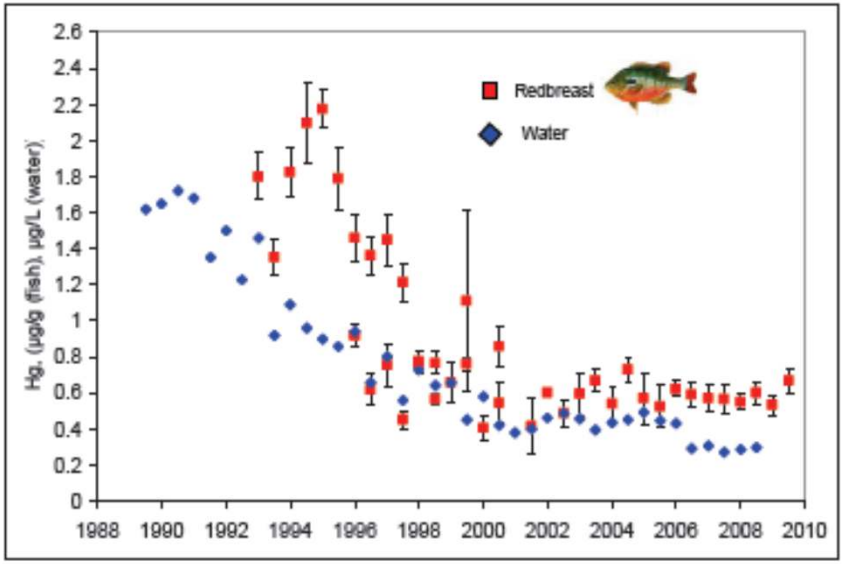


Early years

-Downstream decrease consistent with point source dilution



-Fish concentrations initially decreased commensurate with water at uppermost site (EFK 24.2)



Interim remediation goal: 200 ng/L; initially 0.5 ug/g in fish

ORNL Research Objectives

- ORNL Hg program was establish to provide fundamental understanding of Hg transformations and mechanisms
- Site Investigations:
  - Hg flux, biogeochemical controls & microbial determinants
- Chemistry:
  - Hg speciation, MeHg / de-MeHg biogeochemical controls on rates and mechanisms
- Biological process:
  - Microbial transformation & the genetic basis for MeHg / de-MeHg processes
- Sub-cellular mechanisms:
  - Biochemical / biophysical mechanisms in Hg transformation & sub-cellular relationships

Conclusions

- DOE remedial focus is primarily on control of on-site Hg sources
- SRST's focus is primarily on the South River, its floodplain, and the aquatic processes within the river
- Significant overlap of common interests between ORNL and SRST
- ORNL's East Fork Poplar Creek may be a good surrogate for the South River
- The EFPC may offer a good test bed to test microbial or chemical manipulations or other remedial options
- Comparison of the biological processes of the EFPC and the South River could possibly be of value
- DuPont and DOE are planning further discussions regarding avenues of collaboration