

## *Acronyms and Abbreviations*

These acronyms and abbreviations reflect the typical manner in which terms are used for this specific document and may not apply to all situations. Items with an asterisk (\*) are described in the glossary of technical terms, which follows this list.

|          |   |                   |   |
|----------|---|-------------------|---|
| AEC      | Atomic Energy Commission  | CRM               | Cultural Resource Management                          |
| AGS      | Alternating Gradient Synchrotron  | CRMP              | Cultural Resource Management Plan                     |
| ALARA*   | "As Low As Reasonably Achievable"                                       | Cs                | cesium  |
| AMSL     | above mean sea level  | CSF               | Central Steam Facility                                |
| AOC*     | area of concern   | CTN               | Center for Transitional Neuroimaging                  |
| APG      | Analytical Products Group   | CWA*              | Clean Water Act                                       |
| ARARs    | Applicable, Relevant, and<br>Appropriate Requirements                   | CY                | calendar year   |
| ARPA*    | Archeological Resource Protection Act                                   | D <sub>2</sub> O* | heavy water   |
| AS/SVE*  | air sparging/soil vapor extraction                                      | DAC               | Derived Air Concentration                             |
| AST      | aboveground storage tank  | DCA               | 1,1-dichloroethane                                    |
| AWQS     | Ambient Water Quality Standards   | DCE               | 1,1-dichloroethylene                                  |
| BAF      | Booster Applications Facility   | DCG*              | derived concentration guide                           |
| BGD      | belowground duct  | D&D               | decontamination and decommissioning                   |
| BGRR     | Brookhaven Graphite Research Reactor                                    | DDD               | dichlorodiphenyldichloroethane                        |
| BHSO     | DOE Brookhaven Site Office  | DDE               | dichlorodiphenyldichloroethylene                      |
| BLIP     | Brookhaven Linac Isotope Producer                                       | DDT               | dichlorodiphenyltrichloroethane                       |
| BMRR     | Brookhaven Medical Research Reactor                                     | DMR               | Discharge Monitoring Report                           |
| BNL      | Brookhaven National Laboratory  | DOE*              | U.S. Department of Energy                             |
| BOD*     | biochemical oxygen demand   | DOE CH            | DOE Chicago Operations Office                         |
| Bq*      | becquerel   | DQO               | Data Quality Objective                                |
| Bq/g     | becquerel per gram  | DSA               | Documented Safety Analysis                            |
| Bq/L     | becquerel per liter   | DSB               | Duct Service Building                                 |
| BRAHMS   | Broad Range Hadron Magnetic Spectrometer                                | DUV – FEL         | Deep UltraViolet – Free Electron Laser                |
| BSA      | Brookhaven Science Associates   | DWS               | Drinking Water Standards                              |
| Btu      | British thermal units   | EA*               | Environmental Assessment                              |
| CAA*     | Clean Air Act   | EDB*              | ethylene dibromide                                    |
| CAAA*    | CAA Amendments (1990)   | EDE*              | Effective Dose Equivalent                             |
| CAC      | Community Advisory Council  | EDTA              | ethylenediaminetetraacetic acid                       |
| CAP      | Clean Air Act Assessment Package  | EE/CA             | Engineering Evaluation/Cost Analysis                  |
| CBS      | chemical bulk storage   | EIMS*             | Environmental Information Management System           |
| CCR      | Consumer Confidence Report  | ELAP              | Environmental Laboratory Approval Program             |
| CEGPA    | Community, Education, Government<br>and Public Affairs                  | EML               | Environmental Measurements Laboratory                 |
| CERCLA*  | Comprehensive Environmental Response,<br>Compensation and Liability Act | EMP               | Environmental Monitoring Plan                         |
| CFC-11   | an ozone-depleting refrigerant  | EMS*              | Environmental Management System                       |
| cfm, cfs | cubic feet per minute, per second                                       | EPA*              | U.S. Environmental Protection Agency                  |
| CFN      | Center for Functional Nanomaterials                                     | EPCRA*            | Emergency Planning and<br>Community Right-to-Know Act |
| CFR      | U.S. Code of Federal Regulations  | ER                | environmental restoration                             |
| Ci*      | curie   | ERA               | Environmental Resource Associates                     |
| CO       | certificate to operate  | ERD               | Environmental Restoration Division                    |
| COC*     | chain-of-custody  | ES*               | environmental surveillance                            |
|          |   | ESR               | Experimental Safety Review                            |
|          |   | ES&H              | Environment, Safety, and Health                       |

## APPENDIX A: GLOSSARY

|        |  |                   |  |
|--------|--|-------------------|--|
| ESA*   | Endangered Species Act                               | LTRA              | Long Term Remedial Action                                  |
| ESH&Q  | Environment, Safety, Health, and Quality Directorate | MACT              | Maximum Available Control Technology                       |
| ESPC   | Energy Savings Performance Contract                  | MAPEP             | Mixed Analyte Performance Evaluation Program               |
| ESSH   | Environmental Safety, Security and Health            | MAR               | Materials-at-risk  |
| EWMSD  | Environmental and Waste Management Services Division | MCL               | maximum contaminant level                                  |
| FAMS   | Facility area monitors                               | MDL*              | minimum detection limit                                    |
| FFCA*  | Federal Facilities Compliance Act                    | MEI*              | maximally exposed individual                               |
| FIFRA* | Federal Insecticide, Fungicide, and Rodenticide Act  | MeV               | million electron volts                                     |
| FRP    | Facility Response Plan                               | MGD               | million gallons per day                                    |
| FWS*   | U.S. Fish & Wildlife Service                         | mg/L              | milligrams per liter                                       |
| FY     | fiscal year  | MMBtu             | million British thermal units                              |
| GBq    | giga (billion or E+09) becquerel                     | MOA               | Memorandum of Agreement                                    |
| GAB    | gross alpha and beta                                 | MPF               | Major Petroleum Facility                                   |
| GC/ECD | gas chromatography/electron capture detector         | MPN               | most probable number                                       |
| GC/MS  | gas chromatography/mass spectrometry                 | mrem              | milli (thousandth of a) rem                                |
| GDS    | Groundwater Discharge Standard                       | MRI               | Magnetic Resonance Imaging                                 |
| GEL    | General Engineering Laboratory, LLC                  | MRC               | Medical Research Center                                    |
| GeV    | giga (billion) electron volts                        | MSL*              | mean sea level   |
| gge    | gas gallon equivalent                                | mSv               | millisievert   |
| GIS    | Geographical Information System                      | MTBE              | methyl tertiary butyl ether                                |
| GWh    | gigawatt hour  | MW                | megawatt   |
| H2M    | H2M Labs, Inc.                                       | µg/L              | micrograms per liter                                       |
| HEPA   | high efficiency particulate air                      | NA                | not analyzed   |
| HFBR   | High Flux Beam Reactor                               | NCRP              | National Council on Radiation Protection and Measurements  |
| HSS    | Health, Safety and Security                          | ND                | not detected   |
| HTO    | tritiated water (liquid or vapor)                    | NEAR              | Neighbors Expecting Accountability and Remediation         |
| HVAC   | heating/ventilation/air conditioning                 | NELAC             | National Environmental Laboratory Accreditation Conference |
| HWMF   | Hazardous Waste Management Facility                  | NELAP             | National Environmental Laboratory Accreditation Program    |
| I      | Iodine   | NEPA*             | National Environmental Policy Act                          |
| IAEA   | International Atomic Energy Agency                   | NESHAPs*          | National Emission Standards for Hazardous Air Pollutants   |
| IAG    | Interagency Agreement                                | ng/J              | nano (one-billionth) gram per Joule                        |
| IC     | ion chromatography                                   | NHPA*             | National Historic Preservation Act                         |
| ICP/MS | inductively coupled plasma/mass spectrometry         | NIST              | National Institute for Standards and Technology            |
| ISMS   | Integrated Safety Management System                  | NO <sub>2</sub>   | nitrogen dioxide   |
| ISO*   | International Organization for Standardization       | NOV               | Notice of Violation  |
| K      | potassium  | NO <sub>x</sub> * | nitrogen oxides  |
| kBq    | kilobecquerels (1,000 Bq)                            | NOEC              | no observable effect concentration                         |
| KeV    | kilo (thousand) electron volts                       | NPDES             | National Pollutant Discharge Elimination System            |
| Kr     | kryptonite   | NR                | not required   |
| kwH    | kilowatt hours                                       | NRMP              | Natural Resource Management Plan                           |
| LDR    | Land Disposal Restriction                            | NS                | not sampled  |
| LED    | light emitting diode                                 | NSF-ISR           | NSF-International Strategic Registrations, Ltd.            |
| LEED   | Leadership in Energy and Environmental Design        | NSLS              | National Synchrotron Light Source                          |
| LIE    | Long Island Expressway                               | NSRC              | Nanoscale Science Research Centers                         |
| LIMS   | Laboratory Information Management System             | NSRL              | NASA Space Radiation Laboratory                            |
| Linac  | Linear Accelerator                                   | NT                | not tested   |
| LIPA   | Long Island Power Authority                          | NYCRR*            | New York Codes, Rules, and Regulations                     |
| LSTPD  | Laboratory Science Teacher Professional Development  |                   |  |

