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EXPLORING EARTH'S MYSTERIES
...PROTECTING ITS FUTURE

BROOKHAVEN NATIONAL LABORATORY

1998 Site Environmental Report

September 1999

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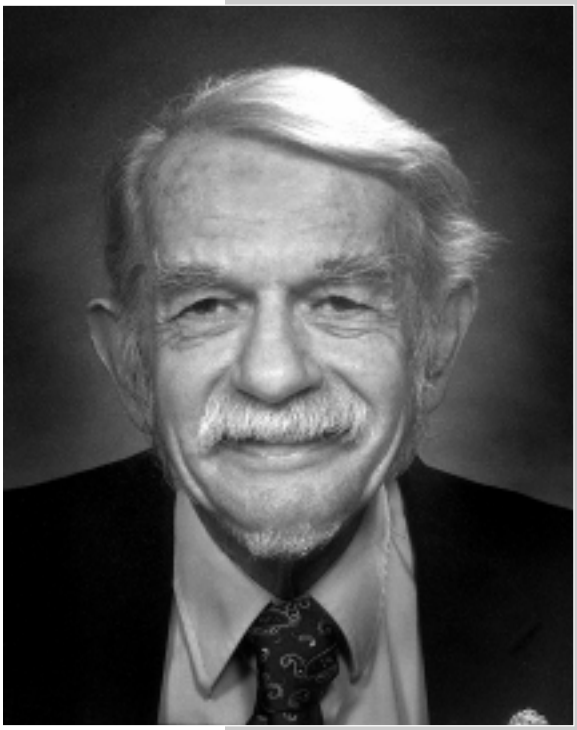

Dedication

Andrew P. Hull, CHP
(1920-1999)

This Site Environmental Report is dedicated to Andrew Hull, who was a Certified Health Physicist at Brookhaven National Laboratory (BNL). Hull was devoted to the environment and the safe use of nuclear physics throughout the world. Born in Bristol, Connecticut, Hull became a health physicist after a career with American Airlines and a tour of duty in the U.S. Air Force during the Korean War. He received his bachelor's degree from Central Connecticut State College in 1956 and, on a fellowship from the Atomic Energy Commission, his master's degree in physics from Vanderbilt University in 1961. For the next 38 years he worked at BNL. From 1962 to 1981, Hull was responsible for the environmental monitoring program and for publishing the site environmental reports.

In addition to his BNL duties, Hull was one of the first health physicists to reach the Three Mile Island nuclear reactor accident in 1979 and was responsible for the analysis and interpretation of the environmental data that estimated population radiation doses. He was also called to the site of the Chernobyl Nuclear Power Plant accident in 1986 and helped determine the health and environmental impacts of that accident for the Department of Energy.

As a source of information, a mentor, and as friend of the environment, Andrew Hull will be missed.

Table of Contents

CHAPTER 1: INTRODUCTION 1-1
1.1 PURPOSE OF THE 1998 SITE ENVIRONMENTAL REPORT (SER) 1-2
1.2 THE HISTORY AND MISSION OF BROOKHAVEN NATIONAL LABORATORY 1-2
1.3 SITE LOCATION AND LOCAL POPULATION 1-3
1.4 FACILITY DESCRIPTION 1-5
1.5 GEOLOGY AND HYDROLOGY 1-9
1.6 CLIMATIC DATA 1-11
1.7 ECOLOGICAL RESOURCES 1-11
REFERENCES 1-13

CHAPTER 2: ENVIRONMENTAL MANAGEMENT SYSTEM 2-1
2.1 ENVIRONMENTAL POLICY GOALS, AND COMMITMENTS 2-2
2.2 ENVIRONMENTAL MANAGEMENT SYSTEM (EMS) AND IMPROVEMENTS 2-3
2.2.1 EMS IMPROVEMENT 2-5
2.3 FACILITY REVIEW PROJECT 2-6
2.4 PROCESS EVALUATION PROJECT (PEP) 2-7
2.5 POLLUTION PREVENTION/WASTE MINIMIZATION 2-7
2.5.1 P2 PROGRAM ACCOMPLISHMENTS 2-8
2.5.2 EMPLOYEE TRIP REDUCTION PLAN 2-8
2.5.3 WATER CONSERVATION PROGRAM — 1998 ACCOMPLISHMENTS 2-9
2.5.4 ENERGY MANAGEMENT 2-9
2.6 WASTE MANAGEMENT (WM) PROGRAM 2-9
2.6.1 WASTE GENERATION 1-9
2.6.2 FACILITIES AND CAPABILITIES 2-9
2.7 ENVIRONMENTAL RESTORATION (ER) 2-11
2.7.1 PROGRESS BY OPERABLE UNIT (OU) 2-11
2.7.2 ETHYLENEDIAMINETETRA ACID (EDTA) INVESTIGATION 2-11
2.8 ENVIRONMENTAL MONITORING 2-13
2.8.1 ENVIRONMENTAL MONITORING PROGRAM PURPOSE AND SCOPE 2-15
2.9 COMMUNITY INVOLVEMENT 2-15
REFERENCES 2-16

