State of Illinois
Illinois Emergency Management Agency

2012 Annual Survey Report

IEMA

EMAP Accredited

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PREFACE

The Illinois Low-Level Radioactive Waste Management Act mandates an annual survey of all low-level radioactive waste (LLRW) generators in Illinois. The Illinois Emergency Management Agency (IEMA) requires all LLRW generators to complete an online questionnaire and provide:

1. The types and quantities of LLRW that was either shipped for disposal or stored on-site;
2. How LLRW is being managed (i.e. treatment); and
3. What management alternatives a generator might use in the future.

This is the 29th report based on the response to those surveys.

Please note that where possible International System of Units (SI) is included in parentheses behind English units. Annual Reports are available for the years 1984 through 2012. Comments on this report and suggestions for preparing future reports are welcome and should be addressed to:

LLRW and Decommissioning Unit
Bureau of Radiation Safety
Illinois Emergency Management Agency
1035 Outer Park Drive
Springfield, IL 62704

Additional information about LLRW is also available by writing to the address above and through IEMA's website: http://iema.illinois.gov/iema/publications/publications.asp.

CONVERSION FACTORS

Multiply English Unit	by	To obtain SI unit
Cubic Foot (ft^3)	0.02832	Cubic Meter (m^3)
Millicurie (mCi)	37	Megabecquerel (MBq)
Curie (Ci)	37	Gigabecquerel (GBq)

1 millicurie = 0.001 curie
1 megaBecquerels = 1,000,000 Becquerels
1 gigaBecquerels = 1,000,000,000 Becquerels
1 teraBecquerels = 1,000,000,000,000 Becquerels

DATA REPORTING

Data is reported to the Agency in cubic feet for volume and millicuries (mCi) for activity. For purposes of this report, the data is presented to 1 decimal place. Some generators produce very small amounts of radioactivity. In those cases, the activity may be reported as less than 0.1 mCi. Some generators produce large amounts of radioactivity. In those cases the data may be presented in curies (Ci). One curie is equal to 1,000 mCi. A value will be reported as 0 only if it is known to be 0.

The data is then converted into SI units. The SI unit for volume is the cubic meter which is equivalent to 35.3 cubic feet. When converting from cubic feet to cubic meters, anything less than 3.5 cubic feet will be shown as less than 0.1 cubic meters.

The SI unit for radioactivity is the Becquerel (Bq). A Becquerel is a very small unit. One millicurie is equal to 37,000,000 Bq or 37 megaBecquerels (MBq) using the prefix “mega” or “M” to represent 1,000,000. One curie is equal to 37,000 MBq or 37 gigaBecquerels (GBq) using the prefix “giga” or “G” to represent 1,000,000,000. For those generators who produce large amounts of radioactivity the activity may be shown in teraBecquerels (TBq) using the prefix “tera” or “T” to represent 1,000,000,000,000. The reader will need to pay attention to the column headers for activity since the units may change from one table to another. This is done because of space limitation in the tables.

During the conversion process, values that are reported as less than 0.1 use the actual value for the calculation. That is why the reader may see different SI unit values for data reported as less than 0.1. When summing data in the tables, actual values that are reported or calculated in the conversion to SI units are included in the total. Therefore, some totals may not add correctly due to rounding.

Introduction

The Illinois Low-Level Radioactive Waste Management Act (Management Act) requires all low-level radioactive waste (LLRW) generators to submit annual reports detailing classes, quantities and types of LLRW possessed, generated, treated or shipped for treatment, storage or disposal. This report contains a summary of the generator's responses to the 2012 annual survey. LLRW will be referred to in terms of volume, radioactivity and half-life.

Low-level radioactive waste is defined in the Management Act as:

> "Low-level radioactive waste" or "waste" means radioactive waste not classified as high-level radioactive waste, transuranic waste, spent nuclear fuel or byproduct material as defined in Section 11e(2) of the Atomic Energy Act of 1954 (42 U.S.C. 2015).

Generators of LLRW include nuclear power stations, hospitals, universities and industrial companies.

Onsite Waste Management

Some LLRW generators perform onsite waste management. Techniques include decontamination, volume reduction, decay in storage (for short half-life radionuclides), and disposal in the sanitary drain (for select radionuclides at low concentrations). The results of the onsite management is a reduced volume of waste requiring offsite treatment or disposal, a more stable waste form and a reduction in waste management related expenses.

Offsite Waste Management

The majority of waste treatment occurs at offsite waste management facilities. Small waste generators typically use the services of a waste broker who collects their waste and takes it either to their facility for consolidation with other generator's waste or to a facility for treatment or disposal. Large generators usually have sufficient volumes of waste to make shipment direct to a treatment or disposal facility.

Offsite treatment varies depending on the waste type. Determining the appropriate treatment is a balance between the cost of processing and the cost of disposal. For components or other re-useable items, the salvage value of the item is also considered. There are several treatment facilities that offer a variety of waste processing services, including:

- Segregation and sorting
- Compaction
- Incineration
- Decontamination
- Thermal destruction
- Encapsulation
- Solidification and stabilization
- Metal melt
- Size reduction
- Repackaging

Waste processing results in a more stable waste form and a reduced volume of waste requiring disposal.

Available Disposal Capacity

Disposal capacity became limited effective on July 1, 2008 when South Carolina no longer authorized importation for purposes of disposal at their Barnwell site. "Importation," for these purposes, means the acceptance at the regional disposal facility of any waste that was generated in any foreign country or any state or territory of the U.S. other than Connecticut, New Jersey, and South Carolina.

Illinois generators can dispose of waste at The Energy*Solutions*' Clive, UT facility which accepts most Class A waste types. Waste considered to be naturally occurring radioactive material (NORM) can be disposed at the US Ecology Richland, WA disposal facility or at several US EPA RCRA Subtitle C landfills (NORM material with lower concentrations). Illinois generators now have the option for disposal of LLRW, including Class B and C waste, at the Waste Control Specialists (WCS) facility in Andrews County, TX.

Annual Surveys

In compliance with the Management Act, the Illinois Emergency Management Agency (IEMA) conducts an annual survey of the LLRW generators located in Illinois and any broker or processor that handles Illinois LLRW within or outside of the state. Each generator provides IEMA with information by completing the generator's Annual Survey about the types, quantities and activity of LLRW generated, stored, treated and disposed of and future LLRW shipment projections. Brokers and processors provide information regarding any and all Illinois waste received, treated, processed and shipped for disposal by completing the Brokers' and Processors' Annual Survey.

