



Illinois Department of  
Nuclear Safety

**1998 Annual  
Survey Report**

DECEMBER 1999

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## PREFACE

The Illinois Department of Nuclear Safety (IDNS) is the state agency with the responsibility for managing low-level radioactive waste (LLRW) issues in Illinois. The IDNS was established in 1980 to protect the public from the potential hazards associated with radiation and radioactive materials.

The Illinois Low-Level Radioactive Waste Management Act of 1983 (as amended) mandates an annual survey of all LLRW generators in Illinois. The IDNS requires all LLRW generators to complete a questionnaire requesting the following information: 1) the types and quantities of LLRW which were either shipped for disposal or stored on site during the year in question; 2) how LLRW is being managed (e.g., treatment); and 3) what management alternatives a generator might use in the future. This is the fifteenth report based on information provided by Illinois LLRW generators.

Chapter 1 contains an introduction to LLRW, defense and civilian radioactive waste information, LLRW disposal facility history, IDNS agency history, governing regulations, and responsibilities. It also contains general information about the annual surveys, survey results and analyses, and the waste tracking system.

Chapter 2 contains detailed generator category volume and activity information, detailed breakdown of LLRW shipment information and projection data as well as a discussion of mixed waste. This information is from the IDNS database.

Chapter 3 compares Illinois LLRW volume and activity final disposal figures with the rest of the nation. It also gives the final disposal volume and activity for Kentucky and compares Illinois and Kentucky volume and activity

figures for waste disposed from the Lockheed-Martin Idaho Technologies Co. (LMITCO) database.

*Please note that, where possible, International System of Units (S.I.) are included in parentheses behind English units. For example: 141 cubic feet (4 cubic meters).*

Annual reports based on the survey of LLRW generators in Illinois are also available for the years 1984 through 1997. Comments on this report and suggestions for preparing future reports are welcome and should be addressed to:

Chief, Division of Low-Level Radioactive Waste Management  
Illinois Department of Nuclear Safety  
1035 Outer Park Drive  
Springfield, IL 62704

Additional information about LLRW is available by writing to the above address.

## CONVERSION FACTORS

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<b>Multiply English Unit</b>	<b>by</b>	<b>To Obtain metric or System International Unit</b>
Cubic Foot (ft <sup>3</sup> )	0.02832	Cubic Meter (m <sup>3</sup> )
Millicurie (mCi)	37.0	Megabecquerel (MBq)
Curie(Ci)	0.037	Terabecquerel (TBq)

---

1 millicurie = 0.001 curies

1 megabecquerel = 1,000,000 becquerels

1 terabecquerel = 1,000,000,000,000 becquerels

**CHAPTER ONE**  
**REPORT SUMMARY**  
**INTRODUCTION**

Low-level radioactive waste (LLRW) is defined in federal and Illinois law as any radioactive waste that is not high-level radioactive waste, transuranic waste, spent nuclear fuel, or uranium mill tailings. Generators of LLRW include nuclear power plants, hospitals, universities, and manufacturers. Each category of generator produces ordinary trash that has been contaminated by radioactive material as well as waste materials that are typical for the generator. For example:

- Nuclear power plant LLRW includes protective clothing, resins, filters and filter sludges from water cleanup equipment, and activated reactor hardware.
- Medical and research LLRW includes radionuclides used for research and for diagnostic and therapeutic procedures, power sources for cardiac pacemakers, sealed sources, and laboratory equipment and clothing.
- Industrial LLRW includes machine parts, plastics, radiopharmaceuticals, medical devices, sealed sources, and consumer goods, such as lantern mantles, smoke alarms, and exit signs.

This report summarizes data on LLRW generated in Illinois. It is based on reports from generators that must be filed annually with the Illinois Department of Nuclear Safety. The Low-Level Radioactive Waste Management Act requires LLRW generators to submit annual reports detailing classes, quantities, and types of LLRW generated.

## **LLRW DISPOSAL FACILITY HISTORY**

During the 1970's, six commercial LLRW disposal facilities operated in the United States: Sheffield, Illinois; Maxey Flats, Kentucky; Beatty, Nevada; West Valley, New York; Barnwell, South Carolina; and Richland, Washington. By the end of 1978 only three remained in operation: Beatty, Barnwell, and Richland. In early 1988, the disposal facility located in Clive, Utah, began accepting naturally occurring radioactive materials (NORM). In 1992, the Beatty disposal facility closed. The Barnwell facility closed to Illinois generators on July 1, 1994, and reopened on July 1, 1995.

Today there are three commercial LLRW disposal facilities open: Barnwell, Richland, and Clive.

## **AGENCY HISTORY AND GOVERNING REGULATIONS**

Concern rose during the 1970's about possible shortages of storage and disposal capacity for nuclear waste and about the need for a complete, reliable waste management system for both high-level and low-level radioactive waste. The Three Mile Island (TMI) accident and a series of packaging and transportation incidents prompted several states to pass laws prohibiting further nuclear power plant construction, while other states restricted or prohibited disposal of radioactive waste within their borders. The governors of Nevada, South Carolina, and Washington became concerned that their states would become the nation's disposal grounds for LLRW and banded together to halt disposal operations. Congress responded by passing the Low-Level Radioactive Waste Policy Act in 1980. Under this law, states are encouraged to form compacts to regulate and be responsible for the availability of disposal capacity of non-federal LLRW within their borders.

In this atmosphere, then-Governor James R. Thompson established a separate cabinet-level state agency, the Illinois Department of Nuclear Safety (IDNS). The agency's mission was to provide radiation protection for individuals in Illinois, with a goal to manage, establish, implement, and enforce LLRW policies in Illinois.

### **IDNS RESPONSIBILITIES**

The Illinois Low-Level Radioactive Waste Management Act of 1983 expanded Illinois' responsibilities to include a LLRW management program with requirements for generators and brokers of LLRW to register and report activities and needs, created fees to fund the program, and called for development of a tracking system to control waste disposal.

In late 1984, Illinois and Kentucky formed the Central Midwest Interstate Low-Level Radioactive Waste Compact to develop and implement a solution to LLRW disposal issues. The federal Low-Level Radioactive Waste Policy Amendments Act of 1985 was adopted setting specific milestones, penalties, and mandates to encourage the development of new disposal facilities across the country. Under these statutes, Illinois was selected as the host state for the compact and given the responsibility to oversee the siting, design, licensing, construction and operation of a regional LLRW disposal facility.

The Management Act also called for the attainment of Agreement State status with the U.S. Nuclear Regulatory Commission (NRC). On June 1, 1987, Illinois became an Agreement State and is responsible for regulating LLRW disposal under this agreement.

## **ANNUAL SURVEYS**

To facilitate compliance with the Management Act, IDNS conducts an annual survey of LLRW generators in Illinois and any broker that handles Illinois LLRW within or outside of the state. Each generator provides IDNS with information (by completing a standard questionnaire) about the types, quantities, and activity of LLRW generated, stored, treated, disposed of, and future LLRW shipment projections. Brokers provide information regarding any and all Illinois waste received, treated, processed, and shipped for disposal. These questionnaires are called the Generators' Annual Survey and the Brokers' Annual Survey.

## **SURVEY RESULTS AND ANALYSES**

This report contains information from a database created to include the volume of direct shipments to disposal facilities plus the volume of shipments to brokers or processors, obtained from the 1998 Generators' Annual Survey. A copy of this standard survey questionnaire is found in appendix A. This database does not include the after-treatment volume (off-site treatment volume of LLRW transferred to a broker or processor) actually disposed of at the operating LLRW disposal facilities. However, the shipment data includes the data for wastes (e.g., liquid scintillation fluids) shipped for incineration.

One other data source is used in this report. This source is the final disposal data recorded by the disposal facilities and after-treatment volumes received from Lockheed-Martin Idaho Technologies Company (LMITCO). LMITCO gathers data from the manifests received by the commercial disposal sites. The differences between data sources are discussed in chapter 3.

## **TRACKING SYSTEM**

New regulatory requirements, entitled "Access to Facilities for Treatment, Storage or Disposal of Low-Level Radioactive Waste," became effective October 1, 1996. The rules, known as the "Tracking System Rules," are codified at 32 Illinois Administrative Code Part 609. This rule implements some of the requirements, prohibitions and mandates of the Compact Act, the Radioactive Waste Enforcement Act, and the Illinois Low-Level Radioactive Waste Management Act, by establishing a monitoring and tracking system for LLRW shipments into, out of, or within Illinois. The purpose of the tracking system is to enforce and verify LLRW shipments from the point of origin to the final place of destination.

All persons who ship LLRW into, out of, or within Illinois must submit to IDNS a Tracking System Permit Application Form for approval. The department reviews the application, and if approved, issues a permit number. Prior to making a shipment, the shipper calls the tracking system operator (TSO) and provides a limited amount of shipment information. The TSO issues a transaction reference number that follows that specific shipment until final disposition. At the time of shipment, the shipper provides the TSO with an electronic data file which contains the pertinent information regarding the shipment in general (consignee, consignor, etc.), the waste in detail (waste type, volume, activity, radionuclides, etc.), and the type and source of shipment (original, consolidated, or final; in or out of state, etc.). Once a facility receives this shipment, they must contact the TSO and report the receipt.

The Department uses the information from the tracking system to provide to Illinois LLRW generators and brokers the off-site waste management and shipping tables on the annual surveys. The reporting process was streamlined by having registrants verify the information gathered by the Tracking System. This streamlined reporting process also helps prevent delays of registrants submitting yearly information.



**CHAPTER TWO**  
**1998 SURVEY RESULTS**  
**GENERATOR DEFINITION AND SURVEY RESPONSE**

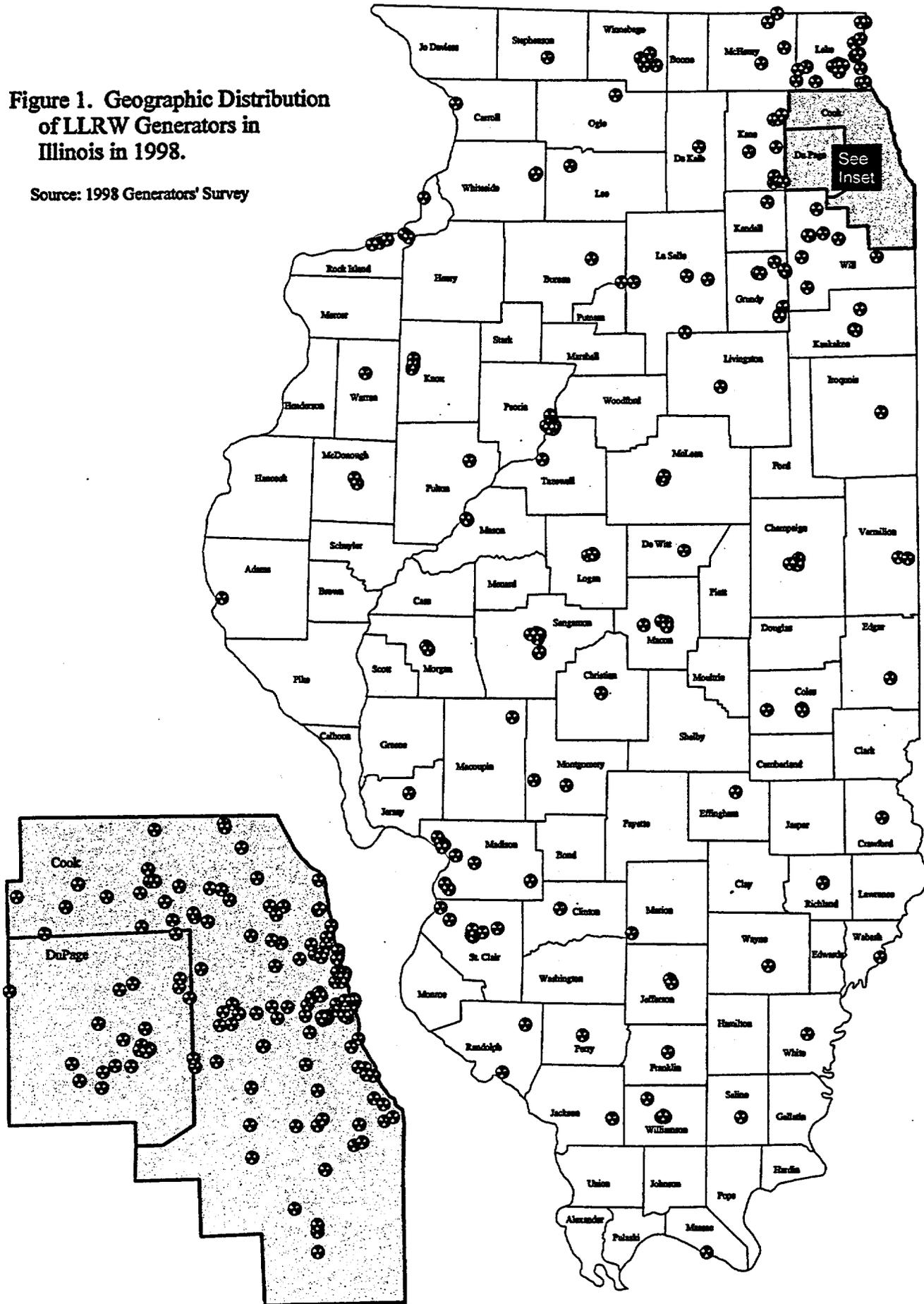
In this report, a LLRW “generator” refers to any individual or organization producing or possessing LLRW in the course of their business operations. Figure 1 shows the geographic distribution of LLRW generators in Illinois during 1998. Of the 380 registered or reactivated Illinois generators of LLRW, 369 (97 percent), responded to the 1998 IDNS survey. Eight Illinois generators did not return their questionnaires, while three Illinois generators returned incomplete questionnaires, for which the Department has requested additional information. Three federal government generators in Illinois refused to participate in the survey process. This report is based solely on the generators who responded to the 1998 IDNS survey.

A LLRW “broker” refers to any entity that takes possession of LLRW for the purpose of consolidation and shipment. The department has registered 16 brokers that receive Illinois waste at the time of this report. All 16 of the registered brokers responded to the 1998 survey.

The Generator Management Section of the Division of Low-Level Radioactive Waste Management uses radioactive materials licenses, broker reports, disposal records, and tracking system permits to identify new or cancelled registrants. During the 1998 reporting period, there were six new or reactivated registrations and 24 cancellations. A listing of the 1998 generators that responded to IDNS’ survey, including facility names and addresses, can be found in appendix B.

**Figure 1. Geographic Distribution of LLRW Generators in Illinois in 1998.**

Source: 1998 Generators' Survey



## **CATEGORIES AND DEFINITIONS**

LLRW generators are classified into categories according to the activities that generate LLRW. IDNS assigns LLRW generators into one of six categories.

**Academic** - Includes LLRW generators from colleges, universities, and their associated research facilities. University hospitals, however, are placed in the medical category.

**Fuel-Cycle** - Includes LLRW generators whose operations are part of the nuclear fuel cycle. Illinois has two fuel-cycle generators, one producing uranium hexafluoride used in the nuclear fuel enrichment process, and one storing spent nuclear fuel.

**Governmental** - Includes LLRW generated by city, state, and federal governmental entities. This category also includes federal medical facilities such as Veterans Administration (V.A.) hospitals.

**Industrial** - Includes LLRW generated by private entities that provide products or services to the private and public sectors. Radiopharmaceutical manufacturers and radiopharmacies are placed in the industrial category even though their product line may be limited to serving medical needs. Likewise, private analytical laboratories and other firms providing services to both non-medical and medical entities, as well as generators such as coal-fired power plants, are included.

**Medical** - Includes LLRW generated by hospitals, medical centers, clinics, laboratories, and private medical offices. Teaching or research hospitals and medical centers are also included.

**Reactor** - Includes LLRW generated at nuclear power stations. Reactor wastes are reported by station site rather than by individual reactor. At one time there were 13 operating reactors at seven stations. Today there are 11 operating reactors at six stations. Each reactor facility (Braidwood, Byron, Clinton, Dresden, LaSalle, and Quad Cities) has a single radioactive waste processing facility where LLRW is

prepared for transportation and disposal. The Zion facility is currently shut down and beginning the closure process for the facility. The Zion facility is still generating waste by emptying tanks and sumps during the closure process.

Table 1 illustrates the number of generators included in the IDNS categories for the years 1994 through 1998. From 1994 until 1996 there was a 7 percent increase in the number of generators; in 1997 there was a 1.8 percent decrease, and in 1998, there was a 1.6 percent decrease.

**TABLE 1**  
**Illinois LLRW Generator Survey Response**  
**by Generator Category**  
**1994-1998**

Generator Category	1994 Generators	1995 Generators	1996 Generators	1997 Generators	1998 Generators
Academic	28	29	35	37	32
Fuel-Cycle	2	2	2	2	2
Governmental	22	21	20	24	25
Industrial	74	75	89	76	73
Medical	224	227	229	229	230
Reactor	7	7	7	7	7
<b>Total</b>	<b>357</b>	<b>361</b>	<b>382</b>	<b>375</b>	<b>369</b>

1998 Generators' Survey

### LLRW VOLUME AND ACTIVITY SHIPPED BY CATEGORY

The breakdown by generator category of the volume and activity of all LLRW shipped in Illinois during 1998 is summarized in table 2. The volume and activity figures in this table represents all LLRW shipped directly for disposal and to brokerage/processing facilities. Nuclear power reactor facilities shipped more than 97 percent of the total LLRW volume (408,213 cubic feet) with more than 99 percent of the total radioactivity (89,852 curies).

**TABLE 2**  
**1998 Volume and Activity by Generator Category**  
**(Direct Shipments Plus Shipments Made to Brokers/Processors)**

Generator Category	Volume (ft <sup>3</sup> )	Volume (m <sup>3</sup> )	Activity (Ci)	Activity (TBq)
Academic	1,521	43	3	<1
Fuel-Cycle	2,609	74	<1	<1
Governmental	197	6	402	15
Industrial	7,792	221	64	2
Medical	312	9	4	<1
Reactor	<u>408,213</u>	<u>11,561</u>	<u>89,852</u>	<u>3,325</u>
Totals	<u>420,644</u>	<u>11,914</u>	<u>90,325</u>	<u>3,343</u>

1998 Generators' Survey

Totals may not add due to rounding.

Table 3 through table 7 present detailed volume and activity data for each of the IDNS generator categories that shipped LLRW in 1998, except for fuel-cycle.

