

2012 and 2013

Annual Low-Level Radioactive Waste

Program Report

to the

Pennsylvania General Assembly and the

Appalachian Compact Commission



pennsylvania
DEPARTMENT OF ENVIRONMENTAL
PROTECTION

Bureau of Radiation Protection

Commonwealth of Pennsylvania

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MESSAGE FROM THE SECRETARY

In 1980, the U.S. Congress enacted the Low-Level Radioactive Waste Policy Act. It made each state responsible for the disposal of such waste generated within its borders and encouraged states to enter into compacts with each other.

The Pennsylvania General Assembly responded to the federal act by enacting the Appalachian States Low-Level Waste Compact Act of 1985 (Act 1985-120). The act permits Pennsylvania to establish a regional disposal site for the Appalachian Compact states of Delaware, Maryland, West Virginia and Pennsylvania. Pennsylvania was selected as the initial host state because it generates the largest amount of low-level radioactive waste (LLRW) within the Appalachian Compact.

Since the act was passed, the factors that drove the need for such a facility have changed dramatically. In December 1998, the Department of Environmental Protection (DEP) announced the suspension of efforts to site a LLRW facility in Pennsylvania. There is currently disposal capacity for Class A LLRW at one out-of-state facility.

While Pennsylvania suspended the siting process, it maintains the ability to restart it should circumstances again change. The work done under the state's voluntary siting and technical screening process would provide a solid foundation for future work if necessary.

To assure the public that LLRW is disposed of properly, the Pennsylvania DEP's Bureau of Radiation Protection collects disposal data from the LLRW generators as well as from the U.S. Department of Energy's (DOE) national LLRW database and the EnergySolutions disposal facility in Clive, Utah. The data is compiled and reported in this, the *Annual Low-Level Radioactive Waste Program Report to the Pennsylvania General Assembly and the Appalachian Compact Commission*. This report contains the LLRW generation data for calendar years 2012 and 2013.

Sincerely,



John Quigley
Secretary

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CHAPTER 1

INTRODUCTION

This report is prepared for submission to the Pennsylvania General Assembly and the Appalachian Compact Commission (Commission). Its purpose is to fulfill the statutory requirements contained in Section 901 of the Pennsylvania Low-Level Radioactive Waste (LLRW) Disposal Act (1988-12) and Article 2 of the Act (1985-120).

Chapter 2 of this report contains activities of the Commission as well as the host state of Pennsylvania.

Chapter 3 contains a discussion of LLRW quantities generated in Pennsylvania and the Compact, waste minimization and toxicity of LLRW.

Chapter 4 contains the financial statistics and expenditures for Pennsylvania (calendar years 2012 and 2013) and the Commission (fiscal years 2012-13), and a list of LLRW disposers in the Compact for 2012 and 2013.

The report also includes, in Appendix A, information on volume, curie content, waste class, radionuclides, and waste toxicity of LLRW generated. The information was obtained from the EnergySolutions facility in Clive, Utah, and the Department of Energy (DOE)'s national database contained in the Manifest Information Management System (MIMS).

Appendix B contains pertinent LLRW disposal tables and charts for Pennsylvania and the other member states of the Compact - Delaware, Maryland and West Virginia. Disposal information for Class B and C wastes from the Compact is not tallied in this report due to the closure of the Barnwell, South Carolina, LLRW disposal facility to generators outside of the Atlantic Compact.

Appendix C provides statistics related to volume and activity trends of LLRW during 1994 through 2013.

Appendix D includes the independent auditor's report of the Commission's financial accounts for fiscal years 2011-13.

CHAPTER 2

APPALACHIAN STATES COMPACT ACTIVITIES

The Commission was established under a compact entered into by Delaware, Maryland, West Virginia and Pennsylvania. The U.S. Congress consented to the Compact in May 1988. The primary purpose of the Compact is to provide for the regional management and disposal of LLRW as required by the federal Low-Level Radioactive Waste Policy Act of 1980, as amended. Pennsylvania was designated as the initial host state to provide a site for a regional facility because it generates more LLRW than the other Compact members. Other important duties of the host state are to:

- Ensure consistency with applicable state and federal law, the protection and preservation of public health, safety and environmental quality in the siting, design, development, licensing, operation, closure, decommissioning, and long-term care for the institutional control period of the facility within the state.
- Prohibit the use of any shallow land burial and develop alternative means for treatment, storage, and disposal of LLRW.
- Establish requirements in law for financial responsibility. These requirements include purchase and maintenance of adequate insurance by generators, brokers, carriers, and regional facility operators and establish a long-term care fund to pay for preventative or corrective measures at the regional facility.
- Ensure that charges for disposal of LLRW at the regional facility are sufficient to fully fund the safe disposal and perpetual care of the regional facility, and that charges are assessed without discrimination based on the state of origin.
- Ensure and maintain a manifest system that documents all waste-related activities of generators, brokers, and carriers, and establish the chain of custody of waste from its initial generation to the end of its hazardous life.

Summary of the Host State Activities for Calendar Year 2012

The Department of Environmental Protection (department) continued to perform the administrative responsibilities and duties of the Appalachian States Low-Level Radioactive Waste Commission (Commission). The Commission's powers and duties are specified in the Appalachian States LLRW Compact Act of 1985 (Act 1985-120).

In March, the department published the combined PA DEP and Commission annual LLRW report for 2010. The report provides a summary of the current activities of the Appalachian Compact, a list of all LLRW generators in the compact, and the amounts of LLRW disposed by volume and radioactivity. It also contains a discussion of LLRW generation trends, including waste minimization and financial statistics, pertaining to all aspects of the compact.

In April, a representative from the department attended the Low-Level Waste (LLW) Forum meeting in San Francisco, CA. The LLW Forum was established to facilitate state and compact implementation of the LLRW Policy Act and to promote the objectives of LLRW regional compacts. At this meeting, the department representative provided an update on recent activities of the Appalachian Compact.

In October, the department held the annual meeting of the LLRW Advisory Committee. The primary purpose of the meeting was to review and discuss regional and national issues and recent developments related to LLRW management and disposal.

A representative from the department attended the LLW Forum meeting in Chicago and participated in a panel discussion regarding the Nuclear Regulatory Commission's (NRC) proposed approach for revising LLRW regulations in 10 CFR Part 61 (Part 61).

In November, the department's LLRW Program staff coordinated and attended the annual meeting of the Commission in Harrisburg.

A representative from the department's LLRW Program served on the LLW Forum's Working Group on Part 61 Rulemaking. The Working Group provided extensive comments to the NRC regarding the NRC's proposed approach to revising Part 61 regulations.

The department continued to monitor the generation of LLRW in Pennsylvania. The department has significantly reduced the regulated community's administrative LLRW reporting requirements by obtaining the appropriate disposal information directly from the national MIMS database.

Summary of Commission's Activities for Fiscal Year 2011-12

In July 2011, the Commission's Independent Auditor, Greenawalt & Company, P.C. conducted its annual audit of the Commission's financial statements. The audit did not identify any instances of non-compliance that are required to be reported under the Government Auditing Standards.

In October 2011, a representative of the Commission attended the LLW Forum meeting in Santa Fe, New Mexico.

In November 2011, the Commission held its annual meeting in Harrisburg. At this meeting, the Commission elected its chairman and vice-chairman, reviewed the audit report of the Commission's financial statements for FY 2010-11, reviewed and discussed the recent national developments involving LLRW management and disposal, approved a proposed budget for FY 2012-13, and provided an analysis of U.S. Court of Appeals decision involving the Northwest Compact and the EnergySolutions' LLRW disposal facility in Utah.

In April 2012, a representative from the Commission attended the LLW Forum meeting in San Francisco, CA.

Summary of the Host State Activities for Calendar Year 2013

In March, a representative from the LLRW Program represented the department at the LLW Forum meeting in Charleston, SC, as one of the LLW Forum directors. The LLW Forum was established to facilitate state and compact implementation of the LLRW Policy Act and to promote the objectives of LLRW regional compacts.

In September, the department published the combined PA DEP and Commission annual LLRW report for 2011. The report provides a summary of the current activities of the Appalachian Compact, a list of all LLRW generators in the compact, and the amounts of LLRW disposed by volume and radioactivity. It also contains a discussion of LLRW generation trends, including waste minimization and financial statistics, pertaining to all aspects of the compact.

In October, the department held the annual meeting of the LLRW Advisory Committee. The primary purpose of the meeting was to discuss regional and national issues and recent developments pertaining to disposal of LLRW. The department also provided an overview of its recent activities and initiatives at the national level as follows:

- Provided input and worked closely with the NRC staff on risk-informed, performance-based blending concept for LLRW;
- Represented the Organization of Agreement States on the NRC Storage Working Group and the development of the Regulatory Issue Summary on Extended Storage;
- Served on the LLW Forum Working Group and provided extensive comments to the NRC regarding 10 CFR Part 61 proposed revisions;
- Provided information and assistance to the state of Texas in support of a characterization study for LLRW to be disposed of at the Waste Control Specialists (WCS) disposal facility;
- Provided two separate Information Notices to the radioactive materials licensees and LLRW generators in Pennsylvania on collection and disposal of sealed sources at the EnergySolutions facility in Utah and the WCS facility in Texas.

A representative from the LLRW Program represented the department at the LLW Forum meeting in Park City, Utah, as one of the LLW Forum directors. At this meeting, the department representative provided an update on recent activities of the Appalachian Compact.

The department's LLRW Program staff coordinated and attended the 2013 annual meeting of the Appalachian Compact Commission in Harrisburg.

A representative from the department's LLRW Program continued to serve on the LLW Forum's Working Group on the 10 CFR Part 61 Rulemaking. The Working Group provided extensive comments to the NRC regarding the NRC's proposed approach to revising LLRW regulations in Part 61.

The department continued to perform the administrative responsibilities and duties of the Commission. The Commission's powers and duties are specified in the Appalachian States LLRW Compact Act of 1985 (Act 1985-120).

The department continued to monitor the generation of LLRW in Pennsylvania. The department has significantly reduced the regulated community's administrative LLRW reporting requirements by obtaining the appropriate disposal information directly from the national MIMS database.

Summary of Commission's Activities for Fiscal Year 2012-13

In July 2012, the Commission's Independent Auditor, Greenawalt & Company, P.C. conducted its annual audit of the Commission's financial statements for fiscal year 2011-12. The audit did not identify any instances of non-compliance that are required to be reported under the Government Auditing Standards.

In October 2012, a representative of the Commission attended the LLW Forum meeting in Chicago, Illinois.

The Commission held its annual meeting in Harrisburg. At this meeting, the Commission elected its chairman and vice-chairman, reviewed the audit report of the Commission's financial statements for FY 2011-12, reviewed and discussed the recent national developments involving LLRW management and disposal, approved a proposed budget for FY 2013-14, and reviewed recent NRC LLW Program activities.

In January 2013, the Commission provided a bulletin to all LLRW generators in the Appalachian Compact and informed them of the availability of the WCS disposal facility, and specifically, disposal options for Class B and C wastes. The Commission also responded to several inquiries by the generators regarding access to the WCS disposal facility in Texas.

In March 2013, a representative from the Commission attended the LLW Forum meeting in Charleston, SC.

Public Information Depositories

An information depository exists in four of the DEP regional offices and the State Library in Harrisburg. These locations serve as depositories where interested parties may review information on the LLRW program. A complete list of the LLRW program information depositories is provided in Table 2-1.

Please call 1-800-232-2786 or visit DEP's website listed on the back cover of this report for more information.

TABLE 2-1

LOW-LEVEL RADIOACTIVE WASTE PROGRAM INFORMATION DEPOSITORIES

The following commonwealth offices were supplied with copies of DEP's LLRW literature. Please call 1-800-232-2786 for information or visit the DEP's website listed on the back cover of this report for assistance in locating LLRW materials.

DEP Regional Offices and the Commonwealth Library

Northwest Regional Office
230 Chestnut St.
Meadville, PA 16335-3481
814-332-6945

Southeast Regional Office
2 E. Main St.
Norristown, PA 19401
484-250-5900

South-central Regional Office
909 Elmerton Ave.
Harrisburg, PA 17110-8200
717-705-4700

Southwest Regional Office
400 Waterfront Drive
Pittsburgh, PA 15222-4745
412-442-4000

Bureau of State Library
333 Market St.
Harrisburg, PA 17126
717-787-3273

CHAPTER 3

WASTE QUANTITIES GENERATED

Radioactive waste is radioactive material judged by the licensee as being no longer useful for its intended purpose. Radioactive waste can also be legacy waste resulting from past contamination of a facility. This legacy waste enters the waste stream after a facility is decontaminated. Radioactive waste can be generally categorized as high-level, low-level, by-product material, special nuclear material, and transuranics or a combination of these. Radioactive waste can also be mixed with hazardous non-radioactive waste, which is generally referred to as mixed waste.

LLRW is waste that satisfies the definition in the Low-Level Radioactive Waste Policy Amendments Act (LLRWPA) of 1985. The LLRWPA defines LLRW as, "radioactive material that (A) is not high-level radioactive waste, spent nuclear fuel or byproduct material as defined in Section 11e.2 of the Atomic Energy Act of 1954 and; (B) which the NRC, consistent with existing law and in accordance with paragraph (A), classifies as low-level radioactive waste."

Any LLRW that requires disposal at a licensed facility is considered generated waste, and the institution or person that produces the waste is considered a generator. Since 1998 commercial LLRW is tabulated by date, in the MIMS system, for the date it was actually disposed of at the Barnwell or the EnergySolutions (formerly called Envirocare) LLRW disposal facilities. The LLRW disposed of at a DOE site is not included in this report.

Generators of LLRW can be categorized according to the type of operation or service they conduct. In the Compact, waste generator types are categorized as nuclear power plant (utility), medical, academic, government, or industrial.

Nuclear power plants include all the nuclear reactors that are used for generation of electricity in the Compact. Medical facilities include hospitals, clinics, and medical colleges where radioactive materials are used for medical applications. Academic facilities include universities and other institutions of higher learning that generate LLRW. Government facilities include federal, state, county, and municipal operated institutions that generate LLRW. Industrial facilities may generate LLRW as part of the manufacturing process, research, waste-volume reduction, sample analysis, and facility or equipment decontamination.

Pennsylvania and Appalachian Compact LLRW Quantities

As of July 1, 2008, the Barnwell LLRW disposal site in South Carolina stopped accepting LLRW from outside of the Atlantic Compact (New Jersey, Connecticut, and South Carolina). Therefore, the LLRW generators within the Compact no longer had a disposal option for Class B and C wastes and certain types of Class A waste. These wastes were placed in storage by the generators. In 2012, WCS in Texas began to accept waste from outside the Texas Compact (Texas and Vermont). WCS is licensed by the state of Texas for all three classes of LLRW (Class A, B, and C). It provides a viable option for the Appalachian Compact generators to dispose of their Class B and C wastes.

Pennsylvania generated the largest quantities of LLRW among the Compact states. Quantities of LLRW by facility type and state for 2012 and 2013 are listed in Tables and Charts B-1 through B-6.

The total volume of waste disposed of by the Compact LLRW generators in 2012 was about 134,840 cubic feet, and 96,019 cubic feet in 2013. The LLRW volume disposed of from the Compact in 2012 and 2013 was mainly due to waste from the utility, government, and industrial categories (see Tables and Charts B-1 through B-4). The significant contribution of waste volume by the government category in 2012 is due to disposal of low-activity waste from the Army Corps of Engineers' cleanup of the Shallow Land Disposal Area. Maryland also had a significant amount of LLRW volume in the government category. This is mainly from the Department of Defense – Aberdeen Proving Ground facility. Another major contributor to the volume of waste is the nuclear utilities in the Appalachian Compact.