CHAPTER 3: COMPLIANCE STATUS
3.1 COMPLIANCE WITH ENVIRONMENTAL REQUIREMENTS 3-2
3.2 ENVIRONMENTAL PERMITS 3-2
3.2.1 NEW OR MODIFIED PERMITS 3-3
3.2.1.1 STATE POLLUTANT DISCHARGE ELIMINATION SYSTEM (SPDES) 3-3
3.2.1.2 AIR 3-5
3.3 NATIONAL ENVIRONMENTAL POLICY ACT (NEPA) 3-6

3.4 NATIONAL HISTORIC PRESERVATION ACT/ARCHEOLOGICAL RESOURCE PROTECTION ACT (NHPA/ARPA) 3-6
3.5 CLEAN AIR ACT (CAA) 3-8
3.5.1 CONVENTIONAL AIR POLLUTANTS 3-8
3.5.1.1 OZONE DEPLETING SUBSTANCES (ODS) 3-8
3.5.2 NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS (NESHAPS) 3-8
3.5.2.1 MAXIMUM AVAILABLE CONTROL TECHNOLOGY (MACT) 3-8
3.5.2.2 ASBESTOS 3-9
3.5.2.3 RADIOACTIVE AIRBORNE EMISSIONS 3-9
3.6 CLEAN WATER ACT (CWA) 3-9
3.6.1 BNL SEWAGE TREATMENT PLANT (STP) OUTFALL 001 3-9
3.6.2 BNL RECHARGE BASINS AND STORMWATER OUTFALLS 002 - 010 3-13
3.6.3 SAFE DRINKING WATER ACT (SDWA) 3-14
3.6.3.1 POTABLE WATER 3-14
3.6.3.2 CROSS-CONNECTION CONTROL 3-14
3.6.3.3 UNDERGROUND INJECTION CONTROL 3-14
3.7 SPILL PREVENTION, EMERGENCY PLANNING, AND REPORTING 3-17
3.7.1 SPILL PREVENTION CONTROL AND COUNTERMEASURES PLAN (SPCC) 3-17
3.7.2 EMERGENCY PLANNING AND COMMUNITY RIGHT TO KNOW ACT (EPCRA) AND SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA) TITLE III REPORTING REQUIREMENTS 3-17
3.7.3 SPILL RESPONSE, REPORTABLE RELEASES AND OCCURRENCES 3-17
3.7.4 MAJOR PETROLEUM FACILITIES (MPF) 1-20
3.7.5 CHEMICAL BULK STORAGE 3-20
3.7.6 ARTICLE 12 3-20
3.8 RESOURCE CONSERVATION AND RECOVERY ACT (RCRA) 3-21
3.8.1 RCRA/ TOXIC SUBSTANCES CONTROL ACT (TSCA) WASTE MORATORIUM 3-21
3.8.2 FEDERAL FACILITIES COMPLIANCE ACT (FFCA) SITE TREATMENT PLAN FOR MIXED WASTE 3-21
3.9 TOXIC SUBSTANCE CONTROL ACT (TSCA) 3-21
3.10 FEDERAL INSECTICIDE FUNGICIDE AND RODENTICIDE ACT (FIFRA) 3-22
3.11 FLOODPLAINS/WETLANDS AND WILD AND SCENIC RECREATIONAL RIVERS AND OTHER SPECIAL PERMITS 3-22
3.12 ENDANGERED SPECIES 3-22
3.13 EXTERNAL AUDITS/OVERSIGHT 3-23
3.13.1 INSPECTIONS BY REGULATORY AGENCIES 3-23
3.13.2 DEPARTMENT OF ENERGY (DOE) 3-23
3.13.3 ENFORCEMENT ACTIONS AND MOA'S 3-23

CHAPTER 4: CONCEPTS OF RADIOACTIVITY 4-1
4.1 RADIOACTIVITY 4-2
4.2 COMMON TYPES OF RADIATION 4-2
4.3 NOMENCLATURE 4-2
4.4 DOSE UNITS 4-2
4.5 SOURCES OF RADIATION 4-3

4.6 TYPES OF RADIOLOGICAL ANALYSIS 4-3
4.7 STATISTICS 4-4
4.7.1 UNCERTAINTY 4-4
4.7.2 NEGATIVE VALUES 4-4
4.8 SCIENTIFIC NOTATION 4-5
4.9 PREFIXES 4-5
4.10 RADIONUCLIDES OF ENVIRONMENTAL INTEREST 4-5
4.10.1 STRONTIUM-90 4-5
4.10.2 TRITIUM 4-6
4.10.3 CESIUM-137 4-6
4.11 DEFINITION OF RADIOLOGICAL TERMS 4-6

