

# Environmental Solutions

*A Summary of Contributions for FY04*

PNNL-15073



## PNNL Contributions to Bechtel Hanford, Inc.



Pacific Northwest  
National Laboratory  
Operated by Battelle for the  
U.S. Department of Energy

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# Executive Summary

## Partnership Supports Clean Up of Hanford's River Corridor

Pacific Northwest National Laboratory supports Bechtel Hanford, Inc., in identifying and applying new technologies to clean up contaminated sites on the land bordering the Columbia River where nine nuclear reactors operated. During fiscal year 2004, PNNL screened more than 100 different technologies for potential application to site clean up.

As part of its restoration work, Bechtel Hanford is in the process of decommissioning a radioactively contaminated facility in the 100-N Area. One of the top challenges is removing a tank inside the facility that contains highly radioactive material. The Laboratory reviewed and helped define appropriate technologies to remove the tank's contents and prepare them for disposal.

In support of Bechtel Hanford's work to remediate the 618-7 burial ground, PNNL reviewed options for excavating, stabilizing, and disposing drums of a zirconium alloy known as Zircaloy. This metal can catch on fire when exposed to certain conditions. In addition, PNNL provided data on methods for monitoring beryllium during excavation. Beryllium, which can cause serious chronic lung disease in exposed workers, may be present in small quantities in the same drums as the Zircaloy.



*Pacific Northwest National Laboratory supports Bechtel Hanford, Inc., in identifying and applying new technologies to clean up contaminated sites on the land bordering the Columbia River where nine nuclear reactors operated.*

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## Introduction

As part of the Bechtel Hanford, Inc.'s cleanup work at the Hanford Site, Pacific Northwest National Laboratory has assessed science and technology opportunities to improve on the Environmental Restoration baseline, identified viable technology solutions, facilitated technology deployments and demonstrations, and provided assistance on technology-related issues. The Laboratory has supported the Environmental Restoration Contractor since fiscal year 1996.

Specific support in fiscal year 2004 is summarized below. Work done for other Hanford contractors, the Waste Treatment Plant, and directly for the U.S. Department of Energy is summarized in the other booklets in this series.

## Decommissioning the 107-N Facility

PNNL assisted the Environmental Restoration Contractor in defining the technical challenges and technology evaluation criteria for decommissioning the 107-N Facility. The facility housed the filtration equipment for the N Reactor fuel storage basin. This facility is particularly challenging due to the high radiation dose material in some of the equipment within the facility. The most difficult piece of equipment to dismantle in the 107-N Facility is the T-1 backwash settling tank. Methods were needed to remove the contents of the T-1 tank and treat the material to contact-handled levels for handling and transportation. PNNL provided a screening-level review of potentially applicable technologies for this challenge. Then, PNNL assisted the Environmental Restoration Contractor in obtaining and conducting a technical solutions project to define potential solutions for the T-1 tank. This project was part of the U.S. Department of Energy's Environmental Management Headquarters Technical Solutions program.

*Technical challenges and technology evaluation criteria were defined for decommissioning the 107-N Facility.*

## Remediating 618-7 Burial Ground

In support of Bechtel Hanford's work to remediate and close the 618-7 burial ground, PNNL reviewed technology options for excavating, stabilizing, and disposing drums of pyrophoric Zircaloy that are present in the burial ground. The technologies are reviewed in the report *Technology Review for Addressing the Drummed Zircaloy Chips in the 618-7 Burial Ground* (BHI-01712).

In addition, PNNL provided information to Bechtel Hanford about methods for monitoring beryllium contamination at work sites. This work supports Bechtel Hanford's efforts to address airborne contaminant concerns during excavation operations, in particular for the 618-7 burial ground where drummed Zircaloy includes beryllium co-contamination.

*Information about methods for monitoring beryllium contamination at work sites was developed.*

## Supplying Technology-Related Information and Assistance

PNNL supported Bechtel Hanford's remediation and decommissioning decisions by providing technology-related information to the project engineers. In fiscal year 2004, PNNL screened more than 100 different technologies in support of Hanford restoration. Specific reports produced in fiscal year 2004 are shown in the following table.

*Fiscal Year 2004 Technology Review Reports*

| Project                    | Report Subject  | Number of Technologies Screened |
|----------------------------|---|---------------------------------|
| Facilities Decommissioning | Evaluation of technology options for the 107-N Facility (Background information report for the Technical Solutions Project) | 69                              |
|                            | Non-flammable cutting techniques for application at the 1304-N Building   | 3                               |
|                            | Techniques to seal duct openings in the 105-H inner rod room  | 2                               |
| Remedial Action            | Technology options for characterization of the 116-C-3 chemical waste tanks   | 17                              |
|                            | <i>Technology Review for Addressing the Drummed Zircaloy Chips in the 618-7 Burial Ground (BHI-01712)</i>                   | 36                              |
|                            | Methods for monitoring beryllium contamination at work sites  | 6                               |
| Waste Disposal Operations  | Technology options for waste drum operations  | 11                              |
|                            | Potential solutions for ensuring proper alignment of waste canisters on trailers  | 3                               |

More than 100 technologies were screened in support of Hanford Site restoration.



In addition, PNNL completed a technology trending report that identifies the technically challenging components of future remediation and facilities decommissioning in the 100 and 300 Areas. For each of these components, the report describes technology needs and the timeframe available for innovative technology efforts.

To provide better in-field radiation measurements for Bechtel Hanford, PNNL also provided a testing and evaluation framework for radiological monitoring instruments to be tested in fiscal year 2005. The instruments are a breathing zone air monitor capable of correcting for radon interference in alpha radiation characterization, and two near real-time field sample analysis techniques for field evaluation of smear samples and air filter media. The field analyzers also correct for radon interference in alpha radiation characterization.

***A framework  
for testing and  
evaluating  
radiological  
monitoring  
instruments in  
fiscal year 2005  
was developed.***

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