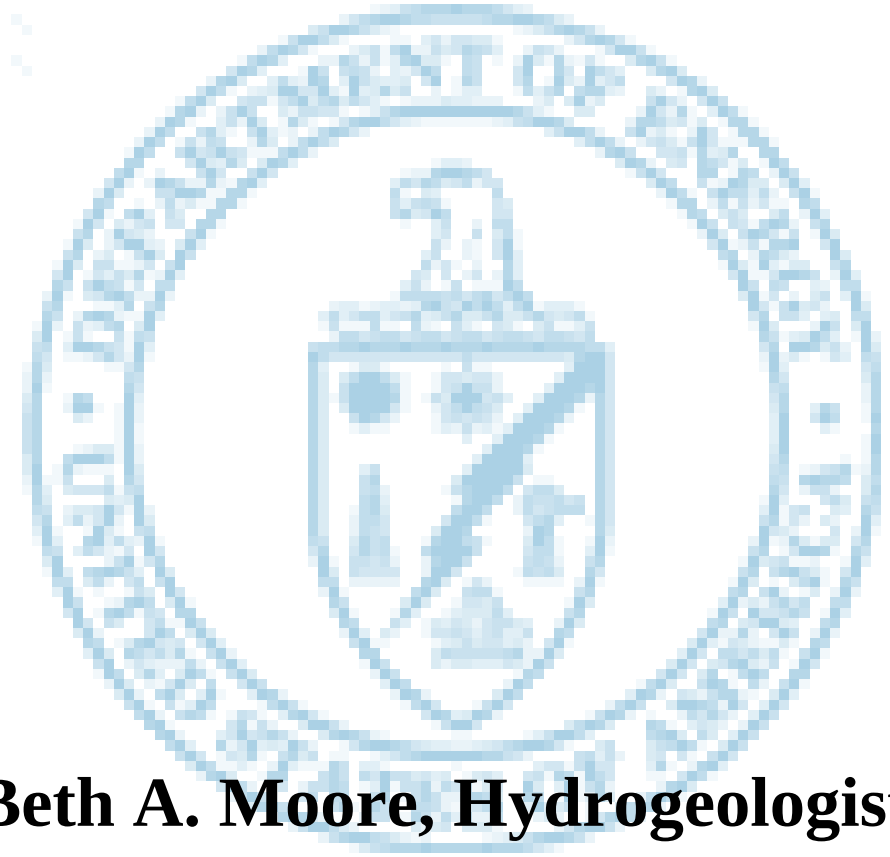
U.S. DOE OPTIMIZATION RESEARCH AND REMEDIAL PROCESS REVIEWS



Beth A. Moore, Hydrogeologist

June 16, 2004

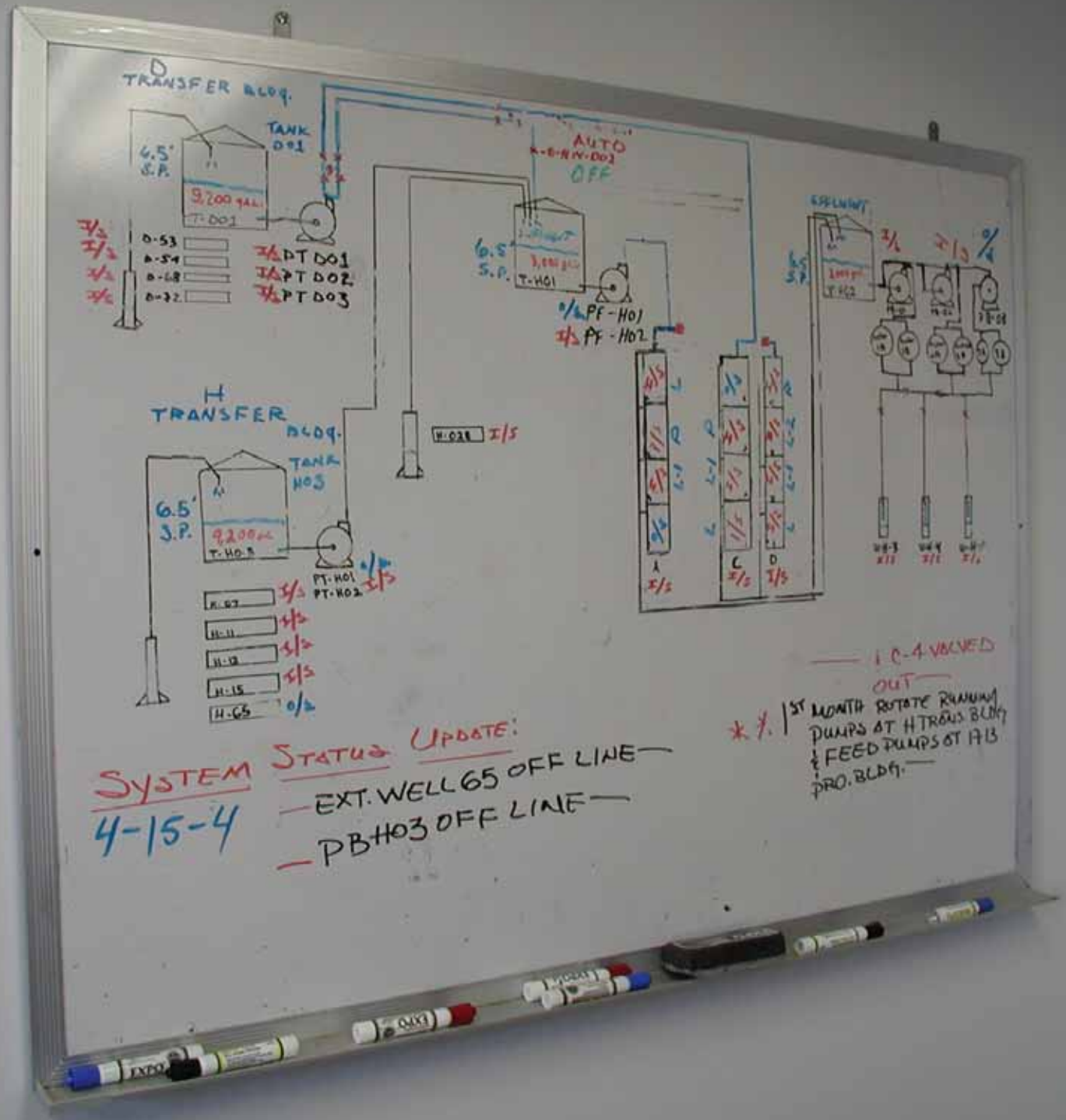
HANFORD PUMP AND TREAT OPTIMIZATION REVIEW

April 26-30, 2004

Richland, WA

KEY ASPECTS OF HANFORD OPTIMIZATION REVIEW

- To evaluate performance, cost improvements, and assess final exit strategy
- Remedial System Evaluation process
- Holistic review of subsurface system, treatment, disposal, and monitoring
- Recommendations regarding additional characterization, modeling, system optimization, and risk assessment


D TRANSFER BLDG.
TANK D01
4.5' S.P.
9,200 gal
T-D01
D-53
D-54
D-68
D-72
DT D01
DT D02
DT D03
AUTO
OFF
6.5 S.P.
T-H01
PF-H01
PF-H02
H TRANSFER BLDG.
TANK H03
6.5' S.P.
9,200 gal
T-H03
PT-H01
PT-H02
H-07
H-11
H-13
H-15
H-65
H-028
A
C
D
EFFLUENT
SYSTEM 4-15-4
STATUS UPDATE:
— EXT. WELL 65 OFF LINE —
— PB H03 OFF LINE —
— 1 C-4 VALVED OUT —
* 1. 1ST MONTH ROTATE RUNNING PUMPS AT H TRANS. BLDG & FEED PUMPS AT A/B PRO. BLDG. —

