

Attachment 6

Land Use and Institutional Controls

Fact Sheets

(These are uncontrolled copies. Controlled versions of these factsheets are available at <http://luic.bnl.gov/website/landcontrols/>)

Land Use Controls Mapping

BROOKHAVEN
NATIONAL LABORATORY

Factsheet: AGS Storage Yard 1 (AOC 18) (B3)

History:

The Alternating Gradient Synchrotron (AGS) storage yards (Area of Concern 18) hold steel and equipment that is being stored for potential reuse within the Collider-Accelerator facility complex. The largest of the two yards, Yard 1 adjacent to Building 922, is divided into two sections 1a and 1b and is currently used to store activated steel and equipment. Yard 2, which is no longer in use, was used primarily to store non-contaminated steel but was found to contain contaminated materials.

Since these materials were stored on soil in unsheltered yards, concerns were raised that rusting/oxidizing metals could contaminate soils within the yards.

Remedial Action:

A number of soil samples were collected from the storage yards. No radiological or chemical contamination at levels of concern to human health or the environment was found. The OU I Record of Decision specified implementation of institutional controls and monitoring. No remediation of the soil was required. The Collider Accelerator Department is currently in the process of transferring material storage operations to a new, enclosed facility.

Current Conditions: Yards 1a and 1b are currently being used for storage by the AGS Department and are fenced and posted radiological control areas. Yard 2 is vacant, open and not posted. (See Factsheet A8, for LU/IC information on Yard 2.) No significant levels of radiological materials above background were found in the soil. The Maximum concentration of Cs-137 was 0.51 pCi/gm. Residual chemical contaminants meet Federal and State guidelines for public exposure.

Land Use and Institutional Controls:

Land Use Classification: Remediation Complete – Restricted (B)

- Currently suitable for Industrial Use.
- Use of the site for residential purposes requires an additional evaluation/risk assessment, and appropriate DOE/regulatory agency approval.

Institutional Controls

Access:

- ◆ Site Security Limits public access to the BNL Site.
- ◆ The area is fenced and posted as a radiological controlled area.

Land Use:

- ◆ Federal ownership and control of the site is expected to continue.
- ◆ The Land Use and Institutional Controls Program Description in SBMS interfaces with the Site Master Planning process.

Engineered Controls:

- ◆ None.

Administrative Controls:

- ◆ Work Planning: Any work in these areas shall be coordinated with the Work Planning and Control Procedure.
- ◆ Ownership: Any transfer of this site from DOE ownership must meet the requirements of CERCLA 120(h).
- ◆ Change Management: Proposed changes to land use and ICs must be coordinated with DOE, NYSDEC and EPA in accordance with the LUCMP prior to implementation and reported annually to the DOE, NYSDEC and EPA.
- ◆ Reporting: Breaches of Institutional and Engineered Controls must be reported to the LTRA Manager immediately upon discovery.
- ◆ Reporting: Implementation, maintenance and changes to land use and institutional controls will be documented in an annual

letter report submitted to DOE, NYSDEC and EPA.

- ◆ **Reporting:** Five Year Reviews will be prepared and submitted to the DOE, EPA and NYSDEC. The Five Year Review will include inspections and a summary of site conditions to assure that ICs are working.
- ◆ **Monitoring and Maintenance:** Details on required monitoring and maintenance can be obtained from the LTRA Manager.

Other:

- ◆ Restoration of the scrap yard shall be incorporated in the facility plan for decommissioning the area (see SBMS Subject Area "Storage and Transfer of Hazardous and Non-Hazardous Materials").
- ◆ Any excavated soils shall be returned to the site and covered as found. If soil cannot be returned, the procedure FS-SOP-1005, Release of Material from Areas Controlled for Radiological Purposes must be followed. The waste soils must be managed in accordance with all Waste Management procedures, and the Environmental and Waste Management Services Division shall review all work requiring the disposal of soil wastes at an approved facility.

Facility Use Agreements:

<https://shms.bnl.gov/private/fua/fof/fofd011.htm> (BNL Internal Use Only)

References:

Operable Units II/VII Remedial Investigation Report. IT Corp. February 1999.

Final Feasibility Study Report Operable Unit I and Radiologically-Contaminates Soils. CDM Federal Programs Corp. March 31, 1999.

Record of Decision Operable Unit I and Radiologically Contaminated Soils (Including Areas of Concern 6,8,10,16,17, and 18). USDOE and BNL. August 25, 1999.

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Land Use Controls Mapping

BROOKHAVEN
NATIONAL LABORATORY

Factsheet: AGS Storage Yard 2 (AOC18) ^(A7)

History:

The Alternating Gradient Synchrotron (AGS) storage yards (Area of Concern 18) hold steel and equipment that is being stored for potential reuse within the Collider–Accelerator facility complex. The largest of the two yards, Yard 1 adjacent to Building 922, is divided into two sections 1a and 1b and is currently used to store activated steel and equipment. Yard 2, which is no longer in use, was used primarily to store non-contaminated steel but was found to contain contaminated materials.

Since these materials were stored on soil in unsheltered yards, concerns were raised that rusting/oxidizing metals could contaminate soils within the yards.

Remedial Action:

A number of soil samples were collected from the storage yards. No radiological or chemical contamination at levels of concern to human health or the environment was found. The OU 1 Record of Decision specified implementation of institutional controls and monitoring. No remediation of the soil was required. The Collider Accelerator Department is currently in the process of transferring material storage operations to a new, enclosed facility.

Current Conditions: Yards 1a and 1b are currently being used for storage by the AGS Department and are fenced and posted radiological control areas. Yard 2 is vacant, open and not posted. No significant levels of radiological materials above background were found in the soil.

Land Use and Institutional Controls:

Land Use Classification: Remediation Complete – Unrestricted (A)

- The site has been remediated to a residential use standard, but is currently used for industrial purposes
- With appropriate DOE/regulatory agency approval, the site can be used for residential purposes once industrial activities have ended.

Institutional Controls

Access:

- Site Security Limits public access to the BNL Site.

Land Use:

- Federal ownership and control of the site is expected to continue.
- The Land Use and Institutional Controls Program Description in SBMS interfaces with the Site Master Planning process.

Engineered Controls:

- None.

Administrative Controls:

- **Work Planning:** Any work in these areas shall be coordinated with the Work Planning and Control Procedure.
- **Ownership:** Any transfer of this site from DOE ownership must meet the requirements of CERCLA 120(h).
- **Change Management:** Proposed changes to land use and ICs must be coordinated with DOE, NYSDEC and EPA in accordance with the LUCMP prior to implementation and reported annually to the DOE, NYSDEC and EPA.
- **Reporting:** Breaches of Institutional and Engineered Controls must be reported to the LTRA Manager immediately upon discovery.
- **Reporting:** Implementation, maintenance and changes to land use and institutional controls will be documented in an annual letter report submitted to DOE, NYSDEC and EPA.
- **Reporting:** Five Year Reviews will be prepared and submitted to the DOE, EPA and NYSDEC. The Five Year Review will include inspections and a summary of site conditions to assure that ICs are working.

- Monitoring and Maintenance: Details on required monitoring and maintenance can be obtained from the LTRA Manager.

Other:

- None.

Facility Use Agreements:

<https://sfms.bnl.gov/private/fua/fa0f/fa0fd011.htm> (BNL Internal Use Only) (BNL Internal Use Only)

References:

Operable Units II/VII Remedial Investigation Report. IT Corp. February 1999.

Final Feasibility Study Report Operable Unit I and Radiologically-Contaminated Soils. CDM Federal Programs Corp. March 31, 1999.

Record of Decision Operable Unit I and Radiologically Contaminated Soils (Including Areas of Concern 6,8,10,16,17, and 18). USDOE and BNL. August 25, 1999.

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Land Use Controls Mapping

BROOKHAVEN
NATIONAL LABORATORY

Factsheet: Alternating Gradient Synchrotron (AGS) g-2/VQ12 Source Area (AOC 16T) (CS)

History:

The g-2 experiment of the Alternating Gradient Synchrotron (AGS) facility operated from 1997 through 2001. Prior to the start of the experiment, BNL constructed a gunite (cement) cap over the beam stop area, the designed beam loss area. During beam line operation, activation of the soils immediately outside of the beam stop was expected due to the creation of secondary particles produced at the stop. The primary radionuclides of concern in the activated soils are tritium and sodium-22.

In November 1999, BNL discovered tritium in groundwater downgradient of the g-2 beam line at concentrations exceeding the 20,000 pCi/L drinking water standard. Sodium-22 was also detected, but at levels below the 400 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 experiment's VQ 12 magnet in the experimental beam line. It was determined that VQ 12 area was not protected by the existing beam stop cap, and that the structures over the VQ 12 area were not effectively controlling stormwater infiltration. The activated soil shielding and the tritium plume were designated Area of Concern 16T under the BNL Environmental Restoration Program.

Controls for other BNL accelerator facility beam loss areas are described in Fact Sheet C6.

Remedial Action:

In December 1999, BNL installed a gunite cap over the VQ 12 magnet region of the beam line. This cap was joined to the previously installed cap over the nearby g-2 beam stop. The groundwater monitoring well network was expanded for improved surveillance of the tritium plume and to verify the effectiveness of the controls.

Current Conditions: The area over the VQ12 source area is capped and the contamination is located well below the land surface. Therefore, there is little chance for workers, visitors and animals to come in contact with the contaminated soil shielding.

Land Use and Institutional Controls:

Land Use Classification: Capped/Controlled Contaminated Soils – Restricted (C)

- BNL accelerator facilities are in active industrial use.
- Additional evaluation/risk assessment and appropriate DOE/regulatory agency approval are required prior to release for unrestricted use.

Institutional Controls

Access:

- ◆ Site Security Limits public access to the BNL Site.
- ◆ The g-2/VQ12 source area is fenced and posted. Access to the beam line tunnel is restricted.
- ◆ Because the activated soil shielding is located far below land surface, site workers; visitors and wildlife are not exposed to the contamination.

Land Use:

- ◆ Federal ownership and control of the site is expected to continue.
- ◆ The Land Use and Institutional Controls Program Description in SBMS interfaces with the Site Master Planning process.

Engineered Controls:

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Administrative Controls:

- ◆ **Work Planning:** Any work in these areas shall be coordinated with the Work Planning and Control Procedure.
- ◆ **Ownership:** Any transfer of this site from DOE ownership must meet the requirements of CERCLA 120(h).
- ◆ **Change Management:** Proposed changes to land use and ICs must be coordinated with DOE, NYSDEC and EPA in accordance with the LUCMP prior to implementation and reported annually to the DOE, NYSDEC and EPA.
- ◆ **Reporting:** Breaches of Institutional and Engineered Controls must be reported to the LTRA Manager immediately upon discovery.
- ◆ **Reporting:** Implementation, maintenance and changes to land use and institutional controls will be documented in an annual letter report submitted to DOE, NYSDEC and EPA.
- ◆ **Reporting:** Five Year Reviews will be prepared and submitted to the DOE, EPA and NYSDEC. The Five Year Review will include inspections and a summary of site conditions to assure that ICs are working.
- ◆ **Monitoring and Maintenance:** Details on required monitoring and maintenance can be obtained from the LTRA Manager.

Other:

- ◆ Without written authorization, no activities shall be permitted in the g-2/VQ12 source area that could compromise the integrity of the impermeable caps and stormwater management systems.
- ◆ Any excavated soil shielding must be characterized, managed in accordance with all Waste Management procedures. If soil cannot be returned to the g-2/VQ12 source area for reuse, the procedure FS-SOP-1005, Release of Material from Areas Controlled for Radiological Purposes must be followed. The Environmental and Waste Management Services Division shall review all work requiring the disposal of soil wastes at an approved facility.

Facility Use Agreements:

<https://shms.bnl.gov/private/fua/fa0f/fa0fd011.htm> (BNL Internal Use Only)

References:

Work Plan Characterization and Monitoring of the g-2 Tritium Plume Area AOC 16T. January 24, 2003.

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Land Use Controls Mapping

BROOKHAVEN
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Factsheet: Ash Pits (AOC 2F) (C)

History:

The Ash Pits (Area of Concern 2F), received ash and slag from a solid waste incinerator used from World War I to the early 1950's. The Ash Pits were also used for disposal of coal ash from various buildings throughout BNL until 1963. The site occupies approximately 3 acres and is located north and south of East Princeton Avenue and west of Grove Street. According to BNL staff, fill material was deposited on top of the Ash Pits along the north and south sides of East Princeton Avenue in order to build up the road. A portion of the northeast area of the Ash Pits was covered with concrete debris from concrete trucks dumping residual loads. In the late 1990's, the section of East Princeton Avenue that bisects the Ash Pits was raised approximately 10 feet to prevent rainwater runoff from ponding on the road. Also, to mitigate erosion, the north section of the Ash Pits was re-graded, re-vegetated with grass, and 4-inch stone rip-rap was placed in two locations. The northern and southern portions are vegetated with trees, shrubs, and grasses. The ash is currently located below a few inches to 10 feet of clean fill material.

Analysis of the ash pit wastes indicates the presence of lead, copper, and zinc at concentrations above site background levels. Lead was detected in amounts greater than 400 mg/kg in eight of the samples, with a maximum of 2,100 mg/kg. Barium and arsenic were concentrated in the ash up to ten times above site background concentrations, and selenium and chromium were detected above site background in almost all samples. Other contaminants of concern, which included aluminum, cadmium, beryllium, manganese, thallium, and vanadium, were present at concentrations exceeding site background in some samples.

Some radionuclides were also detected above background levels. Cesium-137 was detected in one sample at a concentration of 2.1 pCi/g (which is slightly above the site background concentration of 1.5 pCi/g), and strontium-90 was present at a maximum concentration of 1.5 pCi/g (which is five times above the site background concentration of 0.3 pCi/g).

Remedial Action:

Additional remediation on the filled northern portion of the ash pit was not required. Remediation of the ash pit on the southern portion required removal of some trees, backfilling of soil to even out the grade, covering the site with 12-inches of topsoil, and finally reseeded of the area with native grasses. The Ash Pit area has been covered with clean fill to prevent site workers, visitors, and wildlife from being exposed to the subsurface contamination.

Radionuclide concentrations were below the target risk range for all future uses, including residential use. The maximum lead concentration of 2,100 mg/kg exceeded the soil screening level of 400 mg/kg for unlimited use.

Land Use and Institutional Controls:

Land Use Classification: Capped/Controlled Contaminated Soils – Restricted (C)

- Industrial and residential uses of the site are currently prohibited due to buried contaminated materials.
- Recreational and open space uses of the site may be permitted with appropriate DOE/regulatory agency approval.
- Additional evaluation/risk assessment and appropriate DOE/regulatory agency approval are required prior to release for unrestricted use.

Institutional Controls

Access:

- ◆ Site Security Limits public access to the BNL Site.

Land Use:

- ◆ Federal ownership and control of the site is expected to continue.
- ◆ The Land Use and Institutional Controls Program Description in SBMS interfaces with the Site Master Planning process.

Engineered Controls:

- ◆ The Ash Pit area has been covered with clean fill and seeded to prevent site workers, visitors, and wildlife from being exposed to the subsurface contamination.

Administrative Controls:

- ◆ Work Planning: Any work in these areas shall be coordinated with the Work Planning and Control Procedure.
- ◆ Ownership: Any transfer of this site from DOE ownership must meet the requirements of CERCLA 120(h).
- ◆ Change Management: Proposed changes to land use and ICs must be coordinated with DOE, NYSDEC and EPA in accordance with the LUCMP prior to implementation and reported annually to the DOE, NYSDEC and EPA.
- ◆ Reporting: Breaches of Institutional and Engineered Controls must be reported to the LTRA Manager immediately upon discovery.
- ◆ Reporting: Implementation, maintenance and changes to land use and institutional controls will be documented in an annual letter report submitted to DOE, NYSDEC and EPA.
- ◆ Reporting: Five Year Reviews will be prepared and submitted to the DOE, EPA and NYSDEC. The Five Year Review will include inspections and a summary of site conditions to assure that ICs are working.
- ◆ Monitoring and Maintenance: Details on required monitoring and maintenance can be obtained from the LTRA Manager.

Other:

- ◆ Without written authorization, no activities shall be permitted in the Ash Pit areas that could compromise the integrity of the vegetative caps.

Facility Use Agreements:

N/A (BNL Internal Use Only)

References:

Final Engineering Evaluation/Cost Analysis for Landfill Closure Removal Action VI. CDM Federal Programs Corp. Vol. 1 2. March, 1995.

Final Feasibility Study Report Operable Unit I and Radiologically-Contaminated Soils. CDM Federal Programs Corp. March 31, 1999.

Record of Decision Operable Unit I and Radiologically Contaminated Soils (Including Areas of Concern 6,8,10,16,17, and 18). USDOE and BNL. August 25, 1999.

Final Close Out Report for the Ash Pit OU I AOC 2F. BNL Environmental Management Directorate. February 5, 2004.

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Land Use Controls Mapping

BROOKHAVEN
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Factsheet: Brookhaven Graphite Research Reactor (F1)

History:

The Brookhaven Graphite Research Reactor (BGRR) was the world's first research reactor constructed solely for the peaceful use of atomic energy. The BGRR operated from 1950 to 1968. The BGRR produced large quantities of neutrons which were used for research in numerous scientific fields. Nuclear physicists used them to probe the centers of atoms. Solid-state physicists used neutrons to study the locations and motions of atoms in materials. Chemists used neutrons to examine many properties of matter. Biologists and medical physicists used neutrons to study the effects of radiation on organic tissues and to create radioisotopes for medical research and treatment.

Remedial Action:

The BGRR decommissioning will be accomplished through CERCLA Removal Actions. A variety of techniques will be used to achieve desired cleanup levels, such as:

Decontamination: In some cases, contamination can be removed by cleaning surfaces or removing equipment or structures.

Fixing or isolating contaminants: It is sometimes possible to apply coatings or other treatments that stabilize or fix contaminants in place. Also, contaminated areas can be enclosed or sealed off from the environment.

Demolition and dismantlement: Decommissioning can involve tearing down structures and taking apart equipment.

Building conversion and reuse: If buildings are left in place, they can sometimes be converted for other uses after cleanup is completed.

The particular actions to be taken at the BGRR will be chosen after a detailed evaluation of alternatives. This evaluation and the proposed course of action will be presented for public review and input. The selected course of action, upon approval by the U.S. Environmental Protection Agency and the New York State Department of Environmental Conservation, will be documented in a Record of Decision that is placed in the Administrative Record. Waste generated from the DDprocess will be disposed of at a licensed off-site facility.

Land Use and Institutional Controls:

Land Use Classification: Radiological Facility, Restricted Use (F)

- The BGRR is an inactive radiological facility.
- Future land use scenarios to be determined.
- A risk assessment and appropriate DOE/regulatory agency approval are required prior to release for unrestricted use.

Institutional Controls

Access:

- ◆ Site Security Limits public access to the BNL Site.
- ◆ The BGRR Building and associated structures are posted Radiologically Controlled areas, and access to these structures is restricted to authorized personnel.

