



**NEW YORK STATE LOW-LEVEL
RADIOACTIVE WASTE
STATUS REPORT FOR 2008**

JULY 1, 2009

**NEW YORK STATE
ENERGY RESEARCH AND
DEVELOPMENT AUTHORITY**



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Introduction

This report summarizes data on low-level radioactive waste (LLRW)¹ generated in New York State². It is based on reports from generators³ that file annually with the New York State Energy Research and Development Authority (NYSERDA). The New York State Low-Level Radioactive Waste Management Act⁴ (State Act) requires LLRW generators in the State to submit annual reports to NYSERDA providing detailed information on waste generated, stored, and disposed. To facilitate compliance, NYSERDA has developed report forms that can be downloaded from NYSERDA's website. Generators without internet access are provided paper copies upon request. This is the 23rd year generators have submitted such reports to NYSERDA.

The State Act requires NYSERDA to prepare an annual report summarizing, by type of generator and county of generation within the State, the nature, characteristics, and quantities of LLRW generated in New York. This report is designed to meet that requirement. There are three sections in the report summarizing the most recent year's data in a series of tables and figures. Section 1 reports waste disposed in 2008: volume, radioactivity⁵ and other characteristics. Section 2 summarizes waste held in storage pending future disposal as of December 31, 2008: volume, radioactivity, and other characteristics. Section 2 also summarizes the volume of waste held in storage for decay and subsequent disposal as non-radioactive waste as of December 31, 2008. Such waste may still be subject to special disposal requirements due to other hazardous characteristics (*e.g.*, regulated medical waste). Section 3 shows historical LLRW generation and includes generators' projections for the next five years.

In this report, volume is presented in cubic meters and radioactivity is presented in gigabecquerels (GBq) or megabecquerels (Mbq). These units have been adopted to be consistent with U.S. Nuclear Regulatory Commission uniform national LLRW manifest requirements. The Conversions for Units table [see p. 27] and footnotes to the relevant tables provide information for converting the data to the previously used units of cubic feet and curies.

¹ Low-level radioactive waste is one category of waste produced through processes that use radioactive materials. In the U.S., radioactive wastes are classified according to a number of different categories by federal law and U.S. Nuclear Regulatory Commission (NRC) regulations.

² Waste generated by certain federal installations and programs, such as the Brookhaven National Laboratory, the Knolls Atomic Power Laboratory, and West Valley Demonstration Project, are not included in this report nor in the requirements for generator reporting to NYSERDA. Under the federal Low-Level Radioactive Waste (LLRW) Policy Act, as amended in 1985 (Public Law 99-240), the federal government (not the states) is responsible for disposal of LLRW owned and generated by the U.S. DOE, the U.S. Navy as a result of decommissioning vessels, and the federal government as a result of research, development, testing, and production of nuclear weapons.

³ "Generator" is defined in 21 NYCRR Part 502.2(e) as "A person who by his actions within New York, or through the actions within New York of any agent, employee, or independent contractor, generates low-level radioactive waste."

⁴ New York Public Authorities Law. §1854-d(1) (McKinney, 2000)

⁵ Radioactivity is the measure of a material's propensity to emit radiation, or the number of radiation-emitting events occurring each second.

Section 1

Low-Level Radioactive Waste Disposed by New York State Generators in 2008

This section summarizes data reported by LLRW generators in New York State on waste transferred to licensed LLRW disposal facilities in Barnwell, South Carolina (Chem-Nuclear); Clive, Utah (Energy Solutions); and Richland, Washington (U.S. Ecology) during 2008. LLRW is categorized as Class A, B, or C. These categories were established originally by the U.S. Nuclear Regulatory Commission (NRC) in Title 10 of the Code of Federal Regulations, Part 61, “Licensing Requirements for Land Disposal of Radioactive Waste” and have since been adopted by the New York State Department of Environmental Conservation in 6 NYCRR Part 382, “Regulations for Low-Level Radioactive Waste Disposal Facilities.” Class A contains the lowest concentration of short- and long-lived radioactive materials and represents the largest Class by volume produced in the State. On the other end of the spectrum, Class C waste contains the greatest concentration of long-lived radioactive material and, while normally being the smallest in terms of volume generated, usually contains the greatest amount of radioactivity. Class B, as the name suggests, is an intermediate category.

The Clive facility can accept most Class A waste, but cannot accept Class B or C waste. The Clive facility can also accept, treat, and dispose of most solid, mixed waste (*i.e.*, LLRW that also contains other hazardous constituents) that meets the site’s radioactivity concentration limits. The Richland facility is authorized to accept limited volumes of LLRW containing small quantities of naturally occurring radioactive material (*e.g.*, radium, uranium, thorium) from New York State generators. The Barnwell facility accepts all classes of LLRW, however it ceased accepting waste from New York generators, and all other generators outside the Atlantic Compact, on July 1, 2008. Waste disposal at Barnwell that is summarized in this report reflects the period January through June 2008.

In 2008, generators in New York State reported disposing of 440 cubic meters (15,561 cubic feet) of LLRW containing more than 3,433,738 GBq (92,804 curies) of radioactivity. About 93% of the volume of LLRW, containing 0.1% of the radioactivity, was shipped to the Clive, Utah facility. The Barnwell, South Carolina facility received 7% of the volume and 99.9% of the radioactivity. The large jump in radioactive content for 2007 and 2008 corresponds to an increase in disposal at the Barnwell facility prior to its closure to NY waste on July 1, 2008.

The volume of waste reported as being disposed in 2008 represents a return to the lower volumes reported prior to 2003. Very high volumes of low activity waste had been reported in 2003 through 2006 due to two significant projects; a major site decontamination effort and decommissioning of a research reactor. The volume reported disposed in 2007 represented a significant drop, but was still higher than expected due to a cleanout of a waste storage facility at the Nine Mile Point Unit 2 nuclear power plant.

Individual entries in the following tables have been rounded using standard practices as described below. The totals shown represent the sum of the rounded entries, therefore they may vary from one table to another and may not always equal 100%. Waste volumes have been rounded to the nearest 10th of a cubic meter. In most cases, radioactivity has been rounded to the nearest 10,000th of a GBq. Percentages have been rounded to the nearest 10th of a percent in the table and figures.

Table 1-1: Generators Reporting and Disposing¹ Waste

Generator Type	Number Reporting	Number Disposing
MEDICAL		
Government	9	3
Private	94	4
College	14	10
Other	3	0
Total Medical	120	17
INDUSTRIAL		
Manufacturing	7	4
Research & Development	11	6
Other	11	6
Total Industrial	29	16
ACADEMIC (non-medical)		
College or University	24	6
Other	3	2
Total Academic	27	8
GOVERNMENT (non-medical)		
New York State	4	1
Other	5	1
Total Government	9	2
TOTAL NON-POWER PLANT	185	43
NUCLEAR POWER PLANT	6	6
TOTAL	191	49

¹ Disposal refers to generators who reported transferring any class of LLRW directly or via brokers or processors to one of the available licensed LLRW disposal facilities. LLRW generators that did not dispose waste are storing waste for future disposal or storing waste for decay and subsequent disposal as non-radioactive waste. Section 2 addresses storage in detail.