The 2012 LLRW activity (radioactivity) from the compact is about 451 curies. The greatest contribution was from the nuclear utility sector (see Tables and Charts B-1 and B-3). The disposal volume and activity tabulated in the aforementioned tables and charts only apply to Class A LLRW.

In 2012, all LLRW disposed was Class A, and all of it was disposed of at the EnergySolutions LLRW disposal facility in Clive, Utah.

The 2013 LLRW activity (radioactivity) from the compact is about 520 curies. The greatest contribution is from the nuclear utility sector (see Tables and Charts B-2 and B-4). The disposal volume and activity tabulated in the aforementioned tables and charts only apply to Class A LLRW.

In 2013, all LLRW disposed was Class A, and all of it was disposed of at the EnergySolutions LLRW disposal facility in Clive, Utah.

Table B-3 contains information on the radioactive isotopes in the LLRW disposed from the Compact in 2012 and 2013. The radioactive isotopes are arranged by isotope, half-life, and activity. The characterization and quantification of these isotopes are generally performed several months prior to disposal. Therefore, due to the short half-life of some listed isotopes and the in-growth of some others, the actual isotopic characterization and radioactivity will be different at the time of disposal.

Waste Minimization

Waste minimization can be accomplished by two different methods: source reduction and volume reduction. Source reduction is achieved by process modification, materials replacement, and segregation. Volume reduction is generally achieved by compaction or incineration. Appendix C discusses volume and activity trends from 1994 to 2013.

Toxicity of Low-Level Radioactive Waste

The toxicity of LLRW is a function of its constituent radionuclides. Toxicity is based on drinking water standards and expressed in two ways, as shown in Table A-3 of Appendix A.

Toxicity is first expressed as the annual concentration in picocuries per liter (pCi/L) of beta particle and photon radioactivity in drinking water that produces an annual dose equivalent to the total body or any internal organ of no more than 4 millirems (mrem) per year.¹ For gross alpha emitting radionuclides, excluding radon and uranium, the maximum contaminant level (MCL) in drinking water is 15 pCi/L.² For combined radium-226 and radium-228, the MCL in drinking water is 5 pCi/L.³ The second column of Table A-2 shows radionuclide concentrations in pCi/L in drinking water that would yield a risk equal to that from a dose rate of 4 mrem per year. Lower concentration quantity indicates higher toxicity.

The second mode of indicating toxicity is by comparing toxicity of each radionuclide to that of tritium (H-3) and expressing it as relative toxicity. Tritium is one of the least toxic of radionuclides and is assigned a value of 1. Relative toxicity of other radionuclides is calculated in column three of Table A-3, where higher numbers indicate higher toxicity. Radionuclides are listed without their half-lives in Table A-3; however, arrangement of radionuclides with their half-life ranges is provided in Table B-3.

¹ Based on 40 CFR 141.16(a), and proposed revision to 40 CFR 141, published as Appendix C on Sept. 30, 1986, 51 FR 34859.

² 40 CFR 141.15(b)

³ 40 CFR 141.15(a)

CHAPTER 4
FINANCIAL STATISTICS

The Pennsylvania LLRW Disposal Act requires the annual report to include financial statistics relating to all aspects of the (Act 1988-12) Compact and the regional disposal facility. This chapter includes financial information on the host state of Pennsylvania and the Commission.

Pennsylvania law, in the form of the Low-Level Radioactive Waste Disposal Act and the Low-Level Radioactive Waste Disposal Regional Facility Act (Act 1990-107), established funds to pay the costs of developing a LLRW disposal facility in Pennsylvania. Funds were generated from mandatory contributions by nuclear power utilities in Pennsylvania and voluntary contributions from a nuclear utility in Maryland. The maximum amount of money mandated for the Regional Facility Siting Fund was about \$33 million.

Pennsylvania General Fund money was also appropriated for the LLRW program. The acts state that funds used from the General Fund must be repaid to that fund within five years after the LLRW facility begins disposal operations. Repayments to the General Fund will be taken from surcharges on the waste during facility operation.

Expenditures of the Host State and the Appalachian Compact Commission

Table 4-1 contains the financial information of the host state, Pennsylvania, and the Commission for calendar year 2012 and fiscal year 2011-12 respectively. Table 4-2 contains the financial information of the host state, Pennsylvania, and the commission for calendar year 2013 and fiscal year 2012-2013 respectively.

Pennsylvania and Appalachian Compact Commission Expenditures

TABLE 4-1

EXPENDITURES	PENNSYLVANIA (HOST STATE) CY 2012	FY 2011-12 APPALACHIAN COMPACT COMMISSION
GRANTS	\$0.00	\$0.00
PERSONNEL	\$44,240.69	\$0.00
GENERAL EXPENSE	\$27,269.76	\$28,157.00
CONTRACTOR SERVICES	\$0.00	\$0.00
TOTAL	\$71,510.45	\$28,157.00

TABLE 4-2

EXPENDITURES	PENNSYLVANIA (HOST STATE) CY 2013	FY 2012-13 APPALACHIAN COMPACT COMMISSION
GRANTS	\$0.00	\$0.00
PERSONNEL	\$41,642.69	\$0.00
GENERAL EXPENSE	\$26,806.65	\$26,075.00
CONTRACTOR SERVICES	\$0.00	\$0.00
TOTAL	\$68,449.34	\$26,075.00

APPENDIX A

TABLE A-1

APPALACHIAN COMPACT LLRW DISPOSERS BY STATE AND COUNTY FOR 2012

Pennsylvania

County	Facility	Generator Type
Allegheny	Applied Health Physics	Industry
	Bettis Atomic Power Laboratory	Government
	Carnegie Mellon University	Academic
	Curtiss-Wright Electro-Mechanical Corp.	Industry
	Westinghouse - Churchill	Industry
Armstrong	Army Corp. Engineers - SLDA	Government
Beaver	First Energy - Beaver Valley	Utility
Bradford	Global Tungsten, Inc.	Industry
Butler	II-VI, Inc.	Industry
Centre	Pennsylvania State University	Academic
Chester	Absorbtion Systems	Industry
	Lionville Laboratories	Industry
	Sanofi-Aventis U S. Inc.	Industry
	Synthes Development Center	Industry
Dauphin	Exelon Generation Company - TMI Unit 1	Utility
	Pennsylvania Department of Environmental Protection	Government
Delaware	Cenlocor	Industry
Lackawanna	University Of Scranton	Academic
Lancaster	ITT Corporation	Industry
Lawrence	Alaron Corporation	Industry
Luzerne	PPL Susquehanna Steam Electric Station	Utility
Military	US Army - Tobyhanna	Government
	Willow Grove Naval Air Station	Government
Montgomery	Exelon Corporation - Limerick	Utility
	GlaxoSmithkline - Collegetown	Industry
	GlaxoSmithklineBeecham- King of Prussia	Industry
	Haverford College	Academic
	Johnson & Johnson R&D	Industry
	Lockheed Martin	Industry
	Merck & Co.	Industry
	Rohm And Haas Company Research Labs	Industry
	Unitech Services Group, Inc.	Industry
	United Phosphorus	Industry
	VA Medical Center	Government
Philadelphia	Vitae Pharmaceuticals	Industry
	Albert Einstein Medical Center	Medical
	Avid Radiopharmaceuticals	Industry
	TSI, Inc.	Industry
Sullivan	Waste Management	Industry
	QSA Global, Inc.	Industry

Union	Bucknell University	Academic
Westmoreland	Enercon	Industry
	Westinghouse - Waltz Mill (Madison)	Industry
York	Exelon Generation Company - Peach Bottom	Utility
	York College	Academic

Delaware

County	Facility	Generator Type
New Castle	Agilent Technologies. Inc.	Industry
	Astra Zeneca	Industry
	Dupont	Industry
	University Of Delaware	Academic

Maryland

County	Facility	Generator Type
Baltimore	Becton Dickinson Biosciences	Industry
Baltimore City	Baltimore Gas and Electric Company	Industry
	Celsis In Vitro Technologies, Inc.	Industry
	Fasgen	Industry
	Johns Hopkins University	Medical
	PETNET	Industry
	United Iron And Metal	Industry
	United States Postal Service	Government
	Wheelabrator - Baltimore	Industry
Calvert	Calvert Cliffs Nuclear Power Plant	Utility
Dorchester	University of Maryland - Horn Point	Academic
Frederick	Advanced Bioscience - Organon Teknika Corp	Industry
	Science Appl. International Corp.	Industry
Howard	Ecology Services, Inc.	Industry
	Martek Biosciences, Inc.	Medical
Military	US Army - Aberdeen Proving Grounds	Government
	US Army - Edgewood	Government
	US Navy - US Naval Academy	Government
Montgomery	Bioqual Inc.	Industry
	Dade Moeller & Associates Inc	Industry
	FDA-BRF	Government
	Macrogenics, Inc.	Industry
	Montgomery Co. Solid Waste Station	Government
	National Institute Of Health	Government
	National Institute of Standards and Technology	Government
	Teve Biopharmaceuticals USA Inc.	Industry
Prince Georges	Bowie State University	Academic
	Food And Drug Administration - College Park	Government

	Prince Georges Scrap Inc	Industry
	University of Maryland	Academic
	Walter Reed Army Medical Center	Government
Talbot	Wildlife International Ltd.	Industry

West Virginia

County	Facility	Generator Type
Monongalia	NIOSH	Government
	West Virginia University	Academic

**TABLE A-2
APPALACHIAN COMPACT LLRW DISPOSERS BY STATE AND COUNTY FOR 2013**

Pennsylvania

County	Facility	Generator Type
Allegheny	Applied Health Physics	Industry
	Curtiss-Wright Electro Mechanical Division	Industry
	VA Pittsburgh Health System	Government
	Westinghouse - Churchill	Industry
Beaver	First Energy - Beaver Valley	Utility
Bradford	Global Tungsten, Inc.	Industry
	Guthrie Healthcare System	Medical
Bucks	Sims Metal Management	Industry
Butler	II-VI, Inc.	Industry
Chester	Fujirebio Diagnostics	Industry
	Main Line Health Imaging	Industry
	Exelon Generation Company - TMI Unit 1	Utility
Dauphin	Hershey Medical Center	Medical
	Honeywell	Industry
	Pennsylvania Department of Environmental Protection	Government
	ConocoPhillips	Industry
Delaware	Janssen Research and Development	Industry
	BASF, Inc.	Industry
Lackawanna	Calvert Laboratories	Industry
Lawrence	Alaron Corporation	Industry
Lebanon	Waste Recovery Solutions, Inc.	Industry
Lehigh	Allentown Neighborhood Improvement Zone	Government
	Sacred Heart Hospital	Medical
Luzerne	PPL Susquehanna Steam Electric Station	Utility
Lycoming	L-3 Communications	Industry
Montgomery	Applied Biosystems, LLC.	Industry
	Covanta Plymouth Renewable Energy	Industry

Montgomery	Exelon Corporation - Limerick	Utility
	GlaxoSmithKlineBeecham- King of Prussia	Industry
	GlaxoSmithKline, Inc.	Industry
	Janssen Research and Development - Spring House	Industry
	PETNET	Industry
	Rohm And Haas Company Research Labs	Industry
	The Fredericks Company	Industry
	Unitech Services Group, Inc.	Industry
	United Phosphorus	Industry
Northampton	Lafayette College	Academic
Philadelphia	Advanced Diagnostic Medicine	Industry
	Avid Radiopharmaceuticals	Industry
	Friends Select School	Academic
	Temple University	Medical
Union	United States Penitentiary - Lewisburg	Government
Westmoreland	Pace Analytical Service, Inc.	Industry
	Westinghouse - Waltz Mill (Madison)	Industry
York	Exelon Generation Company - Peach Bottom	Utility
	HONEYWELL BUILDING SOLUTIONS	Industry

Delaware

County	Facility	Generator Type
New Castle	Agilent Technologies. Inc.	Industry
	Dupont	Industry
	Papastavros Associates Medical Imaging, LLC.	Industry
	University Of Delaware	Academic

Maryland

County	Facility	Generator Type
Anne Arundel	Maryland Department of Natural Resources	Government
	Northrop Grumman	Industry
Baltimore	Becton Dickinson Biosciences	Industry
Baltimore City	Baltimore Gas and Electric Company	Industry
	Coppin State University	Academic
	Johns Hopkins University	Medical
	Maryland Office of the Chief Medical Examiner	Government
	Republic Services	Industry
	Sinai Hospital	Medical
	University of Maryland - Baltimore	Medical
	Wheelabrator - Baltimore	Industry
Calvert	Calvert Cliffs Nuclear Power Plant	Utility
Charles	Morgantown Generating Station (non-nuclear)	Utility
Frederick	Medimmune, Inc.	Industry
Howard	Ecology Services, Inc.	Industry

	Integrated Environmental Management	Industry
	W R Grace Washington Research Center	Industry
Military	US Army - Aberdeen Test Center	Government
	US Army (MD sites)	Government
	US Army Medical Research Institute of Chemical Defense	Government
	US Navy - US Naval Academy	Government
Montgomery	Bioqual Inc.	Industry
	FDA-BRF	Government
	National Institute Of Health	Government
	National Institute of Standards and Technology	Government
	Neutron Products, Inc.	Industry
	Teve Biopharmaceuticals USA Inc.	Industry
	Wellstat Therapeutics Corporation	Industry
Prince Georges	Chalk Point Generating Station (non-nuclear)	Utility
	Food And Drug Administration - College Park	Government
	University of Maryland - College Park	Academic
	US Department of Agriculture - BARC	Government
	Walter Reed Army Medical Center	Government

West Virginia

County	Facility	Generator Type
Upshur	West Virginia Wesleyan College	Academic
Wyoming	Equitable Resources, Inc.	Industry

**TABLE A-3
TOXICITY TABLE OF INDIVIDUAL RADIONUCLIDES**

<u>Radionuclides</u>	<u>Concentration^a</u> (pCi/L)	<u>Relative^b</u> <u>Toxicity</u>	<u>Radionuclides</u>	<u>Concentration^a</u> (pCi/L)	<u>Relative^b</u> <u>Toxicity</u>
Tritium (H-3)	9.0E04	1.0	Europium-155	7.0E03	12.9
Americium-241	4.0E00	22,500.0	Gadolinium-153	1.0E04	9.0
Americium-23	1.5E01	6,000.0	Hafnium-181	3.0E03	30.0
Antimony-122	2.0E03	45.0	Iodine-125	1.0E03	90.0
Antimony-124	1.0E03	90.0	Iodine-129	1.0E02	900.0
Antimony-125	4.0E03	22.5	Iodine-131	7.0E02	128.6
Barium-131	7.0E03	12.9	Iodine-133	4.0E02	225.0
Barium-140	1.0E03	90.0	Iridium-192	2.0E03	45.0
Beryllium-7	1.0E05	0.9	Iron-55	1.0E04	9.0
Bismuth-207	2.0E03	45.0	Iron-59	1.0E03	90.0
Cadmium-109	5.0E02	180.0	Lanthanum-140	1.0E03	90.0
Calcium-45	2.0E03	45.0	Lead-203	1.0E04	9.0
Californium-252	1.5E01	6,000.0	Manganese-54	3.0E03	30.0
Carbon-14	3.0E03	30.0	Neptunium-237	1.5E01	6,000.0
Cerium-141	4.0E03	22.5	Nickel-59	3.0E04	3.0
Cesium-134	8.0E01	1,125.0	Nickel-63	1.0E04	9.0
Cesium-136	5.0E02	180.0	Niobium-95	5.0E03	18.0
Cesium-137	1.0E02	900.0	Phosphorus-32	7.0E02	128.6
Chlorine-36	2.0E03	45.0	Plutonium-238	1.5E01	6,000.0
Chromium-51	8.0E04	1.1	Plutonium-239	4.0E01	2,250.0
Cobalt-57	6.0E03	15.0	Plutonium-240	1.5E01	6,000.0
Cobalt-58	2.0E03	45.0	Plutonium-241	1.5E01	6,000.0
Cobalt-60	2.0E02	450.0	Plutonium-242	1.5E01	6,000.0
Curium-242	1.5E01	6,000.0	Polonium-210	1.5E01	6,000.0
Curium-243	1.5E01	6,000.0	Promethium-149	3.0E03	30.0
Curium-244	1.5E01	6,000.0	Protactinium-233	3.0E03	30.0
Europium-152	2.0E03	45.0	Radium-226	1.5E01	6,000.0
Europium-154	1.0E03	90.0	Rubidium-86	6.0E02	150.0
Ruthenium-103	4.0E03	22.5	Ruthenium-106	3.0E02	300.0
Scandium-46	2.0E03	45.0	Selenium-75	6.0E02	150.0
Silver-110M	7.0E02	128.6	Sodium-22	5.0E02	180.0
Sodium-24	4.0E03	22.5	Strontium-85	4.0E03	22.5
Strontium-89	9.0E02	100.0	Strontium-90	5.0E01	1,800.0
Sulfur-35	1.0E04	9.0	Tantalum-182	2.0E03	45.0
Technetium-99	5.0E03	18.0	Tellurium-125M	2.0E03	45.0
Thorium-228	1.5E01	6,000.0	Thorium-230	1.5E01	6,000.0
Thorium-232	1.5E01	6,000.0	Thallium-202	4.0E03	22.5
Thallium-204	2.0E03	45.0	Tin-113	4.0E03	22.5
Transuranics	1.5E01	6,000.0	Vanadium-48	2.0E03	45.0
Yttrium-90	1.0E03	90.0	Yttrium-91	1.0E03	90.0
Zinc-65	4.0E02	225.0	Zirconium-95	3.0E03	30.0

^a Concentration of beta and photon radioactivity in drinking water yielding a risk equal to that from a dose rate of 4 mrem/year (proposed revision to 40 CFR 141, 51 FR 34859, Sept. 30, 1986).