|                  |  |                    |   |
|------------------|--|--------------------|---|
| NYISO            | New York Independent System Operator             | SCSC               | Suffolk County Sanitary Code                                      |
| NYPA             | New York Power Authority                         | SDL                | Source Development Laboratory                                     |
| NYS              | New York State                                   | SDWA*              | Safe Drinking Water Act   |
| NYSDEC           | NYS Department of Environmental Conservation     | SER                | Site Environmental Report   |
| NYSDOH           | NYS Department of Health                         | SI                 | International System (measurement units)                          |
| NYSHPO           | NYS Historic Preservation Office                 | SNS                | standard not specified  |
| O <sub>3</sub> * | ozone  | SO <sub>2</sub>    | sulfur dioxide  |
| O&M              | Operation and Maintenance                        | SOP                | standard operating procedure                                      |
| ODS              | ozone-depleting substances                       | SPCC               | Spill Prevention Control and Countermeasures                      |
| OHSAS            | Occupational Health and Safety Assessment Series | SPDES*             | State Pollutant Discharge Elimination System                      |
| OMC              | Occupational Medical Clinic                      | Sr                 | strontium   |
| ORC              | oxygen-releasing compound                        | STAR               | Solenoid Tracker at RHIC  |
| ORPS*            | Occurrence Reporting and Processing System       | STEM               | Scanning Transmission Electron Microscope                         |
| OSHA             | Occupational Health and Safety Administration    | STL                | Severn Trent Laboratories, Inc.                                   |
| OU*              | operable unit                                    | STP                | Sewage Treatment Plant  |
| P2*              | pollution prevention                             | SU                 | standard unit   |
| PAAA*            | Price-Anderson Act Amendment                     | SUNY               | State University of New York                                      |
| PAF              | Process Assessment Form                          | Sv*                | sievert; unit for assessing radiation dose risk                   |
| Pb               | lead   | SVE*               | soil vapor extraction   |
| PBT              | persistent, bioaccumulative, and toxic           | SVOC*              | semivolatile organic compound                                     |
| PCBs*            | polychlorinated biphenyls                        | t <sub>1/2</sub> * | half-life   |
| PCE              | tetrachloroethylene (or perchloroethylene)       | TAG                | Technical Advisory Group  |
| pCi/g            | picocuries per gram                              | TBq                | tera (trillion, or E+12) becquerel                                |
| PE               | performance evaluation                           | TCA                | 1,1,1-trichloroethane   |
| PET              | positron emission tomography                     | TCAP               | Transportation Safety and Operations Compliance Assurance Process |
| ppb              | parts per billion                                | TCE*               | trichloroethylene   |
| ppm              | parts per million                                | TCLP               | toxicity characteristic leaching procedure                        |
| PRAP             | Proposed Remedial Action Plan                    | TEAM               | Transformational Energy Action Management                         |
| QA*              | quality assurance                                | TKN                | Total Kjeldahl nitrogen   |
| QAPP             | Quality Assurance Program Plan                   | TLD*               | thermoluminescent dosimeter                                       |
| QC*              | quality control                                  | TPL                | Target Processing Laboratory                                      |
| QM               | Quality Management                               | TRE                | Toxic Reduction Evaluation  |
| R-11 (etc.)      | ozone-depleting refrigerant                      | TRI                | Toxic Release Inventory   |
| RA*              | removal action                                   | TSCA*              | Toxic Substances Control Act                                      |
| RACT             | Reasonably Available Control Technology          | TVDG               | Tandem Van de Graaff  |
| RATA             | Relativistic accuracy test                       | TVOC*              | total volatile organic compounds                                  |
| RCRA*            | Resource Conservation and Recovery Act           | UIC*               | underground injection control                                     |
| RD/RA            | Remedial Design/Remedial Action                  | UST*               | underground storage tank  |
| RF               | resuspension factor                              | VOC*               | volatile organic compound   |
| RHIC             | Relativistic Heavy Ion Collider                  | VUV*               | very ultraviolet  |
| ROD*             | Record of Decision                               | WAC                | waste acceptance criteria   |
| RPD              | relative percent difference                      | WBS                | Work Breakdown Structure  |
| RSB              | Research Support Building                        | WCPP               | Waste Certification Program Plan                                  |
| RWMB             | Radioactive Waste Management Basis               | WCF                | Waste Concentration Facility                                      |
| RWP              | Radiological Work Permit                         | WET                | Whole Effluent Toxicity   |
| SARA*            | Superfund Amendments and Reauthorization Act     | WLA                | Waste Loading Area  |
| SBMS*            | Standards Based Management System                | WM                 | Waste Management  |
| SCDHS            | Suffolk County Department of Health Services     | WMF                | Waste Management Facility   |
| SCR              | Special Case Resource                            | WTP                | Water Treatment Plant   |

## Technical Terms

These definitions reflect the typical manner in which the terms are used for this specific document and may not apply to all situations. Bold-face words in the descriptions are defined in separate entries.

### A

**AA (atomic absorption)** – A spectroscopy method used to determine the elemental composition of a sample. In this method, the sample is vaporized and the amount of light it absorbs is measured.

**accuracy** – The degree of agreement of a measurement with an accepted reference or true value. It can be expressed as the difference between two values, as a percentage of the reference or true value, or as a ratio of the measured value and the reference or true value.

**activation** – The process of making a material radioactive by bombardment with neutrons, protons, or other high energy particles.

**activation product** – A material that has become radioactive by bombardment with neutrons, protons, or other high energy particles.

**activity** – Synonym for radioactivity.

**Administrative Record** – A collection of documents established in compliance with **CERCLA**. Consists of information the CERCLA lead agency uses in its decision on the selection of response actions. The Administrative Record file should be established at or near the facility and made available to the public. An Administrative Record can also be the record for any enforcement case.

**aerobic** – An aerobic organism is one that lives, acts, or occurs only in the presence of oxygen.

**aerosol** – A gaseous suspension of very small particles of liquid or solid.

**ALARA (As Low As Reasonably Achievable)** – A phrase that describes an approach to minimize exposures to individuals and minimize releases of radioactive or other harmful material to the **environment** to levels as low as social, technical, economic, practical, and public policy considerations will permit. ALARA is not a dose limit, but a process with a goal to keep dose levels as far below applicable limits as is practicable.