AlliedSignal was the only fuel-cycle generator that shipped LLRW in 1998. These shipments went to Envirocare of Utah. Waste shipped to Envirocare is not included in these tables, but is included in table 26. These tables contain data for respondents that reported shipping LLRW during either 1997 or 1998. Due to waste production and shipping cycles, many generators will only ship once every few years. This and other pertinent information will be noted and discussed.

Activity figures in the reactor category are given in curies and terabecquerels rather than in millicuries or megabecquerels, due to the higher activity of the waste shipped by reactor generators. Millicurie figures are used for the other generator categories. Activity of waste produced by non-reactor generators is rarely in the curie range, and sometimes the waste is reported in units as small as microcuries.

**ACADEMIC** - Twelve out of 32 academic generators shipped waste for treatment or disposal in 1998. Most academic generators are one-time shippers, except for a few of the larger universities and medical schools. All academic waste was shipped through a broker and/or processor. There were eight academic generators that shipped LLRW in 1997 but not in 1998. Four academic generator who reported shipping waste in 1998 were not registered in 1997, whereas seven academic generators that shipped LLRW in 1997 terminated their registration in 1998. Table 3 represents the academic generators' shipping activity. Between 1997 and 1998, the total volume increased by 920 cubic feet (26 cubic meters), however, there was only a slight increase in the activity of 291 millicuries (10,730 megabecquerels).

**TABLE 3**  
Academic LLRW Shipped  
1997-1998

Academic Generator	1997 Volume		1997 Activity		1998 Volume		1998 Activity	
	(ft <sup>3</sup> )	(m <sup>3</sup> )	(mCi)	(MBq)	(ft <sup>3</sup> )	(m <sup>3</sup> )	(mCi)	(MBq)
Abbott Middle School	1	<1	<1	<1	**	**	**	**
Consolidated H.S. District 230	*	*	*	*	1	<1	1	37
Augustana College	**	**	**	**	1	<1	11	407
Benedictine University	4	<1	2,351	86,987	**	**	**	**
Champaign Community School	.1	<1	1	37	**	**	**	**
Charleston Schools	<1	<1	1	37	**	**	**	**
DePaul University	0	0	0	0	8	<1	<1	<1
Finch Univ. of Health Sciences								
The Chicago Medical School	151	4	64	2,368	120	3	6	222
Homewood-Flossmoor H.S.	1	<1	<1	<1	**	**	**	**
Illinois College	1	<1	6	222	**	**	**	**
Lincoln Jr. H.S.	1	<1	1	37	**	**	**	**
Marmion Academy	*	*	*	*	1	<1	<1	<1
National College of Chiropractic	0	0	0	0	8	<1	1	<1
Northeastern Illinois University	1	<1	<1	<1	0	0	0	0
Northwestern University	278	8	165	6,105	383	11	77	2,849
SIU-Edwardsville	0	0	0	0	4	<1	3	111
The University of Chicago	30	1	27	999	880	25	2,822	104,414
University of Illinois at Chicago	133	4	22	814	114	3	8	296
Waubensee Community College	*	*	*	*	1	<1	<1	<1
Yorkville H.S.	*	*	*	*	1	<1	<1	<1
<b>Total</b>	<b>602</b>	<b>17</b>	<b>2,638</b>	<b>97,606</b>	<b>1,522</b>	<b>42</b>	<b>2,929</b>	<b>108,336</b>

1998 Generators' Survey

Totals may not add due to rounding.

Fractions are used in conversions.

\*Not registered in 1997.

\*\*Registration canceled.

**GOVERNMENTAL** - Six out of the 25 registered governmental generators reported shipping LLRW in 1998. Four governmental generators shipped LLRW in 1997 but not in 1998, and five governmental generators shipped LLRW in 1998 but not in 1997.

Three new governmental generators registered in 1998. Most governmental generators ship LLRW to a broker/processor for treatment. The Navy Drug Screening Laboratory historically has shipped LLRW to a broker/processor for treatment by decay in storage.

Table 4 shows governmental shipping activity for 1997 and 1998.

**TABLE 4**  
**Governmental LLRW Shipped**  
**1997-1998**

Governmental Generator	1997 Volume		1997 Activity		1998 Volume		1998 Activity	
	(ft <sup>3</sup> )	(m <sup>3</sup> )	(mCi)	(MBq)	(ft <sup>3</sup> )	(m <sup>3</sup> )	(mCi)	(MBq)
Department of the Army Rock Island Arsenal	0	0	0	0	15	<1	332,901	12,317,333
Department of the Army Savanna Army Depot	1,248	35	18,720	692,640	0	0	0	0
Illinois Army National Guard	*	*	*	*	8	<1	69,146	2,558,402
Museum of Science & Industry	*	*	*	*	1	<1	1	37
Naval Hospital Great Lakes	0	0	0	0	8	<1	16	592
Navy Drug Screening Laboratory	368	10	17	629	156	4	5	185
V.A. Lakeside	75	2	25	925	0	0	0	0
V.A. Westside	30	1	1	37	0	0	0	0
U. S. Customs Laboratory	1	<1	<1	<1	0	0	0	0
U. S. Department of Agriculture, ARS	0	0	0	0	10	<1	6	222
<b>Total</b>	<b>1,722</b>	<b>48</b>	<b>18,763</b>	<b>694,231</b>	<b>198</b>	<b>6</b>	<b>402,075</b>	<b>14,876,775</b>

1998 Generators' Survey

Totals may not add due to rounding.

\*Not registered in 1997.

**INDUSTRIAL** – In both 1997 and 1998, more than 30 percent of the registered industrial generators shipped waste. Professional Laundry Management, Inc., contributed 45 percent of the industrial LLRW volume shipped for disposal in 1998. Nycomed Amersham Imaging contributed 73 percent of the activity. Three industrial facilities, ComEd Rockford Headquarters, Novartis Crop Protection, Inc., and Primex Technologies, Inc., (formerly Olin Corporation) shipped waste directly to the Envirocare disposal facility in 1998. These data are not included in this section, but are detailed later. Table 5 shows the industrial generators and the LLRW volume and activity figures for waste shipped in 1997 and 1998.

**TABLE 5**  
**Industrial LLRW Shipped**  
**1997–1998**

Industrial Generator	1997 Volume		1997 Activity		1998 Volume		1998 Activity	
	(ft <sup>3</sup> )	(m <sup>3</sup> )	(mCi)	(MBq)	(ft <sup>3</sup> )	(m <sup>3</sup> )	(mCi)	(MBq)
Abbott Laboratories	940	26	1,381	51,097	1,151	33	2,687	99,419
American Air Liquide, Inc.	*	*	*	*	15	<1	1,980	73,260
Amoco Corporation	30	<1	15	555	8	<1	47	1,739
Baxter Healthcare Corporation	61	1	10	370	0	0	0	0
BetzDearborn, Inc.	1	<1	<1	<1	0	0	0	0
Brach & Brock Conf. Inc.	8	<1	<1	<1	**	**	**	**
ComEd Rockford Headquarters	*	*	*	*	***	***	***	***
Consolidated Coal Company	*	*	*	*	18	<1	<1	<1
A. B. Dick Company	1	<1	<1	<1	**	**	**	**
EPL Bio-Analytical Service	27	<1	3	111	23	<1	1	37
Equistar Chemicals, LP	1	<1	<1	<1	**	**	**	**
G. D. Searle	6,925	196	25	925	323	9	10,281	380,397
Helene Curtis Industries, Inc.	16	1	<1	<1	16	<1	<1	<1
Henkel Adhesive Corporation	1	<1	1	37	**	**	**	**
Heritage Environmental	193	5	1	37	**	**	**	**
Stan A. Huber Consultants, Inc.	*	*	*	*	5	<1	10	370
Interstate Nuclear Services	2,560	72	1,172	43,364	2,560	72	664	24,568
Kay-Ray/Sensall	18	1	<1	<1	0	0	0	0
Koppers Industries, Inc.	12	<1	112	4,144	**	**	**	**
Leiner Health Products	1	<1	<1	<1	**	**	**	**
Lucent Technologies	*	*	*	*	1	<1	<1	<1
McCook Metals LLC	*	*	*	*	3	<1	<1	<1
Nalco Chemical Company	*	*	*	*	2	<1	<1	<1
Nestle Clinical Nutrition	*	*	*	*	1	<1	<1	<1
Northwestern Steel & Wire	0	0	0	0	8	<1	<1	<1
Novartis Crop Protection, Inc.	0	0	0	0	***	***	***	***

**TABLE 5**  
**Industrial LLRW Shipped**  
**1997-1998**  
**(Continued)**

Industrial Generator	1997 Volume		1997 Activity		1998 Volume		1998 Activity	
	(ft <sup>3</sup> )	(m <sup>3</sup> )	(mCi)	(MBq)	(ft <sup>3</sup> )	(m <sup>3</sup> )	(mCi)	(MBq)
Nycomed Amersham Imaging	477	13	175,877	6,507,449	134	4	46,811	1,732,007
Onstate Recycle	*	*	*	*	8	<1	<1	<1
Organics/LaGrange, Inc.	*	*	*	*	1	<1	<1	<1
Packard Instruments Company	54	2	54	1,998	26	<1	381	14,097
Primex Technologies, Inc.	***	***	***	***	***	***	***	***
Professional Laundry Mgmt, Inc.	301	8	190	7,030	3,481	99	243	8,991
Refractory Products Company	<1	<1	<1	<1	**	**	**	**
Reltec Corporation	*	*	*	*	8	<1	1,110	4,107
Sandoz Agro	113	3	14	518	**	**	**	**
Sanford LP	1	<1	9	333	**	**	**	**
Sherwin Williams Automotive Finishes Corporation	*	*	*	*	1	<1	<1	<1
Star Jet Oil Well Service	4	<1	111	4,107	**	**	**	**
Stewart Superior	*	*	*	*	1	<1	<1	<1
<b>Total</b>	<b>11,745</b>	<b>332</b>	<b>178,976</b>	<b>6,622,075</b>	<b>7,794</b>	<b>217</b>	<b>64,215</b>	<b>2,338,992</b>

1998 Generators' Survey

Totals may not add due to rounding.

\*Not registered in 1997.

\*\*Registration canceled.

\*\*\*Shipped to Envirocare of Utah

**MEDICAL** - Eight medical generators shipped LLRW in 1998, which represents about 3 percent of the total number of medical generators registered. Historically, all medical waste is shipped to brokers or processors, and the overall volume and activity is on the decline. This decrease can be attributed to the increased number of medical generators that are opting to replace nuclear medicine with ultrasound, magnet resonance imaging (MRI), and spectrophotometric methods for radioimmunoassay (RIA) testing procedures for medical diagnosis. Table 6 shows 1997 and 1998 medical data.

**TABLE 6**  
**Medical LLRW Shipped**  
**1997-1998**

Medical Generator	1997 Volume		1997 Activity		1998 Volume		1998 Activity	
	(ft <sup>3</sup> )	(m <sup>3</sup> )	(mCi)	(MBq)	(ft <sup>3</sup> )	(m <sup>3</sup> )	(mCi)	(MBq)
Advocate Medical Group								
Formerly Lutheran Gen. Med. Ctr.	8	<1	4	148	0	0	0	0
Children's Mem. Hosp.	199	6	20	740	109	3	6	222
Loyola Univ. Med. Ctr.	113	2	92	3,404	30	1	55	2,035
Michael Reese Hospital and Medical Center	94	3	11	407	23	1	3	111
Northwestern Mem. Hosp.	38	1	21	777	45	1	23	851
Reg. Organ Bank of IL	8	<1	2	74	0	0	0	0
Rush-Pres. St. Luke's Med. Ctr.	32	1	53	1,961	57	2	3	111
St. Francis Hospital	0	0	0	0	12	<1	<1	<1
Schering-Plough Animal Health								
Formerly Malinckrodt Veterinary	0	0	0	0	32	1	3,797	140,489
Synquest								
Formerly Steriods, Ltd.	0	0	0	0	5	<1	11	407
<b>Total</b>	<b>492</b>	<b>14</b>	<b>203</b>	<b>7,511</b>	<b>313</b>	<b>9</b>	<b>3,898</b>	<b>144,226</b>

1998 Generators' Survey

Totals may not add due to rounding.

Fractions are used in conversions.

**REACTOR** - Table 7 contains a comparison of 1997 and 1998 volumes and activities shipped by reactor generators. As you will note, the volume and activity shipped in 1998 is higher than in 1997 because of steam generator replacements and general clean-up. Activity figures in table 7 are given in curies rather than in millicuries. The Braidwood and Byron facilities also shipped reactor waste to Envirocare. All LLRW shipped to Envirocare is included in table 26.

**TABLE 7**  
**Reactor LLRW Shipped**  
**1997-1998**

Reactor Generator	1997 Volume		1997 Activity		1998 Volume		1998 Activity	
	(ft <sup>3</sup> )	(m <sup>3</sup> )	(Ci)	(TBq)	(ft <sup>3</sup> )	(m <sup>3</sup> )	(Ci)	(TBq)
Braidwood (CECo)	10,025	284	93	3	45,986	1,302	207	8
Byron (CECo)	16,354	463	290	11	47,447	1,344	198	7
Dresden (CECo)	204,608	5,795	12,252	453	97,253	2,754	1,624	60
LaSalle (CECo)	30,484	863	1,139	42	89,179	2,526	72,759	2,692
Quad Cities (CECo)	54,370	1,540	2,956	109	61,303	1,736	14,765	546
Zion (CECo)	14,602	414	76	3	10,948	310	93	3
Clinton (IPC)	12,006	340	962	36	56,098	1,589	205	8
<b>Total</b>	<b>342,449</b>	<b>9,699</b>	<b>17,768</b>	<b>657</b>	<b>408,214</b>	<b>11,561</b>	<b>89,851</b>	<b>3,324</b>

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Totals may not add due to rounding.

CECo - Commonwealth Edison Company

IPC - Illinois Power Company

### VOLUME AND CLASS OF LLRW SHIPPED BOTH DIRECTLY TO DISPOSAL FACILITIES AND TO BROKERS/PROCESSORS

While most LLRW is relatively short-lived and has low concentrations of radioactive material, some LLRW presents a significant radiation hazard initially; thus, standards were developed for the safe handling and shipping of this material. The U. S. Nuclear Regulatory Commission (NRC) established a waste classification system (10 CFR 61) which is incorporated and defined in 32 Illinois Administrative Code 340.1052. According to these regulations, LLRW suitable for land disposal is placed in one of three categories: Class A, Class B, or Class C.

Class A waste has the lowest concentrations of specific radionuclides, and can be disposed of with the least stringent requirements governing waste form and disposal packaging requirements. Waste that contains higher concentrations of the shorter-lived radionuclides is classified as Class B and must meet more rigorous waste form and packaging requirements to ensure physical stability. Class B waste has no concentration limits for such radioisotopes as cobalt-60 and tritium. In addition to rigorous waste form and packaging requirements, Class C waste must be additionally protected, when disposed, by intruder barriers with an effective life of at least 500 years. Class C waste

has concentration limits for some longer-lived radionuclides that are greater than those set for Class A waste and has higher limits for short-lived radionuclides. Maximum concentrations of radionuclides are specified for each waste classification, so the amount of radioactivity remaining at the end of 500 years does not pose a significant environmental or safety hazard.

Table 8 illustrates by generator category the classifications of waste shipped both directly to disposal facilities and to brokers/processors. The majority of waste shipped (96.8 percent by volume) was Class A waste. Only 1.8 percent was classified as Class B waste and 1.4 percent was classified as Class C waste.

**TABLE 8**  
**Distribution of Class of LLRW Shipped**  
**by Generator Category in 1998**

Generator Category	Class A Volume		Class B Volume		Class C Volume		Total Category Volume	
	(ft <sup>3</sup> )	(m <sup>3</sup> )	(ft <sup>3</sup> )	(m <sup>3</sup> )	(ft <sup>3</sup> )	(m <sup>3</sup> )	(ft <sup>3</sup> )	(m <sup>3</sup> )
Academic	1,521	43	0	0	0	0	1,521	43
Fuel-Cycle	2,609	74	0	0	0	0	2,609	74
Government	197	6	0	0	0	0	197	6
Industrial	7,761	220	0	0	31	1	7,792	221
Medical	312	9	0	0	0	0	312	9
Reactor	394,995	11,186	7,582	215	5,636	160	408,213	11,561
<b>Total</b>	<b>407,395</b>	<b>11,538</b>	<b>7,582</b>	<b>215</b>	<b>5,667</b>	<b>161</b>	<b>420,644</b>	<b>11,914</b>

1998 Generators' Survey

Totals may not add due to rounding.

In addition to class A, B, and C waste, some wastes are noted as having special properties and are not included in every shipment to LLRW disposal facilities. Some of this waste is classified due to special chemical properties, such as the presence of chelating agents. There are restrictions on the amount of certain materials such as transuranics (TRU), naturally-occurring or accelerator-produced material (NARM/NORM), or source material, such as uranium-contaminated material produced by fuel-cycle processes. Table 9 illustrates by generator category the number of generators shipping such materials.

**Table 9  
Number of Generators Shipping  
Special Waste by Category in 1998**

<b>Generator Category</b>	<b>NARM/ NORM</b>	<b>Special Nuclear Material</b>	<b>Source material</b>	<b>TRU</b>	<b>Chelating Agents</b>
Academic	3	0	1	0	0
Fuel-Cycle	0	0	1	0	0
Government	1	0	0	0	0
Industrial	8	1	2	2	0
Medical	0	0	0	0	0
Reactor	0	3	0	6	1
<b>Total</b>	<b>12</b>	<b>4</b>	<b>4</b>	<b>8</b>	<b>1</b>

1998 Generators' Survey

## **SPECIFIC WASTE**

The NRC and Illinois have designated certain waste in which the concentrations of hydrogen-3 (tritium), carbon-14, or iodine-125 are so low they do not pose a significant radiation threat to public health and safety. Waste of this sort is defined in 32 Illinois Administrative Code 340.1050 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 biohazardous as it decomposes. Most of these wastes are generated by university and medical research activities and are either diluted with water and flushed down the drain, 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 1998, fifteen academic facilities, seven industrial facilities, four governmental facilities, and eighteen medical facilities disposed of waste down the drain.

## **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. The standard

authorization to store waste for decay is for waste with half-lives less than 90 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. Table 10 shows the number of generators that stored waste for decay. Fuel-cycle and reactor generators did not store LLRW for decay in 1998. Table 11 shows the radionuclides with half-lives less than 65 days held for decay and the number of generators that stored these radionuclides. Table 12 shows the radionuclides with half-lives greater than 65 days but less than 120 days held for decay and the number of generators that stored these radionuclides.