Table 1-2: Volume and Radioactivity of Waste Disposed¹

Generator Type	Volume (m³)²	% of Total	Radioactivity (GBq)²	% of Total
MEDICAL				
Government	1.3		8.7882	
Private	1.0		67.7900	
College	15.5		31.2930	
Other	0.0		0.0000	
Total Medical	17.8	4.0	107.8712	*
INDUSTRIAL				
Manufacturing	18.4		271.9560	
Research & Development	2.1		3.9825	
Other	21.1		2.0475	
Total Industrial	41.6	9.4	277.9860	*
ACADEMIC (non-medical)				
College or University	6.8		30.3920	
Other	0.6		4.6181	
Total Academic	7.4	1.7	35.0101	*
GOVERNMENT (non-medical)				
New York State	0.3		0.3358	
Other	1.5		0.0001	
Total Government	1.8	0.4	0.3359	*
TOTAL NON-POWER PLANT	68.6	15.6	421.2032	*
NUCLEAR POWER PLANT	372.1	84.4	3,433,317.3369	99.9
TOTAL	440.7	100.0	3,433,738.5401	100.0
	(15,561 ft³)		(92,804 curies)	

¹ Refers to all classes of LLRW transferred either directly or via broker or processor to one of the available licensed LLRW disposal facilities.

² To obtain volume in cubic feet, multiply the number of cubic meters by 35.31. To obtain radioactivity in curies, divide the number of gigabecquerels (GBq) by 37.

* Less than 0.1% or 0.1 cubic meters.

Table 1-3: Waste Disposed¹, by Class² and Generator Type

Generator Type	Class A		Class B		Class C	
	Volume (m ³) ³	Radioactivity (GBq) ³	Volume (m ³) ³	Radioactivity (GBq) ³	Volume (m ³) ³	Radioactivity (GBq) ³
MEDICAL	17.7	19.7183	0.0	0.0000	0.1	88.1517
INDUSTRIAL	41.7	277.9859	0.0	0.0000	0.0	0.0000
ACADEMIC	7.3	18.3821	0.0	0.0000	0.1	16.6281
GOVERNMENT	1.7	0.3358	0.0	0.0000	0.0	0.0000
NUCLEAR POWER PLANT	346.3	3,027.8440	3.9	3,134.7271	21.9	3,427,154.7660
TOTAL	414.7	3,344.2661	3.9	3,134.7271	22.1	3,427,259.5458
	(14,643 ft³)	(90 curies)	(138 ft³)	(85 curies)	(780 ft³)	(92,629 curies)

¹ Refers to LLRW transferred directly or via brokers or processors to one of the available licensed LLRW disposal facilities.

² Classes A, B, and C are waste-classification categories established by the U.S. Nuclear Regulatory Commission (NRC) in Title 10 of the Code of Federal Regulations, Part 61, "Licensing Requirements for Land Disposal of Radioactive Waste," and adopted by the New York State Department of Environmental Conservation in 6 NYCRR Part 382, "Regulations for Low-Level Radioactive Waste Disposal Facilities."

³ To obtain volume in cubic feet, multiply the number of cubic meters by 35.31. To obtain radioactivity in curies, divide the number of gigabecquerels (GBq) by 37.

* Less than 0.1 cubic meters, 0.0001 gigabecquerels, or 0.1%.

Unless otherwise noted, all data were derived from low-level radioactive waste generator reports received by NYSERDA as of May 22, 2009.

Table 1-4: Distribution of Waste Among Disposal Facilities¹

Disposal Facility	Volume (m³)²	% of Total	Radioactivity (GBq)²	% of Total
Barnwell, South Carolina	30.7	7.0	3,430,984.6973	99.9
Clive, Utah	410.0	93.0	2,752.6272	0.1
Richland, Washington	*	*	1.2125	*
TOTAL	440.7 (15,561 ft³)	100.0	3,433,738.5401 (92,804 curies)	100.0

¹ Refers to all classes of LLRW transferred either directly or via a broker or processor to the respective disposal facility.

² To obtain volume in cubic feet, multiply the number of cubic meters by 35.31. To obtain radioactivity in curies, divide the number of gigabecquerels (GBq) by 37.

* Less than 0.1% or 0.1 cubic meters.

Unless otherwise noted, all data were derived from low-level radioactive waste generator reports received by NYSERDA as of May 22, 2009.

Table 1-5: Waste Disposed, by County of Origin

County	Number of Generators Reporting	Number of Generators Disposing LLRW ¹	Volume (m ³) ²	% of Total	Radioactivity (GBq) ²	% of Total
Albany	10	3	1.8	0.4	0.4176	*
Allegany	0	0	0.0	0.0	0.0000	0.0
Bronx	4	1	0.5	0.1	2.6763	*
Broome	1	1	0.4	*	0.0550	*
Cattaraugus	1	0	0.0	0.0	0.0000	0.0
Cayuga	0	0	0.0	0.0	0.0000	0.0
Chautauqua	1	0	0.0	0.0	0.0000	0.0
Chemung	4	0	0.0	0.0	0.0000	0.0
Chenango	2	0	0.0	0.0	0.0000	0.0
Clinton	1	0	0.0	0.0	0.0000	0.0
Columbia	1	0	0.0	0.0	0.0000	0.0
Cortland	0	0	0.0	0.0	0.0000	0.0
Delaware	0	0	0.0	0.0	0.0000	0.0
Dutchess	7	2	0.2	*	3.5839	*
Erie	18	4	16.5	3.7	292.4511	*
Essex	0	0	0.0	0.0	0.0000	0.0
Franklin	2	0	0.0	0.0	0.0000	0.0
Fulton	0	0	0.0	0.0	0.0000	0.0
Genesee	0	0	0.0	0.0	0.0000	0.0
Greene	0	0	0.0	0.0	0.0000	0.0
Hamilton	0	0	0.0	0.0	0.0000	0.0
Herkimer	0	0	0.0	0.0	0.0000	0.0
Jefferson	1	0	0.0	0.0	0.0000	0.0
Kings	8	1	0.6	0.1	0.6200	*
Lewis	0	0	0.0	0.0	0.0000	0.0
Livingston	2	0	0.0	0.0	0.0000	0.0
Madison	1	0	0.0	0.0	0.0000	0.0
Monroe	9	3	1.4	0.3	4.6683	*
Montgomery	1	0	0.0	0.0	0.0000	0.0
Nassau	14	5	3.7	0.8	48.2973	*
New York	16	11	35.4	8.0	13.8062	*
Niagara	2	0	0.0	0.0	0.0000	0.0
Oneida	4	1	0.1	*	32.6960	*
Onondaga	13	2	0.1	*	8.5700	*

Unless otherwise noted, all data were derived from low-level radioactive waste generator reports received by NYSERDA as of May 22, 2009.