Land Use:

- ◆ Federal ownership and control of the site is expected to continue.
- ◆ The Land Use and Institutional Controls Program Description in SBMS interfaces with the Site Master Planning process.

Engineered Controls:

- ◆ BGRR Building is used for containment.
- ◆ Exterior areas that underwent soil remediation were backfilled with clean soil and paved.

Administrative Controls:

- ◆ Work Planning: Any work in these areas shall be coordinated with the Work Planning and Control Procedure.
- ◆ Ownership: Any transfer of this site from DOE ownership must meet the requirements of CERCLA 120(h).

- ◆ **Change Management:** Proposed changes to land use and ICs must be coordinated with DOE, NYSDEC and EPA in accordance with the LUCMP prior to implementation and reported annually to the DOE, NYSDEC and EPA.
- ◆ **Reporting:** Breaches of Institutional and Engineered Controls must be reported to the LTRA Manager immediately upon discovery.
- ◆ **Reporting:** Implementation, maintenance and changes to land use and institutional controls will be documented in an annual letter report submitted to DOE, NYSDEC and EPA.
- ◆ **Reporting:** Five Year Reviews will be prepared and submitted to the DOE, EPA and NYSDEC. The Five Year Review will include inspections and a summary of site conditions to assure that ICs are working.
- ◆ **Monitoring and Maintenance:** Details on required monitoring and maintenance can be obtained from the LTRA Manager.

Other:

- ◆ Any excavated soils from below or surface soils adjacent to the BGRR structure shall be returned to the site and covered as found. If soil cannot be returned, the procedure FS-SOP-1005, Release of Material from Areas Controlled for Radiological Purposes must be followed. The waste soils must be managed in accordance with all applicable Waste Management procedures, and the Environmental and Waste Management Services Division shall review all work requiring the disposal of soil wastes at an approved facility.
- ◆ Any activities involving the BGRR are subject to the National Historic Preservation Act (NHPA), and must be reviewed as part of the National Environmental Policy Act (NEPA) process to determine whether a proposed action could impact features that extend NHPA eligibility to this facility.

Please refer to the BCRR Boundary Complex Area picture from the final BGRR Record of Decision dated January 31, 2005 for more detailed information about the land use and institutional controls for this area.

Facility Use Agreements:

<https://sbms.bnl.gov/private/fuu/fa6b/fa6hd011.htm> (BNL Internal Use Only)

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Land Use Controls Mapping

BROOKHAVEN
NATIONAL LABORATORY

Factsheet: Brookhaven LINAC Isotope Producer (BLIP) (AOC 16K) (C-1)

History:

The BLIP facility has been in operation since 1972. Radionuclides produced at BLIP are processed for pharmaceutical and medical imaging applications. The BLIP targets are located at the bottom of a 30-foot underground tank. During target irradiation, several radionuclides are produced in the cooling water, and activation of the soils immediately occurs outside of the tank due to the creation of secondary particles produced at the target. The types of radionuclides created in the soils include tritium, beryllium-7, carbon-11, nitrogen-13, oxygen-15 and sodium-22. Once present in the soils, some of these radionuclides can be leached downward into groundwater by means of rainwater percolation. These leaching processes are usually quite slow and, therefore, only radionuclides with long half-lives such as tritium (half life of 12.3 years) and sodium-22 (half life of 2.6 years) are likely to be detected in groundwater.

In late 1998, BNL detected tritium in the groundwater downgradient of the BLIP facility at concentrations that exceeded the 20,000 pCi/L drinking water standard. Sodium-22 was also detected, but at concentrations below the 400 pCi/L drinking water standard. A subsequent investigation determined that tritium and sodium-22 were being leached from the activated soils by rainwater that was infiltrating the soils surrounding the BLIP building.

Remedial Action:

Starting in December 1998, BNL made improvements to the stormwater management program at BLIP in an effort to prevent rainwater infiltration of the activated soils below the building. The BLIP building's roof drains were redirected away from the building, paved areas were resealed, and an extensive gunite (cement) cap was installed on three sides of the building. In May-June 2000, BNL undertook additional protective measures by injecting a colloidal silica grout into the activated soils. The grout reduces the permeability of the soils, thus reducing the potential for rainwater to leach radionuclides out of the soils should one of the surface stormwater controls fail. The groundwater monitoring well network was also expanded for improved surveillance of the tritium plume and to verify the effectiveness of the controls.

Current Conditions: The Medical Department currently operates BLIP, which is a posted and controlled radiological area. Levels of primary radiological contaminants of concern (Tritium and Na-22) above background found in the subsurface soil are contained and subject to radioactive decay. Because the activated soil shielding is located far below land surface, site workers; visitors and wildlife are not exposed to the contamination.

Land Use and Institutional Controls:

Land Use Classification: Capped/Controlled Contaminated Soils - Restricted (C)

- BNL accelerator facilities are in active industrial use.
- Additional evaluation/risk assessment and appropriate DOE/regulatory agency approval are required prior to release for unrestricted use.

Institutional Controls

Access:

- ♦ Site Security Limits public access to the BNL Site.
- ♦ Access to the LINAC to BLIP beam line is restricted.
- ♦ Because the activated soil shielding is located far below land surface, site workers; visitors and wildlife are not exposed to the contamination.

Land Use:

- ♦ Federal ownership and control of the site is expected to continue.
- ♦ The Land Use and Institutional Controls Program Description in SBMS interfaces with the Site Master Planning process.

Engineered Controls:

- ♦ Stormwater infiltration in the BLIP area is controlled by a combination of roof drains and capping materials, including asphalt, concrete, and gunite.

- ◆ The activated soil shielding was impregnated with a colloidal silica grout to reduce its permeability.

Administrative Controls:

- ◆ **Work Planning:** Any work in these areas shall be coordinated with the Work Planning and Control Procedure.
- ◆ **Ownership:** Any transfer of this site from DOE ownership must meet the requirements of CERCLA 120(h).
- ◆ **Change Management:** Proposed changes to land use and ICs must be coordinated with DOE, NYSDEC and EPA in accordance with the LUCMP prior to implementation and reported annually to the DOE, NYSDEC and EPA.
- ◆ **Reporting:** Breaches of Institutional and Engineered Controls must be reported to the LTRA Manager immediately upon discovery.
- ◆ **Reporting:** Implementation, maintenance and changes to land use and institutional controls will be documented in an annual letter report submitted to DOE, NYSDEC and EPA.
- ◆ **Reporting:** Five Year Reviews will be prepared and submitted to the DOE, EPA and NYSDEC. The Five Year Review will include inspections and a summary of site conditions to assure that ICs are working.
- ◆ **Monitoring and Maintenance:** Details on required monitoring and maintenance can be obtained from the LTRA Manager.

Other:

- ◆ Without written authorization, no activities shall be permitted in the BLIP area that could compromise the integrity of the impermeable caps and stormwater management systems.
- ◆ Any excavated soil shielding must be characterized, managed in accordance with all Waste Management procedures. If soil cannot be returned to the BLIP site for reuse, the procedure FS-SOP-1005, Release of Material from Areas Controlled for Radiological Purposes must be followed. The Environmental and Waste Management Services Division shall review all work requiring the disposal of soil wastes at an approved facility.

Facility Use Agreements:

<https://sbms.bnl.gov/private/fua/fa4k/fa4kd011.htm> (BNL Internal Use Only)

References:

Operable Units II/VII Remedial Investigation Report. IT Corp. February 1999.

Final Feasibility Study Report Operable Unit I and Radiologically-Contaminated Soils. CDM Federal Programs Corp. March 31, 1999.

Action Memorandum, Brookhaven LINAC Isotope Producer (BLIP) Removal Action. Brookhaven National Laboratory and USDOE. March 10, 2000.

Brookhaven LINAC Isotope Producer (BLIP) Closeout Report, Removal action Area of Concern 16K. Environmental Management Directorate and Environmental Sciences Division. November 14, 2001.

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Land Use Controls Mapping

BROOKHAVEN
NATIONAL LABORATORY

Factsheet: Bubble Chamber Spill Area (AOC 14) (B12)

History:

The Bubble Chamber Spill Area (AOC 14) was used for the temporary storage of drum and liquid filled scintillation counters. Scintillation oil is mainly composed of mineral oil and trimethylbenzene. Several documented spills of scintillation oil and transformer oil occurred in this area. A July 1989 pipe break resulted in the release of approximately 15 to 20 gallons of scintillation oil to the ground. Most of the free oil and associated contaminated soils were remediated. In August 1987, approximately 100 gallons of transformer oil leaked onto the pavement. The oil contained the PCB Aroclor 1260 at a concentration of 15 ppm. Most of the oil was contained on the pavement, but a small amount was reported to have reached adjacent soils.

Remedial Action:

The Bubble Chamber Spill area was evaluated as part of the Operable Unit III Remedial Investigation and documented in the OU III ROD. Cesspools and septic tanks were removed as part of Removal Action III. Groundwater treatment and monitoring were performed to meet remediation goals.

Land Use and Institutional Controls:

Land Use Classification: Remediation Complete -- Restricted Use (B)

- The area has been remediated to an industrial use standard.
- Low-levels of residual chemical contamination might be present in some areas. Use of the site for residential purposes requires an additional evaluation/risk assessment and appropriate DOE/regulatory agency approval.

Institutional Controls

Access:

- ◆ Site Security Limits public access to the BNL Site.

Land Use:

- ◆ Federal ownership and control of the site is expected to continue.
- ◆ The Land Use and Institutional Controls Program Description in SBMS interfaces with the Site Master Planning process.

Engineered Controls:

- ◆ None.

Administrative Controls:

- ◆ Work Planning: Any work in these areas shall be coordinated with the Work Planning and Control Procedure.
- ◆ Ownership: Any transfer of this site from DOE ownership must meet the requirements of CERCLA 120(h).
- ◆ Change Management: Proposed changes to land use and ICs must be coordinated with DOE, NYSDEC and EPA in accordance with the LUCMP prior to implementation and reported annually to the DOE, NYSDEC and EPA.
- ◆ Reporting: Breaches of Institutional and Engineered Controls must be reported to the LTRA Manager immediately upon discovery.
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- ◆ Reporting: Five Year Reviews will be prepared and submitted to the DOE, EPA and NYSDEC. The Five Year Review will include inspections and a summary of site conditions to assure that ICs are working.
- ◆ Monitoring and Maintenance: Details on required monitoring and maintenance can be obtained from the LTRA Manager.

Other:

- ◆ None.

References:

Removal Action III -- Cesspool/Septic Tanks Action Memorandum. January 1994.

Closeout Report for Removal Action III Cesspool/Septic Tanks. 1999

Operable Unit III Feasibility Study Report. IT Corp. March 1, 1999.

Operable Unit III Record of Decision. April 14, 2000.

For additional information please contact:

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130.199.228.111 (MSIE 6.0) <http://luc.hnl.gov/website/landcontrols> Jul 14, 2006 — 2:27 PM

Land Use Controls Mapping

BROOKHAVEN
NATIONAL LABORATORY

Factsheet: Building 208 Vapor Degreaser (AOC 26) and Warehouse Area (B13)

History:

Building 208 (Area of Concern 26) was located in the Supply and Material (warehouse) area of the site. The northwest section of the building contained a vapor degreasing pit that was in operation until 1988. An investigation of Building 208 was initiated following the discovery of 1,1,1-trichloroethane (TCA) in the sanitary lines leading into the building. A subsequent soil gas study and the collection of soil samples below the vapor degreaser did not show levels of TCA contamination above cleanup levels.

Remedial Action:

Based upon the soil gas and soil sampling results, soil remediation was not required. Building 208 has been demolished, however the foundation and some emptied oil/water separators remain.

Land Use and Institutional Controls:

Land Use Classification: Remediation Complete – Restricted Use (B)

- The area has been remediated to an industrial use standard.
- Low-levels of residual chemical contamination might be present in some areas. Use of the site for residential purposes requires an additional evaluation/risk assessment and appropriate DOE/regulatory agency approval.
- Building 208 has been demolished, however the foundation remains.

Institutional Controls

Access:

- ♦ Site Security Limits public access to the BNL Site.

Land Use:

- ♦ Federal ownership and control of the site is expected to continue.
- ♦ The Land Use and Institutional Controls Program Description in SBMS interfaces with the Site Master Planning process.

Engineered Controls:

- ♦ None.

Administrative Controls:

- ♦ Work Planning: Any work in these areas shall be coordinated with the Work Planning and Control Procedure.
- ♦ Ownership: Any transfer of this site from DOE ownership must meet the requirements of CERCLA 120(h).
- ♦ Change Management: Proposed changes to land use and ICs must be coordinated with DOE, NYSDEC and EPA in accordance with the LUCMP prior to implementation and reported annually to the DOE, NYSDEC and EPA.
- ♦ Reporting: Breaches of Institutional and Engineered Controls must be reported to the LTRA Manager immediately upon discovery.
- ♦ Reporting: Implementation, maintenance and changes to land use and institutional controls will be documented in an annual letter report submitted to DOE, NYSDEC and EPA.
- ♦ Reporting: Five Year Reviews will be prepared and submitted to the DOE, EPA and NYSDEC. The Five Year Review will include inspections and a summary of site conditions to assure that ICs are working.
- ♦ Monitoring and Maintenance: Details on required monitoring and maintenance can be obtained from the LTRA Manager.

Other:

- ♦ None.

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Land Use Controls Mapping

BROOKHAVEN
NATIONAL LABORATORY

Factsheet: Building 464 Area Mercury Contaminated Soils (AOC 27) (A-4)

History:

The grass covered field immediately north and east of Building 464, the DOE Site Office, was occupied by a series of buildings that housed the Chemistry Department from 1947 until 1966. The old Chemistry complex was comprised of several old Army era barracks type buildings and was demolished in 1970.

During construction of the east wing addition to Building 464 in 1993, the excavation contractor discovered elemental mercury in old storm water catch basins, interconnecting piping and adjacent soils (AOC 27). Analysis of soil samples showed mercury concentrations as high as 1,070 mg/Kg. PCBs were also identified in soils at concentrations as high as 47 mg/Kg.

The impacted storm drains were not interconnected to the central stormwater disposal system but acted to spread the water over the large field and permit local recharge. Consequently, mercury and PCB contamination was localized to the basins and soils immediately adjacent the basins.

Remedial Action:

A remedial action of 1 mg/Kg for both mercury and PCBs was selected and approved by the IAG agencies. Soils were excavated and segregated by expected levels of contamination. Soils with high levels of mercury (i.e., > 260 mg/Kg) were shipped for mercury recovery and the remainder by landfill. By October 2003, approximately 280 tons of soil contaminated with mercury and PCBs was disposed at the Madel City landfill. An additional 2.5 tons (8-55 gallon drums) were shipped for mercury recovery via retort furnace.

Land Use and Institutional Controls:

Land Use Classification: Remediation Complete – Unrestricted Use (A)

- ◆ The site has been remediated to a residential use standard, but is currently used for industrial purposes
- ◆ With appropriate DOE/regulatory agency approval, the site can be used for residential purposes once industrial activities have ended.

Institutional Controls

Access:

- ◆ Site Security Limits public access to the BNL Site.

Land Use:

- ◆ Federal ownership and control of the site is expected to continue.
- ◆ The Land Use and Institutional Controls Program Description in SBMS interfaces with the Site Master Planning process.

Engineered Controls:

- ◆ None.

Administrative Controls:

- ◆ Work Planning: Any work in these areas shall be coordinated with the Work Planning and Control Procedure.
- ◆ Ownership: Any transfer of this site from DOE ownership must meet the requirements of CERCLA 120(h).
- ◆ Change Management: Proposed changes to land use and ICs must be coordinated with DOE, NYSDEC and EPA in accordance with the LUCMP prior to implementation and reported annually to the DOE, NYSDEC and EPA.
- ◆ Reporting: Breaches of Institutional and Engineered Controls must be reported to the LTRA Manager immediately upon discovery.

- ◆ Reporting: Implementation, maintenance and changes to land use and institutional controls will be documented in an annual letter report submitted to DOE, NYSDEC and EPA.
- ◆ Reporting: Five Year Reviews will be prepared and submitted to the DOE, EPA and NYSDEC. The Five Year Review will include inspections and a summary of site conditions to assure that ICs are working.
- ◆ Monitoring and Maintenance: Details on required monitoring and maintenance can be obtained from the LTRA Manager.

Other:

- ◆ None.

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Land Use Controls Mapping

BROOKHAVEN
NATIONAL LABORATORY

Factsheet: Building 479 Spill Areas (AOC 25) (A6)

History:

Building 479 (Area of Concern 25) is a heavy machine shop where lubricating oils, cutting oils, and degreasing solvents are used. During a 1992 excavation for an addition to the south side of the building, PCB and petroleum contaminated soils were discovered. The highest PCB and total petroleum hydrocarbon (TPH) levels were 1,300 mg/kg and 22,000 mg/kg, respectively. In addition numerous other small spills have occurred inside and outside Building 479.

Remedial Action:

The PCB and hydrocarbon contaminated soils were remediated, and the building addition was constructed over the cleanup area.

Land Use and Institutional Controls:

Land Use Classification: Remediation Complete – Unrestricted Use (A)

- The site has been remediated to a residential use standard, but is currently used for industrial purposes
- With appropriate DOE/regulatory agency approval, the site can be used for residential purposes once industrial activities have ended.

Institutional Controls

Access:

- ◆ Site Security Limits public access to the BNL Site.

Land Use:

- ◆ Federal ownership and control of the site is expected to continue.
- ◆ The Land Use and Institutional Controls Program Description in SBMS interfaces with the Site Master Planning process.

Engineered Controls:

- ◆ None.

Administrative Controls:

- ◆ **Work Planning:** Any work in these areas shall be coordinated with the Work Planning and Control Procedure.
- ◆ **Ownership:** Any transfer of this site from DOE ownership must meet the requirements of CERCLA 120(h).
- ◆ **Change Management:** Proposed changes to land use and ICs must be coordinated with DOE, NYSDEC and EPA in accordance with the LUCMP prior to implementation and reported annually to the DOE, NYSDEC and EPA.
- ◆ **Reporting:** Breaches of Institutional and Engineered Controls must be reported to the LTRA Manager immediately upon discovery.
- ◆ **Reporting:** Implementation, maintenance and changes to land use and institutional controls will be documented in an annual letter report submitted to DOE, NYSDEC and EPA.
- ◆ **Reporting:** Five Year Reviews will be prepared and submitted to the DOE, EPA and NYSDEC. The Five Year Review will include inspections and a summary of site conditions to assure that ICs are working.
- ◆ **Monitoring and Maintenance:** Details on required monitoring and maintenance can be obtained from the LTRA Manager.

Other:

- ◆ None.

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130.199.228.111 (MSIE 6.0) <http://luic.hnl.gov/website/landcontrols> Jul 14, 2006 — 2:35 PM

Land Use Controls Mapping

BROOKHAVEN
NATIONAL LABORATORY

Factsheet: Building 650 Reclamation Facility Sump And Sump Outfall (AOC 6) ⁽⁰¹⁾

History:

Building 650, known as the Former Reclamation Facility, was constructed in the late 1950's for the decontamination of radioactive contaminated clothing and heavy equipment. The facility was designed to perform decontamination operations both inside and outside the building.

