



PADUCAH GASEOUS DIFFUSION PLANT CITIZENS ADVISORY BOARD

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Consensus Recommendation: 04-08

Submitted for discussion by the Water Task Force, March 18, 2004

Title: Cost-Benefit Analysis for a PGDP Site Comprehensive Water Budget

References:

- **January 9, 2004 Water Quality Task Force Meeting Minutes**
- **First Quarter 2004 PGDP Groundwater Modeling Group Meeting Minutes**

Background:

A preliminary water balance was conducted across the PGDP in 2000, using only engineering estimates (no active measurements were taken). Based upon this survey, Bechtel Jacobs Company LLC has estimated a cost of \$3 to 4 million to execute and complete a comprehensive water budget across the site. The scope of work contained in this budget consists of 17 items, including groundwater flows, surface water, withdrawals from the Ohio River, pipe leakage, precipitation, and various discharges. The complete list of these items is attached to this recommendation.

The PGDP Groundwater Modeling Group met in February 2004 to discuss the overall value of a comprehensive water budget. It was agreed that a cost-benefit analysis for each of the tasks in the scope and a sensitivity analysis needs to be performed. However, no further work was allocated to the water budget since DOE has not authorized additional expenditures for study of a comprehensive water budget.

Concern:

The Citizens Advisory Board believes a comprehensive water budget is vital to existing as well as future operations associated with the plant site. A water budget plays a significant role in discussions surrounding "Risk-Based End State" and site stewardship. Some of the key questions to be answered by the water budget include:

1. What will be the impact to the surrounding community when the plant shuts down and there are no longer 11.9 million gallons of water per day being withdrawn and used from the Ohio River?
2. Is TVA going to be operating at the current withdrawal intensity in the future?
3. Will the proposed Depleted Uranium Hexafluoride Conversion Facility increase the flow of water to the plant and what types of impact could occur?
4. Will the Olmstead Dam projection of raising the Ohio River six feet affect the area?

Recommendation:

The Board requests resources be allocated to prepare a cost-benefit analysis report. This report will be based upon those 17 tasks (attached) within the existing scope of work for the comprehensive water budget. Within this cost-benefit analysis report, include the following items:

- 1) Perform sensitivity analysis modeling to assess the relative importance of inputs to the overall water budget.**
- 2) Refine the estimated cost analysis required to execute the water budget, to include four tiers of information: “low priority, medium priority, high priority and highest priority.”**
- 3) In the report, include a percent contribution from each task toward closing the overall material balance of the water budget.**

This intermediate report will provide valuable feedback to DOE management as well as other agencies on how to proceed in the expensive execution of a comprehensive water balance.

Approved by Consensus 4/15/04

**Comprehensive Scope of Work for the PGDP Groundwater Model
Water Budget Analysis proposed in CY 2000**

Tasks:

- 1). **Precipitation**
 - Collect two locations data for one year and analyze
 - Compile historical data for baseline
- 2). **Withdrawals from Ohio River**
 - Collect for one year for PGDP and TVA, analyze pipeline leakage to PGDP water plant
 - Correlate five-year plant production to water usage
- 3). **Pipeline Leakage** – from treatment through facility
 - Identify high water demand conveyance and measure segment losses during high demand
 - Review waterline leaks and repairs
- 4). **Surface Impoundment Leakage (Lagoons)**
 - Measure inflow/outflow
 - Calculate evaporative loss
- 5). **Surface Water**
 - Utilize existing flow-monitoring stations Big Bayou Creek and Little Bayou Creek
 - Augment to allow for hydrograph separation
 - Identify gaining/losing reaches
 - Calculate losses and gains
- 6). **Stream Losses**
 - Identify gaining/losing reaches
 - Calculate losses and gains
- 7). **Leakage across Porters Creek Terrace**
 - Use existing data to estimate seepage into Upper Continental Recharge System and Regional Gravel Aquifer
- 8). **Ohio River Stage Measurements**
 - Assess affect of stages on groundwater flow
 - Assess changes in storage
- 9). **Evapotranspiration**
 - Estimate with data, empirical formula and historical studies
- 10). **Surface Water Discharge**
 - Identify outfall discharges
- 11). **Cooling Tower Water Vapor Loss**
 - Identify plant losses through tower vapor discharge
- 12). **Steam Plant Losses**
 - Document daily steam loss

13). Shallow Groundwater discharge to Surface Water

- Use existing stations and studies to estimate one year losses and gains to Little Bayou Creek, Big Bayou Creek and tributaries
OR
- Use hydrograph separation

14). Changes in Storage

- 250 wells, 4 water level measurements in 1 year within 48 hours

15). Deep Groundwater Flows

- Represented by calculation of difference between all inputs and outputs plus the change in storage

16). Determine the impact of the DUF6 Conversion Facility

17). Determine the impact of plant shutdown

- Cold Standby Scenario