FACTS

BROOKHAVEN NATIONAL LABORATORY

Cleanup Actions Proposed for g-2, BLIP, and Former Underground Storage Tanks

The U.S. Department of Energy (DOE) and Brookhaven National Laboratory (BNL) have developed a Proposed Remedial Action Plan under the Federal Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) for groundwater and soil contamination at the g-2 tritium source area, activated soils at the Brookhaven Linac Isotope Producer (BLIP), and the removal of eight former underground storage tanks (USTs).

The purpose of *The Proposed Remedial Action Plan for g-2 Tritium Source Area and Groundwater Plume, Brookhaven Linac Isotope Producer Soils, and Former Underground Storage Tanks* (PRAP) is to explain the preferred remedial alternatives and to encourage public comment before the final remedy is selected for the g-2 experiment. Engineered controls in place and continued monitoring at BLIP, and removal of the USTs are proposed as final actions.

The pubic is invited to review the PRAP and two supporting documents: the *BNL Technical Memorandum: Supporting Documentation for the Proposed Plan, AOC 12 and AOC 16K,* and the *BNL g-2 Source Area and Tritium Plume – AOC 16T Focused Feasibility Study*. The public is also invited to provide comments on them to DOE during the formal comment period, which runs from Thursday, October 12 through Monday, November 13, 2006.

After the public comment period, DOE will carefully consider the public's input. The DOE, along with the U.S. Environmental Protection Agency (EPA), will select a final remedy with the concurrence of the New York State Department of Environmental Conservation (NYSDEC).

Based on comments received from the public, the proposed remedies may be changed. The final decision is detailed in a Record of Decision (ROD), which includes DOE's response to community comments in the Responsiveness Summary.

One way to learn more about the Proposed Remedial Action Plan is to attend one of the following meetings:

Information Sessions

Wednesday, October 18, 2006
noon – 2 p.m. and 5 to 7 p.m.
Brookhaven National Laboratory
Berkner Hall, Room D

Public Meeting

October 25, 2006, 7 – 9 p.m.
Brookhaven National Laboratory
Large Conference Room
Medical Department, Bldg. 490

Please note that all visitors to Brookhaven Lab age 16 and older must present photo identification for admission to the Laboratory.

One of the ten national laboratories overseen and primarily funded by the Office of Science of the U.S. Department of Energy (DOE), Brookhaven National Laboratory (BNL) conducts research in the physical, biomedical, and environmental sciences, as well as in energy technologies and national security. Brookhaven Lab also builds and operates major scientific facilities that are available to university, industry, and government researchers.

Brookhaven Lab is operated and managed for DOE by Brookhaven Science Associates (BSA), a limited-liability company founded by Stony Brook University, and Battelle, a nonprofit, applied science and technology organization.

For more information about Brookhaven Lab go to www.bnl.gov on the World Wide Web.

For more information on the g-2 cleanup please contact:

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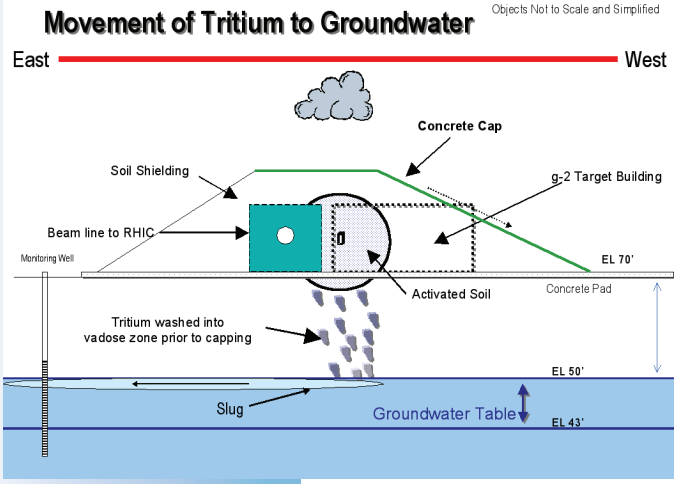

FIGURE 1. Rainwater percolated through the soil leaching tritium into the groundwater.

THE g-2 SOURCE AREA AND PLUME

The activated soils at the g-2 source area still pose a potential threat to groundwater quality below the facility and must continue to be properly protected from rainwater infiltration. Furthermore, several segments of the associated tritium plume continue to contain high levels of tritium and must be monitored to ensure that the plume attenuates by natural radioactive decay and dispersion, as predicted. BNL has prepared remedial action objectives that are based on the available groundwater monitoring data, contaminant transport modeling, and potential human risk of exposure to contaminated soils and groundwater.

(See Preferred Alternative, right-hand column.)

BACKGROUND

G-2 Source Area and Plume

The g-2 experiment was conducted from 1997 through 2001 on an independent beam line originating from the Alternating Gradient Synchrotron (AGS) facility. In November 1999, BNL detected tritium in the groundwater near the g-2 experiment at concentrations of about two times the 20,000 pico curies per liter (pCi/L) drinking water standard. An investigation into the source of the contamination revealed that the tritium originated from activated soil shielding located adjacent to the g-2 target building. The soil became activated, or radioactive by the accelerator beam inadvertently striking one of the magnets in the target building. Rainwater then leached tritium from the soils and carried it into the groundwater. Corrective actions were implemented starting in December 1999, including re-focusing the beam to significantly reduce beam losses, improving beam loss monitoring, installing a concrete cap over the activated soil area to prevent additional rainwater infiltration, controlling rainwater runoff, and conducting additional groundwater monitoring. Although the cap has been effective in preventing additional leaching, some of the tritium previously transported to the deeper soils has been flushed into the groundwater when the water table naturally rises following periods of heavy rainfall. As a result of this flushing activity, three small, high-concentration "slugs" of contamination were released to the groundwater, with tritium concentrations reaching a maximum of 3.4 million pCi/L in June 2002. For the past two years, tritium levels in the groundwater downgradient of the source have dropped to less than 100,000 pCi/L.

