Environmental Evaluation of the NSLS-II Construction Site

Presentation to the Community Advisory Council

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BROOKHAVEN NATIONAL LABORATORY

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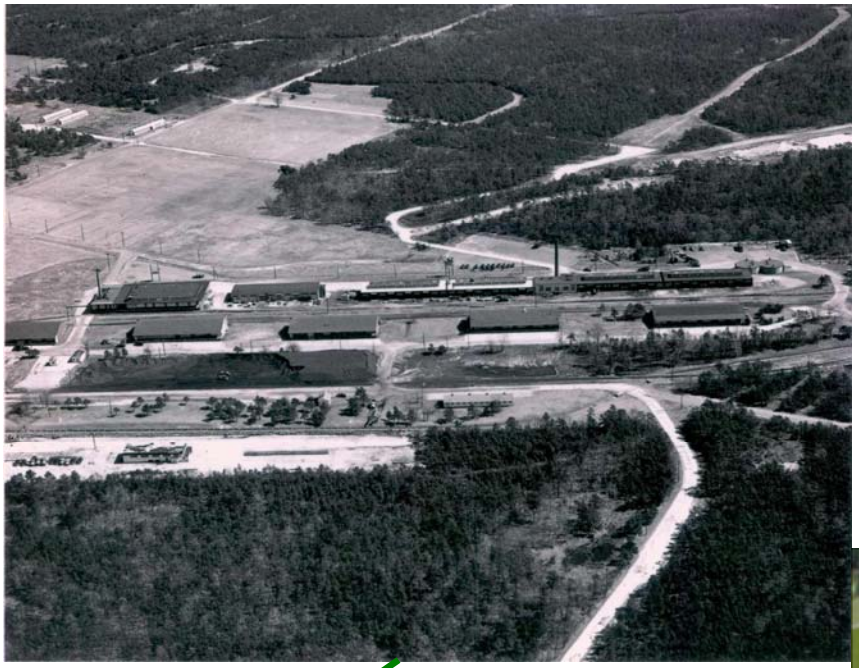
Office of Science
U.S. DEPARTMENT OF ENERGY

Environmental Evaluation of NSLS-II Site



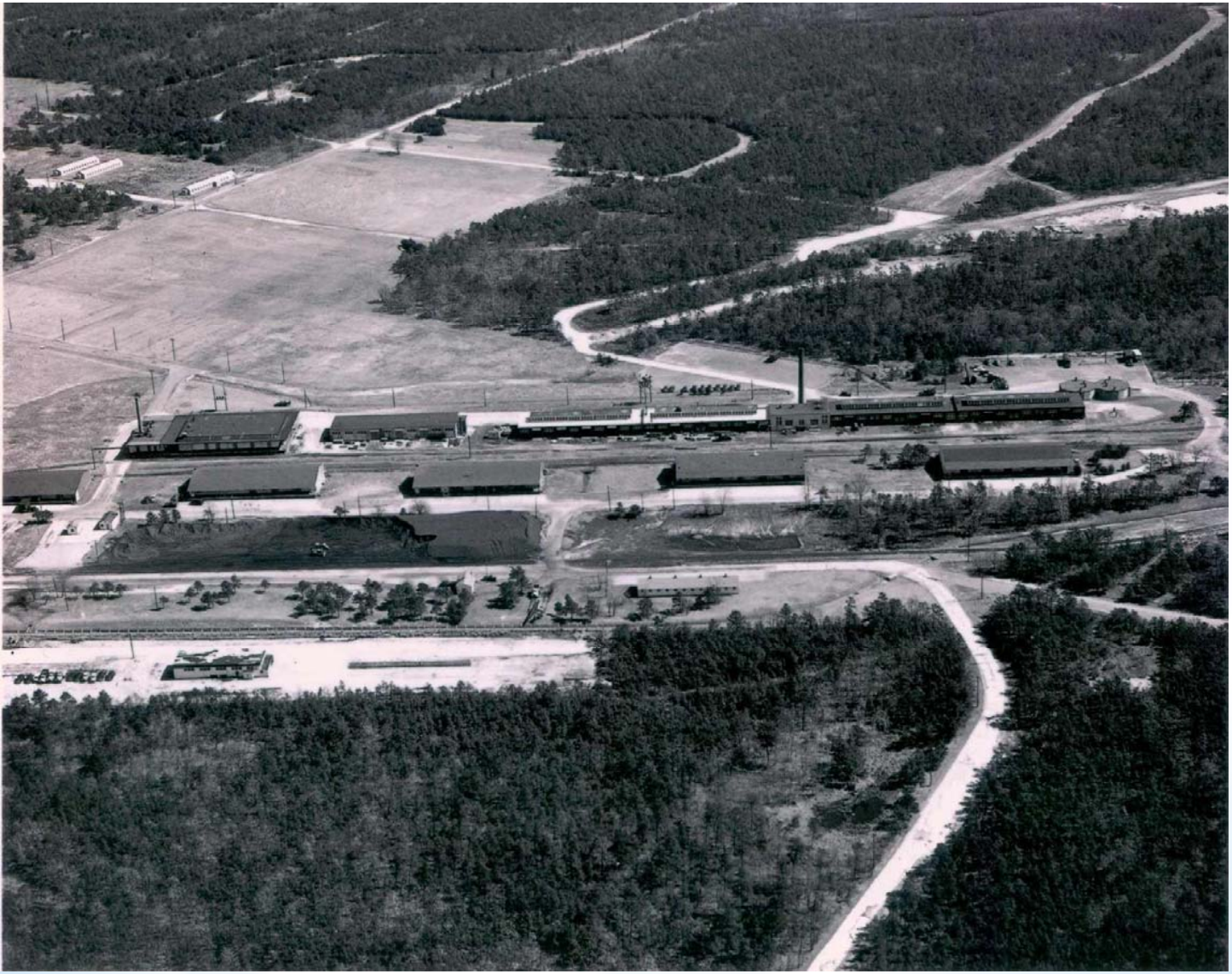
From WW-II
Warehouses to:

Next Generation
Synchrotron Light Source

Environmental Reviews

- Environmental Assessment
  - Required under the National Environmental Policy Act.
  - Reviewed environmental impacts of construction and operations.
  - Archeological review done in 2006: no culturally significant features found.
  - Finding of No Significant Impact Issued October 2006.
- Environmental Evaluation
  - Self-initiated review of the site conducted in 2007 to identify potential environmental concerns early in the construction planning process.
  - Looked at historical building occupancies and past environmental incidents. (1997 Facility Review Project, Remedial Investigation Reports, etc.)
  - Path forward developed to address environmental concerns before construction start.

Construction Site



Warehouse row – ca 1952

Historic Features:

- Gasoline service pumps
- Coal storage and later fuel oil
- Boiler facilities
- Former Landfill
- Vehicle Repair
- Area to the east, open fields

Most Recent Activities:

- Machine Shops
- Warehousing
- Metal degreasing (Bldg. 208)
- Chemical storage
- Scrap metal storage

Preconstruction Planning (Path forward)

- Demolition of remaining buildings: Systematic demolition process to maximize removal of hazardous materials (asbestos siding and floors, light ballasts, mercury switches), recycling (metals, concrete crushed for use as RCA) and minimize landfill disposal

- Sampled and closed 7 drywells, removed main oil/water separator

Preconstruction Planning (Path forward)

- Collected soil and ground water samples near Bldg. 208 to ensure no remnants of former degreasing operations remained – none found

- Many physical obstructions (old cesspools, foundations) and some residual contamination from old spills possible

- Open fields to the east were used historically for geothermal heat pump research and for meteorological deposition studies; no known impacts from these activities