^b Toxicity of radionuclides compared to tritium, which has a value of 1.

APPENDIX B

TABLE B-1

Appalachian Compact 2012 Disposed LLRW Volume by State and Facility Type

Facility Type / State	WV	DE	MD	PA	Total
Academic	0	9.6	6.7	40.2	56.5
Government	1.2	0	7,886.9	18,176.5	26,064.6
Industry	0	65.6	471.6	5,235.0	5,772.2
Medical	19.8	0	13.5	0.7	34.0
Utility	0	0	3,985.6	98,927.8	102,913.4
Total	21.0	75.2	12,364.3	122,380.2	134,840.7

This data is for LLRW burial at the EnergySolutions site in Clive, Utah. Volume is in cubic feet.

CHART B-1

Appalachian Compact 2012 Disposed LLRW Volume by State and Facility Type

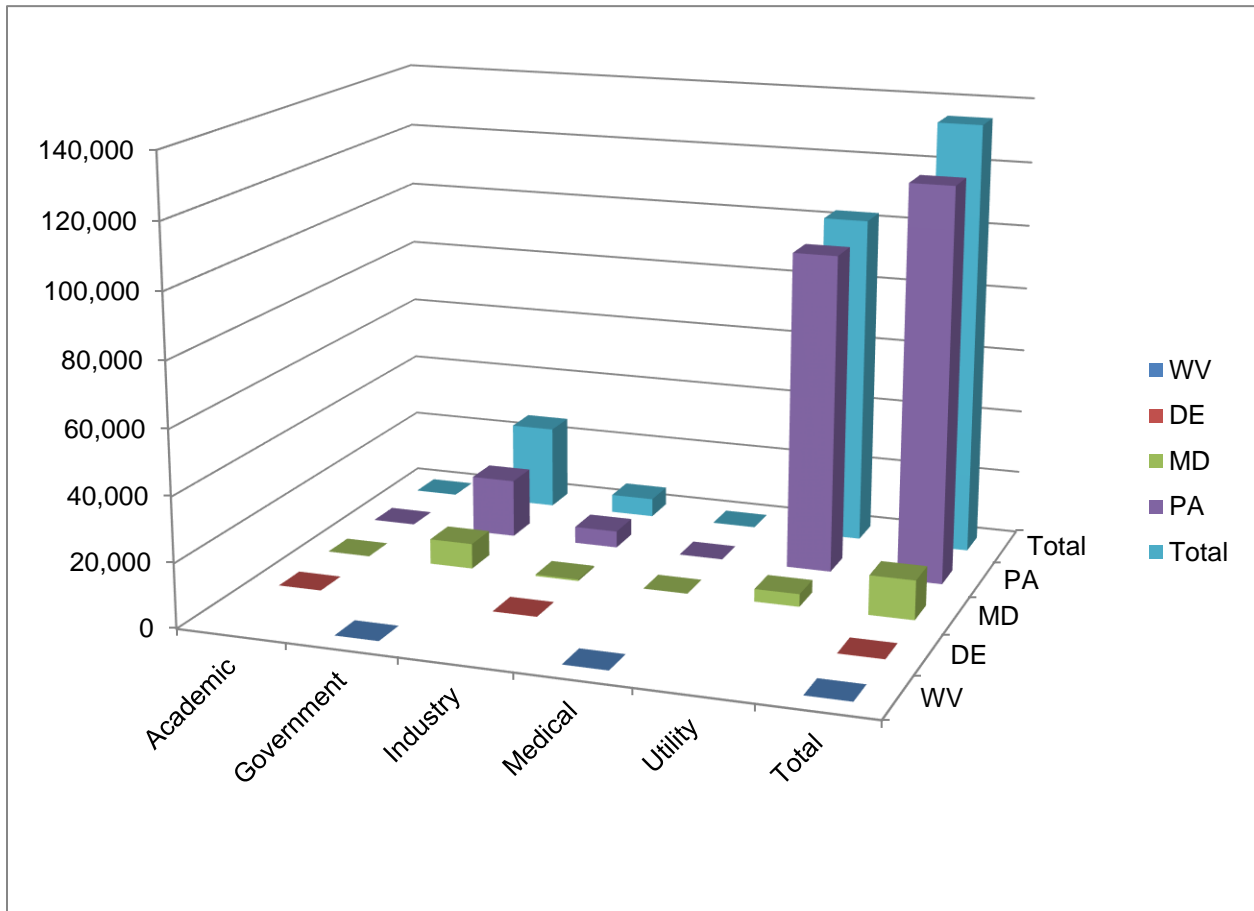


TABLE B-2

Appalachian Compact 2013 Disposed LLRW Volume by State and Facility Type

Facility Type / State	WV	DE	MD	PA	Total
Academic	0.8	3.7	1.4	1.4	7.2
Government	0	0	17932.8	381.0	18313.8
Industry	44.0	335.8	425.5	7672.1	8477.3
Medical	0	0	40.2	15.7	55.9
Utility	0	0	5197.4	63967.6	69165.0
Total	44.8	339.5	23597.2	72037.7	96019.2

This data is for LLRW burial at the EnergySolutions site in Clive, Utah. Volume is in cubic feet.

CHART B-2

Appalachian Compact 2013 Disposed LLRW Volume by State and Facility Type

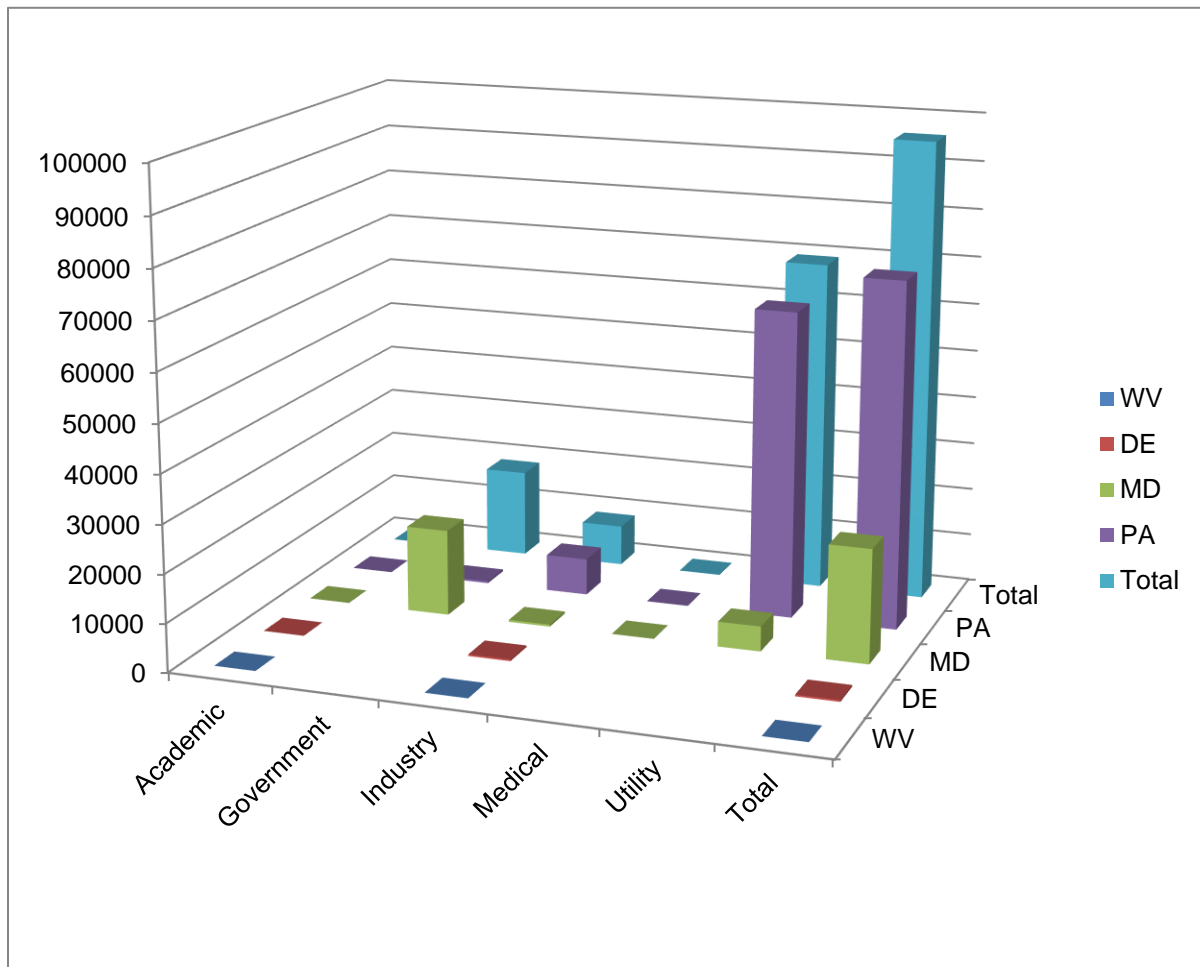


TABLE B-3

Appalachian Compact 2012 Disposed LLRW Activity by State and Facility Type

Facility Type / State	WV	DE	MD	PA	Total
Academic	0	<0.01	<0.01	0.01	0.01
Government	<0.01	0	0.99	2.87	3.87
Industry	0	0.01	0.22	11.29	11.52
Medical	<0.01	0	0.02	<0.01	0.02
Utility	0	0	0.89	435.13	436.02
Total	<0.01	0.01	2.13	449.30	451.44

This data is for LLRW burial at the EnergySolutions site in Clive, Utah. Activity is in Curies.

CHART B-3

Appalachian Compact 2012 Disposed LLRW Activity by State and Facility Type

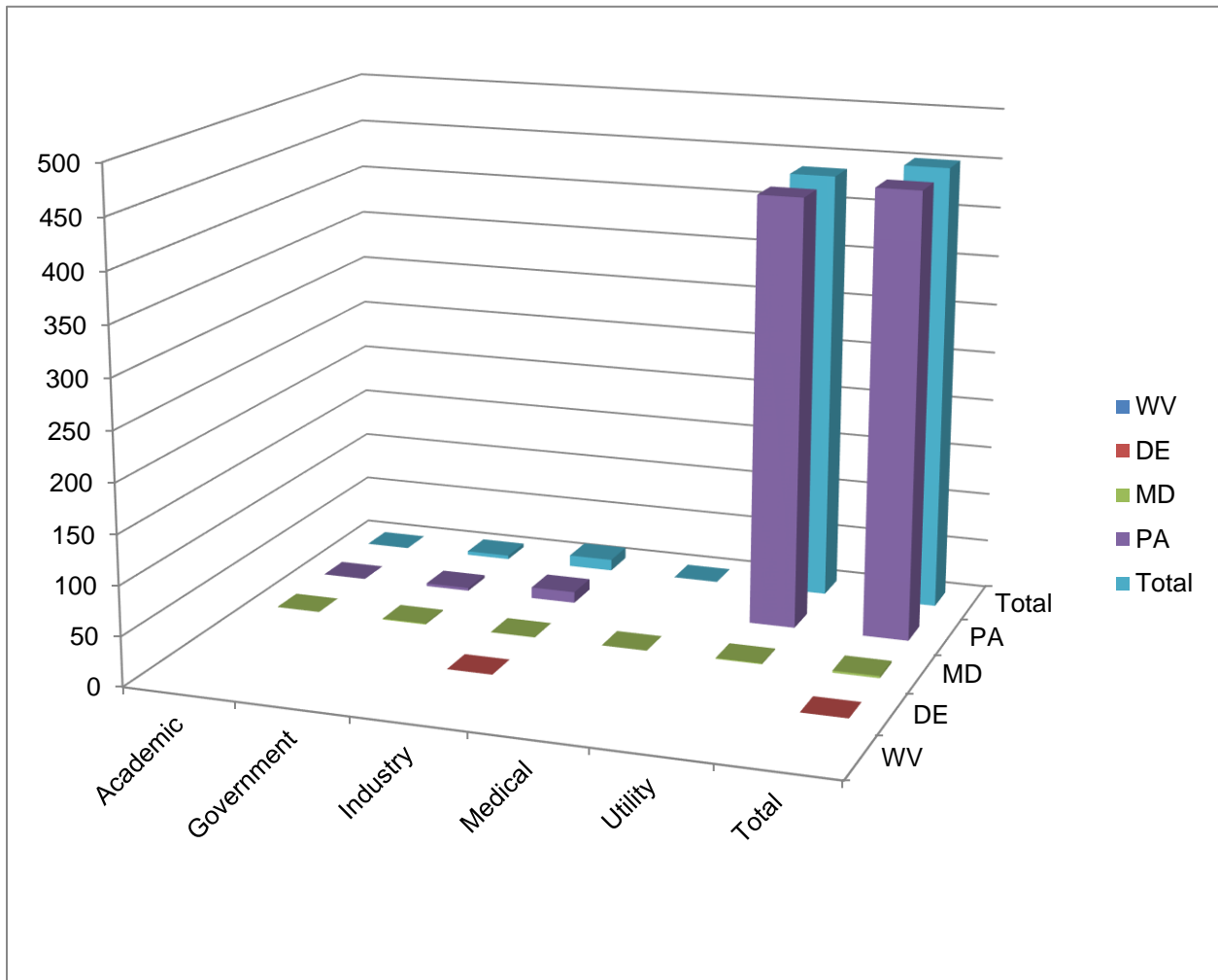


TABLE B-4

Appalachian Compact 2013 Disposed LLRW Activity by State and Facility Type

Facility Type / State	WV	DE	MD	PA	Total
Academic	0.005	0.01	0.01	0.01	0.04
Government	0	0	1.02	0.06	1.08
Industry	0.005	45.27	7.12	5.44	57.84
Medical	0	0	0.08	0.05	0.13
Utility	0	0	7.61	453.46	461.06
Total	0.01	45.28	15.84	459.01	520.13

This data is for LLRW burial at the EnergySolutions site in Clive, Utah. Activity is in Curies.