**alpha radiation** – The emission of alpha particles during radioactive decay. Alpha particles are identical in makeup to the nucleus of a helium atom and have a positive charge. Alpha radiation is easily stopped by materials as thin as a sheet of paper and has a range in air of only an inch or so. Despite its low penetration ability, alpha radiation is densely ionizing and therefore very damaging when ingested or inhaled. Naturally occurring radioactive sources such as radon emit alpha radiation.

**air stripping** – A process for removing **VOCs** from contaminated water by forcing a stream of air through the water in a vessel. The contaminants evaporate into the air stream. The air may be further treated before it is released into the atmosphere.

**ambient air** – The surrounding atmosphere, usually the outside air, as it exists around people, animals, plants, and structures. It does not include the air immediately adjacent to emission sources.

**analyte** – A constituent that is being analyzed.

**anneal** – To heat a material and then cool it. In the case of thermoluminescent dosimeters (TLDs), this is done to reveal the amount of radiation the material had absorbed.

**anion** – A negatively charged ion, often written as a superscript negative sign after an element symbol, such as Cl<sup>-</sup>.

**anthropogenic** – Resulting from human activity; anthropogenic radiation is human-made, not naturally occurring.

**AOC (area of concern)** – Under **CERCLA**, this term refers to an area where releases of hazardous substances may have occurred or a location where there has been a release or threat of a release of a hazardous substance, pollutant, or contaminant (including **radionuclides**). AOCs may include, but need not be limited to, former spill areas, landfills, surface impoundments, waste piles, land treatment units, transfer stations, wastewater treatment units, incinerators, container storage areas, scrap yards, cesspools, tanks, and associated piping that are known to have caused a release into the environment or whose integrity has not been verified.

**aquifer** – A water-saturated layer of rock or soil below the ground surface that can supply usable quantities of **groundwater** to wells and springs. Aquifers can be a source of water for domestic, agricultural, and industrial uses.

**ARPA (Archaeological Resources Protection Act)** This law, passed in 1979, has been amended four times. It protects any material remains of past human life or activities that are of archaeological interest. Known *and potential* sites of interest are protected from uncontrolled excavations and pillage, and artifacts found on public and Indian lands are banned from commercial exchange.

**AS/SVE (air sparging/soil vapor extraction)** – A method of extracting **volatile organic compounds** from the **groundwater**, in place, using compressed air. (In contrast, air stripping occurs in a vessel.) The vapors are typically collected using a soil vapor extraction system.

## B

**background** – A sample or location used as reference or control to compare BNL analytical results to those in areas that could not have been impacted by BNL operations.

**background radiation** – Radiation present in the environment as a result of naturally occurring radioactive materials in the Earth, cosmic radiation, or human-made radiation sources, including fallout.

**beta radiation** – Beta radiation is composed of charged particles emitted from a nucleus during radioactive decay. A negatively charged beta particle is identical to an electron. A positively charged beta particle is called a positron. Beta radiation is more penetrating than alpha radiation, but it may be stopped by materials such as aluminum or Lucite™ panels. Naturally occurring radioactive elements such as potassium-40 emit beta radiation.

**blank** – A sample (usually reagent-grade water) used for quality control of field sampling methods, to demonstrate that cross contamination has not occurred.

**blowdown** – Water discharged from either a boiler or cooling tower in order to prevent the build-up of inorganic matter within the boiler or tower and to prevent scale formation (i.e., corrosion).

**BOD (biochemical oxygen demand)** – A measure of the amount of oxygen in biological processes that breaks down organic matter in water; a measure of the organic pollutant load. It is used as an indicator of water quality.

**Bq (becquerel)** – A quantitative measure of radioactivity. This alternate measure of activity is used internationally and with increasing frequency in the United States. One Bq of activity is equal to one nuclear decay per second.

**bremsstrahlung** – Translates as “fast braking” and refers to electromagnetic radiation produced by the sudden retardation of a charged particle in an intense electric field.

## C

**CAA (Clean Air Act), CAA Amendments (CAAA)** – The original Clean Air Act was passed in 1963, but the U.S. air pollution control program is based on the 1970 version of the law. The 1990 Clean Air Act Amendments (CAAA) are the most far-reaching revisions of the 1970 law. In common usage, references to the CAA typically mean to the 1990 amendments. (*source*: EPA’s “Plain English Guide to the Clean Air Act” glossary, accessed 3-7-05)

**caisson** – A watertight container used in construction work under water or as a foundation.

**cap** – A layer of natural or synthetic material, such as clay or gunite, used to prevent rainwater from penetrating and spreading contamination. The surface of the cap is generally mounded or sloped so water will drain off.

**carbon adsorption/carbon treatment** – A treatment system in which contaminants are removed from groundwater, surface water, and air by forcing water or air through tanks containing activated carbon (a specially treated material that attracts and holds or retains contaminants).

**carbon tetrachloride** – A poisonous, nonflammable, colorless liquid, CCl<sub>4</sub>.

**CERCLA (Comprehensive Environmental Response, Compensation and Liability Act)** – Pronounced “sir-klah” and commonly known as Superfund, this law was enacted by Congress on December 11, 1980. It created a tax on the chemical and petroleum industries and provided broad federal authority to respond directly to releases or threatened releases of hazardous substances that may endanger public health or the environment. CERCLA established prohibitions and requirements concerning closed and abandoned hazardous waste sites; provided for liability of persons responsible for releases of hazardous waste at these sites; and established a trust fund to provide for cleanup when no responsible party could be identified

The law authorizes two kinds of response actions: short-term removals, where actions may be taken to address releases or threatened releases requiring prompt response, and long-term remedial response actions that permanently and significantly reduce the dangers associated with releases or threats of releases of hazardous substances that are serious, but not immediately life threatening. These actions can be conducted only at sites listed on EPA’s National Priorities List (NPL). CERCLA was amended by the Superfund Amendments and Reauthorization Act (SARA) on October 17, 1986, accessed 03-7-05)

**CFR (Code of Federal Regulations)** – A codification of all regulations developed and finalized by federal agencies in the Federal Register. The CFR is arranged by “title,” with Title 10 covering energy- and radiation-related issues, and Title 40 covering protection of the environment. Subparts within the titles are included in citations, as in “40 CFR Subpart H.”

**characterization** – Facility or site sampling, monitoring, and analysis activities to determine the extent and nature of contamination. Characterization provides the basis of necessary technical information to select an appropriate cleanup alternative.

**Ci (curie)** – A quantitative measure of radioactivity. One Ci of activity is equal to 3.7E+10 decays per second. One curie has the approximate activity of 1 gram of radium. It is named after Marie and Pierre Curie, who discovered radium in 1898.

**Class GA groundwater** – New York State Department of Environmental Conservation classification for high quality groundwater, where the best intended use is as a source of drinking water supply.

**closure** – Under RCRA regulations, this term refers to a hazardous or solid waste management unit that is no longer operating and where potential hazards that it posed have been addressed (through clean up, immobilization, capping, etc.) to the satisfaction of the regulatory agency.

**COC (chain-of-custody)** – A method for documenting the history and possession of a sample from the time of collection, through analysis and data reporting, to its final disposition.

## APPENDIX A: GLOSSARY

**cocktail** – a mixture of chemicals used for **scintillation** counting.

**collective Effective Dose Equivalent** – A measure of health risk to a population exposed to radiation. It is the sum of the **EDEs** of all individuals within an exposed population, frequently considered to be within 50 miles (80 kilometers) of an environmental release point. It is expressed in **person-rem** or **person-sievert**.