Construction – Site Preparation October 2008

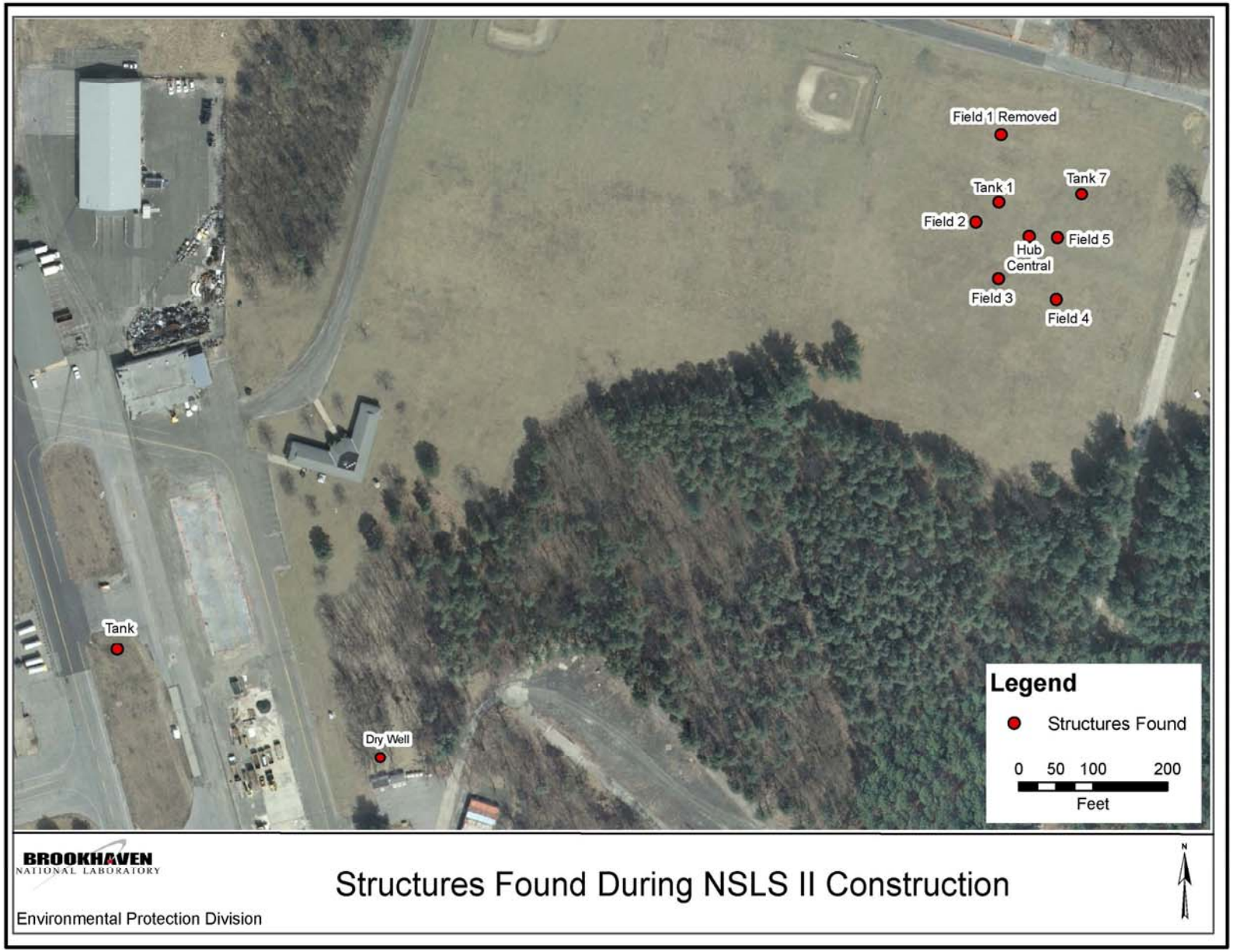
- Fence and storm water erosion controls installed

- Utilities isolated (electric, water, steam, sewers)

- Completed site clearing (remove asphalt, remaining structures, removal of utilities)
  - Removal of topsoil and substandard soils.

The best laid plans of mice and men…..

- May 6th – A report of a release of ethylene glycol received from the NSLS-II project. Polyethylene piping discovered in eastern fields, remnants of solar heat research performed 1978 – 1981. Recovered ~ 250 gallons of glycol/water.
- May 19th – 550 gallon underground storage tank discovered near former location of Bldg. T-89. Recovered ~ 15 gallons of fuel/water and removed 20 yards of impacted soil.
- May 22nd – Drywell found in grass east of Bldg. 207. Drywell was sampled and found to meet Suffolk County clean-up criteria.
- All events addressed immediately and to the satisfaction of the NYS Department of Environmental Conservation and/or Suffolk County Dept. of Health Services.