**Table 10**  
**Number of Generators Storing for Decay to Background**  
**by Waste Type in 1998**

Waste Type	Academic	Governmental	Industrial	Medical	Total
Charcoal	0	0	4	62	66
Gas	0	0	2	6	8
Cont. Aqueous Liquids	9	4	15	54	82
Filter Media	1	0	4	7	12
Mechanical Filter	0	0	1	0	1
EPA or State Hazardous	0	0	4	0	4
Exchange Media	1	0	0	0	1
Cont. Equipment	0	0	4	14	18
Organic Liquid	3	0	1	2	6
Glassware/Labware	3	0	6	9	18
Sealed Sources	0	0	5	9	14
Dry Active Waste (Compactible & Noncompactible)	20	11	15	199	245
Animal Carcass	2	0	1	2	5
Biological Material	1	1	6	11	19
Medical Generators	1	0	5	19	25
Other	0	0	0	1	1

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**Table 11**  
**Radionuclides Held for Decay <65 Days**  
**by Waste Type in 1998**

Waste Type	Academic	Governmental	Industrial	Medical	Total
Au-198	0	0	0	1	1
Ba-137	1	0	0	0	1
Cr-51	12	1	8	13	34
F-18	0	0	5	6	11
Fe-59	1	0	1	2	4
Ga-67	1	3	19	179	202
I-123	1	3	14	120	138
I-125	14	6	27	37	84
I-131	2	3	16	119	140
In-111	2	3	15	123	143
Mo-99	1	0	5	18	24
Nb-95	2	0	0	0	2
P-32	24	4	17	22	67
P-33	7	0	9	1	17
Pd-103	0	0	0	6	6
Rb-86	3	0	1	1	5
Ru-103	0	0	0	1	1
Sm-153	1	0	1	7	9
Sr-89	1	1	4	41	47
Tc-99m	4	2	19	265	290
Tl-201	2	3	19	205	229
Tl-202	0	0	9	0	9
Xe-133	1	1	6	103	111

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**Table 12**  
**Radionuclides Held for Decay >60 Days and <120 Days**  
**by Waste Type in 1998**

Waste Type	Academic	Governmental	Industrial	Medical	Total
As-73	1	0	0	0	1
Co-58	0	0	0	1	1
Ir-192	0	0	0	1	1
S-35	18	3	13	8	42
Se-75	1	0	0	0	1

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## **MIXED WASTE**

Waste shown to contain radioactive components and meet the U. S. Environmental Protection Agency (EPA) hazardous waste criteria is considered mixed waste. The EPA has issued explicit guidelines to determine whether a waste is hazardous. Hazardous components are generally those that exhibit any of the following four hazardous characteristics: ignitability, corrosivity, reactivity, or toxicity (Note: toxicity is determined by using the toxic characteristic leaching procedure (TCLP) test or are produced from a listed activity). TCLP tests for toxicity will likely define more compounds as being hazardous due to both its sensitivity to compounds and also its inclusion of some organic compounds. Table 13 shows the cumulative total of mixed waste in storage in both 1997 and 1998.

A type of LLRW that is clearly mixed waste is scintillation fluid consisting of toluene, xylene, benzene, or dioxin-based liquid usually containing 0.05 microcuries or more of tritium or carbon-14 per gram of fluid. If an organic liquid scintillation fluid contains less than 0.05 microcuries of tritium or carbon-14 per gram of fluid, then it is still considered to be hazardous and can be disposed of as a hazardous material only. The radioactive component is not considered in this case.

**TABLE 13**  
**Types of Mixed Waste Stored On-Site 1997-1998**

Waste Type	1997		1998		1998 Radionuclides
	Volume (ft <sup>3</sup> )	Volume (m <sup>3</sup> )	Volume (ft <sup>3</sup> )	Volume (m <sup>3</sup> )	
Lead	---	---	99.0	3.0	Co-60, Cs-137
Contaminated Lead	12.5	<0.1	35.0	1.0	Co-60, Cs-137, Ra-226
Chromium					
Other	---	---	7.5	<0.1	Co-60, Cs-137
Metals					
Mercury	<0.1	<0.1	<1.0	<0.1	C-60
Barium	310.0	8.7	310.0	8.7	Co-58, Co-60, Cs-137, Fe-55, Mn-54
Scintillation Fluids					
Toluene	14.8	<0.1	3.1	<0.1	Am-241
Xylene	7.5	<0.1	7.5	<0.1	Co-57, Co-60, Cs-134, Cs-137, Mn-54
Solvents & Other Organic Fluids					
Freon	1470.7	41.6	423.7	11.9	Co-57, Co-60, Cs-134, Cs-137, Mn-54, Sb-125, Uranium
Other	104.0	2.9	128.9	3.7	C-14, Co-60, Cs-134, Cs-137, Sb-125
Alkaline Liquids	127.5	3.6	127.5	3.6	Co-60, Cs-137, Mn-54
Other	<u>276.2</u>	<u>7.8</u>	<u>491.4</u>	<u>13.9</u>	C-14, Co-60, Cs-137, Ga-67, H-3, I-123, In-111, Mn-54, Sb-125, S-35, Thallium, Uranium
<b>Total</b>	<b>2323.2</b>	<b>65.5</b>	<b>1632.9</b>	<b>45.8</b>	

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Totals may not add due to rounding.

Generators are required to project the amount of mixed waste volume they expect to produce or possess between 1999 and 2005. According to these projections, the total annual mixed waste volume possessed and produced is expected to increase from 1,344 cubic feet to 1,374 cubic feet, an increase of 2.2 percent over a seven year period. The activity projected during this same period, however, indicates a decrease of 17.7 percent over the same period. Tables 14 and 15 detail the volume projections by generator category, while tables 16 and 17 detail activity projections.

**Table 14**  
**Mixed Waste Volume Projections by Generator Category**  
**1999-2005**

Projection Year	Academic Volume (ft <sup>3</sup> )	Fuel-Cycle Volume (ft <sup>3</sup> )	Gov't Volume (ft <sup>3</sup> )	Industrial Volume (ft <sup>3</sup> )	Medical Volume (ft <sup>3</sup> )	Reactor Volume (ft <sup>3</sup> )	Total Volume (ft <sup>3</sup> )
1999	180	23	9	560	162	410	1,344
2000	185	23	9	579	162	303	1,261
2001	190	23	9	599	162	300	1,283
2002	165	23	9	619	158	298	1,272
2003	170	23	9	650	158	296	1,306
2004	175	23	9	680	156	296	1,339
2005	180	23	9	710	156	296	1,374

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**Table 15**  
**Mixed Waste Volume Projections by Generator Category**  
**1999-2005**

Projection Year	Academic Volume (m <sup>3</sup> )	Fuel-Cycle Volume (m <sup>3</sup> )	Gov't Volume (m <sup>3</sup> )	Industrial Volume (m <sup>3</sup> )	Medical Volume (m <sup>3</sup> )	Reactor Volume (m <sup>3</sup> )	Total Volume (m <sup>3</sup> )
1999	5	<1	<1	16	5	12	39
2000	5	<1	<1	16	5	9	36
2001	5	<1	<1	17	5	8	36
2002	5	<1	<1	17	5	8	36
2003	5	<1	<1	18	5	8	37
2004	5	<1	<1	19	4	8	37
2005	5	<1	<1	20	4	8	38

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**Table 16**  
**Mixed Waste Activity Projections by Generator Category**  
**1999-2005**

Projection Year	Academic Activity (mCi)	Fuel-Cycle Activity (mCi)	Gov't Activity (mCi)	Industrial Activity (mCi)	Medical Activity (mCi)	Reactor Activity (mCi)	Total Activity (mCi)
1999	27	200	13	928	52	<1	1,220
2000	27	200	13	763	52	<1	1,055
2001	28	200	13	598	52	<1	891
2002	23	200	13	618	49	<1	903
2003	24	200	13	658	49	<1	944
2004	24	200	13	688	48	<1	973
2005	25	200	13	718	48	<1	1,004

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**Table 17**  
**Mixed Waste Activity Projections by Generator Category**  
**1998-2005**

Projection Year	Academic Activity (MBq)	Fuel-Cycle Activity (MBq)	Gov't Activity (MBq)	Industrial Activity (MBq)	Medical Activity (MBq)	Reactor Activity (MBq)	Total Activity (MBq)
1999	999	7,400	481	34,336	1,924	<1	45,140
2000	999	7,400	481	28,231	1,924	<1	39,035
2001	1,036	7,400	481	22,126	1,924	<1	32,967
2002	851	7,400	481	22,866	1,813	<1	33,411
2003	888	7,400	481	24,346	1,813	<1	34,928
2004	888	7,400	481	25,456	1,776	<1	36,001
2005	925	7,400	481	26,566	1,776	<1	37,148

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## LLRW PROJECTIONS

The 1998 annual survey required all generators that shipped waste, stored waste on-site for future shipment, or believed they would ship waste in the future to project the amount of LLRW they would expect to produce or possess between 1999 and 2005. Because reactors produce the most waste, each station is given a separate projection breakdown. Tables 18 and 19 show projected reactor volumes and historical final disposal volumes. Tables 20 and 21 show projected reactor activity and historical activity disposed. Appendix C gives a history of LLRW volume and activities disposed by reactors from 1970 to 1985. Tables 22 and 23 show historical and projected non-

reactor generator disposal volumes, and tables 24 and 25 show historical and projected activity levels.

**Table 18**  
**Historical and Projected Annual Disposal Volume of LLRW**  
**Generated by Illinois Nuclear Power Facilities**  
**1986-2005**

Year	Braidwood (ft <sup>3</sup> )	Byron (ft <sup>3</sup> )	Dresden (ft <sup>3</sup> )	LaSalle (ft <sup>3</sup> )	Quad Cities (ft <sup>3</sup> )	Zion (ft <sup>3</sup> )	Clinton (ft <sup>3</sup> )	Total Volume (ft <sup>3</sup> )
1986	0	10,875	76,580	26,528	45,228	11,846	0	171,057
1987	0	10,788	78,723	24,725	23,300	13,237	1,200	151,973
1988	2,424	7,713	31,090	18,833	20,617	8,208	11,054	99,939
1989	3,890	10,585	28,205	20,522	22,628	13,633	14,630	114,093
1990	4,044	6,782	24,238	13,053	20,608	10,814	9,794	89,333
1991	7,909	8,959	25,931	23,085	14,483	6,520	8,761	95,648
1992	6,910	5,622	29,494	15,017	19,970	12,016	8,439	97,468
1993	3,577	2,876	24,169	9,782	13,663	6,233	3,136	63,436
1994	5,334	2,681	12,622	8,908	15,558	5,691	2,895	53,689
1995	6,630	5,090	14,178	11,253	10,580	6,284	2,380	56,395
1996	2,321	4,562	11,424	9,460	10,683	7,701	1,299	47,450
1997	1,668	1,720	10,648	9,301	6,805	2,681	3,097	35,920
1998	2,560	1,763	7,424	6,613	5,085	1,608	2,324	27,377
1999	4,900	2,760	50,600	5,100	4,977	11,120	3,294	82,751
2000	2,100	2,370	48,100	5,352	4,117	5,700	3,294	71,033
2001	2,100	2,640	45,725	5,000	3,117	2,775	3,294	64,651
2002	2,100	2,370	43,600	4,552	4,417	2,775	3,294	63,108
2003	2,100	2,640	41,450	4,000	3,517	2,775	3,294	59,776
2004	2,100	2,370	39,400	3,452	4,217	2,775	3,294	57,608
2005	2,100	2,640	37,460	3,200	3,517	2,775	3,294	54,986

1998 Generators' Survey projected volumes are in bold print  
 LMITCO actual volumes are in regular print  
 Totals may not add due to rounding.

**Table 19**  
**Historical and Projected Annual Disposal Volume of LLRW**  
**Generated by Illinois Nuclear Power Facilities**  
**1986-2005**

Year	Braidwood (m <sup>3</sup> )	Byron (m <sup>3</sup> )	Dresden (m <sup>3</sup> )	LaSalle (m <sup>3</sup> )	Quad Cities (m <sup>3</sup> )	Zion (m <sup>3</sup> )	Clinton (m <sup>3</sup> )	Total Volume (m <sup>3</sup> )
1986	0	308	2,169	751	1,281	335	0	4,844
1987	0	306	2,229	700	660	375	34	4,304
1988	69	218	881	533	584	232	313	2,830
1989	110	300	799	582	641	386	414	3,232
1990	115	192	686	370	584	306	277	2,530
1991	224	254	734	654	410	185	248	2,709
1992	196	159	835	425	566	340	239	2,760
1993	101	81	684	277	387	177	89	1,796
1994	151	76	358	252	441	161	82	1,521
1995	188	144	402	319	300	178	67	1,598
1996	66	129	324	266	303	218	37	1,343
1997	47	49	302	263	193	76	88	1,018
1998	72	49	210	187	144	45	65	772
1999	139	78	1,433	144	141	315	93	2,343
2000	60	67	1,362	152	117	161	93	2,012
2001	60	75	1,295	142	88	79	93	1,832
2002	60	67	1,235	129	125	79	93	1,788
2003	60	75	1,174	113	100	79	93	1,694
2004	60	67	1,116	98	119	79	93	1,632
2005	60	75	1,061	91	100	79	93	1,559

1998 Generators' Survey projected volumes are in bold print  
 LMITCO actual volumes are in regular print  
 Totals may not add due to rounding.

**Table 20**  
**Historical and Projected Annual Disposal Activity of LLRW**  
**Generated by Illinois Nuclear Power Facilities**  
**1986-2005**

Year	Braidwood (Ci)	Byron (Ci)	Dresden (Ci)	LaSalle (Ci)	Quad Cities (Ci)	Zion (Ci)	Clinton (Ci)	Total Volume (Ci)
1986	0	100	37,319	1,107	2,136	674	0	41,336
1987	0	876	840	2,286	28,961	708	<1	33,671
1988	3	509	1,749	3,888	627	1,597	62	8,435
1989	618	1,122	2,487	2,740	133,067	3,578	1,717	145,329
1990	510	1,574	2,029	2,895	504	86	544	8,142
1991	62	623	975	3,998	1,537	1,947	803	9,945
1992	1,522	880	33,476	5,950	57,009	3,024	2,146	104,007
1993	1,570	409	20,554	11,189	2,399	1,004	568	37,693
1994	290	186	14,124	11,598	1,576	883	1,281	29,938
1995	179	433	818	543	3,771	929	146	6,819
1996	195	3,388	886	2,402	52,723	256	247	60,097
1997	88	277	12,267	1,202	3,187	77	970	18,067
1998	206	144	22,506	73,354	14,745	104	201	111,260
1999	845	740	85	264	24,705	52	5,200	31,891
2000	680	375	82	28,964	29,985	15	5,200	65,301
2001	680	459	79	259	29,870	<1	5,200	36,547
2002	680	375	76	28,923	30,012	<1	5,200	65,266
2003	680	540	73	207	29,850	<1	5,200	36,550
2004	680	375	71	28,866	29,972	<1	5,200	65,164
2005	680	459	69	166	29,850	<1	5,200	36,424

1998 Generators' Survey projected activities are in bold print

LMITCO actual activities are in regular print

Totals may not add due to rounding.

**Table 21**  
**Historical and Projected Annual Disposal Activity of LLRW**  
**Generated by Illinois Nuclear Power Facilities**  
**1986-2005**

Year	Braidwood (TBq)	Byron (TBq)	Dresden (TBq)	LaSalle (TBq)	Quad Cities (TBq)	Zion (TBq)	Clinton (TBq)	Total Volume (TBq)
1986	0	4	1,381	41	79	25	0	1,529
1987	0	32	31	85	1,072	26	<1	1,246
1988	<1	19	65	144	23	59	2	312
1989	23	42	92	101	4,923	132	64	5,377
1990	19	58	75	107	19	3	20	301
1991	2	23	36	148	57	72	30	368
1992	56	33	1,239	220	2,109	112	79	3,848
1993	58	15	771	414	89	37	21	1,405
1994	11	7	523	429	58	33	47	1,108
1995	7	16	30	20	140	34	5	252
1996	7	125	33	89	1,951	9	9	2,223
1997	3	10	454	44	118	3	36	668
1998	7	5	832	2,714	545	3	7	4,113
1999	<b>31</b>	<b>27</b>	<b>3</b>	<b>9,768</b>	<b>914</b>	<b>1</b>	<b>192</b>	<b>10,936</b>
2000	<b>25</b>	<b>13</b>	<b>3</b>	<b>1,071</b>	<b>1,109</b>	<b>&lt;1</b>	<b>192</b>	<b>2,413</b>
2001	<b>25</b>	<b>16</b>	<b>2</b>	<b>9</b>	<b>1,105</b>	<b>&lt;1</b>	<b>192</b>	<b>1,349</b>
2002	<b>25</b>	<b>13</b>	<b>2</b>	<b>1,070</b>	<b>1,110</b>	<b>&lt;1</b>	<b>192</b>	<b>2,412</b>
2003	<b>25</b>	<b>19</b>	<b>2</b>	<b>7</b>	<b>1,104</b>	<b>&lt;1</b>	<b>192</b>	<b>1,349</b>
2004	<b>25</b>	<b>13</b>	<b>2</b>	<b>1,068</b>	<b>1,108</b>	<b>&lt;1</b>	<b>192</b>	<b>2,408</b>
2005	<b>25</b>	<b>16</b>	<b>2</b>	<b>6</b>	<b>1,104</b>	<b>&lt;1</b>	<b>192</b>	<b>1,345</b>

1998 Generators' Survey projected activities are in bold print

LMITCO actual activities are in regular print

Totals may not add due to rounding.

