

cleanupdate

U.S. DEPARTMENT OF ENERGY/BROOKHAVEN NATIONAL LABORATORY/BROOKHAVEN SCIENCE ASSOCIATES

ENVIRONMENTAL RESTORATION DIVISION — VOL.4/NO.1/JUNE 1999



Reports out, comments in

Dear Community Member,

I am excited to report that the environmental cleanup at Brookhaven National Laboratory is moving ahead rapidly. A schedule of many of the activities to date is in the center of this newsletter.

Brookhaven has removed a number of sources of soil and groundwater contamination over the last several years. The most recent cleanup actions are discussed in an article beginning on page 3 on the progress of the Lab cleanup.

In addition to these successes, we have reached a number of milestones in the Superfund process. Since the last issue of *cleanupdate* was mailed in December 1998, six reports have been issued detailing investigations of contaminated areas, cleanup options evaluated, and cleanup remedies proposed.

The recent flurry of activity began with the release of a report on Brookhaven soil contamination on February 19. Two information sessions attended by 48 people were held to answer questions about the report.

More recently, two additional reports about soil cleanup options and the proposed cleanup methods were published on April 1. Two information sessions and a public meeting were held in April, attended by a total of 75 people. Questions focused on the low-level cesium contamination of deer (see updates, page 2), dust control during the cleanup, and transportation of contaminated soils for off-site disposal.

Three reports on groundwater contamination were issued on March 1. Three information sessions and a public meeting on groundwater were held in March, attended by a total of 112 people. Issues discussed included the duration of cleanup, cleanup costs, and the effectiveness and locations of treatment systems.

All of the comments received are being considered during the selection of final cleanup remedies. Responses to public comments and the chosen cleanup remedies will be released to the public in documents known as Records of Decision. The final cleanup will begin after these documents have been approved by the regulators and published.

We are glad to report this progress in the BNL cleanup program to you, and we will keep you informed as the program advances. In the meantime, please call Eloise Gmur at (516) 344-6336 if you have any questions or comments.

Sincerely,

John J. Meersman
Manager, Environmental Restoration Division

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"The environmental cleanup at Brookhaven National Laboratory is moving ahead rapidly."

Report on localized soil cleanup is anticipated

Brookhaven National Laboratory (BNL) soon will be releasing a report on cleanup alternatives for contaminated soils at the Brookhaven Linac Isotope Producer, or BLIP. The *BLIP Engineering Evaluation and Cost Analysis* will summarize the nature and extent of soil contamination, describe and evaluate removal alternatives, and recommend one alternative. The recommended alternative will prevent further contamination of groundwater beneath BNL property by radioactive elements.

BLIP, which is located in the northwestern section of the BNL property, has operated from 1972 to the present. This facility is a national resource for producing radioactive isotopes that are crucial to nuclear medicine for both research and clinical use. BLIP also supports BNL research on diagnostic and therapeutic radionuclides (radioactive elements).

Routine BLIP operations generate particles called neutrons that pass through the soil beneath the BLIP building. These neutrons "activate" the soil by reacting with atoms already present in the soil to form radioactive elements. For example, hydrogen atoms within the soil can be converted into tritium.

As a result of BLIP operations, soil located beneath the facility has been activated with several radionuclides. Some of the radionuclides are short-lived. However, tritium and sodium-22,

(see *BLIP*, page 11)

Deer hunting OK, says NYSDOH report

Restrictions on deer hunting in the vicinity of Brookhaven National Laboratory are unnecessary, according to a report issued by the New York State Department of Health (NYSDOH). The NYSDOH finds that the maximum likely radiation exposure from deer consumption is below New York State Department of Environmental Conservation (NYSDEC) guidelines. Nevertheless, the March 1999 report does recommend that the public, particularly hunters, be advised of the presence of elevated levels of cesium-137 in deer close to the Laboratory site.

The NYSDOH report, titled *Deer Meat Contaminated with ¹³⁷Cs at Brookhaven National Laboratory*, examines cesium levels from 32 deer sampled between 1992 and 1999. Cesium levels in deer in the vicinity of BNL consistently were found to be greater than cesium levels in deer found elsewhere on Long Island. The levels measured are quite low and are not harmful to the deer. Elevated cesium levels are thought to occur because deer on the Lab's property graze on lawns and vegetation, some of which are contaminated with low levels of cesium.