CHAPTER 5: AIR QUALITY 5-1
5.1 AIRBORNE EMISSIONS - RADIOACTIVE 5-2
5.1.1. BROOKHAVEN MEDICAL RESEARCH REACTOR (BMRR) 5-2
5.1.2 HIGH FLUX BEAM REACTOR (HFBR) 5-3
5.1.3. BROOKHAVEN LINAC ISOTOPE PRODUCER (BLIP) 5-4
5.1.4. EVAPORATOR FACILITY 5-4
5.1.5. BUILDING 801 TARGET PROCESSING LABORATORY 5-5
5.1.6. ADDITIONAL MINOR SOURCES 5-5
5.1.7. PREVIOUSLY UNCHARACTERIZED EMISSION SOURCES EVALUATED IN 1998 5-5
5.1.7.1. LINEAR ACCELERATOR (LINAC) 5-5
5.1.7.2. ALTERNATING GRADIENT SYNCHROTRON (AGS) COOLING TOWER #2 5-5
5.2 AIRBORNE EMISSIONS - NON-RADIOACTIVE 5-6
5.3 AIR MONITORING 5-6
5.3.1. GROSS ACTIVITY 5-8
5.3.2. AIRBORNE TRITIUM 5-9
5.3.2.1. REMOVAL ACTION V (RA V) RECHARGE BASIN 1-9
REFERENCES 5-10

CHAPTER 6: WATER QUALITY 6-1
6.1 SANITARY SYSTEM EFFLUENTS 6-2
6.1.1 SANITARY SYSTEM EFFLUENT - RADIOLOGICAL 6-3
6.1.1.1 PLUTONIUM ANALYSIS 6-7
6.1.2 SANITARY SYSTEM EFFLUENT - NONRADIOLOGICAL 6-7
6.2 ASSESSMENTS OF PROCESS-SPECIFIC WASTEWATER 6-7
6.2.1 RECHARGE BASINS 6-8
6.2.1.1 RECHARGE BASINS - RADIOLOGICAL ANALYSES 6-11
6.2.1.2 RECHARGE BASINS - NONRADIOLOGICAL ANALYSES 6-11
6.3 PECONIC RIVER SURVEILLANCE 6-15
6.3.1 PECONIC RIVER - RADIOLOGICAL ANALYSES 6-15
6.3.2 PECONIC RIVER - NONRADIOLOGICAL ANALYSES 6-19

CHAPTER 7: FLORA AND FAUNA 7-1
7.1 WILDLIFE MANAGEMENT PROGRAM 7-2
7.1.1 IDENTIFICATION AND MAPPING OF NATURAL RESOURCES 7-2
7.1.2 HABITAT PROTECTION OR ENHANCEMENT 7-2
7.1.3 POPULATION MANAGEMENT 7-2
7.1.4 COMPLIANCE ASSURANCE AND POTENTIAL IMPACT ASSESSMENT 7-4
7.2 MONITORING 7-4
7.2.1 DEER SAMPLING 7-4
7.2.2 FISH SAMPLING 7-5
7.3 VEGETATION SAMPLING 7-8
7.4 PECONIC RIVER SEDIMENTS 7-8
7.5 TOXICITY TESTING AT THE SEWAGE TREATMENT PLANT 7-9
7.6 WILDLIFE MANAGEMENT EDUCATION, OUTREACH AND RESEARCH 7-9
REFERENCES 7-10

CHAPTER 8: GROUNDWATER PROTECTION
8.1 GROUNDWATER MONITORING 8-3
8.1.1 POTABLE AND PROCESS SUPPLY WELLS (SUPPLEMENTAL MONITORING PROGRAM) 8-7
8.1.1.1 NON-RADIOLOGICAL ANALYSES 8-7
8.1.1.2 RADIOLOGICAL ANALYSES 8-11
8.1.2 ENVIRONMENTAL RESTORATION GROUNDWATER MONITORING PROGRAM 8-12
8.1.2.1 BACKGROUND MONITORING 8-13
8.1.2.2 OPERABLE UNIT 1 8-13
8.1.2.2.1 FORMER LANDFILL, ANIMAL/CHEMICAL PITS AND GLASS HOLES 8-13
8.1.2.2.2 CURRENT LANDFILL 8-14
8.1.2.2.3 FORMER HAZARDOUS WASTE MANAGEMENT FACILITY (HWMF) PLUME AND DOWNGRADIENT SECTION OF CURRENT LANDFILL PLUME 8-18
8.1.2.3 OPERABLE UNIT III 8-19
8.1.2.3.1 HFBR TRITIUM PLUME 8-28
8.1.2.3.2 WASTE CONCENTRATION FACILITY AND BROOKHAVEN GRAPHITE RESEARCH REACTOR (BGRR)/PILE FAN SUMP AREAS 8-28
8.1.2.4 OPERABLE UNIT IV 8-31
8.1.2.4.1 1977 OIL-SOLVENT SPILL SITE AND DOWNGRADIENT AREAS 8-31
8.1.2.4.2 BUILDING 650 SUMP OUTFALL 8-31
8.1.2.5 OPERABLE UNIT V 8-33
8.1.2.5.1 EASTERN PLUME 8-33
8.1.2.6 OPERABLE UNIT VI 8-38
8.1.2.6.1 BIOLOGY FIELDS 8-38
8.1.2.7 GROUNDWATER TREATMENT SYSTEMS 8-38
8.1.3 ENVIRONMENTAL MONITORING PROGRAM (NON-CERCLA) 8-44
8.1.3.1 RESEARCH FACILITIES 8-45
8.1.3.1.1 ALTERNATING GRADIENT SYNCHROTRON AND BROOKHAVEN LINAC ISOTOPE PRODUCER (BLIP) AREAS 8-45