Table 1-5: Waste Disposed, by County of Origin (continued)

County	Number of Generators Reporting	Number of Generators Disposing LLRW ¹	Volume (m ³) ²	% of Total	Radioactivity (GBq) ²	% of Total
Ontario	3	0	0.0	0.0	0.0000	0.0
Orange	4	0	0.0	0.0	0.0000	0.0
Orleans	0	0	0.0	0.0	0.0000	0.0
Oswego	4	3	232.1	52.7	3,413,074.2346	99.4
Otsego	0	0	0.0	0.0	0.0000	0.0
Putnam	1	0	0.0	0.0	0.0000	0.0
Queens	5	1	0.3	*	0.0331	*
Rensselaer	3	0	0.0	0.0	0.0000	0.0
Richmond	0	0	0.0	0.0	0.0000	0.0
Rockland	5	2	0.3	*	1.5125	*
St. Lawrence	2	0	0.0	0.0	0.0000	0.0
Saratoga	3	0	0.0	0.0	0.0000	0.0
Schenectady	2	0	0.0	0.0	0.0000	0.0
Schoharie	0	0	0.0	0.0	0.0000	0.0
Schuyler	1	0	0.0	0.0	0.0000	0.0
Seneca	0	0	0.0	0.0	0.0000	0.0
Steuben	2	0	0.0	0.0	0.0000	0.0
Suffolk	11	3	6.1	1.4	1.9879	*
Sullivan	1	0	0.0	0.0	0.0000	0.0
Tioga	0	0	0.0	0.0	0.0000	0.0
Tompkins	4	2	0.2	*	9.7218	*
Ulster	2	0	0.0	0.0	0.0000	0.0
Warren	2	0	0.0	0.0	0.0000	0.0
Washington	0	0	0.0	0.0	0.0000	0.0
Wayne	1	1	49.6	11.3	4,773.8000	0.1
Westchester	12	3	91.4	20.7	15,469.3785	0.5
Wyoming	0	0	0.0	0.0	0.0000	0.0
Yates	0	0	0.0	0.0	0.0000	0.0
TOTALS	191	49	440.7		3,433,738.5401	
			(15,561 ft³)		(92,804 curies)	

¹ Refers to the number of generators that reported transferring all classes of LLRW either directly or via a broker or processor to one of the available licensed LLRW disposal facilities.

² To obtain volume in cubic feet, multiply the number of cubic meters by 35.31. To obtain radioactivity in curies, divide the number of gigabecquerels (GBq) by 37.

* Less than 0.1 cubic meter or 0.1%.

Unless otherwise noted, all data were derived from low-level radioactive waste generator reports received by NYSERDA as of May 22, 2009.

Table 1-6: Radionuclide Content of Waste Disposed (MBq)²

Radionuclide	Half-Life ³	Academic	Government	Industrial	Medical	Nuclear Power Plants	Total
Ag-110m	249.8 d			0.888		14,626.354	1.5 E4
Am-241	432.7 y	22.008		190.930	2.227	301.027	5.2 E2
Ba-133	10.5 y	0.083		0.091	9.948		10.0
C-14	5.7 E3 y	994.589	117.697	1,115.436	1,469.238	153,445.824	1.6 E5
Cd-109	461.0 d	7.401			114.111		1.2 E2
Ce-144	284.6 d			0.444		180,549.313	1.8 E5
Cl-36	3.01 E5 y	3.704			15.537		19.2
Cm-242	162.8 d					295.508	2.9 E2
Cm-243	29.1 y					688.358	6.9 E2
Cm-244	29.1 y	0.005				539.850	5.4 E2
Co-56	77.3 d				111.560		1.1 E2
Co-57	271.8 d	0.037			346.672	19,452.319	1.9 E4
Co-58	70.9 d				148.000	7,108,123.184	7.1 E6
Co-60	5.3 y	1.365		3,264.556	99.337	1,629,286,478.300	1.6 E9
Cr-51	27.7 d					1,199,839.702	1.2 E6
Cs-134	2.1 y			1.554		2,383,654.818	2.4 E6
Cs-137	30.1 y	4,632.064		1.332	80,514.254	6,175,925.972	6.3 E6
Fe-55	2.7 y	47.001			37.000	1,564,981,111.800	1.6 E9
Fe-59	44.5 d					3,960,431.895	4.0 E6
Gd-153	241.6 d				267.640		2.7 E2
Ge-68	270.8 d				18.500		18.5
H-3	12.3 y	20,445.845	211.159	1,131.334	20,786.737	123,607.277	1.7 E5
Hg-203	46.6 d	29.500					29.5
I-125	59.4 d	12.647			1,808.953		1.8 E3
I-129	1.6 E7 y	0.128			0.030	142.731	1.4 E2
Ir-192	73.8 d				235.690		2.4 E2
Kr-85	10.7 y	5,198.553					5.2 E3
Mn-51	46.2 m				37.000		37.0
Min-54	312.1 d	61.790		2.726	25.560	53,732,990.066	5.4 E7
Mo-99	2.7 d			76.220			76.22
Na-22	2.6 y	0.016			24.947		24.9
Nb-94	2.0 E4 y					3,431.768	3.4 E3
Nb-95	35.0 d					24,217.270	2.4 E4
Ni-59	7.6 E4 y					964,712.459	9.6 E5
Ni-63	101 y	3,332.186		271,620.000		152,049,818.350	1.5 E8

Unless otherwise noted, all data were derived from low-level radioactive waste generator reports received by NYSERDA as of May 22, 2009.

Radionuclide	Half-Life ³	Academic	Government	Industrial	Medical	Nuclear Power Plants	Total
P-32	14.3 d	28.342					28.3
Pd-103	17 d				290.857		2.9 E2
Po-210	138.4 d			95.475			95.5
Pu-238	87.7 y					1,392.941	1.3 E3
Pu-239	2.4 E4 y					164.246	1.6 E2
Pu-240	2.4 E4 y					109.394	1.1 E2
Pu-241	14.4 y					57,411.818	5.7 E4
Ra-226	1.6 E3 y	165.356	0.007	453.810	1,047.140		1.7 E3
Ru-106	1.0 y			1.332	3.890	1,000.000	1.0 E3
S-35	87.2 d	1.073			55.864		56.9
Sb-124	60.2 d					83,538.718	8.4 E4
Sb-125	2.8 y			0.550		108,679.883	1.1 E5
Sn-113	115.1 d					7,060.000	7.1 E3
Sr-89	50.5 d					2,210.000	2.2 E3
Sr-90	28.8 y	1.250		0.002	4,668.744	203,541.760	2.1 E5
Ta-182	114.4 d					531,714.246	5.3 E5
Tc-99m	6.0 h	0.188		0.037		1,773.150	2.2 E3
Th-230	7.5 E4 y			0.504	0.169		0.6
Th-232	1.4 E10 y	0.033	0.370	48.810			49.2
U-238	4.5 E9 y	21.984	6.545	7.497	60.746	0.001	96.2
Zn-65	243.8 d	0.074		0.001	150.410	11,011,107.489	1.1 E7
Zr-93	1.5 E6 y					0.019	0.019
Zr-95	64 d					6,283.200	6.3 E3
Other ⁴	---	---	---	---	---	---	---
Total	Total	35,010.075	335.853	277,986.382	107,871.296	3,433,317,336.900	3.4 E9

