2010

Annual Low-Level Radioactive Waste

Program Report

to the

Pennsylvania General Assembly and the

Appalachian Compact Commission

DEPARTMENT OF ENVIRONMENTAL PROTECTION

Bureau of Radiation Protection

Commonwealth of Pennsylvania

An Equal Opportunity Employer

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 the waste 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 low-level radioactive waste (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 help assure the public that LLRW is disposed of properly, the Pennsylvania DEP's Bureau of Radiation Protection currently collects storage and disposal data from the LLRW generators as well as from the U.S. Department of Energy's (DOE) national LLRW database and the Energy Solutions 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 year 2010.

Sincerely,

Michael L. Krancer
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 (1)(4) of the Act 1985-120.

There are two major differences from this year's report compared to the previous annual reports. First, this report does not contain disposal information for Class B and C wastes from the Appalachian Compact (Compact). This is due to the closure of the Barnwell, South Carolina, LLRW disposal facility to generators outside of the Atlantic Compact (Connecticut, New Jersey and South Carolina). However, the Compact is tracking these types of wastes and is reporting it as "waste in storage." Appendix B includes a chart containing this information. The other major difference is that the *Annual Low-Level Radioactive Waste Program Report to the General Assembly* and the *Appalachian States Low-Level Radioactive Waste Commission Annual Report* are now combined into one report.

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 year 2010) and the Commission (fiscal year 2009-10), and a list of LLRW disposers in the Compact for 2010.

The report also includes information on volume, curie content, waste class, radionuclides and waste toxicity of LLRW generated. The information was obtained from the Energy Solutions 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. As noted above, 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. However, the Compact is tracking these types of wastes and is reporting it as "waste in storage."

Appendix C provides statistics related to volume and activity trends of LLRW during 1991 through 2010.

Appendix D includes the independent auditors' report of the Commission's financial accounts for fiscal year 2009-10.

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, consistent 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; and
- 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 2010

The Department of Environmental Protection (DEP) 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).

January: The department's Low-Level Radioactive Waste (LLRW) Program formally submitted comments to the Nuclear Regulatory Commission (NRC) regarding blending of LLRW. These comments were also published in the Low-Level Waste Forum's (LLW Forum) publication, the *LLW Notes*, that is a national publication. Blending is defined as the mixing of LLRW having different concentrations of radionuclides to form a relatively homogeneous mixture that may be appropriate for disposal in a licensed facility. Blending is not dilution or mixing of clean and contaminated materials.

March: The department published the annual LLRW program report for 2009. The report provides a summary of the current activities of the 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.

May: A representative from the department's LLRW Program accepted the opportunity to serve on the NRC working group on storage of LLRW, representing the Organization of Agreement States. The main purpose of this working group is to document all current guidance applicable to different categories of LLRW generators, identify changes and circumstances that may impact adequacy of storage guidance, and propose amendments or supplemental guidance as appropriate.

September: A representative from the department attended the LLW Forum meeting in Saratoga Springs, New York. The LLW Forum was established to facilitate state and compact implementation of the Low-

Level Radioactive Waste Policy Act and to promote the objectives of LLRW regional compacts. At this meeting, the department provided an update on recent activities of the Compact and discussed the department's official comments to the NRC regarding blending of LLRW.

October: The department held the annual meeting of the Low-Level Radioactive Waste Advisory Committee. The primary purpose of the meeting was to: (1) review and discuss regional and national issues and developments related to LLRW management and disposal; (2) review information on LLRW generation and storage within the Compact; (3) discuss blending of LLRW: current policy, the NRC staff recommendation and the Pennsylvania position; (4) Exelon's request to transfer LLRW from Limerick Generating Station to Peach Bottom Atomic Power Station; and (5) elect the Committee officers.

November: The department's LLRW program staff coordinated and attended the annual meeting of the Commission in Harrisburg.

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 now obtaining the appropriate disposal information directly from the national MIMS database.

Summary of Commission's Activities for Fiscal Year 2009-10

July 2009: 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.

September 2009: A representative from the Commission attended the LLW Forum meeting in Salt Lake City, Utah.

November 2009: The Commission held its annual meeting. The primary purpose of this meeting was to: (1) review the Independent Auditors' Report for Commission's financial statements; (2) consider a revised budget for fiscal year 2009-10 and a proposed budget for fiscal year 2010-11; (3) review and discuss regional and national developments related to LLRW management and disposal; (4) review information on LLRW generation within the Appalachian Compact; (5) review the NRC Issue Summary for Interim Storage of LLRW at Reactor Sites; (6) review the status of lawsuit involving Energy Solutions and Northwest Interstate Compact on LLRW Management and its potential implications for the Compact; and (7) elect Commission officers. Additionally, the Commission adopted the following resolution pertaining to Article III (voting), section one (quorum) of the Commission bylaws:

"RESOLVED, that the counsel to the Commission research the permissibility of telephone participation for the purpose of making a quorum of the Commission and, if it is legally permissible, to draft proposed amendments to the bylaws effecting that."

March 2010: A representative from the Commission attended the LLW Forum meeting in Austin, Texas. This meeting included a site tour of the Waste Control Specialist (WCS) facility.

Public Information Depositories

An information depository exists in four of the DEP regional offices and the Commonwealth 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 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

Southcentral 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

Mailing Address:

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 a mixed waste.

LLRW is waste that satisfies the definition in the Low-Level Radioactive Waste Policy Amendments Act (LLRWPAA) of 1985. The LLRWPAA 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 Energy Solutions (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. 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. Both Pennsylvania and the Commission are monitoring and tracking the generation of these types of wastes, which are now being stored by the LLRW generators in the Compact.

Pennsylvania generated the largest quantities of LLRW among the Compact states. Quantities of LLRW by facility type and state for 2010 are listed in Tables and Charts B-1 and B-2.

The total volume of waste disposed of by the Compact LLRW generators in 2010 is about 99,518 cubic feet. The LLRW volume disposed of from the Compact in 2010 was mainly due to waste from the utility, government and industrial categories (see Table and Chart B-1). The significant contribution of waste volume by the government category in 2010 is due to disposal of low activity decontamination waste from the Pennsylvania DEP, Hazardous Sites Cleanup Act (HSCA) radium decontamination project in Lock Haven, Clinton County. Maryland also had a significant amount of LLRW waste 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.

The 2010 LLRW activity (radioactivity) from the compact is about 658 curies. The greatest contribution is from the nuclear utility sector (see Table and Chart B-2). The disposal volume and activity tabulated in the aforementioned tables and charts only apply to Class A LLRW.

LLRW must be classified according to 10 CFR 61.55 before it can be shipped for disposal. In 2010, all LLRW disposed of was Class A, and all of it was disposed of at the Energy Solution's LLRW disposal facility in Clive, Utah.

Table B-3 contains information on the radioactive isotopes in the LLRW disposed from the Compact in 2010. 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.

A survey of LLRW generators in the compact indicates that nearly the entire radioactivity of the LLRW in storage is from Class B and C wastes being stored at the nuclear power plants. Additionally, one generator in the industrial sector reported storing a small amount of Class B waste. Table B-4 contains information on LLRW in storage for the period of Jan. 1, 2010 to Dec. 31, 2010.