**Table 22**  
**Historical and Projected Annual Disposal Volume of LLRW**  
**Generated by Non-Reactor Generators**

Projection Year	Academic (ft <sup>3</sup> )	Fuel-Cycle (ft <sup>3</sup> )	Governmental (ft <sup>3</sup> )	Industrial (ft <sup>3</sup> )	Medical (ft <sup>3</sup> )	Total Volume (ft <sup>3</sup> )
1986	3,762	23,357	13,761	5,689	3,846	50,415
1987	4,064	17,748	466	5,651	3,717	31,646
1988	4,787	9,958	277	6,715	3,092	24,829
1989	4,233	6,387	58	31,675	2,834	45,187
1990	1,249	1,055	1,032	4,106	1,475	8,917
1991	840	0	1,316	3,641	782	6,579
1992	1,159	2,970	679	176,622	1,264	182,694
1993	223	1,422	106	113	166	2,030
1994	403	3,622	1,931	1,268	209	7,433
1995	50	962	19	294	43	1,368
1996	125	2,365	224	1,550	121	4,385
1997	83	279	391	743	33	1,529
1998	51	3	346	1,151	21	1,572
1999	<b>1,323</b>	<b>9,280</b>	<b>59</b>	<b>15,008</b>	<b>674</b>	<b>26,344</b>
2000	<b>1,378</b>	<b>9,280</b>	<b>49</b>	<b>15,505</b>	<b>634</b>	<b>26,846</b>
2001	<b>1,383</b>	<b>9,280</b>	<b>829</b>	<b>11,276</b>	<b>626</b>	<b>23,394</b>
2002	<b>1,438</b>	<b>9,280</b>	<b>29</b>	<b>11,710</b>	<b>619</b>	<b>23,076</b>
2003	<b>1,493</b>	<b>9,280</b>	<b>36</b>	<b>13,714</b>	<b>545</b>	<b>25,068</b>
2004	<b>1,598</b>	<b>9,280</b>	<b>29</b>	<b>11,785</b>	<b>537</b>	<b>23,229</b>
2005	<b>1,583</b>	<b>9,280</b>	<b>29</b>	<b>11,820</b>	<b>537</b>	<b>23,249</b>

1998 Generators' Survey projected volumes are in bold print  
 LMITCO actual volumes are in regular print  
 Totals may not add due to rounding.

**Table 23**  
**Historical and Projected Annual Disposal Volume of LLRW**  
**Generated by Non-Reactor Generators**

Projection Year	Academic (m <sup>3</sup> )	Fuel-Cycle (m <sup>3</sup> )	Governmental (m <sup>3</sup> )	Industrial (m <sup>3</sup> )	Medical (m <sup>3</sup> )	Total Volume (m <sup>3</sup> )
1986	106	661	389	161	108	1,425
1987	115	502	13	160	105	896
1988	135	282	7	190	87	701
1989	119	180	1	897	80	1,279
1990	35	29	29	116	41	252
1991	23	0	37	103	22	186
1992	1,159	84	19	5,001	35	6,298
1993	32	40	106	3	4	185
1994	11	102	3	35	5	156
1995	1	27	<1	8	1	38
1996	3	66	6	43	3	124
1997	2	8	11	21	1	43
1998	1	<1	10	33	1	45
1999	37	263	2	425	19	746
2000	39	263	1	439	18	760
2001	39	263	24	319	18	663
2002	41	263	1	332	18	655
2003	42	263	1	388	15	709
2004	45	263	1	334	15	658
2005	45	263	1	335	15	659

1998 Generators' Survey projected volumes are in bold print  
 LMITCO actual volumes are in regular print  
 Totals may not add due to rounding.

**Table 24**  
**Historical and Projected Annual Disposal Activity of LLRW**  
**Generated by Non-Reactor Generators**

Projection Year	Academic (mCi)	Fuel-Cycle (mCi)	Governmental (mCi)	Industrial (mCi)	Medical (mCi)	Total Volume (mCi)
1986	4,000	1,000	121,000	43,000	3,000	172,000
1987	3,000	3,000	45,000	9,000	3,000	63,000
1988	6,000	1,000	761,000	17,000	6,000	791,000
1989	6,000	3,000	16,000	46,000	2,000	73,000
1990	10,000	46,330	311,000	28,670	2,000	398,000
1991	2,000	0	5,000	186,000	1,000	194,000
1992	4,000	432,000	130,000	128,000	3,000	697,000
1993	1,000	<1	6,000	28,000	<1	35,000
1994	5,000	1,756,000	353,000	79,000	6,000	2,199,000
1995	<1	224,328	<1	1,672	<1	226,000
1996	<1	199,000	88,000	8,000	1,000	296,000
1997	2,310	145,640	24,960	142,090	2,800	317,800
1998	<1	<1	1,334,010	56,900	<1	1,390,910
1999	663	1,500	10,149	107,379	475	120,166
2000	665	1,500	37	59,749	375	62,326
2001	692	135,500	33	9,438	374	146,037
2002	699	1,500	32	10,138	375	12,744
2003	726	1,500	35	10,098	357	12,716
2004	758	1,500	32	10,246	356	12,892
2005	745	1,500	32	10,206	357	12,840

1998 Generators' Survey projected activities are in bold print  
 LMITCO actual activities are in regular print  
 Totals may not add due to rounding.

**Table 25**  
**Historical and Projected Annual Disposal Activity of LLRW**  
**Generated by Non-Reactor Generators**

Projection Year	Academic (MBq)	Fuel-Cycle (MBq)	Governmental (MBq)	Industrial (MBq)	Medical (MBq)	Total Volume (MBq)
1986	148,000	37,000	4,477,000	1,591,000	111,000	6,364,000
1987	111,000	111,000	1,665,000	333,000	111,000	2,331,000
1988	222,000	37,000	28,157,000	629,000	222,000	29,267,000
1989	222,000	111,000	592,000	1,702,000	74,000	2,701,000
1990	370,000	1,714,210	11,507,000	1,060,790	74,000	14,726,000
1991	74,000	0	185,000	6,882,000	37,000	7,178,000
1992	148,000	15,984,000	4,810,000	4,736,000	111,000	25,789,000
1993	37,000	<1	222,000	1,036,000	<1	1,295,000
1994	185,000	64,972,000	13,061,000	2,923,000	222,000	81,363,000
1995	<1	8,300,136	<1	61,864	<1	8,362,000
1996	<1	7,363,000	3,259,700	296,000	37,000	10,955,700
1997	85,470	5,388,680	923,520	5,257,330	103,600	11,758,600
1998	<1	<1	49,358,370	2,105,300	<1	51,463,670
1999	24,531	55,500	375,513	3,973,023	17,575	4,446,142
2000	24,605	55,500	1,369	2,210,713	13,875	2,306,062
2001	25,604	5,013,500	1,221	349,206	13,838	5,403,369
2002	25,863	55,500	1,184	375,106	13,875	471,528
2003	26,862	55,500	1,295	373,676	13,209	470,542
2004	28,046	55,500	1,184	379,102	13,175	477,007
2005	27,565	55,500	1,184	377,622	13,209	475,080

1998 Generators' Survey projected activities are in bold print  
 LMITCO actual activities are in regular print  
 Totals may not add due to rounding.

## ENVIROCARE OF UTAH

The Envirocare of Utah facility, located near Clive, Utah, takes only low-activity, high-volume waste. The shipment information for waste disposed at the Envirocare facility is provided in table 26. Six Illinois facilities (AlliedSignal, Inc.; Braidwood Nuclear Power Station; Byron Nuclear Power Station; ComEd-Rockford Headquarters; Novartis; and Primex Technologies Inc.) shipped waste to Envirocare in 1998. All of the waste was Class A, consisting of dry active waste (DAW), EPA or state hazardous media, filter media, mixed bed ion-exchange media, soil, and sealed sources. Because Envirocare is a specialized facility, its data are included separately so that continuity with previous data will not be lost.

**TABLE 26**  
**LLRW Shipped in 1997 and 1998 by Generator Category**  
**(Direct Shipments to Envirocare, Utah)**

Generator Category	1997 Volume		1997 Activity		1998 Volume		1998 Activity	
	(ft <sup>3</sup> )	(m <sup>3</sup> )	(mCi)	(MBq)	(ft <sup>3</sup> )	(m <sup>3</sup> )	(mCi)	(MBq)
Academic	---	---	--	--	---	---	---	---
Fuel-Cycle	24,714	698	2	74	8,245	233	2	74
Governmental	10,069	285	151	5	---	---	---	---
Industrial	4,410	124	<1	<1	4,296	122	<1	<1
Medical	---	---	---	---	---	---	--	--
Reactor	<u>2,619</u>	<u>73</u>	<u>&lt;1</u>	<u>&lt;1</u>	<u>41,606</u>	<u>1,179</u>	<u>&lt;1</u>	<u>&lt;1</u>
Total	41,812	1,180	153	79	54,147	1,534	2	74
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**CHAPTER THREE**  
**NATIONAL AND COMPACT DATA**

Lockheed Martin Idaho Technologies Company (LMITCO) gathers data from the manifests received by the commercial disposal sites. Table 27 shows the final (after treatment) disposal volumes of LLRW as recorded by the disposal facilities.

**TABLE 27**  
**1998 Volume and Activity by Generator Category**  
**(Final Disposal Figures)**

Generator Category	Volume (ft <sup>3</sup> )	Volume (m <sup>3</sup> )	Activity (Ci)	Activity (TBq)
Academic	51	1	<1	<1
Fuel-Cycle	3	<1	<1	<1
Governmental	346	10	1,334	49
Industrial	1,151	33	57	2
Medical	21	1	<1	<1
Reactor	27,380	775	111,263	4,117
Undefined*	35,995	1,019	8	<1
<b>Totals</b>	<b>64,947</b>	<b>1,839</b>	<b>112,662</b>	<b>4,168</b>

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Totals may not add due to rounding.

Fractions are used in conversions.

\*Brokered LLRW disposed at Envirocare of Utah, origin unknown.

As shown in tables 28 and 29, Illinois ranked seventh in the nation in LLRW volume disposed and first in the nation in activity disposed, based on the LMITCO database. The number one volume shipper, Tennessee, did not rank in the top ten of activity shipped.

**Table 28**  
**Volume of LLRW Disposed by the Top Ten Volume Producing States in 1998**  
**as Reported by LMITCO**

State of Origin	Final Disposal Volume (ft <sup>3</sup> )	Final Disposal Volume (m <sup>3</sup> )
1. Tennessee	435,276	12,327
2. Unknown*	157,187	4,451
3. Massachusetts	155,654	4,408
4. Ohio	130,507	3,695
5. Oregon	92,742	2,626
6. Michigan	81,700	2,313
7. Illinois	64,947	1,839
8. Pennsylvania	42,686	1,208
9. Florida	39,531	1,119
10. Washington	30,809	872

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\*Brokered LLRW disposed at Envirocare of Utah, state or origin unknown.

**Table 29**  
**Activity of LLRW Disposed by the Top Ten Activity Producing States in 1998**  
**as Reported by LMITCO**

State of Origin	Final Activity Disposed (Ci)	Final Activity Disposed (TBq)
1. Illinois	112,622	4,167
2. New York	54,757	2,026
3. Pennsylvania	43,690	1,616
4. Michigan	37,423	1,384
5. New Jersey	21,182	783
6. Massachusetts	18,998	702
7. Mississippi	17,375	642
8. Nebraska	7,747	286
9. Alabama	3,583	132
10. Virginia	2,538	93

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### **KENTUCKY VOLUME AND ACTIVITY SHIPMENTS – 1995 - 1998**

Kentucky and Illinois comprise the Central Midwest Interstate LLRW Compact. Kentucky LLRW generators are not required to complete the Illinois Generators' Annual Survey form. Therefore, shipment information has not been documented in prior annual survey reports, and only final disposal figures have been reported. Past Kentucky LLRW disposal volumes are discussed in this section. No waste shipment projections

are included since all Kentucky data is taken from the LMITCO database. Table 30 illustrates the volume disposed by Kentucky generators, by category, for the years 1995 to 1998 while table 31 shows the activity contained in that waste for the same period.

**Table 30**  
**Kentucky Volume Shipped by Category**  
**1995-1998**

Generator Category	1995		1996		1997		1998	
	(ft <sup>3</sup> )	(m <sup>3</sup> )						
Academic	0.0	0.0	135.7	3.8	28	0.7	78.9	2.2
Governmental	77.8	2.2	76.9	2.2	0.0	0.0	0.0	0.0
Industrial	1.3	<0.1	210.0	5.9	0.6	<0.1	47.3	1.3
Medical	11.6	0.3	19.3	1.0	0.0	0.0	0.0	0.0
Non-Reactor								
Utility	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Undefined*	0.0	0.0	0.0	0.0	0.0	0.0	2,880.0	81.5
<b>Total</b>	<b>90.7</b>	<b>2.5</b>	<b>441.9</b>	<b>12.9</b>	<b>28.6</b>	<b>0.7</b>	<b>3,006.2</b>	<b>85.0</b>

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Totals may not add due to rounding

\*Brokered LLRW disposed at Envirocare of Utah, state or origin unknown.

**Table 31**  
**Kentucky Activity Shipped by Category**  
**1995-1998**

Generator Category	1995		1996		1997		1998	
	(Ci)	(TBq)	(Ci)	(TBq)	(Ci)	(TBq)	(Ci)	(TBq)
Academic	0.0	0.0	4.7	0.2	28	1.0	1.0	<0.1
Governmental	19.7	1.0	457.6	16.9	0.0	0.0	0.0	0.0
Industrial	0.1	<0.1	<0.1	<0.1	0.6	<0.1	3.3	<0.1
Medical	<1.0	<0.1	<0.1	<0.1	0.0	0.0	0.0	0.0
Non-Reactor								
Utility	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Undefined*	0.0	0.0	0.0	0.0	0.0	0.0	1.0	<0.1
<b>Total</b>	<b>19.8</b>	<b>1.0</b>	<b>462.3</b>	<b>17.1</b>	<b>28.6</b>	<b>1.0</b>	<b>5.3</b>	<b>&lt;0.1</b>

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Totals may not add due to rounding

\*Brokered LLRW disposed at Envirocare of Utah, state or origin unknown.

Over the past six years, the Kentucky contribution to the waste stream averaged less than two percent of the total waste volume. The Kentucky activity contribution also

averaged less than one percent of the total activity. Kentucky academic generators contributed the most volume and activity. Tables 32 and 33 give a comparison by volume and activity of Kentucky and Illinois LLRW disposal between 1986 and 1997, and also illustrate the Kentucky percentage of waste and activity.

**Table 32**  
**Kentucky and Illinois Volume**  
**1986-1998**

Year	Kentucky		Illinois		Total		% KY Volume
	(ft <sup>3</sup> )	(m <sup>3</sup> )	(ft <sup>3</sup> )	(m <sup>3</sup> )	(ft <sup>3</sup> )	(m <sup>3</sup> )	
1986	2,288	65	202,703	5,740	204,991	5,805	1%
1987	877	25	183,218	5,189	184,095	5,214	<1%
1988	2,122	60	112,529	3,187	114,651	3,247	2%
1989	10,047	285	134,787	3,817	144,834	4,102	7%
1990	4,616	131	98,360	2,785	102,976	2,916	4%
1991	2,348	66	101,949	2,887	104,297	2,954	2%
1992	2,195	62	285,023	8,072	287,218	8,134	<1%
1993	468	13	66,515	1,884	66,983	1,897	<1%
1994	333	9	61,224	1,734	61,557	1,743	<1%
1995	91	3	57,762	1,636	57,853	1,638	<1%
1996	442	13	51,771	1,466	52,213	1,479	<1%
1997	29	1	37,449	1,061	37,478	1,062	<1%
1998	3,006	85	64,947	1,839	67,953	1,924	4%

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Totals may not add due to rounding

**Table 33**  
**Kentucky and Illinois Activity**  
**1986-1998**

Year	Kentucky		Illinois		Total		% KY Activity
	(Ci)	(TBq)	(Ci)	(TBq)	(Ci)	(TBq)	
1986	5	<1	41,955	1,552	41,960	1,552	<1%
1987	40	2	33,687	1,246	33,727	1,248	<1%
1988	762	28	8,936	331	9,698	359	8%
1989	21	1	147,115	5,443	147,136	5,444	<1%
1990	61	2	8,254	305	8,315	308	<1%
1991	631	23	9,713	359	10,344	383	6%
1992	26	1	103,273	3,821	103,299	3,822	<1%
1993	514	19	37,718	1,396	38,232	1,415	1%
1994	285	11	32,137	1,189	32,422	1,200	<1%
1995	20	1	7,044	261	7,064	261	<1%
1996	462	17	57,328	2,121	57,790	2,138	<1%
1997	29	1	18,385	680	18,414	681	<1%
1998	5	<1	112,662	4,168	112,667	4,168	<1%

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Totals may not add due to rounding



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**APPENDIX A**  
**1998 LLRW Generators' Annual Survey**

**STATE OF ILLINOIS**  
**Generators' Annual Survey**  
**1998**

**GENERAL INSTRUCTIONS**

**Survey Completion**

1. The survey for calendar year 1998 must be completed and submitted no later than **February 1, 1999** as required by 32 Ill. Admin. Code 620.30.
2. All quantitative data entered on the survey form must include data for the entire calendar year, unless otherwise specified.

**Enter all volume data in cubic feet.**

For purposes of this survey, one 55-gallon drum is equal to 7.5 cubic feet, one 30-gallon drum is equal to 4.0 cubic feet, and one 83-gallon drum is equal to 11.6 cubic feet.

**Enter all activity data in millicuries.**

3. Complete only those questions and tables that are applicable to your facility. If your facility only stores LLRW for decay to background, only Parts I-IV and Table 1 need to be completed. If your facility only does in-vitro testing, then Parts I-IV must be completed.
4. Be sure to mark all YES and NO choices clearly with an "X" or check mark.
5. Complete the appropriate table(s) as directed.
6. If any response exceeds the space available for it in the survey or its tables, type or print the response on a separate sheet and attach it to the survey. Explanatory notes on attachments are welcome. The survey form or any of its pages or attachments may be reproduced.
7. Retain these instructions and a copy of your completed survey and attachments in the office of the contact person identified in Part I of the survey.
8. Return the completed survey and attachments to:

**Chief, Division of Low-Level Radioactive Waste Management**  
**Illinois Department of Nuclear Safety**  
**Office of Environmental Safety**  
**1035 Outer Park Drive**  
**Springfield, Illinois 62704**

**If you require assistance, call Vera Small at 217-524-6309.**

### **Additional Information**

1. **Appendix I contains a list of waste type descriptions and codes used to complete Part IV Section 4C and Tables 1, 2, 7, and 9.**
2. **Appendix II contains a list of treatment method descriptions and codes used to complete Part IV Section 4C and Tables 2, 7, and 9.**
3. **Appendix III contains a list of IDNS mixed waste type descriptions and codes, and general RCRA hazardous waste type codes used to complete Tables 4 and 5.**
4. **Appendix IV contains the container codes necessary to complete Table 7.**
5. **Appendix V contains a copy of the State of Illinois requirements, as reflected in 32 Illinois Administrative Code 340.1052, which determines waste classification as A, B, C, or greater than class C, and 340.1050 which provides information regarding the disposal of specific wastes used to complete Tables 2, 3, 4, 5, 6, 7, 8, and 9.**
6. **Appendix VI contains the glossary of terms.**

**STATE OF ILLINOIS**  
**Generators' Annual Survey**  
**1998**

**PART I**

**FACILITY INFORMATION**

- |   |  |
|---|--|
| 1. LLRW Registration number:  | 1. OWT - <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> |
| 2. Check the label at right for facility name, address, and contact person and make corrections below. Enter the phone number of the contact person at g. | 2. <input type="text"/><br><br><input type="text"/>  |
| a. Name of organization:  | a. <input type="text"/>  |
| b. Name of facility:  | b. <input type="text"/>  |
| c. Street address:  | c. <input type="text"/>  |
| d. City, State, Zip Code:   | d. <input type="text"/>  |
| e. Contact person:  | e. <input type="text"/>  |
| f. Title:   | f. <input type="text"/>  |
| g. Phone:   | g. ( <input type="text"/> ) <input type="text"/>   |
| 3. County:  | 3. <input type="text"/>  |
| 4. Principal officer:   | 4. <input type="text"/>  |
| 5. Title:   | 5. <input type="text"/>  |
| 6. Name of person completing report:  | 6. <input type="text"/>  |
| 7. Phone:   | 7. ( <input type="text"/> ) <input type="text"/>   |
| 8. Date of report:  | 8. <input type="text"/>  |

## Part II

Place an "X" in the appropriate space to indicate how each type of LLRW you either produced or possessed during 1998 was managed or disposed.