8.1.3.1.2 BROOKHAVEN MEDICAL RESEARCH REACTOR 8-45
8.1.3.2 SUPPORT FACILITIES 8-46
8.1.3.2.1 SEWAGE TREATMENT PLANT / PECONIC RIVER AREA 8-46
8.1.3.2.2 BNL SHOTGUN RANGE 8-47
8.1.3.2.3 WATER TREATMENT PLANT (WTP) AREA 8-48
8.1.3.2.4 BUILDING 423 (MOTOR POOL) AREA 8-48
8.1.3.2.5 ONSITE SERVICE STATION 8-48
8.1.3.2.6 MAJOR PETROLEUM FACILITY (MPF) AREA 8-49
8.1.3.2.7 NEW WASTE MANAGEMENT FACILITY (WMF) 8-50
REFERENCES 8-51

CHAPTER 9: RADIOLOGICAL DOSE ASSESSMENT 9-1
9.1 EXTERNAL PENETRATING RADIATION MEASUREMENTS 9-2
9.1.1 BUILDING 650 SUMP OUTFALL 9-4
9.2 AIRBORNE PATHWAY 9-6
9.2.2 AIR DISPERSION MODEL 9-6
9.2.4 EFFECTIVE DOSE EQUIVALENT CALCULATIONS - AIRBORNE PATHWAY 9-7
9.3 EFFECTIVE DOSE EQUIVALENT CALCULATIONS- FISH CONSUMPTION 9-7
9.4 EFFECTIVE DOSE EQUIVALENT CALCULATIONS - MEAT CONSUMPTION 9-8
9.5 COLLECTIVE EFFECTIVE DOSE EQUIVALENT (EDE) 9-8
9.6 SUMMARY AND CONCLUSION 9-9
REFERENCES 9-9

CHAPTER 10: QUALITY ASSURANCE 10-1
10.1 THE BNL QUALITY ASSURANCE PROGRAM 10-2
10.2 SCOPE OF THE PROGRAM 10-2
10.3 QUALITY ASSURANCE PROGRAM FOR CERCLA GROUNDWATER MONITORING ACTIVITIES 10-4
10.4 ANALYSES PERFORMED OFFSITE 10-4
10.4.1 THE CONTRACT PROCESS 10-4
10.4.2 QA/QC VALIDATION PERFORMED AT BNL 10-4
10.4.3 PROFICIENCY TESTING RESULTS OF OFFSITE LABS 10-5
10.5 ANALYSES PERFORMED IN-HOUSE 10-8
10.5.1 RADIOLOGICAL LAB RELOCATION TO MEDICAL 490 10-14
10.6 ASL'S INTERNAL QUALITY ASSURANCE PROGRAM 10-14
10.6.1 ASL INSTRUMENT CALIBRATIONS 10-14
10.6.2 PRECISION AND ACCURACY 10-16
10.6.3 RADIOLOGICAL LABORATORY SWIPE TESTING 10-19
10.7 RESULTS OF THE ASL'S INDEPENDENT PROFICIENCY EVALUATION TESTS 10-19
10.7.1 RADIOLOGICAL ASSESSMENTS 10-19
10.7.2 NONRADIOLOGICAL ASSESSMENTS 10-21
10.8 AUDITS AND SELF-ASSESSMENTS OF THE ASL 10-25
10.9 UNUSUAL OCCURRENCES 10-25
REFERENCES 10-25

APPENDIX A: ACRONYMS, GLOSSARY A1
ACRONYMS A1
GLOSSARY A3

APPENDIX B: RADIOLOGICAL DATA METHODOLOGIES
1. DOSE CALCULATION - ATMOSPHERIC RELEASE PATHWAY B1
2. DOSE CALCULATION - FISH INGESTION PATHWAY B1
3. DOSE CALCULATION - DEER MEAT CONSUMPTION B1
4. RADIOLOGICAL DATA PROCESSING B1