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 1991 to 2010.

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-2 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-2, where higher numbers indicate higher toxicity. Radionuclides are listed without their half-lives in Table A-2; however, arrangement of radionuclides by their half-life ranges is provided in Table B-3, which is also arranged by nuclide and activity.

[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 2010 and fiscal year 2009-10 respectively.

TABLE 4-1

Pennsylvania and Appalachian Compact Commission Expenditures

EXPENDITURES	PENNSYLVANIA (HOST STATE) CY 2010	FY 2009-10 APPALACHIAN COMPACT COMMISSION
GRANTS	**$0.00**	**$0.00**
PERSONNEL	**$55,914.70**	**$0.00**
GENERAL EXPENSE	**$344.98**	**$25,758.00**
CONTRACTOR SERVICES	**$0.00**	**$0.00**
TOTAL	**$56,259.68**	**$25,758.00**

APPENDIX A

TABLE A-1

APPALACHIAN COMPACT LLRW DISPOSERS BY STATE AND COUNTY FOR 2010

Pennsylvania

County	Facility	Generator Type
Allegheny	Applied Health Physics, Inc.	Industry
	Bettis Atomic Power Laboratory	Government
	Community College of Allegheny County	Academic
	Curtiss-Wright Electro-Mechanical Corp.	Industry
	University of Pittsburgh	Medical
	VA Medical Center	Government
Beaver	FENOC-Beaver Valley	Utility
Bradford	Global Tungsten	Industry
Butler	Slippery Rock University	Academic
Centre	Pennsylvania State University	Academic
Chester	Lincoln University	Academic
Clinton	Air Parts of Lock Haven	Industry
	PA DEP, Keystone Instruments Site	Government
Columbia	USACE for USEPA - Safety Light Site	Government
Dauphin	Exelon Corporation-TMI 1	Utility
	Martin Water Conditioning	Industry
Delaware	Swarthmore College	Academic
Lancaster	Elizabethtown College	Academic
Lebanon	Lebanon High School	Academic
Luzerne	Susquehanna Steam Electric Station	Utility
Military	Defense Distribution Depot Susquehanna	Government
	U.S. Army PA National Guard	Government
Montgomery	Exelon Corporation-Limerick	Utility
	Glaxo Smith Kline-Collegeville	Industry
	Glaxo Smith Kline Beecham - King of Prussia	Industry
	Johnson & Johnson R&D	Industry
	JRT Calibration Services	Industry
	Merck & Co.	Industry
	Petnet Pharmaceuticals	Industry
	Rohm and Haas Company Research Labs	Industry
	Salus University	Academic
	Vascular Strategies, LLC	Industry
	Wyeth-Ayerst Laboratories	Industry
Northampton	Lehigh University	Academic
Philadelphia	Academy of Natural Sciences	Academic
	Drexel University	Academic
	Philadelphia College of Osteopathic Medicine	Medical
	University of Pennsylvania	Medical
Westmoreland	Westinghouse Waltz Mill	Industry
York	Exelon Corporation-Peach Bottom	Utility

Delaware

County	Facility	Generator Type
New Castle	Agilent Technologies. Inc.	Industry
	Astra Zeneca	Industry
	University of Delaware	Academic
Sussex	Intervet	Industry

Maryland

County	Facility	Generator Type
Allegany	Braddock Hospital	Medical
	Memorial Medical Hospital	Medical
Baltimore	Becton Dickinson (Bd) Biosciences	Industry
	Celsis In Vitro Technologies, Inc.	Industry
	Fasgen	Industry
	Johns Hopkins Medical - Baltimore	Medical
	Johns Hopkins University	Academic
	Johns Hopkins University-Asthma Allergy	Medical
	United Iron and Metal	Industry
	University of Maryland	Medical
Calvert	Calvert Cliffs Nuclear Power Plant	Utility
Frederick	Advanced Bioscience-Organon Teknika Corp	Industry
	Clym Environmental Services	Industry
	GPL Laboratories	Industry
	Medlmmune, Inc.	Industry
	Science Appl. International Corp.	Industry
Howard	Ecology Services, Inc.	Industry
Military	DOD Aberdeen Proving Grounds	Government
	U.S. Army Corp. of Engineers	Government
	U.S. Army Medical Research Institute of Infectious Diseases	Government
	U.S. Navy Uniformed Services University	Government
Montgomery	Alfagene	Industry
	Bioqual Inc.	Industry
	Bridge Gps Lso Facility	Industry
	Celera Genomics	Industry
	FDA-BRF	Government
	Food and Drug Administration-CDER	Government
	National Institute of Health	Government
	National Institute of Standards & Technology	Government
	National Institute on Drug Abuse Research Center	Government
	Neutron Products, Inc.	Industry
	Sequoia Pharmaceuticals, Inc	Industry
	Stiek Research Laboratories	Industry
	Teve Biopharmaceuticals USA Inc.	Industry
Prince Georges	Food and Drug Administration - College Park	Government
	Radiation Service Organization, Inc.	Industry
	University of Maryland	Academic
	U.S. Department of Agriculture	Government
Somerset	University of MD Eastern Shore	Academic

West Virginia

County	Facility	Generator Type
Kanawha	Union Carbide Corp.	Industry
Monongalia	West Virginia University	Medical
Raleigh	U.S. Dept of Agriculture	Government

TABLE A-2
TOXICITY TABLE OF INDIVIDUAL RADIONUCLIDES

Radionuclides	Concentration[a] (pCi/L)	Relative[b] Toxicity	Radionuclides	Concentration[a] (pCi/L)	Relative[b] Toxicity
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 2010 Disposed LLRW Volume by State and Facility Type

Facility Type/State	WV	DE	MD	PA	Total
Academic	0	2.7	2.1	18.8	23.6
Government	0	0	22,430.0	20,854.7	43,284.7
Industry	0.2	26.7	108.7	5,594.0	5,729.6
Medical	11.1	0	45.9	6.1	63.1
Utility	0	0	370.9	50,045.8	50,416.7
Total	11.3	29.4	22,957.6	76,519.4	99,517.7

This data is from the PA DEP and the MIMS – US DOE as of May 2011. Volume is in cubic feet. This data is for LLRW burial at the Energy Solutions site in Clive, Utah.