¹ Some generator facilities have reported radionuclides with half-lives of less than 90 days in LLRW disposed. In the majority of these cases, these radionuclides cannot be separated readily from longer-lived radionuclides in the waste. The sum of individual radionuclide radioactivities will frequently not match the overall radioactivity totals reported for waste disposed due to rounding and other approximation techniques. Every effort is made to identify and resolve significant discrepancies.

² To obtain radioactivity in curies, divide the number of MBq by 37,000.

³ Source: Chart of the Nuclides, General Electric Company under the direction of Naval Reactors, U.S. DOE; 16th edition, revised to 2002. NB: y=years, m=months, d=days, h=hours.

⁴ In certain cases, LLRW generators are permitted by manifest to report a single activity for a group of radionuclides without assigning a value to each; those data are reported here.

Table 1-7: Number of Facilities Disposing Various Waste Types¹

Waste Type ²	Medical	Industrial	Academic	Government	Nuclear	Total
					Power Plants	
Activated Material	1	1	0	0	1	3
Aqueous Liquids	3	3	3	1	2	12
Animal Carcasses	1	1	1	0	0	3
Anion Exchange Media	0	0	0	0	0	0
Biological Material (except animal carcasses)	2	0	0	0	0	2
Cation Exchange Medias	0	0	0	0	1	1
Charcoal	0	0	0	0	1	1
Compacted Trash	9	9	5	2	2	27
Contaminated Equipment	0	1	0	0	1	2
Demolition Rubble	0	1	0	0	1	2
Evaporator Bottoms /Sludges/Concentrates	0	1	0	0	0	1
Filter Media	0	2	0	0	1	3
Filter (Mechanical)	0	1	0	0	2	3
Glassware/Labware	0	0	0	0	0	0
Incinerator Ash	0	0	0	0	0	0
Material to be Incinerated	2	2	1	1	1	7
Mixed Bed Ion-Exchange Media	0	0	0	0	2	2
Non-Compacted Trash	1	2	0	0	2	5
Oil	0	2	0	0	0	2
Organic Liquids (excluding oil)	2	2	0	0	0	4
Paint or Plating	0	1	0	0	0	1
Sealed Source/Device	2	2	1	2	0	7
Soil	0	0	0	0	0	0
Other ³	1	1	1	2	2	7

¹ Refers to the number of generators who reported transferring any class of LLRW directly and via brokers and processors to one of the available licensed LLRW disposal facilities.

² Waste types listed are as defined by the U.S. Nuclear Regulatory Commission (NRC) Uniform Manifest. Generators frequently report disposal of several types of waste.

³ In certain cases, generators reported disposing waste that did not fit into any of the categories listed. Those data are reported here.

Unless otherwise noted, all data were derived from low-level radioactive waste generator reports received by NYSERDA as of May 22, 2009.

Section 2

Low-Level Radioactive Waste in Storage (as of December 31, 2008)

This section provides information on LLRW being stored by generators.

Many generators store LLRW to allow its radioactivity to diminish to levels that permit disposal as non-radioactive waste (*i.e.*, storage for decay). In general, the regulatory agencies with jurisdiction over LLRW in the State allow storage for decay only where the waste contains radionuclides with half-lives less than 90 days. LLRW in storage for decay is normally held for 10 half-lives or until radioactivity has diminished to a level where it is indistinguishable from background radiation. Most generators hold LLRW in storage for decay at their own facilities, although approved off-site facilities may be used.

Generators also regularly store waste pending future transfer to a licensed LLRW disposal facility (*i.e.*, storage pending disposal). Storage pending disposal can occur for extended periods, as when the Barnwell LLRW disposal facility closed to generators in New York from June 30, 1994 until June 30, 1995. The Barnwell facility has again closed to generators in New York as of July 1, 2008. Such storage may also occur when the LLRW has a particular characteristic that makes it unacceptable at the available disposal facilities (*e.g.*, contains chemically hazardous components).

For those cases where access to licensed disposal facilities is not available, most generators will store LLRW at their own sites, although approved off-site storage facilities may be used. In addition, most generators routinely store LLRW at their facilities for short periods as a normal part of operation or staging while accumulating a sufficient quantity for transfer to a waste broker or a treatment or disposal facility. Post-storage treatment or processing may significantly reduce the volume of waste requiring final disposal.

Individual entries in the following tables have been rounded using standard procedures as described below. The totals shown represent the sum of the rounded entries, therefore they may vary slightly from one table to another and may not always equal 100%. Waste volumes have been rounded to the nearest 10th of a cubic meter. In most cases, radioactivity has been rounded to the nearest 10,000th of a GBq. Percentages have been rounded to the nearest 10th of a percent in the tables and figures.

Table 2-1: Generators Reporting and Storing Waste Pending Disposal¹

Generator Type	Number Reporting	Number² Storing
MEDICAL		
Government	9	1
Private	94	5
College	14	3
Other	3	0
Total Medical	120	9
INDUSTRIAL		
Manufacturing	7	4
Research & Development	11	3
Other	11	5
Total Industrial	29	12
ACADEMIC (non-medical)		
College or University	24	8
Other	3	1
Total Academic	27	9
GOVERNMENT (non-medical)		
New York State	4	2
Other	5	2
Total Government	9	4
TOTAL NON-POWER PLANT	185	34
NUCLEAR POWER PLANT	6	3
TOTAL	191	37

¹ Includes any class of LLRW in storage at generator sites or an approved off-site location pending transfer to a licensed LLRW facility, as of December 31, 2008. Does not include LLRW held in storage for decay.

Unless otherwise noted, all data were derived from low-level radioactive waste generator reports received by NYSERDA as of May 22, 2009.