OBSERVATIONS OF THREE TREATMENT SYSTEMS

- Well maintained and highly automated
- No safety issues
- Operators improved efficiency of treatment train, waste minimization, system downtime
- Consideration of alternative technologies such as in-situ barriers and phytoremediation

ISSUES FOR SYSTEM IMPROVEMENT-- CHARACTERIZATION

- Adequacy of three-dimensional source identification and plume delineation
- Adequacy of data to evaluate plume capture
- Need to update conceptual site models for ROD modifications and exit strategy

ISSUES FOR IMPROVEMENT OF STRONTIUM-90 SYSTEM

- Cease treatment and evaluate pumping to accommodate source term decay and hydraulic control (protect the Columbia River)
- Evaluate recent transport and risk assessments for ROD modification and final exit strategy
- Phase-in passive technologies, phase-out pump and treat

ISSUES FOR IMPROVEMENT OF CHROMIUM SYSTEM

- Consider alternatives for chromium treatment (i.e., resins and process)
- Phase-in In Situ Redox Manipulation Barrier with additional amendments to improve performance
- Evaluate the benefit of optimization techniques and uncertainty assessment to decision making, ROD modification, and final exit strategy

- **Final Review Report In Progress**
- **Groundwater Monitoring Optimization Review, August 2004**