APPENDIX C: INSTRUMENTATION AND ANALYTICAL METHODS C1

APPENDIX D: GROUNDWATER MONITORING WELLS LIST D1

List of Figures

Figure 1-1. Regional Location of Brookhaven National Laboratory 1-3
Figure 1-2. Residential Population of Long Island (Source: LIPA 1998) 1-4
Figure 1-3. Local and On-Site Residential Population 1-4
Figure 1-4. Residential Locations of BNL Employees 1-5
Figure 1-5. Major Scientific Facilities 1-7
Figure 1-6. High Flux Beam Reactor. (HFBR) 1-8
Figure 1-7. Aerial photograph of Sewage Treatment Plant 1-8
Figure 1-8. Use of Groundwater at BNL 1-9
Figure 1-9. Groundwater Flow and Elevation (December, 1998) 1-10
Figure 1-10. Annual Wind Rose for 1998 1-11
Figure 1-11. Monthly Precipitation Trends 1-12
Figure 1-12. 10 Year Precipitation Trend 1-12
Figure 1-13. Monthly Mean Temperature Trend 1-12
Figure 1-14. Spotted Salamander *(Ambystoma Maculatum)* 1-13
Figure 2-1. Key Elements of Environmental Management System 2-2
Figure 2-2. Aerial photogragh of the Waste Management Facility 2-10
Figure 3-1 Maximum Concentration of Copper Discharged from BNL STP, 1994-1998 3-11
Figure 3-2. Maximum Concentration of Iron Discharged from BNL STP, 1994-1998 3-11
Figure 3-3. Maximum Concentration of Lead Discharged from BNL STP, 1994-1998 3-11
Figure 3-4 Maximum Concentration of Silver Discharged from BNL STP, 1994-1998 3-12
Figure 3-5. Maximum Concentration of Nickel Discharged from BNL STP, 1994-1998 3-12
Figure 3-6. Maximum Concentration of Zinc Discharged from BNL STP, 1994-1998 3-12
Figure 5-1. Potential Air Emission Release Points Subject to Monitoring 5-2
Figure 5-2. HFBR Airborne Tritium Emissions, 10 Year Trend 5-3
Figure 5-3. Environmental Air Sampling Blockhouse 5-7
Figure 5-4. Air Monitoring Stations 5-7
Figure 5-5. Airborne Gross Beta Concentration Trend recorded at Station P7 5-8
Figure 6-1. Sewage Treatment Plant 6-2
Figure 6-2. Cs-137 Trend in STP Influent and Effluent 6-5
Figure 6-3. 1998 STP Effluent Tritium Concentrations 6-6
Figure 6-4. STP/Peconic Annual Average Tritum Concentrations 6-6
Figure 6-5. Tritium Released to the Peconic River, 15 Year Trend 6-6
Figure 6-6. BNL Outfall/Recharge Basin Locations 6-9
Figure 6-7. Brookhaven Nationl Laboratory Schematic of Water Use and Flow for 1998 6-10
Figure 6-8. Peconic River Sampling Stations 6-14
Figure 6-9. Surface water sampling at the Station HQ site boundary. 6-15
BNL's Groundwater Protection Program 8-3
Figure 8-1. Locations of BNL Groundwater Monitoring Wells 8-4
Figure 8-2. Extent of Volatile Organic Compound Plumes at BNL 8-5
Figure 8-3. Extent of Radionuclide Plumes at BNL 8-6
Figure 8-4. Locations of BNL Potable and Process Supply Wells 8-8
Figure 8-5. Former Landfill, Animal/Chemical Pit and Glass Holes Area - VOC Plume Map and Concentration Trends 8-15
Figure 8-6. Former Landfill, Animal/Chemical Pit and Glass Holes Area - VOC Plume Cross Section. 8-16
Figure 8-7. Former Landfill, Animal/Chemical Pit and Glass Holes Area - Strontium-90 Plume Map and Concentration Trends 8-17
Figure 8-8. Former Hazardous Waste Management Facility/Current Landfill Area - VOC Plume Map and Concentration Trends 8-20