CHART B-4

Appalachian Compact 2013 Disposed LLRW Activity by State and Facility Type

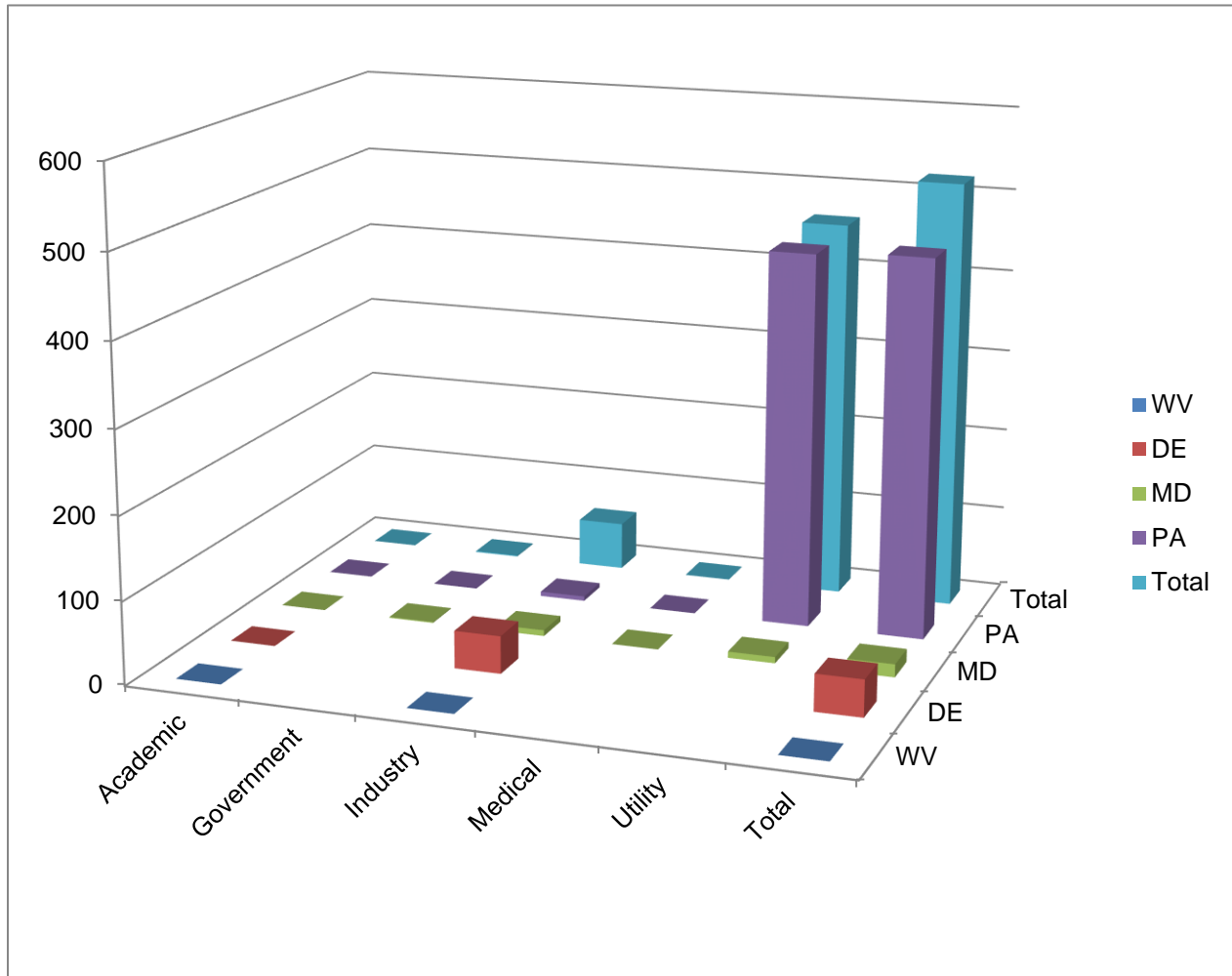


TABLE B-5: Appalachian Compact LLRW Isotopes for 2012

Isotope	Element	Half-Life (Years)	Curies	Isotope	Element	Half-Life (Years)	Curies
Ac-225	actinium	2.74E-02	0.00006	I-129	iodine	1.57E+07	0.01746
Ac-228	actinium	6.99E-04	0.00003	I-131	iodine	2.20E-02	< 0.00001
Ag-108	silver	4.51E-06	0.00015	K-40	potassium	1.28E+09	0.00005
Ag-108m	silver	1.27E+02	0.00075	Kr-85	krypton	1.07E+01	0.00445
Ag-110	silver	7.79E-07	0.00041	La-140	lanthanum	4.59E-03	< 0.00001
Ag-110m	silver	6.84E-01	0.62261	Mn-54	manganese	8.56E-01	14.37103
Am-241	americium	4.32E+02	0.00686	Mo-99	molybdenum	7.53E-03	< 0.00001
Am-242m	americium	1.52E+02	< 0.00001	Na-22	sodium	2.60E+00	0.00835
Am-243	americium	7.38E+03	< 0.00001	Nb-93m	niobium	1.46E+01	< 0.00001
At-217	astatine	1.02E-09	0.00006	Nb-94	niobium	2.03E+04	0.013
Au-198	gold	7.38E-03	< 0.00001	Nb-95	niobium	9.60E-02	0.03901
Au-199	gold	8.59E-03	< 0.00001	Nb-97	niobium	1.37E-04	< 0.00001
Ba-133	barium	1.05E+01	< 0.00001	Ni-59	nickel	7.50E+04	0.08273
Ba-137m	barium	4.85E-06	0.02068	Ni-63	nickel	1.00E+02	15.80242
Ba-140	barium	3.50E-02	0.00001	Np-237	neptunium	2.14E+06	< 0.00001
Be-7	beryllium	1.46E-01	< 0.00001	Pa-233	protactinium	7.39E-02	< 0.00001
Bi-212	bismuth	1.15E-04	0.00039	Pa-234	protactinium	7.64E-04	0.00011
Bi-213	bismuth	8.68E-05	0.00006	Pa-234m	protactinium	2.22E-06	0.00008
Bi-214	bismuth	3.78E-05	< 0.00001	Pb-209	lead	3.71E-04	0.00006
C-14	carbon	5.73E+03	5.14137	Pb-210	lead	2.23E+01	0.02718
Ca-45	calcium	4.45E-01	0.0006	Pb-212	lead	1.21E-03	0.0004
Cd-109	cadmium	1.27E+00	0.00016	Pb-214	lead	5.10E-05	< 0.00001
Cd-113m	cadmium	1.37E+01	< 0.00001	Pm-147	promethium	2.62E+00	0.04526
Ce-141	cerium	8.90E-02	0.00168	Po-210	polonium	3.79E-01	< 0.00001
Ce-144	cerium	7.78E-01	0.17131	Po-212	polonium	9.44E-15	0.00024
Cl-36	chlorine	3.01E+05	0.00003	Po-213	polonium	1.33E-13	0.00006
Cm-242	curium	4.47E-01	0.00039	Po-216	polonium	4.63E-09	0.00039
Cm-243	curium	2.85E+01	0.00452	Pu-238	plutonium	8.78E+01	0.00248
Cm-244	curium	1.81E+01	0.00007	Pu-239	plutonium	2.41E+04	0.00153
Cm-245	curium	8.50E+03	< 0.00001	Pu-240	plutonium	6.54E+03	0.00033
Co-56	cobalt	2.16E-01	0.00958	Pu-241	plutonium	1.44E+01	0.40021
Co-57	cobalt	7.42E-01	0.01141	Pu-242	plutonium	3.76E+05	< 0.00001
Co-58	cobalt	1.94E-01	2.42871	Ra-224	radium	9.91E-03	0.00039
Co-60	cobalt	5.27E+00	219.78775	Ra-225	radium	4.05E-02	0.00006
Cr-51	chromium	7.58E-02	1.04731	Ra-226	radium	1.60E+03	0.02197
Cs-134	cesium	2.06E+00	4.74908	Ra-228	radium	5.75E+00	0.0001
Cs-137	cesium	3.02E+01	27.83193	Re-188	rhenium	1.94E-03	< 0.00001
Cu-64	copper	1.45E-03	< 0.00001	Rn-220	radon	1.76E-06	0.00039
Eu-152	europium	1.36E+01	0.012	Ru-103	ruthenium	1.08E-01	0.00007
Eu-154	europium	8.80E+00	0.00071	Ru-105	ruthenium	5.07E-04	< 0.00001
Eu-155	europium	4.96E+00	0.00003	Ru-106	ruthenium	1.01E+00	0.0014
Fe-55	iron	2.70E+00	130.90688	S-35	sulfur	2.39E-01	0.00076
Fe-59	iron	1.22E-01	0.00337	Sb-122	antimony	7.39E-03	< 0.00001
Fr-221	francium	9.13E-06	0.00006	Sb-124	antimony	1.65E-01	0.0406
Ge-68	germanium	7.89E-01	< 0.00001	Sb-125	antimony	2.77E+00	0.13376
H-3	tritium	1.23E+01	3.55253	Sc-46	scandium	2.29E-01	< 0.00001
Hf-175	hafnium	1.92E-01	0.00002	Se-75	selenium	3.28E-01	< 0.00001
Hf-181	hafnium	1.16E-01	0.00002	Sm-151	samarium	9.00E+01	0.00001
I-125	iodine	1.65E-01	0.0095	Sn-113	tin	3.15E-01	0.0026

TABLE B-5: Appalachian Compact LLRW Isotopes for 2012 (cont.)

Isotope	Element	Half-Life (Years)	Curies	Isotope	Element	Half-Life (Years)	Curies
Sn-117m	tin	3.72E-02	< 0.00001	Tl-209	thallium	4.11E-06	< 0.00001
Sr-82	strontium	6.84E-02	< 0.00001	Tm-171	thulium	1.92E+00	< 0.00001
Sr-85	strontium	1.78E-01	0.00001	U-232	uranium	7.20E+01	0.00073
Sr-89	strontium	1.38E-01	0.03886	U-233	uranium	1.59E+05	0.02167
Sr-90	strontium	2.86E+01	0.22765	U-234	uranium	2.45E+05	0.30029
Ta-182	tantalum	3.14E-01	0.00063	U-235	uranium	7.04E+08	0.01024
Tc-99	technetium	2.13E+05	0.10838	U-236	uranium	3.42E+06	< 0.00001
Te-123m	tellurium	3.28E-01	0.0004	U-238	uranium	4.47E+09	0.0161
Th-228	thorium	1.91E+00	0.00295	U-DEP	depleted uranium	4.47E+09	0.24776
Th-229	thorium	7.34E+03	0.00007	U-NAT	natural uranium	4.47E+09	0.00412
Th-230	thorium	7.70E+04	0.00211	W-181	tungsten	3.31E-01	0.00003
Th-231	thorium	2.91E-03	0.00003	Y-88	yttrium	2.92E-01	< 0.00001
Th-232	thorium	1.41E+10	0.1658	Y-90	yttrium	7.31E-03	0.00054
Th-234	thorium	6.60E-02	0.00008	Zn-65	zinc	6.69E-01	22.94489
Th-NAT	natural thorium	1.41E+10	0.00028	Zr-93	zirconium	1.53E+06	< 0.00001
Tl-204	thallium	3.78E+00	< 0.00001	Zr-95	zirconium	1.75E-01	0.06768
Tl-208	thallium	5.87E-06	0.00014	Zr-97	zirconium	1.93E-03	< 0.00001

TABLE B-6: Appalachian Compact LLRW Isotopes for 2013

Isotope	Element	Half-Life (Years)	Curies
Ac-228	actinium	6.99E-04	0.00075
Ag-108	silver	4.51E-06	0.00001
Ag-108m	silver	1.27E+02	0.00495
Ag-110	silver	7.79E-07	0.0001
Ag-110m	silver	6.84E-01	0.52794
Am-241	americium	4.32E+02	0.01973
Ba-133	barium	1.05E+01	0.00096
Ba-137m	barium	4.85E-06	0.0068
Ba-140	barium	3.50E-02	< 0.00001
Be-7	beryllium	1.46E-01	< 0.00001
Bi-212	bismuth	1.15E-04	0.00276
Bi-214	bismuth	3.78E-05	0.00361
C-14	carbon	5.73E+03	2.19519
Ca-45	calcium	4.45E-01	0.00379
Cd-109	cadmium	1.27E+00	0.00061
Ce-141	cerium	8.90E-02	0.00478
Ce-144	cerium	7.78E-01	1.46346
Cl-36	chlorine	3.01E+05	0.00028
Cm-242	curium	4.47E-01	0.00013
Cm-243	curium	2.85E+01	0.00258
Cm-244	curium	1.81E+01	0.00006
Co-56	cobalt	2.16E-01	0.00524
Co-57	cobalt	7.42E-01	0.0463
Co-58	cobalt	1.94E-01	4.44543
Co-60	cobalt	5.27E+00	225.66199
Cr-51	chromium	7.58E-02	3.79487
Cs-134	cesium	2.06E+00	3.29525
Cs-137	cesium	3.02E+01	22.07528
Eu-152	europium	1.36E+01	0.00001
Eu-154	europium	8.80E+00	< 0.00001
Fe-55	iron	2.70E+00	144.35332
Fe-59	iron	1.22E-01	0.17029
Gd-153	gadolinium	6.61E-01	0.00005
Ge-68	germanium	7.89E-01	< 0.00001
H-3	tritium	1.23E+01	9.41324
Hf-181	hafnium	1.16E-01	0.00368
I-125	iodine	1.65E-01	0.1144
I-129	iodine	1.57E+07	0.009
I-131	iodine	2.20E-02	0.00026
I-135	iodine	7.54E-04	< 0.00001
In-111	indium	7.75E-03	< 0.00001
K-40	potassium	1.28E+09	0.03438
Kr-85	krypton	1.07E+01	0.04545
La-140	lanthanum	4.59E-03	< 0.00001
Lu-177	lutetium	1.84E-02	0.00026
Mn-54	manganese	8.56E-01	14.98014
Na-22	sodium	2.60E+00	0.00007
Nb-94	niobium	2.03E+04	0.00245
Nb-95	niobium	9.60E-02	0.20568
Ni-59	nickel	7.50E+04	0.08357
Ni-63	nickel	1.00E+02	60.72982

Isotope	Element	Half-Life (Years)	Curies
Np-237	neptunium	2.14E+06	< 0.00001
P-32	phosphorus	3.91E-02	0.00266
P-33	phosphorus	6.95E-02	0.00007
Pb-210	lead	2.23E+01	0.07395
Pb-212	lead	1.21E-03	0.00075
Pb-214	lead	5.10E-05	0.00189
Pm-147	promethium	2.62E+00	0.00077
Po-210	polonium	3.79E-01	< 0.00001
Pr-144	praseodymium	3.29E-05	0.00127
Pu-238	plutonium	8.78E+01	0.00105
Pu-239	plutonium	2.41E+04	0.00033
Pu-240	plutonium	6.54E+03	0.00012
Pu-241	plutonium	1.44E+01	0.51241
Pu-242	plutonium	3.76E+05	< 0.00001
Ra-226	radium	1.60E+03	0.11718
Ra-228	radium	5.75E+00	0.00385
Re-187	rhenium	4.70E+10	0.00003
Ru-103	ruthenium	1.08E-01	0.00243
Ru-105	ruthenium	5.07E-04	0.00171
Ru-106	ruthenium	1.01E+00	0.00573
S-35	sulfur	2.39E-01	0.01141
Sb-122	antimony	7.39E-03	< 0.00001
Sb-124	antimony	1.65E-01	0.00449
Sb-125	antimony	2.77E+00	0.44599
Sc-46	scandium	2.29E-01	0.0027
Sn-113	tin	3.15E-01	0.01744
Sn-125	tin	2.64E-02	0.00009
Sr-87m	strontium	3.20E-04	< 0.00001
Sr-89	strontium	1.38E-01	0.01391
Sr-90	strontium	2.86E+01	0.15189
Tc-99	technetium	2.13E+05	0.04874
Te-123m	tellurium	3.28E-01	< 0.00001
Te-132	tellurium	8.92E-03	< 0.00001
Th-228	thorium	1.91E+00	< 0.00001
Th-229	thorium	7.34E+03	< 0.00001
Th-230	thorium	7.70E+04	0.00207
Th-232	thorium	1.41E+10	0.27577
Th-234	thorium	6.60E-02	0.00491
Th-NAT	natural thorium	1.41E+10	< 0.00001
Tl-204	thallium	3.78E+00	0.00015
Tl-208	thallium	5.87E-06	0.00083
U-234	uranium	2.45E+05	0.00019
U-235	uranium	7.04E+08	0.00001
U-238	uranium	4.47E+09	0.00515
U-DEP	depleted uranium	4.47E+09	0.04483
U-NAT	natural uranium	4.47E+09	0.00029
W-181	tungsten	3.31E-01	0.00001
Zn-65	zinc	6.69E-01	24.27943
Zr-89	zirconium	8.95E-03	< 0.00001
Zr-95	zirconium	1.75E-01	0.165

APPENDIX C

Discussion of Low-Level Radioactive Waste Trends in the Appalachian Compact

The DOE's National Low-Level Waste Management Program's MIMS has been collecting data on LLRW generated in Pennsylvania since 1986. MIMS data can be found on the DOE's website at: <http://mims.apps.em.doe.gov/>.

