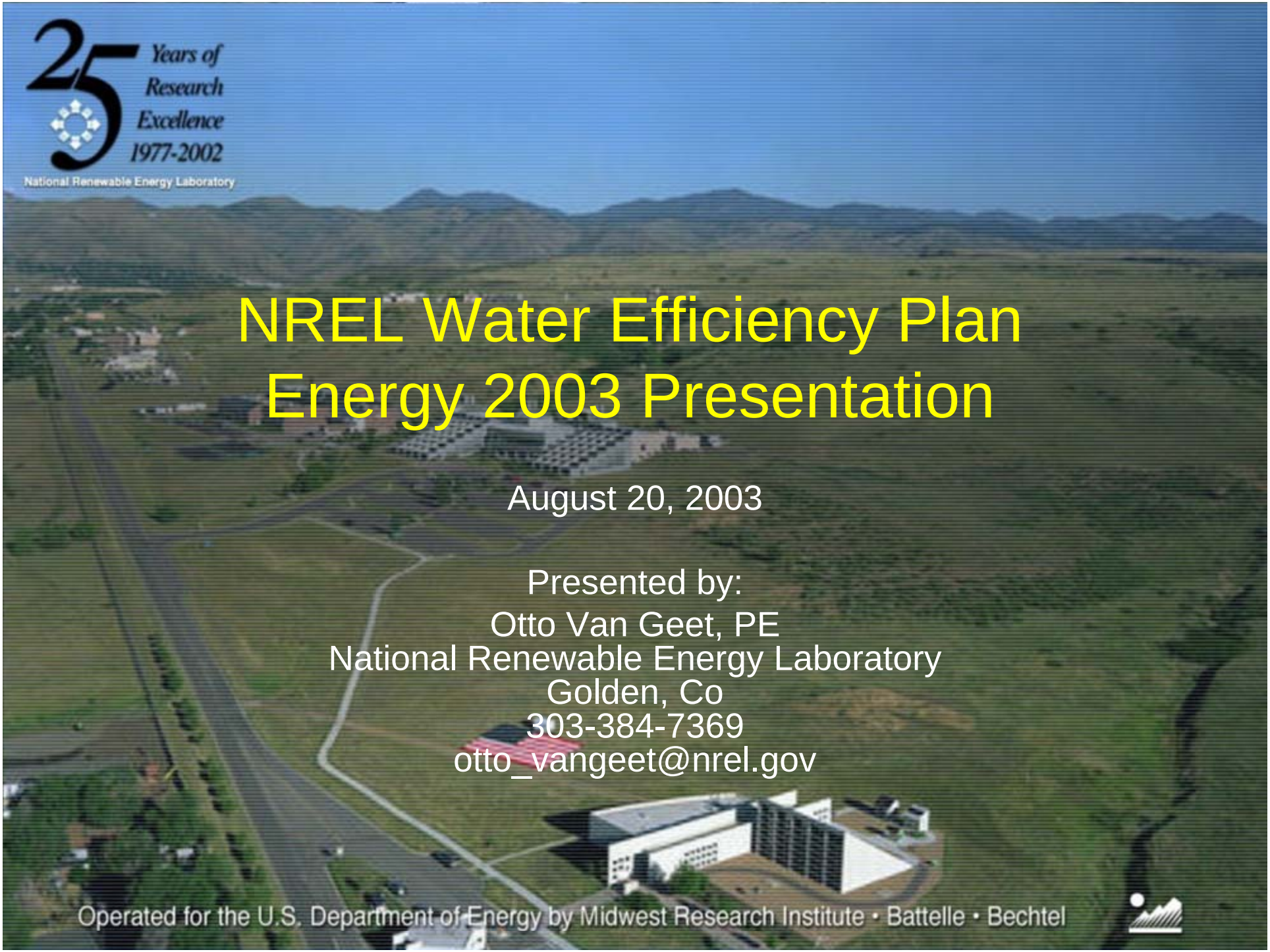

NREL Water Efficiency Plan Energy 2003 Presentation

August 20, 2003

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Water Efficiency Plan

- NREL Water Efficiency Plan was developed to comply with EO 13123 and DOE Order 430.2A, as well as an objective established in the Energy Management Performance Based Agreement between DOE/EERE & DOE Golden Field Office
- The Water Efficiency Plan was developed utilizing the Air Force Water Conservation Guidebook (May 2002)
- NREL Water Efficiency Plan is located on the Sustainable NREL Website: www.nrel.gov/sustainable_nrel/pdfs/water_plan_1_2003.pdf