In the past, all soiled laundry from BNL was delivered to Building 650, where potentially radioactively contaminated laundry was segregated from routine laundry. The radioactively contaminated laundry was cleaned with dedicated equipment and the residual wash water was transferred to and contained in the facility's underground storage tanks (USTs) until the level radiological activity could be determined. These USTs were located on the north side of the building. The liquid waste was emptied from the USTs about three times a year and taken to the Waste Concentration Facility (WCF) by a tanker truck.

Building 650 also served as a decontamination facility for radioactively contaminated equipment. The radioactively contaminated equipment was steam cleaned on a 30-foot by 30-foot concrete pad on the north side of the building. The radioactively contaminated water from the steam cleaning operation collected in a drain in the middle of the sloping concrete pad, known as the Building 650 Sump. Depending upon the expected level of contamination, the effluent was supposed to be either piped into the sanitary sewer system or into the USTs. An investigation in 1969 revealed that the drainage pipe from the outdoor pad behind Building 650 led to a natural depression in a wooded area about 800 feet northeast of Building 650, rather than the sanitary sewer system or USTs. The practice of decontaminating radioactively contaminated equipment on the concrete pad was discontinued after the 1969 incident. The natural wooded depression is referred to as the Building 650 Sump Outfall Area.

Remedial Action:

The USTs were included under AOC 12 and were removed under Removal Action (RA) II, the UST RA, during the summer of 1994. The action was documented in the OU IV Record of Decision.

Excavation of soils began in March 2002 and was completed in June 2002. Soils, asphalt and concrete debris were excavated from the area behind Building 650 and the Building 650 Sump Outfall Area. In addition to soil excavation at the Building 650 Sump Outfall, approximately 987 feet of storm pipe leading from Building 650 to the Sump Outfall and the 30-foot by 30-foot concrete decontamination pad (and associated soils) behind Building 650 were excavated for disposal at Envirocare of Utah. The work also included the removal and disposal of 8-inch and 15-inch diameter storm pipe, two manholes, and contaminated soil around the pipeline and manholes.

Plans are being prepared to DD Building 650 and attached hopper structures.

Current Conditions: The residual Cs-137 activity in the remediated soils is below the cleanup goal of 23 pCi/gm Cs-137, which is the only contaminant of concern remaining. The remaining Cs-137 activity in the soils today will meet residential requirements following 50 years of radioactive decay. A few isolated deep locations and a small section of storm pipe could not be fully remediated. The risk and dose associated with these locations is negligible. Maximum residual concentrations in one isolated deep excavation several feet below normal excavation in the Sump Outfall were 16 to 23 pCi/gm Cs-137, 25-174 pCi/gm U-238 and 2.6 pCi/gm Sr-90. These deep locations were backfilled and the entire outfall area covered with five feet of clean soil. A section of storm pipe that could not be removed showed maximum at one-end concentrations of 38 pCi/gm Cs-137, 16 pCi/gm Sr-90 and 2.6 pCi/gm U-239. This location was remediated to the extent possible in is now under 14 ft. of clean soil. Soils in the pad area at Bldg. 650 are at or below maximum background levels for Cs-137.

Any radionuclides in the groundwater downgradient from this facility are well below the USEPA standards for drinking water. Current conditions meet worker exposure guidelines for radioactivity. The dose and risk to workers are essentially zero. There were no chemical contaminants of concern and soil concentrations for chemicals meet Federal and State guidelines for public exposure.

Land Use and Institutional Controls:

Land Use Classification: Remediation Complete - Restricted Use (B)

- The area has been remediated to an industrial use standard.
- Based upon residual contamination levels, the site will be suitable for residential purposes with 50 years of in situ radioactive decay (i.e., by the year 2055). Use of the site for residential purposes prior to 2055 requires an additional evaluation/risk assessment, and

- appropriate DOE/regulatory agency approval.
- Building 650 is undergoing D&D and its use is restricted.

Institutional Controls

Access:

- ◆ Site Security Limits public access to the BNL Site.

Land Use:

- ◆ Federal ownership and control of the site is expected to continue.
- ◆ The Land Use and Institutional Controls Program Description in SBMS interfaces with the Site Master Planning process.

Engineered Controls:

- ◆ None.

Administrative Controls:

- ◆ Work Planning: Any work in these areas shall be coordinated with the Work Planning and Control Procedure.
- ◆ Ownership: Any transfer of this site from DOE ownership must meet the requirements of CERCLA 120(h).
- ◆ Change Management: Proposed changes to land use and ICs must be coordinated with DOE, NYSDEC and EPA in accordance with the LUCMP prior to implementation and reported annually to the DOE, NYSDEC and EPA.
- ◆ Reporting: Breaches of Institutional and Engineered Controls must be reported to the LTRA Manager immediately upon discovery.
- ◆ Reporting: Implementation, maintenance and changes to land use and institutional controls will be documented in an annual letter report submitted to DOE, NYSDEC and EPA.
- ◆ Reporting: Five Year Reviews will be prepared and submitted to the DOE, EPA and NYSDEC. The Five Year Review will include inspections and a summary of site conditions to assure that ICs are working.
- ◆ Monitoring and Maintenance: Details on required monitoring and maintenance can be obtained from the LTRA Manager.

Other:

- ◆ None.

Facility Use Agreements:

<https://sbms.bnl.gov/private/fua/fa7c/fa7cd011.htm> (BNL Internal Use Only)

References:

Operable Unit IV Record of Decision. USDOE and BNL Office of Environmental Restoration. March 14, 1996.

Final Feasibility Study Report Operable Unit I and Radiologically-Contaminated Soils. CDM Federal Programs Corp. March 31, 1999.

Record of Decision Operable Unit I and Radiologically Contaminated Soils (Including Areas of Concern 6,8,10,16,17, and 18). USDOE and BNL. August 25, 1999.

Closeout Report Remedial Action Area of Concern 6, Building 650 Reclamation Facility Sump and Sump Outfall. BNL Environmental Restoration, December, 2002.

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Land Use Controls Mapping

BROOKHAVEN
NATIONAL LABORATORY

Factsheet: Building 811 Waste Concentration Facility (AOC 10) ^(B7)

History:

At the Waste Concentration Facility (Area of Concern 10), liquid radioactive waste received from the Brookhaven Graphite Research Reactor, the Hot Laboratory Complex, Building 801, and the High Flux Beam Reactor, was temporarily stored and eventually distilled to remove particulates, and suspended and dissolved solids. The facility contained three 100,000 gallon capacity above ground D-waste tanks (Tanks D-1, D-2 and D-3) that were used to store liquid waste from 1949 to 1987. In addition to the aboveground tanks, six 8,000-gallon stainless steel underground storage tanks were located 50 feet north of Building 811. The six UST were used to store class A and B radioactive wastes.

Documented spills and leaks at the facility have resulted in soil and groundwater contamination. The primary radionuclides of concern in soils are cesium-137 and strontium-90, and strontium-90 in the groundwater.

The Waste Management Division currently uses the facility to manage and store low-level radioactive liquid waste in aboveground storage tanks prior to offsite disposal.

Remedial Action:

All three aboveground D-tanks were dismantled and removed in 1995. The contaminated concrete pads for the D-tanks were given an additional temporary asphalt cover in 1998 to prevent runoff and leaching of contaminants. The six underground storage tanks, associated piping and concrete pads were removed in early 2005 and disposed of at Envirocaire of Utah. Approximately 4,100 cubic yards of soil, concrete, asphalt, and piping were removed, transported, and disposed of at Envirocaire of Utah. Elevated levels of contamination could not be removed in 2 deep areas (see Current Conditions). To ensure future users are not exposed to residual contamination, a minimum of six inches of clean fill was placed over the remediated area and seeded. All of the debris, including the tanks, piping, concrete pads, asphalt surfaces and contaminated soils were disposed of at a licensed off-site facility. Groundwater is being monitored and treated for Sr-90 down gradient from the facility.

Current Conditions: The average residual Cs-137 activity, which is the primary contaminant of concern remaining in the remediated soils, is 4.56 pCi/g which is below the cleanup goal of 23 pCi/gm Cs-137. The remaining radioactivity in the soils today will meet residential requirements following 50 years of radioactive decay. The dose to a resident after 50 years of institutional controls is 3.75 mrem/yr and the dose to a resident at time zero is 12.79 mrem/yr. This meets both the EPA cleanup criteria of 15 mrem/yr and the New York State Department of Environmental Conservation ALARA cleanup goal of 10 mrem/yr.

Two areas of known contamination were left behind but were still factored into the final dose assessment. They included a small pocket of contaminated soil below the active steam and D waste lines and soil that was adjacent to the building 810 foundation. These two areas will be further remediated when the Waste Concentration Facility is decommissioned and are discussed in the Final Closeout Report.

Groundwater is currently being treated for removal of Sr-90 down gradient from the facility for up to 10 years and will be monitored for a period of 60 years.

The facility is currently under control of the Waste Management Division, is fenced and posted as a radiological control area.

Land Use and Institutional Controls:

Land Use Classification: Remediation Completed – Restricted Use (B)

- The area has been remediated to an industrial use standard.
- The WCF is currently active and continues to be used for managing and shipping liquid radioactive waste.
- Based upon residual contamination levels, the site will be suitable for residential purposes with 50 years of in situ radioactive decay (i.e., by the year 2055). Use of the site for residential purposes prior to 2055 requires an additional evaluation/risk assessment, and appropriate DOE/regulatory agency approval.

Institutional Controls

Access:

- ♦ Site Security Limits public access to the BNL Site.

- ◆ The remediated area is fenced and posted for access control.

Land Use:

- ◆ Federal ownership and control of the site is expected to continue.
- ◆ The Land Use and Institutional Controls Program Description in SBMS interfaces with the Site Master Planning process.

Engineered Controls:

- ◆ None.

Administrative Controls:

- ◆ **Work Planning:** Any work in these areas shall be coordinated with the Work Planning and Control Procedure.
- ◆ **Ownership:** Any transfer of this site from DOE ownership must meet the requirements of CERCLA 120(h).
- ◆ **Change Management:** Proposed changes to land use and ICs must be coordinated with DOE, NYSDEC and EPA in accordance with the LUCMP prior to implementation and reported annually to the DOE, NYSDEC and EPA.
- ◆ **Reporting:** Breaches of Institutional and Engineered Controls must be reported to the LTRA Manager immediately upon discovery.
- ◆ **Reporting:** Implementation, maintenance and changes to land use and institutional controls will be documented in an annual letter report submitted to DOE, NYSDEC and EPA.
- ◆ **Reporting:** Five Year Reviews will be prepared and submitted to the DOE, EPA and NYSDEC. The Five Year Review will include inspections and a summary of site conditions to assure that ICs are working.
- ◆ **Monitoring and Maintenance:** Details on required monitoring and maintenance can be obtained from the LTRA Manager.

Other:

- ◆ Any excavated soils shall be returned to the site and covered as found. If soil cannot be returned, the procedure FS-SOP-1005, Release of Material from Areas Controlled for Radiological Purposes must be followed. The waste soils must be managed in accordance with all Waste Management procedures, and the Environmental and Waste Management Services Division shall review all work requiring the disposal of soil wastes at an approved facility.

Facility Use Agreements:

<https://sbms.bnl.gov/private/fu/fu49/fu49d011.htm> (BNL Internal Use Only)

References:

- Dames & Moore, 1993. Engineering Evaluation/Cost Analysis (EE/CA) 'D' Tanks Removal Action Project. July 1993.
- IT Corp. 1995. Closeout Report for Brookhaven National Laboratory 'D' Tanks Removal Action Upton, New York. November, 1995.
- Operable Units II/VII Remedial Investigation Report. IT Corp. February 1999.
- Final Feasibility Study Report Operable Unit I and Radiologically-Contaminated Soils. CDM Federal Programs Corp. March 31, 1999.
- Record of Decision Operable Unit I and Radiologically Contaminated Soils (Including Areas of Concern 6,8,10,16,17, and 18). USDOE and BNL. August 25, 1999.
- URS Corp., 2001. Closeout Report. Removal, Treatment, and Disposal of Radioactive and Mixed Waste Sludge from Building 811 Tanks. October 2001.
- Weston Solutions, Inc, 2005. Final Status Survey Report for Building 811 Underground Tank Removal and Soils Remediation.
- Closeout Report, Brookhaven National Laboratory, Operable Unit I Area of Concern 10, Waste Concentration Facility, September 2005.

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Land Use Controls Mapping

BROOKHAVEN
NATIONAL LABORATORY

Factsheet: Building 830 Facility, Pipe Leak and USTs (AOCs 11 12) (B5)

History:

This site consists of two areas of concern (Bldg. 830 Pipe Leak –AOC 11 and Bldg. 830 USTs –AOC 12). Operations within Building 830 commenced in 1963, when the High Intensity Radiation Development Laboratory was opened. Hot cells and associated laboratories were used to fabricate high intensity cobalt-60 sources for food irradiation programs. The cells have also been used for the cutting, milling and evaluation of radioactively contaminated and activated material and components from commercial nuclear power plants.

A 1986 inspection of the facility's liquid waste tanks and waste inventory records revealed a 825 to 900 gallon discrepancy between the period of July 1984 and April 1987. Leak tests conducted in 1986 and 1987 revealed that there was a leak in the transfer line located between Building 830 and two, 1,000 gallon capacity underground storage tanks (USTs) that were located approximately 75 feet east of the building. The transfer line leak resulted in radionuclide contamination of the soils adjacent to the line. Low levels of cobalt-60 were also detected in nearby groundwater monitoring wells.

Remedial Action:

The tanks were removed from service in 1986. The contaminated soils along the transfer line were excavated in September and October 1988. The USTs were completely pumped out in November 1994, and the tanks, valve pit pipes and additional contaminated soils were removed in 1999. The excavated areas were backfilled with clean soil and seeded. The Cobalt source in Building 830 was removed and the Gamma Irradiation Facility decommissioned in March 2000. (See Factsheet F4 for LU/IC information on Building 830.)

Current Conditions: The remaining radioactivity in the soils south of the facility today will meet residential requirements following 50 years of radioactive decay. Current conditions meet worker exposure guidelines for radioactivity. Residual chemical contaminants meet Federal and State guidelines for public exposure. Groundwater is currently being monitored down gradient from the facility.

Land Use and Institutional Controls:

Land Use Classification: Remediation Complete – Restricted Use (B)

- The area has been remediated to an industrial use standard.
- Based upon residual contamination levels, the site will be suitable for residential purposes with 50 years of in situ radioactive decay (i.e., by the year 2055). Use of the site for residential purposes prior to 2055 requires an additional evaluation/risk assessment, and appropriate DOE/regulatory agency approval.

Institutional Controls

Access:

- ♦ Site Security Limits public access to the BNL Site.

Land Use:

- ♦ Federal ownership and control of the site is expected to continue.
- ♦ The Land Use and Institutional Controls Program Description in SBMS interfaces with the Site Master Planning process.

Engineered Controls:

- ♦ None.

Administrative Controls:

- ♦ **Work Planning:** Any work in these areas shall be coordinated with the Work Planning and Control Procedure.
- ♦ **Ownership:** Any transfer of this site from DOE ownership must meet the requirements of CERCLA 120(h).
- ♦ **Change Management:** Proposed changes to land use and ICs must be coordinated with DOE, NYSDEC and EPA in accordance with the LUCMP prior to implementation and reported annually to the DOE, NYSDEC and EPA.

- ◆ **Reporting:** Breaches of Institutional and Engineered Controls must be reported to the LTRA Manager immediately upon discovery.
- ◆ **Reporting:** Implementation, maintenance and changes to land use and institutional controls will be documented in an annual letter report submitted to DOE, NYSDEC and EPA.
- ◆ **Reporting:** Five Year Reviews will be prepared and submitted to the DOE, EPA and NYSDEC. The Five Year Review will include inspections and a summary of site conditions to assure that ICs are working.
- ◆ **Monitoring and Maintenance:** Details on required monitoring and maintenance can be obtained from the LTRA Manager.

Other:

- ◆ Any excavated soils shall be returned to the site and covered as found. If soil cannot be returned, the procedure FS-SOP-1005, Release of Material from Areas Controlled for Radiological Purposes must be followed. The waste soils must be managed in accordance with all Waste Management procedures, and the Environmental and Waste Management Services Division shall review all work requiring the disposal of soil wastes at an approved facility.

References:

Final Action Memorandum for Building 830 UST Removal Action. 1998.

Operable Units II/VII Remedial Investigation Report. IT Corp. February 1999.

Operable Unit III Remedial Investigation Report. IT Corp. March, 1999.

Closeout Report for Building 830 USTs Removal Action (Appendix to OU III RI Report.)

Operable Unit III Feasibility Study Report. IT Corp. March 1, 1999.

Operable Unit III Record of Decision. April 14, 2000.

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Land Use Controls Mapping

BROOKHAVEN
NATIONAL LABORATORY

Factsheet: Building 96 PCB Soil Contamination (AOC 26B) (B11)

History:

The former Building 96 area was a truck wash and drum and scrap metal storage area for many years (Area of Concern 26B). Spills of volatile organic solvents and polychlorinated biphenyls (PCBs) resulted in soil and groundwater contamination.

Characterization of the former Building 96 scrapyard area was originally performed to identify the source of high concentrations of volatile organic compounds (VOCs) in the Operable Unit III groundwater plume (specifically tetrachloroethylene and 1,1,1-trichloroethane). Analytical results from soil samples collected from the area near Building 96 indicated PCB contamination up to 4,000 ppm. The NYS TAGM level for PCB contamination is 1 ppm for surface soil and 10 ppm for subsurface soil.

Remedial Action:

Excavation of PCB-contaminated soil was initially performed in February 2000 primarily to allow construction of the installation of a treatment system to address VOC contamination of the groundwater. In 2005, additional soil was excavated. The PCB contaminated soils were remediated to levels below the required NYS TAGM levels. A minimum of 12 inches of clean fill was placed over the remediated areas.

Land Use and Institutional Controls:

Land Use Classification: Remediation Completed – Restricted Use (B)

- The area has been remediated to an industrial use standard. In place, covered residual PCB soils should not be disturbed. (See soil map from the Closeout Report.)
- Use of the site for residential purposes requires an additional evaluation/risk assessment and appropriate DOE/regulatory agency approval.

Institutional Controls

Access:

- ◆ Site Security Limits public access to the BNL Site.

Land Use:

- ◆ Federal ownership and control of the site is expected to continue.
- ◆ The Land Use and Institutional Controls Program Description in SBMS interfaces with the Site Master Planning process.

Engineered Controls:

- ◆ None.