Table 2-2: Volume and Radioactivity of Waste Stored Pending Disposal¹

Generator Type	Volume (m³)²	% of Total	Radioactivity (GBq)²	% of Total
MEDICAL				
Government	0.8		0.8145	
Private	3.2		0.2153	
College	37.5		2.8930	
Other	0.0		0.0000	
Total Medical	41.5	16.2	3.9228	0.1
INDUSTRIAL				
Manufacturing	8.2		97.3421	
Research & Development	0.7		0.0563	
Other	3.7		0.3035	
Total Industrial	12.6	4.9	97.7018	1.5
ACADEMIC (non-medical)				
College or University	4.4		1.7608	
Other	0.1		0.0185	
Total Academic	4.5	1.8	1.7793	*
GOVERNMENT (non-medical)				
New York State	35.6		456.8072	
Other	0.1		1.1100	
Total Government	35.7	13.9	457.9173	7.2
TOTAL NON-POWER PLANT	94.3	36.8	561.3212	8.9
NUCLEAR POWER PLANT	162.2	63.2	5,762.2660	91.1
TOTAL	256.5	100.0	6,323.5872	100.0
	(9,057 ft³)		(171 curies)	

¹ Includes all classes of LLRW reported in storage at generator sites or an approved off-site location pending transfer to a licensed LLRW facility, as of December 31, 2008. Does not include LLRW held in storage for decay.

² To obtain volume in cubic feet, multiply the number of cubic meters by 35.31. To obtain radioactivity in curies, divide the number of gigabecquerels (GBq) by 37.

* Less than 0.1% or 0.1 cubic meters.

Table 2-3: Waste in Storage Pending Disposal, by Class¹ and Generator Type²

Generator Type	Class A		Class B		Class C	
	Volume (m ³) ³	Radioactivity (GBq) ³	Volume (m ³) ³	Radioactivity (GBq) ³	Volume (m ³) ³	Radioactivity (GBq) ³
MEDICAL	41.5	3.9228	0.0	0.0000	0.0	0.0000
INDUSTRIAL	12.6	97.7017	0.0	0.0000	0.0	0.0000
ACADEMIC	4.5	1.7794	0.0	0.0000	0.0	0.0000
GOVERNMENT	35.7	457.9173	0.0	0.0000	0.0	0.0000
NUCLEAR POWER PLANT	155.1	586.0100	7.1	5,176.2560	0.0	0.0000
TOTAL	249.5	1,147.3312	7.1	5,176.2560	0.0	0.0000
	(8,810 ft³)	(31 curies)	(251 ft³)	(140 curies)	(0.0 ft³)	(0.0 curies)

¹ Classes A, B, and C are waste-classification categories established by the U.S. Nuclear Regulatory Commission (NRC) in Title 10 of the Code of Federal Regulations, Part 61, "Licensing Requirements for Land Disposal of Radioactive Waste," and adopted by the New York State Department of Environmental Conservation in 6 NYCRR Part 382, "Regulations for Low-Level Radioactive Waste Disposal Facilities."

² Refers to LLRW in storage at generator sites or an approved off-site location pending transfer to a licensed LLRW facility, as of December 31, 2008. Does not include LLRW held in storage for decay.

³ To obtain volume in cubic feet, multiply the number of cubic meters by 35.31. To obtain radioactivity in curies, divide the number of gigabecquerels (GBq) by 37.

Unless otherwise noted, all data were derived from low-level radioactive waste generator reports received by NYSERDA as of May 22, 2009.

Table 2-4: Number of Facilities Reporting Storage of Various Waste Types Pending Disposal

Waste Type ¹	Medical	Industrial	Academic	Government	Nuclear Power Plants	Total
Activated Material	0	0	0	0	0	0
Animal Carcasses	1	0	0	0	0	1
Anion Exchange Media	0	0	0	0	0	0
Aqueous Liquids	1	3	2	3	1	10
Biological Material (Except Animal Carcasses)	1	0	1	0	0	2
Cation Exchange Media	0	0	0	0	0	0
Contaminated Equipment	0	1	0	1	0	2
Compacted Trash	4	5	2	2	1	14
Demolition Rubble	0	0	1	0	0	1
Evaporator Bottoms/Sludge	0	1	0	0	0	1
Filter Media	0	2	0	0	0	2
Filter Media (Mechanical)	0	0	0	0	0	0
Glassware/Labware	0	3	1	2	0	6
Incinerator Ash	0	0	0	0	0	0
Material that will be Incinerated	1	0	0	0	0	1
Mixed Bed Ion-Exchange Media	0	0	0	0	1	1
Non-Compactible Trash	0	2	0	3	0	5
Organic Liquids (excluding oil)	0	1	0	1	0	2
Sealed Source/Device	2	1	1	1	0	5
Soil	0	1	0	0	0	1
Other ²	0	1	0	0	0	1

¹ Waste types listed are as defined by the U.S. Nuclear Regulatory Commission (NRC) Uniform Manifest. Generators frequently report storage of several types of waste.

² In certain cases, generators reported storage of waste that did not fit into any of the categories listed. Those data are reported here.

Unless otherwise noted, all data were derived from low-level radioactive waste generator reports received by NYSERDA as of May 22, 2009.

Table 2-5: Waste in Storage¹ Pending Disposal, by County of Origin

County	Number of Generators Reporting	Number of Generators Storing LLRW ²	Volume (m ³) ³	% of Total	Radioactivity (GBq) ³	% of Total
Albany	10	3	0.4	0.2	0.1530	*
Allegany	0	0	0.0	0.0	0.0000	0.0
Bronx	4	1	*	*	0.0350	*
Broome	1	0	0.0	0.0	0.0000	0.0
Cattaraugus	1	1	35.4	13.8	456.8072	7.2
Cayuga	0	0	0.0	0.0	0.0000	0.0
Chautauqua	1	0	0.0	0.0	0.0000	0.0
Chemung	4	0	0.0	0.0	0.0000	0.0
Chenango	2	2	0.2	*	0.0149	*
Clinton	1	0	0.0	0.0	0.0000	0.0
Columbia	1	0	0.0	0.0	0.0000	0.0
Cortland	0	0	0.0	0.0	0.0000	0.0
Delaware	0	0	0.0	0.0	0.0000	0.0
Dutchess	7	1	0.1	*	0.0114	*
Erie	18	7	7.5	2.9	98.3021	1.6
Essex	0	0	0.0	0.0	0.0000	0.0
Franklin	2	1	0.1	*	0.0185	*
Fulton	0	0	0.0	0.0	0.0000	0.0
Genesee	0	0	0.0	0.0	0.0000	0.0
Greene	0	0	0.0	0.0	0.0000	0.0
Hamilton	0	0	0.0	0.0	0.0000	0.0
Herkimer	0	0	0.0	0.0	0.0000	0.0
Jefferson	1	0	0.0	0.0	0.0000	0.0
Kings	8	0	0.0	0.0	0.0000	0.0
Lewis	0	0	0.0	0.0	0.0000	0.0
Livingston	2	1	0.2	*	0.0016	*
Madison	1	0	0.0	0.0	0.0000	0.0
Monroe	9	2	0.2	*	0.0244	*
Montgomery	1	0	0.0	0.0	0.0000	0.0
Nassau	14	2	3.3	1.3	0.0187	*
New York	16	5	43.5	17.0	1.9016	*
Niagara	2	0	0.0	0.0	0.0000	0.0
Oneida	4	0	0.0	0.0	0.0000	0.0
Onondaga	13	0	0.0	0.0	0.0000	0.0

Unless otherwise noted, all data were derived from low-level radioactive waste generator reports received by NYSERDA as of May 22, 2009.