Type of LLRW	Stored for decay to background	Stored on-site for future disposal	Shipped directly to disposal site	Transferred to broker or processor	Combined with other waste for shipment <sup>1</sup>	Other <sup>2</sup> (describe)
20. Charcoal						
21. Incinerator Ash						
22. Soil						
23. Gas						
24. Oil						
25. Aqueous Liquid						
26. Filter Media						
27. Mechanical Filter						
28. EPA or State Hazardous						
29. Demolition Rubble						
30. Cation Ion-exchange Media						
31. Anion Ion-exchange Media						
32. Mixed Bed Ion-exchange						
33. Contaminated Equipment						
34. Organic Liquid (except oil)						

**Part II (cont.)**

<b>Type of LLRW</b>	<b>Stored for decay to background</b>	<b>Stored on-site for future disposal</b>	<b>Shipped directly to disposal site</b>	<b>Transferred to broker or processor</b>	<b>Combined with other waste for shipment<sup>1</sup></b>	<b>Other<sup>2</sup> (describe)</b>
35. Glassware						
36. Sealed Source or Device*						
37. Paint or Plating						
38. Evaporator Bottoms/ Sludges/Concentrates						
39. Compacted Trash						
40. Uncompacted Trash						
41. Animal Carcass						
42. Biological Material						
43. Activated Material						
44. Medical Generators						
59. Other (describe) _____ _____						

\*Do not include sealed sources returned to the manufacturer or supplier.

1. Specify the combined waste types.
2. Provide the management practices, such as incineration, disposal down a sanitary drain, return to manufacturer or supplier, ect.

**PART III**

**WASTE MINIMIZATION AND TREATMENT**

Place an "X" in the appropriate space for each waste minimization and treatment practice that you used in 1998 to reduce or eliminate LLRW.

- 0. None. No waste minimization and treatment practices used in reporting year. (continue to Part IV) 0. \_\_\_\_\_
- 1. Limiting the number of contaminated areas 1. \_\_\_\_\_
- 2. Limiting articles brought into contaminated areas 2. \_\_\_\_\_
- 3. Sorting low-level radioactive waste by radionuclide 3. \_\_\_\_\_
- 4. Sorting low-level radioactive waste by half-life 4. \_\_\_\_\_
- 5. Sorting low-level radioactive waste by activity 5. \_\_\_\_\_
- 6. Using strippable coatings 6. \_\_\_\_\_
- 7. Recycling materials rather than discarding: 7. \_\_\_\_\_  
Describe recycling practices and materials recycled.

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- 8. a. Decontaminating articles on-site: 8a. \_\_\_\_\_  
Describe decontamination process and articles decontaminated.

---

---

- b. Decontaminating articles off-site: 8b. \_\_\_\_\_  
Describe decontamination process and articles decontaminated.

---

---

If the decontamination was done by a company other than your own, include the name and address of the company performing this treatment:

Name of company: \_\_\_\_\_

Address: \_\_\_\_\_

City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_

If waste was decontaminated by more than one company, provide additional information in an attachment.

9. a. Incinerating LLRW on-site, including scintillation fluids and specific waste. 9a. \_\_\_\_\_
- b. Incinerating LLRW off-site, including scintillation fluids and specific waste. 9b. \_\_\_\_\_

If the incineration was done by a company other than your own, include the name and address of the company performing this treatment:

Name of company: \_\_\_\_\_

Address: \_\_\_\_\_

City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_

10. Replacing techniques that use radionuclides with techniques that do not use radionuclides: (describe) 10. \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

11. Returning unit dose syringes or other contaminated material to a radiopharmacy: (do not include sealed sources returned to the manufacturer or supplier). 11. \_\_\_\_\_

12. Other (describe) \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**PART IV**

**ON-SITE WASTE MANAGEMENT**

1. Did you store LLRW on-site for decay to background during 1998? (Do *not* include sealed sources stored for future return to manufacturer or supplier.)

\_\_\_\_\_ NO

\_\_\_\_\_ YES—Complete TABLE 1 (page 13) for such waste.

**NOTE:** If you only store waste for decay to background levels, you are only required to complete Table 1. If you only dispose of waste through the sanitary drain, you do not need to complete the rest of this form.

2. Did you store LLRW on-site that was in a form suitable for disposal in 1998 for future disposal? (Do not include LLRW stored for decay to background, mixed waste, or waste awaiting further on-site processing.) Do include specific waste as defined in 32 Ill. Adm. Code 340.1050

\_\_\_\_\_ NO

\_\_\_\_\_ YES—Complete a, b, and TABLE 2 (page 14).

- a) Total volume remaining in storage (awaiting disposal) placed in storage during the period of 01/01/98 through 12/31/98:

2a. \_\_\_\_\_ cu.ft.

- b) Total volume (awaiting disposal) placed in storage as of 1998:

2b. \_\_\_\_\_ cu.ft.

3. Do you plan to generated LLRW at anytime during 1999 through 2005 that will require disposal at some time in the future? (Include specific waste, such as scintillation fluids, as defined in 32 Ill. Adm. Code 340.1050.)

\_\_\_\_\_ NO

\_\_\_\_\_ YES—Complete TABLE 3 (page 15) for such waste.

4. Will you need a Tracking System Permit Application to dispose of any LLRW at any time during 1999? (If you already have a Tracking System Permit, you do not need to re-apply.)

\_\_\_\_\_ NO

\_\_\_\_\_ YES—Complete Tracking System Permit Application form (page 12).

**PART V**

**MIXED WASTE**

1. Are you presently storing mixed wastes (see Appendix VI for definitions)? (Do *not* include specific waste, such as scintillation fluids, as defined in 32 Ill. Adm. Code 340.1050.)

\_\_\_\_\_ NO  
\_\_\_\_\_ YES—Complete TABLE 4 (page 16) and the remainder of this question.

Enter the volume of mixed waste that was placed in storage during 1998 only.

\_\_\_\_\_ cu.ft.

Enter the total volume of mixed waste presently in storage as of 12/31/98.

\_\_\_\_\_ cu.ft.

2. What testing methods do you use to determine that your LLRW is mixed waste?

\_\_\_\_\_  
\_\_\_\_\_

3. Do you plan to produce or possess mixed waste during 1999 through 2005 that will require on-site storage for future treatment or shipment for disposal at some time in the future? (Include specific waste, such as scintillation fluids, as defined in 32 Ill. Adm. Code 340.1050.)

\_\_\_\_\_ NO  
\_\_\_\_\_ YES—Complete TABLE 5 (page 17) for such mixed waste.

4. Did your facility ship mixed waste for treatment, storage, and/or disposal during 1998?

\_\_\_\_\_ NO  
\_\_\_\_\_ YES—Complete the remainder of this question.

- a) List the total volume of mixed waste shipped for treatment, storage, and/or disposal during 1998. (Include specific waste, such as scintillation fluids, as defined in 32 Ill. Adm. Code 340.1050.) This waste also must be included on Tables 6 & 7 (pages 18 thru 20) and/or 8 & 9 (pages 21 thru 23).

\_\_\_\_\_ cu.ft.

b) Complete the names, addresses, and telephone numbers of the carrier/transporter; and the storage and treatment facilities:

Name of Carrier: \_\_\_\_\_

Address: \_\_\_\_\_

City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_

Telephone: (\_\_\_\_) \_\_\_\_\_

Name of Storage/Treatment Facility: \_\_\_\_\_

Address: \_\_\_\_\_

City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_

Telephone: (\_\_\_\_) \_\_\_\_\_

If the mixed waste was transported by more than one carrier, or if the mixed waste was shipped to more than one storage and treatment facility, provide additional information in an attachment.

**PART VI**

**OFF-SITE WASTE MANAGEMENT**

1. Did you ship LLRW directly to a LLRW disposal facility during 1998?

\_\_\_\_\_ NO  
\_\_\_\_\_ YES—Complete TABLES 6 (page 18) and 7 (pages 19-20) for the waste.

2. Did you transfer LLRW to a waste processor or broker for treatment and/or disposal during at a LLRW disposal facility during 1998? (Include specific waste, such as scintillation fluids, as defined in 32 Ill. Adm. Code 340.1050.)

\_\_\_\_\_ NO  
\_\_\_\_\_ YES—Complete TABLE 8 (page 21) and 9 (pages 22-23) for the waste.

3. Did you ship LLRW containing naturally-occurring or accelerator-produced radioactive material (NARM) for disposal either directly or via a broker/processor during 1998?

\_\_\_\_\_ NO  
\_\_\_\_\_ YES \_\_\_\_\_ cu.ft.

4. Did you ship LLRW containing special nuclear material for disposal either directly or via a broker/processor during 1998?

\_\_\_\_\_ NO  
\_\_\_\_\_ YES \_\_\_\_\_ cu.ft.

5. Did you ship LLRW containing source material for disposal either directly or via a broker/processor during 1998? (Do *not* include sealed sources.)

\_\_\_\_\_ NO  
\_\_\_\_\_ YES \_\_\_\_\_ cu.ft.

6. Did you ship LLRW containing transuranic radionuclides in concentrations  $\leq 100$  nanocuries per gram either directly or via a broker/processor in 1998?

\_\_\_\_\_ NO  
\_\_\_\_\_ YES \_\_\_\_\_ cu.ft.

7. Did you ship LLRW containing chelating agents in concentrations exceeding 0.1% by weight for disposal either directly or via a broker/processor during 1998?

\_\_\_\_\_ NO

\_\_\_\_\_ YES \_\_\_\_\_ cu.ft.  
Type of Chelating Agent- \_\_\_\_\_  
Percent by weight- \_\_\_\_\_

8. Did you dispose of LLRW for any other person, company, or entity in 1998?

\_\_\_\_\_ NO  
\_\_\_\_\_ YES-Provide the name and address below.

Name of  
Person/Company/Entity: \_\_\_\_\_  
Address: \_\_\_\_\_  
City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_  
Telephone: (\_\_\_\_) \_\_\_\_\_

9. Other off-site waste management practices: (describe)

\_\_\_\_\_  
\_\_\_\_\_

**RETURN ENTIRE REPORT TO:**

**Chief, Division of Low-Level Radioactive Waste Management  
Illinois Department of Nuclear Safety  
Office of Environmental Safety  
1035 Outer Park Drive  
Springfield, Illinois 62704**

**COMMENTS:** \_\_\_\_\_  
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**ILLINOIS DEPARTMENT OF NUCLEAR SAFETY  
TRACKING SYSTEM PERMIT APPLICATION FORM**

**Facility Information :**

Facility Name: \_\_\_\_\_  
Address: \_\_\_\_\_  
City, State, Zip: \_\_\_\_\_  
Phone Number: (    ) \_\_\_\_\_  
Contact Name: \_\_\_\_\_  
Contact Number: (    ) \_\_\_\_\_

**License Information :**

License Number: \_\_\_\_\_  
Licensing Agency: \_\_\_\_\_

**Final Waste Disposition :**

Is your facility licensed to receive back its own waste?    Yes [ ]    No [ ]

Is your facility permitted to use a disposal facility?    Yes [ ]    No [ ]

If yes:            Disposal Facility: \_\_\_\_\_  
                         Site Permit Number: \_\_\_\_\_

Other Disposition Arrangement/Facility: \_\_\_\_\_

I hereby certify that the above information is correct and complete. Further I hereby certify that radioactive material will not be treated, stored or disposed of in Illinois in violation of any provisions of the Compact Enforcement Act. I further agree to allow the Illinois Department of Nuclear Safety to inspect shipments at times and locations determined to be convenient by the Department.

Name/Title: \_\_\_\_\_

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Completed Applications shall be sent to:

**Chief, Division of Low-Level Radioactive Waste Management  
Illinois Department of Nuclear Safety  
1035 Outer Park Drive  
Springfield, IL 62704**

The Department of Nuclear Safety is requesting disclosure of information that is required to accomplish the statutory provisions as outlined in the Illinois Low-Level Radioactive Waste Management Act, 420 ILCS 20/9, as amended. Failure to provide this relevant information will result in the rejection of the permit application by issuing authority. Shipping waste without this required permit may subject the offender to criminal and/or civil penalties per 45 ILCS 141/30, and 32 Ill. Admin. Code 609-80.

**Do Not Write Below This Line**

Approval By: \_\_\_\_\_ Entered By: \_\_\_\_\_ Application Type: Initial [ ]

Yes No Date: \_\_\_\_\_ Date: \_\_\_\_\_ Renewal [ ]

[ ] [ ] Facility Classification: \_\_\_\_\_ Permit Number: \_\_\_\_\_

**TABLE 1: Waste Stored On-Site for Decay to Background during 1998**

Provide the waste type, the volume in cubic feet, and the associated radionuclide(s) for each type of LLRW generated in Illinois and stored for decay to background at any given time during 1998. See Appendix I for waste type codes. All waste types listed on Table 1 must be listed in Part II. Attach additional sheets as necessary.

TABLE 1: Waste Stored On-site for Decay to Background during 1998							
Waste Types	Volume (cu.ft.)	Radionuclides					
<b>Total Volume:</b>							

**Instructions:**

**Waste Type** - Enter the appropriate waste type code in this column. Appendix I contains a list of codes describing various waste types.

**Volume** - Enter the maximum volume in cubic feet of each type of waste that was in storage for decay at any one time.

**Radionuclides** - List the radionuclides originally present in the waste for each type of waste stored on-site for decay to background.

**TABLE 2: Waste Stored On-Site During 1998 for Future Disposal**

Provide the waste type, the volume in cubic feet, and the associated prominent radionuclide(s) for each type of LLRW generated in Illinois that was stored on-site for future disposal in a form suitable for final disposal at any given time during 1998. See Appendix I for waste type codes. All waste types on Table 2 also must be listed in Part II. Attach additional sheets as necessary.

TABLE 2: Waste Stored On-Site During 1998 for Future Disposal							
Waste Type	Volume (cu.ft.)	Activity (mCi)	Waste Class	Treatment Code	Primary Radionuclide(s)		
<b>Total Volume:</b>							

**Instructions:**

**Waste Type** - Enter the appropriate waste type code in this column. Appendix I contains a list of codes describing various waste types.

**Volume** - Enter the volume in cubic feet for each type of waste that was in a form suitable for disposal (after treatment).

**Activity** - Enter the total activity content in millicuries for each of the waste types listed.

**Waste Class** - The State of Illinois' requirements, as reflected in 32 Ill. Adm. Code 340.1052, determine waste classification as A, B, or C. Refer to Appendix V to determine waste classification and enter the appropriate classification of the waste in this column.

**Treatment Code** - Enter the appropriate code in this column. Include only for waste stored on-site for future disposal. Appendix II contains a list of codes describing various waste treatment.

**Radionuclides** - List the radionuclides present in the waste for each type of waste stored on-site for future disposal.

**TABLE 3: LLRW Generation Projections (1999-2005)**

Enter the estimated volume in cubic feet and radioactivity content in millicuries of waste in each class projected to be generated in Illinois during 1999 through 2005 that will require disposal at some time in the future. Waste classification as A, B, or C is determined by the state of Illinois' requirements, as reflected in 32 Ill. Adm. Code 340.1052 (see Appendix V). Include specific waste, such as scintillation fluids, as defined in 32 Ill. Adm. Code 340.1050.

TABLE 3: LLRW Generation Projections						
Year	Class A		Class B		Class C	
	Volume (cu.ft.)	Activity (mCi)	Volume (cu.ft.)	Activity (mCi)	Volume (cu.ft.)	Activity (mCi)
1999						
2000						
2001						
2002						
2003						
2004						
2005						

**Instructions :**

**Volume** - Enter the volume of waste anticipated to be generated for disposal either directly or via a broker/processor during each year from 1999 through 2005.

**Activity** - Enter the activity content in millicuries of waste anticipated to be shipped for disposal during each year from 1999-2005.

**TABLE 4: Storage of Mixed Wastes during 1998**

Provide the IDNS mixed waste types, the RCRA hazardous waste codes, the volume in cubic feet, the activity in millicuries, the waste class, the form the waste is in, the associated radionuclides(s), and the practice used to generate the waste for each type of mixed waste generated in Illinois and stored on-site during 1998. Attach additional sheets as necessary.

TABLE 4: Storage of Mixed Wastes during 1998											
IDNS Mixed Waste Type	RCRA Waste Code	Volume (cu.ft.)	Activity (mCi)	Waste Class	Waste Form	Radionuclides					Generating Practice
<b>Total:</b>											

63

**Instructions:**

**Mixed Waste Type** - Enter the appropriate mixed types and hazardous waste codes in the first two columns. Appendix III contains a list of codes describing various IDNS mixed waste types and RCRA hazardous waste codes.

**Volume** - Enter the total volume in cubic feet of each type of mixed waste in storage during 1998.

**Activity** - Enter the activity content in millicuries of each type of mixed waste.

**Waste Class** - The State of Illinois' requirements, as reflected in 32 Ill. Adm. Code 340.1052, Determine the waste classification as A, B, or C. Refer to Appendix V to determine waste classification and enter the appropriate classification in this column.

**Waste Form** - Specify the form that the mixed waste is in (solid, liquid, sludge, etc.).

**Radionuclides** - List the radionuclides present in the waste for each separate type of mixed waste stored on-site.

**Generating Practice** - List the practice used in generating this waste (e.g. laboratory counting procedures, research or manufacturing (kind), spent reagents, cleaning components, decontamination, spill, etc.).