DOE ENVIRONMENTAL MANAGEMENT SCIENCE PROGRAM

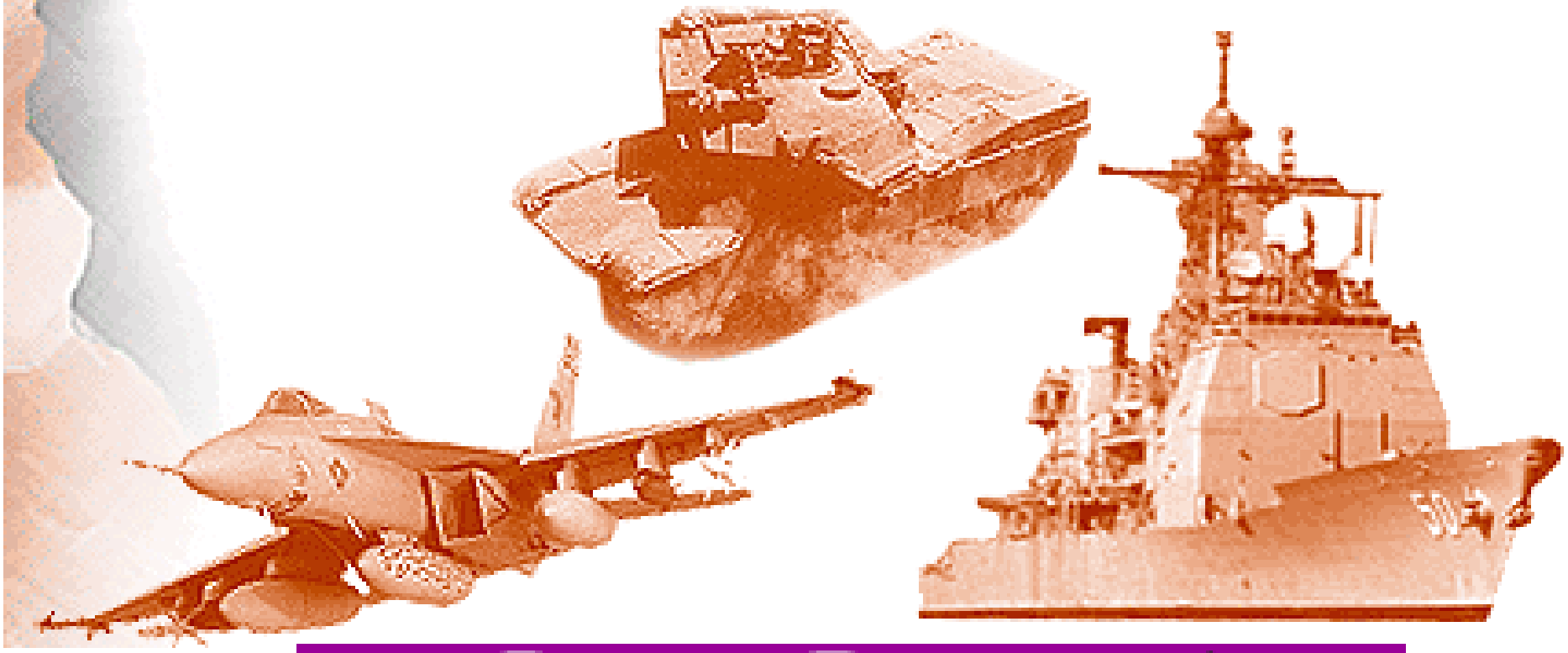
emsp.em.doe.gov

EMSP Subsurface Contamination

- Project: ***A New Framework for Adaptive Sampling and Analysis During Long-Term Monitoring and Remedial Action Management***
- PI: Dr. Barbara Minsker (Univ. of Illinois)
- Nature of Research: Develop and test new hierarchical models that integrate process knowledge, geologic and monitoring data, and biochemical transformation processes into an adaptive sampling and analysis framework for decision-making
- Duration of Research: 2003-2005
- Optimization Strategy: Physical models linked to multi-objective optimization models
- Expected Benefit: Interactive model and parameter identification system will permit easy user interface and LTM analysis

STRATEGIC ENVIRONMENTAL RESEARCH & DEVELOPMENT PROGRAM

www.serdp.org



ESTCP

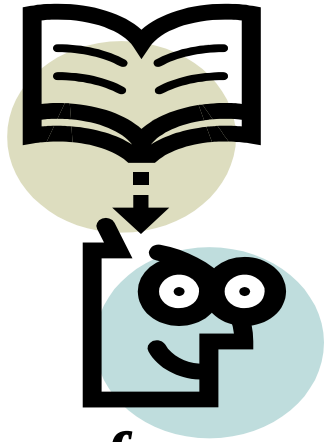
Environmental Security Technology Certification Program

DOD Cleanup Thrust

Optimization Research in three areas:

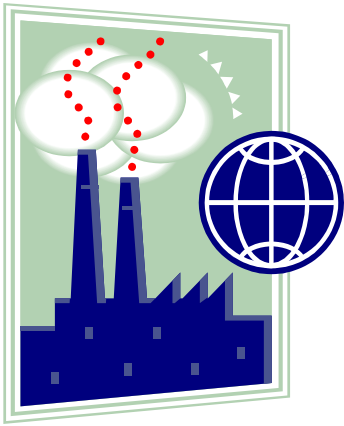
1. Numerical search methods (1 project)
2. Predictive models to simulate remedial processes (2 projects)
3. Characterization methods (2 projects)

Numerical Search Methods



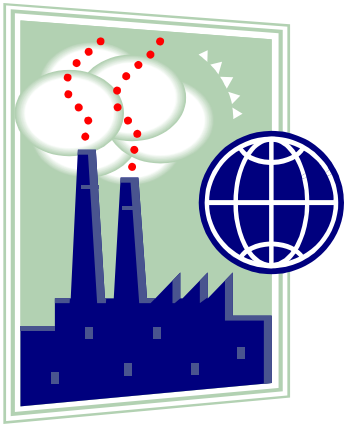
- Project: ***Optimal Search Strategy for the Definition of a DNAPL Source***
- PI: Dr. George Pinder (Univ. of Vermont)
- Nature of Research: Develop optimal search algorithm to improve predictions of DNAPL source locations
- Duration of Research: 04/2003 – 03/2006
- Optimization Strategy: Combination of latin hypercube sampling, Monte Carlo analysis, Kalman filter and genetic algorithm
- Expected Benefit: A least-cost, non-invasive approach to identify DNAPL source location and architecture at contaminated sites