Table 2-5: Waste in Storage¹ Pending Disposal, by County of Origin (continued)

County	Number of Generators Reporting	Number of Generators Storing LLRW ²	Volume (m ³) ³	% of Total	Radioactivity (GBq) ³	% of Total
Ontario	3	0	0.0	0.0	0.0000	0.0
Orange	4	0	0.0	0.0	0.0000	0.0
Orleans	0	0	0.0	0.0	0.0000	0.0
Oswego	4	4	164.1	64.0	5,762.3030	91.1
Otsego	0	0	0.0	0.0	0.0000	0.0
Putnam	1	0	0.0	0.0	0.0000	0.0
Queens	5	1	0.7	0.3	1.1669	*
Rensselaer	3	1	0.4	0.2	1.4211	*
Richmond	0	0	0.0	0.0	0.0000	0.0
Rockland	5	2	0.2	*	0.1429	*
St. Lawrence	2	0	0.0	0.0	0.0000	0.0
Saratoga	3	0	0.0	0.0	0.0000	0.0
Schenectady	2	1	0.1	*	0.1543	*
Schoharie	0	0	0.0	0.0	0.0000	0.0
Schuyler	1	0	0.0	0.0	0.0000	0.0
Seneca	0	0	0.0	0.0	0.0000	0.0
Steuben	2	0	0.0	0.0	0.0000	0.0
Suffolk	11	1	*	*	0.0001	*
Sullivan	1	0	0.0	0.0	0.0000	0.0
Tioga	0	0	0.0	0.0	0.0000	0.0
Tompkins	4	0	0.0	0.0	0.0000	0.0
Ulster	2	0	0.0	0.0	0.0000	0.0
Warren	2	0	0.0	0.0	0.0000	0.0
Washington	0	0	0.0	0.0	0.0000	0.0
Wayne	1	0	0.0	0.0	0.0000	0.0
Westchester	12	1	0.1	*	1.1100	*
Wyoming	0	0	0.0	0.0	0.0000	0.0
Yates	0	0	0.0	0.0	0.0000	0.0
TOTALS	191	37	256.5 (9,061 ft³)		6,323.5872 (171 curies)	

¹ Includes LLRW in storage at generator sites or an approved off-site location pending transfer to a licensed LLRW facility, as of December 31, 2008. Does not include LLRW held in storage for decay.

² Refers to the number of generators who reported LLRW in storage pending disposal as of December 31, 2008.

³ To obtain volume in cubic feet, multiply the number of cubic meters by 35.31. To obtain radioactivity in curies, divide the number of gigabecquerels (GBq) by 37.

* Less than 0.1 cubic meter, or 0.1%, or 0.0001GBq.

Unless otherwise noted, all data were derived from low-level radioactive waste generator reports received by NYSERDA as of May 22, 2009.

Table 2-6: Radionuclide Content of Waste¹ in Storage Pending Disposal (MBq)²

Radionuclide	Half-Life ³	Academic	Government	Industrial	Medical	Nuclear Power Plants	Total
Ag-110	24.65			0.250			0.25
Am-241	432.7 y		0.007	74.040		23.055	97.1
Ba-133	10.5 y	0.003		0.008			0.011
C-14	5.7 E3 y	146.489	7,518.797	197.858	810.124	3,559,400	1.2 E4
Cd-109	461.0 d	4.000					4.0
Ce-144	284.6 d			0.140		17,216.687	1.7 E4
Cm-242	162.8 d					1.219	1.2
Cm-243	29.1 y					23.896	23.9
Cm-244	18.1 y					92.500	92.5
Co-57	271.8 d				37.000		37.0
Co-58	70.9 d					9.139	9.1
Co-60	5.3 y	0.003	0.001	0.860		1,194,798.005	1.2 E6
Cr-51	27.7 d					0.033	0.033
Cs-134	2.1 y					25,792.000	2.6 E4
Cs-137	30.1 y	1.689	246.897	0.277		343,848.050	3.4 E5
Eu-152	13.5 y				11.000		11.0
Eu-154	8.6 y				12.000		12.0
Eu-155	4.8 y				12.000		12.0
Fe-55	2.7 y					3,755,700.000	3.8 E6
Fe-59	44.5 d					9.175	9.2
H-3	12.3 y	1,141.028	448,881.038	168.700	2,994.547	2,722.500	4.6 E5
I-125	59.4 d			298.200	46.102		3.4 E2
I-129	1.6 E7 y		0.203				0.203
Mn-54	312.1 d			0.660		87,138.000	8.7 E4
Mo-99	2.7 d				0.007		0.007
Ni-63	101 y	370.000	1,110.000	96,913.840		186,456.300	2.8 E5
Pb-210	22.3 y		0.001				0.001
Po-210	138.4 d y			37.020			37.0
Pu-238	87.8 y					22.389	22.4
Pu-239	2.4 E4 y		0.001			10.488	10.5

Unless otherwise noted, all data were derived from low-level radioactive waste generator reports received by NYSERDA as of May 22, 2009.

Radionuclide	Half-Life ³	Academic	Government	Industrial	Medical	Nuclear Power Plants	Total
Pu-241	14.4 y					0.290	0.29
Ra-226	1.6 E3 y		0.001	0.037			0.04
Ra-228	5.8 y			0.038			0.04
Ru-106	1.02 y			0.320			0.32
S-35	87.2 d	50.000					50.0
Sb-124	60.2 d					0.0167	0.02
Sb-125	2.75 y			0.140		4.290	4.43
Sm-153	1.9 d				0.008		0.01
Sr-90	28.8 y		61.730	0.037		9,399.900	9.5 E3
Tc-99m	6.0 h		98.750			73.26	1.7 E2
Te-123	6 E14 y			0.130			0.13
Th-230	7.5 E4 y		0.0001	0.217			0.2
Th-232	1.4 E10 y			2.075			2.1
U-238	4.5 E9 y	15.268		6.137			21.4
Yb-169	32.0 d		0.001				0.001
Zn-65	243.8 d					135,057.700	1.4 E5
Others ⁴			0.001				0.001
	Total	1,778.480	457,917.422	97,700.984	3,922.788	5,761,958.289	6.3 E6

¹ Some generator facilities have reported radionuclides with half-lives of less than 90 days in LLRW stored. In the majority of these cases, the shorter-lived radionuclides reported cannot be separated readily from longer-lived radionuclides in the waste. The sum of individual radionuclide radioactivities will frequently not match the overall radioactivity totals reported for waste stored due to rounding and other approximation techniques. Every effort is made to identify and resolve significant discrepancies with the affected generators.