**Committed Effective Dose Equivalent** – The total **EDE** received over a 50-year period following the internal deposition of a **radionuclide**. It is expressed in **rems** or **sieverts**.

**composite sample** – A sample of an environmental medium containing a certain number of sample portions collected over a period of time, possibly from different locations. The constituent samples may or may not be collected at equal time intervals over a predefined period of time, such as 24 hours.

**confidence interval** – A numerical range within which the true value of a measurement or calculated value lies. In the SER, radiological values are shown with a 95 percent confidence interval: there is a 95 percent probability that the true value of a measurement or calculated value lies within the specified range. *See also* “Uncertainty” discussion in Appendix B.

**conservative** – Estimates that err on the side of caution because all possibly deleterious components are included at generous or high values.

**contamination** – Unwanted radioactive and/or hazardous material that is dispersed on or in equipment, structures, objects, air, soil, or water.

**control** – *See background.*

**cooling water** – Water used to cool machinery and equipment. *Contact* cooling water is any wastewater that contacts machinery or equipment to remove heat from the metal; *noncontact* cooling water has no direct contact with any process material or final product. *Process wastewater* cooling water is water used for cooling that may have become contaminated through contact with process raw materials or final products.

**cover boards** – Sheets of plywood placed on the ground near ponds to serve as attractive habitat for salamanders, as part of a population study.

**curie** – *See Ci.*

**CWA (Clean Water Act)** – Growing public awareness and concern for controlling water pollution led to enactment of the Federal Water Pollution Control Act Amendments of 1972. As amended in 1977, this law became commonly known as the Clean Water Act. It established the basic structure for regulating discharges of pollutants into the waters of the United States, giving **EPA** the authority to implement pollution control programs such as setting wastewater standards for industry. The CWA also continued requirements to set water quality standards for all contaminants in surface waters and made it unlawful for any person to discharge any

pollutant from a **point source** into navigable waters unless a permit was obtained. The CWA also funded the construction of sewage treatment plants and recognized the need for planning to address the critical problems posed by **nonpoint source pollution**.

Revisions in 1981 streamlined the municipal construction grants process. Changes in 1987 phased out the construction grants program. Title I of the Great Lakes Critical Programs Act of 1990 put into place parts of the Great Lakes Water Quality Agreement of 1978, signed by the U.S. and Canada; the two nations agreed to reduce certain toxic pollutants in the Great Lakes. Over the years many other laws have changed parts of the CWA, accessed 03-7-05)

## D

**D<sub>2</sub>O** – *See heavy water.*

**daughter, progeny** – A given **nuclide** produced by radioactive decay from another nuclide (the “parent”). *See also radioactive series.*

**DCG (derived concentration guide)** – The concentration of a **radionuclide** in air or water that, under conditions of continuous exposure for one year by a single pathway (e.g., air inhalation, absorption, or ingestion), would result in an effective dose equivalent of 100 mrem (1 mSv). The values were established in **DOE Order 5400.5**.

**decay product** – A **nuclide** resulting from the radioactive disintegration of a **radionuclide**, being formed either directly or as a result of successive transformations in a radioactive series. A decay product may be either radioactive or stable.

**decontamination** – The removal or reduction of **radioactive** or hazardous contamination from facilities, equipment, or soils by washing, heating, chemical or electrochemical action, mechanical cleaning, or other techniques to achieve a stated objective or end condition.

**disposal** – Final placement or destruction of waste.

**DOE (Department of Energy)** – The federal agency that promotes scientific and technical innovation to support the national, economic, and energy security of the United States. DOE has responsibility for 10 national laboratories and for the science and research conducted at these laboratories, including Brookhaven National Laboratory.

**DOE Order 231.1A** – This order, Environment, Safety, and Health Reporting, is dated 8/19/03. It replaces the 1995 version, Order 231.1, as well as the “ORPS” order, DOE Order 232.1A, Occurrence Reporting and Processing of Operations Information, dated 7/21/97, and Order 210.1, Performance Indicator..., dated 9/27/95.

**DOE Order 450.1** – This order, Environmental Protection Program, is dated 1/15/03. It replaces DOE Order 5400.1, General Environmental Protection Program, dated 11/9/88.

**DOE Order 5400.5** – This order, Radiation Protection of the Public and the Environment, was first published by **DOE** in 1990 and was modified in 1993. It established

the standards and requirements for operations of DOE and DOE contractors with respect to protecting the public and the **environment** against undue risk from radiation.

**dose** – See **EDE**.

**dosimeter** – A portable detection device for measuring exposure to ionizing radiation. See Chapter 8 for details.

**downgradient** – In the direction of **groundwater** flow from a designated area; analogous to “downstream.”

**DQO (Data Quality Objective)** – The Data Quality Objective (DQO) process was developed by **EPA** for facilities to use when describing their environmental monitoring matrices, sampling methods, locations, frequencies, and measured parameters, as well as methods and procedures for data collection, analysis, maintenance, reporting, and archiving. The DQO process also addresses data that monitor quality assurance and quality control.

**drift fence** – A stretch of temporary fencing to prevent an animal population from leaving the area, used at BNL as part of a population study.

**dry weight** – The dry weight concentration of a substance is after a sample is dried for analysis. Dry weight concentrations are typically higher than wet weight values.

**D-waste** – Liquid waste containing radioactivity.

## E

**EA (Environmental Assessment)** – A report that identifies potentially significant effects from any federally approved or funded project that might change the physical **environment**. If an EA identifies a “significant” potential impact (as defined by **NEPA**), an Environmental Impact Statement (EIS) must be researched and prepared.

**EDB (ethylene dibromide)** – A colorless, nonflammable, heavy liquid with a sweet odor; slightly soluble in water. Although the U.S. Department of Health and Human Services has determined that ethylene dibromide may reasonably be anticipated to be a carcinogen, it is still used to treat felled logs for bark beetles; to control wax moths in beehives; as a chemical intermediary for dyes, resins, waxes, and gums; to spot-treat milling machinery; and to control Japanese beetles in ornamental plants.

**EDE (Effective Dose Equivalent)** – A value used to express the health risk from radiation exposure to tissue in terms of an equivalent whole body exposure. It is a “normalized” value that allows the risk from radiation exposure received by a specific organ or part of the body to be compared with the risk due to whole-body exposure. The EDE equals the sum of the doses to different organs of the body multiplied by their respective **weighting factors**. It includes the sum of the EDE due to radiation from sources external to the body and the committed effective dose equivalent due to the internal deposition of **radionuclides**. EDE is expressed in **rems** or **sieverts**.

**effluent** – Any liquid discharged to the environment, including stormwater **runoff** at a site or facility.

**EIMS (Environmental Information Management System)** – A database system used to store, manage, verify, protect, retrieve, and archive BNL’s environmental data.

**EM (environmental monitoring)** – Sampling for contaminants in air, water, sediment, soil, food stuffs, plants, and animals, either by directly measuring or by collecting and analyzing samples.

**emissions** – Any gaseous or particulate matter discharged to the atmosphere.

**EMS (Environmental Management System)** – The BNL EMS meets the requirements of the **ISO 14001 EMS standard**, with emphasis on compliance assurance, pollution prevention, and community outreach. An extensive environmental monitoring program is one component of BNL’s EMS.

**environment** – Surroundings (including air, water, land, natural resources, flora, fauna, and humans) in which an organization operates, and the interrelation of the organization and its surroundings.

**environmental aspect** – Elements of an organization’s activities, products, or services that can interact with the surrounding air, water, land, natural resources, flora, fauna, and humans.

**environmental impact** – Any change to the surrounding air, water, land, natural resources, flora, and fauna, whether adverse or beneficial, wholly or partially resulting from an organization’s activities, products, or services.