CHART B-1

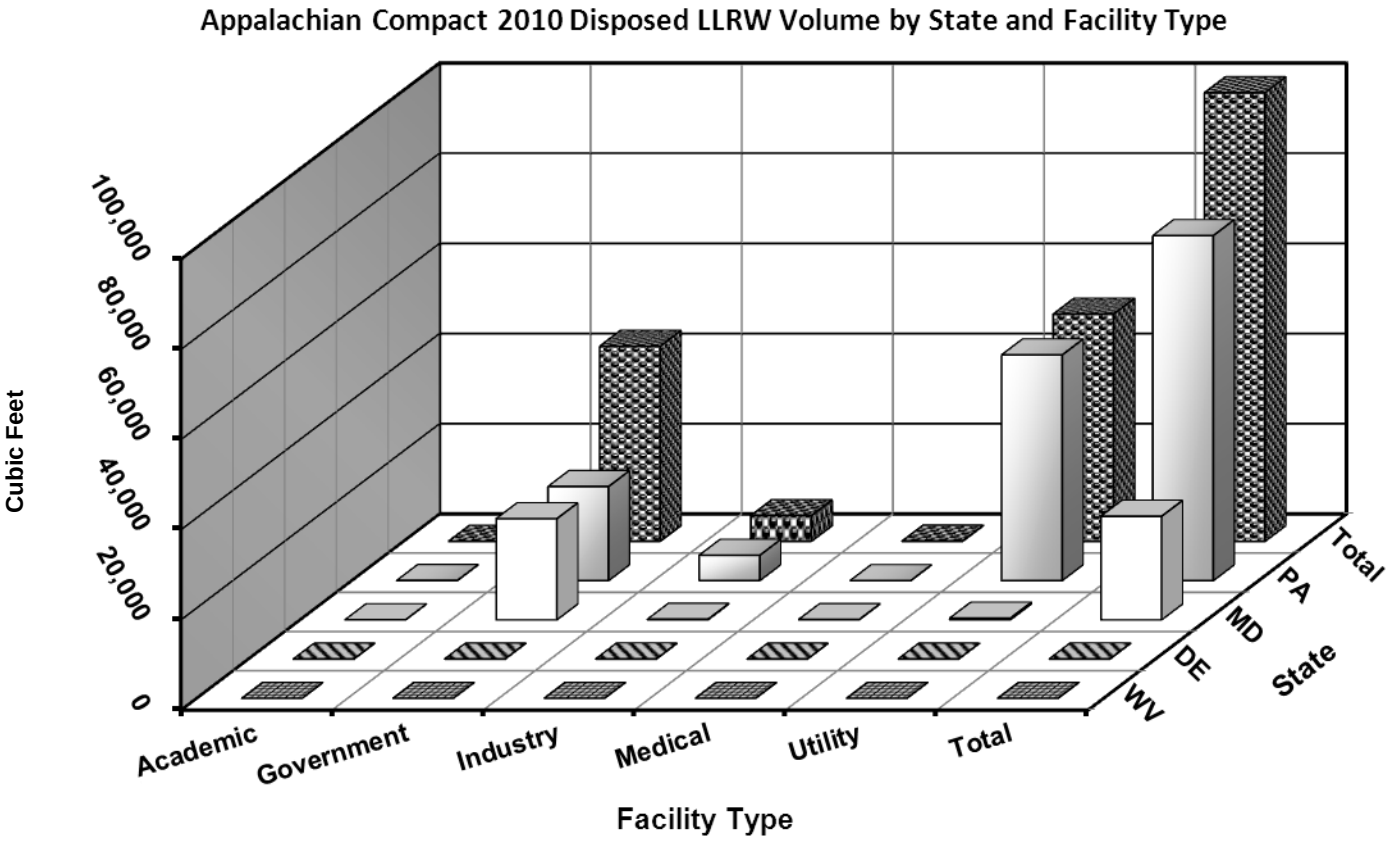


TABLE B-2

Appalachian Compact 2010 Disposed LLRW Activity by State and Facility Type

Facility Type/State	WV	DE	MD	PA	Total
Academic	0	0.02	<0.01	0.01	0.03
Government	0	0	0.84	1.20	2.04
Industry	<0.01	0.01	0.24	3.44	3.70
Medical	0.01	0	0.16	<0.01	0.17
Utility	0	0	0.11	652.11	652.22
Total	0.01	0.03	1.35	656.77	658.16

This data is from the PA DEP and the MIMS – US DOE as of May 2011. Volume is in cubic feet. This data is for LLRW burial at the Energy Solutions site in Clive, Utah.