LLRW Tracking System

IEMA operates a system to administratively track shipments of LLRW that have a point of origination or destination in the state of Illinois. Persons who ship LLRW into, out of or within the state must obtain a permit from IEMA and report shipment information electronically to the Tracking System. Brokers can provide the Electronic Data Transmission (EDT) files on behalf of their generator customers. IEMA provides the information collected by the Tracking System back to the generators in the form of completed annual survey tables for generator verification.

Conclusion and Observations from the 2012 Annual Survey

Illinois LLRW generation in 2012 continued to demonstrate the typical variation in year to year production. The waste volume increased slightly from 2011; however the activity decreased significantly from the previous year. The number of generators decreased from 2011 to 2012 by 14. This continues the decline observed since 2000.

In 2012 the large volume generators were a fuel cycle facility that performed major cleanup activities and the nuclear power stations (reactor generators).

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Chapter Two

2012 Annual Survey Results

There were 422 LLRW generators in Illinois during 2012, a decrease of 5 from the previous year. Table 1 provides a summary of the number of generators in each of the categories. Figure 1 provides a graphical representation of the distribution of generators for the last 7 years. A description of each of the generator categories is provided below. The category with the largest number of generators is Medical with 313. LLRW generators are distributed throughout Illinois with the largest concentration in the Chicago metropolitan region.

Table 1 – Illinois LLRW Generator Survey Response by Generator Category 2006 – 2012

Generator Category	2006	2007	2008	2009	2010	2011	2012
Academic	32	33	35	33	33	29	28
Fuel Cycle	2	2	2	2	2	2	2
Governmental	18	18	19	18	15	15	15
Industrial	81	71	66	66	65	58	57
Medical	318	326	327	329	319	316	313
Reactor	7	7	7	7	7	7	7
Total	458	457	456	455	441	427	422

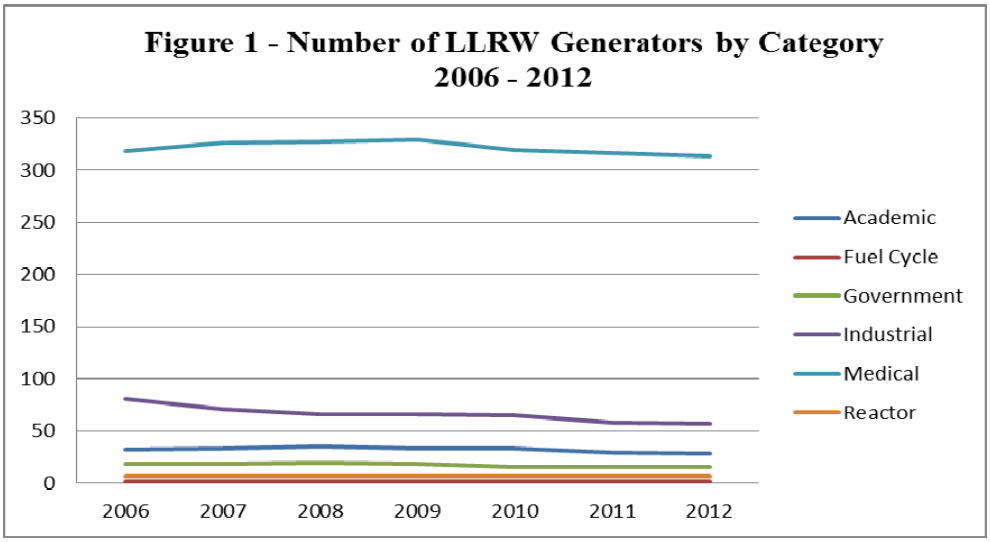
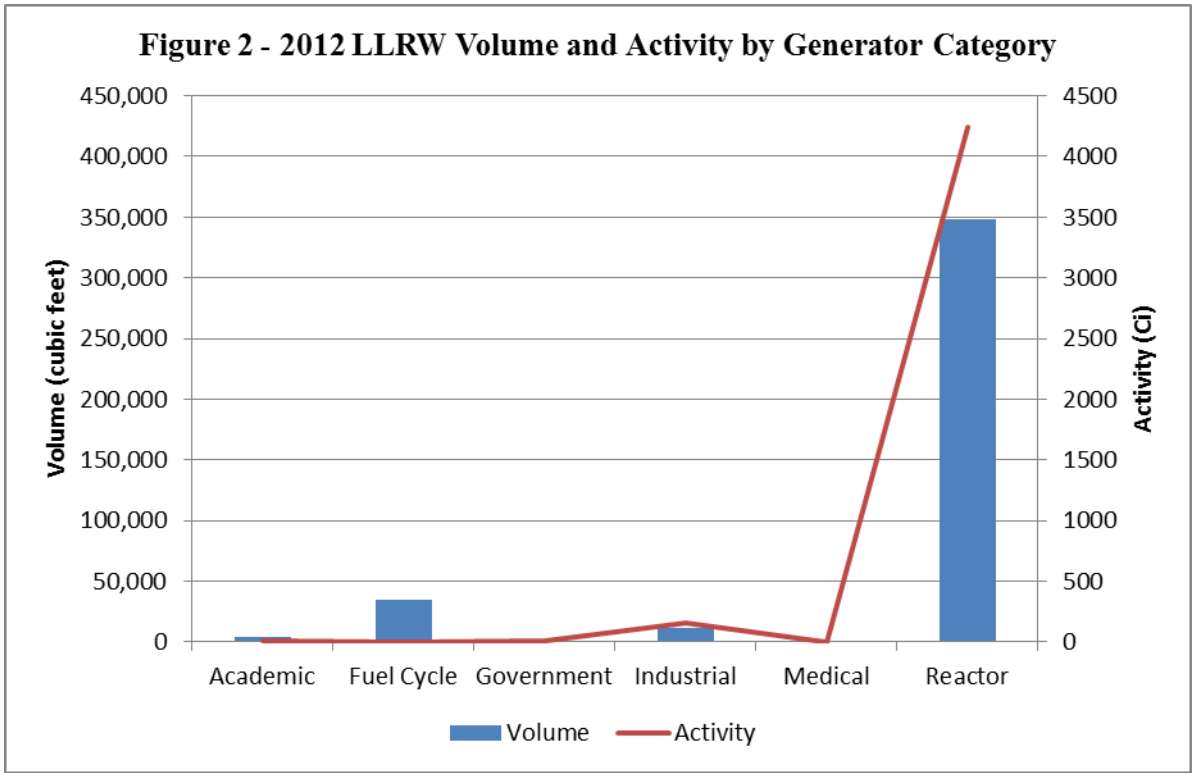


Table 2 provides a summary of the volume and activity of LLRW produced by each generator category. Figure 2 shows a graphical representation of the waste volume and activity distribution between the generator categories.