Based on the average cesium levels measured in deer, the NYSDOH projects a radiation dose of five millirems per year (mrem/yr) using a conservative figure of 64 pounds of

(see *Deer report*, page 4)

Actions at BLIP to protect groundwater

- Rainwater downspouts re-routed
- Impermeable cap placed over target area
- Additional groundwater characterization through sampling at 13 separate locations

cleanupdate

A newsletter from the Environmental Restoration Division (www.oer.dir.bnl.gov) at Brookhaven National Laboratory, *cleanupdate* is part of an on-going effort to inform people about environmental restoration issues and activities at the Lab. If you would like to be on the Environmental Restoration Division mailing list, or if you have any questions about the cleanup, please contact:

John Meersman
Division Manager
516-344-8632 (meersman@bnl.gov)

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516-344-6336 (egmur@bnl.gov) or 344-8192 (clafon@bnl.gov)

Lab Cleanup Progresses

Since the last issue of cleanup update in December 1998, Brookhaven National Laboratory has made significant progress on its environmental cleanup program. Soil and groundwater cleanup actions have removed both radiological and chemical contaminants from the environment. The most recent cleanup successes are detailed below.

Soil cleanup

On February 18, BNL's Environmental Restoration Division completed the excavation of two 1,000-gallon underground storage tanks and 370 cubic yards of radiologically contaminated soils. This excavation, detailed in the *Action Memorandum: Building 830 Underground Storage Tanks Removal Action*, protects the groundwater and the environment by removing a source of radiological contamination. The excavation took place at Building 830 near the center of the Lab's 5,300-acre site. Backfilling of the excavated area, which occupied about a tenth of an acre, was completed on March 22.

Groundwater cleanup

Over 80,000 gallons of groundwater contaminated by an industrial solvent called carbon tetrachloride were treated during a removal action beginning on January 14. This cleanup, detailed in the *Action Memorandum: Carbon Tetrachloride Tank Groundwater Removal Action*, prevents groundwater migration from this area and provides treatment of the contaminated groundwater. The water was pumped from a monitoring well at the southwest-central portion of the Lab over the course of two weeks and filtered, removing 61 pounds of the solvent. Additional treatment is planned following the installation of a new pump-and-treat system, scheduled to take place during the summer of 1999. Water will be pumped from the aquifer and treated with carbon filters to remove the carbon tetrachloride.



The excavation of radiologically contaminated soils from the Building 830 area. Following the excavation, the area was filled in with clean soil.

In November of 1998, Brookhaven began constructing seven groundwater treatment wells in an industrial park south of the Lab. These wells will use an innovative technology called in-well air stripping, which treats extracted groundwater within the well to remove chemical contaminants.

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An innovative technology will treat groundwater within the wells to extract chemical contaminants.
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The installation of these wells and associated systems is expected to be complete by July 1. This groundwater treatment system is scheduled to start operating this summer. Additional treatment systems will be constructed south of the Lab after final approval of the Operable Unit III Record of Decision.

One existing groundwater treatment system located at BNL's southern boundary has removed over 800 pounds of chemicals from nearly 600

(see Cleanup progress, page 4)

Recent cleanup successes

- Two underground tanks and 370 cubic yards of soil excavated
- 87,000 gallons of water treated, 61 pounds of VOCs removed
- Construction nears completion on seven groundwater treatment wells



One of the drill rigs being used to install the off-site groundwater treatment wells.

Cleanup progress...

(continued from page 3)

million gallons of groundwater since it began operating in June 1997. The clean water was returned to the ground at a basin near the center of the BNL site. Construction of an additional well just east of the other wells is planned in June of this year. This new well will capture the industrial solvent contamination in that area and ensure that those contaminants do not move beyond the Lab's southern boundary. Three additional systems on Brookhaven property have removed over 200 pounds of chemicals from over 800 million gallons of groundwater.

Future activities

The next focus of cleanup activities will be the Brookhaven Graphite Research Reactor (BGRR), which was in use between 1950 and 1969. Preliminary decontamination of the BGRR was completed in 1972. Complete decommissioning of this facility is now being aggressively pursued. More information about this project and the associated schedules will be provided in upcoming months. ■

Deer report...