Figure 8-9. Former Hazardous Waste Management Facility/Current Landfill Area - VOC Plume Cross Section 8-21
Figure 8-10. Former Hazardous Waste Management Facility/Current Landfill Area - Tritium Concentration Trends 8-22
Figure 8-11. Former Hazardous Waste Management Facility/Current Landfill Area - Strontium-90 Concentration Trends 8-23
Figure 8-12. OU III and OU IV VOC Plume Map 8-25
Figure 8-13. OU III and OU IV VOC Plume Cross Section 8-26
Figure 8-14. Time-vs.-VOC concentration trend plots for key wells in the OU III VOC Plume (central area): Well 65-06 located downgradient of the AGS area; Well 85-98 located downgradient of a carbon tetrachloride spill area; Well 95-84 located in the former Building 96 area; and Well 96-07 located downgradient of the Supply and Materiel Building 208. 8-27
Figure 8-15. Time-vs.-VOC concentration trend plots for key wells in the OU III VOC Plume (southern boundary and off-site areas): Well 121-10 located at the BNL southern boundary; Well 85-98 located off-site near the Brookhaven Industrial Park; Well 000-130 located on Carleton Drive; and Well 800-43 located near Flower Hill Drive near the leading edge of the OU III plume. 8-27
Figure 8-16. High Flux Beam Reactor Tritium Plume and Concentration Trends 8-29
Figure 8-17. Waste Concentration Facility and Brookhaven Graphite Research Reactor areas - Strontium-90 Plumes 8-30
Figure 8-18. OU IV VOC Plume Cross Section 8-32
Figure 8-19. Time-vs.-VOC concentration trend plots for key wells in the OU IV VOC Plume: Well 76-04 located near the 1977 oil/solvent spill area; Well 105-06 located on East Princeton Avenue; and Wells 122-22 and 114-07 located along the southern boundary. 8-33
Figure 8-20. OU IV AOC 6 ñ Strontium-90 Plume and Concentration Trends 8-34
Figure 8-21. OU V VOC Plume Map 8-35
Figure 8-22. OU V VOC Plume Cross Section 8-36
Figure 8-23. OU V Tritium Concentration Trends 8-37
Figure 8-24. VI Ethylene Dibromide Plume Map 8-39
Figure 8-25. OU VI Ethylene Dibromide Plume Cross Section 8-40
Figure 8-26. Locations of BNL Groundwater Remediation Systems 8-41
Figure 8-27. Time-vs.-Tritium concentration trend plots for key wells in the Sewage Treatment Plantís filter bed area 8-49
Figure 9-1. Onsite TLD Locations 9-2
Figure 9-2. Offsite TLD Locations 9-3
Figure 9-3. Building 650 Sump Outfall TLD Network 9-5
Figure 10-1. Summary of Proficiency Evaluation Scores in U.S. DOE, U.S. EPA and NYS DOH ELAP Radiological Programs 10-3
Figure 10-2. Summary of Proficiency Evaluation Scores in U.S. EPA and NYS DOH ELAP Non-Radiological Programs 10-3
Figure 10-3. Instrument Efficiency Summary for 1998 10-15
Figure 10-4. Instrument Background Summary for 1998 10-15
Figure 10-5. Cesium 137 Energy Calibration Summary for 1998 10-15
Figure 10-6. Strontium-90 Instrument Efficiency Summary for 1998 10-15
Figure 10-7. ASL Gross Alpha and Beta Precision 10-16
Figure 10-8. ASL Tritium Precision 10-16
Figure 10-9. Reference Check Summary for 1998 Inorganic Analysis 10-17
Figure 10-10. Spiked Recovery Summary for 1998 Inorganic Analysis 10-17
Figure 10-11. Reference Check Summary for Organic Analysis in 1998 10-18
Figure 10-12. Surrogate and Spike Recovery Summaries for 1998 Organic Analysis 10-18
Figure 10-13. Matrix Spike Duplicate Summary for Organic Analysis in 1998 10-18

List of Tables

Table 2-1. Elements of the Environmental Management System: Implementation of ISO 14001 at BNL 2-3
Table 2-2. Environmental Restoration Progress 2-12
Table 2-3. BNL 1998 Sampling Program Summary of Samples Collected Sorted by Media 2-14
Table 3-1. Federal, State and Local Environmental Statutes Applicable to the BNL 3-2
Table 3-2. BNL Environmental Permits 3-4
Table 3-3. Summary of Title V Permit Application Emission Units 3-6
Table 3-4. Summary of Analytical Results for Waste Water Discharges to Outfall 001 3-10
Table 3-5. Summary of Analytical Results for Waste Water Discharges to Outfalls 002-010 3-13
Table 3-6. Potable Water Wells and Potable Distribution System, Bacteriological, Inorganic Chemical and Radiological Analytical Data 3-15
Table 3-7. Potable Water Wells, Analytical Data for Principal Organic Compounds, and Micro-Extractables 3-16
Table 3-8. Summary of Chemical and Oil Spill Reports 3-18
Table 3-9. Existing Agreements and Enforcement Actions Issued to BNL with Status 3-24
Table 4-1. Common Measurement Unit Prefixes 4-5
Table 5-1. Airborne Radionuclide Releases from Monitored Facilities 5-4
Table 5-2. Gross Activity Detected in Air Particulate Filters 5-8
Table 5-3. Ambient Airborne Tritium Measurements 5-9
Table 5-4. Ambient Tritium Monitoring Results at RA V Recharge Basin 5-10
Table 6 -1. Gross Activity and Tritium Results at the Sewage Treatment Plant 6-4
Table 6-2. Gamma-emitting Radionuclides and Strontium-90 Detected at the Sewage Treatment Plant 6-5
Table 6-3. Sewage Treatment Plant (STP), Average Water Quality and Metals Data 6-8
Table 6-4. Radiological Analysis Results for Recharge Basin Samples 6-11
Table 6-5. Water Quality Data for Onsite Recharge Basins 6-12
Table 6-6. Metals Data for On-Site Recharge Basins 6-13
Table 6-7: Radiological Analysis of Peconic River Water Samples 6-16
Table 6-8. Water Quality Data for Surface Water Samples Collected Along the Peconic and Carmans Rivers 6-17
Table 6-9. Metals Concentration Data for Surface Water Samples Collected Along the Peconic and Carmans Rivers 6-18
Table 8-1. Potable Water and Process Supply Wells Quality Data 8-9
Table 8-2 Potable and Process Supply Wells Metals Data 8-10
Table 8-3: Potable and Process Well Radiological Analysis Results on Carleton Drive; and Well 800-43 located near Flower Hill Drive near the leading edge of the OU III plume. 8-27
Table 8-4. OU III South Boundary Groundwater Remediation System Comparison of Monthly Average Influent and Effluent VOC Concentrations 8-42
Table 8-5. Removal Action V Groundwater Remediation System Comparison of Monthly Average Influent and Effluent VOC Concentrations 8-43
Table 8-6. HFBR Tritium Plume and Recharge System Monthly Average Influent Tritium Concentrations and a Comparison of Monthly Average Influent and Effluent VOC Concentrations 8-44
Table 8-7. Radiological Data for Groundwater Wells Near AGS, BLIP, and LINAC Areas 8-46
Table 8-8. Radiological Analysis Results for Wells Downgradient of the BMRR 8-47
Table 8-10. Radiological Analysis Resuts for Wells near the New Waste Management Facility 8-50
Table 9-1. Quarterly Onsite Ambient Radiation Measurements 9-4
Table 9-2. Quarterly Offsite Ambient Radiation Measurements 9-4