Table 2 – 2012 Volume and Activity by Generator Category

Generator Category	Volume (ft^3)	Volume (m^3)	Activity (mCi)	Activity (MBq)
Academic	3,673.3	104.0	4,901.5	181,354.0
Fuel-Cycle	34,633.0	980.8	852.5	31,541.0
Governmental	152.6	4.3	4,352.0	161,023.6
Industrial	11,183.9	316.7	156,857.7	5,803,734.1
Medical	120.2	3.4	121.6	4,499.6
Reactor	348,054.7	9,856.9	4,247,955.0	157,174,335.0
Totals	397,817.7	11,266.2	4,415,040.2	163,356,487.3

Note – Totals may not add due to rounding.



The following pages detail the responses received to the 2012 Annual Survey. The responses have been consolidated by generator category.

Academic Category –

- Includes LLRW generated at high schools, colleges, universities and associated research facilities.
- 8 of 28 generators shipped in 2012
- An increase in waste volume and activity from the previous year was reported.
- The U of I at Urbana-Champaign completed the decommissioning of their training reactor.

Table 3 – 2006 – 2012 Academic Generator Shipment Summary

Year	2006	2007	2008	2009	2010	2011	2012
# of generators	32	33	35	33	33	29	28
# of shippers	9	9	12	11	10	9	8
Volume (ft^3)	1,096	962	2,380	911	703	2,579	3,673
Volume (m^3)	31	28	27	26	20	73	104
Activity (mCi)	2,089	5,096	1,003	2,528	629	881	4,901
Activity (MBq)	77,293	188,552	37,111	93,526	23,263	32,605	181,354

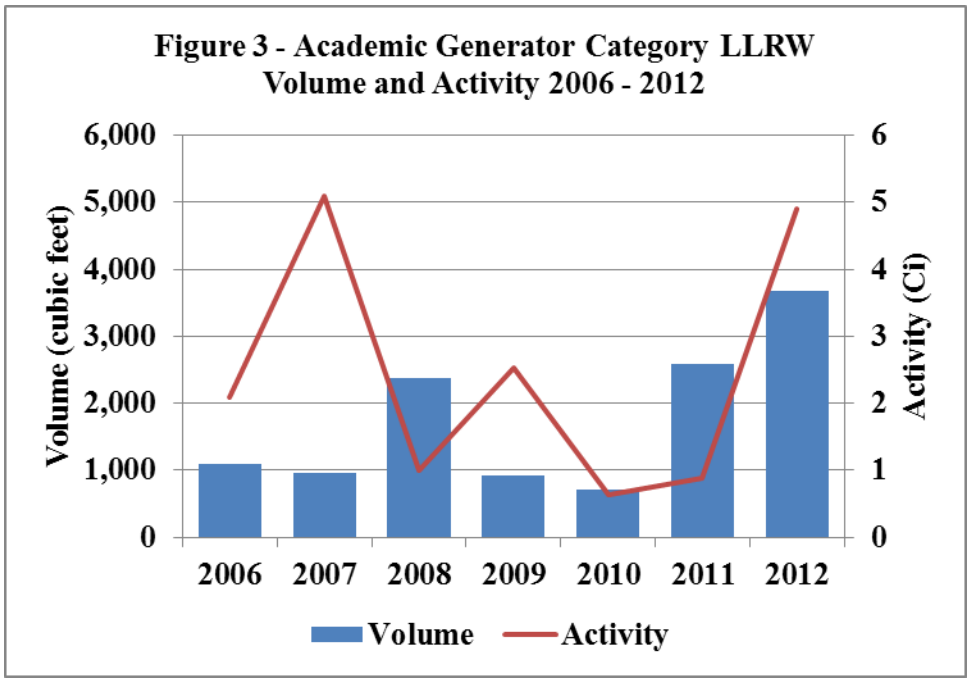


Table 4 – 2012 Academic Generators Shipping LLRW for Processing or Disposal

Academic Generator	Volume (ft^3)	Volume (m^3)	Activity (mCi)	Activity (MBq)
ASTELLAS Research Institute of America	27.0	0.8	7.0	258.6
Northwestern University	112.4	3.2	74.2	2,746.4
Rosalind Franklin University of Medical Science	216.0	6.1	186.7	6,907.5
SIU at Carbondale	36.0	1.0	103.0	3,811.3
SIU at Edwardsville	0.7	0.1	<0.1	1.8
The University of Chicago	303.5	8.6	140.1	5,183.8
U of I at Urbana-Champaign	2,656.1	75.2	4,320.4	159,855.1
U of I at Chicago	321.6	9.1	70.0	2,589.4
Total	3,673.3	104.0	4,901.5	181,354.0

Note – Totals may not add due to rounding.

Fuel Cycle Category

- Includes LLRW generators whose operations are part of the nuclear fuel cycle
- A decrease in waste volume and activity generation from the previous year

Table 5 – 2006 – 2012 Fuel Cycle Generator Shipment Summary

Year	2006	2007	2008	2009	2010	2011	2012
# of generators	2	2	2	2	2	2	2
# of shippers	2	1	1	2	2	1	1
Volume (ft^3)	468,831	37,391	210,426	255,614	187,167	122,200	34,633
Volume (m^3)	13,277	1,059	5,959	6,389	5,301	3,461	981
Activity (mCi)	80,203	400	2,248	5,175	8,648	2,245	852
Activity (MBq)	2,967,511	14,800	83,176	191,465	319,969	83,045	31,541