Remedial Process Model



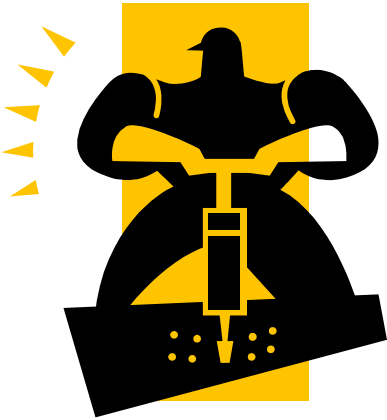
- Project 1: ***Development of Assessment Tools for Evaluation of the Benefits of DNAPL Source Zone Treatment***
- PI: Dr. Linda Abriola (Tufts Univ.)
- Nature of Research: Apply experimental and remedial process literature data to simulate various remediation processes in an exiting mathematical model (MISER), as well as apply refined model to heterogeneous field settings
- Project Duration: 04/2003-10/2005
- Expected Benefit: To develop a better understanding of the impacts of DNAPL source treatment in heterogeneous field settings by combining monitoring data with predictive modeling

Remedial Process Model



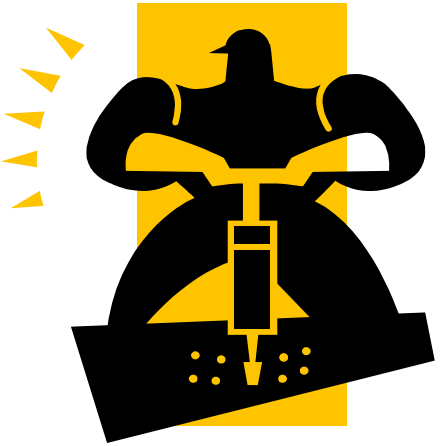
- Project 2: ***Modeling Assessment of Benefits of Partial DNAPL Source Removal***
- PI: Dr. Lynn Wood (EPA-NRMRL)
- Nature of Research: Perform numerical simulations to assess the plume response to partial DNAPL source removal in laboratory and field settings, and optimize model performance by compiling statistics on model response for various hydrogeological templates of actual sites
- Duration of Research: 07/2003 – 10/2005
- Optimization Strategy: Monte Carlo Simulations coupled with geostatistics
- Expected benefit: Assess benefits of aggressive DNAPL source zone remediation

Characterization Methods



- Project 1: ***Characterization Methods and Prediction Tools for DNAPL Sources Undergoing Remediation***
- PI: Dr. Tissa Illangasekare (Colorado School of Mines)
- Nature of Research: Use mass transport data from physical models to improve numerical model predictions of dissolved flux from entrapped DNAPL sources undergoing field remediation
- Project Duration: 03/2003 – 09/2005
- Optimization Strategy: Up-scaling methods based on parameters of heterogeneity and architecture
- Expected Benefit: Improve model predictions for decision making with respect to remedial performance at field sites

Characterization Methods



- Project 2: ***Tomography Tests to Characterize DNAPL Source Zones***
- PI: Drs. Walter Illman (Univ. of Iowa) and T.C. Jim-Yeh (Univ. of Arizona)
- Nature of Research: Use tomography test data to develop unbiased estimates of heterogeneities and DNAPL distribution via 2D and 3D algorithms for transient hydraulic tomography and physical models to validate algorithms
- Duration of Project: 10/2003 – 05/2006
- Optimization Strategy: Monte Carlo Simulations coupled with geostatistics
- Expected benefits: Develop stochastic approach to provide cost effective characterization tool for DNAPL source zones


THANK YOU FOR YOUR INTEREST