CHART B-2

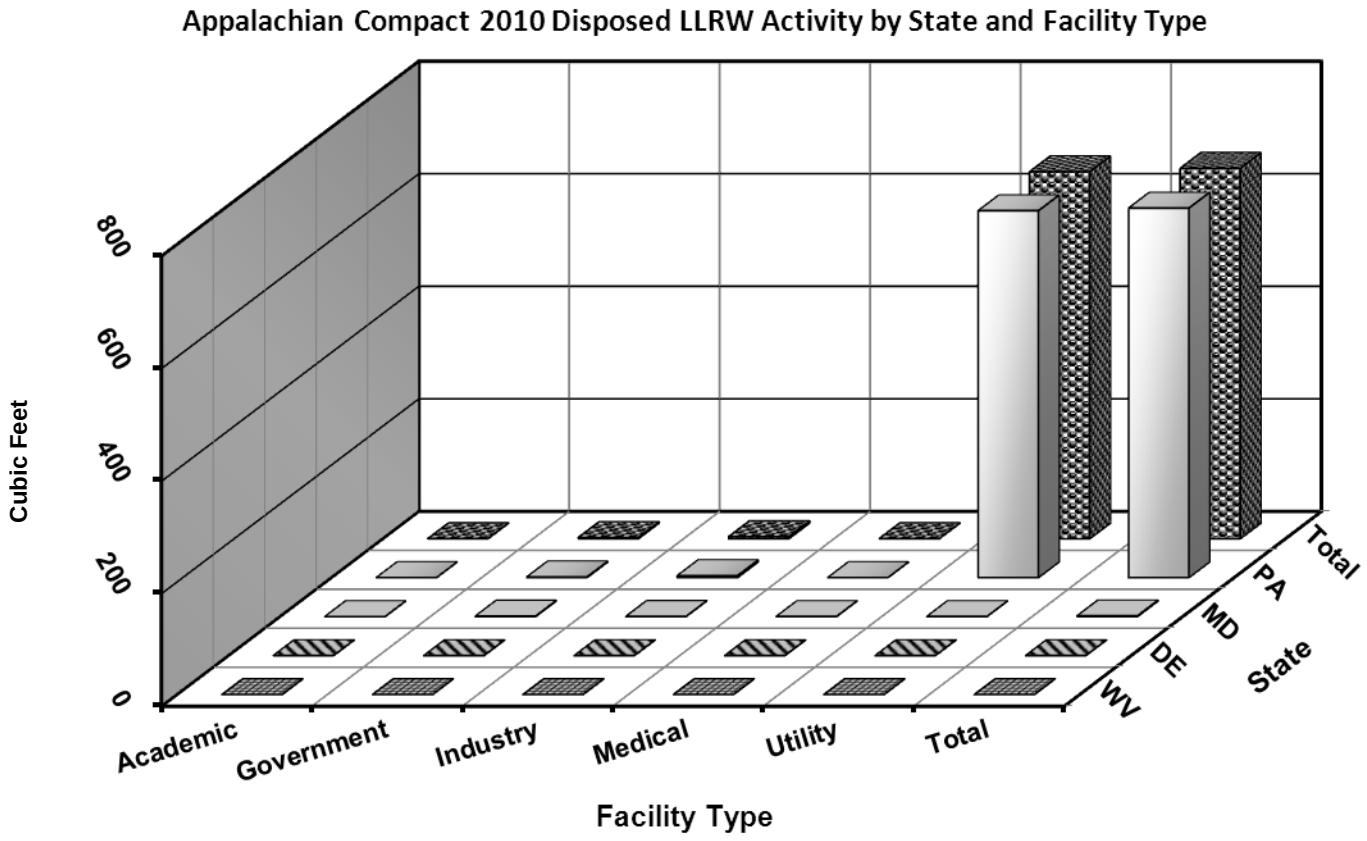


TABLE B-3: Appalachian Compact 2010 LLRW Isotopes Sorted by Isotope

Isotope	Element	Half-Life (Years)	Curies	Isotope	Element	Half-Life (Years)	Curies
Ac-225	actinium	2.7379E-02	0.005	Ni-63	nickel	1.0010E+02	6.865
Ac-228	actinium	6.9930E-04	0.005	Np-237	neptunium	2.1400E+06	0.005
Ag-108	silver	4.5061E-06	0.005	P-32	phosphorus	3.9124E-02	0.035
Ag-108m	silver	1.2700E+02	0.01	P-33	phosphorus	6.9542E-02	0.005
Ag-110	silver	7.7858E-07	0.005	Pa-234	protactinium	7.6432E-04	0.005
Ag-110m	silver	6.8405E-01	0.39	Pa-234m	protactinium	2.2245E-06	0.005
Am-241	americium	4.3220E+02	0.115	Pb-210	lead	2.2260E+01	0.435
Am-243	americium	7.3800E+03	0.005	Pm-147	promethium	2.6234E+00	0.055
Au-198	gold	7.3813E-03	0.005	Po-210	polonium	3.7887E-01	0.015
Ba-133	barium	1.0500E+01	0.035	Pt-193	platinum	5.0000E+01	0.005
Ba-140	barium	3.5015E-02	0.01	Pu-238	plutonium	8.7750E+01	0.11
Be-7	beryllium	1.4631E-01	0.005	Pu-239	plutonium	2.4131E+04	0.085
Bi-210	bismuth	1.3725E-02	0.015	Pu-240	plutonium	6.5370E+03	0.01
Bi-212	bismuth	1.1512E-04	0.005	Pu-241	plutonium	1.4400E+01	0.235
Bi-213	bismuth	8.6794E-05	0.005	Pu-242	plutonium	3.7580E+05	0.005
C-14	carbon	5.7300E+03	1.23	Ra-223	radium	3.1305E-02	0.005
Ca-45	calcium	4.4545E-01	0.02	Ra-224	radium	9.9111E-03	0.005
Cd-109	cadmium	1.2704E+00	0.01	Ra-226	radium	1.6000E+03	0.86
Ce-141	cerium	8.8981E-02	0.015	Ra-228	radium	5.7500E+00	0.015
Ce-144	cerium	7.7837E-01	0.67	Rh-105	rhodium	4.0338E-03	0.005
Cl-36	chlorine	3.0100E+05	0.02	Ru-103	ruthenium	1.0773E-01	0.015
Cm-242	curium	4.4682E-01	0.085	Ru-106	ruthenium	1.0081E+00	0.015
Cm-243	curium	2.8500E+01	0.085	S-35	sulfur	2.3940E-01	0.055
Cm-244	curium	1.8110E+01	0.025	Sb-122	antimony	7.3922E-03	0.005
Co-56	cobalt	2.1563E-01	0.005	Sb-124	antimony	1.6482E-01	0.04
Co-57	cobalt	7.4169E-01	0.1	Sb-125	antimony	2.7700E+00	0.23
Co-58	cobalt	1.9384E-01	2.75	Sc-46	scandium	2.2943E-01	0.005
Co-60	cobalt	5.2710E+00	138.13	Se-75	selenium	3.2794E-01	0.005
Cr-51	chromium	7.5850E-02	0.16	Sm-151	samarium	9.0000E+01	0.005
Cs-134	cesium	2.0620E+00	0.555	Sn-113	tin	3.1513E-01	0.04
Cs-137	cesium	3.0170E+01	7.085	Sn-117m	tin	3.7235E-02	0.01
Eu-152	europium	1.3600E+01	0.025	Sr-89	strontium	1.3840E-01	0.025
Eu-154	europium	8.8000E+00	0.01	Sr-90	strontium	2.8600E+01	0.62
Eu-155	europium	4.9600E+00	0.005	Sr-92	strontium	3.0915E-04	0.005
Fe-55	iron	2.7000E+00	164.15	Ta-182	tantalum	3.1414E-01	0.005
Fe-59	iron	1.2219E-01	0.07	Tc-99	technetium	2.1300E+05	0.065
Gd-148	gadolinium	7.4600E+01	0.005	Th-228	thorium	1.9132E+00	0.01
Gd-153	gadolinium	6.6147E-01	0.005	Th-229	thorium	7.3400E+03	0.005
H-3	tritium	1.2280E+01	1.045	Th-230	thorium	7.7000E+04	0.01
Hf-175	hafnium	1.9165E-01	0.01	Th-231	thorium	2.9113E-03	0.005
Hf-181	hafnium	1.1606E-01	0.01	Th-232	thorium	1.4050E+10	0.055
Hg-203	mercury	1.2758E-01	0.005	Th-NAT	natural thorium	1.4050E+10	0.03
I-125	iodine	1.6466E-01	0.06	Tl-204	thallium	3.7790E+00	0.02
I-129	iodine	1.5700E+07	0.065	U-234	uranium	2.4450E+05	0.02
I-131	iodine	2.2012E-02	0.005	U-235	uranium	7.0380E+08	0.025
Ir-192	iridium	2.0266E-01	0.005	U-236	uranium	3.4150E+06	0.01
Kr-85	krypton	1.0720E+01	0.005	U-238	uranium	4.4680E+09	0.065
La-140	lanthanum	4.5882E-03	0.005	U-DEP	depleted uranium	4.4680E+09	0.37
Mn-54	manganese	8.5613E-01	17.75	U-NAT	natural uranium	4.4680E+09	0.04
Na-22	sodium	2.6020E+00	0.035	W-181	tungsten	3.3114E-01	0.005
Nb-93m	niobium	1.4600E+01	0.005	Y-88	yttrium	2.9186E-01	0.005
Nb-94	niobium	2.0300E+04	0.015	Zn-65	zinc	6.6913E-01	19.71
Nb-95	niobium	9.5989E-02	0.135	Zr-93	zirconium	1.5300E+06	0.005
Nb-97	niobium	1.3708E-04	0.015	Zr-95	zirconium	1.7528E-01	0.11
Nd-147	neodymium	3.0062E-02	0.01	Zr-97	zirconium	1.9279E-03	0.005
Ni-59	nickel	7.5000E+04	0.065				