Administrative Controls:

- ◆ Work Planning: Any work in these areas shall be coordinated with the Work Planning and Control Procedure.
- ◆ Ownership: Any transfer of this site from DOE ownership must meet the requirements of CERCLA 120(h).
- ◆ Change Management: Proposed changes to land use and ICs must be coordinated with DOE, NYSDEC and EPA in accordance with the LUCMP prior to implementation and reported annually to the DOE, NYSDEC and EPA.
- ◆ Reporting: Breaches of Institutional and Engineered Controls must be reported to the LTRA Manager immediately upon discovery.
- ◆ Reporting: Implementation, maintenance and changes to land use and institutional controls will be documented in an annual letter report submitted to DOE, NYSDEC and EPA.
- ◆ Reporting: Five Year Reviews will be prepared and submitted to the DOE, EPA and NYSDEC. The Five Year Review will include inspections and a summary of site conditions to assure that ICs are working.
- ◆ Monitoring and Maintenance: Details on required monitoring and maintenance can be obtained from the LTRA Manager.

Other:

- ◆ None.

Facility Use Agreements:

<https://shms.bnl.gov/private/uaa/ua6t/ua6td011.htm> (BNL Internal Use Only)

References:

Operable Unit III Remedial Investigation Report. IT Corp. 1999.

Operable Unit III Feasibility Study Report. IT Corp. 1999.

Operable Unit III Record of Decision. April 14, 2000.

OU III Building 96 PCB Soil Excavation Closeout Report. March 2005.

Building 96 Groundwater Source Control Treatment System Operation and Maintenance Manual.

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Land Use Controls Mapping

BROOKHAVEN
NATIONAL LABORATORY

Factsheet: Central Steam Facility – Former Off Load Area (A2)

History:

The Central Steam Facility supplies heating and cooling to all major BNL buildings and includes aboveground fuel tanks connected to a boiler building (Building 610) by aboveground and underground pipes.

During a 1996 upgrade project to the CSF's piping system, several small-scale releases of petroleum occurred. During the remediation of these spills, additional petroleum contaminated soils were encountered just to the north of Tank 611C and south of Temple Place. Available information suggests that these heavily contaminated soils were probably related to historical fuel off-loading operations.

Remedial Action:

In 1996, BNL removed approximately 1,200 cubic yards of petroleum contaminated soils from the off load spill site. The excavation was then backfilled with clean soil.

Land Use and Institutional Controls:

Land Use Classification: Remediation Complete – Unrestricted Use (A)

- The site has been remediated to a residential use standard, but is currently used for industrial purposes
- With appropriate DOE/regulatory agency approval, the site can be used for residential purposes once industrial activities have ended.

Institutional Controls

Access:

- ◆ Site Security Limits public access to the BNL Site.

Land Use:

- ◆ Federal ownership and control of the site is expected to continue.
- ◆ The Land Use and Institutional Controls Program Description in SBMS interfaces with the Site Master Planning process.

Engineered Controls:

- ◆ None.

Administrative Controls:

- ◆ Work Planning: Any work in these areas shall be coordinated with the Work Planning and Control Procedure.
- ◆ Ownership: Any transfer of this site from DOE ownership must meet the requirements of CERCLA 120(h).
- ◆ Change Management: Proposed changes to land use and ICs must be coordinated with DOE, NYSDEC and EPA in accordance with the LUCMP prior to implementation and reported annually to the DOE, NYSDEC and EPA.
- ◆ Reporting: Breaches of Institutional and Engineered Controls must be reported to the LTRA Manager immediately upon discovery.
- ◆ Reporting: Implementation, maintenance and changes to land use and institutional controls will be documented in an annual letter report submitted to DOE, NYSDEC and EPA.
- ◆ Reporting: Five Year Reviews will be prepared and submitted to the DOE, EPA and NYSDEC. The Five Year Review will include inspections and a summary of site conditions to assure that ICs are working.
- ◆ Monitoring and Maintenance: Details on required monitoring and maintenance can be obtained from the LTRA Manager.

Other:

- ◆ None.

For additional information please contact:

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130.199.228.111 (MSIE 6.0) <http://luc.bnl.gov/website/landcontrols> Jul 14, 2006 — 3:02 PM

Land Use Controls Mapping

BROOKHAVEN
NATIONAL LABORATORY

Factsheet: Central Steam Facility 1977 Oil/Solvent Spill (AOC 5A) (A1)

History:

The Central Steam Facility supplies heating and cooling to all major BNL buildings and includes aboveground fuel tanks connected to a boiler building (Building 610) by aboveground and underground pipes. In the past, the Central Steam Facility included underground fuel storage tanks.

In November 1977, a spill of about 25,000 gallons of a waste oil/solvent mixture occurred. The spill pooled on about 1.2 acres and was contained with sand berms. Immediately following the initial spill, portable pumps were used to clean up as much of the spill as possible. An unknown quantity of the oil and solvent was recovered from the site. Subsequent groundwater monitoring demonstrated that the 1977 spill had impacted groundwater quality, and soil excavations near the spill site found residual soil contamination.

Remedial Action:

In the 1990's BNL conducted a remedial investigation at the 1977 spill site. In October 1993, a 5,000 gallon-capacity underground storage tank, associated piping and visibly contaminated soil were removed from this area. To address the volatile and semi-volatile contaminants remaining in soils and groundwater, an air sparging/soil vapor extraction system was installed and became operational in November 1997. This system stripped volatile and some semi-volatile contaminants from soils and groundwater into their vapor phase. The vapors were then extracted from the ground and filtered to remove the contaminants. The system was shut down in January 2001 when levels of VOCs in the groundwater and soils dropped to acceptable levels.

Current Conditions: Appendix 1 of the closeout report for the vapor extraction system show 8 organic chemical detected in the in the soil. No samples exceeded the soil cleanup goals for these chemicals.

Land Use and Institutional Controls:

Land Use Classification: Remediation Complete – Unrestricted Use (A)

- The site has been remediated to a residential use standard, but is currently used for industrial purposes
- With appropriate DOE/regulatory agency approval, the site can be used for residential purposes once industrial activities have ended.

Institutional Controls

Access:

- ♦ Site Security Limits public access to the BNL Site.

Land Use:

- ♦ Federal ownership and control of the site is expected to continue.
- ♦ The Land Use and Institutional Controls Program Description in SBMS interfaces with the Site Master Planning process.

Engineered Controls:

- ♦ None.

Administrative Controls:

- ♦ **Work Planning:** Any work in these areas shall be coordinated with the Work Planning and Control Procedure.
- ♦ **Ownership:** Any transfer of this site from DOE ownership must meet the requirements of CERCLA 120(h).
- ♦ **Change Management:** Proposed changes to land use and ICs must be coordinated with DOE, NYSDEC and EPA in accordance with the LUCMP prior to implementation and reported annually to the DOE, NYSDEC and EPA.
- ♦ **Reporting:** Breaches of Institutional and Engineered Controls must be reported to the LTRA Manager immediately upon discovery.
- ♦ **Reporting:** Implementation, maintenance and changes to land us and institutional controls will be documented in an annual letter report submitted to DOE, NYSDEC and EPA.
- ♦ **Reporting:** Five Year Reviews will be prepared and submitted to the DOE, EPA and NYSDEC. The Five Year Review will include inspections and a summary of site conditions to assure that ICs are working.

- ◆ Monitoring and Maintenance: Details on required monitoring and maintenance can be obtained from the LTRA Manager.

Other:

- ◆ None.

Facility Use Agreements:

<https://sbms.bnl.gov/private/fua/fa76/fa76d011.htm> (BNL Internal Use Only)

References:

Operable Unit IV Record of Decision. USDOE and BNL Office of Environmental Restoration. March 14, 1996.

Petition for Closure and Termination of Formal Post Closure Monitoring of OU IV Air Sparge/Soil Vapor Extraction Remediation System. BNL Environmental Restoration. June 2002.

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Land Use Controls Mapping

BROOKHAVEN
NATIONAL LABORATORY

Factsheet: Chemical/Animal Pits and Glass Holes (AOCs 2B 2C) ^(B9)

History:

The Chemical/Animal Pits and Glass Holes (Areas of Concern 2B and 2C) consisted of 55 waste pits that were located in a two wooded areas to the east of the Former Landfill. From the late 1950s to 1981, a variety of materials were disposed of in these pits including chemical bottles, laboratory glassware, small gas cylinders, animal matter, needles, and miscellaneous solid and liquid laboratory chemicals. The pits were a source of volatile organic compound and strontium-90 groundwater contamination.

Remedial Action:

In 1997, BNL excavated each of the 55 pits and removed all of the buried waste and associated contaminated soils. The depth of the pits average 18 feet below the surface. Following excavation the materials were stored, sorted and segregated. The pits were backfilled after meeting of remediation goals were confirmed. The excavated waste and contaminated soils were shipped to licensed off-site disposal facilities. The area has been scraped to remove residuals from sorting and processing, covered with clean soil and re-vegetated. Groundwater down gradient from the area contains concentration of Sr-90 above drinking water standards and is currently being treated. (See Factsheet 'Groundwater Contaminated Areas').

Current Conditions: The residual Cs-137 activity in the remediated soils is below the residential cleanup goal of 23 pCi/gm Cs-137, and the mercury goal of 1.84 ug/kg which are the primary residual surface contaminants of concern remaining from waste processing activities. Only three of the 55 pits contained residual concentrations of Cs-137 above background at the base of the pits, the maximum being 1.99 pCi/gm. Current soil conditions meet worker exposure guidelines for radioactivity. The remaining Cs-137 activity in the soils meet residential requirements today. The maximum surface residual activity is ___pCi/gm and maximum mercury residual is ___ug/g. There are no other chemical contaminants of concern and soil concentrations for chemicals meet Federal and State guidelines for public exposure.

Land Use and Institutional Controls:

Land Use Classification: Remediation Complete – Restricted (B)

- The area has been remediated to an industrial use standard.
- Based upon residual contamination levels, the site will be suitable for residential purposes with 50 years of in situ radioactive decay (i.e., by the year 2055). Use of the site for residential purposes prior to 2055 requires an additional evaluation/risk assessment, and appropriate DOE/regulatory agency approval.

Institutional Controls

Access:

- ◆ Site Security Limits public access to the BNL Site.

Land Use:

- ◆ Federal ownership and control of the site is expected to continue.
- ◆ The Land Use and Institutional Controls Program Description in SBMS interfaces with the Site Master Planning process.

Engineered Controls:

- ◆ None.

Administrative Controls:

- ◆ **Work Planning:** Any work in these areas shall be coordinated with the Work Planning and Control Procedure.
- ◆ **Ownership:** Any transfer of this site from DOE ownership must meet the requirements of CERCLA 120(h).
- ◆ **Change Management:** Proposed changes to land use and ICs must be coordinated with DOE, NYSDEC and EPA in accordance with the LUCMP prior to implementation and reported annually to the DOE, NYSDEC and EPA.
- ◆ **Reporting:** Breaches of Institutional and Engineered Controls must be reported to the LTRA Manager immediately upon discovery.
- ◆ **Reporting:** Implementation, maintenance and changes to land use and institutional controls will be documented in an annual letter report submitted to DOE, NYSDEC and EPA.

- ◆ Reporting: Five Year Reviews will be prepared and submitted to the DOE, EPA and NYSDEC. The Five Year Review will include inspections and a summary of site conditions to assure that ICs are working.
- ◆ Monitoring and Maintenance: Details on required monitoring and maintenance can be obtained from the LTRA Manager.

Other:

- ◆ Any excavated soils shall be returned to the site and covered as found. If soil cannot be returned, the procedure FS-SOP-1005, Release of Material from Areas Controlled for Radiological Purposes must be followed. The waste soils must be managed in accordance with all Waste Management procedures, and the Environmental and Waste Management Services Division shall review all work requiring the disposal of soil wastes at an approved facility.

Facility Use Agreements:

N/A, (BNL Internal Use Only)

References:

Final Engineering Evaluation/Cost Analysis for Landfill Closure Removal Action VI. CDM Federal Programs Corp. Vol. 1 & 2. March, 1995.

Chemical/Animal Pits and Glass Holes, Final Evaluation of Alternative Report. CDM Federal Programs Corp. April 1997.

Final Action Memorandum Phase III – Landfill Closure Removal Action. June 16, 1997.

Animal/Chemical Pits and Glass Holes Remedial Action Closure Report. September 1997.

Record of Decision Operable Unit I and Radiologically Contaminated Soils (Including Areas of Concern 6,8,10,16,17, and 18). USDOE and BNL. August 25, 1999.

Addendum: Animal/Chemical Pits and Glass Holes Remedial Action Closure Report. September 2005.

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Land Use Controls Mapping

BROOKHAVEN
NATIONAL LABORATORY

Factsheet: Current Landfill (AOC 3) (C2)

History:

The Current Landfill (Area of Concern 3) occupies about eight acres in the southeast portion of the site. It was used by BNL between 1967 and 1990 for disposal of general office, laboratory, and construction waste. Based upon available records, putrescible waste, sludge from the BNL Water Treatment Plant, anaerobic digester sludge from the Sewage Treatment Plant, and limited quantities of Laboratory waste were disposed in the landfill. Groundwater monitoring results showed low levels of solvents, metals, and radionuclides that exceeded New York State groundwater standards.

Remedial Action:

In 1995 the Current Landfill was capped in accordance with NYCRR Part 360 requirements to prevent rainwater infiltration and potential leaching of contaminants to the groundwater. The landfill was capped with geomembrane fabric, which was then covered with clean soil and seeded. Gas venting pipes were installed to prevent the potential buildup of methane gas. Monitoring wells were installed down gradient of the landfill to monitor groundwater quality. To ensure that the cap remains effective, long-term inspections, cap maintenance, groundwater sampling and methane gas monitoring programs have been established.

Current Conditions:

Contaminated soils and materials are present below the landfill cap. The landfill is currently monitored and maintained by mowing the grass, inspecting the cap, keeping the soil cap intact and monitoring landfill gas and groundwater. Groundwater down gradient of the Current Landfill is contaminated with low-level radioisotopes and chemicals. The landfill area has been capped to prevent site workers, employees, visitors, and wildlife from being exposed to the subsurface contamination.

Land Use and Institutional Controls:

Land Use Classification: Capped/Controlled Contaminated Soils – Restricted (C)

- Industrial and residential uses of the site are currently prohibited due to buried contaminated materials.
- Recreational and open space uses of the site may be permitted with appropriate DOE/regulatory agency approval.
- Additional evaluation/risk assessment and appropriate DOE/regulatory agency approval are required prior to release for unrestricted use.

Institutional Controls

Access:

- ◆ Site Security Limits public access to the BNL Site.
- ◆ The landfill area is fenced and posted, with gated roadway access.

Land Use:

- ◆ Federal ownership and control of the site is expected to continue.
- ◆ The Land Use and Institutional Controls Program Description in SBMS interfaces with the Site Master Planning process.

Engineered Controls:

- ◆ The landfill areas were capped with impermeable geomembrane fabric, and then covered with clean soil and seeded. Gas venting pipes were installed to prevent the potential buildup of methane gas.

Administrative Controls:

- ◆ Work Planning: Any work in these areas shall be coordinated with the Work Planning and Control Procedure.
- ◆ Ownership: Any transfer of this site from DOE ownership must meet the requirements of CERCLA 120(h).
- ◆ Change Management: Proposed changes to land use and ICs must be coordinated with DOE, NYSDEC and EPA in

- accordance with the LUCMP prior to implementation and reported annually to the DOE, NYSDEC and EPA.
- ◆ **Reporting:** Breaches of Institutional and Engineered Controls must be reported to the LTRA Manager immediately upon discovery.
 - ◆ **Reporting:** Implementation, maintenance and changes to land us and institutional controls will be documented in an annual letter report submitted to DOE, NYSDEC and EPA.
 - ◆ **Reporting:** Five Year Reviews will be prepared and submitted to the DOE, EPA and NYSDEC. The Five Year Review will include inspections and a summary of site conditions to assure that ICs are working.
 - ◆ **Monitoring and Maintenance:** Details on required monitoring and maintenance can be obtained from the LTRA Manager.

Other:

- ◆ Without written authorization, no activities shall be permitted in the landfill areas that could compromise the integrity of the impermeable caps and stormwater management systems.

Facility Use Agreements:

<https://shms.bnl.gov/private/fua/fa001011.htm>, (BNL Internal Use Only)

References:

Final Engineering Evaluation/Cost Analysis for Landfill Closure Removal Action VI. CDM Federal Programs Corp. Vol. 1 2. March, 1995.
Action Memorandum. Landfill Closure Removal Action Phase I Current Landfill. BNL Office of Environmental Restoration. December, 1994.
Current Landfill Final Operation and Maintenance Manual. CDM Federal Programs Corp., 2 Volumes. March 1996.
Final Construction Certification report for Current Landfill Capping. CDM Federal Programs Corp., 4 Volumes. May 1996.

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Land Use Controls Mapping

BROOKHAVEN
NATIONAL LABORATORY

Factsheet: Former Hazardous Waste Management Facility (AOC 1) (B10)

History:

The former Hazardous Waste Management Facility (Area of Concern 1) was used from the 1940's to 1997 as the central receiving Resource Conservation and Recovery Act (RCRA) facility for packaging, limited treatment (neutralization), and storage for radioactive waste, RCRA hazardous waste, and mixed waste generated at BNL. Between 15 and 40 tons of solvents, waste oils, solids, caustics, ignitable waste, and various laboratory chemicals were handled at the facility each year. Records also indicate that the former HWMF area was a munitions storage area and livery stable when occupied by the U.S. Army.

Waste handling operations resulted in soil and groundwater contamination. Radionuclides detected in soils at the former HWMF include americium-241, cesium-137, cobalt-60, plutonium-239/240, strontium-90, and uranium-235/238. The non-radiological contaminants of concern at the HWMF include lead and mercury.

Remedial Action:

Remediation of the Former HWMF was completed in 2005. Approximately 31,000 cubic yards of contaminated soil and 3,500 cubic yards of contaminated debris was excavated from the HWMF. Prior to soil excavation, all remaining equipment was removed and buildings in the area were demolished to grade. Industrial land use goals following institutional control were used as the criteria for remediation. Excavated areas were returned to grade with clean fill and re-vegetated to minimize erosion. The adjacent HWMF Wetland was also remediated. (See Former HWMF Wetland Area Factsheet.)

Current Conditions: The facility is currently fenced and posted. The average residual Cs-137 activity, which is the primary contaminant of concern remaining in the remediated soils, is below the cleanup goal of 23 pCi/gm Cs-137 for residential use following the institutional control period. The remaining radioactivity in the soils today will meet industrial requirements today. The average Cs-137 and Sr-90 concentrations following remediation are 7.63 pCi/g and 1.51 pCi/g, respectively. The 95% upper confidence level (UCL) concentrations for Cs-137 and Sr-90 are 16.6 pCi/g and 5.3 pCi/g respectively.

The dose to an industrial worker after 50 years of institutional controls is 1.8 mrem/yr and 4.0 mrem/yr using the average and 95% UCL concentrations, respectively. These annual dose projections are well below the 15 millirem per year (mrem/yr) cleanup goal in the OU I ROD.

The dose to an industrial worker with no time for radioactive decay (i.e. present day) using the average and 95% UCL concentrations is 5.4 mrem/yr and 11.8 mrem/yr, respectively. The dose to a resident after 50 years of institutional controls using the average and UCL values are 6.1 mrem/yr and 14.5 mrem/yr. These additional dose projections indicate that the OU I ROD requirements are satisfied by a wide margin.