Steps to Complete a Water Efficiency Plan

The Air Force Water Conservation Guidebook outlines six steps to complete a Water Efficiency Plan:

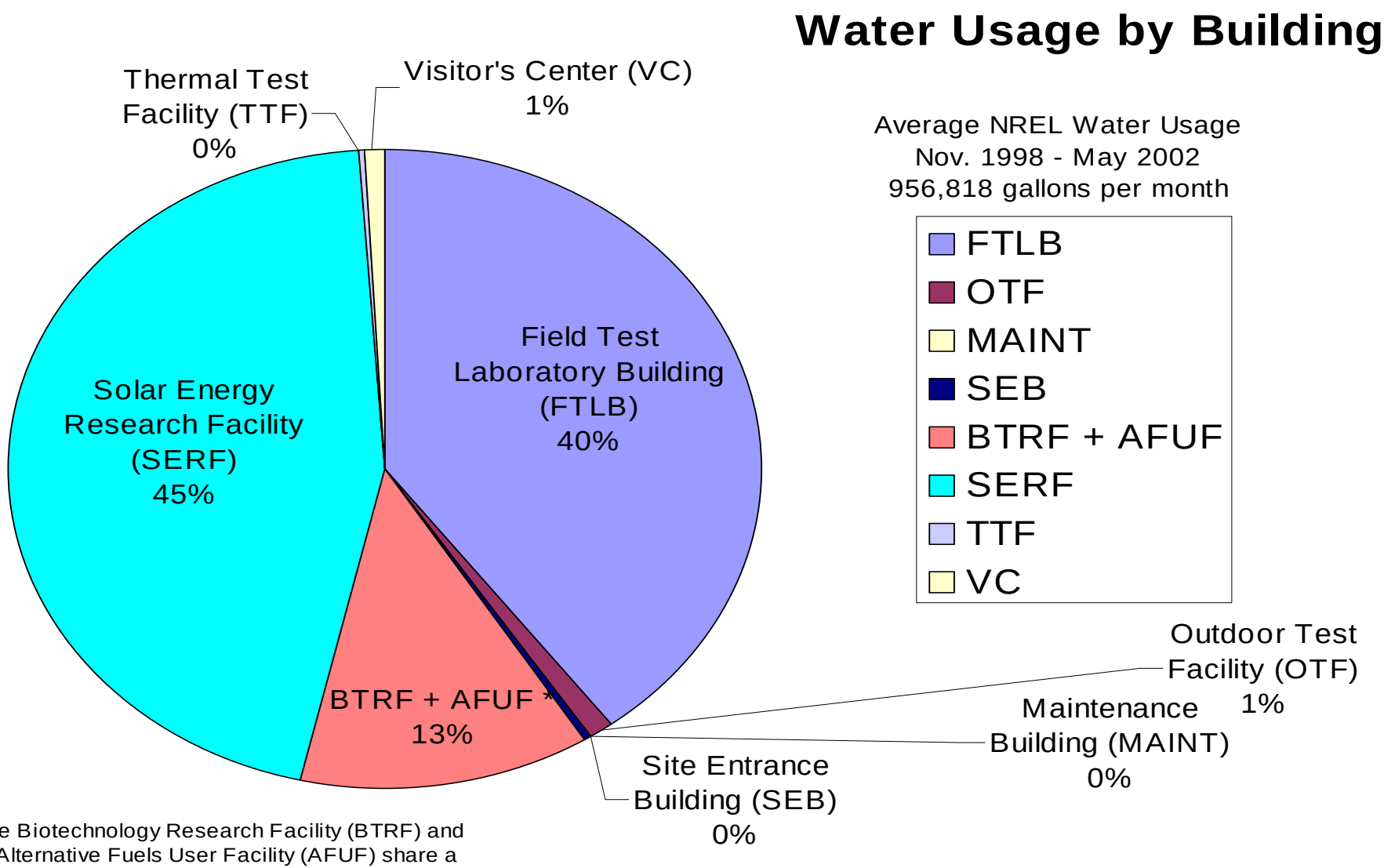
- Step 1 - Collect Background Data
- Step 2 - Investigate and Categorize Baseline Water Use
- Step 3 - Calculate Incremental Cost of Water
- Step 4 - Investigate BMPs for Implementation
- Step 5 - Begin Implementation
- Step 6 - Monitor Program

Step 1 – Collecting Background Data

Collection of specific background data related to:

- Utility Information – include Company name(s); Points of Contact; list of water meters and water rates; free audit from Denver Water Utility company
- Water Emergency and/or Drought Contingency Plans – include base plans for emergency response and comprehensive planning information
  - In drought situations, NREL suspends landscape watering
- Additional Information – NREL Water Usage by Building Data graph

Step 1 – Collecting Background Data



* The Biotechnology Research Facility (BTRF) and the Alternative Fuels User Facility (AFUF) share a building.