**environmental media** – Includes air, **groundwater**, surface water, soil, flora, and fauna.

**environmental monitoring or surveillance** – See **EM**.

**EPA (U. S. Environmental Protection Agency)** – The federal agency responsible for developing and enforcing environmental laws. Although state or local regulatory agencies may be authorized to administer environmental regulatory programs, EPA generally retains oversight authority.

**EPCRA (Emergency Planning and Community Right-to-Know Act)** – Also known as Title III of SARA, EPCRA was enacted by Congress as the national legislation on community safety, to help local groups protect public health, safety, and the environment from chemical hazards. To implement EPCRA, Congress required each state to appoint a State Emergency Response Commission (SERC). The SERCs were required to divide their states into Emergency Planning Districts and to name a Local Emergency Planning Committee for each district.

Broad representation by fire fighters, health officials, government and media representatives, community groups, industrial facilities, and emergency managers ensures that all necessary elements of the planning process are represented.

**ES (environmental surveillance)** – Sampling for contaminants in air, water, sediment, soil, food stuffs, plants, and animals, either by directly measuring or by collecting and analyzing samples.

## APPENDIX A: GLOSSARY

**ESA (Endangered Species Act)** – This provides a program for conserving threatened and endangered plants and animals and their habitats. The **FWS** maintains the list of 632 *endangered* species (326 are plants) and 190 *threatened* species (78 are plants). Species include birds, insects, fish, reptiles, mammals, crustaceans, flowers, grasses, and trees. Anyone can petition FWS to include a species on this list. The law prohibits any action, administrative or real, that results in a “taking” of a listed species *or* adversely affects habitat. Likewise, import, export, interstate, and foreign commerce of listed species are all prohibited. **EPA**’s decision to register pesticides is based in part on the risk of adverse effects on endangered species as well as environmental fate (how a pesticide will affect habitat). Under **FIFRA**, **EPA** can issue emergency suspensions of certain pesticides to cancel or restrict their use if an endangered species will be adversely affected.

**evapotranspiration** – A process by which water is transferred from the soil to the air by plants that take the water up through their roots and release it through their leaves and other aboveground tissue.

**exposure** – A measure of the amount of ionization produced by **x-rays** or **gamma rays** as they travel through air. The unit of radiation exposure is the roentgen (**R**).

## F

**fallout** – Radioactive material, made airborne as a result of aboveground nuclear weapons testing, that has been deposited on the Earth’s surface.

**FFCA (Federal Facility Compliance Act)** – Formerly, the federal government maintained that it was not subject to fines and penalties under solid and hazardous waste law because of the doctrine of “sovereign immunity.” The State of Ohio challenged this in *Ohio v. the Department of Energy (1990)*. The U.S. Circuit Court of Appeals found in favor of the State (June 11, 1990), writing that the federal government’s sovereign immunity is waived under both the **CWA** sovereign immunity provision and **RCRA**’s citizen suit provision. The Circuit Court decision was overturned by the Supreme Court on April 21, 1992, in *DOE v. Ohio*, which held that the waiver of sovereign immunity in **RCRA** and **CWA** is not clear enough to allow states to impose civil penalties directly. After the high court’s ruling, the consensus among lawmakers was that a double standard existed: the same government that developed laws to protect human health and the environment and required compliance in the private sector, was itself not assuming the burden of compliance. As a result, Congress enacted the **FFCA** (October 6, 1992, Pub. Law 102-386), which effectively overturned the Supreme Court’s ruling. In the legislation Congress specifically waived sovereign immunity with respect to **RCRA** for federal facilities.

Under section 102, **FFCA** amends section 6001 of **RCRA** to specify that federal facilities are subject to “all civil and

administrative penalties and fines, regardless of whether such penalties or fines are punitive or coercive in nature.” These penalties and fines can be levied by **EPA** or by authorized states. In addition, **FFCA** states that “the United States hereby expressly waives any immunity otherwise applicable to the United States.” Although federal agents, employees, and officers are not liable for civil penalties, they are subject to criminal sanctions. No departments, agencies, or instrumentalities are subject to criminal sanctions. Section 104 (1) and (2) require **EPA** to conduct annual **RCRA** inspections of all federal facilities.

**FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act)** – The primary focus of this law was to provide federal control of pesticide distribution, sale, and use. **EPA** was given authority under **FIFRA** not only to study the consequences of pesticide usage but also to require users (farmers, utility companies, and others) to register when purchasing pesticides. Through later amendments to the law, users also must take exams for certification as applicators of pesticides. All pesticides used in the U.S. must be registered (licensed) by **EPA**. Registration assures that pesticides will be properly labeled and that if used in accordance with specifications, will not cause unreasonable harm to the environment.

**FS (feasibility study)** – A process for developing and evaluating remedial actions using data gathered during the remedial investigation. The **FS** defines the objectives of the remedial program for the site and broadly develops remedial action alternatives, performs an initial screening of these alternatives, and performs a detailed analysis of a limited number of alternatives that remain after the initial screening stage.

**FWS (U.S. Fish & Wildlife Service)** – The U.S. Fish and Wildlife Service is the principal federal agency responsible for conserving, protecting, and enhancing fish, wildlife, plants, and their habitats for the continuing benefit of the people of the United States. **FWS** manages the 95-million-acre National Wildlife Refuge System, which encompasses 544 national wildlife refuges, thousands of small wetlands, and other special management areas. It also operates 69 national fish hatcheries, 64 fishery resources offices, and 81 ecological services field stations. The agency enforces federal wildlife laws, administers the Endangered Species Act, manages migratory bird populations, restores nationally significant fisheries, conserves and restores wildlife habitat such as wetlands, and helps foreign and Native American tribal governments with their conservation efforts. It also oversees the Federal Assistance Program, which distributes hundreds of millions of dollars in excise taxes on fishing and hunting equipment to state fish and wildlife agencies.

**fugitive source** – Unanticipated sources of volatile hazardous air pollutants due to leaks from valves, pumps, compressors, relief valves, connectors, flanges, and various other pieces of equipment.



## G

**gamma radiation** – Gamma radiation is a form of electromagnetic radiation, like radio waves or visible light, but with a much shorter wavelength. It is more penetrating than **alpha** or **beta** radiation, capable of passing through dense materials such as concrete.

**gamma spectroscopy** – This analysis technique identifies specific **radionuclides**. It measures the particular energy of a radionuclide's gamma radiation emissions. The energy of these emissions is unique for each nuclide, acting as a “fingerprint.”

**geotextile** – A product used as a soil reinforcement agent and as a filter medium. It is made of synthetic fibers manufactured in a woven or loose manner to form a blanket-like product.

**grab sample** – A single sample collected at one time and place.

**Green Building** – Construction that adheres to guidelines established by the Green Building Council, a coalition of leaders from across the building industry working to promote structures that are environmentally responsible, profitable, and healthy places to live and work.

**groundwater** – Water found beneath the surface of the ground (subsurface water). Groundwater usually refers to a zone of complete water saturation containing no air.

**gunite** – A mixture of cement, sand, and water sprayed over a mold to form a solid, impermeable surface. Formerly a trademarked name, now in general usage.

## H

**half-life ( $t_{1/2}$ )** – The time required for one-half of the atoms of any given amount of a radioactive substance to disintegrate; the time required for the activity of a radioactive sample to be reduced by one half.

**halon** – An ozone-depleting fire suppressant; suffixes (-1301, etc.) indicate variants.

**hazardous waste** – Toxic, corrosive, reactive, or ignitable materials that can injure human health or damage the environment. It can be liquid, solid, or sludge, and include heavy metals, organic solvents, reactive compounds, and corrosive materials. It is defined and regulated by **RCRA**, Subtitle C.