**TABLE 5: Mixed Waste Projections (1999-2005)**

Provide the IDNS mixed waste types, the RCRA hazardous waste codes, the estimated generated volume in cubic feet, the waste class, and the radioactivity content in millicuries for each type of mixed waste projected to be generated in Illinois during 1999 through 2005 that will require disposal some time in the future. Include specific waste, such as scintillation fluids, as defined in 32 Ill. Adm. Code 340.1050. Attach additional sheets as necessary.

TABLE 5: Mixed Waste Projections					
Year	IDNS Mixed Waste Type	RCRA Waste Code	Volume (cu.ft.)	Waste Class	Activity (mCi)
1999					
2000					
2001					
2002					
2003					
2004					
2005					

**Instructions:**

**Waste Type/Waste Code** - Enter the appropriate codes. Appendix III contains a list of codes describing various IDNS mixed waste types and RCRA hazardous waste codes.

**Volume** - Enter the total volume in cubic feet of each type of mixed waste projected to be generated during each year from 1999 through 2005.

**Waste Class** - The State of Illinois' requirements, as reflected in 32 Ill. Adm. Code 340.1052, determine waste classification as A, B, or C. Refer to Appendix V to determine waste classification and enter the appropriate classification in this column.

**Activity** - Enter the activity content in millicuries of each type of mixed waste projected to be generated each year from 1999 through 2005.

**TABLE 6: Destination of Waste Shipped Directly to LLRW Disposal Sites in 1998**

For waste generated in Illinois, List the volume in cubic feet and activity in millicuries of all low-level radioactive waste in classes A, B, and C shipped directly to a disposal facility during 1998. Also list the number of shielded (SH) and unshielded (UNSH) shipments of waste in each class made to each disposal facility. See Appendix V for waste classification definitions.

TABLE 6: Destination of Waste Shipped Directly to LLRW Disposal Sites in 1998												
Waste Class	Barnwell, SC				Clive, UT				Facility (other) _____ (name)			
	Volume (cu.ft.)	Activity (mCi)	Number of Shipments		Volume (cu.ft.)	Activity (mCi)	Number of Shipments		Volume (cu.ft.)	Activity (mCi)	Number of Shipments	
			SH	UNSH			SH	UNSH			SH	UNSH
A												
B												
C												
Total:												

65

**Instructions:**

**Volume** - Enter the volume in cubic feet of waste in each class A, B, or C shipped to each disposal facility. The total volume listed for each facility on Table 6 must equal the total sum of the total volume (individual container disposal volume) x (the number of containers) shipped to each facility listed on Table 7.

**Activity** - Enter the total activity in millicuries of waste in each class A, B, or C shipped to each disposal facility. The total activity listed on Table 8 must equal the total activity listed on Table 7.

**Number of Shipments** - Enter the total number of shielded (SH) and unshielded (UNSH) shipments of waste in each class made to each disposal facility.

For each disposal site to which LLRW generated in Illinois was shipped directly, indicate each type of container used, the disposal volume of the container (the exterior volume, not the interior capacity), the total number of containers of that type shipped, the surface dose rate range of the containers (A-E, see below), and the average weight of the containers when filled. Provide the total inventory of radionuclides with their associated activities in millicuries contained in the waste shipped for each type of container used. Also provide a description of each type of waste shipped in the containers and indicate the waste class, the waste type, and the volume. Additionally, for each waste description, indicate the methods used on-site to treat the waste prior to disposal (if any), and the volume in cubic feet of the waste after treatment. See Appendix I for waste type codes, Appendix II for treatment method codes, Appendix IV for container codes, and Appendix V for waste class definitions. Copy and attach a separate sheet for each type of container used to ship waste to a specific site. Include waste generated in Illinois only. All waste types listed on TABLE 7 also must be listed in Part II.

**Instructions:**

**Disposal Site** - Indicate the disposal site to which waste was shipped directly. Direct disposal sites are Barnwell, South Carolina (SC), Clive, Utah (UT) or "other".

**Container Type** - Use Appendix IV for container codes.

**Container Volume** - Enter the disposal volume in cubic feet of the container used (the exterior volume as recorded by the LLRW disposal site operator, *not* the interior capacity, with the exception of 55-gallon drums). The sum of this volume times the number of containers shall equal the transferred volume and the volume reported in Table 6.

**Number of Containers** - Enter the number of containers of the specified type used to ship waste to the selected disposal site.

**Surface Dose Rate Range** - Enter the surface dose rate range (from A to F) of the containers used, where:

- |                            |                               |
|----------------------------|-------------------------------|
| A = 0 - 100 mR/hr.         | D = >15,000 - 100,000 mR/hr.  |
| B = >100 - 1,000 mR/hr.    | E = >100,000 - 500,000 mR/hr. |
| C = >1,000 - 15,000 mR/hr. | F = >500,000 mR/hr.           |

**Radionuclides and Activity** - List each radionuclide contained in the waste shipped and the associated activity in millicuries for each type of container used.

**Average Filled Weight** - Enter the average weight in pounds of filled containers (including the container) shipped off-site.

**Waste Class** - The state of Illinois' requirements, as reflected in 32 Ill. Adm. Code 340.1052, determine waste classification as A, B, or C. Refer to Appendix V to determine waste classification and enter the appropriate classification of the waste in the container in this column.

**Waste Type** - Enter the appropriate waste type code in this column. Appendix I contains a list of codes describing various waste types.

**Treatment Code** - Enter the appropriate treatment code in this column. Include only treatments done on-site. Appendix II contains a list of codes describing various waste treatment methods.

**Transferred Volume** - Enter the volume in cubic feet of the waste transferred to the disposal facility. The sum of this volume is the same as the container volume times the number of containers.



**TABLE 8: Destination of Waste Shipped to Brokers and Processors During 1998**

For waste generated in Illinois, list the volume in cubic feet and activity in millicuries of all low-level radioactive waste in classes A, B, and C shipped to each broker/processor during 1998. Also list the number of shielded (SH) and unshielded (UNSH) shipments of waste in each class made to each disposal facility. See Appendix V for waste classification definitions.

TABLE 8: Destination of Waste Shipped Brokers and Processors During 1998												
Waste Class	Facility #1 _____ (name)				Facility #2 _____ (name)				Facility #3 _____ (name)			
	Volume (cu.ft.)	Activity (mCi)	Number of Shipments		Volume (cu.ft.)	Activity (mCi)	Number of Shipments		Volume (cu.ft.)	Activity (mCi)	Number of Shipments	
			SH	UNSH			SH	UNSH			SH	UNSH
	A											
B												
C												
Total:												

**Instructions:**

**Volume** - Enter the volume on cubic feet of waste in each class A, B, or C transferred to each broker/processor facility. The total volume listed for each broker or processor on Table 8 must equal the total volume shipped to each facility listed on Table 9.

**Activity** - Enter the total activity in millicuries of waste in each class A, B, or C shipped to each broker or processor. The total activity listed on Table 8 must equal the total activity listed on Table 9.

**Number of Shipments** - Enter the total number of shielded (SH) and unshielded (UNSH) shipments of waste in each class made to each broker or processor.

**Table 9: Waste Transferred to Broker(s) or LLRW Processor(s) for Treatment and/or Disposal During 1998**

Provide the company's name and address and the total inventory of radionuclides with their associated activities in millicuries for LLRW generated in Illinois that was transferred to a broker or processor for treatment and/or disposal. Also provide a description of each type of waste transferred to the broker/processor and indicate the waste class, the waste type, and the volume of the waste transferred to the broker/processor. Include specific waste, such as scintillation fluids, as defined in 32 Ill. Adm. Code 340.1050. Additionally, for each waste description, indicate the methods used on-site to treat the waste prior to transfer to the broker/processor (if any). See Appendix I for waste type codes, Appendix II for treatment method codes, and Appendix V for waste class definitions. Copy and attach a separate sheet for each broker or processor used. Include waste generated in Illinois only. All waste types listed on TABLE 9 also must be listed in Part II.

**Instructions:**

**Broker/Processor** - Provide the name and address of each broker or processor to which waste was transferred.

**Radionuclides and Activity** - List all of the radionuclides contained in the waste transferred and their associated activities in millicuries for the total waste transferred to each individual broker or processor.

**Waste Class** - The state of Illinois' requirements, as reflected in 32 Ill. Adm. Code 340.1052, determine waste classification as A, B, or C. Refer to Appendix V to determine waste classification and enter the appropriate classification of the waste transferred in this column.

**Waste Type** - Enter the appropriate waste type code in this column. Appendix I contains a list of codes describing various waste types.

**Treatment Code** - Enter the appropriate treatment code in this column. **IMPORTANT:** Report only those waste treatment methods employed on-site *prior* to transferring waste to the broker or processor. Appendix II contains a list of codes describing various waste treatment methods.

**Transferred Volume** - Enter the volume in cubic feet of the waste transferred, if there was on-site treatment, use the after treatment volume.





**APPENDICES**

## APPENDIX I: List of Waste Types

<b>CODE</b>	<b>WASTE TYPE</b>
20.	Charcoal
21.	Incinerator Ash
22.	Soil
23.	Gas
24.	Oil
25.	Aqueous Liquid
26.	Filter Media
27.	Mechanical Filter
28.	EPA or State Hazardous
29.	Demolition Rubble
30.	Cation Ion-exchange Media
31.	Anion Ion-exchange Media
32.	Mixed Bed Ion-exchange Media
33.	Contaminated Equipment
34.	Organic Liquid (except oil)
35.	Glassware or Labware
36.	Sealed Source/Device
37.	Paint or Plating
38.	Evaporator Bottoms/Sludges/Concentrates
39.	Compacted Trash
40.	Uncompacted Trash
41.	Animal Carcass
42.	Biological Material (except animal carcass)
43.	Activated Material
44.	Medical Generators
59.	Other

## APPENDIX II: Treatment Methods

CODE	TREATMENT METHOD
------	------------------

1.	Sorption* a.) Speedi Dry b.) Celetom c.) Floor Dry/Superfine d.) Hi Dri e.) Safe T Sorab f.) Safe N Dri g.) Florco h.) Florco X I.) Solid A Sorb j.) Chemcil 30 k.) Chemcil 50 l.) Chemcil 3030 n.) Dicaperl HP200 n.) Dicaperl HP500 o.) Petroset p.) Petrocset II q.) Aquaset r.) Aquaset II s.) Other
2.	Chemical Extraction
3.	Dewatering
4.	Evaporation
5.	Filtration
6.	Incineration
7.	Ion-exchange
8.	Solidification* t.) Cement u.) Concrete (encapsulation) v.) Bitumen w.) Vinyl Chloride x.) Vinyl Ester Styrene
9.	Washing
10.	Abrasive Cleaning
11.	High-pressure water
12.	Electropolishing
13.	Supercompaction
14.	Standard Compaction
15.	Baling/Shredding
99.	Other: (describe) _____

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\*Specify a, b, c, etc. (e.g., 8v = bitumen solidification)

**APPENDIX III: Mixed Waste Types/RCRA Hazardous Waste Codes**

IDNS CODE CODES	WASTE TYPE	RCRA
1	Lead* a) activated lead b) contaminated lead c) lead containers (pigs)	D008 D008 D008
2	Chromium * a) corrosion-inhibiting chromates b) incidental corrosion products c) Cr-51 carrier	D007 D007 D007 **
3	Metals* a) mercury b) cadmium c) barium d) silver e) arsenic f) other	D009 D006 D005 D011 D004 **
4	Scintillation Fluids* a) benzene b) dioxane c) toluene d) xylene e) other	F005 D001/U108 F005 F003 **
5	Solvents and Other Organic Fluids* a) freon b) other	F002 **
6	Alkaline liquids (pH>=12.5)	D002
7	Acidic liquids (pH<=2)	D002
99	Other wastes not specifically listed above which are listed by the U.S. EPA in 40 CFR 261 or which exhibit at least one of the following properties: Ignitability Corrosivity Reactivity Toxicity	D001 D002 D003 D004-43

\*Specify a, b, c, etc. (e.g., 4c = toluene scintillation fluid)

\*\*No waste code provided in this survey. If available, use the RCRA code.

#### APPENDIX IV: Container Description Codes

<b>CODE</b>	<b>CONTAINER</b>
1.	Wooden Box or Crate
2.	Metal Box
3.	Plastic Drum or Pail
4.	Metal Drum or Pail
5.	Metal Tank or Liner
6.	Concrete Tank or Liner
7.	Polyethylene Tank or Liner
8.	Fiberglass Tank or Liner
9.	Demineralizer
10.	Gas Cylinder
11.	Bulk, Unpackaged Waste
12.	Unpackaged Components
13.	High Integrity Container
19.	Other

**APPENDIX V: Waste Classification (32 Ill. Adm. Code 340.1052) and Disposal of Specific Wastes (32 Ill. Adm. Code 340.1050)**

**Section 340.1052 Classification of Radioactive Waste for Land Disposal**

- a) **Considerations.** Determination of the classification of radioactive waste involves two considerations. First, consideration must be given to the concentration of long-lived radionuclides (and their shorter-lived precursors) whose potential hazard will persist long after such precautions as institutional controls, improved waste form, and deeper disposal have ceased to be effective. These precautions delay the time when long-lived radionuclides could cause exposures. In addition, the magnitude of the potential dose is limited by the concentration and availability of the radionuclide at the time of exposure. Second, consideration must be given to the concentration of shorter-lived radionuclides for which requirements on institutional controls, waste form, and disposal methods are effective.
- b) **Classes of waste.**
- 1) **Class A waste** is waste that is usually segregated from other waste classes at the disposal site. The physical form and characteristics of Class A waste must meet the minimum requirements set forth in Section 340.1055(a). If Class A waste also meets the stability requirements set forth in Section 340.1055(b), it is not necessary to segregate the waste for disposal.
  - 2) **Class B waste** is waste that must meet more rigorous requirements on waste form to ensure stability (as defined in 32 Ill. Adm. Code 601.20) after disposal. The physical form and characteristics of Class B waste must meet both the minimum and stability requirements set forth in Section 340.1055.
  - 3) **Class C waste** is waste that not only must meet more rigorous requirements on waste form to ensure stability but also requires additional measures at the disposal facility to protect against inadvertent intrusion. The physical form and characteristics of Class C waste must meet both the minimum and stability requirements set forth in Section 340.1055.
- c) **Classification determined by long-lived radionuclides.** If the radioactive waste contains only radionuclides listed in Table 1, classification shall be determined as follows:
- 1) If the concentration does not exceed 0.1 times the value in Table 1, the waste is Class A.
  - 2) If the concentration exceeds 0.1 times the value in Table 1, but does not exceed the value in Table 1, the waste is Class C.
  - 3) If the concentration exceeds the value in Table 1, the waste is not generally acceptable for land disposal.
  - 4) For wastes containing mixtures of radionuclides listed in Table 1, the total concentration shall be determined by the sum of fractions rule described in subsection (g).

**TABLE 1**

<b>Radionuclide</b>	<b>Concentration curies/cubic meter</b>
C-14	20,008.00
C-14 in activated metal	80.00
Ni-59 in activated metal	220.00
Nb-94 in activated metal	0.20
Tc-99	3.00
I-129	0.08
Alpha emitting transuranic radionuclides with half-life greater than five years	100.00*
Pu-241	3,500.00*
Cm-242	20,000.00*
Ra-226	100.00*

\*AGENCY NOTE: Units are nanocuries per gram.

- d) Classification determined by short-lived radionuclides. If the waste does not contain any of the radionuclides listed in Table 1, classification shall be determined based on the concentrations shown in Table 2. However, as specified in subsection (f), if radioactive waste does not contain any nuclides listed in either Table 1 or 21, it is Class A.
- 1) If the concentration does not exceed the value in Column 1, the waste is Class A.
  - 2) If the concentration exceeds the value in Column 1 but does not exceed the value in Column 2, the waste is Class B.
  - 3) If the concentration exceeds the value in Column 2 but does not exceed the value in Column 3, the waste is Class C.
  - 4) If the concentration exceeds the value in Column 3, the waste is not generally acceptable for near-surface disposal.
  - 5) For wastes containing mixtures of the radionuclides listed in Table 2, the total concentration shall be determined by the sum of fractions rule described in subsection (g).

**TABLE 2**

Radionuclide	Concentration curies/cubic meter		
	Column 1	Column 2	Column 3
Total of all radionuclides with less than 5-year half-life	70.00	*	*
H-3	40.00	*	*
Co-60	700.00	*	*
Ni-63	3.50	70.00	700.00
Ni-63 in activated metal	35.00	700.00	7000.00
Sr-90	0.04	150.00	7000.00
Cs-137	1.00	44.00	4600.00

\*AGENCY NOTE: There are no limits established for these radionuclides in Class B or C wastes. Practical considerations such as the effects of external radiation and internal heat generation on transportation, handling, and disposal will limit the concentrations for these wastes. These wastes shall be Class B unless the concentrations of other radionuclides in Table 2 determine the waste to be Class C independent of these radionuclides.

- e) Classification determined by both long- and short-lived radionuclides. If the radioactive waste contains a mixture of radionuclides, some of which are listed in Table 1 and some of which are listed in Table 2, classification shall be determined as follows:
  - 1) If the concentration of a radionuclide listed in Table 1 is less than 0.1 times the value listed in Table 1, the class shall be that determined by the concentration of radionuclides listed in Table 2.
  - 2) If the concentration of a radionuclide listed in Table 1 exceeds 0.1 times the value listed in Table 1, but does not exceed the value in Table 1, the waste shall be Class C, provided the concentration of radionuclides listed in Table 2 does not exceed the value shown in Column 3 of Table 2.
  
- f) Classification of wastes with radionuclides other than those listed in Tables 1 and 2. If the waste does not contain any radionuclides listed in either Table 1 or 2, it is Class A.
  
- g) The sum of the fractions rule for mixtures of radionuclides. For determining classification for waste that contains a mixture of radionuclides, it is necessary to determine the sum of fractions by dividing each radionuclide's concentration by the appropriate limit and adding the resulting values. The appropriate limits must all be taken from the same column of the same table. The sum of the fractions for the column must be less than 1.0 if the waste class is to be determined by that column. Example: A waste contains SR-90 in a concentration of 50 curies/cubic meter and CS-137 in a concentration of 22 curies/cubic meter. Since the concentrations both exceed the values in Column 1. Table 2, they must be compared to Column 2 values. For Sr-90 fraction, 50/150 equals 0.33; for Cs-137 fraction, 22/44 equals 0.5; the sum of the fractions equals 0.83. Since the sum is less than 1.0, the waste is Class B.