TABLE B-3: Appalachian Compact 2010 LLRW Isotopes Sorted by Activity

Isotope	Element	Half-Life (Years)	Curies	Isotope	Element	Half-Life (Years)	Curies
Fe-55	iron	2.7000E+00	164.145	Ra-228	radium	5.7500E+00	0.015
Co-60	cobalt	5.2710E+00	138.13	Ru-103	ruthenium	1.0773E-01	0.015
Zn-65	zinc	6.6913E-01	19.705	Ru-106	ruthenium	1.0081E+00	0.015
Mn-54	manganese	8.5613E-01	17.75	Ag-108m	silver	1.2700E+02	0.01
Cs-137	cesium	3.0170E+01	7.085	Ba-140	barium	3.5015E-02	0.01
Ni-63	nickel	1.0010E+02	6.865	Cd-109	cadmium	1.2704E+00	0.01
Co-58	cobalt	1.9384E-01	2.75	Eu-154	europium	8.8000E+00	0.01
C-14	carbon	5.7300E+03	1.23	Hf-175	hafnium	1.9165E-01	0.01
H-3	tritium	1.2280E+01	1.045	Hf-181	hafnium	1.1606E-01	0.01
Ra-226	radium	1.6000E+03	0.86	Nd-147	neodymium	3.0062E-02	0.01
Ce-144	cerium	7.7837E-01	0.67	Pu-240	plutonium	6.5370E+03	0.01
Sr-90	strontium	2.8600E+01	0.62	Sn-117m	tin	3.7235E-02	0.01
Cs-134	cesium	2.0620E+00	0.555	Th-228	thorium	1.9132E+00	0.01
Pb-210	lead	2.2260E+01	0.435	Th-230	thorium	7.7000E+04	0.01
Ag-110m	silver	6.8405E-01	0.39	U-236	uranium	3.4150E+06	0.01
U-DEP	depleted uranium	4.4680E+09	0.37	Ac-225	actinium	2.7379E-02	0.005
Pu-241	plutonium	1.4400E+01	0.235	Ac-228	actinium	6.9930E-04	0.005
Sb-125	antimony	2.7700E+00	0.23	Ag-108	silver	4.5061E-06	0.005
Cr-51	chromium	7.5850E-02	0.16	Ag-110	silver	7.7858E-07	0.005
Nb-95	niobium	9.5989E-02	0.135	Am-243	americium	7.3800E+03	0.005
Am-241	americium	4.3220E+02	0.115	Au-198	gold	7.3813E-03	0.005
Pu-238	plutonium	8.7750E+01	0.11	Be-7	beryllium	1.4631E-01	0.005
Zr-95	zirconium	1.7528E-01	0.11	Bi-212	bismuth	1.1512E-04	0.005
Co-57	cobalt	7.4169E-01	0.1	Bi-213	bismuth	8.6794E-05	0.005
Cm-242	curium	4.4682E-01	0.085	Co-56	cobalt	2.1563E-01	0.005
Cm-243	curium	2.8500E+01	0.085	Eu-155	europium	4.9600E+00	0.005
Pu-239	plutonium	2.4131E+04	0.085	Gd-148	gadolinium	7.4600E+01	0.005
Fe-59	iron	1.2219E-01	0.07	Gd-153	gadolinium	6.6147E-01	0.005
I-129	iodine	1.5700E+07	0.065	Hg-203	mercury	1.2758E-01	0.005
Ni-59	nickel	7.5000E+04	0.065	I-131	iodine	2.2012E-02	0.005
Tc-99	technetium	2.1300E+05	0.065	Ir-192	iridium	2.0266E-01	0.005
U-238	uranium	4.4680E+09	0.065	Kr-85	krypton	1.0720E+01	0.005
I-125	iodine	1.6466E-01	0.06	La-140	lanthanum	4.5882E-03	0.005
Pm-147	promethium	2.6234E+00	0.055	Nb-93m	niobium	1.4600E+01	0.005
S-35	sulfur	2.3940E-01	0.055	Np-237	neptunium	2.1400E+06	0.005
Th-232	thorium	1.4050E+10	0.055	P-33	phosphorus	6.9542E-02	0.005
Sb-124	antimony	1.6482E-01	0.04	Pa-234	protactinium	7.6432E-04	0.005
Sn-113	tin	3.1513E-01	0.04	Pa-234m	protactinium	2.2245E-06	0.005
U-NAT	natural uranium	4.4680E+09	0.04	Pt-193	platinum	5.0000E+01	0.005
Ba-133	barium	1.0500E+01	0.035	Pu-242	plutonium	3.7580E+05	0.005
Na-22	sodium	2.6020E+00	0.035	Ra-223	radium	3.1305E-02	0.005
P-32	phosphorus	3.9124E-02	0.035	Ra-224	radium	9.9111E-03	0.005
Th-NAT	natural thorium	1.4050E+10	0.03	Rh-105	rhodium	4.0338E-03	0.005
Cm-244	curium	1.8110E+01	0.025	Sb-122	antimony	7.3922E-03	0.005
Eu-152	europium	1.3600E+01	0.025	Sc-46	scandium	2.2943E-01	0.005
Sr-89	strontium	1.3840E-01	0.025	Se-75	selenium	3.2794E-01	0.005
U-235	uranium	7.0380E+08	0.025	Sm-151	samarium	9.0000E+01	0.005
Ca-45	calcium	4.4545E-01	0.02	Sr-92	strontium	3.0915E-04	0.005
Cl-36	chlorine	3.0100E+05	0.02	Ta-182	tantalum	3.1414E-01	0.005
Tl-204	thallium	3.7790E+00	0.02	Th-229	thorium	7.3400E+03	0.005
U-234	uranium	2.4450E+05	0.02	Th-231	thorium	2.9113E-03	0.005
Bi-210	bismuth	1.3725E-02	0.015	W-181	tungsten	3.3114E-01	0.005
Ce-141	cerium	8.8981E-02	0.015	Y-88	yttrium	2.9186E-01	0.005
Nb-94	niobium	2.0300E+04	0.015	Zr-93	zirconium	1.5300E+06	0.005
Nb-97	niobium	1.3708E-04	0.015	Zr-97	zirconium	1.9279E-03	0.005
Po-210	polonium	3.7887E-01	0.015				