The total volume as calculated from the MIMS data for 2012 for the Compact LLRW generators is about 134,840 cubic feet. The total volume as calculated from the MIMS data for 2013 for the Compact LLRW generators is about 96,019 cubic feet. The LLRW volume increased moderately in 2011 and 2012 due to an increase in the amount of government-owned and former industrial facilities' decontamination and decommissioning (D&D) waste. It is difficult to predict the volume of D&D waste because it depends on several factors, such as the time frame designated for decommissioning activities and decisions made by corporate and regulatory authorities.

The traditional volume-reduction methods are not effective for most D&D waste, which generally consists of building debris and soil. On the other hand, D&D waste has extremely low radioactivity per volume (also known as low-specific activity). Most of the commercial D&D waste produced in the United States is shipped to the EnergySolutions facility in Clive, Utah. Furthermore, most of this low-specific activity D&D waste would not have been disposed of at the proposed Pennsylvania LLRW site.

The 2012 LLRW activity (radioactivity) from the Compact is about 451 curies. The 2013 LLRW activity from the Compact is about 520 curies. The closure of the Barnwell disposal facility to waste generators outside the Atlantic Compact in July 2008 resulted in storage of higher concentrations of LLRW, namely Class B and C wastes, by the Appalachian Compact generators. Therefore, the reported numbers in Table C-2 for the period of 2009 through 2013 represents only the activity of Class A waste disposed of at the EnergySolutions facility in Utah.

The large spike in the volume of LLRW in 2000 and 2001 is mainly from the D&D waste.

It should be mentioned that the DOE's MIMS database does not include LLRW disposed of at the EnergySolutions facility prior to 1998. This omission of the historical data would affect waste generation trend information for volume, but would not have a significant impact on the radioactivity of LLRW. Historically, about 99 percent of the Compact's radioactivity of LLRW has been shipped to the Barnwell disposal site for burial. The MIMS database includes LLRW volume and activity data for the Barnwell disposal site from 1986 through 2008 for the Compact.

The WCS LLRW disposal facility in Texas became operational in 2012. This facility is a regional facility for the Texas Compact, but it is allowed to accept LLRW from outside the Texas Compact. It is expected that the majority of the nuclear power plants in Pennsylvania and the Appalachian Compact will have access to this facility within the next few years. This should alleviate the need for long-term storage of Class B and C wastes by the majority of the nuclear utilities in the Appalachian Compact. Additionally, the DOE's MIMS national database has been modified to reflect waste disposal information from the WCS facility. All future shipments of Class B and C wastes to this facility by the Appalachian Compact generators will be tracked and reported on the MIMS database, as well as the department's annual LLRW Program Report.

TABLE C-1: Appalachian Compact Disposed LLRW Volume (cu. ft.) from 1994 to 2013

Year	WV	DE	MD	PA	Total
1994	81.8	374.8	8,421.1	51,441.6	60,319.3
1995	4.2	57.8	4,428.7	35,199.6	39,690.3
1996	34.8	127.2	3,391.1	24,203.1	27,756.1
1997	1.8	23.9	3,096.5	14,486.2	17,608.4
1998	48	173.8	7,604.6	42,686.0	50,512.4
1999	158.7	80.6	8,406.8	143,043.7	151,689.8
2000	53.4	27.6	9,766.8	421,398.1	431,246.0
2001	44.1	76.2	10,759.9	534,429.4	545,309.6
2002	183.3	366.4	6,752.8	55,371.4	62,673.8
2003	151.8	73.5	3,703.1	74,901.0	78,829.4
2004	34.8	48.8	13,177.8	55,136.0	68,397.4
2005	2.4	74.2	107,956.4	91,292.6	199,325.6
2006	38.02	59.2	48,131.8	57,627.7	105,856.8
2007	48.69	42.7	21,015.6	78,454.5	99,561.5
2008	132.15	414.8	6,702.5	113,483.2	120,732.6
2009	134.1	431.2	21,451.3	103,666.9	125,683.5
2010	11.3	29.4	22,957.6	76,519.4	99,517.7
2011	19.1	1,061.00	10,568.7	155,508.5	167,157.3
2012	21	75.2	12364.3	122380.20	134,840.7
2013	44.8	339.47	23597.2	72037.7	96,019.2
Total 1994 to 2013	1248.2	3957.7	354,254.6	2,323,266.8	Grand total 2,682,727.4

* The 2009 to 2011 LLRW volume only includes burial at EnergySolutions in Clive, Utah. All other years include Barnwell, South Carolina, burial and EnergySolutions, Clive, Utah, burial. Volume is in cubic feet.

**Chart C-1
Appalachian Compact Disposed LLRW Volume 1994 – 2013**

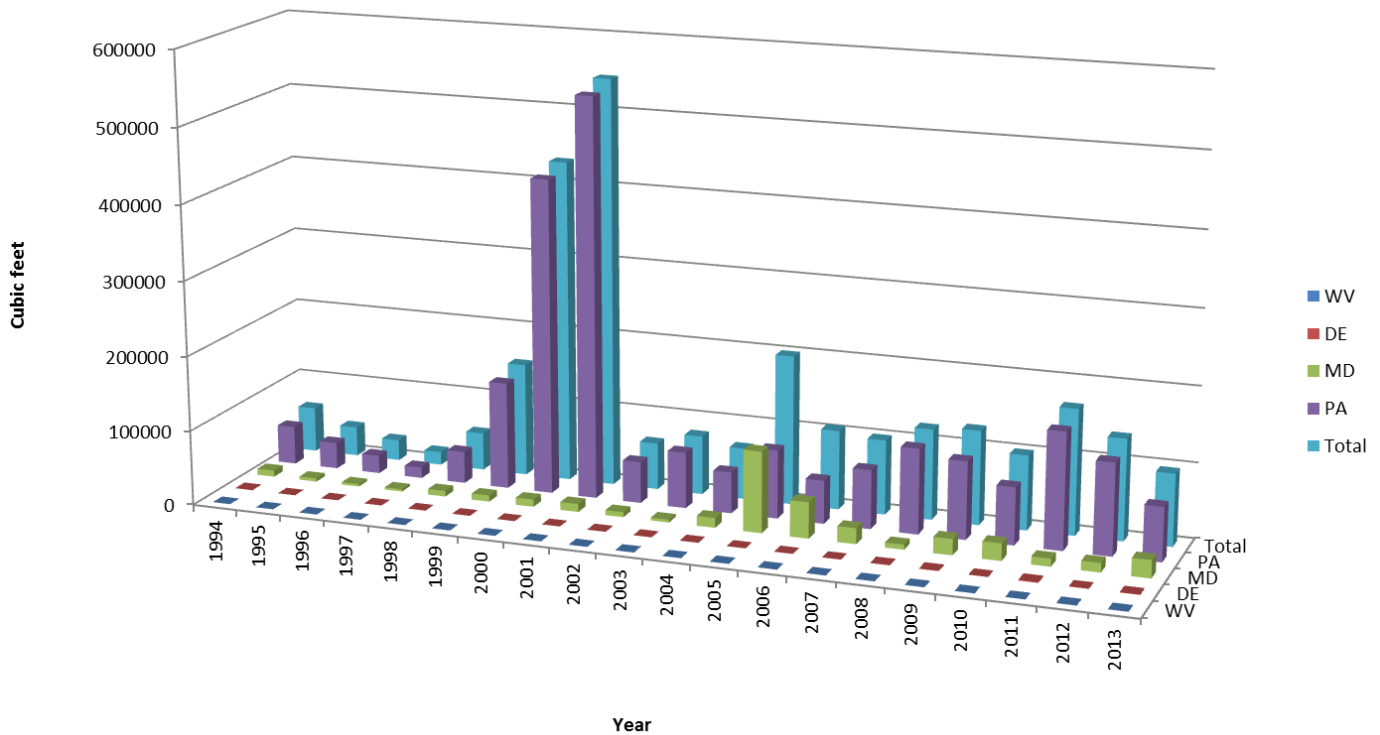


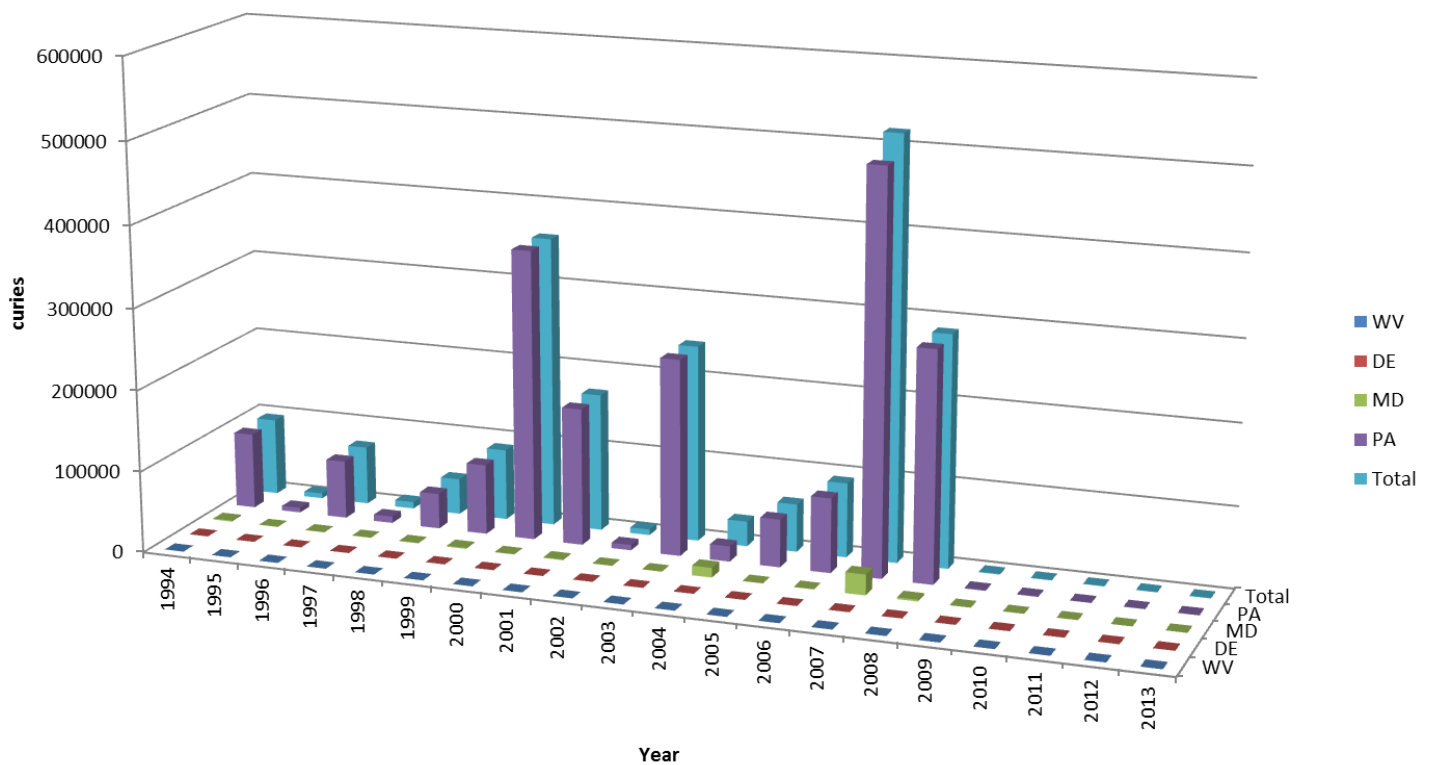
TABLE C-2. Appalachian Compact Disposed LLRW Activity (curies) from 1994 to 2013

Year	WV	DE	MD	PA	Total
1994	0.5	69.3	1,439.70	93,729.60	95,239.00
1995	4.6	0.01	346.2	5,691.90	6,042.70
1996	0.1	5.6	349.1	71,900.50	72,255.40
1997	0.03	1.3	198.5	8,017.90	8,217.70
1998	37.3	0.1	531.5	43,691.00	44,259.90
1999	0.5	0.1	1,335.70	86,618.00	87,954.30
2000	2.2	0.02	484	357,624.40	358,110.70
2001	0.03	0.03	903.3	168,919.60	169,822.90
2002	0.1	0.5	244.5	6,777.40	7,022.50
2003	0.2	24.7	166.3	241,649.80	241,840.90
2004	0.8	0.2	11,830.70	18,890.30	30,722.00
2005	0.7	31.3	156.8	58,786.20	58,974.90
2006	0.03	11.9	60.1	91,719.10	91,791.10
2007	0.16	12.9	25,304.70	492,579.30	517,897.00
2008	0.14	12.2	2,181.50	283,328.80	285,522.60
2009	0.02	0.5	4.7	1,001.40	1,006.60
2010	0.01	0.03	1.4	656.8	658.2
2011	0.02	1	1.8	492.6	495.5
2012	0	0.01	2.13	449.30	451.44
2013	0.01	45.28	15.835	459.005	520.13
Total 1994 to 2013	47.45	216.98	45,558.47	2,032,982.91	Grand total 2,078,805.47

* The 2009 to 2011 LLRW activity only includes burial at EnergySolutions in Clive, Utah. All other years include Barnwell, South Carolina, burial and EnergySolutions, Clive, Utah, burial. Activity is in curies.

CHART C-2

Appalachian Compact Disposed LLRW Activity (curies) 1994 - 2013



APPENDIX D

**Appalachian States Low-Level Radioactive Waste Commission
Financial Statements**

**APPALACHIAN STATES LOW-LEVEL
RADIOACTIVE WASTE COMMISSION**

FINANCIAL STATEMENTS

YEARS ENDED JUNE 30, 2012 AND 2011

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INDEPENDENT AUDITOR'S REPORT

Commission Members
Appalachian States Low-Level
Radioactive Waste Commission
Harrisburg, Pennsylvania

We have audited the accompanying financial statements of the governmental activities and each major fund of Appalachian States Low-Level Radioactive Waste Commission as of and for the years ended June 30, 2012 and 2011, which collectively comprise the Commission's basic financial statements as listed in the table of contents. These financial statements are the responsibility of the Commission's management. Our responsibility is to express an opinion on these financial statements based on our audits.