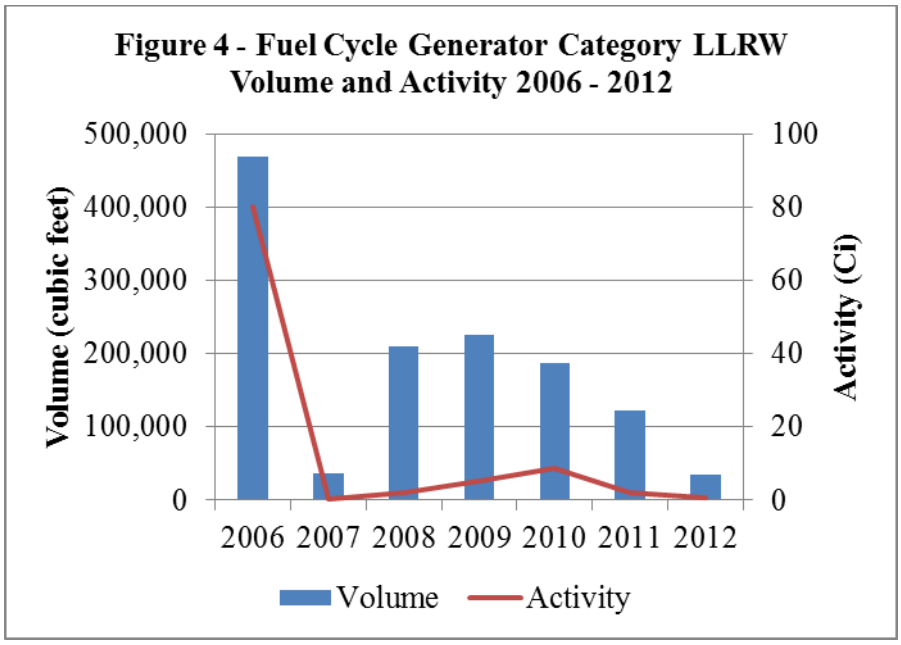


Table 6 – 2012 Fuel Cycle Generators Shipping LLRW for Processing or Disposal

Fuel Cycle Generator	Volume		Activity	
	(ft^3)	(m^3)	(mCi)	(MBq)
Honeywell International Inc.	34,633.0	980.8	852.5	31,541.0
Total	34,633.0	980.8	852.5	31,541.0

Governmental Category

- Includes LLRW generated by city, state and federal governmental entities (including VA hospitals)
- 4 of 15 generators shipped in 2012
- An increase in volume from last year
- A significant increase in activity from the previous year

Table 7 – 2006 – 2012 Governmental Generator Shipment Summary

Year	2006	2007	2008	2009	2010	2011	2012
# of generators	18	18	19	18	15	15	15
# of shippers	3	4	4	2	1	2	4
Volume (ft^3)	262	154	191	30	620	27	153
Volume (m^3)	7	4	6	1	18	1	4
Activity (mCi)	65	5,498	335	1	644	<1	4,352
Activity (MBq)	2,405	203,426	12,395	39	23,823	8	161,024

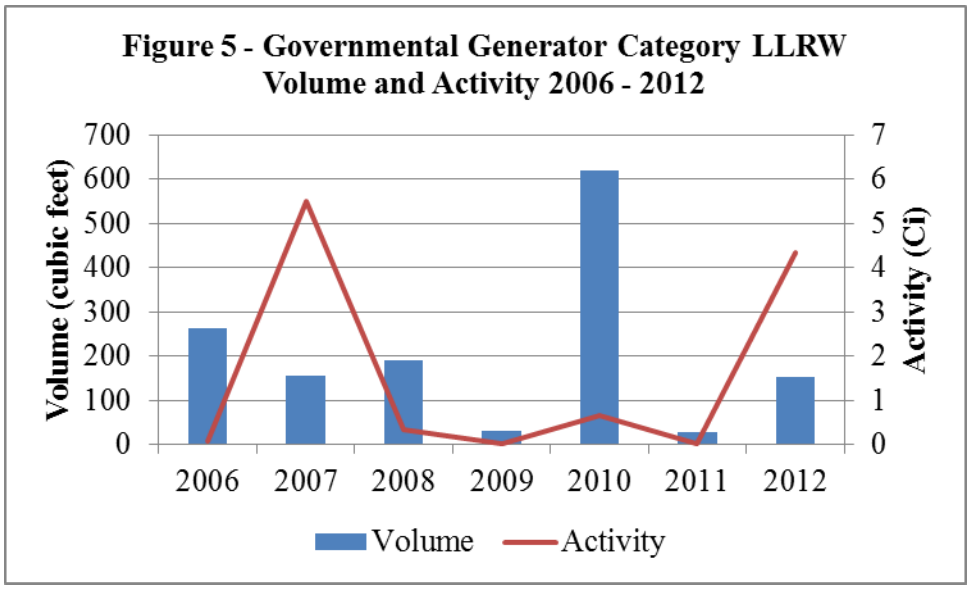


Table 8 – 2012 Governmental Generators Shipping LLRW for Processing or Disposal

Governmental Generator	Volume (ft^3)	Volume (m^3)	Activity (mCi)	Activity (MBq)
Edward Hines, Jr. VA Hospital	0.7	<0.1	20.0	739.1
IL Emergency Management Agency	54.0	1.5	84.7	3,135.6
Jesse Brown VA Medical Center	23.0	0.6	20.1	744.9
US Dept. of the Army-Rock Island	75.0	2.1	4,227.1	156,404.0
Total	152.6	4.3	4,352.0	161,023.6

Note – Totals may not add due to rounding.

Industrial Category

- Includes LLRW generated by private entities that provide products or services to the private and public sectors
- 9 of 57 generators shipped in 2012
- A significant decrease in waste volume and an increase in activity from the previous year

Table 9 – 2006 – 2012 Industrial Generator Shipment Summary

Year	2006	2007	2008	2009	2010	2011	2012
# of generators	81	71	66	66	65	58	57
# of shippers	24	15	17	17	15	13	9
Volume (ft^3)	21,940	6,194	10,072	24,865	11,295	67,298	11,184
Volume (m^3)	621	176	285	704	320	1,906	317
Activity (Ci)	4	138	46	41	20	112	156,858
Activity (GBq)	148	5,140	1,705	1,515	738	4,153	5,803,734

Please note the units for activity are in Curies and gigaBecquerels.
1 Ci = 1,000 mCi; 1 GBq = 1,000 MBq