(continued from page 3)

deer meat consumed by a person in one year. (By comparison, the dose that a typical resident of North America receives from eating foods containing naturally-occurring and fallout-related radionuclides is about 40 mrem/yr.) The 64-pound figure is based on data from the U.S. Environmental Protection Agency and corresponds to two 10-ounce meals of deer meat per week.

The NYSDOH also calculates a maximum likely dose for any person of nine millirems per year, using more conservative values of cesium levels in deer and deer meat consumption. A nine-millirem exposure would require the consumption of nearly 88 pounds of deer meat per year – the equivalent of 1.7 pounds of deer meat per person every week.

These projected doses are below the 10 millirem per year guidance value established by the NYSDEC. Therefore, the NYSDEC concludes that no area hunting restrictions are needed, and no restrictions on consumption of deer har-

vested in the BNL area will be issued. The Standing for Truth About Radiation (STAR) Foundation had petitioned for deer hunting restrictions due to the presence of elevated levels of cesium-137 in deer near the Lab.

The NYSDEC will advise hunters of the presence of elevated cesium levels in deer close to BNL. Hunting on the BNL site is banned by the Laboratory because firearm possession is prohibited at federal facilities.

The public can obtain a copy of the NYSDOH report by calling 1-800-458-1158. The report is also available on the web at <http://www.esh.bnl.gov/esd/Deer/Deer.html>. ■

The progress of the Superfund cleanup at BNL is reviewed in *cleanupupdate* twice each year. These charts show the status as of June 1999. One chart is for "removal actions" (right) and the other for "operable units" (below).

The Lab's cleanup is organized into six administrative segments, each representing a geographic area of the Lab site. The soil and groundwater in the "operable units" are investigated to see if past Lab practices have left contamination with the potential to impact human health and/or the environment. If contamination is found, BNL's Environmental Restoration Division works with the federal, state and local officials, and the public, to determine the appropriate cleanup remedy.

A "removal action" occurs if contamination is found that could pose a threat to public health or the environment. The action is taken as quickly as possible to eliminate the potential threat. Five removal actions are complete and two are close to completion.

In the cleanup process, completion of a given step usually means the issuance of a major report. These reports are listed in quotation marks across the top section. Below are the actual or anticipated dates when regulators release these reports to the public. Future dates are scheduled in the "Schedules Document," which proposes the timetable for each operable unit and removal action.

These schedules, approved by the U.S. Department of Energy, the U.S. Environmental Protection Agency and the New York State Department of Environmental Conservation, are updated at least annually and may change based on the time needed to review and finalize draft reports. Also listed above the columns are the cleanup-related activities that do not result in major reports—sampling, analysis and evaluation of data and public participation—but play major roles in the cleanup process.

The completed reports listed here, as well as the Schedules Document, are available for public review as part of the "Administrative Record" of the BNL cleanup. Complete sets of the Administrative Record are available at the Lab's four information repositories. Document summaries, meeting schedules and other public participation information can be also be found at the ERD web site (www.oer.dir.bnl.gov).

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REMOVAL ACTIONS 	"Work Plan" "Health & Safety Plan" "Sampling & Analysis Plan"	Inv Field inve sampling da
Removal Action I D Tanks	completed 7/91	
Removal Action II 12 Underground storage tanks	completed 7/94	
Removal Action III Cesspools	completed 7/91	
Removal Action IV Bldg. 479 PCB soil remediation	completed 1/92	
Removal Action V OU I Groundwater removal	completed 9/92	
Removal Action VI 1. Current landfill 2. Former landfill 3. Glass holes	completed 10/93	
Removal Action VII Bldg. 464 Mercury soil remediation	completed 7/94	