² To obtain radioactivity in curies, divide the number of MBq by 37,000.

³ Source: Chart of the Nuclides, General Electric Company under the direction of Naval Reactors, U.S. DOE; 16th edition, revised to 2002. NB: y=years, m=months, d=days, h=hours.

⁴ In certain cases, LLRW generators are permitted by manifest to report a single activity for a group of radionuclides without assigning a value to each; those data are reported here.

Table 2-7: Waste Reported in Storage for Decay¹, by Generator Type

Generator Type	Number of Generators Reporting	Number of Generators Reporting Storage for Decay ²	Number of Generators Reporting Only Storage for Decay	Estimated Maximum Volume in Storage for Decay at Any Time (m ³) ³
MEDICAL	120	108	88	662
INDUSTRIAL	29	8	4	5
ACADEMIC	27	17	5	129
GOVERNMENT	9	3	2	21
NUCLEAR POWER PLANT	6	0	0	0
TOTAL	191	136	99	817 (28,848 ft³)

¹ Storage for decay means holding the LLRW until the level of radioactivity has diminished to the point where it can be disposed of as non-radioactive waste. Normally, such LLRW is held for 10 half-lives, or until the radioactivity has diminished to a level that is undetectable above background radiation.

Typical radionuclides held for decay, with their respective half-lives, include: Iodine-123 (13.1 hours), Iodine-125 (59.7 days), Iodine-131 (8.0 days), Technetium-99m (6.0 hours), Phosphorous-32 (14.3 days), Gallium-67 (3.3 days), and Sulfur-35 (89.9 days).

² Some generators who store for decay also may have transferred other LLRW to one of the licensed LLRW disposal facilities or may be storing LLRW pending disposal.

³ To obtain volume in cubic feet, multiply the number of cubic meters by 35.31.

Unless otherwise noted, all data were derived from low-level radioactive waste generator reports received by NYSERDA as of May 22, 2009.

Section 3

Historic Data and Projections for Low-Level Radioactive Waste Generation in New York State

This section provides historic data on the volume and radioactivity of LLRW shipped for disposal, based on generator data reported to NYSERDA for years 1999 through 2008.

This section also provides a summary, based on information supplied in the 2008 generator reports, of generator projections of the volume and radioactivity of LLRW that will require disposal in a licensed LLRW facility for the years 2009 to 2013.

Volume projections have been rounded to the nearest 10th of a cubic meter, and radioactivity projections to the nearest GBq.

Table 3-1: Historic Overview of Waste Disposal, by Volume¹ (in m³)²

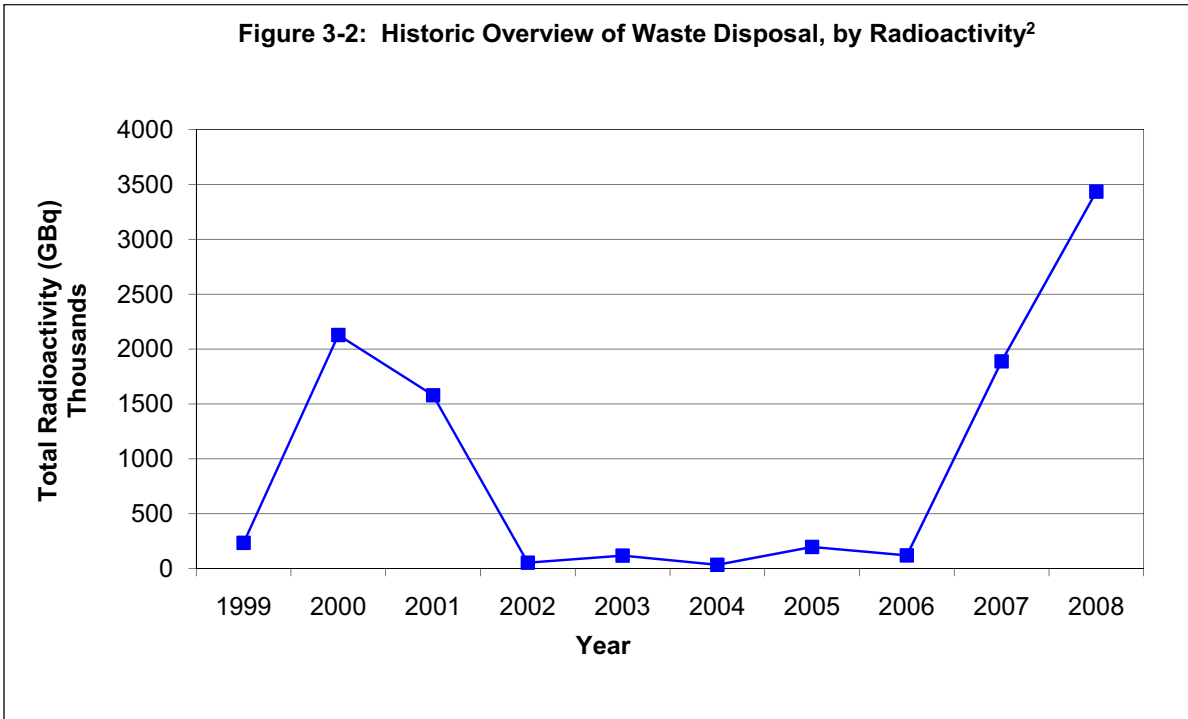
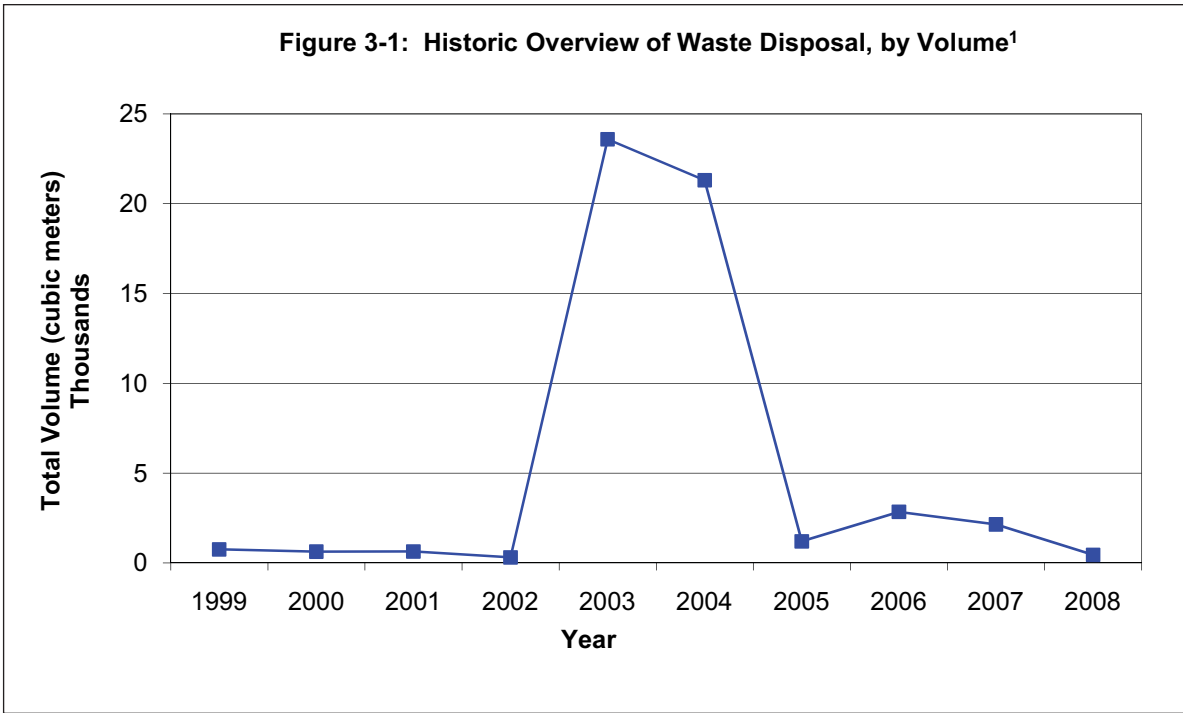
Generator Type	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
NON-POWER PLANT	103	25	160	76	23,404	20,779	477	1,248	35	69
NUCLEAR POWER PLANT	644	599	624	225	183	525	718	1,588	2,106	372
TOTAL	747	624	784	301	23,587	21,304	1,195	2,836	2,141	441