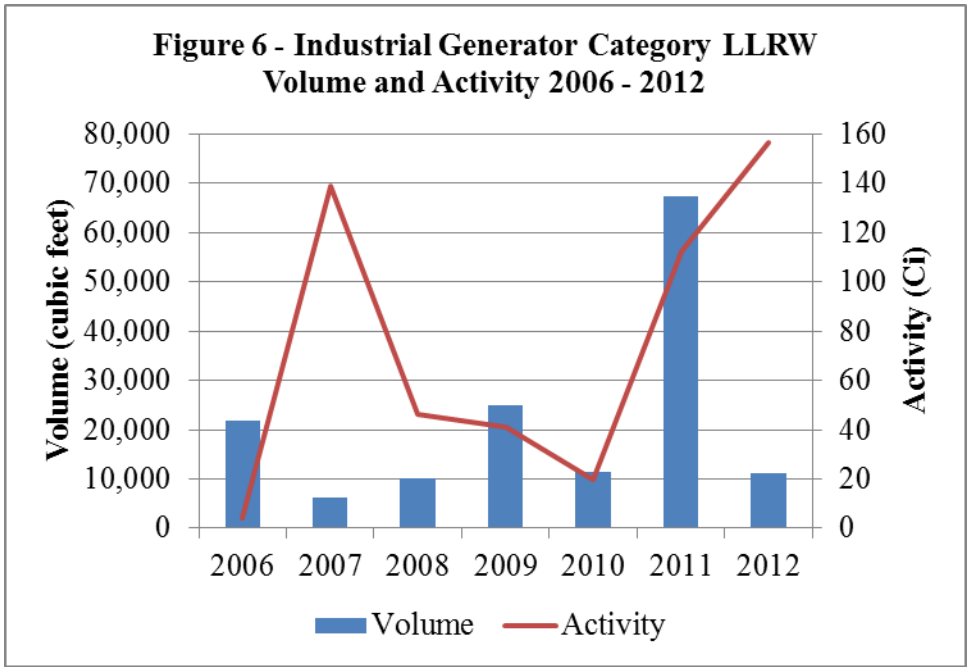


Table 10 – 2012 Industrial Generators Shipping LLRW for Processing or Disposal

Industrial Generator	Volume		Activity	
	(ft^3)	(m^3)	(mCi)	(MBq)
Abbott Laboratories	561.5	15.9	111,521.7	4,126,303.8
APL Engineered Materials, Inc.	7.5	0.2	<0.1	0.6
Chicago Zoological Society	7.0	0.2	30.4	1,124.8
Eichrom Technologies, LLC	24.0	0.7	<0.1	1.4
GE Healthcare	64.8	1.8	44,230.0	1,636,510.0
PETNET Solutions, Inc.	8.0	0.2	0.3	10.8
Unitech Services Group, Inc.	8,480.0	240.2	1,061.0	39,256.2
UOP Honeywell	4.1	0.1	0.2	8.5
Water Remediation Technology, LLC	2,027.0	57.4	14.0	518.0
Total	11,183.9	316.7	156,857.7	5,803,734.1

Note – Totals may not add due to rounding.

Medical Category

- Includes LLRW generated by hospitals, medical centers, clinics, laboratories and private medical offices
- 7 of the 313 medical generators shipped waste during 2012
- The majority of medical generators don't generate waste that requires offsite management
- The waste volume and activity deceased from the previous year

Table 11 – 2006 – 2012 Medical Generator Shipment Summary

Year	2006	2007	2008	2009	2010	2011	2012
# of generators	318	326	327	329	319	316	313
# of shippers	4	4	16	8	7	9	7
Volume (ft^3)	729	405	217	226	155	397	120
Volume (m^3)	21	11	5	6	4	11	3
Activity (mCi)	22	894	4,530	62	50	605	122
Activity (MBq)	814	33,078	167,610	2,296	1,854	22,377	4,500

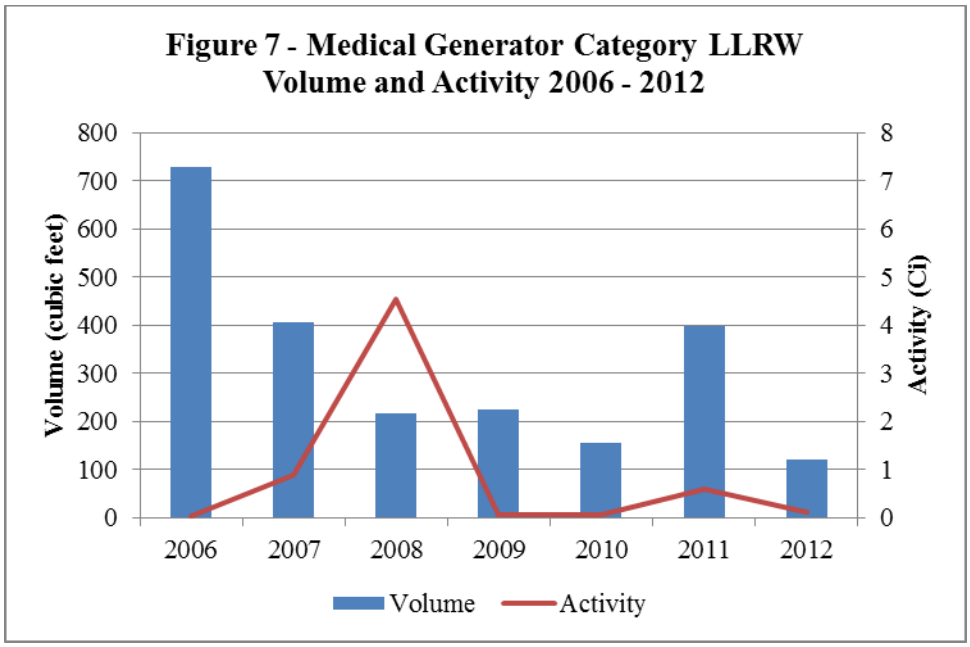


Table 12 – 2012 Medical Generators Shipping LLRW for Processing or Disposal

Medical Generator	Volume (ft^3)	Volume (m^3)	Activity (mCi)	Activity (MBq)
Children's Hospital of Chicago Medical Center	13.8	0.4	11.6	428.8
Loyola University Medical Center	7.5	0.2	0.7	24.4
Mercy Hospital Medical Center	1.0	<0.1	72.4	2,679.2
Morton Grove Pharmaceuticals	0.7	<0.1	13.3	491.0
Northwestern Memorial Hospital	89.0	2.5	5.1	187.9
Rush University Medical Center	0.7	<0.1	5.1	188.5
Valent Biosciences Corporation	7.5	0.2	13.5	499.9
Total	120.2	3.4	121.6	4,499.6

Note – Totals may not add due to rounding.