This AOC was a source of Sr-90, tritium and volatile organic compound contamination in groundwater downgradient of the facility. Groundwater is monitored downgradient from the facility during the period of institutional control. (See Groundwater Contaminated Areas Factsheet.)

Land Use and Institutional Controls:

Land Use Classification: Remediation Complete – Restricted Use (B)

- The area has been remediated to an industrial use standard.
- Based upon residual contamination levels, the site will be suitable for residential purposes with 50 years of *in situ* radioactive decay (i.e., by the year 2055). Use of the site for residential purposes prior to 2055 requires an additional evaluation/risk assessment, and appropriate DOE/regulatory agency approval. Area is currently not suitable for industrial use. Limited activities may be permitted following evaluation and risk assessment.
- Several wetland areas that may contain protected habitats are adjacent to the former HWMF. NYSDEC regulations regulates all work within 100 feet of wetlands with confirmed protected species habitats. Any work activities within 100 feet of a wetland requires DOE and NYSDEC notification and approval.
- BNL limits activities within 850 feet of wetlands with confirmed protected species habitats.

Institutional Controls

Access:

- ◆ Site Security Limits public access to the BNL Site.
- ◆ Point of contact sign postings for access will be maintained.
- ◆ All facility gates will be kept locked for both personnel and deer access control.

Land Use:

- ◆ Federal ownership and control of the site is expected to continue.
- ◆ The Land Use and Institutional Controls Program Description in SBMS interfaces with the Site Master Planning process.

Engineered Controls:

- ◆ None.

Administrative Controls:

- ◆ Work Planning: Any work in these areas shall be coordinated with the Work Planning and Control Procedure.
- ◆ Work Planning: Activities in this area must comply with the BNL Wildlife Management Plan (BNL-71870-2003).
- ◆ Ownership: Any transfer of this site from DOE ownership must meet the requirements of CERCLA 120(h).
- ◆ Change Management: Proposed changes to land use and ICs must be coordinated with DOE, NYSDEC and EPA in accordance with the LUCMP prior to implementation and reported annually to the DOE, NYSDEC and EPA.
- ◆ Reporting: Breaches of Institutional and Engineered Controls must be reported to the LTRA Manager immediately upon discovery.
- ◆ Reporting: Implementation, maintenance and changes to land use and institutional controls will be documented in an annual letter report submitted to DOE, NYSDEC and EPA.
- ◆ Reporting: Five Year Reviews will be prepared and submitted to the DOE, EPA and NYSDEC. The Five Year Review will include inspections and a summary of site conditions to assure that ICs are working.
- ◆ Monitoring and Maintenance: Details on required monitoring and maintenance can be obtained from the LTRA Manager.

Other:

- ◆ Any excavated soils shall be returned to the site and covered as found. If soil cannot be returned, the procedure FS-SOP-1005, Release of Material from Areas Controlled for Radiological Purposes must be followed. The waste soils must be managed in accordance with all Waste Management procedures, and the Environmental and Waste Management Services Division shall review all work requiring the disposal of soil wastes at an approved facility.

Facility Use Agreements:

<https://sbms.bnl.gov/private/fua/fa48/fa48d011.htm> (BNL Internal Use Only)

References:

Final Remedial Investigation/Risk Assessment Report, Operable Unit I/VI. CDM Federal Programs Corp. June 14, 1996.

Final Feasibility Study Report Operable Unit I and Radiologically-Contaminates Soils. CDM Federal Programs Corp. March 31, 1999.

Record of Decision Operable Unit I and Radiologically Contaminated Soils (Including Areas of Concern 6,8,10,16,17, and 18). USDOE and BNL. August 25, 1999.

Natural Resource Management Plan. Brookhaven National Laboratory. (BNL-71870-2003)

Operable Unit I, AOC I Remedial Action Work Plan. March 7, 2003.

Closeout Report, OU I AOC I Former Hazardous Waste Management Facility Soil Remediation . September 29, 2005.

For additional information please contact:

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Land Use Controls Mapping

BROOKHAVEN
NATIONAL LABORATORY

Factsheet: Former Hazardous Waste Management Facility (HWMF) Wetland (AOC 1) (G2)

History:

A shallow wetland borders the northwestern fence of the former Hazardous Waste Management Facility. This area seasonally ponds and is known as the HWMF wetland (part of Area of Concern 1 also designated as SubAOC 1J). The HWMF wetland is shown on the National Wetland Inventory Mapping as part of a larger wetland area, and has been delineated as a Federal wetland under section 404 of the Clean Water Act. It is also regulated by the NYSDEC as a Class 1 wetland due to the presence of the Tiger Salamander, a protected New York State species.

Sediments within the wetland were contaminated with radionuclides and chemicals in stormwater runoff from the paved areas of the HWMF. A focused ecological risk assessment was performed as part of the remedial investigation and feasibility study for OU 1 identified a low potential for risk to Tiger Salamanders from elevated levels of several metals in the sediments of the wetland.

The Operable Unit 1 Record of Decision identified concentrations of 13 pCi/g of cesium-137; 36 ug/kg of Aroclor-126; 8,150 mg/kg of aluminum; and 14 mg/kg of zinc present in the wetland sediments. The Feasibility Study identifies a maximum concentration of 1800 pCi/g of cesium-137 in the soil.

Remedial Action:

In 2004 the contaminated sediment was excavated from the HWMF Wetland area and disposed of off-site. In 2005 the wetland area was reconstructed by backfilling excavated areas with clean soils and restoring the original grade and depression to ensure that the wetland was able to retain water during the breeding season and that the restored area provides the necessary conditions to support the appropriate habitat. Native vegetation was planted.

Current Conditions: Breeding ponds for Tiger Salamanders include a 500-foot buffer zone surrounding the site as critical habitat with an additional 350 feet for resident adult salamanders. Based on the Ecological Risk Assessment in the OU I/VI Feasibility Study, current concentrations in the wetland indicate the habitat is safe for the Tiger Salamander. This Wetland is a contiguous part of a larger regulated wetland. No radiological materials are present that exceed cleanup goals for industrial land use. Residual chemical contaminants meet Federal and State guidelines for public exposure.

Land Use and Institutional Controls:

Land Use Classification: Biologically/Culturally Sensitive Area – Restricted Use (G)

- This area is designated as open space and protected habitat.
- NYSDEC regulations regulates all work within 100 feet of wetlands. Any work activities within 100 feet of a wetland requires DOE and NYSDEC notification and approval.
- BNL limits activities within 850 feet of wetlands with confirmed protected species habitats.

Institutional Controls

Access:

- ◆ Site Security Limits public access to the BNL Site.
- ◆ Point of contact sign postings for access will be maintained.
- ◆ All facility gates will be kept locked for personnel and deer access control.

Land Use:

- ◆ Federal ownership and control of the site is expected to continue.
- ◆ The Land Use and Institutional Controls Program Description in SBMS interfaces with the Site Master Planning process.

Engineered Controls:

- ◆ None.

Administrative Controls:

- ◆ **Work Planning:** Any work in these areas shall be coordinated with the Work Planning and Control Procedure.
- ◆ **Work Planning:** Activities in this area must comply with the BNL Natural Resource Management Plan (BNL-71870-2003).
- ◆ **Ownership:** Any transfer of this site from DOE ownership must meet the requirements of CERCLA 120(h).
- ◆ **Change Management:** Proposed changes to land use and ICs must be coordinated with DOE, NYSDEC and EPA in accordance with the LUCMP prior to implementation and reported annually to the DOE, NYSDEC and EPA.
- ◆ **Reporting:** Breaches of Institutional and Engineered Controls must be reported to the LTRA Manager and Natural Resources Manager immediately upon discovery.
- ◆ **Reporting:** Implementation, maintenance and changes to land use and institutional controls will be documented in an annual letter report submitted to DOE, NYSDEC and EPA.
- ◆ **Reporting:** Five Year Reviews will be prepared and submitted to the DOE, EPA and NYSDEC. The Five Year Review will include inspections and a summary of site conditions to assure that ICs are working.
- ◆ **Monitoring and Maintenance:** Details on required monitoring and maintenance can be obtained from the LTRA Manager.

Other:

- ◆ None.

Facility Use Agreements:

<https://sbms.bnl.gov/private/fua/fa48/fa48d011.htm> (BNL Internal Use Only)

References:

Final Remedial Investigation/Risk Assessment Report, Operable Unit I/VI. CDM Federal Programs Corp. June 14, 1996.

Final Feasibility Study Report Operable Unit I and Radiologically-Contaminated Soils. CDM Federal Programs Corp. March 31, 1999.

Focused Ecological Risk Assessment for OUI/VI, Appendix L in Final Feasibility Study Report Operable Unit I and Radiologically-Contaminated Soils. CDM Federal Programs Corp. March 31, 1999.

Record of Decision Operable Unit I and Radiologically Contaminated Soils (Including Areas of Concern 6,8,10,16,17, and 18). USDOE and BNL. August 25, 1999.

Natural Resource Management Plan. Brookhaven National Laboratory. (BNL-71870-2003)

Operable Unit I, AOC 1 Remedial Action Work Plan. March 7, 2003.

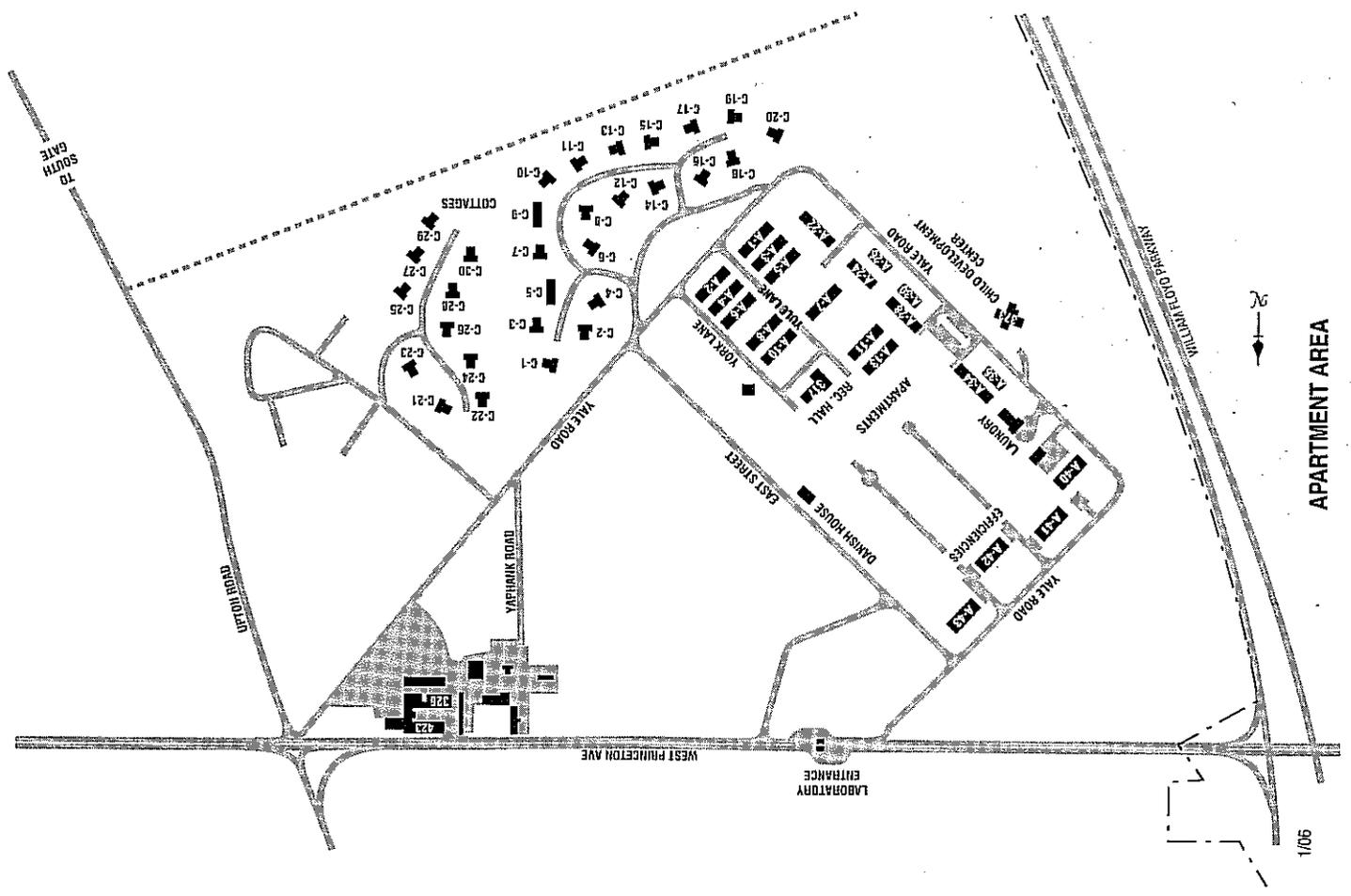
(Not completed) Close Out Report for Operable Unit I, Area of Concern 1. BNL Environmental Management Directorate. _____, 2005.

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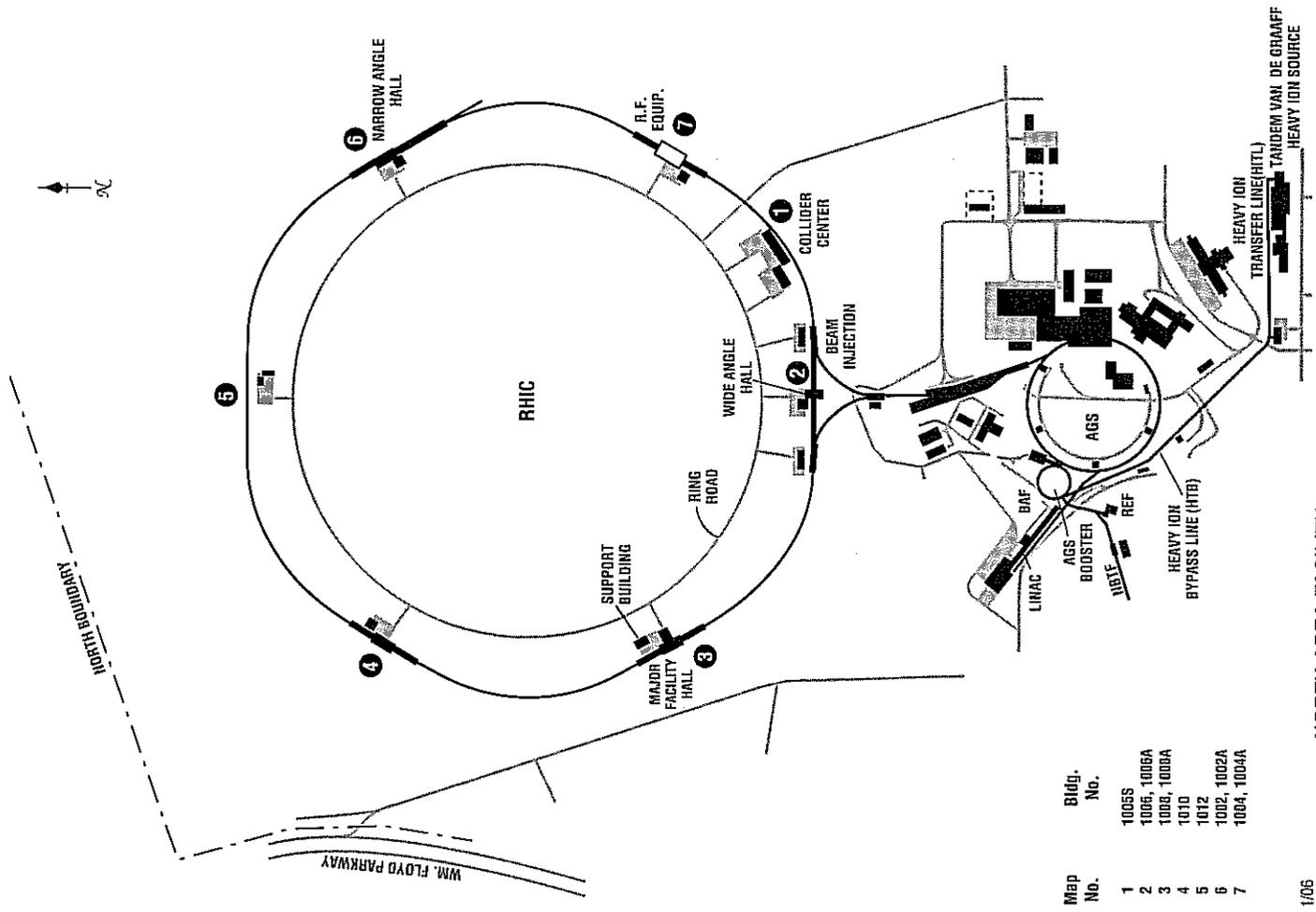
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APARTMENT AREA

1/06



NORTH AREA FACILITY

Map No.	Buildg. No.
1	1005S
2	1006, 1006A
3	1008, 1008A
4	1010
5	1012
6	1002, 1002A
7	1004, 1004A

1/06

Land Use Controls Mapping

BROOKHAVEN
NATIONAL LABORATORY

Factsheet: Former Landfill Area (AOCs 2A, 2D 2E) (C1)

History:

This landfill area consists of the following: the Former Landfill (Area of Concern 2A), the Slit Trench (Area of Concern 2E) and the Interim Landfill (Area of Concern 2D).

Former Landfill is an eight-acre site in the south-central part of the site that was originally operated by the U.S. Army for waste disposal during World War I and World War II. BNL used approximately three acres of the Former Landfill from 1947 through 1966 for disposal of general office, laboratory, and construction wastes. Between 1953 and 1966, the former landfill was also used for the disposal of low-level radioactive waste. A 1983 aerial radiological survey detected cesium-137 contamination on the surface of the Former Landfill, and subsequent groundwater monitoring detected low levels of solvents, metals and radionuclides. Levels of TCA, TCE, PCE, benzene, and strontium-90 exceeded New York State groundwater standards.

The Slit Trench was operated by BNL as a test disposal site from 1960 to 1967 for the disposal of construction debris.

The Interim Landfill was operated by BNL from 1966 to 1967 until the Current Landfill was built. Prior to the construction of the Current Landfill (Area of Concern 3), BNL used the interim landfill for the disposal of general office, municipal-type, sanitary, laboratory, and construction wastes. Limited amounts of low-level radioactive waste and some laboratory chemical wastes were also landfilled.

Remedial Action:

In 1996 the three landfill areas were capped to prevent precipitation from entering the landfill waste and possibly leaching contaminants into the groundwater. The landfill areas were capped with impermeable geomembrane fabric, and then covered with clean soil and seeded. Gas venting pipes were installed to prevent the potential buildup of methane gas. To ensure that the cap remains effective, long-term inspections, groundwater and methane gas monitoring and cap maintenance programs have been established.

Current Conditions: Contaminated soils and materials are present below these capped areas. These landfills are currently monitored and maintained by mowing the grass, keeping the cap intact and monitoring landfill gas and groundwater. Groundwater down gradient of the Former Landfill is contaminated with low-level radioisotopes and chemicals. The landfill areas have been capped to prevent site workers, employees, visitors, and wildlife from being exposed to the subsurface contamination.