We conducted our audits in accordance with auditing standards generally accepted in the United States of America and the standards applicable to financial audits contained in Government Auditing Standards, issued by the Comptroller General of the United States. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements. An audit also includes assessing the accounting principles used and the significant estimates made by management, as well as evaluating the overall financial statement presentation. We believe that our audits provide a reasonable basis for our opinion.

In our opinion, the financial statements referred to above present fairly, in all material respects, the respective financial position of the governmental activities and each major fund of Appalachian States Low-Level Radioactive Waste Commission as of June 30, 2012 and 2011 and the results of its activities for the years then ended in conformity with accounting principles generally accepted in the United States of America.

In accordance with Government Auditing Standards, we have also issued our report dated August 31, 2012 on our consideration of Appalachian States Low-Level Radioactive Waste Commission's internal control over financial reporting and on our tests of its compliance with certain provisions of laws, regulations, contracts and other matters. The purpose of that report is to describe the scope of our testing of internal control over financial reporting and compliance and the results of that testing, and not to provide an opinion on the internal control over financial reporting or compliance. That report is an integral part of an audit performed in accordance with Government Auditing Standards and should be considered in assessing the results of our audit.

AR - 1

400 West Main Street • Mechanicsburg, PA 17055 • 717.766.4763 • Fax 717.766.2731
62 West Pomfret Street • Carlisle, PA 17013 • 717.243.4822 • Fax 717.258.9372
www.greenawalt.cc

Commission Members
Appalachian States Low-Level
Radioactive Waste Commission
Page two

Accounting principles generally accepted in the United States of America require that the management's discussion and analysis on pages MDA-1 through MDA-3 and budgetary comparison information on page ORI-1 be presented to supplement the basic financial statements. Such information, although not a part of the basic financial statements, is required by the Governmental Accounting Standards Board, who considers it to be an essential part of financial reporting for placing the basic financial statements in an appropriate operational, economic, or historical context. We have applied certain limited procedures to the required supplemental information in accordance with auditing standards generally accepted in the United States of America, which consisted of inquiries of management about the methods of preparing the information and comparing the information for consistency with management's responses to our inquiries, the basic financial statements, and other knowledge we obtained during our audit of the basic financial statements. We do not express an opinion or provide any assurance on the information because the limited procedures do not provide us with sufficient evidence to express an opinion or provide any assurance.

Greenawalt & Company, P.C.
GREENAWALT & COMPANY, P.C.

August 31, 2012

Mechanicsburg, Pennsylvania

AR - 2

**APPALACHIAN STATES LOW-LEVEL
RADIOACTIVE WASTE COMMISSION
MANAGEMENT'S DISCUSSION AND ANALYSIS
JUNE 30, 2012**

The General Assembly of the Commonwealth of Pennsylvania created the Appalachian States Low-Level Radioactive Waste Commission (Commission) by enacting the Appalachian States Low-Level Radioactive Waste Compact Act, 1985-120. Under the authority of this act, the states of Delaware, Maryland, West Virginia and the Commonwealth of Pennsylvania formed a compact to provide for the regional management and disposal of Low-Level Radioactive Waste (LLRW). Congress consented to the Appalachian States Low-Level Radioactive Waste Compact in 1988.

The Commission consists of ten members; four members from Pennsylvania and two members from each of the other party states of Maryland, Delaware and West Virginia. The Commission members are appointed according to the laws of each party state. Each party state determined the length of term for which its Members and Alternates are appointed.

The Commission provides for representation of the compact party states throughout the siting process and LLRW disposal facility development and operations. Pennsylvania has been designated as the initial host state for the regional LLRW disposal facility because it generates the largest amount of LLRW in the compact.

In December of 1998, the Pennsylvania Department of Environmental Protection (DEP) suspended the LLRW siting process due to the current availability of out-of-state LLRW disposal facilities and the diminished volume of LLRW that would have been disposed of at the regional LLRW disposal facility in Pennsylvania. As a result, the Commission amended certain provisions of its bylaws to facilitate its continued operations without a business office and transferred the duties and responsibilities of the executive director to the chairman of the Commission. The vice chairman acts as secretary and treasurer of the Commission.

The Commission continues to incur certain expenditures, which are included in the Commission's budget. The budget is reviewed and approved by the Commission at its annual meeting. The Commission's annual expenditures presently exceed its annual interest income from the Operating fund. The Operating Fund accounts for the general operations of the Commission and is managed by the Pennsylvania Department of Treasury's INVEST Program. At the current level of expenditures, the Operating Fund would be adequate to provide for continued funding of the Commission's expenditures for a relatively long period of time. As of June 30, 2012 the Operating Fund had a fund balance of approximately \$ 271,000. The Commission's actual expenditures for this period were approximately \$ 28,000.

MDA-1

**APPALACHIAN STATES LOW-LEVEL
RADIOACTIVE WASTE COMMISSION
MANAGEMENT'S DISCUSSION AND ANALYSIS**

JUNE 30, 2012

The Commission's annual budget is not expected to vary significantly in the foreseeable future. However, the interest income from the INVEST Program may vary due to economic conditions.

Article II of act 1985-120 allows the Commission to collect fees from the four compact party states for the purpose of continuing its duties and responsibilities. The Act requires that the payments by the party states be made directly to the Commission in quarterly installments during the fiscal year. In 1998, the Commission decided to suspend the collection of the fees due to the suspension of the LLRW siting process and the subsequent closure of its business office. However, the option continues to be available to the Commission should the need arise.

The Commission has appropriated a portion of its Operating Fund's fund balance in the amount of \$ 200,000 in order to re-establish its business office expeditiously in the event the project would restart. It is unlikely that a restart of the siting process would occur in the foreseeable future as LLRW generators in the Appalachian Compact continue to have access to an out-of-state disposal facility. If the circumstances change, the Commission in conjunction with the host state of Pennsylvania may need to consider options for providing LLRW generators with access to a disposal facility. Those options may include, but are not limited to, restarting the siting process or providing for LLRW disposal capacity through contractual arrangements with other sites, states, or compacts.

In November of 2010, the Pennsylvania Department of Environmental Protection (PADEP) announced that it would return \$ 1,008,235 from the original \$ 2 million that it had received from the Commission in 1997, through a formal Grant Agreement. The Grant provided funding for a Community Partnering Program to site the regional LLRW disposal facility in Pennsylvania. The funds were to be used solely to continue the process of siting a regional LLRW disposal facility. If PADEP did not use any portion of the funds as specified, it would repay said amount to the Commission. In 1998, PADEP decided to suspend its siting process for a LLRW disposal facility in Pennsylvania. The Commission supported the suspension of the siting process under the condition that, "the Department will resolve the Siting Contract in such a manner to assure the resumption of the siting process on an expeditious and economical basis if the need arises or if the availability of a LLRW disposal site ceases for any reasons". PADEP had decided to retain the remaining \$ 1,008,235 from the funds in the Low-Level Waste Fund (LLW Fund) should there be a need to restart the siting process expeditiously.

MDA-2

**APPALACHIAN STATES LOW-LEVEL
RADIOACTIVE WASTE COMMISSION
MANAGEMENT'S DISCUSSION AND ANALYSIS**

JUNE 30, 2012

Following the Commission's annual meeting in November of 2010, PADEP initiated the process for transferring to the Commission the remaining amount of \$ 1,008,235 and an accrued interest amount of \$ 971,385. In March of 2011, a total amount of \$ 1,979,620 that the Commission received from PADEP was deposited in the Commission's Restricted Account with the PA Department of Treasury's Invest Program.

The Commission is not presently involved in any litigation that would have a material adverse effect on the financial position of the Commission. Also, the Commission is tax exempt under the Internal Revenue Code and, accordingly, there is no provision for income taxes in the Commissions' financial statements.

As required by Article II of Act 1985-120 and Article VIII of the Commission Bylaws, the Commission prepares and publishes an annual report. The report summarizes the activities of the Commission during the preceding fiscal year, and includes the Independent Auditor's Report of the Commission's financial statements.

MDA-3

**APPALACHIAN STATES LOW-LEVEL
RADIOACTIVE WASTE COMMISSION**
STATEMENTS OF NET ASSETS
JUNE 30, 2012 AND 2011

	<u>2012</u>	<u>2011</u>
Assets		
Cash	\$ 35,677	\$ 6,834
Investments	<u>2,904,234</u>	<u>2,964,863</u>
Total assets	<u><u>\$ 2,939,911</u></u>	<u><u>\$ 2,971,697</u></u>
Liabilities - Accounts payable	<u>\$ -</u>	<u>\$ 5,000</u>
Net assets		
Unappropriated	35,677	6,834
Appropriated	235,738	292,614
Restricted	<u>2,668,496</u>	<u>2,667,249</u>
Total net assets	<u>2,939,911</u>	<u>2,966,697</u>
Total liabilities and net assets	<u><u>\$ 2,939,911</u></u>	<u><u>\$ 2,971,697</u></u>

The accompanying notes are an integral part of these financial statements.

**APPALACHIAN STATES LOW-LEVEL
RADIOACTIVE WASTE COMMISSION**
STATEMENTS OF ACTIVITIES
YEARS ENDED JUNE 30, 2012 AND 2011

	<u>2012</u>	<u>2011</u>
Direct expenses		
Legal services	\$ 10,000	\$ 10,000
Membership fee	8,500	8,500
Meeting expenses	1,618	1,399
Audit	2,500	2,300
Travel	4,636	2,200
Bank fees	39	-
Office supplies	204	-
Insurance	200	200
Advertising	460	552
	<u>28,157</u>	<u>25,151</u>
Revenue		
Return of unused grant funds	-	1,979,620
Investment earnings	1,371	1,240
	<u>1,371</u>	<u>1,980,860</u>
Change in net assets	(26,786)	1,955,709
Net assets - beginning of the year	<u>2,966,697</u>	<u>1,010,988</u>
Net assets - end of the year	<u>\$ 2,939,911</u>	<u>\$ 2,966,697</u>

The accompanying notes are an integral part of these financial statements.

**APPALACHIAN STATES LOW-LEVEL
RADIOACTIVE WASTE COMMISSION**
STATEMENTS OF REVENUE, EXPENDITURES
AND CHANGES IN FUND BALANCES - GOVERNMENTAL FUNDS
YEAR ENDED JUNE 30, 2012

	Operating Fund	Surcharge Fund	Total
Revenue			
Interest	\$ 124	\$ 1,247	\$ 1,371
Expenditures			
Legal services	10,000	-	10,000
Membership fee	8,500	-	8,500
Meeting expenses	1,618	-	1,618
Audit	2,500	-	2,500
Travel	4,636	-	4,636
Bank fees	39	-	39
Office supplies	204	-	204
Insurance	200	-	200
Advertising	460	-	460
	28,157	-	28,157
Excess (deficiency) of revenues over expenditures	(28,033)	1,247	(26,786)
Fund balance - beginning of the year	299,448	2,667,249	2,966,697
Fund balance - ending of the year	\$ 271,415	\$ 2,668,496	\$ 2,939,911

(Continued)

The accompanying notes are an integral part of these financial statements.

**APPALACHIAN STATES LOW-LEVEL
RADIOACTIVE WASTE COMMISSION**
STATEMENTS OF REVENUE, EXPENDITURES
AND CHANGES IN FUND BALANCES - GOVERNMENTAL FUNDS (Cont'd.)
YEAR ENDED JUNE 30, 2011

	Operating Fund	Surcharge Fund	Total
Revenue			
Interest	\$ 305	\$ 935	\$ 1,240
Return of unused grant funds	-	1,979,620	1,979,620
	<u>305</u>	<u>1,980,555</u>	<u>1,980,860</u>
Expenditures			
Legal services	10,000	-	10,000
Membership fee	8,500	-	8,500
Meeting expenses	1,399	-	1,399
Audit	2,300	-	2,300
Travel	2,200	-	2,200
Insurance	200	-	200
Advertising	552	-	552
	<u>25,151</u>	<u>-</u>	<u>25,151</u>
Excess (deficiency) of revenues over expenditures	(24,846)	1,980,555	1,955,709
Fund balance - beginning of the year	<u>324,294</u>	<u>686,694</u>	<u>1,010,988</u>
Fund balance - ending of the year	<u>\$ 299,448</u>	<u>\$ 2,667,249</u>	<u>\$ 2,966,697</u>

The accompanying notes are an integral part of these financial statements.

**APPALACHIAN STATES LOW-LEVEL
RADIOACTIVE WASTE COMMISSION**

NOTES TO FINANCIAL STATEMENTS

JUNE 30, 2012 AND 2011

REPORTING ENTITY

The Appalachian States Low-Level Radioactive Waste Commission was established to meet state responsibilities outlined in the federal Low-Level Radioactive Waste Policy Act of 1980 (P.L. 96-573) and the Low-Level Radioactive Waste Policy Amendments Act of 1985 (P.L. 99-240).

The reporting entity consists of all funds over which the Commission exercises oversight responsibility. Oversight responsibility is determined on the basis of financial interdependency, selection of governing authority, designation of management, ability to significantly influence operations and accountability for fiscal matters and scope of public service. The Commission is not a component unit of any of the Party States and is not included in any of the Party State's financial statements. Additionally, no other component units exist.

SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES

Basis of presentation

Entity-wide financial statements (i.e., the statement of net assets and the statement of activities) report information on all activities of the Commission.

The statement of activities demonstrates the degree to which the direct expenses are offset by revenues.

Fund financial statements are also presented to show revenues and expenditures of each fund.

Fund accounting

The accounts of the Commission are organized on the basis of funds, each of which is considered a separate accounting entity. The operations of each fund are accounted for with a separate set of self-balancing accounts that comprise its assets, liabilities, fund balance, revenues, and expenses. Resources are allocated to and accounted for in individual funds based upon the purposes for which they are to be spent and the means by which spending activities are controlled. The Commission has the following funds:

Operating Fund - This fund accounts for the general operations of the Commission.

Surcharge Fund - This fund accounts for the surcharge payments received by the Commission.

Surcharge payments

Surcharge payments came from a disposal surcharge levied by the Federal government on generators of low-level waste. This surcharge was mandated by the 1985 Low-Level Radioactive Waste Policy Amendments Act. The surcharge was to serve as an incentive to regions and states to meet federally set milestones in the development of their own disposal facilities.

FS - 5

**APPALACHIAN STATES LOW-LEVEL
RADIOACTIVE WASTE COMMISSION**
NOTES TO FINANCIAL STATEMENTS (Cont'd.)
JUNE 30, 2012 AND 2011

SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES (Cont'd.)

Income tax

The Commission is exempt under the Internal Revenue Code and, accordingly, there is no provision for income taxes in the accompanying financial statements.

Subsequent events

Management has considered the disclosure of subsequent events through August 31, 2012 and there are no items requiring disclosure.

CASH AND INVESTMENTS

All of the Commission's cash deposits are FDIC insured up to \$ 250,000. The Commission does not have a formal policy regarding cash deposits.

All of the Commission's investments are with the Pennsylvania Treasurer's INVEST Program. These amounts are invested directly in a portfolio of securities which are held by third-party custodians. Since the INVEST Program acts in a fiduciary capacity for the Commission and recognizes the Commission as the pledgee of the collateral securities, these investments are considered to be held by the third-party custodians in the Commission's name.

APPROPRIATED NET ASSETS

The Commission has appropriated a portion of June 30 net assets as follows:

	2012	2011
Legal	\$ 10,000	\$ 10,000
Fiscal stabilization	25,738	82,614
Restart	200,000	200,000
	\$ 235,738	\$ 292,614

LEGAL SERVICES

Legal services are primarily to assist the Commission in fulfilling its activity as disclosed in the Reporting Entity Note. In the opinion of management, the Commission is not involved in any litigation that would have a material adverse effect on the financial position of the Commission.