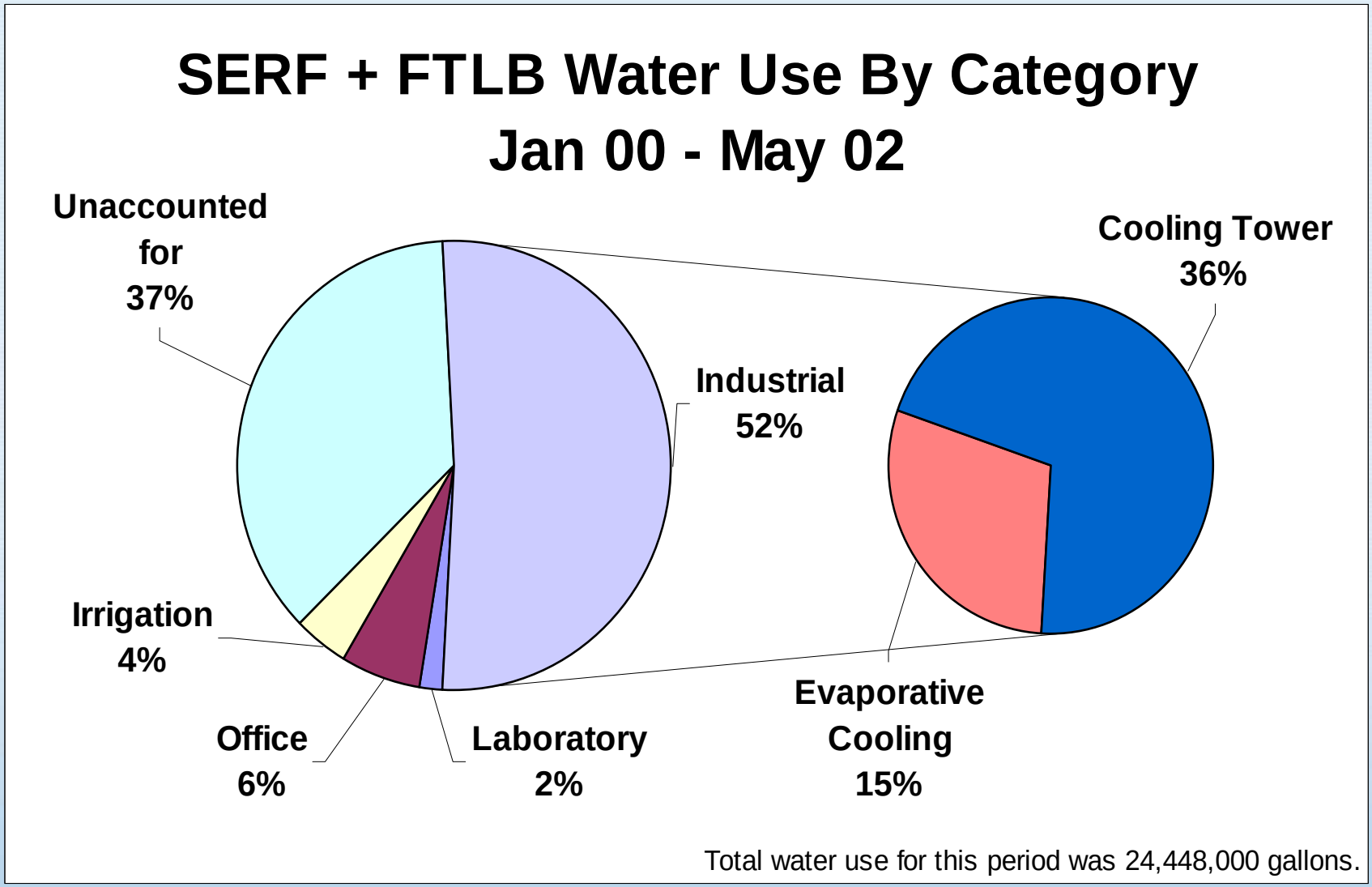
Step 2 – Est. Water Use by Category

NREL Water Efficiency Plan breaks down water use into five categories:

- Category 1 – Laboratories: deionized (DI) water, lab sinks, water cooling of laboratory equipment
- Category 2 – Offices: kitchen sinks and public restrooms
- Category 3 – Irrigation Water Use
- Category 4 – Industrial: make-up water for cooling towers & evaporative coolers
- Category 5 – Leaks, Losses, and Unaccounted for Water Use

Air Force Guidebook had Category 1 as Housing and Category 2 as Commercial.