**heat input** – The heat derived from combustion of fuel in a steam generating unit. It does not include the heat from preheated combustion air, recirculated flue gases, or the exhaust from other sources.

**heavy water ( $D_2O$ )** – A form of water containing deuterium, a nonradioactive isotope of hydrogen.

**herpetofaunal** – Relating to the study of reptiles.

**hot cell** – Shielded and air-controlled facility for the remote handling of radioactive material.

**hydrology** – The science dealing with the properties, distribution, and circulation of natural water systems.

## I

**inert** – Lacking chemical or biological action.

**influent** – Liquid (such as stormwater runoff or wastewater) flowing into a reservoir, basin, or treatment plant.

**intermittent river** – A stream that dries up on occasion, usually as a result of seasonal factors or decreased contribution from a source such as a wastewater treatment plant.

**ionizing radiation** – Any radiation capable of displacing electrons from atoms or molecules, thereby producing ions. High doses of ionizing radiation may produce severe skin or tissue damage. *See also* **alpha, beta, gamma radiation; x-rays**.

**ISO 14001 EMS standard** – The International Organization for Standardization (ISO) sets standards for a wide range of products and management operations. Following the success of the ISO 9000 Standards for quality management, ISO introduced the 14000 series for environmental management. BNL was the first DOE Office of Science laboratory to obtain third-party registration to this globally recognized environmental standard.

**isotope** – Two or more forms of a chemical element having the same number of protons in the nucleus (the same atomic number), but having different numbers of neutrons in the nucleus (different atomic weights). Isotopes of a single element possess almost identical chemical properties.

## L

**leaching** – The process by which soluble chemical components are dissolved and carried through soil by water or some other percolating liquid.

**light water** – As used in this document, tap water, possibly filtered.

**liquid scintillation counter** – An analytical instrument used to quantify tritium, carbon-14, and other beta-emitting **radionuclides**. *See also* **scintillation**.

## M

**matrix, matrices** – The natural context (e.g., air, vegetation, soil, water) from which an environmental sample is collected.

**MDL (minimum detection limit)** – The lowest level to which an analytical parameter can be measured with certainty by the analytical laboratory performing the measurement. While results below the MDL are sometimes measurable, they represent values that have a reduced statistical confidence associated with them (less than 95 percent confidence).

**MEI (maximally exposed individual)** – The hypothetical individual whose location and habits tend to maximize his/her radiation dose, resulting in a dose higher than that received by other individuals in the general population.

**metamorphic** – In the state of changing from larval to mature forms.

## APPENDIX A: GLOSSARY

**mixed waste** – Waste that contains both a hazardous waste component (regulated under Subtitle C of **RCRA**) and a radioactive component.

**monitoring** – The collection and analysis of samples or measurements of effluents and emissions for the purpose of characterizing and quantifying contaminants, and demonstrating compliance with applicable standards.

**monitoring well** – A well that collects **groundwater** for the purposes of evaluating water quality, establishing groundwater flow and elevation, determining the effectiveness of treatment systems, and determining whether administrative or engineered controls designed to protect groundwater are working as intended.

**MSL (mean sea level)** – The average height of the sea for all stages of the tide. Used as a benchmark for establishing **groundwater** and other elevations.

## N

**NEPA (National Environmental Policy Act)** – Assures that all branches of government give proper consideration to the environment before any land purchase or any construction projects, including airports, buildings, military complexes, and highways. Project planners must assess the likely impacts of the project by completing an Environmental Assessment (EA) and, if necessary, an Environmental Impact Statement (EIS).

**NESHAPs (National Emissions Standards for Hazardous Air Pollutants)** – Standards that limit emissions from specific sources of air pollutants linked to serious health hazards. NESHAPs are developed by **EPA** under the **CAA**. Hazardous air pollutants can be chemical or radioactive. Their sources may be human-made, such as vehicles, power plants, and industrial or research processes, or natural, such as radioactive gas in soils.

**neutrino** – A small, neutral particle created as a result of particle decay. Neutrinos were believed to be massless, but recent studies have indicated that they have small, but finite, mass. Neutrinos interact very weakly.

**NHPA (National Historic Preservation Act)** – With passage of the National Historic Preservation Act in 1966, Congress made the federal government a full partner and a leader in historic preservation. The role of the federal government is fulfilled through the National Park Service. State participation is through State Historic Preservation Offices. “Before 1966, historic preservation was mainly understood in one-dimensional terms: the proverbial historic shrine or Indian burial mound secured by lock and key—usually in a national park—set aside from modern life as an icon for study and appreciation. NHPA largely changed that approach, signaling a much broader sweep that has led to the breadth and scope of the vastly more complex historic preservation mosaic we know today.”

**nonpoint source pollution** – Nonpoint source pollution occurs when rainfall, snowmelt, or irrigation water runs over land or through the ground, picks up pollutants, and depos-

its them into rivers, lakes, and coastal waters or introduces them into **groundwater**. Nonpoint source pollution also includes adverse changes to the hydrology of water bodies and their associated aquatic habitats. After Congress passed the Clean Water Act in 1972, the nation’s water quality community emphasized **point source** pollution (coming from a discrete conveyance or location, such as industrial and municipal waste discharge pipes). Point sources were the primary contributors to the degradation of water quality then, and the significance of nonpoint source pollution was poorly understood. Today, nonpoint source pollution remains the largest source of water quality problems. It is the main reason that approximately 40 percent of surveyed rivers, lakes, and estuaries are not clean enough to meet basic uses such as fishing or swimming.

**NO<sub>x</sub>** – Nitrogen oxides are gases consisting of one molecule of nitrogen and varying numbers of oxygen molecules. Nitrogen oxides are produced, for example, by the combustion of fossil fuels in vehicles and electric power plants. In the atmosphere, NO<sub>x</sub> can contribute to the formation of smog, impair visibility, and have health consequences. NO<sub>x</sub> are considered “criteria air pollutants” under the **CAA**.

**nuclide** – A species of atom characterized by the number of protons and neutrons in the nucleus.

**NYCRR (New York Codes, Rules, and Regulations)** The NYCRR primarily contains state agency rules and regulations adopted under the State Administrative Procedure Act. There are 22 Titles: one for each state department, one for miscellaneous agencies and one for the Judiciary. Title 6 addresses environmental conservation, so many references in the SER are to “6 NYCRR.”

## O

**O<sub>3</sub>** – See ozone.

**on site** – The area within the boundaries of a site that is controlled with respect to access by the general public.

**opacity** – Under the Clean Air Act (**CAA**), a measurement of the degree to which smoke (emissions other than water vapor) reduces the transmission of light and obscures the view of an object in the background.

**ORPS (Occurrence Reporting and Processing System)** A system for identifying, categorizing, notifying, investigating, analyzing, and reporting to DOE events or conditions discovered at the BNL site. It was originally established by DOE Order 232.1, which has been replaced by **DOE Order 231.1A**.

**OU (operable unit)** – Division of a contaminated site into separate areas based on the complexity of the problems associated with it. Operable units may address geographical portions of a site, specific site problems, or initial phases of an action. They may also consist of any set of actions performed over time, or actions that are concurrent, but located in different parts of a site. An OU can receive specific investigation and a particular remedy may be proposed. A Record of Decision (**ROD**) is prepared for each OU.

**outfall** – The place where wastewater is discharged.

**oxides of nitrogen (NO<sub>x</sub>)** – See NO<sub>x</sub>.

**ozone (O<sub>3</sub>)** – A very reactive type of oxygen formed naturally in the upper atmosphere which provides a shield for the earth from the sun's ultraviolet rays. At ground level or in the lower atmosphere, it is pollution that forms when oxides of nitrogen and hydrocarbons react with oxygen in the presence of strong sunlight. Ozone at ground level can lead to health effects and cause damage to trees and crops.