Land Use and Institutional Controls:

Land Use Classification: Capped/Controlled Contaminated Soils – Restricted (C)

- Industrial and residential uses of the site are currently prohibited due to buried contaminated materials.
- Recreational and open space uses of the site may be permitted with appropriate DOE/regulatory agency approval.
- Additional evaluation/risk assessment and appropriate DOE/regulatory agency approval are required prior to release for unrestricted use.

Institutional Controls

Access:

- ◆ Site Security Limits public access to the BNL Site.
- ◆ The landfill areas are posted.
- ◆ Roadways to the landfill areas are gated.

Land Use:

- ◆ Federal ownership and control of the site is expected to continue.
- ◆ The Land Use and Institutional Controls Program Description in SBMS interfaces with the Site Master Planning process.

Engineered Controls:

- ◆ The landfill areas were capped with impermeable geomembrane fabric, and then covered with clean soil and seeded. Gas venting pipes were installed to prevent the potential buildup of methane gas.

Administrative Controls:

- ◆ **Work Planning:** Any work in these areas shall be coordinated with the Work Planning and Control Procedure.
- ◆ **Ownership:** Any transfer of this site from DOE ownership must meet the requirements of CERCLA 120(h).
- ◆ **Change Management:** Proposed changes to land use and ICs must be coordinated with DOE, NYSDEC and EPA in accordance with the LUCMP prior to implementation and reported annually to the DOE, NYSDEC and EPA.
- ◆ **Reporting:** Breaches of Institutional and Engineered Controls must be reported to the LTRA Manager immediately upon discovery.
- ◆ **Reporting:** Implementation, maintenance and changes to land use and institutional controls will be documented in an annual letter report submitted to DOE, NYSDEC and EPA.
- ◆ **Reporting:** Five Year Reviews will be prepared and submitted to the DOE, EPA and NYSDEC. The Five Year Review will include inspections and a summary of site conditions to assure that ICs are working.
- ◆ **Monitoring and Maintenance:** Details on required monitoring and maintenance can be obtained from the LTRA Manager.

Other:

- ◆ Without written authorization, no activities shall be permitted in the landfill areas that could compromise the integrity of the impermeable caps and stormwater management systems.

Facility Use Agreements:

<https://sbms.bnl.gov/private/fua/fa00t011.htm> (BNL Internal Use Only)

References:

Final Engineering Evaluation/Cost Analysis for Landfill Closure Removal Action VI. CDM Federal Programs Corp. Vol. 1 2. March, 1995.
Action Memorandum. Landfill Closure Removal Action Former Landfill Area. BNL Office of Environmental Restoration. April 8, 1996.
Former Landfill Operation and Maintenance Manual. CDM Federal Programs Corp., 2 Volumes. May 1996.
Final Construction Certification report for Former Landfill Capping. R.F. Weston. March 1997.
Record of Decision Operable Unit I and Radiologically Contaminated Soils (Including Areas of Concern 6,8,10,16,17, and 18). USDOE and BNL. August 25, 1999.

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Land Use Controls Mapping

BROOKHAVEN
NATIONAL LABORATORY

Factsheet: Former Reclamation Facility Building 650 (F5)

History:

Building 650, known as the "Hot Laundry" or Reclamation Facility, was constructed in the late 1950's for the decontamination of radioactive contaminated clothing and heavy equipment. The facility was designed to perform decontamination operations both inside and outside the building.

In the past, all soiled laundry from BNL was delivered to Building 650, where potentially radioactively contaminated laundry was segregated from routine laundry. The radioactively contaminated laundry was cleaned with dedicated equipment and the residual wash water was transferred to and contained in the facility's underground storage tanks (USTs) until the level radiological activity could be determined. These USTs were located on the north side of the building. The liquid waste was emptied from the USTs about three times a year and taken to the Waste Concentration Facility (WCF) by a tanker truck.

Building 650 also served as a decontamination facility for radioactively contaminated equipment. The radioactively contaminated equipment was steam cleaned on a 30-foot by 30-foot concrete pad on the north side of the building. The radioactively contaminated water from the steam cleaning operation collected in a drain in the middle of the sloping concrete pad, known as the Building 650 Sump. Depending upon the expected level of contamination, the effluent was supposed to be either piped into the sanitary sewer system or into the USTs. An investigation in 1969 revealed that the drainage pipe from the outdoor pad behind Building 650 led to a natural depression in a wooded area about 800 feet northeast of Building 650, rather than the sanitary sewer system or USTs. The practice of decontaminating radioactively contaminated equipment on the concrete pad was discontinued after the 1969 incident. The natural wooded depression is referred to as the Building 650 Sump Outfall Area.

Remedial Action:

Plans are being prepared for the decontamination and decommissioning of Building 650.

Contaminated soils associated with the sump and sump outfall have been remediated (see Factsheet B1 for Building 650 Reclamation Facility Sump and Sump Outfall).

Land Use and Institutional Controls:

Land Use Classification: Radiological Facility, D&D pending – Restricted Use (F)

- Building 650 is an inactive radiological facility.
- Future land use scenarios to be determined.

• A risk assessment and appropriate DOE/regulatory agency approval are required prior to release for unrestricted use.

Institutional Controls

Access:

- ◆ Site Security Limits public access to the BNL Site.
- ◆ Building 650 is a posted Radiologically Controlled area, and access to this building is restricted to authorized personnel.

Land Use:

- ◆ Federal ownership and control of the site is expected to continue.
- ◆ The Land Use and Institutional Controls Program Description in SBMS interfaces with the Site Master Planning process.

Engineered Controls:

- ◆ The Building 650 structure is used for containment.

Administrative Controls:

- ◆ Work Planning: Any work in these areas shall be coordinated with the Work Planning and Control Procedure.

- ◆ **Ownership:** Any transfer of this site from DOE ownership must meet the requirements of CERCLA 120(h).
- ◆ **Change Management:** Proposed changes to land use and ICs must be coordinated with DOE, NYSDEC and EPA in accordance with the LUCMP prior to implementation and reported annually to the DOE, NYSDEC and EPA.
- ◆ **Reporting:** Breaches of Institutional and Engineered Controls must be reported to the LTRA Manager immediately upon discovery.
- ◆ **Reporting:** Implementation, maintenance and changes to land use and institutional controls will be documented in an annual letter report submitted to DOE, NYSDEC and EPA.
- ◆ **Reporting:** Five Year Reviews will be prepared and submitted to the DOE, EPA and NYSDEC. The Five Year Review will include inspections and a summary of site conditions to assure that ICs are working.
- ◆ **Monitoring and Maintenance:** Details on required monitoring and maintenance can be obtained from the LTRA Manager.

Other:

- ◆ Any excavated soils from below the Building 650 structure shall be returned to the site and covered as found. If soil cannot be returned, the procedure FS-SOP-1005, Release of Material from Areas Controlled for Radiological Purposes must be followed. The waste soils must be managed in accordance with all Waste Management procedures, and the Environmental and Waste Management Services Division shall review all work requiring the disposal of soil wastes at an approved facility.

Facility Use Agreements:

<https://sbms.bnl.gov/private/fu/f7c/f7cd011.htm> (BNL Internal Use Only)

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Land Use Controls Mapping

BROOKHAVEN
NATIONAL LABORATORY

Factsheet: Groundwater Contamination Areas (E1)

History:

Due to past waste handling practices and accidental spills, the soils and groundwater at a number of areas of the BNL site were contaminated with volatile organic compounds and radionuclides. The BNL site was added to the National Priorities List in 1989. To help manage the soil and groundwater remediation efforts, 30 separate Areas of Concern (AOCs) were grouped into six Operable Units (OUs). Remedial Investigation/Feasibility Studies were conducted for each OU. As a result of these investigations, BNL determined the nature and extent of soil and groundwater contamination. Based upon this information, appropriate treatment methods were identified and implemented. Operable Units I, III, IV, V, and VI addressed groundwater contamination issues.

Operable Unit I contains groundwater contamination plumes emanating from the southeastern area of the Laboratory. The main contaminants of concern are volatile organic compounds (VOCs), with lesser amounts of tritium and strontium-90.

Operable Unit III contains groundwater plumes emanating from the central and southern portions of the BNL site. The main contaminants of concern are volatile organic compounds, strontium-90, and tritium. Volatile organic compounds have been found both on and off Laboratory property, while strontium-90 and tritium contaminants are confined to the Laboratory site.

Operable Unit IV included groundwater contamination at BNL's Central Steam Plant. Air sparging successfully treated these contaminants.

Operable Unit V includes groundwater in the eastern-central area of the Laboratory. The primary contaminants of concern are VOCs, with lesser amounts of tritium.

Operable Unit VI includes off site groundwater containing the chemical ethylene dibromide (EDB), which had been used by BNL as a fumigant in its agricultural research fields located on the eastern portion of the site.

Note: To obtain the most recent information on the extent of contamination (plume locations, contaminant concentrations, groundwater restoration systems), please refer to the BNL Site Environmental Report and associated Groundwater Status Report.

Remedial Action:

BNL has constructed a number of groundwater treatment systems located on and off site to treat groundwater contamination. Groundwater monitoring programs have been established to monitor contaminant plume positions and to verify the effectiveness of the restoration activities. Groundwater remediation activities are expected to continue until approximately 2030 to meet the ultimate cleanup objective - which is to reduce contaminant levels in the Upper Glacial aquifer to below drinking water standards. Two remediation systems (the OU IV Air Sparging/Soil Vapor Extraction System, and the Carbon Tetrachloride Treatment System) have met their cleanup objectives, and have been shut down. In addition, the source areas for a number of groundwater contaminant plumes have been excavated and/or controlled (the Former Landfill areas, Current Landfill, 1977 Oil/Solvent Spill Area, former Hazardous Waste Management Facility, Waste Concentration Facility, numerous cesspools, and underground storage tanks).

Public water hookups have been provided to most residents in North Shirley, East Yaphank, and Manorville. Those residents that declined the offer for public water hookups are offered free, periodic water testing of their wells.

Land Use and Institutional Controls:

Land Use Classification: Restricted Groundwater Use (E)

- Use of the land overlying the groundwater contaminant plumes is not impacted by contamination, and is suitable for industrial, residential or recreational purposes, as approved
- Some land use restrictions may apply in areas where groundwater restoration facilities are present (including groundwater monitoring and remediation wells, water pipelines, water treatment facility structures and associated utilities)

Institutional Controls

Access:

- ◆ Site Security Limits public access to the BNL Site.
- ◆ Groundwater contaminant plumes are located far below land surface, therefore site workers, visitors and wildlife are not exposed to the contamination unless the impacted water is pumped from a supply well.
- ◆ Access to groundwater treatment system buildings and wells is restricted
- ◆ Drinking water or process supply wells cannot be installed at BNL without DOE/BNL and NYSDEC approval.
- ◆ Drinking water or process supply wells cannot be installed in off-site areas without NYSDEC approval.
- ◆ There are mandatory public water hookup requirements in off-site areas for all new home/business construction.

Land Use:

- ◆ Federal ownership and control of the site is expected to continue.
- ◆ The Land Use and Institutional Controls Program Description in SBMS interfaces with the Site Master Planning process.

Engineered Controls:

- ◆ BNL and off-site municipal water supplies are tested and treated, as required, to ensure pumped water meets NYSDOH drinking water standards.
- ◆ BNL has active on-site and off-site groundwater treatment facilities.

Administrative Controls:

- ◆ Work Planning: Any work in these areas shall be coordinated with the Work Planning and Control Procedure.
- ◆ Work Planning: All current and future groundwater pumping and recharge activities at BNL that may impact contaminant plume migration or treatment system operations shall be evaluated by the BNL Pump and Recharge Committee. BNL Plant Engineering will maintain a potable/supply well pumping distribution of 75% or greater from the western well field and 25% or less from the eastern well field. This pumping distribution is necessary to prevent the shifting of contaminant plumes located in the central, developed portion of the site (g-2 tritium, BGRR Sr-90, HFBR tritium) outside of the established monitoring well networks.
- ◆ Work Planning: "One-Call" system is in place to ensure that utility mark-outs are conducted prior to performing digging operations near off-site groundwater treatment systems.
- ◆ Ownership: Any transfer of this site from DOE ownership must meet the requirements of CERCLA 120(h).
- ◆ Change Management: Proposed changes to land use and ICs must be coordinated with DOE, NYSDEC and EPA in accordance with the LUCMP prior to implementation and reported annually to the DOE, NYSDEC and EPA.
- ◆ Reporting: Breaches of Institutional and Engineered Controls must be reported to the LTRA Manager immediately upon discovery.
- ◆ Reporting: Implementation, maintenance and changes to land use and institutional controls will be documented in an annual letter report submitted to DOE, NYSDEC and EPA.
- ◆ Reporting: Five Year Reviews will be prepared and submitted to the DOE, EPA and NYSDEC. The Five Year Review will include inspections and a summary of site conditions to assure that ICs are working.
- ◆ Monitoring and Maintenance: Details on required monitoring and maintenance can be obtained from the LTRA Manager.

Other:

- ◆ None.

Facility Use Agreements:

N/A (BNL Internal Use Only)

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Land Use Controls Mapping

BROOKHAVEN
NATIONAL LABORATORY

Factsheet: Landscape Soils (AOC 16) (B2)

Land Use and Institutional Controls:

Land Use Classification: Remediation Completed – Restricted Use (B)

- The area has been remediated to an industrial use standard.
- Based upon residual contamination levels, the site will be suitable for residential purposes with 50 years of in situ radioactive decay (i.e., by the year 2055). Use of the site for residential purposes prior to 2055 requires an additional evaluation/risk assessment, and appropriate DOE/regulatory agency approval.

Institutional Controls

Access:

- ◆ Site Security Limits public access to the BNL Site.

Land Use:

- ◆ Federal ownership and control of the site is expected to continue.
- ◆ The Land Use and Institutional Controls Program Description in SBMS interfaces with the Site Master Planning process.

Engineered Controls:

- ◆ None.

Administrative Controls:

- ◆ Work Planning: Any work in these areas shall be coordinated with the Work Planning and Control Procedure.
- ◆ Ownership: Any transfer of this site from DOE ownership must meet the requirements of CERCLA 120(h).
- ◆ Change Management: Proposed changes to land use and ICs must be coordinated with DOE, NYSDEC and EPA in accordance with the LUCMP prior to implementation and reported annually to the DOE, NYSDEC and EPA.
- ◆ Reporting: Breaches of Institutional and Engineered Controls must be reported to the LTRA Manager immediately upon discovery.
- ◆ Reporting: Implementation, maintenance and changes to land use and institutional controls will be documented in an annual letter report submitted to DOE, NYSDEC and EPA.
- ◆ Reporting: Five Year Reviews will be prepared and submitted to the DOE, EPA and NYSDEC. The Five Year Review will include inspections and a summary of site conditions to assure that ICs are working.
- ◆ Monitoring and Maintenance: Details on required monitoring and maintenance can be obtained from the LTRA Manager.

Other:

- ◆ Any excavated soils shall be returned to the site and covered as found. If soil cannot be returned, the procedure FS-SOP-1005, Release of Material from Areas Controlled for Radiological Purposes must be followed. The waste soils must be managed in accordance with all Waste Management procedures, and the Environmental and Waste Management Services Division shall review all work requiring the disposal of soil wastes at an approved facility.

Facility Use Agreements:

<https://shms.bnl.gov/standart/1h/1h01d011.htm> (BNL Internal Use Only)

References:

Operable Units II/VII Remedial Investigation Report. IT Corp. February 1999.

Final Feasibility Study Report Operable Unit I and Radiologically-Contaminates Soils. CDM Federal Programs Corp. March 31, 1999.

Record of Decision Operable Unit I and Radiologically Contaminated Soils (Including Areas of Concern 6,8,10,16,17, and 18). USDOE and BNL. August 25, 1999.

Final Closeout Report for Area of Concern 16 Landscape Soil. April 10 2001.

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Land Use Controls Mapping

BROOKHAVEN
NATIONAL LABORATORY

Factsheet: Low Mass Criticality Facility (AOC 17) (B-4)

History:

The former Low Mass Criticality Facility (Area of Concern 17) was used from 1955 to 1967 for experiments using small amounts of radiological material. Once decontaminated and decommissioned, the facility stood empty until 1983, when it was then used for one year to store 20 drums of ethylene dibromide. No accidents or spills were documented during either period of use. Although a 1983 aerial radiological survey detected contamination in the area, a remedial investigation conducted in the 1990's indicated no radiological contamination above background detection levels. This facility was decontaminated and decommissioned in 1967 and the silo was disassembled in 1994.

Remedial Action:

No chemical or radiological contamination at levels of human health concern was present at the Low Mass Criticality Facility site. Therefore, no cleanup was required.

Land Use and Institutional Controls:

Land Use Classification: Remediation Complete – Restricted Use (B)

- Currently suitable for industrial use
- Use of the site for residential purposes requires an additional evaluation/risk assessment, and appropriate DOE/regulatory agency approval.

Institutional Controls

Access:

- ◆ Site Security Limits public access to the BNL Site.

Land Use:

- ◆ Federal ownership and control of the site is expected to continue.
- ◆ The Land Use and Institutional Controls Program Description in SBMS interfaces with the Site Master Planning process.

Engineered Controls:

- ◆ None.

Administrative Controls:

- ◆ **Work Planning:** Any work in these areas shall be coordinated with the Work Planning and Control Procedure.
- ◆ **Ownership:** Any transfer of this site from DOE ownership must meet the requirements of CERCLA 120(h).
- ◆ **Change Management:** Proposed changes to land use and ICs must be coordinated with DOE, NYSDEC and EPA in accordance with the LUCMP prior to implementation and reported annually to the DOE, NYSDEC and EPA.
- ◆ **Reporting:** Breaches of Institutional and Engineered Controls must be reported to the LTRA Manager immediately upon discovery.
- ◆ **Reporting:** Implementation, maintenance and changes to land use and institutional controls will be documented in an annual letter report submitted to DOE, NYSDEC and EPA.
- ◆ **Reporting:** Five Year Reviews will be prepared and submitted to the DOE, EPA and NYSDEC. The Five Year Review will include inspections and a summary of site conditions to assure that ICs are working.
- ◆ **Monitoring and Maintenance:** Details on required monitoring and maintenance can be obtained from the LTRA Manager.

Other:

- ◆ None.

Facility Use Agreements:

<https://sbms.bnl.gov/private/fua/fa0u/fa0ud011.htm> (BNL Internal Use Only)

References:

Operable Units II/VII Remedial Investigation Report. IT Corp. February 1999.

Final Feasibility Study Report Operable Unit I and Radiologically-Contaminated Soils. CDM Federal Programs Corp. March 31, 1999.

Record of Decision Operable Unit I and Radiologically Contaminated Soils (Including Areas of Concern 6,8,10,16,17, and 18). USDOE and BNL. August 25, 1999.