Field 1 Removed
Tank 1
Tank 7
Field 2
Hub
Central
Field 5
Field 3
Field 4
Tank
Dry Well
Legend
Structures Found
0 50 100 200
Feet
BROOKHAVEN
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Structures Found During NSLS II Construction
N

Ground Coupled Heat Pump System Experiment

The Use of Serpentine Earth Coils in Ground Coupled Heat Pump Systems[1]

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A research program at Brookhaven National Laboratory (BNL) has studied ground coupling, i.e., the use of the earth as a heat source/sink or storage medium for solar-assisted and stand-alone heat pump systems. As part of this research program, five serpentine earth coil experiments were operated between December 1978 and September 1981. Heat was added to or removed from the earth coils according to weekly schedules based on computer simulations of solar-assisted and stand-alone, ground-coupled heat pump systems operated in the local (New York) climate. Each earth coil was operated according to a different control strategy. This paper presents experimental results from these experiments for the period December 1978 to April 1981, and compares these results to those generated by a computer model, GROCS, developed at BNL. The model is found to provide a reasonably good fit to the data, for the most part, using the experimental undisturbed soil thermal properties. In some cases, the use of a lower soil thermal conductivity provides a better fit, particularly during summer months when heat was added to the ground. Thus, given soil properties, GROCS can be used to predict earth coil performance. If given earth coil performance, the model can predict soil thermal properties. Serpentine earth coils are found to be suitable to provide auxiliary heat or heat rejection for solar heat pump systems. In fact, earth coil-based, stand-alone, ground-coupled heat pump systems can provide all heat needed for winter space heating and all heat rejection required for summer space cooling with no need for any auxiliary heating. Subfreezing winter operation is necessary for shallow earth coils in cold climates. No deleterious effects to the ground were observed from the long-term operation of these experiments.

- Abstract from November 1984 paper published in Journal of Solar Energy Engineering

- Ethylene glycol filled serpentine earth coil configurations
  - 2600 feet of coil
  - 240 gallons of glycol

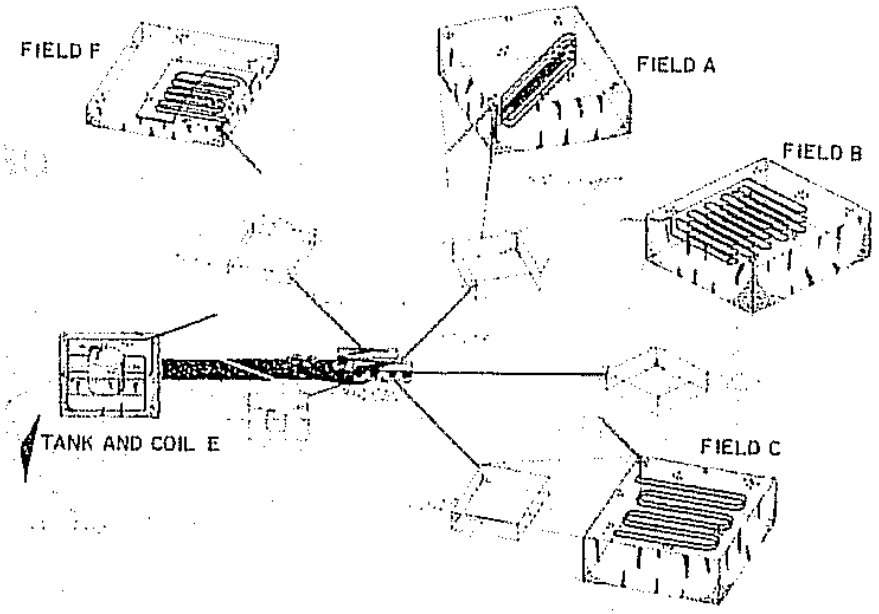

Fig. 1 BNL serpentine earth coil configurations

Ground Coupled Heat Pump System Experiment

Investigation of glycol filled piping systems

Former Underground Storage Tank (T-89)

Removal & Cleanup Process