OPERABLE UNITS 	Investigation/Study					"Feasibi Report" & Pl
	"Scope of Work"	"Remedial Investigation/ Feasibility Study/Work Plan" (Include "Sampling & Analysis Plan" "Health & Safety Plan")	Remedial Investigation (Field work)	"Remedial Investigation/ Risk Assessment Report"	Feasibility Study	
Operable Unit I Hazardous Waste Management Facility and site-wide radiologically contaminated soils	completed 2/92	completed 10/93 OU I 7/94 OU VI	Field work and evaluation	completed 7/96	Alternative methods of cleanup examined	comp 4/
Operable Unit II Waste Concentration Facility, AGS scrap yards, former Low-Mass Criticality Facility, contaminated landscape soils	completed 12/94	completed 1/96		completed 2/99		
Operable Unit III HFBR Tritium Potable/supply wells, spills, sewer pipes (in the central area)	completed 3/93	completed 10/94		completed 3/99 <small>Incorporates additional work on HFBR Tritium Plume</small>		comp 3/
Operable Unit IV Central Steam Facility, Reclamation Facility	completed 9/90	completed 12/91		completed 11/94 completed 11/95 addendum		comp 11
Operable Unit V Contamination related to Sewage Treatment Plant	completed 8/92	completed 3/94		completed May 98 <small>Incorporates additional sampling/study of Peconic River</small>		Fal
Operable Unit VI Ethylene dibromide (EDB) groundwater contamination	Included with OU I			Included with OU I		comp 10 "Foot Feasibi

Refund Process at BNL

Investigation/Study	Decision	Design	Cleanup	Closure		
Investigation, & analysis data	"Engineering Evaluation/ Cost Analysis"	Public participation, press releases, public notices, information meetings	"Action Memorandum" (Includes comments & responses in "Responsiveness Summary")	Design phase of Remedial Action	Begin actual cleanup	"Closeout Report"
completed 7/93	completed 9/93	completed 8/94	8/94	12/95	On-going	DONE
N/A	N/A	completed 3/95	7/95	4/96		DONE
completed 2/94	completed 3/94	completed 4/94	7/95	Summer 99*		
N/A	N/A	N/A	5/92	3/93 Immediate removal action		DONE
completed 12/95	completed 12/96	completed 5/96	5/96 Initiated public water hook-up 12/96 Initiated ground-water cleanup	12/96		DONE
completed 4/95 Current & Former landfill closure	1. completed 12/94	completed 7/94	5/95	6/96		DONE
completed 4/97 "Evaluation of Alternatives Report for Glass Holes"	2. completed 7/95	completed 8/95	5/96	3/97		DONE
	3. completed 5/97	completed 11/96	5/97	Summer 99*		DONE
N/A	completed 2/95	N/A	7/94	2/95 Immediate removal action	DONE	

Investigation/Study	Decision	Design	Action		
"Proposed Remedial Action"	Public participation, press releases, public notices, information meetings	Public meeting	Record of public comments & responses in "Responsiveness Summary" (Included in ROD)		
Record of Decision (ROD)	Begin design phase of remedial action	Begin actual cleanup			
completed 9/99	completed 4/99	Summer 99*	Summer 99*	Fall 99*	Summer 00*
Evaluation of alternatives and cleanup transferred to OU I (To allow for a consolidated effort to clean up all site-wide radiologically contaminated soils.)					
completed 9/99	completed 3/99	Fall 99*	Fall 99*	1999*	Summer 00* Interim cleanup systems operational 6/97, 7/99
completed 1/95	completed 12/95	completed 3/96	completed 3/96	5/97	11/97 Interim soil cleanup completed 1994
completed 1/99*	Fall/Winter 99*	Fall/Winter 99*	Fall/Winter 99*	Fall/Winter 99*	Spring/ Summer 00* Imhoff tanks cleanup completed early 1996
completed 1/96 used in Remedial Action Study	completed 11/96	Included with OU I		8/96	Public water hookups completed

* Anticipated dates

Lab Publishes 1997 Site Environmental Report

1997 Superfund highlights

- 55 former waste pits excavated
- Last of three landfills on site was capped
- Two ground-water treatment systems installed at Lab's southern boundary
- Soil/ground-water treatment system constructed to remove remnants of 1977 oil spill

On March 5, Brookhaven National Laboratory published its Site Environmental Report for the year 1997. This report presents the results of Brookhaven's environmental monitoring program for that calendar year and provides an assessment of the Lab's environmental performance. The data in the report demonstrate that the Laboratory was in full compliance with the federal Clean Air and Clean Water Acts during 1997.