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Land Use Controls Mapping

BROOKHAVEN
NATIONAL LABORATORY

Factsheet: Nuclear Waste Management Facility Building 830 (AOC 16R) (F4)

History:

This AOC consists of former Nuclear Waste Management Facility, Radioactive waste Research Program and High-Intensity Radiation Laboratory in Building 830 (AOC 16R). This AOC was identified as part of the Aerial Radiological Survey and monitoring results and was address in the OU II/VII Remedial Investigation Report. Operations within Building 830 commenced in 1963, when the High Intensity Radiation Development Laboratory was opened. Hot cells and associated laboratories were used to fabricate high intensity cobalt-60 sources for food irradiation programs. The cells have also been used for the cutting, milling and evaluation of radioactively contaminated and activated material and components from commercial nuclear power plants. Since it is an active operating facility, it is considered as a future decontamination and demolition activity. Any work in this area shall be coordinated via the Work Planning and Control procedure.

A 1986 inspection of the facility's liquid waste tanks and waste inventory records revealed a 825 to 900 gallon discrepancy between the period of July 1984 and April 1987. Leak tests conducted in 1986 and 1987 revealed that there was a leak in the transfer line located between Building 830 and two, 1,000 gallon capacity underground storage tanks (USTs) that were located approximately 75 feet east of the building (see Factsheet for Bldg 830 Pipe Leaks and USTs, AOCs 11 12).

Remedial Action:

In March of 2000 the Gamma Irradiation Facility in Bldg. 830 was decommissioned. The cobalt-60 sources were shipped for disposal and dismantling and disposal of the gamma pool water and other equipment associated with the facility.

Current Conditions: Building 830 is an active research facility operated by the Environmental Sciences Department. No known sources of radioactivity were found to contaminate the groundwater from the Building. Contamination from pipe leaks and the USTs near the building were addressed in Bldg 830 Pipe Leaks and USTs remediation.

Land Use and Institutional Controls:

Land Use Classification: Radiological Facility, D&D pending – Restricted Use (F)

- Building 830 is a currently an active industrial facility, and continues to be used for research.
- Future land use scenarios to be determined.
- A risk assessment and appropriate DOE/regulatory approval are required prior to release for unrestricted use.

Institutional Controls

Access:

- ◆ Site Security Limits public access to the BNL Site.
- ◆ The Nuclear Waste Management section of Building 830 is a posted Radiologically Controlled area, and access to this building is restricted to authorized personnel.

Land Use:

- ◆ Federal ownership and control of the site is expected to continue.
- ◆ The Land Use and Institutional Controls Program Description in SBMS interfaces with the Site Master Planning process.

Engineered Controls:

- ◆ BMRR Building is used for containment.

Administrative Controls:

- ◆ Work Planning: Any work in these areas shall be coordinated with the Work Planning and Control Procedure.
- ◆ Ownership: Any transfer of this site from DOE ownership must meet the requirements of CERCLA 120(h).
- ◆ Change Management: Proposed changes to land use and ICs must be coordinated with DOE, NYSDEC and EPA in accordance with the LUCMP prior to implementation and reported annually to the DOE, NYSDEC and EPA.
- ◆ Reporting: Breaches of Institutional and Engineered Controls must be reported to the LTRA Manager immediately upon

discovery.

- ◆ **Reporting:** Implementation, maintenance and changes to land use and institutional controls will be documented in an annual letter report submitted to DOE, NYSDEC and EPA.
- ◆ **Reporting:** Five Year Reviews will be prepared and submitted to the DOE, EPA and NYSDEC. The Five Year Review will include inspections and a summary of site conditions to assure that ICs are working.
- ◆ **Monitoring and Maintenance:** Details on required monitoring and maintenance can be obtained from the LTRA Manager.

Other:

- ◆ Any excavated soils from below the Nuclear Waste Management section of Building 830 shall be returned to the site and covered as found. If soil cannot be returned, the procedure FS-SOP-1005, Release of Material from Areas Controlled for Radiological Purposes must be followed. The waste soils must be managed in accordance with all Waste Management procedures, and the Environmental and Waste Management Services Division shall review all work requiring the disposal of soil wastes at an approved facility.

Facility Use Agreements:

<https://shms.bnl.gov/private/fuaf3v/fa3vd011.htm> (BNL Internal Use Only)

References:

Operable Units II/VII Remedial Investigation Report. IT Corp. February 1999.

Operable Unit III Remedial Investigation Report. IT Corp. March, 1999.

Decommissioning the Brookhaven National Laboratory Building 830 Gamma Irradiation Facility. B.S. Bowerman and P.T. Sullivan, Environmental Research and Technology Division, Environmental Sciences Department, BNL. April, 2000.

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Land Use Controls Mapping



Factsheet: Old Firehouse Area (AOC 22) (B6)

History:

In the spring of 1985, a routine radiological survey was made of the old firehouse before it was to be demolished. The survey revealed an area of soil contamination beneath the concrete floor that contained radiation levels that were above background levels. Low levels of cesium-137 and strontium-90 were detected in the soils.

Remedial Action:

In 1987 the contaminated soils were excavated to a depth of one foot. Following the removal of the soils, radiation levels dropped to background levels of

Current Conditions: Maximum residual soil level of CS-137 following remediation in 1985 was 7.2 pCi/gm with an average concentration of 2.5 pCi/gm. Three samples taken in 1995 had nondetectable levels of Cs-137.

Land Use and Institutional Controls:

Land Use Classification: Remediation Complete – Restricted Use (B)

- The area is currently suitable for industrial use.
- Use of the site for residential purposes requires an additional evaluation/risk assessment, and appropriate DOE/regulatory agency approval.

Institutional Controls

Access:

- ◆ Site Security Limits public access to the BNL Site.

Land Use:

- ◆ Federal ownership and control of the site is expected to continue.
- ◆ The Land Use and Institutional Controls Program Description in SBMS interfaces with the Site Master Planning process.

Engineered Controls:

- ◆ None.

Administrative Controls:

- ◆ **Work Planning:** Any work in these areas shall be coordinated with the Work Planning and Control Procedure.
- ◆ **Ownership:** Any transfer of this site from DOE ownership must meet the requirements of CERCLA 120(h).
- ◆ **Change Management:** Proposed changes to land use and ICs must be coordinated with DOE, NYSDEC and EPA in accordance with the LUCMP prior to implementation and reported annually to the DOE, NYSDEC and EPA.
- ◆ **Reporting:** Breaches of Institutional and Engineered Controls must be reported to the LTRA Manager immediately upon discovery.
- ◆ **Reporting:** Implementation, maintenance and changes to land use and institutional controls will be documented in an annual letter report submitted to DOE, NYSDEC and EPA.
- ◆ **Reporting:** Five Year Reviews will be prepared and submitted to the DOE, EPA and NYSDEC. The Five Year Review will include inspections and a summary of site conditions to assure that ICs are working.
- ◆ **Monitoring and Maintenance:** Details on required monitoring and maintenance can be obtained from the LTRA Manager.

Other:

◆ None.

References:

Operable Unit III Remedial Investigation Report. IT Corp. March 1999.

Operable Unit III Feasibility Study Report. IT Corp. 1999.

Operable Unit III Record of Decision. April 14, 2000.

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Land Use Controls Mapping

BROOKHAVEN
NATIONAL LABORATORY

Factsheet: Paint Shop Soils Area (AOC 7) (A3)

History:

The area surrounding Buildings 422 and 244 has become known as the Paint Shop Area. Several areas of soil contamination have been identified and addressed over the past 20 years, including old septic systems, outdoor paintbrush cleaning areas, and drywells. The most significant area of contamination was the septic tank serving Bldg. 422. Analytical results dating back to as far as 1983 showed significant contamination with degreasing (e.g., methylene chloride, 1,1,1-trichloroethane) and paint solvents (e.g., toluene, naphtha). The septic tank and cesspools were allegedly remediated in 1988, however investigation in 1998, showed that the septic tank was simply connected to the sanitary sewer, and the cesspools were disconnected and remediated. Significant contamination of sludge within the septic tank remained. The septic tank and its contents were removed in September 1998 and end-point samples showed no residual contamination. A Geoprobe investigation of the cesspools was conducted in 1993 that showed no residual contamination. A second septic tank was located at Bldg. 244 and in 1983 was found to contain high levels of solvents. The septic tank was removed in 1987.

Another area of concern was a small drywell located on the west side of Bldg. 422 that was connected to a trough drain from a paint spray room. The drywell was constructed of a small section of 2-foot diameter clay tile pipe that was back filled with gravel. Investigation showed no substantial impact to soils. The last area was a brush cleaning area on the south side of Bldg. 244.

Remedial Action:

All areas have been remediated to the satisfaction of the regulatory agencies. Septic tanks have been removed and end-point samples show no contamination. Cesspools have been backfilled and investigations conducted in 1993 showed no impacts to soils. The drywell and former brush cleaning areas have also been excavated to remove physical evidence of contamination. Chemical analyses of endpoint samples show no impact to soil. Groundwater monitoring wells in the area show low-level VOC contamination but it is uncertain if this is due to past Paint shop activities or another upstream VOC source.

Land Use and Institutional Controls:

Land Use Classification: Remediation Complete – Unrestricted Use (A)

- The site has been remediated to a residential use standard, but is currently used for industrial purposes
- With appropriate DOE/regulatory agency approval, the site can be used for residential purposes once industrial activities have ended.

Institutional Controls

Access:

- ♦ Site Security Limits public access to the BNL Site.

Land Use:

- ♦ Federal ownership and control of the site is expected to continue.
- ♦ The Land Use and Institutional Controls Program Description in SBMS interfaces with the Site Master Planning process.

Engineered Controls:

- ♦ None.

Administrative Controls:

- ♦ Work Planning: Any work in these areas shall be coordinated with the Work Planning and Control Procedure.
- ♦ Ownership: Any transfer of this site from DOE ownership must meet the requirements of CERCLA 120(h).
- ♦ Change Management: Proposed changes to land use and ICs must be coordinated with DOE, NYSDEC and EPA in accordance with the LUCMP prior to implementation and reported annually to the DOE, NYSDEC and EPA.
- ♦ Reporting: Breaches of Institutional and Engineered Controls must be reported to the LTRA Manager immediately upon discovery.
- ♦ Reporting: Implementation, maintenance and changes to land use and institutional controls will be documented in an annual

letter report submitted to DOE, NYSDEC and EPA.

- ◆ Reporting: Five Year Reviews will be prepared and submitted to the DOE, EPA and NYSDEC. The Five Year Review will include inspections and a summary of site conditions to assure that ICs are working.
- ◆ Monitoring and Maintenance: Details on required monitoring and maintenance can be obtained from the LTRA Manager.

Other:

- ◆ None.

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Land Use Controls Mapping

BROOKHAVEN
NATIONAL LABORATORY

Factsheet: Peconic River Remediation Areas (AOC 30) (G7)

History:

The Peconic River receives discharges from the BNL Sewage Treatment Plant (STP) that are regulated by a State Pollution Discharge Elimination System (SPDES) permit. Past wastewater disposal practices at BNL resulted in the discharge of chemical and radiological contaminants to the sanitary system. Some of these contaminants could not be fully treated by the STP, and were subsequently discharged to the Peconic River. These releases resulted in contamination of river sediments and fish. Elevated levels of heavy metals (such as mercury, copper, and silver), and low levels of polychlorinated biphenyls (PCBs), pesticides (such as DDD, a product of DDT degradation) and radionuclides were present in Peconic River sediment. Most of the contaminants were found in the top six inches of the sediment in depositional (low velocity) areas of the river, and decreased in concentration with distance down river from the STP.

Remedial Action:

During 2004 and 2005, BNL removed approximately 14,500 cubic yards of contaminated sediment. Approximately 14,025 linear feet (2.66 miles) of the Peconic River were remediated between the BNL Sewage Treatment Plant (STP) and just downstream of Manor Road in Manorville, NY, encompassing a riverbed area of approximately 19.8 acres.

On BNL property, the response actions described in the ROD for removal of sediment established a cleanup goal to reduce the average mercury concentrations in the Peconic River to less than 1 ppm with a goal that all mercury concentrations in the remediated areas would be less than 2 ppm. The cleanup achieved the remedial objectives by reducing the average mercury concentration on BNL property to 0.2 ppm with all samples less than 2 ppm.

Outside BNL property and upstream of Schultz Road, the cleanup goal was to reduce the average mercury concentrations in the Peconic River to less than 0.75 ppm, with a goal that all mercury concentrations in the remediated areas would be less than 2 ppm. The cleanup achieved the remedial objectives by reducing the average mercury concentration outside BNL property and upstream of Schultz Road to 0.092 ppm with all samples less than 2 ppm.

Outside BNL property and immediately upstream and downstream of Manor Road, the cleanup goal was that all mercury concentrations in sediment be remediated to less than 2 ppm. The cleanup achieved the remedial objectives by reducing the average mercury concentration immediately upstream and downstream of Manor Road to 0.19 ppm with all samples less than 2 ppm. Any other co-located contaminants in these depositional areas were also removed during this process.

The major features of the removal action included stream dewatering, the excavation and removal of the sediment layer, dewatering of removed sediment, disposal of sediment at a licensed off-site landfill facility, wetland restoration (as needed) and the installation of temporary access roads for equipment. Post-excavation sampling will be performed to confirm that cleanup goals have been met. Long-term monitoring of surface water, sediment, and fish will verify the effectiveness of the cleanup action.

Land Use and Institutional Controls:

Land Use Classification: Biologically/Culturally Sensitive – Restricted Use or Activity (G)

- This area is designated as a Scenic River and protected habitat.
- The NYS Fresh Water Wetlands and Wild, Scenic and Recreational Rivers Act governs all development or work activities within one-half mile of regulated waters.
- NYSDEC regulations regulate all work within 100 feet of wetlands with confirmed protected species habitats. Any work activities within 100 feet of a wetland requires DOE and NYSDEC notification and approval.
- BNL limits activities within 850 feet of wetlands with confirmed protected species habitats.

Institutional Controls

Access:

- ◆ Site Security Limits public access to the BNL Site.

Land Use:

- ◆ Federal ownership and control of the site is expected to continue.
- ◆ The Land Use and Institutional Controls Program Description in SBMS interfaces with the Site Master Planning process.

Engineered Controls:

- ◆ None.

Administrative Controls:

- ◆ Work Planning: Any work in these areas shall be coordinated with the Work Planning and Control Procedure.
- ◆ Work Planning: Activities in this area must comply with the BNL Wildlife Management Plan (BNL-71870-2003).
- ◆ Ownership: Any transfer of this site from DOE ownership must meet the requirements of CERCLA 120(h).
- ◆ Change Management: Proposed changes to land use and ICs must be coordinated with DOE, NYSDEC and EPA in accordance with the LUCMP prior to implementation and reported annually to the DOE, NYSDEC and EPA.
- ◆ Reporting: Breaches of Institutional and Engineered Controls must be reported to the LTRA Manager and Natural Resources Manager immediately upon discovery.
- ◆ Reporting: Implementation, maintenance and changes to land use and institutional controls will be documented in an annual letter report submitted to DOE, NYSDEC and EPA.
- ◆ Reporting: Five Year Reviews will be prepared and submitted to the DOE, EPA and NYSDEC. The Five Year Review will include inspections and a summary of site conditions to assure that ICs are working.
- ◆ Monitoring and Maintenance: Details on required monitoring and maintenance can be obtained from the LTRA Manager.

Other:

- ◆ None.

References:

- Future Land Use Plan. Brookhaven National Laboratory, Upton, N.Y. BNL, 1995. (BNL-62130).
- Final Operable Unit V Remedial Investigation Report. IT Corp. May 1998.
- Final Operable Unit V Feasibility Study Report. IT Corp. September 1998.
- Natural Resource Management Plan. Brookhaven National Laboratory. (BNL-71870-2003)
- Engineering Evaluation/Cost Analysis and Action Memorandum: Peconic River Removal Action for Sediment on BNL Property. 2003
- Final Feasibility Study Addendum Operable Unit V: Peconic River, Brookhaven National Laboratory, Upton, N.Y. May 14, 2004
- Action Memorandum: Peconic River Removal Action for Sediment outside BNL Property. Brookhaven National Laboratory, Upton, N.Y. September 2, 2004.
- Final Operable Unit V Record of Decision for Area of Concern 30 (Peconic River) Brookhaven Science Associates and U.S. Department of Energy November 3, 2004.
- Final Closeout Report: Peconic River Remediation Phases 1 and 2. Envirocon Inc., Brookhaven National Laboratory, Upton, NY, 2004.

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Land Use Controls Mapping

BROOKHAVEN
NATIONAL LABORATORY

Factsheet: Recharge Basins (AOCs 24B, 24C, 24D, 24E) (G3)

History:

Wastewater effluents are routinely generated as a result of BNL's operations and research activities. A portion of the wastewater, mainly stormwater runoff, cooling tower blowdown and once through cooling water, is directly discharged to recharge basins located throughout the site. While these wastewaters have little potential to impact groundwater quality, and the health of aquatic and terrestrial organisms, to ensure that these discharges comply with regulatory requirements and result in minimal environmental impact, they are frequently monitored in accordance with the Laboratory's State Pollutant Discharge Elimination System (SPDES) permit and Department of Energy Orders.

Due to contaminant discharges over the years of operation, several of BNL's recharge basins were evaluated as part of the BNL environmental restoration program. The Laboratory discharges storm and cooling water to the following recharge basin.

* Recharge Basins HN (Outfall 002) (AOC 24C) and HT (Outfall 006) (AOC 24 ??) receive once-through cooling water discharges generated at the Alternating Gradient Synchrotron (AGS), as well as cooling tower blowdown and stormwater runoff.

* Recharge Basin HS (Outfall 005) (AOC 24E) receives predominantly stormwater runoff, once-through cooling water from Building 555 (Chemistry), and minimal cooling tower blowdown from the National Synchrotron Light Source.

* Basin HX (Outfall 007) receives filter backwash water from the Water Treatment Plant. Basin HP (Outfall 004) (AOC 24 B) received once-through cooling water from the Brookhaven Medical Research Reactor (BMRR). This discharge ceased with the shutdown of the BMRR in 2000.

* Recharge Basin HO (Outfall 003) (AOC 24 D) receives once through cooling water from the AGS and cooling tower discharges from the High Flux Beam Reactor, as well as stormwater runoff. Discharges from the AGS consist of once-through domestic water used to cool the main magnet heat exchanger located in Building 911.

* In addition, several other recharge areas are used exclusively for discharging stormwater runoff. These include Basin HW (Outfall 008), the Central Steam Facility storm water outlet (Outfall 010), Outfall 011 located within the Former Hazardous Waste Management Facility, and Basin HZ (Outfall 012).

Remedial Action:

Contamination was not detected in any of the recharge basins at levels that warranted remedial action.

All stormwater and cooling water discharges continue to be regulated under the New York State SPDES permit.

Land Use and Institutional Controls:

Land Use Classification: Biologically Sensitive Area – Restricted Use (G)

- Currently in industrial use. These areas are used for stormwater and cooling water recharge, and may contain protected habitats.
- Activities in some of the recharge basin areas are restricted because they contain protected plant or animal habitats. NYSDEC regulations regulate all work within 100 feet of wetlands with protected species habitats.
- BNL limits activities within 850 feet of wetlands with confirmed protected species habitats.