TABLE B-3: Appalachian Compact 2010 LLRW Isotopes Sorted by Half-life

Isotope	Element	Half-Life (Years)	Curies	Isotope	Element	Half-Life (Years)	Curies
Ag-110	silver	7.7858E-07	0.005	Mn-54	manganese	8.5613E-01	17.75
Pa-234m	protactinium	2.2245E-06	0.005	Ru-106	ruthenium	1.0081E+00	0.015
Ag-108	silver	4.5061E-06	0.005	Cd-109	cadmium	1.2704E+00	0.01
Bi-213	bismuth	8.6794E-05	0.005	Th-228	thorium	1.9132E+00	0.01
Bi-212	bismuth	1.1512E-04	0.005	Cs-134	cesium	2.0620E+00	0.555
Nb-97	niobium	1.3708E-04	0.015	Na-22	sodium	2.6020E+00	0.035
Sr-92	strontium	3.0915E-04	0.005	Pm-147	promethium	2.6234E+00	0.055
Ac-228	actinium	6.9930E-04	0.005	Fe-55	iron	2.7000E+00	164.145
Pa-234	protactinium	7.6432E-04	0.005	Sb-125	antimony	2.7700E+00	0.23
Zr-97	zirconium	1.9279E-03	0.005	Tl-204	thallium	3.7790E+00	0.02
Th-231	thorium	2.9113E-03	0.005	Eu-155	europium	4.9600E+00	0.005
Rh-105	rhodium	4.0338E-03	0.005	Co-60	cobalt	5.2710E+00	138.13
La-140	lanthanum	4.5882E-03	0.005	Ra-228	radium	5.7500E+00	0.015
Au-198	gold	7.3813E-03	0.005	Eu-154	europium	8.8000E+00	0.01
Sb-122	antimony	7.3922E-03	0.005	Ba-133	barium	1.0500E+01	0.035
Ra-224	radium	9.9111E-03	0.005	Kr-85	krypton	1.0720E+01	0.005
Bi-210	bismuth	1.3725E-02	0.015	H-3	tritium	1.2280E+01	1.045
I-131	iodine	2.2012E-02	0.005	Eu-152	europium	1.3600E+01	0.025
Ac-225	actinium	2.7379E-02	0.005	Pu-241	plutonium	1.4400E+01	0.235
Nd-147	neodymium	3.0062E-02	0.01	Nb-93m	niobium	1.4600E+01	0.005
Ra-223	radium	3.1305E-02	0.005	Cm-244	curium	1.8110E+01	0.025
Ba-140	barium	3.5015E-02	0.01	Pb-210	lead	2.2260E+01	0.435
Sn-117m	tin	3.7235E-02	0.01	Cm-243	curium	2.8500E+01	0.085
P-32	phosphorus	3.9124E-02	0.035	Sr-90	strontium	2.8600E+01	0.62
P-33	phosphorus	6.9542E-02	0.005	Cs-137	cesium	3.0170E+01	7.085
Cr-51	chromium	7.5850E-02	0.16	Pt-193	platinum	5.0000E+01	0.005
Ce-141	cerium	8.8981E-02	0.015	Gd-148	gadolinium	7.4600E+01	0.005
Nb-95	niobium	9.5989E-02	0.135	Pu-238	plutonium	8.7750E+01	0.11
Ru-103	ruthenium	1.0773E-01	0.015	Sm-151	samarium	9.0000E+01	0.005
Hf-181	hafnium	1.1606E-01	0.01	Ni-63	nickel	1.0010E+02	6.865
Fe-59	iron	1.2219E-01	0.07	Ag-108m	silver	1.2700E+02	0.01
Hg-203	mercury	1.2758E-01	0.005	Am-241	americium	4.3220E+02	0.115
Sr-89	strontium	1.3840E-01	0.025	Ra-226	radium	1.6000E+03	0.86
Be-7	beryllium	1.4631E-01	0.005	C-14	carbon	5.7300E+03	1.23
I-125	iodine	1.6466E-01	0.06	Pu-240	plutonium	6.5370E+03	0.01
Sb-124	antimony	1.6482E-01	0.04	Th-229	thorium	7.3400E+03	0.005
Zr-95	zirconium	1.7528E-01	0.11	Am-243	americium	7.3800E+03	0.005
Hf-175	hafnium	1.9165E-01	0.01	Nb-94	niobium	2.0300E+04	0.015
Co-58	cobalt	1.9384E-01	2.75	Pu-239	plutonium	2.4131E+04	0.085
Ir-192	iridium	2.0266E-01	0.005	Ni-59	nickel	7.5000E+04	0.065
Co-56	cobalt	2.1563E-01	0.005	Th-230	thorium	7.7000E+04	0.01
Sc-46	scandium	2.2943E-01	0.005	Tc-99	technetium	2.1300E+05	0.065
S-35	sulfur	2.3940E-01	0.055	U-234	uranium	2.4450E+05	0.02
Y-88	yttrium	2.9186E-01	0.005	Cl-36	chlorine	3.0100E+05	0.02
Ta-182	tantalum	3.1414E-01	0.005	Pu-242	plutonium	3.7580E+05	0.005
Sn-113	tin	3.1513E-01	0.04	Zr-93	zirconium	1.5300E+06	0.005
Se-75	selenium	3.2794E-01	0.005	Np-237	neptunium	2.1400E+06	0.005
W-181	tungsten	3.3114E-01	0.005	U-236	uranium	3.4150E+06	0.01
Po-210	polonium	3.7887E-01	0.015	I-129	iodine	1.5700E+07	0.065
Ca-45	calcium	4.4545E-01	0.02	U-235	uranium	7.0380E+08	0.025
Cm-242	curium	4.4682E-01	0.085	U-DEP	depleted uranium	4.4680E+09	0.37
Gd-153	gadolinium	6.6147E-01	0.005	U-238	uranium	4.4680E+09	0.065
Zn-65	zinc	6.6913E-01	19.705	U-NAT	natural uranium	4.4680E+09	0.04
Ag-110m	silver	6.8405E-01	0.39	Th-232	thorium	1.4050E+10	0.055
Co-57	cobalt	7.4169E-01	0.1	Th-NAT	natural thorium	1.4050E+10	0.03
Ce-144	cerium	7.7837E-01	0.67				

TABLE B-4

Appalachian Compact Class B and C LLRW in Storage Data for 2010

Appalachian Compact LLRW Placed in Storage in 2010 (not including fuel pool storage)

LLRW Placed in Storage in 2010	Class B Volume	Class B Activity	Class C Volume	Class C Activity
PA Nuclear Power Plants	1,106	3,327	249	351
MD Nuclear Power Plant	180	192	90	349
DE Industrial	15	33	0	0
Appalachian Compact Total	1,301	3,552	339	700

Appalachian Compact LLRW Placed in Spent Fuel Pool Storage in 2010

LLRW Placed in Storage in Fuel Pools 2010	Class C Volume	Class C Activity
PA Nuclear Power Plants	557	8,000
MD Nuclear Power Plant	0	0
Appalachian Compact Total	557	8,000 *

* Activity was estimated for some irradiated components in storage.

Appalachian Compact LLRW Available Storage Capacity in 2010 (excluding fuel pool storage)

LLRW Onsite Storage Availability in 2010	Volume (cubic feet)	Currently Storing Offsite
PA Nuclear Power Plant 1	24,000	No
PA Nuclear Power Plant 2	147	No
PA Nuclear Power Plant 3	10,184	No
PA Nuclear Power Plant 4	100,000	No
PA Nuclear Power Plant 5	19,740	No
MD Nuclear Power Plant 1	12,000	Yes
DE Industry 1	12	No

Volume is in cubic feet and activity is in curies. Data was obtained from a survey conducted by the Appalachian Compact member states.

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 the beginning of 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 2010 for the Compact LLRW generators is about 99,518 cubic feet. The LLRW volume decreased slightly in 2010 compared to the previous year mainly due to a modest decrease in the amount of government-owned facilities decontaminating and decommissioning waste (D&D) in 2010. 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) and can be disposed of at a less restrictive LLRW facility. Most of the commercial D&D waste produced in the United States is shipped to the Energy Solutions 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 2010 LLRW activity (radioactivity) from the Compact is about 658 curies. This modest decrease from 2009 is mainly due to the normal variation of the nuclear power plant's operational waste stream. The closure of the Barnwell facility to waste disposal from outside the Atlantic Compact has had a significant impact on the activity trend of LLRW in the Compact. For 2009 and 2010 and until the Compact generators of LLRW are allowed access to Class B and C disposal, the activity of this LLRW will only be tabulated as "waste in-storage" and will be reported as such.

The large spike in the volume of LLRW in 2000 and 2001 is mainly from the D&D waste. The significant increase in the activity level for the utility category in 1991 was due to a large amount of non-routine waste of irradiated components from nuclear power facilities.