## P

**P2 (pollution prevention)** – Preventing or reducing the generation of pollutants, contaminants, hazardous substances, or wastes at the source, or reducing the amount for treatment, storage, and disposal through recycling. Pollution prevention can be achieved through reduction of waste at the source, segregation, recycle/reuse, and the efficient use of resources and material substitution. The potential benefits of pollution prevention include the reduction of adverse environmental impacts, improved efficiency, and reduced costs.

**PAAA (Price-Anderson Act Amendments)** – The Price-Anderson Act (PAA) was passed in 1957 to provide for prompt compensation in the case of a nuclear accident. The PAA provided broad financial coverage for damage, injury, and costs, and required DOE to indemnify contractors. The amended act of 1988 (PAAA) extended indemnification for 15 years and required DOE to establish and enforce nuclear safety rules. The PAAA Reauthorization, passed in December of 2002, extended current indemnification levels through 2004. 10 CFR 820 and its Appendix A provide DOE enforcement procedure and policy.

**Parshall flume** – An engineered channel used to measure the flow rate of water. It was named after the inventor, who worked for the U.S. government as an irrigation research engineer.

**PCBs (polychlorinated biphenyls)** – A family of organic compounds used from 1926 to 1979 (when they were banned by EPA) in electrical transformers, lubricants, carbonless copy paper, adhesives, and caulking compounds. PCBs are extremely persistent in the environment because they do not break down into different and less harmful chemicals. PCBs are stored in the fatty tissues of humans and animals through the bioaccumulation process.

**percent recovery** – For analytical results, the ratio of the measured amount, divided by the known (spiked) amount, multiplied by 100.

**permit** – An authorization issued by a federal, state, or local regulatory agency. Permits are issued under a number of environmental regulatory programs, including CAA, CWA, RCRA, and TSCA. Permits grant permission to operate, to discharge, to construct, and so on. Permit provisions may include emission/effluent limits and other requirements such as the use of pollution control devices, monitoring, record keeping and reporting. Also called a “license” or “certificate” under some regulatory programs.

**pH** – A measure of hydrogen ion concentration in an aqueous solution. Acidic solutions have a pH less than 7, neutral solutions have a pH of 7, and basic solutions have a pH greater than 7 and up to 14.

**plume** – A body of contaminated groundwater or polluted air flowing from a specific source. The movement of a groundwater plume is influenced by such factors as local groundwater flow patterns, the character of the aquifer in which groundwater is contained, and the density of contaminants. The movement of an air contaminant plume is influenced by the ambient air motion, the temperatures of the ambient air and of the plume, and the density of the contaminants.

**point source** – Any confined and discrete conveyance (e.g., pipe, ditch, well, or stack) of a discharge.

**pollutant** – Any hazardous or radioactive material naturally occurring or added to an environmental medium, such as air, soil, water, or vegetation.

**potable water** – Water of sufficient quality for use as drinking water without endangering the health of people, plants, or animals.

**precision** – A statistical term describing the dispersion of data around a central value, usually represented as a variance, standard deviation, standard error, or confidence interval.

**putrescible waste** – Garbage that contains food and other organic biodegradable materials. There are special management requirements for this waste in 6 NYCRR Part 360.

## Q

**QA (quality assurance)** – In environmental monitoring, any action to ensure the reliability of monitoring and measurement data. Aspects of QA include procedures, inter-laboratory comparison studies, evaluations, and documentation.

**QC (quality control)** – In environmental monitoring, the routine application of procedures to obtain the required standards of performance in monitoring and measurement processes. QC procedures include calibration of instruments, control charts, and analysis of replicate and duplicate samples.

**qualifier** – A letter or series of letter codes in a graph or chart indicating that the associated value did not meet analytical requirements or was estimated.

**quenching** – Anything that interferes with the conversion of decay energy to electronic signal in the photomultiplier tubes of detection equipment, usually resulting in a reduction in counting efficiency.

## R

**R (roentgen)** – A unit of exposure to ionizing radiation. It is the amount of gamma or x-rays required to produce ions carrying one electrostatic unit of electrical charge in one cubic centimeter of dry air under standard conditions. It is named after the German scientist Wilhelm Roentgen, who discovered x-rays.

## APPENDIX A: GLOSSARY

**RA (removal actions, “removals”)** – Interim actions that are undertaken to prevent, minimize, or mitigate damage to the public health or environment that may otherwise result from a release or threatened release of hazardous substances, pollutants, or contaminants pursuant to **CERCLA**, and that are not inconsistent with the final remedial action. Under **CERCLA**, **EPA** may respond to releases or threats of releases of hazardous substances by starting an RA to stabilize or clean up an incident or site that immediately threatens public health or welfare. Removal actions are less comprehensive than *remedial* actions. However, removal actions must contribute to the efficiency of future remedial actions.

**radiation** – Some atoms possess excess energy, causing them to be physically unstable. Such atoms become stable when the excess energy is released in the form of charged particles or electromagnetic waves, known as radiation.

**radiation event** – A single detection of a charged particle or electromagnetic wave.

**radioactive series** – A succession of **nuclides**, each of which transforms by radioactive disintegration into the next until a stable nuclide results. The first member of the series is called the parent and the intermediate members are called daughters or progeny.

**radioactivity** – The spontaneous transition of an atomic nucleus from a higher energy to a lower energy state. This transition is accompanied by the release of a charged particle or electromagnetic waves from the atom. Also known as “activity.”

**radionuclide** – A radioactive element characterized by the number of protons and neutrons in the nucleus. There are several hundred known radionuclides, both artificially produced and naturally occurring.

**RCRA (Resource Conservation and Recovery Act)** Pronounced “rick-rah,” this act of Congress gave **EPA** the authority to control the generation, transportation, treatment, storage, and disposal of hazardous waste. RCRA also set forth a framework for the management of nonhazardous wastes. The 1986 amendments to RCRA enabled **EPA** to address environmental problems that could result from underground tanks storing petroleum and other hazardous substances. RCRA focuses only on active and future facilities and does not address abandoned or historical sites (*see CERCLA*). In 1984, amendments to RCRA called the Hazardous and Solid Waste Amendments (HSWA, pronounced “hiss-wa”) required phasing out the land disposal of hazardous waste. Some other mandates of this strict law include increased enforcement authority for **EPA**, more stringent hazardous waste management standards, and a comprehensive underground storage tank (UST) program.

**recharge** – The process by which water is added to a zone of saturation (aquifer) from surface infiltration, typically when rainwater soaks through the earth to reach an aquifer.

**recharge basin** – A basin (natural or artificial) that collects water. The water will infiltrate to the aquifer.

**release** – Spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing of a hazardous substance, pollutant, or contaminant into the environment. The National Contingency Plan also defines the term to include a threat of release.

**rem** – Stands for “roentgen equivalent man,” a unit by which human radiation dose is assessed (*see also Sv*). The rem is a risk-based value used to estimate the potential health effects to an exposed individual or population. 100 rem = 1 sievert.

**remedial (or remediation) alternatives** – Options considered under **CERCLA** for decontaminating a site such as an operable unit (**OU**) or area of concern (**AOC**). Remedial actions are long-term activities that prevent the possible release, or stop or substantially reduce the actual release, of substances that are hazardous but not immediately life-threatening. *See also* feasibility study (**FS**) and Record of Decision (**ROD**).

**residual fuel** – Crude oil, Nos. 1 and 2 fuel oil that have a nitrogen content greater than 0.05 weight percent, and all fuel oil Nos. 4, 5, and 6, as defined by the American Society of Testing and Materials in ASTM D396-78, *Standard Specifications for Fuel Oils*, (c. 2001).