RETURN OF UNUSED GRANT FUNDS

In 1997, the Commission made a \$ 2,000,000 grant to the Pennsylvania Department of Environmental Protection (PADEP) to fund the siting of a regional facility in Pennsylvania. In March of 2011, PADEP returned \$ 1,979,620 of unused grant funds and accrued interest to the Commission.

FS - 6

**APPALACHIAN STATES LOW-LEVEL
RADIOACTIVE WASTE COMMISSION**
BUDGETARY COMPARISON INFORMATION - OPERATING FUND
YEAR ENDED JUNE 30, 2012

	<u>Actual</u>	<u>Original Budget</u>	<u>Variance Over (under) Budget</u>
Revenue - Interest	\$ 124	\$ 300	\$ (176)
Expenditures			
Legal services	10,000	10,000	-
Membership fee	8,500	8,500	-
Meeting expenses	1,618	1,500	(118)
Audit	2,500	2,500	-
Travel	4,636	5,000	364
Bank fees	39	-	(39)
Office supplies	204	-	(204)
Insurance	200	200	-
Advertising	460	500	40
	<u>28,157</u>	<u>28,200</u>	<u>43</u>
Excess (deficiency) of revenues over expenditures	<u>\$ (28,033)</u>	<u>\$ (27,900)</u>	<u>\$ (133)</u>

**APPALACHIAN STATES LOW-LEVEL
RADIOACTIVE WASTE COMMISSION**

FINANCIAL STATEMENTS

YEARS ENDED JUNE 30, 2013 AND 2012

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INDEPENDENT AUDITOR'S REPORT

Commission Members
Appalachian States Low-Level
Radioactive Waste Commission
Harrisburg, Pennsylvania

We have audited the accompanying financial statements of the governmental activities and each major fund of Appalachian States Low-Level Radioactive Waste Commission as of and for the years ended June 30, 2013 and 2012, and the related notes to the financial statements, which collectively comprise the Commission's basic financial statements as listed in the table of contents.

Management's Responsibility for the Financial Statements

Management is responsible for the preparation and fair presentation of these financial statements in accordance with accounting principles generally accepted in the United States of America; this includes the design, implementation, and maintenance of internal control relevant to the preparation and fair presentation of financial statements that are free from material misstatement, whether due to fraud or error.

Auditor's Responsibility

Our responsibility is to express opinions on these financial statements based on our audit. We conducted our audit in accordance with auditing standards generally accepted in the United States of America and the standards applicable to financial audits contained in *Government Auditing Standards*, issued by the Comptroller General of the United States. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditor's judgment, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to the entity's preparation and fair presentation of the financial statements in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the entity's internal control. Accordingly, we express no such opinion. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of significant accounting estimates made by management, as well as evaluating the overall presentation of the financial statements.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinions.

IAR -1

400 West Main Street • Mechanicsburg, PA 17055 • 717.766.4763 • Fax 717.766.2731
62 West Pomfret Street • Carlisle, PA 17013 • 717.243.4822 • Fax 717.258.9372
www.greenawalt.cc

Commission Members
Appalachian States Low-Level
Radioactive Waste Commission

Opinions

In our opinion, the financial statements referred to above present fairly, in all material respects, the respective financial position of the governmental activities and each major fund of Appalachian States Low-Level Radioactive Waste Commission as of June 30, 2013 and 2012 and respective changes in financial position for the years then ended in accordance with accounting principles generally accepted in the United States of America.

Other Matters

Required Supplementary Information

Accounting principles generally accepted in the United States of America require that management's discussion and analysis on pages MDA-1 and MDA-2 and budgetary comparison information on page ORSI-1 be presented to supplement the basic financial statements. Such information, although not a part of the basic financial statements, is required by the Governmental Accounting Standards Board, who considers it to be an essential part of financial reporting for placing the basic financial statements in an appropriate operational, economic, or historical context. We have applied certain limited procedures to the required supplementary information in accordance with auditing standards generally accepted in the United States of America, which consisted of inquiries of management about the methods of preparing the information and comparing the information for consistency with management's responses to our inquiries, the basic financial statements, and other knowledge we obtained during our audit of the basic financial statements. We do not express an opinion or provide any assurance on the information because the limited procedures do not provide us with sufficient evidence to express an opinion or provide any assurance.

Other Reporting Required by Government Auditing Standards

In accordance with *Government Auditing Standards*, we have also issued our report dated September 12, 2013 on our consideration of the Commission's internal control over financial reporting and on our tests of its compliance with certain provisions of laws, regulations, contracts and other matters. The purpose of that report is to describe the scope of our testing of internal control over financial reporting and compliance and the results of that testing, and not to provide an opinion on the internal control over financial reporting or compliance. That report is an integral part of an audit performed in accordance with *Government Auditing Standards* and in considering the Commission's internal control over financial reporting and compliance.


GREENAWALT & COMPANY, P.C.

September 12, 2013

Mechanicsburg, Pennsylvania

IAR - 2

**APPALACHIAN STATES LOW-LEVEL
RADIOACTIVE WASTE COMMISSION
MANAGEMENT'S DISCUSSION AND ANALYSIS**

JUNE 30, 2013

The General Assembly of the Commonwealth of Pennsylvania created the Appalachian States Low-Level Radioactive Waste Commission (Commission) by enacting the Appalachian States Low-Level Radioactive Waste Compact Act, 1985-120. Under the authority of this act, the states of Delaware, Maryland, West Virginia and the Commonwealth of Pennsylvania formed a compact to provide for the regional management and disposal of Low-Level Radioactive Waste (LLRW). Congress consented to the Appalachian States Low-Level Radioactive Waste Compact in 1988.

The Commission consists of ten members; four members from Pennsylvania and two members from each of the other party states of Maryland, Delaware and West Virginia. The Commission members are appointed according to the laws of each party state. Each party state determined the length of term for which its Members and Alternates are appointed.

The Commission provides for representation of the compact party states throughout the siting process and LLRW disposal facility development and operations. Pennsylvania has been designated as the initial host state for the regional LLRW disposal facility because it generates the largest amount of LLRW in the compact.

In December of 1998, the Pennsylvania Department of Environmental Protection (DEP) suspended the LLRW siting process due to the current availability of out-of-state LLRW disposal facilities and the diminished volume of LLRW that would have been disposed of at the regional LLRW disposal facility in Pennsylvania. As a result, the Commission amended certain provisions of its bylaws to facilitate its continued operations without a business office and transferred the duties and responsibilities of the executive director to the chairman of the Commission. The vice chairman acts as secretary and treasurer of the Commission.

The Commission continues to incur certain expenditures, which are included in the Commission's budget. The budget is reviewed and approved by the Commission at its annual meeting. The Commission's annual expenditures presently exceed its annual interest income from the Operating Fund. The Operating Fund accounts for the general operations of the Commission and is managed by the Pennsylvania Department of Treasury's INVEST Program. At the current level of expenditures, the Operating Fund would be adequate to provide for continued funding of the Commission's expenditures for a relatively long period of time. As of June 30, 2013 the Operating Fund had a fund balance of approximately \$ 245,000. The Commission's actual expenditures for this period were approximately \$ 26,000.

MDA-1

**APPALACHIAN STATES LOW-LEVEL
RADIOACTIVE WASTE COMMISSION
MANAGEMENT'S DISCUSSION AND ANALYSIS**

JUNE 30, 2013

The Commission's annual budget is not expected to vary significantly in the foreseeable future. However, the interest income from the INVEST Program may vary due to economic conditions.

Article II of act 1985-120 allows the Commission to collect fees from the four compact party states for the purpose of continuing its duties and responsibilities. The Act requires that the payments by the party states be made directly to the Commission in quarterly installments during the fiscal year. In 1998, the Commission decided to suspend the collection of the fees due to the suspension of the LLRW siting process and the subsequent closure of its business office. However, the option continues to be available to the Commission should the need arise.

The Commission has appropriated a portion of its Operating Fund's fund balance in the amount of \$ 200,000 in order to re-establish its business office expeditiously in the event the project would restart. It is unlikely that a restart of the siting process would occur in the foreseeable future as LLRW generators in the Appalachian Compact continue to have access to out-of-state disposal facilities. If the circumstances change, the Commission in conjunction with the host state of Pennsylvania may need to consider options for providing LLRW generators with access to a disposal facility. Those options may include, but are not limited to, restarting the siting process or providing for LLRW disposal capacity through contractual arrangements with other sites, states, or compacts.

The Commission is not presently involved in any litigation that would have a material adverse effect on the financial position of the Commission. Also, the Commission is tax exempt under the Internal Revenue Code and, accordingly, there is no provision for income taxes in the Commission's financial statements.

As required by Article II of Act 1985-120 and Article VIII of the Commission Bylaws, the Commission prepares and publishes an annual report. The report summarizes the activities of the Commission during the preceding fiscal year, and includes the Independent Auditor's Report on the Commission's basic financial statements.

MDA-2

**APPALACHIAN STATES LOW-LEVEL
RADIOACTIVE WASTE COMMISSION**
STATEMENTS OF NET POSITION
JUNE 30, 2013 AND 2012

	<u>2013</u>	<u>2012</u>
Assets		
Cash	\$ 9,602	\$ 35,677
Investments	<u>2,909,242</u>	<u>2,904,234</u>
Total assets	<u>2,918,844</u>	<u>2,939,911</u>
 Liabilities - none	 <u>-</u>	 <u>-</u>
 Net position		
Unappropriated	9,602	35,677
Appropriated	235,879	235,738
Restricted	<u>2,673,363</u>	<u>2,668,496</u>
Total net position	<u>\$ 2,918,844</u>	<u>\$ 2,939,911</u>

The accompanying notes are an integral part of these financial statements.

**APPALACHIAN STATES LOW-LEVEL
RADIOACTIVE WASTE COMMISSION**
STATEMENTS OF ACTIVITIES
YEARS ENDED JUNE 30, 2013 AND 2012

	<u>2013</u>	<u>2012</u>
Direct expenses		
Legal services	\$ 10,000	\$ 10,000
Membership fee	8,500	8,500
Meeting expenses	1,546	1,618
Audit	2,600	2,500
Travel	2,651	4,636
Bank fees	-	39
Office supplies	-	204
Insurance	200	200
Advertising	578	460
	<u>26,075</u>	<u>28,157</u>
Revenue		
Investment earnings	<u>5,008</u>	<u>1,371</u>
	<u>5,008</u>	<u>1,371</u>
Change in net position	(21,067)	(26,786)
Net position - beginning of the year	<u>2,939,911</u>	<u>2,966,697</u>
Net position - end of the year	<u>\$ 2,918,844</u>	<u>\$ 2,939,911</u>

The accompanying notes are an integral part of these financial statements.

**APPALACHIAN STATES LOW-LEVEL
RADIOACTIVE WASTE COMMISSION**
STATEMENTS OF REVENUE, EXPENDITURES
AND CHANGES IN FUND BALANCES - GOVERNMENTAL FUNDS
YEAR ENDED JUNE 30, 2013

	Operating Fund	Surcharge Fund	Total
Revenue			
Interest	\$ 141	\$ 4,867	\$ 5,008
Expenditures			
Legal services	10,000	-	10,000
Membership fee	8,500	-	8,500
Meeting expenses	1,546	-	1,546
Audit	2,600	-	2,600
Travel	2,651	-	2,651
Bank fees	-	-	-
Office supplies	-	-	-
Insurance	200	-	200
Advertising	578	-	578
	<u>26,075</u>	<u>-</u>	<u>26,075</u>
Excess (deficiency) of revenues over expenditures	(25,934)	4,867	(21,067)
Fund balance - beginning of the year	<u>271,415</u>	<u>2,668,496</u>	<u>2,939,911</u>
Fund balance - ending of the year	<u>\$ 245,481</u>	<u>\$ 2,673,363</u>	<u>\$ 2,918,844</u>

The accompanying notes are an integral part of these financial statements.

**APPALACHIAN STATES LOW-LEVEL
RADIOACTIVE WASTE COMMISSION**
STATEMENTS OF REVENUE, EXPENDITURES
AND CHANGES IN FUND BALANCES - GOVERNMENTAL FUNDS
YEAR ENDED JUNE 30, 2012

	Operating Fund	Surcharge Fund	Total
Revenue			
Interest	\$ 124	\$ 1,247	\$ 1,371
Expenditures			
Legal services	10,000	-	10,000
Membership fee	8,500	-	8,500
Meeting expenses	1,618	-	1,618
Audit	2,500	-	2,500
Travel	4,636	-	4,636
Bank fees	39	-	39
Office supplies	204	-	204
Insurance	200	-	200
Advertising	460	-	460
	<u>28,157</u>	<u>-</u>	<u>28,157</u>
Excess (deficiency) of revenues over expenditures	(28,033)	1,247	(26,786)
Fund balance - beginning of the year	<u>299,448</u>	<u>2,667,249</u>	<u>2,966,697</u>
Fund balance - ending of the year	<u>\$ 271,415</u>	<u>\$ 2,668,496</u>	<u>\$ 2,939,911</u>

The accompanying notes are an integral part of these financial statements.

**APPALACHIAN STATES LOW-LEVEL
RADIOACTIVE WASTE COMMISSION**
NOTES TO FINANCIAL STATEMENTS
JUNE 30, 2013 AND 2012

REPORTING ENTITY

The Appalachian States Low-Level Radioactive Waste Commission was established to meet state responsibilities outlined in the federal Low-Level Radioactive Waste Policy Act of 1980 (P.L. 96-573) and the Low-Level Radioactive Waste Policy Amendments Act of 1985 (P.L. 99-240).

The reporting entity consists of all funds over which the Commission exercises oversight responsibility. Oversight responsibility is determined on the basis of financial interdependency, selection of governing authority, designation of management, ability to significantly influence operations and accountability for fiscal matters and scope of public service. The Commission is not a component unit of any of the Party States and is not included in any of the Party State's financial statements. Additionally, no other component units exist.

SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES

Basis of presentation

Entity-wide financial statements (i.e., the statement of net position and the statement of activities) report information on all activities of the Commission.

The statement of activities demonstrates the degree to which the direct expenses are offset by revenues.

Fund financial statements are also presented to show revenues and expenditures of each fund.

Fund accounting

The accounts of the Commission are organized on the basis of funds, each of which is considered a separate accounting entity. The operations of each fund are accounted for with a separate set of self-balancing accounts that comprise its assets, liabilities, fund balance, revenues, and expenditures. Resources are allocated to and accounted for in individual funds based upon the purposes for which they are to be spent and the means by which spending activities are controlled. The Commission has the following funds:

Operating Fund - This fund accounts for the general operations of the Commission.

Surcharge Fund - This fund accounts for the surcharge payments received by the Commission.

Surcharge payments

Surcharge payments came from a disposal surcharge levied by the Federal government on generators of low-level waste. This surcharge was mandated by the 1985 Low-Level Radioactive Waste Policy Amendments Act. The surcharge was to serve as an incentive to regions and states to meet federally set milestones in the development of their own disposal facilities.

**APPALACHIAN STATES LOW-LEVEL
RADIOACTIVE WASTE COMMISSION**
NOTES TO FINANCIAL STATEMENTS (Cont'd.)
JUNE 30, 2013 AND 2012

SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES (Cont'd.)

Income tax

The Commission is exempt under the Internal Revenue Code and, accordingly, there is no provision for income taxes in the accompanying financial statements.

Subsequent events

Management has considered the disclosure of subsequent events through September 12, 2013 and there are no items requiring disclosure.

CASH AND INVESTMENTS

All of the Commission's cash deposits are FDIC insured up to \$ 250,000. The Commission does not have a formal policy regarding cash deposits.