It should be mentioned that the DOE's MIMS database does not include LLRW disposed of at the Energy Solutions 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. This is because, historically, 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.

TABLE C-1: Appalachian Compact Disposed LLRW (cu. ft.) Volume from 1991 to 2010

Year	WV	DE	MD	PA	Total
1991	368.2	775.5	19,224.3	224,563.6	244,931.6
1992	192.2	986.5	17,673.6	93,189.4	112,041.6
1993	26.8	479.8	11,358.8	48,439.3	60,304.7
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	48.0	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
Total 1991 to 2010	1,750.5	4,723.8	355,980.9	2,339,532.7	grand total 2,701,988.0

This data is from the Pennsylvania DEP and the MIMS – DOE as of May 2011. Volume is in cubic feet. * The 2009 and 2010 LLRW volume only includes burial at Energy Solutions in Clive, Utah. All other years include Barnwell, South Carolina, burial and Energy Solutions, Clive, Utah, burial.

CHART C-1

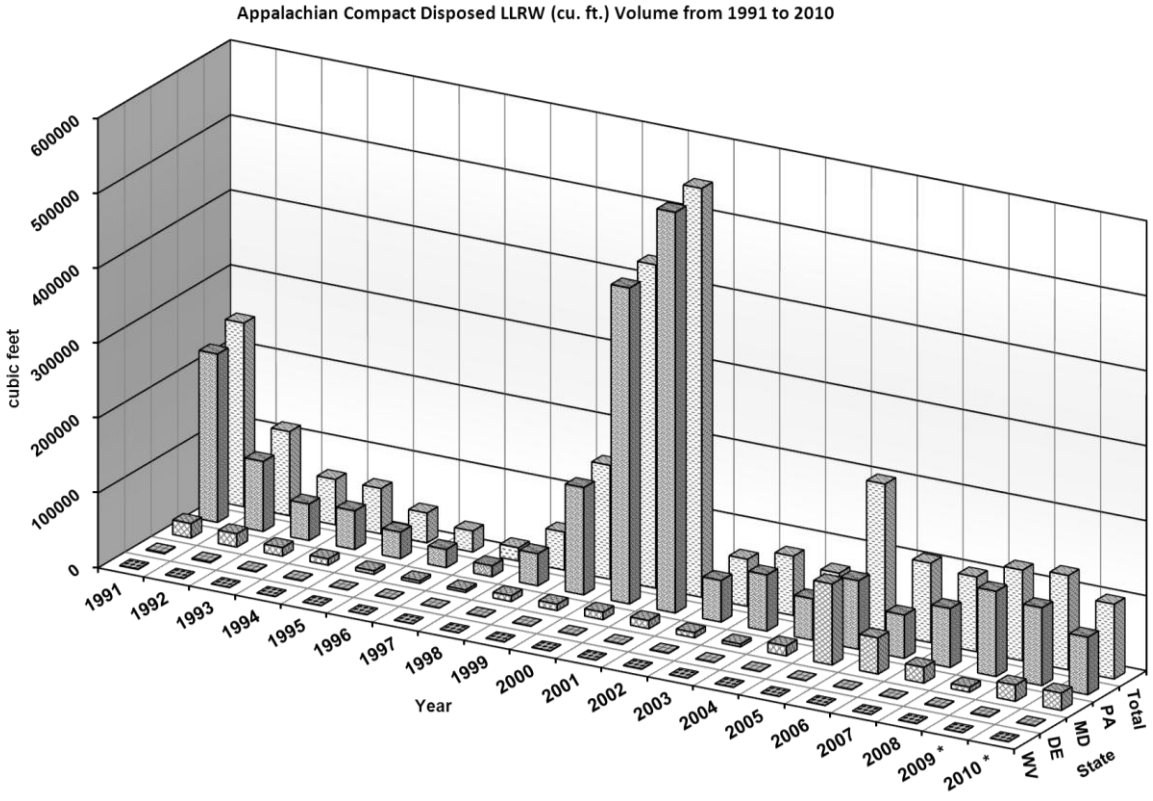
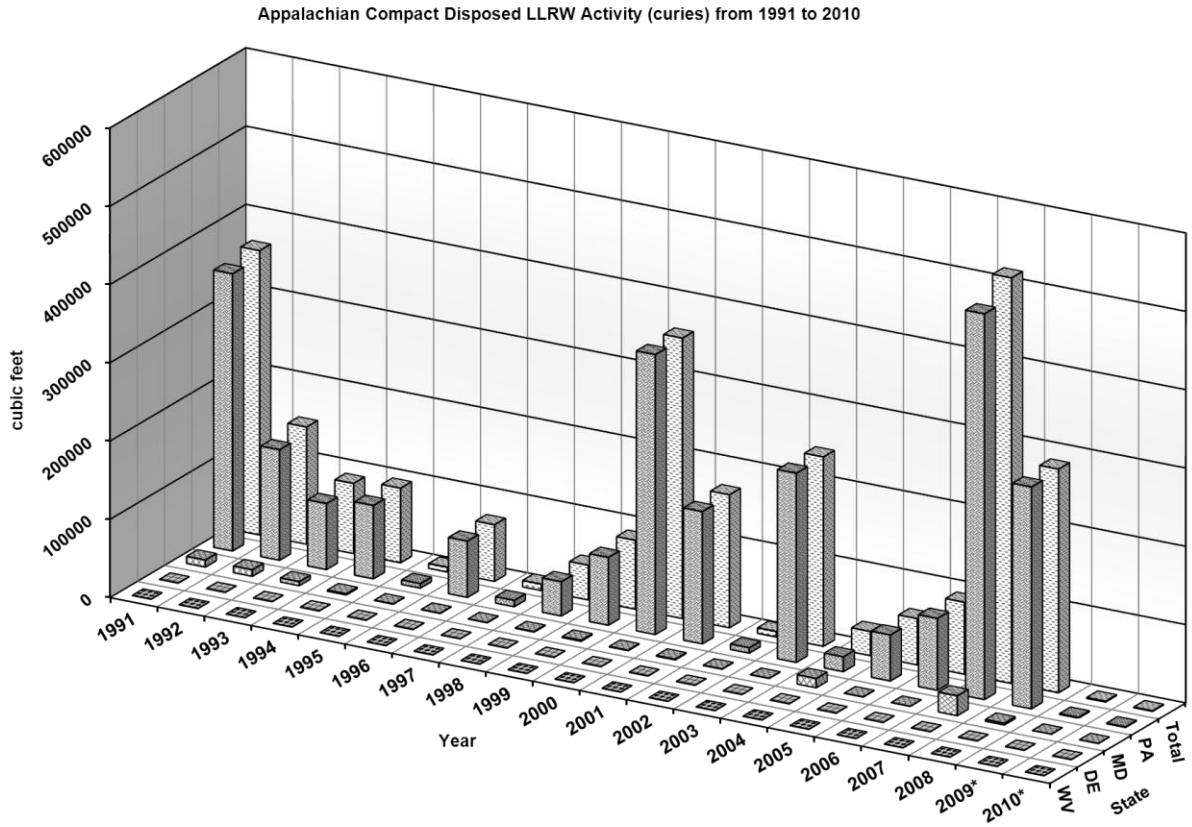