Highlights of the report include the following:

- In 1997, pollution prevention and waste minimization efforts continued to pay dividends at the Laboratory. For example, the Lab's photography shop converted to digital processing, which significantly reduced the need for photo developing chemicals. Hazardous waste production by Brookhaven's vehicle maintenance group has been completely eliminated through measures such as recycling of oil and batteries, as well as the use of nonhazardous cleaning products. Also, a scrap-metal compactor purchased in 1997 will reduce the volume of metallic waste generated by the Lab, thereby reducing disposal costs by an estimated \$170,000 per year.

- In 1997, the compliance rate for liquid discharges from Brookhaven's sewage treatment plant (a discharge point regulated by the New York State Department of Environmental Conservation) was greater than 99%. Tritium concentrations in the sewage treatment plant discharges were at their lowest levels since routine monitoring began in 1966. The average tritium concentration in released water was less than seven percent of the drinking water standard set by the U.S. Environmental Protection Agency (EPA). For surface water

samples in the Peconic River, all water quality measurements were consistent with off-site control locations and, with the exception of iron, met the N.Y. State drinking water standards. (High levels of iron are common in the region.)

- As has been reported in previous years, tritium was found in eight private wells east of the Lab. The highest tritium level measured in 1997 was about one-ninth of the EPA drinking water standard. The homeowners were informed of all testing results. These homes were included in the public water hookup area established by the Department of Energy in 1996 as a precautionary measure to ensure that residents would not be exposed to chemical contaminants. The maximum expected radiation dose to a person drinking water from one of these wells is 0.1 millirem per year. (A millirem is 1/1000th of a rem.) This is well below the EPA limit of 4 millirems per year from drinking water.

- In 1997, Brookhaven collected over 1,100 air samples on site to monitor airborne radioactive elements, primarily tritium. Results showed that levels were well within federal standards. A person standing at the Laboratory boundary 24 hours a day for an entire year would receive a radiation dose of 0.07 millirem. This dose is well below the EPA's standard of 10 millirems for the air pathway.

- Extensive characterization of the High Flux Beam Reactor spent fuel pool tritium plume was begun in 1997. This characterization included the installation of more than 100 temporary monitoring wells and the analysis of more than 1,800 groundwater samples. An interim groundwater extraction system was constructed to prevent tritium from leaving the Lab site at levels above the drinking water standard. Water was removed from the spent fuel pool in December 1997, eliminating the source of the tritium. The plume continues to

(see next page)

be addressed under the Lab's environmental cleanup program.

Other areas of the Brookhaven site where past activities have caused groundwater, soil and sediment contamination continued to undergo monitoring and cleanup in 1997 under the environmental restoration program. This program is conducted in cooperation with the N.Y. State Department of Environmental Conservation, the U.S. Environmental Protection Agency and the U.S. Department of Energy.

The 1997 BNL Site Environmental Report can be viewed at local libraries (see page 11 for locations). A copy of the report or a 12-page summary booklet can be obtained by calling (516) 344-2345. The report is also available on the web at <http://www.esh.bnl.gov/esd/1997ser.htm>. The summary booklet is available on the web at <http://www.bnl.gov>. ■



Peconic sampling...

(continued from page 5)

Environmental Protection Agency. Because credibility of the results is important to the community and to the Lab, samples were split with these agencies so they could independently verify Brookhaven's results.

Community participation

On March 23, Brookhaven provided a tour of the proposed split sampling sites to the Commissioner of the SCDHS and other SCDHS representatives, the Peconic Bay Keeper, Department of Energy representatives and members of the county's Community Oversight Committee. The Community Oversight Committee was formed by the Suffolk County legislature to provide advice on plans by the SCDHS to sample the Peconic and Carmans rivers for radionuclides.

Sampling of locations on Brookhaven property began on March 25. On April 12, the first day of sediment sampling in the Peconic River, two members of the Community Oversight Committee accompanied the Brookhaven Lab team to observe the sampling process. A representative of the Town of Riverhead was present for two days to observe the sampling in the Riverhead region. Also, a member



A member of the BNL sampling team collects sediments from the Peconic River. Surface water samples were also taken from both the Peconic and Connetquot rivers.

of the Ridge Civic Association observed a portion of the sampling.