Institutional Controls

Access:

- ◆ Site Security Limits public access to the BNL Site.
- ◆ No specific postings are required for these areas.

Land Use:

- ◆ Federal ownership and control of the site is expected to continue.
- ◆ The Land Use and Institutional Controls Program Description in SBMS interfaces with the Site Master Planning process.

Engineered Controls:

- ◆ None.

Administrative Controls:

- ◆ Work Planning: Any work in these areas shall be coordinated with the Work Planning and Control Procedure.
- ◆ Work Planning: Discharges to the recharge basins must comply with NYS SPDES Permit requirements.
- ◆ Work Planning: Activities in this area must comply with the BNL Natural Resources Management Plan (BNL-71870-2003).
- ◆ Ownership: Any transfer of this site from DOE ownership must meet the requirements of CERCLA 120(h).
- ◆ Change Management: Proposed changes to land use and ICs must be coordinated with DOE, NYSDEC and EPA in accordance with the LUCMP prior to implementation and reported annually to the DOE, NYSDEC and EPA.
- ◆ Reporting: Breaches of Institutional and Engineered Controls must be reported to the LTRA Manager immediately upon discovery.
- ◆ Reporting: Implementation, maintenance and changes to land use and institutional controls will be documented in an annual letter report submitted to DOE, NYSDEC and EPA.
- ◆ Reporting: Five Year Reviews will be prepared and submitted to the DOE, EPA and NYSDEC. The Five Year Review will include inspections and a summary of site conditions to assure that ICs are working.
- ◆ Monitoring and Maintenance: Details on required monitoring and maintenance can be obtained from the LTRA Manager.

Other:

- ◆ None.

Facility Use Agreements:

N/A. (BNL Internal Use Only)

References:

Record of Decision Operable Unit I and Radiologically Contaminated Soils (Including Areas of Concern 6,8,10,16,17, and 18). USDOE and BNL, August 25, 1999.

Operable Unit III Record of Decision. USDOE and BNL, April 14, 2000.

Operable Unit IV Record of Decision. USDOE and BNL Office of Environmental Restoration. March 14, 1996.

New York State Pollutant Discharge Elimination System (SPDES Permit No. 0005835)

Natural Resource Management Plan. Brookhaven National Laboratory. (BNL-71870-2003)

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Land Use Controls Mapping

BROOKHAVEN
NATIONAL LABORATORY

Factsheet: Sewage Treatment Plant (AOCs 4 21) (08)

History:

This area consists of: the Sludge Drying Beds (AOC 4A), Sand Filter Beds (AOC 4B), former Imhoff Tanks (AOC 4C), Hold-up Ponds (AOC 4D), the Satellite Disposal Area (AOC 4E) and Abandoned Former Sewerlines (AOC 21).

The STP processes sanitary sewage for the BNL facilities. STP operations in this area initially started when Camp Upton was established during World War I. The original STP was replaced with a World War II facility, which was constructed in stages from 1940 through 1944. With the continued growth of the Laboratory, the original sewage plant to handle the increased flow, it was expanded in February 1967. In conjunction with portions of the old plant that are still in service, the treatment plant was upgraded to a hydraulic capacity of 2.3 MGD. In 1993, the STP was further upgraded with: modular aeration tanks and secondary clarifiers to provide suspended growth activated sludge treatment for BOD and nitrogen control; an aerobic digester for improved management of wastewater treatment residuals; and significant piping upgrades and repair. Although the capacity of the STP was increased to 3.0 MGD, significant wastewater conservation efforts have reduced the current average flow to approximately 0.4 MGD, with peak instantaneous flows of approximately 1.0 MGD in the summer.

The STP has two, two million gallon capacity emergency holding ponds. These ponds are sealed with dual plastic membrane liners with interstitial space monitors. The ponds provide storage of up to four days' average sanitary flow in the event of an accidental release of a contaminant into the sanitary system.

The effluent from the Sewage Treatment Plant is discharged into the headwaters of the Peconic River, which flows east from the Laboratory into the Peconic Bay. The Laboratory's Environmental and Waste Management Services and Plant Engineering Divisions regularly monitor influent and effluent at the plant. Radioactive and chemical contaminants are precluded at the source via monitoring and administrative controls. The existing sewage treatment process provides solids removal via screening, primary clarification, aerobic treatment, secondary clarification, sand filtration and aerobic sludge digestion. Routine monitoring of the plant effluent shows that the discharge continually meets all applicable effluent discharge standards. Constant monitoring of performance parameters, such as dissolved oxygen, settleable solids, mixed liquor suspended solids, biological oxygen demand (BOD), coliform, conductivity, and pH ensures optimum plant performance to meet the requirements of the Laboratory's New York State (SPDES) operating permit.

The historical release of contaminants to the sanitary system resulted in the soil, sediment, and groundwater contamination. The primary contaminants that had been contained in historical releases to the STP included metals, radionuclides, and solvents. Metals (primarily mercury) and radionuclides (primarily cesium-137) were deposited in the sand filter beds, and solvents and tritium have been detected in the groundwater. Metals, PCBs, and low levels of radionuclides have been detected in the sediments of the Peconic River (see Fact Sheet for Peconic River Remediation Areas). No contaminants were detected above cleanup levels at the Satellite Disposal Area and the Holding Ponds.

Remedial Action:

Remediation of the STP involved the excavation of twelve cleanup areas resulting in 1,350 cubic yards of contaminated soils. The Imhoff tanks were emptied and removed. The contaminated areas of the sand filter beds and sludge drying beds were excavated to levels that allow for continued industrial use without controls, and potential future residential land use after 50 years of institutional controls. A minimum of six inches of clean fill was placed over the remediated areas.

Current Conditions: The maximum residual soil concentration of Cs-137 remaining following remediation of the STP AOC 4 is 6.7 pCi/gm which is below the concentration for unrestricted land use today. Concentrations of mercury following remediation are below the 2.0 mg/gm clean-up goal.

Land Use and Institutional Controls:

Land Use Classification: Remediation Complete - Restricted (B)

- The area has been remediated to an industrial use standard.
- The STP is an active waste water treatment facility.
- Based upon residual contamination levels, the site will be suitable for residential purposes with 50 years of in situ radioactive decay (i.e., by the year 2055). Use of the site for residential purposes prior to 2055 requires an additional evaluation/risk assessment, and appropriate DOE/regulatory agency approval.

Institutional Controls

Access:

- ◆ Site Security Limits public access to the BNL Site.
- ◆ The areas around the STP buildings and emergency holding ponds are fenced.

Land Use:

- ◆ Federal ownership and control of the site is expected to continue.
- ◆ The Land Use and Institutional Controls Program Description in SBMS interfaces with the Site Master Planning process.

Engineered Controls:

- ◆ None.

Administrative Controls:

- ◆ **Work Planning:** Any work in these areas shall be coordinated with the Work Planning and Control Procedure.
- ◆ **Ownership:** Any transfer of this site from DOE ownership must meet the requirements of CERCLA 120(h).
- ◆ **Change Management:** Proposed changes to land use and ICs must be coordinated with DOE, NYSDEC and EPA in accordance with the LUCMP prior to implementation and reported annually to the DOE, NYSDEC and EPA.
- ◆ **Reporting:** Breaches of Institutional and Engineered Controls must be reported to the LTRA Manager immediately upon discovery.
- ◆ **Reporting:** Implementation, maintenance and changes to land use and institutional controls will be documented in an annual letter report submitted to DOE, NYSDEC and EPA.
- ◆ **Reporting:** Five Year Reviews will be prepared and submitted to the DOE, EPA and NYSDEC. The Five Year Review will include inspections and a summary of site conditions to assure that ICs are working.
- ◆ **Monitoring and Maintenance:** Details on required monitoring and maintenance can be obtained from the LTRA Manager.

Other:

- ◆ Any excavated soils shall be returned to the site and covered as found. If soil cannot be returned, the procedure FS-SOP-1005, Release of Material from Areas Controlled for Radiological Purposes must be followed. The waste soils must be managed in accordance with all Waste Management procedures, and the Environmental and Waste Management Services Division shall review all work requiring the disposal of soil wastes at an approved facility.

Facility Use Agreements:

<https://sbms.bnl.gov/standard/1h/1h01d011.htm> (BNL Internal Use Only)

References:

Final Operable Unit V Remedial Investigation Report. IT Corp. May 1998.

Final Operable Unit V Feasibility Study Report. IT Corp. September 1998.

Operable Unit V – Record of Decision AOC 4 (Sewage Treatment Plant); AOC 21 (Sewer Lines) AOC 23 (Eastern Offsite Tritium Plume) . July 24, 2001.

Final Completion Report: Remedial Action AOC 4, STP and AOC 21, abandoned Former Sewer lines. November 17, 2004.

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Land Use Controls Mapping

BROOKHAVEN
NATIONAL LABORATORY

Factsheet: TCE Spill Area (AOC 19) (A5)

History:

The TCE spill area was reported to have been located near the present day courtyard of Building 515. Between 1951 and 1953 it was reported that approximately 5 gallons of trichloroethylene (TCE) was discharged to the ground at a frequency of every two days – which would amount to approximately 1,800 gallons of TCE for the time period.

Remedial Action:

Based upon a review of historical records, the location of the probable spill area was identified as the present day courtyard of Building 515 (Physics). As part of the Operable Unit III Remedial Investigation, soil and groundwater samples were collected in this area. No residual contamination was detected in the soils, and groundwater samples did not indicate the presence of residual TCE contamination.

Land Use and Institutional Controls:

Land Use Classification: Remediation Complete – Unrestricted Use (A)

- The site has been remediated to a residential use standard, but is currently used for industrial purposes
- With appropriate DOE/regulatory agency approval, the site can be used for residential purposes once industrial activities have ended.

Institutional Controls

Access:

- ◆ Site Security Limits public access to the BNL Site.

Land Use:

- ◆ Federal ownership and control of the site is expected to continue.
- ◆ The Land Use and Institutional Controls Program Description in SBMS interfaces with the Site Master Planning process.

Engineered Controls:

- ◆ None.

Administrative Controls:

- ◆ Work Planning: Any work in these areas shall be coordinated with the Work Planning and Control Procedure.
- ◆ Ownership: Any transfer of this site from DOE ownership must meet the requirements of CERCLA 120(h).
- ◆ Change Management: Proposed changes to land use and ICs must be coordinated with DOE, NYSDEC and EPA in accordance with the LUCMP prior to implementation and reported annually to the DOE, NYSDEC and EPA.
- ◆ Reporting: Breaches of Institutional and Engineered Controls must be reported to the LTRA Manager immediately upon discovery.
- ◆ Reporting: Implementation, maintenance and changes to land use and institutional controls will be documented in an annual letter report submitted to DOE, NYSDEC and EPA.
- ◆ Reporting: Five Year Reviews will be prepared and submitted to the DOE, EPA and NYSDEC. The Five Year Review will include inspections and a summary of site conditions to assure that ICs are working.
- ◆ Monitoring and Maintenance: Details on required monitoring and maintenance can be obtained from the LTRA Manager.

Other:

- ◆ None.

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Land Use Controls Mapping

BROOKHAVEN
NATIONAL LABORATORY

Factsheet: Upland Recharge/ Meadow Marsh (AOC 8) (G1)

History:

The meadow marsh ponds and two upland recharge basins (Area of Concern 8) were used for experiments from 1973 to 1975 on the use of natural ecosystems for treatment of sewage and recharge to groundwater. These ponds are currently breeding grounds for the Tiger Salamander, a New York State endangered species. This area is classified as Class I Wetlands based on the presence of this species.

Analysis of the sediments in the ponds detected elevated levels of heavy metals including copper, aluminum, and zinc in the surface water and sediments. An ecological risk assessment prepared for the OU I Feasibility Study showed potential for impact to the Tiger Salamander. No contaminants of concern were found that exceed remediation goals for impacting human health.

Remedial Action:

In 2003, the contaminated sediments were excavated and the underlying PVC liners removed from the two eastern ponds. The wastes were disposed of off-site. The excavated wetlands were restored to a single pond designed to support the desired ecological habitat for Tiger Salamanders.

Current Conditions: Based on the Ecological Risk Assessment method used in the OU I/VI Feasibility Study, current concentrations of metals in the remediated and restored meadow marsh pond indicate that the pond is safe for the Tiger Salamander. No radiological materials are present that exceed cleanup goals. Residual chemical contaminants meet Federal and State guidelines for public exposure.

Land Use and Institutional Controls:

Land Use: Biologically/Culturally Sensitive – Restricted Land Use (G)

- The area is designated as open space and a protected habitat.
- NYSDEC regulations regulates all work within 100 feet of wetlands with confirmed protected species habitats. Any work activities within 100 feet of a wetland requires DOE and NYSDEC notification and approval.
- BNL limits activities within 850 feet of wetlands with confirmed protected species habitats.

Institutional Controls

Access:

- ◆ Site Security Limits public access to the BNL Site.
- ◆ No specific postings are required for this area.

Land Use:

- ◆ Federal ownership and control of the site is expected to continue.
- ◆ The Land Use and Institutional Controls Program Description in SBMS interfaces with the Site Master Planning process.

Engineered Controls:

- ◆ None.

Administrative Controls:

- ◆ **Work Planning:** Any work in these areas shall be coordinated with the Work Planning and Control Procedure.
- ◆ **Work Planning:** Activities in this area must comply with the BNL Wildlife Management Plan (BNL-71870-2003).
- ◆ **Ownership:** Any transfer of this site from DOE ownership must meet the requirements of CERCLA 120(h).
- ◆ **Change Management:** Proposed changes to land use and ICs must be coordinated with DOE, NYSDEC and EPA in accordance with the LUCMP prior to implementation and reported annually to the DOE, NYSDEC and EPA.
- ◆ **Reporting:** Breaches of Institutional and Engineered Controls must be reported to the LTRA Manager and Natural Resources Manager immediately upon discovery.

- ◆ Reporting: Implementation, maintenance and changes to land use and institutional controls will be documented in an annual letter report submitted to DOE, NYSDEC and EPA.
- ◆ Reporting: Five Year Reviews will be prepared and submitted to the DOE, EPA and NYSDEC. The Five Year Review will include inspections and a summary of site conditions to assure that ICs are working.
- ◆ Monitoring and Maintenance: Details on required monitoring and maintenance can be obtained from the LTRA Manager.

Other:

- ◆ None.

Facility Use Agreements:

N/A (BNL Internal Use Only)

References:

Final Remedial Investigation/Risk Assessment Report, Operable Unit I/VI. CDM Federal Programs Corp. June 14, 1996.

Final Feasibility Study Report Operable Unit I and Radiologically-Contaminates Soils. CDM Federal Programs Corp. March 31, 1999.

Record of Decision Operable Unit I and Radiologically Contaminated Soils (Including Areas of Concern 6,8,10,16,17, and 18). USDOE and BNL. August 25, 1999.

Natural Resource Management Plan. Brookhaven National Laboratory. (BNL-71870-2003)

Close Out Report for the Meadow Marsh, Operable Unit I, Area of Concern 8. BNL Environmental Management Directorate. February 6, 2004.

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Land Use Controls Mapping

BROOKHAVEN
NATIONAL LABORATORY

Factsheet: Wooded Wetlands by Current Landfill Area (AOC 3A) (GH)

History:

The Wooded Wetland (*SubArea of Concern 3A*) is located adjacent to the eastern edge of the Current Landfill (AOC 3). Prior to capping of the landfill, runoff, which was contaminated with leachate, drained into the wetland from the landfill. Elevated concentrations of aluminum and copper were found below those of human health concern. These levels were a concern for protection of wetlands serving as a breeding habitat for the Tiger Salamander, a New York State endangered species.

Remedial Action:

Capping of the Current Landfill in 1995 corrected the runoff into the wetland. The OU 1 Record of Decision stipulated institutional control and monitoring metal concentrations in the surface water and sediments of the Wooded Wetland.

Current Conditions: Based on the Ecological Risk Assessment in the OU I/VI Feasibility Study, current concentrations in the wetland indicate the habitat is safe for the Tiger Salamander. The Wooded Wetland is a contiguous part of a larger regulated wetland. No radiological materials are present that exceed cleanup goals. Residual chemical contaminants meet Federal and State guidelines for public exposure.

Land Use and Institutional Controls:

Land Use Classification: Biologically/Culturally Sensitive – Restricted Use or Activity (G)

- This area contains a protected habitat.
- NYSDEC regulations regulate all work within 100 feet of wetlands with confirmed protected species habitats. Any work activities within 100 feet of a wetland requires DOE and NYSDEC notification and approval.
- BNL limits activities within 850 feet of wetlands with confirmed protected species habitats.

Institutional Controls

Access:

- ◆ Site Security Limits public access to the BNL Site.
- ◆ Specific postings for this area are not required.

Land Use:

- ◆ Federal ownership and control of the site is expected to continue.
- ◆ The Land Use and Institutional Controls Program Description in SBMS interfaces with the Site Master Planning process.

Engineered Controls:

- ◆ None.

Administrative Controls:

- ◆ **Work Planning:** Any work in these areas shall be coordinated with the Work Planning and Control Procedure.
- ◆ **Work Planning:** Activities in this area must comply with the BNL Wildlife Management Plan (BNL-71870-2003).
- ◆ **Ownership:** Any transfer of this site from DOE ownership must meet the requirements of CERCLA 120(h).
- ◆ **Change Management:** Proposed changes to land use and ICs must be coordinated with DOE, NYSDEC and EPA in accordance with the LUCMP prior to implementation and reported annually to the DOE, NYSDEC and EPA.
- ◆ **Reporting:** Breaches of Institutional and Engineered Controls must be reported to the LTRA Manager and Natural Resources Manager immediately upon discovery.
- ◆ **Reporting:** Implementation, maintenance and changes to land use and institutional controls will be documented in an annual letter report submitted to DOE, NYSDEC and EPA.
- ◆ **Reporting:** Five Year Reviews will be prepared and submitted to the DOE, EPA and NYSDEC. The Five Year Review will include inspections and a summary of site conditions to assure that ICs are working.
- ◆ **Monitoring and Maintenance:** Details on required monitoring and maintenance can be obtained from the LTRA Manager.

Other:

◆ None.

References:

Final Engineering Evaluation/Cost Analysis for Landfill Closure Removal Action VI. CDM Federal Programs Corp. Vol. 1 & 2. March, 1995.

Record of Decision Operable Unit I and Radiologically Contaminated Soils (Including Areas of Concern 6,8,10,16,17, and 18). USDOE and BNL. August 25, 1999.

OU I Wooded Wetlands Supplemental Sampling and Analysis Plan.

Landfill Gas and Surface Leachate Monitoring Current Landfill – Wooded Wetland Monitoring

Natural Resources Management Plan. Brookhaven National Laboratory. (BNL-71870-2003)

November 20, 2003 <http://intrunet.bnl.gov/esh/esd/internal/Docs/EMP05ndfiles/EMP05Ch13.pdf>

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