Reactor Category

- Includes LLRW generated at the nuclear power stations
- All 7 generators shipped waste in 2012
- The waste volume and activity increased in 2012.
- Waste volume and activities will vary substantially from year to year depending on the number of stations conducting refueling outages or other maintenance activities
- The Zion Station is being decommissioned

Table 13 – 2006 – 2012 Reactor Generator Shipment Summary

Year	2006	2007	2008	2009	2010	2011	2012
# of generators	7	7	7	7	7	7	7
# of shippers	6	7	7	6	6	7	7
Volume (ft^3)	394,276	199,043	240,475	226,885	270,393	322,928	348,055
Volume (m^3)	11,166	5,637	6,810	6,425	7,658	9,429	9,857
Activity (Ci)	456,221	15,492	21,846	1,261	1,911	1,363	4,248
Activity (TBq)	16,880	573	808	47	71	50	157

Please note the units for activity are in Curies and teraBecquerels.
1 Ci = 1,000 mCi; 1 TBq = 1,000 GBq = 1,000,000 MBq

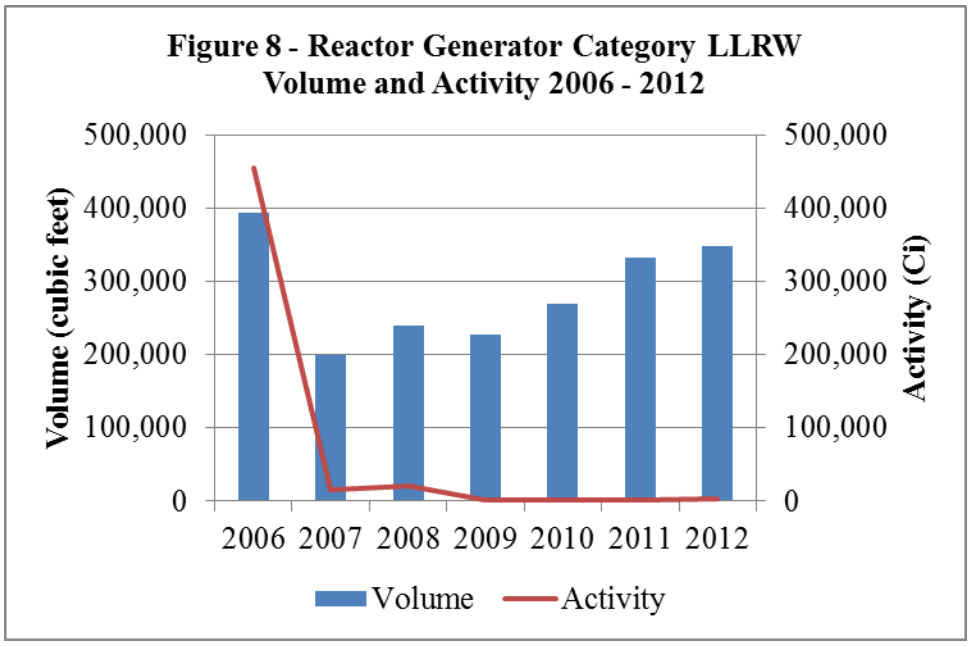


Table 14 – 2012 Reactor Generators Shipping LLRW for Processing or Disposal

Reactor Generator	Volume (ft^3)	Volume (m^3)	Activity (mCi)	Activity (MBq)
Braidwood	27,557.8	780.4	39,063.2	1,445,337.0
Byron	34,599.4	979.9	654,650.9	24,222,085.0
Clinton	14,738.7	417.4	273,097.4	10,104,605.4
Dresden	92,850.4	2,629.5	217,036.7	8,030,357.9
LaSalle	48,839.0	1,383.1	41,667.6	1,541,702.4
Quad Cities	51,156.9	1,448.8	1,721,345.1	63,689,768.4
Zion Station	78,312.5	2,217.8	1,301,094.0	48,140,479.0
Total	348,054.7	9,856.9	4,247,955.0	157,174,355.0

Note – Totals may not add due to rounding.

Volume and Classes of LLRW Shipped Directly to Disposal Facilities, Brokers and Processors

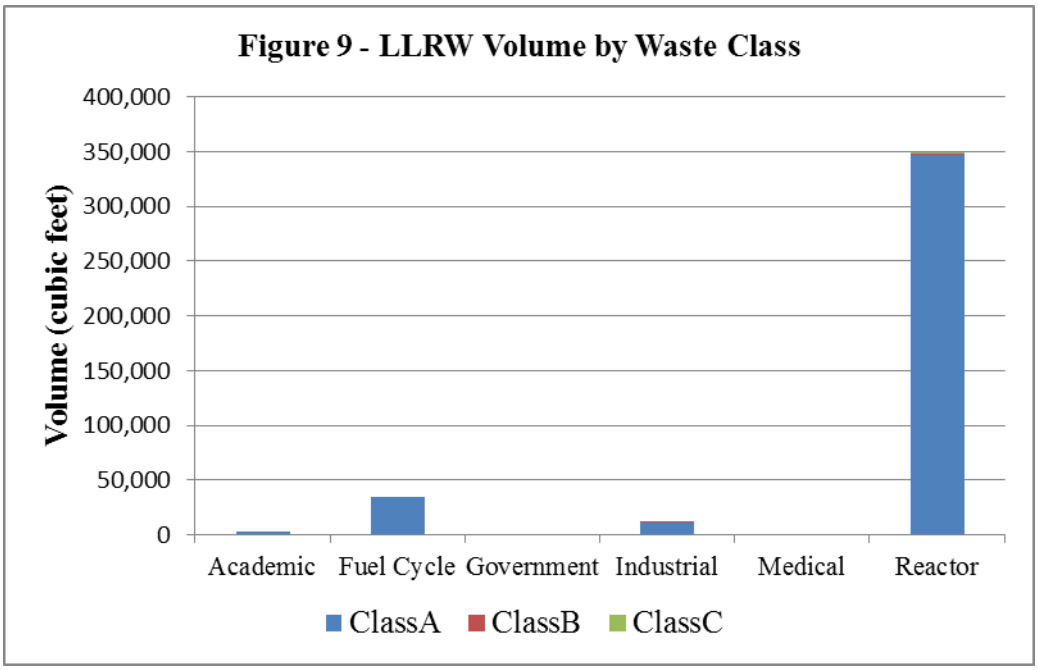
The U.S. Nuclear Regulatory Commission (NRC) established a waste classification system (10 CFR 61) that is incorporated and defined in 32 Illinois Administrative Code 340.1052. These regulations define three classes of LLRW based on the radionuclide content and concentration: Class A, Class B and Class C. The greater the hazard, the greater the level of protection required for disposal. Waste that is classified as greater than Class C (GTCC) is not generally acceptable for land disposal and is the responsibility of the federal government.