Table 9-3. Building 650 Sump Outfall TLD Network Data 9-6
Table 9-4. 1998 Airborne Radiological Dose by Facility as Calculated by CAP88-PC 9-7
Table 9-5. Summary of Dose From All Environmental Pathways, 1998 9-8
Table 10-1. H2M Performance Evaluation Study BNL State Pollution Discharge Elimination System (SPDES) - DMR QA 18 10-5
Table 10-2. H2M Water Pollution Performance Evaluation Studies WP39/40 USEPA Environmental Monitoring Systems Laboratory - Cincinnati 10-6
Table 10-3. H2M Water Supply Performance Evaluation Studies - WS040/041 USEPA Environmental Monitoring Systems Laboratory - Cincinnati 10-7
Table 10-4. H2M Non-Potable Water Chemistry Proficiency Test #193,198 Results Environmental Laboratory Approval Program 10-8
Table10-5. H2M Potable Water Chemistry Proficiency Tests #187, #197 Results Environmental Laboratory Approval Program 10-9
Table 10-6. ChemTex Water Supply and Water Pollution Performance Evaluation Studies- WS041, WP040 USEPA Environmental Monitoring Systems Laboratory - Cincinnati 10-10
Table 10-7. GEL Quality Assessment Program #48, #49 Results Environmental Measurements Laboratory 10-11
Table 10-7. GEL Quality Assessment Program #48, #49 Results Environmental Measurements Laboratory (cont'd.) 10-12
Table 10-8. GEL Quality Assessment Program Results National Exposure Research Laboratory (NERL-LV) 10-13
Table 10-9. BNL Quality Assessment Program #48, #49 Results Environmental Measurements Laboratory 10-20
Table 10-10. BNL Quality Assessment Program Results National Exposure Research Laboratory (NERL-LV) 10-21
Table 10-11. BNL Potable Water Radiochemistry Proficiency Test #187, #197 Results Environmental Laboratory Approval Program 10-21
Table 10-12. BNL Water Pollution Performance Evaluation Studies - WP040 USEPA Environmental Monitoring Systems Laboratory - Cincinnati 10-22
Table 10-13. BNL Water Supply Performance Evaluation Studies - WS040/041 USEPA Environmental Monitoring Systems Laboratory - Cincinnati 10-22
Table 10-14. BNL Non-Potable Water Chemistry Proficiency Test #183 and #193 Results Environmental Laboratory Approval Program 10-23
Table 10-15. BNL Potable Water Chemistry Proficiency Test #187 and #197 Results 10-24
Table B-2. Typical Minimum Detection Limits for Gamma Spectroscopy Analysis B2
Table B-1. Typical Detection Limits for Gross Activity and Tritium Analyses B2
Table B-3. Typical Detection Limits for Chemical Analyses. B2

Executive Summary

For 50 years, the unique, leading-edge facilities at Brookhaven National Laboratory (BNL) have made many valuable scientific contributions possible. Today, BNL continues its research mission while paying close attention to protecting and cleaning up the local environment. The Laboratory's new environmental motto, "Exploring Earth's Mysteries ... Protecting Its Future," reflects a desire to balance world class research with operating in harmony with the natural environment.

ENVIRONMENTAL PROGRAMS AND EFFORTS

This Site Environmental Report is a summary of BNL's environmental performance. It is BNL's policy to integrate environmental stewardship into all facets of the Laboratory's missions. In 1998, BNL strengthened its environmental programs to ensure that it operates in a responsible manner that protects human health and the ecosystem. Major investments were made in four key programs:

* The Upgrade of BNL's Environmental Management System. Improvements include the use of the International Standards Organization (ISO) 14001 standard as a framework, with added emphasis on assuring compliance with environmental requirements.