All of the Commission's investments are with the Pennsylvania Treasurer's INVEST Program. These amounts are invested directly in a portfolio of securities which are held by third-party custodians. Since the INVEST Program acts in a fiduciary capacity for the Commission and recognizes the Commission as the pledgee of the collateral securities, these investments are considered to be held by the third-party custodians in the Commission's name.

APPROPRIATED NET POSITION

The Commission has appropriated a portion of June 30 net position as follows:

	2013	2012
Legal	\$ 10,000	\$ 10,000
Fiscal stabilization	25,879	25,738
Restart	200,000	200,000
	\$ 235,879	\$ 235,738

LEGAL SERVICES

Legal services are primarily to assist the Commission in fulfilling its activity as disclosed in the Reporting Entity Note. In the opinion of management, the Commission is not involved in any litigation that would have a material adverse effect on the financial position of the Commission.

**APPALACHIAN STATES LOW-LEVEL
RADIOACTIVE WASTE COMMISSION**
BUDGETARY COMPARISON INFORMATION - OPERATING FUND
YEAR ENDED JUNE 30, 2013

	<u>Actual</u>	<u>Original Budget</u>	<u>Variance Over (under) Budget</u>
Revenue - Interest	\$ 141	\$ 300	\$ (159)
Expenditures			
Legal services	10,000	10,000	-
Membership fee	8,500	8,500	-
Meeting expenses	1,546	1,500	(46)
Audit	2,600	2,500	(100)
Travel	2,651	5,000	2,349
Insurance	200	200	-
Advertising	578	500	(78)
	<u>26,075</u>	<u>28,200</u>	<u>2,125</u>
Excess (deficiency) of revenues over expenditures	<u>\$ (25,934)</u>	<u>\$ (27,900)</u>	<u>\$ 1,966</u>

Glossary of Common Radioactive Waste Terms

Atomic Energy Act (AEA) - This 1954 act created the federal Atomic Energy Commission (AEC). The AEC later split into the Nuclear Regulatory Commission (NRC) and the Energy Research and Development Administration (ERDA). ERDA then became part of the DOE in 1977. This act encouraged the development and use of nuclear energy and research for the general welfare and the common defense and security of the United States. It is the basis of authority for the NRC, the DOE, and the U.S. Environmental Protection Agency (EPA) in regulating radioactive materials defined in the AEA. NARM is not defined under this act and, therefore, is not subject to its requirements. (See Glossary entry for "NARM.")

By-product Material - There are three types of by-product materials: (1) any radioactive material (except special nuclear material) yielded in, or made radioactive by, exposure incident to the process of producing or utilizing special nuclear material; (2) the tailings or wastes produced by the extraction or concentration of uranium or thorium from ore processed primarily for its source material content, including discrete surface wastes resulting from uranium solution extraction processes. Underground ore bodies depleted by these solution extraction operations do not constitute "by-product material" within this definition; and (3) the Energy Policy Act in 2005 added discrete Ra-226 sources to the by-product definition. Also included is any other naturally occurring radioactive material made into a discrete source that would pose a similar hazard to a Ra-226 discrete source.

CERCLA (Superfund) - Passed in 1980, the Comprehensive Environmental Response, Compensation and Liability Act (also known as Superfund) addresses immediate and long-term threats to the public's health and the environment from abandoned or active sites contaminated with hazardous or radioactive materials. Under the Superfund program, EPA has the authority to clean up the nation's worst hazardous waste sites using money from a trust fund supported primarily from a tax on chemical feed stocks used by manufacturers. Companies or individuals responsible for the wastes are identified by EPA, if possible, and made to pay for the cleanups. The Superfund Amendments and Reauthorization Act (SARA) of 1986 authorized 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 the Emergency Planning and Community Right-to-Know Act (EPCRA).

CFR - Code of Federal Regulations.

Curie (Ci) - Radioactive atoms are unstable and break down by disintegrating into other atoms. A curie is the unit of radioactivity equal to 3.7×10^{10} disintegrations per second or 3.7×10^{10} becquerel (Bq). A common unit used in environmental measurements is the picocurie (pCi), which is equal to 10^{-12} Ci or 0.037 disintegrations per second or 0.037 Bq.

Department of Energy (DOE) - This federal agency's mission is to achieve efficiency in energy use, diversity in energy sources, a more productive and competitive economy, improved environmental quality, and a secure national defense. DOE was created on Oct. 1, 1977, out of the Energy Research and Development Agency, as well as various aspects of non-nuclear federal energy policy and programs. The DOE complex, which is located across 22 states, produced and tested nuclear weapons. For more information, visit DOE's website at www.doe.gov.

Environmental Protection Agency (EPA) - Created in 1970, the federal EPA is responsible for working with state and local governments to control and prevent pollution in areas of solid and hazardous waste, pesticides, water, air, drinking water, and toxic and radioactive substances.

Federal Facilities Compliance Act (FFCA or FFCAct) - An amendment to RCRA, the FFCA waives immunity for DOE and other federal agencies, allowing states and the EPA to impose penalties for non-compliance, and requires DOE to develop plans for treating the hazardous components of radioactive wastes subject to RCRA requirements.

Half-Life - The half-life of a radioactive material is the time it takes for half of the material to radiate energetic particles and rays and transform to new materials. For example, the half-life of cesium (Cs-137) is 30 years, after which time half of it decays to a non-radioactive stable nuclide, barium (Ba-137). If one starts with 100 Kg of Cs-137, 50 Kg of Cs-137 remain after 30 years.

Hazardous Waste - A subset of solid wastes that poses substantial or potential threats to public health or the environment and meets any of the following criteria identified in 40 CFR 260 and 261:

Is specifically listed as a hazardous waste by EPA;

Exhibits one or more of the characteristics of hazardous waste (ignitability, corrosivity, reactivity and/or toxicity); or
Is generated by the treatment of hazardous waste or is contained in a hazardous waste.

Hazardous and Solid Waste Amendments (HSWA) - This 1984 act amended RCRA and required the phasing out of land disposal of untreated hazardous waste by more stringent hazardous-waste management standards (broken down into thirds with a timetable for each third). Some of the other mandates of this law include increased enforcement authority for EPA and a program requiring corrective action.

High-Level Radioactive Waste (HLW) - The radioactive waste material that results from the reprocessing of spent nuclear fuel, including liquid waste produced directly from reprocessing and any solid waste derived from the liquid that contains a combination of transuranic and fission product nuclides in quantities that require permanent isolation. HLW is also a mixed waste because it has highly corrosive components or has organics or heavy metals that are regulated under RCRA. HLW may include other highly radioactive material that NRC determines by rule, consistent with existing law, requires permanent isolation.

Heavy Metal (RCRA Metals) - This is a common hazardous waste that can damage organisms at low concentrations and tends to accumulate in the food chain. Examples are lead, chromium, cadmium, and mercury.

Land Disposal Restrictions (LDR) - These restrictions were mandated by the 1984 HSWA amendments to RCRA. They prohibit the disposal of hazardous wastes into or on the land unless the waste meets treatability standards of lower toxicity.

Liquid Scintillation Cocktail (LSC) - A common fluid used in medical laboratories to analyze DNA and proteins. It often uses radioactive tracers and RCRA-listed hazardous materials, such as Toluene and Xylene. The combinations of the two make it a mixed waste. By volume, it is the most common form of commercially generated (non-DOE) mixed waste (71 percent in a 1990 national study).

Low-Level Mixed Waste (LLMW) - LLMW is waste that contains LLRW and hazardous waste.

Low-Level Radioactive Waste (LLRW or LLW) - LLRW is waste that satisfies the definition of LLRW in the Low-Level Radioactive Waste Policy Amendments Act (LLRWPA) of 1985. The LLRWPA defines LLRW as "radioactive material that (A) is not high-level radioactive waste, spent nuclear fuel or byproduct material as defined in Section 11e.2 of the Atomic Energy Act of 1954 and; (B) which the NRC, consistent with existing law and in accordance with paragraph (A), classifies as low-level radioactive waste."

Mixed Transuranic Waste (MTRU) - MTRU contains both transuranic (TRU) and hazardous wastes. Approximately 55 percent of DOE's TRU is MTRU.

Mixed Waste (MW) - MW contains both hazardous waste (as defined by RCRA and its amendments) and radioactive waste (as defined by AEA and its amendments). The NRC or the NRC's agreement states and EPA or EPA's RCRA authorized states jointly regulate mixed waste. The fundamental and most comprehensive statutory definition is found in the Federal Facilities Compliance Act (FFCA), where Section 1004(41) was added to RCRA: "The term 'mixed waste' means waste that contains both hazardous waste and source, special nuclear or byproduct material subject to the Atomic Energy Act of 1954."

Naturally Occurring or Accelerator-Produced Radioactive Materials (NARM) - Radioactive materials not covered under the AEA that are naturally occurring or produced by an accelerator. Accelerators are used in sub-atomic particle physics research. These materials have been traditionally regulated by the states. A subset of NARM is NORM. NARM waste with more than 2 nCi/g of 226Ra or equivalent is commonly referred to as discrete NARM waste; below this threshold, the waste is referred to as diffuse NARM waste. Naturally occurring radionuclides made into sources (discrete NARM) may be classified as by-product material under the Energy Policy Act of 2005.

NORM - Naturally occurring radioactive material is a radioisotope that is radioactive in its natural physical state, not man-made, but does not include source or special nuclear material.

Nuclear Regulatory Commission (NRC) - NRC is an independent regulatory agency created out of the Atomic Energy Commission in 1975 to regulate the civilian uses of nuclear material. Specifically, the NRC is responsible for ensuring that activities associated with the operation of nuclear power plants and fuel cycle plants, and medical, industrial, and research applications are carried out with adequate protection of the public health and safety,

environment, and national security. At full complement, the NRC has five commissioners nominated by the President and confirmed by the Senate. The President designates one of the commissioners as Chairman. NRC regulates all commercial AEA materials. Except in a few cases, NRC does not regulate DOE. NRC does not regulate NARM. Please see NRC's home page at <http://www.nrc.gov>.

Resource Conservation and Recovery Act (RCRA) - RCRA gave EPA authority to control hazardous waste from "cradle-to-grave." This includes the minimization, generation, transportation, treatment, storage, and disposal of hazardous waste. RCRA also set forth a framework for the management of non-hazardous solid wastes. RCRA focuses only on active and future facilities and does not address abandoned or historical sites (see CERCLA).

Rad (Radiation Absorbed Dose) - One rad is defined as the absorption of 100 ergs per gram of material. The unit rad can be used for any type of radiation. The rad is a unit used to measure a quantity called absorbed dose. This relates to the amount of energy actually absorbed in some material and is used for any type of radiation and any material.

Radiation - Ionizing radiation is comprised of highly energetic and penetrating X-rays and gamma rays and lesser penetrating particles. Beta particles are simply energetic electrons, and alpha particles are helium nuclei both arising from the nucleus of a decaying atom. The alpha particle is the easiest of these radiations to stop, and the gamma rays are the most difficult to shield against. A piece of paper can stop an alpha particle, but it may take as much as many inches of lead shielding to stop most of the X-rays or gamma rays in a beam. Depending on the dose, kind of radiation and observed endpoint, the biological effects of radiation can differ widely. Ionizing radiation has been proven to cause cancer at high doses and is assumed to cause cancer and other deleterious health effects at low doses.

Rem (Roentgen Equivalent Man) - The rem is a unit used to derive a quantity called equivalent dose. This relates the absorbed dose in human tissue to the effective biological damage of the radiation. Equivalent dose is often expressed in terms of thousandths of a rem or mrem.

Solid Waste - As defined under RCRA, any solid, semi-solid, liquid or contained gaseous materials discarded from industrial, commercial, mining, agricultural operations, and from community activities. Solid waste includes garbage, construction debris, commercial refuse, sludge from water supply or waste treatment plants or air pollution control facilities, and other discarded materials. Solid waste does not include solid or dissolved materials in irrigation return flows or industrial discharges which are point sources subject to permits under Section 402 of the Clean Water Act or source, special nuclear or byproduct material as defined by the AEA.

Source Material - Source material is the uranium or thorium ores mined from the earth. Source material is defined in 10 CFR 20.1003 as "(1) uranium or thorium or any combination of uranium and thorium in any physical or chemical form; or (2) ores that contain, by weight, one-twentieth of one percent (0.05 percent) or more of uranium, thorium or any combination of uranium and thorium. Source material does not include special nuclear material."

Special Nuclear Material (SNM) - SNM is defined in 10 CFR 20.1003 as "(1) plutonium, uranium-233, uranium enriched in the isotope 233 or in isotope 235, and any other material that the NRC, pursuant to the provisions of Section 51 of the AEA, determines to be SNM, but does not include source material; (2) or any material artificially enriched by any of the foregoing but does not include source material." SNM is important in the fabrication of weapons-grade materials and as such has strict licensing and handling controls.

Specific Activity - The amount of radioactivity per unit weight or volume.

Spent Nuclear Fuel (SNF) - Fuel is withdrawn from a nuclear reactor following irradiation and has undergone at least one year's decay since being used as a source of energy in a power reactor. SNF has not been chemically separated from its constituent elements by reprocessing. SNF includes the special nuclear material, byproduct material, source material, and other radioactive materials associated with fuel assemblies. See 10 CFR 72.3 for more details.

Superfund - See "CERCLA."

Storage-in-Decay - Radioactive elements will break down and yield energetic gamma rays, X-rays, and particles. After enough time has elapsed (usually ten half-lives) the material has decayed to a point where a radiation survey meter cannot distinguish between it and natural background radiation levels.

TENORM - Technologically enhanced naturally occurring radioactive materials. It is naturally occurring radioactive material not specifically subject to regulation under the laws of the commonwealth or Atomic Energy Act (Public Law 83-703, 68 Stat. 921, 42 U.S.C. §2011 et seq.), but whose radionuclide concentrations or potential for human exposure have been increased above levels encountered in the undisturbed natural environment by human activities.

Transuranic Radioactive Waste (TRU) - TRU waste contains more than 100 nanocuries of alpha-emitting transuranic isotopes with half-lives greater than 20 years, per gram of waste except for (1) high-level radioactive waste; (2) wastes that DOE has determined, with the concurrence of EPA, do not need the degree of isolation required by EPA's high-level waste rule (40 CFR 191); or (3) waste that has been approved for disposal on a case-by-case basis in accordance with NRC's radioactive land disposal regulation (10 CFR Part 61). TRU is not generally found outside the DOE complex and is mainly produced from the reprocessing of spent nuclear fuel, nuclear weapons production, and reactor fuel assembly. TRU wastes mainly emit alpha particles as they break down. DOE is currently proceeding with plans for TRU waste disposal at a geologic repository called the Waste Isolation Pilot Plant (WIPP) near Carlsbad, New Mexico. DOE categorizes TRU as either contact handled (CH) or remote handled (RH) with RH being the more radioactive of the two.

Vitrification - Vitrification is the process of converting materials into a glass-like substance, typically through a thermal process. Radionuclides and other inorganics are chemically bonded in the glass matrix. Consequently, vitrified materials generally perform very well in leach tests. EPA has specified, under the land disposal restrictions, vitrification to be the treatment technology for high-level waste (55 FR 22627, June 1, 1990).

Waste Isolation Pilot Plant (WIPP) - The WIPP, which is managed by the DOE, is a geologic disposal facility for TRU radioactive waste generated as by-products from DOE's nuclear weapons production. The WIPP is located underground in excavated, natural salt formations near Carlsbad, New Mexico.

**Commonwealth of Pennsylvania
Department of Environmental Protection
Bureau of Radiation Protection
P.O. Box 8469
Harrisburg, PA 17105-8469
717-787-2480**

**Low-Level Radioactive Waste Hot Line (within PA)
800-232-2786**

For more information, visit
www.dep.state.pa.us, keyword: Radioactive Waste.