Class A waste contains lower concentration of both short and long half-life radionuclides. Class B waste contains higher concentrations of short half-life radionuclides while Class C contains higher concentrations of long half-life radionuclides. Both Class B and C wastes must meet more stringent waste form and packaging requirements while Class C wastes must be disposed with an intruder barrier with an effective 500-year service life. The maximum concentrations of radioactivity are specified for waste so that the amount of radioactivity remaining at the end of 500 years does not pose any significant environmental health or safety hazard, even if someone intrudes into the waste.

Table 15 – Distribution by Class of LLRW Shipped by Generator Category in 2012

Generator	Class A Volume		Class B Volume		Class C Volume		Total Category Volume	
Category	(ft^3)	(m^3)	(ft^3)	(m^3)	(ft^3)	(m^3)	(ft^3)	(m^3)
Academic	3,673.3	104.0	0.0	0.0	0.0	0.0	3,673.3	104.0
Fuel-Cycle	34,633.0	980.8	0.0	0.0	0.0	0.0	34,633.0	980.8
Governmental	151.6	4.3	0.0	0.0	1.0	0.0	152.6	4.3
Industrial	11,177.6	316.5	6.3	0.2	0.0	0.0	11,183.9	316.7
Medical	119.2	3.4	0.0	0.0	1.0	0.0	120.2	3.4
Reactor	346,696.5	9,818.4	1,233.0	34.9	125.2	3.5	348,054.7	9,856.9
Total	396,451.2	11,227.5	1,239.3	35.1	127.2	3.6	397,817.7	11,266.2

Note – Totals may not add due to rounding.



As can be seen in Table 15 above, Class A, B and C waste was shipped for disposal or to a broker or processor. The volume of Class B and Class C waste that is sent for disposal will likely increase in the future with the opening of a LLRW disposal facility in Texas and the development of processing techniques to treat Class B and C wastes.

Specific Waste

The NRC and Illinois have deregulated certain wastes in which the concentration of hydrogen-3 (tritium), carbon-14, or iodine-125 is so low they do not pose a significant radiation threat to public health and safety. This type of waste is defined in 32 Illinois Administrative Code 340.1050 as 'specific waste' (liquid scintillation fluids and animal carcasses) and may be disposed of as non-radioactive waste. Some of these wastes contain non-radioactive hazardous materials, such as toxic chemicals, or consist of animal tissue that can become bio-hazardous as it decomposes. Most of these wastes are generated by university and medical research activities and are either diluted with sufficient volumes of water as defined in 32 Administrative Code 340.1050 and disposed of in the sanitary sewer, destroyed by incineration, or transferred to a hazardous waste disposal facility. In some cases, these wastes are shipped to LLRW disposal facilities despite their low radioactive content. In 2012, fifteen academic facilities, three governmental, nine industrial facilities and twenty one medical facilities disposed of specific waste into the sanitary sewer.

LLRW Stored On-Site for Decay to Background Levels

One alternative Illinois generators have to shipping LLRW contaminated with short-lived radionuclides for disposal is to store the waste on-site until the radioactivity diminishes to levels that permit disposal as non-radioactive waste. Licensees may be authorized to store waste for decay up to half-lives less than 120 days. However, depending upon the needs of the generator, authorization for extended periods is granted. LLRW in storage for decay is normally held for 10 half-lives, or until the radioactivity has diminished to background levels. The table below shows the radionuclides stored for decay by Illinois generators and the number of generators who stored waste for decay by generator category. Fuel-cycle and reactor generators do not store waste for decay.

Table 16 – Radionuclides Held for Decay in 2012

Radionuclide	Half-Life		Academic	Governmental	Industrial	Medical	Total
Ar-41	1.8	Hours			1		1
Au-198	64.8	Hours				1	1
Ba-139	83.1	Minutes			1		1
Bi-206	6.2	Days	1				1
Br-82	1.5	Days			1		1
Cl-38	37.29	Minutes			1		1
Cr-51	27.7	Days			3	1	4
Cs-131	9.7	Days				1	1
Cs-138	33.4	Minutes			1		1
Cu-64	12.7	Hours	1				1
F-18	109.7	Minutes			5	32	37
Ga-67	3.3	Days		1	6	89	96
I-123	13.2	Hours		2	6	109	117
I-125	60.1	Days	2			14	16
I-131	8	Days		1	6	78	85
I-133	20.8	Hours		1			1
I-135	6.68	Hours			1		1
In-111	2.8	Days		1	6	87	94
Ir-192	74	Days				1	1
K-42	12.4	Hours			1		1
Lu-177	6.6	Days	1				1
Mn-56	2.58	Hours			1		1
Mo-99	66	Hours			2	1	3
N-13	9.97	Minutes				1	1
P-32	14.3	Days	2		1	2	5
Pd-103	17	Days				7	7
Sb-122	67	Hours			1		1
Sm-153	47	Hours			3	14	17
Sr-89	50.6	Days			4	8	12
Sr-91	9.67	Hours			1		1
Sr-92	2.71	Hours			1		1
Tc-99m	6	Hours	2	3	6	264	275
Tl-201	73.1	Hours		1	6	138	145
Xe-123	2.14	Hours				1	1
Xe-133	5.2	Days		3	5	67	75
Y-90	64.1	Hours	1		4	9	14

Mixed Waste

LLRW that also meets the U.S. Environmental Protection Agency's criteria as hazardous waste is called "mixed waste." The US EPA uses a process to define hazardous waste, but simply

stated a hazardous waste is a waste with properties that make it dangerous or capable of having a harmful effect on human health or the environment. Some mixed waste is treated based on the hazardous component only, such as the organic fluids which are generally used as a secondary fuel source. Other mixed waste is treated to eliminate or stabilize the hazard prior to disposal. Some mixed waste is treated and disposed using the U.S. EPA's mixed waste exemption where the hazardous component is not considered as long as the waste is being managed in accordance with the radioactive hazard.