TABLE C-2. Appalachian Compact Disposed LLRW Activity (curies) from 1991 to 2010

Year	WV	DE	MD	PA	Total
1991	15.5	0.6	8,969.0	354,340.7	363,325.8
1992	30.7	0.9	8,419.9	141,251.8	149,703.3
1993	5.5	45.1	5,019.4	84,346.7	89,416.7
1994	0.5	69.3	1,439.7	93,729.6	95,239.0
1995	4.6	0.01	346.2	5,691.9	6,042.7
1996	0.1	5.6	349.1	71,900.5	72,255.4
1997	0.03	1.3	198.5	8,017.9	8,217.7
1998	37.3	0.1	531.5	43,691.0	44,259.9
1999	0.5	0.1	1,335.7	86,618.0	87,954.3
2000	2.2	0.02	484.0	357,624.4	358,110.7
2001	0.03	0.03	903.3	168,919.6	169,822.9
2002	0.1	0.5	244.5	6,777.4	7,022.5
2003	0.2	24.7	166.3	241,649.8	241,840.9
2004	0.8	0.2	11,830.7	18,890.3	30,722.0
2005	0.7	31.3	156.8	58,786.2	58,974.9
2006	0.03	11.9	60.1	91,719.1	91,791.1
2007	0.16	12.9	25,304.7	492,579.3	517,897.0
2008	0.14	12.2	2,181.5	283,328.8	285,522.6
2009*	0.02	0.5	4.7	1,001.4	1,006.6
2010*	0.01	0.03	1.4	656.8	658.2
Total 1991 to 2010	99.1	217.2	67,946.8	2,611,521.0	grand total 2,679,784.1

This data is from the Pennsylvania DEP and the MIMS – DOE as of May 2011. Activity is in curies. * The 2009 and 2010 LLRW activity only includes burial at Energy Solutions in Clive, Utah. All other years include Barnwell, South Carolina, burial and Energy Solutions, Clive, Utah, burial.

CHART C-2



APPENDIX D

Appalachian States Low-Level Radioactive Waste Commission
Financial Statements

APPALACHIAN STATES LOW-LEVEL RADIOACTIVE WASTE COMMISSION

FINANCIAL STATEMENTS

YEARS ENDED JUNE 30, 2010 AND 2009

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Howard R. Greenawalt
Deborah J. Kelly
Scott J. Christ

Creedon R. Hoffman

INDEPENDENT AUDITORS' 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, 2010 and 2009, 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 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 accompanying financial statements 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, 2010 and 2009 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 20, 2010 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.

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

Management's discussion and analysis on pages MDA - 1 through MDA - 2 and budgetary comparison information on page RSI - 1 are not a required part of the financial statements but are supplementary information required by accounting principles generally accepted in the United States of America. We have applied certain limited procedures, which consisted principally of inquiries of management regarding the methods of measurement and presentation of the required supplementary information. However, we did not audit the information and express no opinion on it.

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

August 20, 2010

Mechanicsburg, Pennsylvania

APPALACHIAN STATES LOW-LEVEL RADIOACTIVE WASTE COMMISSION

MANAGEMENT'S DISCUSSION AND ANALYSIS

JUNE 30, 2010

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, 2010 the Operating Fund had a fund balance of approximately $ 324,000. The Commission's actual expenditures for this period were approximately $ 26,000.

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 of 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 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 Auditors' Report of the Commission's financial statements.

APPALACHIAN STATES LOW-LEVEL RADIOACTIVE WASTE COMMISSION

STATEMENTS OF NET ASSETS

JUNE 30, 2010 AND 2009

	2010	2009
Assets		
Cash	$ 2,985	$ 13,244
Investments	1,008,003	1,021,072
Total assets	$ 1,010,988	$ 1,034,316
Liabilities	$ -	$ -
Net assets		
Unappropriated	2,985	13,244
Appropriated	321,309	336,020
Restricted	686,694	685,052
Total net assets	1,010,988	1,034,316
Total liabilities and net assets	$ 1,010,988	$ 1,034,316

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, 2010 AND 2009

	2010	2009
Direct expenses		
Legal services	$ 10,000	$ 10,000
Membership fee	8,500	8,500
Meeting expenses	1,558	6,497
Audit	2,250	2,200
Travel	2,819	1,983
Office supplies	-	204
Insurance	200	200
Advertising	431	1,052
	25,758	30,636
Revenue - Investment earnings	2,430	13,488
Change in net assets	(23,328)	(17,148)
Net assets - beginning of the year	1,034,316	1,051,464
Net assets - end of the year	$ 1,010,988	$ 1,034,316

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, 2010

	Operating Fund	Surcharge Fund	Total
Revenue - Interest	$ 788	$ 1,642	$ 2,430
Expenditures			
Legal services	10,000	-	10,000
Membership fee	8,500	-	8,500
Meeting expenses	1,558	-	1,558
Audit	2,250	-	2,250
Travel	2,819	-	2,819
Office supplies	-	-	-
Insurance	200	-	200
Advertising	431	-	431
	25,758	-	25,758
Excess (deficiency) of revenues over expenditures	(24,970)	1,642	(23,328)
Fund balance - beginning of the year	349,264	685,052	1,034,316
Fund balance - ending of the year	$ 324,294	$ 686,694	$ 1,010,988

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, 2009

	Operating Fund	Surcharge Fund	Total
Revenue - Interest	$ 4,619	$ 8,869	$ 13,488
Expenditures			
Legal services	10,000	-	10,000
Membership fee	8,500	-	8,500
Meeting expenses	6,497	-	6,497
Audit	2,200	-	2,200
Travel	1,983	-	1,983
Office supplies	204	-	204
Insurance	200	-	200
Advertising	1,052	-	1,052
	30,636	-	30,636
Excess (deficiency) of revenues over expenditures	(26,017)	8,869	(17,148)
Fund balance - beginning of the year	375,281	676,183	1,051,464
Fund balance - ending of the year	$ 349,264	$ 685,052	$ 1,034,316

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

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.

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.

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:

	2010	2009
Legal	$ 10,000	$ 10,000
Fiscal stabilization	111,309	126,020
Restart	200,000	200,000
	$ 321,309	$ 336,020

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, 2010

	Actual	Original Budget	Variance Over (under) Budget
Revenue			
Interest	$ 788	$ 5,000	$ (4,212)
Expenditures			
Legal services	10,000	10,000	-
Membership fee	8,500	8,500	-
Meeting expenses	1,558	2,000	(442)
Audit	2,250	2,200	50
Travel	2,819	5,000	(2,181)
Office supplies	-	-	-
Insurance	200	200	-
Advertising	431	1,000	(569)
	25,758	28,900	(3,142)
Excess (deficiency) of revenues over expenditures	$ (24,970)	$ (23,900)	$ (1,070)

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

RSI - 1

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 Web site 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 pose substantial or potential threats to public health or the environment and meet 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 (LLRWPAA) of 1985. The LLRWPAA 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. This site (http://www.nrc.gov) will link you to NRC's home page.

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.

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2930-BK-DEP4322 3/2012