FIGURE 2. Inspecting the g-2 beam line.

FIGURE 3. BLIP facility.

BLIP

The BLIP facility has been in operation since 1972. It is a national resource for producing radioisotopes that are crucial in nuclear medicine for research and clinical use. The facility is located in the central portion of the BNL site. In 1998, tritium at a concentration of 14,000 pCi/L was found in a groundwater monitoring well south of the facility. Additional sampling wells were installed and tritium concentrations of approximately 53,000 pCi/L were detected immediately downgradient of the BLIP. It was determined that significant rainwater infiltration occurred along the building's foundation and penetrated the activated soil surrounding the BLIP target vessel. The rainwater leached the tritium from the soils and carried it into the groundwater.

A number of corrective actions were implemented in 1998 to prevent rainwater from entering the soil. The

FIGURE 4. Removal of an empty underground storage tank.

building rainwater downspouts were repaired and reconfigured, the paved area south of the building was resealed, and a concrete cap was installed over the remaining areas around the building.

In June 2000, to further protect groundwater, a DOE technology demonstration project was implemented wherein a liquid silica grout was injected into the soil around the target to immobilize the tritium.

Since 1998, tritium concentrations have been generally declining, however they have periodically increased to approximately two times the 20,000 pCi/L drinking water standard. The increases appear to be correlated to the same water table flushing mechanism described for the g-2 source area. The amount of tritium remaining in the deep soils above the water table is expected to decline over time. Groundwater monitoring will continue to be conducted to verify that the engineered controls remain effective. Continued inspections and maintenance of the cap; groundwater monitoring; institutional controls; and previously completed work are proposed as the final action under this PRAP.

Underground Storage Tanks

Eight underground storage tanks (USTs) used to hold low-level radioactive liquid waste were located at various facilities around the Lab site. These tanks were removed between 1988 and 1996 with oversight provided by the Suffolk County Department of Health Services. Confirmatory sampling was performed after the tanks were removed and no further environmental concerns were identified. No further action is proposed under this PRAP.

g-2 REMEDIAL ALTERNATIVES

Five remedial alternatives are described in the PRAP:

Alternative 1 calls for no further action beyond the maintenance of the concrete cap already installed over the activated soil source area. The activated soils will be allowed to decay in place until the facility is fully decommissioned.

Alternative 2 calls for continued source area controls and ground-water monitoring. The concrete cap over the source area will be maintained as in Alternative 1, and groundwater monitoring will be used to verify the effectiveness of the cap and the predicted attenuation of the tritium plume. If, over time, monitoring reveals that the tritium is not attenuating as expected, additional actions will be evaluated. The activated soils will be allowed to decay in place until the facility is fully decommissioned.

Alternatives 3 and 4 provide for groundwater pumping to control downgradient migration of the tritium plume and to remove spots of higher contamination, respectively. The concrete cap over the source area will be maintained and groundwater monitoring will continue. The activated soils will be allowed to decay in place until the facility is fully decommissioned.

Alternative 5 physically removes the activated soils and underlying leachate-contaminated soils at the source area, as well as those beneath the adjacent g-2 target building and beam stop. The soils would be characterized and shipped off-site for disposal at an approved facility. Groundwater monitoring would be used to verify the effectiveness of the removal and the predicted natural attenuation of the tritium plume.

All five alternatives provide institutional controls to prevent exposure to the contaminated soil and groundwater.

THE PREFERRED ALTERNATIVE

g-2 Tritium Source Area and Groundwater Plume

Alternative 2, Continued Source Area Controls and Groundwater Monitoring, is the Preferred Alternative. Alternative 2 provides for the best balance of the alternatives when evaluating them against the CERCLA evaluation criteria.

Alternative 2 requires continued routine inspection and maintenance of the concrete cap and other stormwater controls. In addition, this alternative requires continued groundwater monitoring of the source area to verify the continued effectiveness of the stormwater controls and to monitor the downgradient segments of the plume to verify that the tritium levels will decrease to less than the 20,000 pCi/L drinking water standard between 2010 and 2015, as predicted. Disposition of the activated soils will be addressed during facility decommissioning.

Human health and the environment are protected under Alternative 2, which achieves the remedial action objectives of minimizing potential human exposure to the activated soil and contaminated groundwater.

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THE COMMUNITY'S ROLE IN THE REMEDY SELECTION

The community has played and continues to play an important role in selecting cleanup alternatives. To ensure that community expectations are considered in making the decision on cleanup of the g-2 Source Area, BLIP, and the USTs, DOE encourages the public to submit its input on the PRAP during the formal public comment period, which runs from Thursday, October 12 through Monday, November 13, 2006.

To submit your comments before the end of the comment period, please do one of the following:

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mail: Michael Holland, Site Manager
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Brookhaven Site Office
Attn: g-2 PRAP
Bldg. 464
P. O. Box 5000
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WHERE TO FIND THE DOCUMENTS

The PRAP is available at http://www.bnl.gov/erd on the World Wide Web. The PRAP and its accompanying *BNL Technical Memorandum: Supporting Documentation for the Proposed Plan, AOC 12 and AOC 16K*, and the *BNL g-2 Source Area and Tritium Plume – AOC 16T Focused Feasibility Study* are available at the following libraries:

BNL Research Library
Building 477
Brookhaven National Laboratory
Upton, NY 11973
(631) 344-3483

Mastics-Moriches-Shirley Community Library
301 William Floyd Parkway
Shirley, NY 11967
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U.S. EPA Region II Library
290 Broadway
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(212) 637-4296