Table 17 – Types of Mixed Waste Stored On-Site at the end of 2012

Waste Type	Volume (ft^3)	(m^3)	Radionuclides
Lead			
Contaminated Lead	7.4	0.2	C0-60, Cs-137, Mn-54
Metals			
Mercury	4.0	0.1	Co-60, Cs-134, Cs-137, Mn-54
Arsenic	7.5	0.2	U-Nat
Scintillation Fluids			
Toluene	57.1	1.6	C-14, H-3, P-32,U-Nat
Xylene	7.5	0.2	C0-60, Cs-134, Cs-137, Mn-54
Other	70.0	2.0	C-14, H-3
Solvents & Other Organic Fluids Other	45.5	1.3	C-14, Co-58, Co-60, Cs-134, Cs-137, Mn-54, Ni-63
Alkaline Liquids	37.5	1.1	Co-60, Cs-134, Cs-137, Mn-54
Other	47.9	1.3	C-14, Co-57, Co-60, Cs-134, Cs-137, H-3, Mn-54, P-32, U-Nat
Total	284.3	8.1	

Chapter Three

Waste Projections

The 2012 Annual Survey required the generators to project the amount of LLRW they expect to produce or possess between 2013 and 2019. This information is used by the Agency for determining the development timeframe for a regional disposal facility or the need for an interim storage facility. Past history has indicated that the non-reactor generators underestimate volumes and activities by three to four times what was actually generated and disposed.

The projections are presented in both English and SI units for volume and activity.

Table 18 – LLRW Volume Projections (ft^3)
2013 - 2019

Year	2013	2014	2015	2016	2017	2018	2019
Academic	289	143	133	147	154	158	160
Fuel Cycle	50,000	50,000	50,000	50,000	50,000	50,000	50,000
Governmental	60	6	6	6	6	6	6
Industrial	5,903	5,902	5,902	5,928	5,899	5,898	5,898
Medical	576	426	336	336	336	336	336
Reactor	1,004,285	612,264	446,065	1,244,023	493,924	323,016	143,924
Total	1,061,113	668,740	502,441	1,300,440	550,319	379,414	200,324

Note: - Totals may not add due to rounding.

Table 19 – LLRW Volume Projections (m^3)
2013 - 2019

Year	2013	2014	2015	2016	2017	2018	2019
Academic	8	4	4	4	4	4	5
Fuel Cycle	1,416	1,416	1,416	1,416	1,416	1,416	1,416
Governmental	2	<1	<1	<1	<1	<1	<1
Industrial	167	167	167	168	167	167	167
Medical	16	12	10	10	10	10	10
Reactor	28,441	17,339	12,633	35,231	13,988	9,148	4,076
Total	30,051	18,939	14,229	36,828	15,585	10,745	5,673

Note – Totals may not add due to rounding.

Table 20 – LLRW Activity Projections (mCi)
2013 - 2019

Year	2013	2014	2015	2016	2017	2018	2019
Academic	266	109	100	90	109	131	136
Fuel Cycle	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Governmental	100,004	2	2	2	2	2	2
Industrial	4,741	4,763	4,763	4,764	4,763	4,763	4,763
Medical	45	44	44	44	44	44	44
Reactor	8,691,800	10,859,730	8,614,240	8,585,200	8,575,000	8,572,617	8,530,204
Total	8,797,855	10,865,648	8,620,149	8,591,100	8,580,918	8,578,557	8,536,149

Table 21 – LLRW Activity Projections (MBq)
2013 - 2019

Year	2013	2014	2015	2016	2017	2018	2019
Academic	9,824	4,015	3,682	3,330	4,033	4,847	5,032
Fuel Cycle	37,000	37,000	37,000	37,000	37,000	37,000	37,000
Governmental	3,700,130	74	74	74	74	74	74
Industrial	175,421	176,235	176,235	176,271	176,234	176,233	176,233
Medical	1,647	1,639	1,639	1,639	1,639	1,639	1,639
Reactor	321,596,600	401,810,010	318,726,880	317,652,400	317,275,000	317,186,829	315,617,548
Total	325,520,621	402,028,973	318,945,510	317,870,714	317,493,980	317,406,623	315,837,527

Note – Totals may not add due to rounding.

Mixed Waste Projections

The 2012 Annual Survey asked generators to project the volume and activity of mixed waste they thought they would produce between 2013 and 2019. The following tables provide a summary of the generators' projections. Tables are presented for volume and activity in both English and SI units.

Table 22 – Mixed Waste Volume Projections (ft^3) by Generator Category
2013 - 2019

Year	2013	2014	2015	2016	2017	2018	2019
Academic	120.0	0.0	0.0	0.0	0.0	0.0	0.0
Fuel Cycle	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Government	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Industrial	72.5	12.5	12.5	12.5	12.5	12.5	12.5
Medical	0.0	7.5	0.0	0.0	7.5	0.0	0.0
Reactor	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Total	200.5	28.0	20.5	20.5	28.0	20.5	20.5

Table 23 – Mixed Waste Volume Projections (m^3) by Generator Category
2013 - 2019

Year	2013	2014	2015	2016	2017	2018	2019
Academic	3.4	0.0	0.0	0.0	0.0	0.0	0.0
Fuel Cycle	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Government	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Industrial	2.1	0.4	0.4	0.4	0.4	0.4	0.4
Medical	0.0	0.2	0.0	0.0	0.2	0.0	0.0
Reactor	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Total	5.7	0.8	0.6	0.6	0.8	0.6	0.6

Note – Totals may not add due to rounding.

Table 24 – Mixed Waste Activity Projections (mCi) by Generator Category
2013 - 2019

Year	2013	2014	2015	2016	2017	2018	2019
Academic	20.0	0.0	0.0	0.0	0.0	0.0	0.0
Fuel Cycle	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Government	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Industrial	110.5	104.5	104.5	104.5	104.5	104.5	104.5
Medical	0.0	0.5	0.0	0.0	0.5	0.0	0.0
Reactor	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Total	134.5	109.0	108.5	108.5	109.0	108.5	108.5

Note – Totals may not add due to rounding.

Table 25 – Mixed Waste Volume Projections (MBq) by Generator Category
2013 - 2019

Year	2013	2014	2015	2016	2017	2018	2019
Academic	740.0	0.0	0.0	0.0	0.0	0.0	0.0
Fuel Cycle	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Government	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Industrial	4,088.5	3,866.5	3866.5	3,866.5	3,866.5	3,866.5	3,866.5
Medical	0.0	18.5	0.0	0.0	18.5	0.0	0.0
Reactor	148.0	148.0	148.0	148.0	148.0	148.0	148.0
Total	4,976.5	4,033.0	4,014.5	4,014.5	4,033.0	4,014.5	4,014.5

Note – Totals may not add due to rounding.