Table 3-2: Historic Overview of Waste Disposal, by Radioactivity¹ (in GBq)²

Generator Type	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
NON-POWER PLANT	303	119	759	295	597	4,231	292	435	78	421
NUCLEAR POWER PLANT	235,003	2,127,398	1,578,346	53,894	118,319	30,669	197,148	120,080	1,877,537	3,433,317
TOTAL	235,306	2,127,517	1,579,105	54,189	118,916	34,900	197,440	120,515	1,877,615	3,433,738

¹ Data are based on reports that must be filed annually with NYSERDA.

² To obtain volume in cubic feet, multiply the number of cubic meters by 35.31. To obtain radioactivity in curies, divide the number of gigabecquerels (GBq) by 37.



¹ The jump in volume shown in 2003 and 2004 is directly attributable to a major site decontamination effort at a former Sylvania nuclear fuel fabrication facility that is currently owned by GTE Verizon. The waste consisted primarily of lightly contaminated soil. Disposal volume dropped drastically in 2005 and the project was completed in 2006. The smaller jump in volume in 2006 is attributable to a one-time decommissioning of a research reactor at Cornell University.

² In general, the radioactive content of the LLRW disposed continues to be a function of refueling and maintenance activities at New York's six nuclear power plants, and shows little or no correlation to overall volume. The large jump in radioactive content for 2007 and 2008 corresponds to an increase in disposal at the Barnwell facility prior to its closure to NY waste on July 1, 2008.

Unless otherwise noted, all data were derived from low-level radioactive waste generator reports received by NYSERDA as of May 22, 2009.

Table 3-3: Generators' Five-Year Projections of Waste¹, by Volume (m³)²

Generator Type	2009	2010	2011	2012	2013
MEDICAL	54.0	52.9	55.2	55.0	59.0
INDUSTRIAL	112.8	33.1	31.6	21.0	31.0
ACADEMIC	36.4	34.6	34.6	33.0	30.0
GOVERNMENT	12.8	0.9	0.9	0.0	0.0
TOTAL NON-POWER PLANT	216.0	121.5	122.3	109.0	120.0
NUCLEAR POWER PLANT	385.6	442.8	385.6	433.0	385.0
TOTAL	601.6	564.3	507.9	542.0	505.0

Table 3-4: Generators' Five-Year Projections of Waste¹, by Radioactivity (Gbcq)²

Generator Type	2009	2010	2011	2012	2013
MEDICAL	27.0	28.0	29.0	66.4	32.3
INDUSTRIAL	1,188.6	1,128.4	1,098.4	1,008.4	1,098.4
ACADEMIC	16.6	14.0	14.0	13.9	13.8
GOVERNMENT	1.5	0.4	0.3	0.3	0.3
TOTAL NON-POWER PLANT	1,233.7	1,170.8	1,141.7	1,089.0	1,144.8
NUCLEAR POWER PLANT	153,200.0	125,200.0	133,200.0	124,300.0	133,200.0
TOTAL	154,433.7	126,370.8	134,341.7	125,389.0	134,344.8

¹ Refers to all classes of LLRW projected by generators to require disposal in a licensed LLRW facility.

² To obtain volume in cubic feet, multiply the number of cubic meters by 35.31. To obtain radioactivity in curies, divide the number of gigabecquerels (GBq) by 37.

* Less than 0.1.

Conversions for Units

The metric system is the standardized set of measurement units used in science and technology today. Metric or SI system (Système International d'Unités) units have been incorporated in the U.S. Nuclear Regulatory Commission's (NRC) Uniform Waste Manifest.

Volume is presented in cubic meters and radioactivity is presented in gigabecquerels (GBq) and megabecquerels (MBq). These units have been adopted for this report to be consistent with the uniform national LLRW manifest requirements. Some conversions for SI units to the previously used units of cubic feet and curies are provided in the following tables.

CONVERSIONS FOR UNITS				
Measurement	SI Unit	Previously Used Unit	Value of Conventional Unit in SI Units	Conversional Factors
Radioactivity	Gigabecquerel (GBq) Megabecquerel (MBq)	Curie (Ci) milliCurie (mCi)	1 Ci = 37 GBq 1 Ci = 37,000 MBq	Ci x 37 = GBq Ci x 37,000 = MBq GBq / 37 = Ci MBq / 37,000 = Ci
Volume	cubic meters (m³)	cubic feet (ft³)	1 ft³ = 0.028 m³	ft³ x 0.028 = m³ m³ x 35.31 = ft³

Radioactivity Conversions		
mCi	MBq	GBq
500	18,500	18.500
200	7,400	7.400
100	3,700	3.700
50	1,850	1.850
20	740	0.740
10	370	0.370
5	185	0.185
2	74	0.074
1	37	0.037

Volume Conversions	
ft³	m³
11.9 (89 gal. drum)	0.33
11.1 (83 gal. drum)	0.31
7.5 (55 gal. drum)	0.21
4.01 (30 gal. drum)	0.11
0.67 (5 gal. pail)	0.019

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**NEW YORK STATE LOW-LEVEL RADIOACTIVE
WASTE STATUS REPORT FOR 2008**

**STATE OF NEW YORK
DAVID A. PATERSON, GOVERNOR**

**NEW YORK STATE ENERGY RESEARCH AND DEVELOPMENT AUTHORITY
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