* The Facility Review Project. This program provides an extensive examination of all previous and current buildings and equipment that have the potential to cause environmental damage, and furnishes remedies for any identified endangerment.

* The Process Evaluation Project. This program is being used to create an integrated database that will be used to identify, track and address all potential or historical environmental concerns and issues related to facility operations.

* The Groundwater Protection Program. Expansion of this program included the efforts in pollution prevention, monitoring, restoration and communications with the public.

Together, the programs provide effective tools for pinpointing and preventing conditions that could harm the environment. They are described in more detail in Chapter 2.

BNL's aggressive Pollution Prevention Program is the keystone for all programs safeguarding the environment. It is being integrated into the planning, decision-making, and implementation phases of all site activities. Pollution prevention initiatives in 1998 resulted in declines of 11 tons of particulate emissions, 8.5 tons of nitrogen oxides, and 66.2 tons of sulfur dioxide; reductions in excess of 500 million liters per year of water used for cooling; elimination of the use of treatment chemicals at two water cooling towers; and other significant accomplishments. Chapter 2 has more information.

COMPLIANCE

BNL is subject to more than 50 sets of federal, state and local environmental regulations, 60 site-specific permits and a number of other binding agreements. BNL is committed to achieving and maintaining full compliance with these environmental requirements and agreements. In 1998, BNL operated in compliance with the majority of applicable regulations. Exceptions include nine minor exceedances of wastewater discharge permit limitations, and noncompliance with administrative provisions of the hazardous waste regulations. Corrective actions have been taken to address any issues noted. In order to meet Article 12 of the Suffolk County Sanitary code that regulates the storage and handling of toxic and hazardous materials, BNL permanently removed 26 storage tanks and retrofitted 31 tanks with containment systems in 1998. Other improvements that enhanced compliance this year (and for future years) include the upgrade of the Sewage Treatment Plant from primary to tertiary treatment facilities and the Spill Prevention Control Plan upgrade. Potable water met all standards. Chapter 3 gives more information about the environmental regulations affecting BNL operations and compliance.

In addition, BNL's operations and environmental protection programs were reviewed and audited extensively by a number of organizations in 1998. The New York State Department of Environmental Conservation and the Suffolk County Department of Health Services conducted compliance inspections; DOE local, regional and headquarters conducted audits and program reviews; and BNL conducted its own assessments. No significant compliance issues were identified.

ENVIRONMENTAL MONITORING AND RESULTS

In addition to groundwater monitoring, BNL's comprehensive monitoring program has hundreds of ambient and emission-point air monitoring stations and river water checkpoints. The monitoring system assesses environmental quality, ensures compliance with regulatory and permit conditions, and provides early detection of any condition requiring corrective action.

Over 5,000 samples of air, drinking water, surface water, groundwater, soil, flora and fauna were collected from hundreds of locations in 1998. Samples were analyzed for radiological parameters and organic and inorganic constituents. Improved wastewater management and reduced maintenance work within the High Flux Beam Reactor resulted in the lowest amount of tritium released to the Peconic River since measurements began in 1966. Analytical results showed that farm-grown vegetation remained unaffected by BNL activities. Due to historical environmental releases, local deer and fish continued to show somewhat elevated levels of BNL-related radionuclides, but at levels that continue to decrease with time. Both total air emissions and radiological air quality met Clean Air Act and DOE standards in 1998. Analytical results from groundwater monitoring wells located near most active facilities indicated that releases from current operations were within regulatory standards. However, groundwater monitoring did identify elevated tritium concentrations near the Brookhaven Linac Isotope Producer. Following this discovery, corrective actions were immediately taken to prevent further impacts to groundwater quality.

Modeling of radioactive air emissions showed that the theoretical maximum public dose from the air exposure pathway was equal to only two percent of the limit established by the EPA's National Emission Standards for Hazardous Air Pollutants. Potential radiological doses from the routine consumption of fish and deer containing BNL-related radionuclides were calculated to be less than eight percent of the annual public dose limit specified by the DOE.

ENVIRONMENTAL RESTORATION

Six significant volatile organic compound (VOC) plumes and six radionuclide plumes exist in the groundwater underneath and downgradient of the BNL site as a result of historical spills and past operations. Efforts to monitor and cleanup the soil and groundwater contamination are managed under the Environmental Restoration Program. As part of BNL's extensive monitoring program carried out in 1998, 470 monitoring wells were sampled for a total of 1,750 individual sampling events, to verify that prevention and restoration activities are effective. During 1998, groundwater restoration activities resulted in the removal of approximately 222 kilograms (490 pounds) of volatile organic compounds (VOCs) and the treatment and return of approximately 2,800 million liters (740 million gallons) of groundwater in the Upper Glacial aquifer. As a whole, no significant change in contaminant concentrations occurred during the year. However, remediation systems are decreasing VOC concentrations located near the southern boundary of the site.

These strides forward reflect BNL's commitment to continually bettering its environmental performance through managerial emphasis as well as compliance efforts.

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