Representatives of SCDHS observed the sampling of all locations from which splits were shared with the county. Similarly, a representative from NYSDEC was present during sampling of all locations from which splits were shared with the state. A representative from the Department of Energy's Environmental Measurements Laboratory was present during numerous sampling activities in order to observe sampling procedures. ■



Workers installing one of the off-site groundwater treatment wells south of the Lab. Groundwater will be treated within the well by blowing air through the water to “strip out” the volatile organic compounds.

Remediation roundup

The Laboratory currently has three treatment systems operating 24 hours a day to clean up groundwater on the site. The following is an update on the total amounts of groundwater treated by each system and the amount of contaminants removed from the sole-source aquifer.

- **Removal Action V Pump-and-Treat System (operating since 12/96):**
 - 700,000,000 gallons of groundwater treated by air stripper and recharged
 - 180 pounds of VOCs removed
- **Operable Unit III Pump-and-Treat System (operating since 6/97):**
 - 575,000,000 gallons of groundwater treated by air stripper and recharged
 - 840 pounds of VOCs removed
- **Tritium Remediation System (operating since 5/97)**
 - 100,000,000 gallons of water treated by carbon filters (to remove VOCs) and recharged
 - 50 pounds of VOCs removed
 - Further southward movement of High Flux Beam Reactor tritium plume curtailed

To date, more than 1.3 billion gallons of groundwater have been treated, and more than 1,000 pounds of contaminants have been removed from the sole source aquifer.

BLIP...

(continued from page 2)

both of which have been found in groundwater on Lab property near BLIP, are longer-lived and therefore have a greater potential to affect groundwater.

Brookhaven has responded to soil activation under the BLIP in a number of ways. The Lab re-routed rainwater downspouts on the BLIP building and placed a cap over the BLIP target area to prevent rainwater from draining through contaminated soils and moving radionuclides into the groundwater. Also, BNL has more thoroughly characterized groundwater in the area by taking additional groundwater samples in thirteen separate locations.

To effectively protect groundwater beneath BLIP, a number of removal action alternatives are being evaluated, including upgrading the existing cap over the soil, containing the soil in place by injecting a grout into the ground, and excavating the activated soil. After weighing all of the key factors, the best remedy will be proposed. As part of BNL's groundwater monitoring program, six permanent monitoring wells will be installed near BLIP in 1999.

When the BLIP report is released, the public will have 30 days to review the proposed action and express their preference for one of the proposed alternatives. ■

Libraries and reports

All reports from BNL's Environmental Restoration Division are available at:

Longwood Public Library
800 Middle Country Road
Middle Island NY 11953
516-924-6400

Mastics-Moriches-Shirley
Community Library
301 William Floyd Parkway
Shirley NY 11967

BNL Research Library
Building 477A
Brookhaven Avenue
Upton NY 11973
516-344-3483

U.S. EPA Region II Library
Administrative Records Room
290 Broadway
New York NY 10007-1866
212-637-4296

What's new in the libraries:

- ***Operable Unit I Feasibility Study Report*** (Indexed as BNL/OU1/11.4/95-1735)
- ***Operable Unit I Proposed Plan*** (Indexed as BNL/OU1/11.5/1-38)
- ***Operable Unit II/VII Remedial Investigation/Risk Assessment Report*** (Indexed as BNL/OU2/10.7/1-2262)
- ***Operable Unit III Remedial Investigation/Risk Assessment Report*** (Indexed as BNL/OU3/10.7/1-3382)
- ***Operable Unit III Feasibility Study Report*** (Indexed as BNL/OU3/11.4/616-2921)
- ***Operable Unit III Proposed Plan*** (Indexed as BNL/OU3/11.5/1-46)
- ***Action Memorandum: Carbon Tetrachloride Tank Groundwater Removal Action*** (Indexed as BNL/OU3/11.4/593-615)
- ***Action Memorandum: Building 830 Underground Storage Tanks Removal Action*** (Indexed as BNL/OU3/11.4/2922-2937)
- ***Operable Unit V Plutonium Contamination Characterization Sampling and Analysis Plan*** (Indexed as BNL/OU5/10.3/353-540)