- h) Determination of concentrations in wastes. The concentration of a radionuclide may be determined by indirect methods such as use of scaling factors which relate the inferred concentration of one radionuclide to another that is measured, or radionuclide material accountability, if there is reasonable assurance that the indirect methods can be correlated with actual measurements. The concentration of a radionuclide may be averaged over the volume of the waste, or weight of the waste if the units are expressed as nanocuries per gram.**

**Section 340.1050 Disposal of Specific Wastes**

- a) A licensee may dispose of the following licensed material as if it were not radioactive:**
- 1) 1.85 kBq (0.05 uCi), or less, of hydrogen-3, carbon-14, or iodine-125 per gram of medium used for scintillation counting; and**
  - 2) 1.85 kBq (0.05 uCi), or less, of hydrogen-3, carbon-14, or iodine-125 per gram of animal tissue, averaged over the weight of the entire animal.**
- b) A licensee shall not dispose of tissue pursuant to subsection (a)(2) above in a manner that would permit its use either as food for humans or as animal feed.**
- c) The licensee shall maintain records in accordance with Section 340.1180.**

## APPENDIX VI: Glossary of Terms

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**Abrasive cleaning:** The use of abrasive substances to remove contamination from the surface of an object. Such abrasives may include sand or grit used in scouring and sand used in sandblasting.

**Absorption:** Any process in which a liquid is held in the interstices of an absorbent material, such as water being held in a sponge.

**Absorbent materials:** Absorbent materials such as diatomaceous earth or vermiculite are currently added to several institutional waste streams to minimize potential transportation impacts. These streams include liquid scintillation vial (LSV) waste, absorbed liquid waste, and biowaste. Existing commercial disposal facility operators require that these wastes be packaged with specified proportions of waste to absorbent material before they are accepted for disposal. For example, LSV waste is required to be packaged using sufficient absorbent material to absorb twice the total volume of the liquid in the package. Lime is frequently added to the biowaste stream. Double packaging of these waste streams is also used for additional safety. For the liquid scintillation vial and the absorbed liquid waste streams, a volume increase factor of 3.0 assumed. NOTE: Absorbents such as vermiculite and diatomaceous earth are not considered to be solidification agents since they do not chemically or physically bind the wastes.

**Accelerator-produced material:** Any material made radioactive by a particle accelerator.

**Activated hardware:** Tools, instruments, equipment, and lead or lead shielding made radioactive by irradiation. Activated metals and instruments come from equipment directly associated with the reactor and spent fuel pool.

**Air filter:** Any device used to filter particles or chemicals from the air. May include ventilation exhaust filters, HEPA (high-efficiency particulate air) filters, and charcoal filters, or the media used in air filters. Such air filter media may include charcoal or cellulosic fibers.

**Aqueous liquid waste:** Waste that is dissolved in water. Water-soluble liquid scintillation fluids are included in this waste type.

**Ash:** The product of incinerating low-level radioactive waste (LLRW).

**Background radiation:** The radiation in the natural environment, including cosmic rays and radiation from naturally-occurring radioactive elements both outside and inside living organisms. Also called naturally-occurring radiation.

**Biological wastes:** The waste consists of animal carcasses, tissues, animal bedding, and excreta, as well as vegetation and culture media.

**Broker:** Any person who takes possession of LLRW for the purposes of consolidation and shipment.

**Byproduct material:** 1) Any radioactive material, except special nuclear material, yielded in or made radioactive by exposure to the radiation 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 any ore processed primarily for its source material content, including discrete surface wastes resulting from underground solution extraction processes, but not including underground ore bodies depleted by such solution extraction processes. Please note that for the purposes of this survey, the second definition (2) is not considered to be LLRW.

**Cartridge filters:** Cartridge filters contain one or more disposable filter elements. These elements may be typically constructed of woven fabric, wound fabric, or pleated paper supported internally by a stainless steel basket.

**Chelating agent:** Amine polycarboxylic acids (e.g. EDTA, DTPA), hydroxy-carboxylic acids, and polycarboxylic acids (e.g., citric acid, carboxylic acid, and glucinic acid) used for purposes of bonding, i.e., to stabilize radioactive materials.

**Class A waste:** Waste with the lowest concentrations of radionuclides. The physical form and characteristics of Class A waste must meet the minimum requirements set forth in 32 Ill. Adm. Code, ch. II, 340.3080(a). If Class A waste also meets the stability requirements set forth in 32 Ill. Adm. Code, ch. II 340.3080(b), it is not necessary to segregate the waste for disposal.

**Class B waste:** Waste with higher concentrations of radionuclides than Class A, Class B waste must meet more rigorous requirements on waste form to ensure stability (as defined in 32 Ill. Adm. Code, ch II, 601.20) after disposal. The physical form and characteristics of Class B waste must meet both the minimum and stability requirements set forth in 32 Ill. Adm. Code, ch. II 340.3080.

**Class C waste:** The highest concentrations of waste that is permitted for disposal as low-level radioactive waste, Class C waste not only must meet more rigorous requirements on waste form to ensure stability but also requires additional measures at the disposal facility to protect against inadvertent intrusion. The physical form and characteristics of Class C waste must meet both the minimum and stability requirements set forth in 32 Ill. Adm. Code, ch. II 340.3080.

**Compaction:** Compaction is an often-used treatment method--particularly at nuclear fuel-cycle facilities--for reducing the volume of waste streams containing compressible material such as paper, plastic, glass, wood, and light-gauge metal. Most of the volume reduction is attained by compressing the waste to reduce its void volume. The term compactor is usually applied to hydraulic or mechanical rams that compress wastes into boxes or 55-gallon steel drums. The boxes and drums are then used as disposal containers. Typical hydraulic rams generate 20,000 to 30,000 pounds of force, and are fitted with shrouds and simple air filtration systems to minimize release of airborne radioactivity.

**Concentration:** The amount of a specified substance in a unit amount of another substance. The classification system for low-level radioactive waste is based on the concentrations of long- and/or short-lived radionuclides, measured in curies per cubic meter or nanocuries per gram.

**Contaminated hardware:** Tools, instruments, equipment, and lead or lead shielding having radioactive contamination on their surfaces.

**Contaminated oils:** Lubricating or machine oil which becomes contaminated with radioactive materials.

**Contaminated Rubble, Sand, Soil:** Concrete, gravel, sand and soil, or other building rubble contaminated with radioactive materials.

**Contamination:** The introduction of radioactive material any place where it is not desired.

**Decay:** The spontaneous transformation of one nuclide into a different nuclide or into a different energy state of the same nuclide. During decay, the unstable radioactive nucleus releases energy or particles. The process results in a decrease, with time, in the number of original radioactive atoms in the sample. Also referred to as radioactive disintegration.

**Decontamination:** The removal of radioactive contaminants from surfaces or equipment, using processes such as washing, electropolishing, abrasive cleaning, or cleaning with high-pressure water.

**Depleted uranium:** The source material uranium in which the isotope uranium-235 is less than 0.711 weight percent of the total uranium present. Depleted uranium does not include special nuclear material.

**Dewatering:** The process of removing water from wet low-level radioactive wastes.

**Disposal facility:** A parcel of land or site, together with structures, equipment, and improvements on or appurtenant to the land or site, which is used or is being developed for the disposal of LLRW. "Facility" does not include lands, sites, structures, or equipment used by a generator in the generation of LLRW.

**Drums:** Commonly used to ship and dispose of low-level radioactive waste, drums are usually made of steel, and are cylindrical in shape with either sealed or removable heads.

**Dry active waste (DAW):** Waste that commonly consists of paper, cloth, plastic, rubber, tape, non-metal filter, and scrap wood. May also include scrap metal, glass, smoke detectors, electrical conduit and cable, and insulation material. DAW may be both compactible and combustible, compactible and non-combustible, non-compactible and combustible, or non-compactible and non-combustible. Also see reactor trash and institutional trash.

**Electropolishing:** Any electrochemical process in which radioactive contamination is removed from the surface of the metal.

**Evaporation:** Treating liquid wastes by heating them to vaporize the volatile components. The vaporized liquid generally contains greatly reduced quantities of dissolved fluids, suspended solids, and radioactivity relative to those found in the input waste stream. In the nuclear industry, the vaporized waste is normally condensed and collected, and then either discharges or recycled after testing to determine whether the condensate requires additional treatment. The concentrated solution (bottoms) left in the evaporator retains virtually all of the solids and radioactivity and is solidified and shipped to a disposal facility.

**Evaporator concentrates:** Concentrated liquid waste may be produced by the evaporation of a wide variety of liquid waste streams. The waste consists of liquids with elevated suspended and dissolved solids content, and also consists of sludge resulting from supersaturation during evaporation.

**Filter sludge:** Filter sludge is waste produced by precoat filters and consists of filter aid and waste solids retained by the filter aid. Diatomaceous earth, powdered mixtures of cation and anion exchange resins, and high purity cellulose fibers are common filter aids. These materials are slurried and deposited (precoated) as a tin cake on the initial filter medium (wire mesh, cloth, etc.). The filter cake removes suspended solids from liquid streams.

**Filtration:** A process of removing radioactive particles from liquid waste by filtering. Filtration media may include cellulosic fiber, diatomaceous earth, and activated carbon. In some cases, the filtered liquid can be recycled. Filtration may also be applied to the removal of contamination from air by using high-efficiency particulate air (HEPA) filters or other kinds of filters.

**Final disposal volume:** The volume of waste shipped for disposal including the container in which it was disposed.

**Gaseous waste:** Radioactive waste in a gaseous state.

**Generator:** Any person who produces or possesses LLRW in the course of or incident to manufacturing, power generation, processing, medical diagnosis and treatment, research, education, or other activity.

**Greater than Class C waste:** Waste with a concentration of radioactivity exceeding those established for Class C low-level radioactive waste, as defined in 32 Ill. Adm. Code ch. II, Part 340.3070.

**Half-life; radioactive:** For a single radioactive decay process, the time required for the activity to decrease by half its value by that process. Glossary of Nuclear Science Terms.

**Hazardous waste:** A waste or combination of wastes, which because of its quantity, concentration, or physical, chemical, or infectious characteristics may cause or significantly contribute to an increase in mortality or an increase in serious, irreversible, or incapacitating reversible illness; or pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of, or otherwise managed, and which has been identified, by characteristics or listing, as hazardous pursuant to Section 3001 of the Resource Conservation and Recovery Act of 1976, P.L. 94-580 or pursuant to regulations of the Pollution Control Board.

**High-integrity container (HIC):** A type of container that is intended to provide structural stability and containment of low-level radioactive waste for a long period of time. The design, and physical and chemical properties of the materials from which such containers are fabricated contribute to this stability. They are used for both the transportation and disposal of waste.

**High-level radioactive waste:** 1) The highly radioactive material resulting from the reprocessing of spent nuclear fuel including liquid waste produced directly in reprocessing and any solid material derived from such liquid waste that contains fission products in sufficient concentrations; and 2) the highly radioactive material that the Nuclear Regulatory Commission has determined, on the effective date of this Amendatory Act of 1988 (Illinois Low-Level Radioactive Waste Management Act, Section 3(j)), to be high-level radioactive waste requiring permanent isolation.

**High-pressure water cleaning:** A process for cleaning radioactive contamination from the surfaces of objects by spraying with a jet of water. Also see "Decontamination."

**Incineration:** Treatment of combustible waste materials by thermal oxidation. Combustion or incineration involves complete oxidation of wastes by burning in an excess of oxygen (air). Most frequently used for organic liquids, animal carcasses, and most solid institutional wastes.

**Institutional trash (DAW):** Consists almost entirely of materials that are both compactible and combustible. It generally consists of paper, rubber or plastic gloves, disposable and broken labware, and disposable syringes.

**Ion exchange:** A process for selectively removing ionic constituents from liquid waste by reversibly transferring ions between resins and the waste.

**Ion exchange media:** Ion exchange media usually consist of organic resins, which can be cation or anion resins, or a mixture of both. Inorganic zeolite ion exchange media have also been used in some cases.

**Ionizing radiation:** Includes gamma rays and x-rays, alpha and beta particles, high speed electrons, neutrons, protons, and other nuclear particles or electromagnetic radiations capable of producing ions directly or indirectly in their passage through matter; but does not include sound or radio waves, or visible, infrared or ultraviolet light.

**Isotope:** One of two or more atoms with the same atomic number (the same chemical element), but with different atomic weights. Carbon-12, carbon-13, and carbon-14 are isotopes of the element carbon, the numbers denoting the approximate atomic weights. Isotopes may be stable or radioactive.

**Limitation of articles in contaminated areas:** Unnecessary contamination of tools and other articles can be avoided by restricting the number of articles allowed to enter contaminated areas.

**Limitation of contaminated areas:** Similar to "limitation of articles in contaminated areas," a limitation on the number of areas within a facility in which radioactive materials can be used will also minimize unnecessary contamination of materials.

**Liquid filter cartridges:** Disposable or cleanable filters that are replaceable as a cartridge unit.

**Liquid filter media:** A sludge consisting of diatomaceous earth, cellulosic fiber, powdered ion exchange resin, charcoal, or activated powdered carbon.

**Liquid scintillation fluids:** Flammable organic solvents (e.g. toluene, benzene, xylene) comprise the major constituents of scintillation fluids.

**Liner:** An inner package into which LLRW is packed that is loaded into an outer shielded packaging for shipping. The liner is subsequently unloaded for burial at the waste disposal site while the outer container is cleaned and reused.

**Long-lived radionuclide:** An atom whose nucleus decays at a slow rate so that a quantity of such radionuclides will exist for an extended time.

**Low-level radioactive waste or "waste":** 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. 2014. Except when otherwise indicated in the rules, LLRW includes "mixed waste."

**Medical generators:** Separation columns that are both "hazardous waste" and "low-level radioactive waste" as defined in the Illinois Low-Level Radioactive Waste Management Act. Also see hazardous waste and low-level radioactive waste.

**Mixed waste:** Waste that contains a combination of low-level radioactive waste and hazardous materials. Hazardous components are those listed by the Environmental Protection Agency in Subpart D of 40 CFR 261, or those that exhibit any of the following four hazardous characteristics: ignitability, corrosivity, reactivity, or extraction procedure (EP) toxicity. Both radiological and chemical toxicity must be considered in its management and disposal.

**NARM:** See "Naturally-occurring or Accelerator-produced Radioactive Material."

**Natural uranium:** An element with the atomic number 92 having 14 known isotopes ranging from uranium-227 to uranium-240, the most abundant being uranium-238. Natural uranium is found in several minerals from which uranium is extracted and processed for use in research, nuclear fuels, and nuclear weapons.

**Naturally-occurring or Accelerator-produced Radioactive Material (NARM):** Radioactive NARM waste includes discrete material (small volume, high activity accelerator-produced materials, radium needles used in medicine, and drinking water filters from radium-contaminated areas) as well as diffuse material (generally lower activity radium-contaminated soil at locations where radium was used for manufacturing luminous dials and paint or where natural deposits of radium exist, or material in which radium or other naturally-occurring materials have been concentrated).

**Naturally-occurring Radioactive Material (NORM):** Radioactive material that has a natural source. See Naturally-occurring or Accelerator-produced Radioactive Material.

**Nuclide:** A species of atoms characterized by its mass number, atomic number, and nuclear energy state provided that the lifetime in that state is long enough to be observable. Nuclides may be stable or radioactive.

**Oils (contaminated):** Lubricating or machine oil contaminated with radioactive materials.

**Organic liquid:** Carbon-based compounds such as alcohols, aldehydes, ketones, and organic acids. Includes liquid scintillation media containing chemicals such as benzene, xylene, or toluene, and degreasing solvents such as carbon tetrachloride, freon, or vanadous formate. For purposes of this report, this waste type does not include oils.

**Processing:** The preparation, manipulation, or conversion of radioactive material.

**Processor:** Any person or company taking possession of LLRW for treatment.

**Radiation:** See ionizing radiation.

**Radioactive material:** Any material, solid, liquid, or gas which emits radiation spontaneously.

**Radioactivity:** The spontaneous emission of radiation, generally alpha, or beta particles and often accompanied by gamma rays, from the nucleus of an unstable nuclide. Measured in curies.

**Radioisotope:** A radioactive isotope. An unstable atom of an element that decays or disintegrates spontaneously, emitting radiation. More than 1,300 natural and artificial radioisotopes have been identified.

**Radionuclide:** A radioactive species of atom having a specific mass, atomic number, and nuclear energy state.

**Radium contaminated waste:** Radium is a naturally occurring radioactive element which has been used in medical and industrial applications since the turn of the century. While there are several known isotopes of radium, the one that has the greatest utilization is radium-226, an isotope forming part of the uranium-228 decay scheme. Since it is an alkaline metal that reacts with nitrogen, in commercial use it is principally in the form of a salt.

**Reactor trash (DAW):** Trash is the most varied waste stream generated by Light Water Reactors and can contain everything from paper towels to irradiated reactor internals.

**Recycling:** The process of reusing items or materials. Recycling may include some form of treatment before the item or material can be reused for its intended purpose.

**Rubble, sand, soil (contaminated):** Concrete, gravel, sand and soil, or other building rubble contaminated with radioactive materials.

**Sealed source:** Any device containing radioactive material to be used primarily as a source of radiation which has been constructed in such a manner as to prevent the escape, under normal conditions, of any radioactive material.

**Sludge:** Wet wastes resulting from sewage or water treatment processes.

**Sorting of waste by radionuclide, half-life, or activity:** Keeping track of the radionuclide, curie content and the half-life of each type of waste enables generators to segregate materials according to the manner in which they must be handled and disposed.

**Source material:** Uranium or thorium, or any combination thereof, in any physical or chemical form; or ores which contain by weight one-twentieth of one percent (0.05 percent) or more of uranium; thorium; or any combination thereof. Source material does not include special nuclear material.

**Source reduction:** Those administrative practices that reduce the radionuclide levels of LLRW or that prevent the generation of additional LLRW.

**Special nuclear material in quantities not sufficient to form a critical mass:** Uranium enriched in the isotope U-235 in quantities not exceeding 350 grams of contained U-235; U-233 in quantities not exceeding 200 grams; or any combination of them, except source material.

**Specific waste:** Refers to two specific waste types that may be disposed of without regard to their radioactive component: 1) liquid scintillation fluids containing no more than 0.05 microcuries per gram of carbon-14 or hydrogen-3 (tritium); and 2) animal carcasses containing no more than 0.05 microcuries per gram of tissue of carbon-14 or tritium. These materials must still be handled in accordance with other applicable regulatory requirements.