Step 2 – Water Use by Category



Step 3 – Calculate Incremental Cost of Water

- Determining incremental cost of water determines cost effectiveness of conservation measures.
- The Air Force Guidebook provides five different method for calculating incremental water costs, depending on rate structure.
- NREL Water Efficiency Plan calculated the incremental cost of water and sewage disposal. For SERF and FTLB has an average water cost of $2.69 per thousand gallons.

Step 4– Investigating BMPs For Implementation

- BMP #1—Public Information and Education Programs
- BMP #2—Distribution System Audits, Leak Detection, & Repair
- BMP #3—Water Efficient Landscaping
- BMP #4—Toilets and Urinals
- BMP #5—Faucets and Showerheads
- BMP #6—Boiler/Steam Systems
- BMP #7—Single-Pass Cooling Systems
- BMP #8—Cooling Tower Management
- BMP #9—Miscellaneous High Water-Using Processes
- BMP #10—Water Reuse and Recycling

See www.eere.energy.gov/femp/techassist/best_practices.html

Step 5– Implementation of BMPs

Summary of BMP Analysis and Action Items for Implementation

Best Management Practice	Implemented O&M Options?	Selected for Implementation?	Claim Credit for BMP Implementation?	Action Items Necessary to Claim Credit
#1 Public Information and Education Programs	N/A	In process	FY 2003	Publicize a number to call to report leaks or other water waste. Work with the Source to publish quarterly articles promoting water conservation.
#2 Distribution System Audits, Leak Detection, And Repair	Further investigation recommended		No	If more than 10% of water usage is unaccounted for after identification of all single-pass cooling systems (See BMP #7), a more thorough leak detection audit is recommended.
#3 Water Efficient Landscaping	Yes	In process	FY 2003	Publicize a number for reporting irrigation system problems.
#4 Toilets and Urinals	Yes	Yes	FY 2002	COMPLETED
#5 Faucets and Showerheads		Yes	FY 2002	COMPLETED

Step 5– Implementation of BMPs

Best Management Practice	Implemented O&M Options?	Selected for Implementation?	Claim Credit for BMP Implementation?	Action Items Necessary to Claim Credit
#6 Boiler / Steam Systems	Further investigation recommended	Recommended for further investigation	No	Institute a regular schedule of boiler tube cleaning and inspection
#7 Single-Pass Cooling Equipment	Further investigation recommended	Recommended for FY 2004	No	Inventory laboratory equipment to identify all single-pass cooling systems. Ensure procedures are in place to turn off the water supply when the single-pass cooling equipment is not in operation. Consider putting single-pass equipment on a process loop.
#8 Cooling Tower Management	Further investigation recommended	Recommended for FY 2004	No	Consider other water treatment methods in order to reduce water usage.
#9 Miscellaneous High Water-Using Processes	No	No	No	E.g., fish hatcheries, hospitals, laundry services, vehicle washing, or kitchen and food processing areas.
#10 Water Reuse and Recycling	No	No	No	E.g., reuse of vehicle or laundry rinse water for first cycle of next wash. Not applicable to NREL

Step 6– Program Monitoring

- Monitoring the program is the final step.
- Annual DOE Energy Management reporting requires follow up on Water Efficiency Plans.
- NREL Water Efficiency team has completed two BMPs (#4 & 5 – Toilets and Urinals & Faucets and Showerheads), and is on track to complete two more BMPs (#1 & 3 –Public Information and Education Programs & Water Efficient Landscaping) in FY2003. This meets the requirements of E.O. 13123.
- BMPs #7 and #8, single pass cooling equipment and cooling tower systems are under review for FY 2004. Two other BMPs (#2 & 6 – Distribution System Audits, Leak Detection and Repair & Boiler/Steam Systems) require further investigation and re-evaluation.

Questions?

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Visit the Sustainable NREL Site: http://www.nrel.gov/sustainable_nrel/