**riparian** – An organism living on the bank of a river, lake, or tidewater.

**ROD (Record of Decision)** – A document that records a regulatory agency’s decision for the selected remedial action. The ROD also includes a responsiveness summary and a bibliography of documents that were used to reach the remedial decision. When the ROD is finalized, remedial design and implementation can begin.

**roentgen** – *See R.*

**RPD (relative percent difference)** – A measure of precision, expressed by the formula:  $RPD = [(A-B)/(A+B)] \times 200$ , where A equals the concentration of the first analysis and B equals the concentration of the second analysis.

**runoff** – The movement of water over land. Runoff can carry pollutants from the land into surface waters or uncontaminated land.

## S

**sampling** – The extraction of a prescribed portion of an effluent stream or environmental media for purposes of inspection or analysis.

**SARA (Superfund Amendments and Reauthorization Act)** – This Act of Congress in 1986 reauthorized **CERCLA** to continue cleanup activities around the country. Several site-specific amendments, definitions clarifications, and technical requirements were added to the legislation, including additional enforcement authorities. Title III of **SARA** also authorized **EPCRA**.

**SBMS (Standards-Based Management System)** – A document management tool used to develop and integrate

systems, and to demonstrate BNL's conformance to requirements to perform work safely and efficiently.

**scintillation** – Flashes of light produced in a phosphor by a radioactive material.

**SDWA (Safe Drinking Water Act)** – The Safe Drinking Water Act was established to protect the quality of drinking water in the United States. It focuses on all waters actually or potentially designed for drinking use, whether from above ground or underground sources. The SDWA authorized EPA to establish safe standards of purity and required all owners or operators of public water systems to comply with health-related standards. State governments assume regulatory power from EPA.

**sediment** – The layer of soil and minerals at the bottom of surface waters, such as streams, lakes, and rivers.

**sensitivity** – The minimum amount of an analyte that can be repeatedly detected by an instrument.

**sievert** – See Sv.

**skyshine** – Radiation emitted upward from an open-topped, shielded enclosure and reflected downward, resulting in the possibility that flora and fauna (including humans) outside the shielded enclosure can be exposed to radiation.

**sludge** – Semisolid residue from industrial or water treatment processes.

**sole source aquifer** – An area defined by EPA as being the primary source of drinking water for a particular region. Includes the surface area above the sole source aquifer and its recharge area.

**SPDES (State Pollutant Discharge Elimination System)** This permit program is delegated to the states, but the effluent limitations and other requirements are set by the federal government. 6 NYCRR Section 750-1.11(a) concerns the provisions of SPDES permits and lists the citations for the various effluent limitations from the Federal Register and the CFR.

**stable** – Nonradioactive.

**stakeholder** – People or organizations with vested interests in BNL and its environment and operations. Stakeholders include federal, state, and local regulators; the public; DOE; and BNL staff.

**stripping** – A process used to remove volatile contaminants from a substance (see also **air stripping**).

**sump** – A pit or tank that catches liquid **runoff** for drainage or disposal.

**Sv (sievert)** – A unit for assessing the risk of human radiation dose, used internationally and with increasing frequency in the United States. One sievert is equal to 100 rem.

**SVE (soil vapor extraction)** – An *in situ* (in-place) method of extracting VOCs from soil by applying a vacuum to the soil and collecting the air, which can be further treated to remove the VOCs, or discharged to the atmosphere.

**SVOC** – A general term for volatile organic compounds that vaporize relatively slowly at standard temperature and

pressure. See also VOC.

**synoptic** – Relating to or displaying conditions as they occur over a broad area.

## T

**$t_{1/2}$  (half-life)** – The time required for one-half of the atoms of any given amount of a radioactive substance to disintegrate; the time required for the activity of a radioactive sample to be reduced by one half.

**TCE (trichloroethylene, also known as trichloroethene)** A stable, colorless liquid with a low boiling point. TCE has many industrial applications, including use as a solvent and as a metal degreasing agent. TCE may be toxic when inhaled or ingested, or through skin contact, and can damage vital organs, especially the liver. See also VOC.

**Tier III reports** – Reports, required by SARA, that are prepared to document annual emissions of toxic materials to the environment. These are also known as TRI Section 313 reports.

**TLD (thermoluminescent dosimeter)** – A device used to measure radiation dose to occupational workers or radiation levels in the environment.

**tritium** – The heaviest and only radioactive nuclide of hydrogen, with a **half-life** of 12.3 years and a very-low-energy radioactive decay (tritium is a **beta** emitter).

**TSCA (Toxic Substances Control Act)** – Enacted by Congress in 1976, TSCA empowers EPA to track the 75,000 industrial chemicals produced or imported into the United States. EPA repeatedly screens these chemicals and can require reporting or testing of any that may pose an environmental or human health hazard. EPA can ban the manufacture or import of chemicals that pose an unreasonable risk.

**TVOC (total volatile organic compounds)** – A sum of all individual VOC concentrations detected in a given sample.

## U

**UIC (underground injection control)** – A hole with vertical dimensions greater than its largest horizontal dimensions; used for disposal of wastewater.

**UST (underground storage tank)** – A stationary device, constructed primarily of nonearthen material, designed to contain petroleum products or hazardous materials. In a UST, 10 percent or more of the volume of the tank system is below the surface of the ground.

**upgradient/upslope** – A location of higher **groundwater** elevation; analogous to “upstream.”

## V

**vadose** – Relating to water in the ground that is above the permanent groundwater level.

**vernal pool** – A small, isolated, and contained basin that holds water on a temporary basis, most commonly during winter and spring. It has no aboveground outlet for water and is extremely important to the life cycle of many am-

## APPENDIX A: GLOSSARY

phibians (such as the tiger salamander), as it is too shallow to support fish, a major predator of amphibian larvae.

**VOC (volatile organic compound)** – A general term for organic compounds capable of a high degree of vaporization at standard temperature and pressure. Because VOCs readily evaporate into the air, the potential for human exposure is greatly increased. Due to widespread industrial use, VOCs are commonly found in soil and groundwater.

**VUV** – Stands for “very ultraviolet” and refers to a beamline at the NSLS with wavelengths at the far ultraviolet end of the spectrum.

### W

**waste minimization** – Action that avoids or reduces the generation of waste, consistent with the general goal of minimizing current and future threats to human health, safety, and the environment. Waste minimization activities include recycling, improving energy usage, reducing waste at the source, and reducing the toxicity of hazardous waste. This action is associated with pollution prevention, but is more likely to occur after waste has been generated.

**water table** – The water-level surface below the ground where the unsaturated zone ends and the saturated zone begins. It is the level to which a well that is screened in the unconfined aquifer will fill with water.

**watershed** – The region draining into a river, a river system, or a body of water.

**weighting factor** – A factor which, when multiplied by the dose equivalent delivered to a body organ or tissue, yields the equivalent risk due to a uniform radiation exposure of the whole body. *See also EDE.*

**wet weight** – The wet weight concentration of a substance is before a sample is dried for analysis (in other words, in its “natural” state), and is the form most likely to be consumed. Wet weight concentrations are typically lower than dry weight values.

**wind rose** – A diagram that shows the frequency of wind from different directions at a specific location.

### X

**x-rays** – A form of electromagnetic **radiation** with short wavelength, generated when high-energy electrons strike matter or when lower-energy **beta** radiation is absorbed in matter. **Gamma** radiation and x-rays are identical, except for the source.

### Z

**zeolite** – A naturally occurring group of more than 100 minerals, formed of silicates and aluminum, with unique and diverse crystal properties. Zeolites can perform ion exchange, filtering, odor removal, and chemical sieve and gas absorption tasks. Synthetic zeolites are now used for most applications.