**Stabilization:** Any process by which radioactive waste is made stable to physical, chemical, or biological degradation. Processes such as solidification, or certain packaging procedures may result in stabilization.

**Standard compaction:** Compacting material using a compactor capable of generating up to 15 tons of compressive force can produce volume reduction ratios of three or four to one when used to treat compactible waste streams. Waste streams compactible with a standard compactor include dry active waste, filter cartridges, and liquid scintillation vials.

**Storage:** Temporary holding of waste for treatment or disposal for a period determined by Department regulations.

**Storage for decay to background:** Practice of holding waste in storage for decay to background. Once at a background radiation level, as measured with an appropriate instrument, this waste could then be deemed no longer radioactive and routine trash disposal is permitted by most regulatory agencies.

**Strippable coating:** Any removable coating layered on a surface to prevent an item or area from becoming contaminated.

**Supercompaction:** Compacting material using a compactor that can apply compressive forces approaching 100 times those achievable by standard compactors. Volume reduction ratios can approach eight to one for selected applications.

**Transferred disposal volume:** The waste-only volume of low-level radioactive waste transferred to a broker or processor for storage, treatment, or disposal.

**Transuranic:** An element with an atomic number greater than 92.

**Transuranic waste:** Waste contaminated with alpha-emitting radionuclides with atomic numbers greater than 92 and half-lives greater than 20 years in concentrations greater than 100 nanocuries per gram.

**Treatment:** Any method, technique, or process, including storage for radioactive decay, designed to change the physical, chemical, or biological characteristics or composition of any waste in order to render the waste safer for transport or management, amenable to recovery, convertible to another usable material or reduced in volume.

**Volume reduction:** Those methods including, but not limited to, biological, chemical, mechanical, and thermal methods used to reduce the amount of space that waste materials occupy and to put them into a form suitable for storage or disposal.

**Washing:** Any procedure in which tools, glassware, and other contaminated articles are washed in order to partially or completely remove radioactive contamination. Washing may involve the use of detergents or chelating agents.

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**APPENDIX B**  
**List of LLRW Generators**  
**Returning Surveys in 1998**

## ACADEMIC

Augustana College  
639 38th Street  
Rock Island, IL 61201

Belleville Area College  
2500 Carlyle Road  
Belleville, IL 62221

Chicago State University  
Williams Science Center  
9501 South King Drive, Sci-309  
Chicago, IL 60628

College of DuPage  
425 22nd Street  
Glen Ellyn, IL 60137

Consolidated High School District 230  
Victor J. Andrew High School  
9001 West 171st Street  
Tinley Park, IL 60477

DePaul University  
2335 North Clifton  
Chicago, IL 60614

Eastern Illinois University  
Charleston, IL 61920

Field Museum of Natural History  
Biochemistry Laboratories  
Roosevelt Road at Lake Shore Drive  
Chicago, IL 60605

Finch University of Health Sciences  
The Chicago Medical School  
3333 Green Bay Road  
North Chicago, IL 60064

IIT Research Institute  
10 West 35th Street  
Chicago, IL 60616

Illinois Institute of Technology  
3101 S. Dearborn St., Room 206 LS  
Chicago, IL 60616

Illinois State University  
Office of Env. Health & Safety  
Room 203, General Services Bldg.  
Normal, IL 61761

Knox College  
2 East South Street  
Galesburg, IL 61401

Lake Forest College  
555 North Sheridan Road  
Lake Forest, IL 60045

Loyola University of Chicago  
6525 North Sheridan Road  
Chicago, IL 60626

Marmion Academy  
1000 Butterfield Road  
Aurora, IL 60504

Midwestern University  
Basic Science/Research Dept.  
555 31st Street  
Downers Grove, IL 60515

National College of Chiropractic  
200 East Roosevelt Road  
Lombard, IL 60148

Northeastern Illinois University  
Department of Earth Science  
5500 North St. Louis  
Chicago, IL 60625

Northwestern University  
Office of Research Safety  
303 East Chicago Avenue  
Chicago, IL 60611

SIU at Carbondale  
Center For Environmental Health & Safety  
1400 Poultry Center Drive  
Carbondale, IL 62901

Southern Illinois University  
SIU - School of Medicine  
801 North Rutledge  
Springfield, IL 62702

Southern Illinois University  
SIU-Edwardsville  
Campus Box 1657  
Edwardsville, IL 62026

The University of Chicago  
Office of Radiation Safety  
1101 East 57th Street, Room Z-11  
Chicago, IL 60637

U of I at Urbana-Champaign  
101 South Gregory Street  
Urbana, IL 61801

#### **FUEL CYCLE**

AlliedSignal, Inc.  
Metropolis Works  
U S Hwy 45n, P. O. Box 430  
Metropolis, IL 62960

University of IL at Peoria  
College of Medicine  
One Illini Drive, Box 1649  
Peoria, IL 61656

University of Illinois  
College of Medicine at Rockford  
1601 Parkview Avenue  
Rockford, IL 61107

University of Illinois at Chicago  
820 S. Wood Street , Room 339 CSN  
Chicago, IL 60612

Waubonsee Community College  
Route 47 & Harter Road  
Sugar Grove, IL 60554

Western Illinois University  
1 University Circle  
Macomb, IL 61455

Wheaton College  
501 East College Avenue  
Wheaton, IL 60187

Yorkville High School  
797 Game Farm Road  
Yorkville, IL 60560

G.E. Nuclear Energy  
Morris Operation  
7555 East Collins Road  
Morris, IL 60450

## **GOVERNMENTAL**

375th Medical Group  
310 West Losey Street  
Scott AFB, IL 62225

American Water Works Service Company  
Belleville Laboratory  
1115 South Illinois Street  
Belleville, IL 62220

Department of the Army  
Savanna Army Depot Activity  
Attn: SIOSV-SAF-Saf  
Savanna, IL 61074

Department of Veterans Affairs  
Edward Hines, Jr. Hospital  
Hines, IL 60141

Dept of the Army  
Rock Island Arsenal  
SIORI-SEM Building 210, Room 407  
Rock Island, IL 61299

IL Dept of Public Health  
2121 West Taylor Street  
Chicago, IL 60612

Illinois Army National Guard  
USPFO for Illinois  
1301 North MacArthur Boulevard  
Springfield, IL 62702

Illinois Department of Nuclear Safety  
1301 Knotts Street  
Springfield, IL 62703

Illinois State Police  
Spgfld Forensic Science Lab  
2060 Hill Meadows Drive  
Springfield, IL 62702

Illinois State Police  
Westchester Forensic Science Laboratory  
10001 Roosevelt Road  
Westchester, IL 60154

Illinois State Police - Forensic  
2040 Hill Meadows Drive  
Springfield, IL 62702

Metro Wtr. Recl. Dist. of Greater Chicago  
R & D Laboratory  
6001 West Pershing Road  
Cicero, IL 60804

Museum of Science & Industry  
57th & Lake Shore Drive  
Chicago, IL 60637

Naval Dental Research Institute  
Building 1-H  
Great Lakes, IL 60088

Naval Hospital Great Lakes  
3001a Sixth Street  
Great Lakes, IL 60088

Navy Drug Screening Laboratory  
P. O. Box 886819, Building 38-H  
Great Lakes, IL 60088

North Chicago V.A. Medical Center  
3001 North Green Bay Road  
North Chicago, IL 60064

Office of Medical Examiner  
Cook County Toxicology Laboratory  
2121 W. Harrison  
Chicago, IL 60612

U. S. Environmental Protection Agency  
Central Regional Laboratory  
536 South Clark Street, 10th Floor  
Chicago, IL 60605

U.S. Customs Laboratory  
610 South Canal St, Ste 1100  
Chicago, IL 60607

U.S. Department of Agriculture, ARS  
NCAUR  
1815 North University Street  
Peoria, IL 61604

U.S. Nuclear Regulatory Commission  
Region III  
801 Warrenville Road  
Lisle, IL 60532

## INDUSTRIAL

Abbott Laboratories  
100 Abbott Park Road  
Abbott Park, IL 60064

Alliant Techsystems  
Lap Facility  
29745 Alliant Drive  
Wilmington, IL 60481

Alnor Instrument Company  
7555 North Linder Avenue  
Skokie, IL 60077

American Air Liquide, Inc.  
5230 South East Avenue  
Countryside, IL 60525

Amoco Chemical Company  
P. O. Box 941  
Joliet, IL 60434

V.A. Medical Center  
Nuclear Medicine Service  
2401 West Main Street  
Marion, IL 62959

V.A. Medical Center  
1900 East Main Street  
Danville, IL 61832

V.A. Westside Medical Center  
820 South Damen Avenue  
Chicago, IL 60612

Analysts, Inc.  
2450 Hassell Road  
Hoffman Estates, IL 60195

APL Engineered Materials, Inc.  
2401 North Willow Road  
Urbana, IL 61802

Archer-Daniels-Midland Company  
Corporate Office  
4666 Faries Parkway  
Decatur, IL 62526

Austeel Lemont Company, Inc.  
New Avenue at Ceco Road  
Lemont, IL 60439

Barber-Colman Company  
1354 Clifford Avenue, P. O. Box 2940  
Loves Park, IL 61111

Baxter Healthcare Corporation  
Fenwal & Life Sciences Division  
Route 120 & Wilson Road WG3-2S  
Round Lake, IL 60073

BetzDearborn Inc.  
300 Gemesee Street  
Lake Zurich, IL 60047

BRK Brands, Inc.  
3901 Liberty Street  
Aurora, IL 60504

Centeon, L. L. C.  
Armour Pharmaceutical Company  
P. O. Box 511  
Kankakee, IL 60901

Chicago Magnesium Casting Company  
14101 S. Seeley Ave., P. O. Box 237  
Blue Island, IL 60406

CMI International Corporation  
945 Busse Road  
Elk Grove Village, IL 60007

Commonwealth Edison Company  
Rockford Headquarters  
123 Energy Avenue  
Rockford, IL 61109

Commonwealth Edison Company  
1400 Opus Place - Suite 800  
Downers Grove, IL 60515

Consolidation Coal Company  
Rend Lake Mine  
P. O. Box 566  
Sesser, IL 62884

CPC International  
6400 Archer Road  
Argo, IL 60501

Crete Oil Company  
Formerly International Wireline Services, Inc.  
7005 East 1050th Avenue  
Robinson, IL 62454

EPL Bio-Analytical Services, Inc.  
P. O. Box 109, 395 N. Memorial Pkwy  
Harristown, IL 62537

G. D. Searle & Company  
4901 Searle Parkway  
Skokie, IL 60077

Hanson Engineers Incorporated  
1525 South 6th Street  
Springfield, IL 62703

Helene Curtis Industries, Inc.  
Unilever HPC-USA  
3100 Golf Road, Room F-109  
Rolling Meadows, IL 60008

High Technology Medical Park  
11800 Southwest Highway  
Palos Heights, IL 60463

Indicator Lites, Inc.  
500 North Rt. 53  
Gardner, IL 60424

Institute of Gas Technology  
Corporate Headquarters  
1700 South Mt. Prospect Road  
Des Plaines, IL 60018

Interstate Nuclear Services, Inc.  
1006 Third Avenue  
Morris, IL 60450

Kay-Ray/Sensall, Inc.  
1400 Business Center Drive  
Mount Prospect, IL 60056

Keystone Steel and Wire  
7000 South West Adams Street  
Peoria, IL 61641

Koppers Industries, Inc.  
3900 South Laramie Avenue  
Chicago, IL 60650

Kraft Foods, Inc.  
Technology Center  
801 Waukegan Road  
Glenview, IL 60025

Lixi, Inc.  
1438 Brook Drive  
Downers Grove, IL 60515

Lucent Technologies  
4513 Western Avenue, Executive Room 8  
Lisle, IL 60532

Mallinckrodt Inc.  
Nuclear Medicine Division  
4100 North Elston Avenue  
Chicago, IL 60618

McCook Metals LLC  
Formerly Reynolds Metals Company  
4900 First Avenue  
McCook, IL 60525

Monsanto Research Farm/Monmouth  
700 Chesterfield Parkway North  
M.Z. BB5G  
St. Louis, MO 63198

Nalco Chemical Company  
One Nalco Center  
Naperville, IL 60563

Nalge Nunc International  
2000 North Aurora  
Naperville, IL 60563

Nestle Clinical Nutrition  
13580 East Central Avenue, P. O. Box D  
Hopkins Park, IL 60944

Northwestern Steel and Wire  
121 Wallace Street  
Sterling, IL 61081

Novartis Crop Protection, Inc.  
Ciba-Geigy Corp., MW Res. Sta.  
P. O. Box 18300  
Greensboro, NC 27419

Nuclear Data Systems  
Canberra/NSD  
150 Spring Lake Drive  
Itasca, IL 60143

Nuclin Diagnostics, Inc.  
3322 Commercial Avenue  
Northbrook, IL 60062

Nycomed Amersham  
Medi-Physics, Inc.  
3350 North Ridge Avenue  
Arlington Heights, IL 60004

Nycomed Amersham  
Formerly MPI Pharmacy Services  
1053 West Grand Avenue  
Chicago, IL 60622

Nycomed Amersham Imaging  
Formerly Amersham Holdings  
2636 South Clearbrook Drive  
Arlington Heights, IL 60005

Onstate Recycle  
5807 South State Street  
Chicago, IL 60621

Organics/Lagrange, Inc.  
1935 Techny Road, Suite 14  
Northbrook, IL 60062

Packard Instrument Company, Inc.  
2200 Warrenville Road  
Downers Grove, IL 60515

Petnet Pharmaceutical Services  
CTI Services, Inc. Chicago Pet Compound  
3571 Peachtree Parkway, Suite C  
Suwanee, GA 30024

Pharmacy Services of Peoria  
920 Main Street  
Peoria, IL 61602

Primex Technologies, Inc.  
Marion Operations  
8820 Route 148  
Marion, IL 62959

Professional Laundry Management, Inc.  
113 South Route 53  
Gardner, IL 60424

Quaker Oats Company (The)  
John Stuart Research Laboratory  
617 West Main Street  
Barrington, IL 60010

Recra Lab Net-Chicago  
Weston Environmental Metrics, Inc.  
2417 Bond Street  
University Park, IL 60466

RELTEC Corporation  
1019 Entry Drive  
Bensenville, IL 60106

Shell Oil Products Company  
Shell Wood River Refining Company  
900 South Central Avenue  
Roxana, IL 62084

Sherwin Williams Automotive Finishes  
Corporation  
Automotive Technical Center  
10909 South Cottage Grove Avenue  
Chicago, IL 60628

Siemens Medical Systems, Inc.  
Formerly Siemens Gammasonics, Inc.  
2501 Barrington Road  
Hoffman Estates, IL 60195

Stan A. Huber Consultants, Inc.  
200 North Cedar Road  
New Lenox, IL 60451

Stewart Superior  
1800 West Larchmont  
Chicago, IL 60613

Syncor Corporation  
614 East Carpenter Street  
Springfield, IL 62701

Syncor International  
25 North May Street  
Chicago, IL 60607

Syncor International  
25 North May Street  
Chicago, IL 60607

Syncor International Corporation  
200 East Howard, Suite 204b  
Des Plaines, IL 60018

System Sensor  
Division Of Pittway  
3825 Ohio Avenue  
St. Charles, IL 60174

Teledyne Brown Eng. Env. Services  
Midwest Laboratory  
700 Landwehr Road  
Northbrook, IL 60062

TEST-ER, Inc.  
225 Mitchell Court, A10  
Addison, IL 60101

## MEDICAL

Abraham Lincoln Memorial Hospital  
315 8th Street  
Lincoln, IL 62656

ACGT, Inc.  
1955 Raymond Drive, Suite 104  
Northbrook, IL 60062

Advanced Medical Imaging Center  
111 North Wabash, Suite 620  
Chicago, IL 60602

Advocate Health Care  
Bethany Hospital  
3435 West Van Buren  
Chicago, IL 60624

Advocate Medical Imaging Center  
249 River Road  
Des Plaines, IL 60016

Alexian Brothers Medical Center  
800 West Biesterfield Road  
Elk Grove Village, IL 60007

The Nutrasweet Company  
601 Kensington  
Mt. Prospect, IL 60056

UOP/Allied Signal Research Center  
50 East Algonquin Road, Box 5016  
Des Plaines, IL 60017

Vysis, Inc.  
3100 Woodcreek Drive  
Downers Grove, IL 60515

Alton Memorial Hospital  
#1 Memorial Drive  
Alton, IL 62002

American Dental Association  
211 East Chicago Avenue  
Chicago, IL 60611

American Diagnostic Medicine  
960 Industrial Drive, Suite 7  
Elmhurst, IL 60126

Anderson Hospital  
Route 162 & Old Edwardsville Rd  
Maryville, IL 62062

Biomedical Scanning Services  
9445 Chavez Drive  
Sunset Hills, MO 63127

Blessing Hospital  
1005 Broadway  
Quincy, IL 62301

Bromenn Health Care  
Virginia at Franklin  
Normal, IL 61761

Cardiology Consultants, Ltd.  
301 West Lincoln Street  
Belleville, IL 62220

Cardio-Med, Ltd.  
121 South Wilke Road, Suite 110  
Arlington Heights, IL 60005

Carle Clinic Association  
602 West University Avenue  
Urbana, IL 61801

Carle Foundation Hospital  
611 West Park Street  
Urbana, IL 61801

Catholic Health Partners  
St. Anthony Hospital  
19th Street and California Avenue  
Chicago, IL 60623

Central DuPage Hospital  
025 Winfield Road  
Winfield, IL 60190

CGH Medical Center  
100 East Lefevre Road  
Sterling, IL 61081

Christ Hospital and Medical Center  
4440 West 95th Street  
Oak Lawn, IL 60453

Clinical Associates, S.C.  
150 North River Road, Suite 300  
Des Plaines, IL 60016

Columbia Michael Reese Osteo. Fam. Hlth.  
Ctr.  
Formerly Chicago Michael Reese Osteo. Fam.  
Hlth. Ctr.  
5200 South Ellis Avenue  
Chicago, IL 60615

Columbia Olympia Flds. Osteo. Med. Ctr.  
20201 South Crawford Avenue  
Olympia Fields, IL 60461

Columbus-Cabrini Medical Center  
2520 North Lakeview Avenue  
Chicago, IL 60614

Community Hospital of Ottawa  
1100 East Norris Drive  
Ottawa, IL 61350

Community Memorial Hospital  
1000 West Harlem Avenue  
Monmouth, IL 61462

Condell Memorial Hospital  
801 South Milwaukee Road  
Libertyville, IL 60048

Cook County Hospital  
1835 West Harrison Street  
Chicago, IL 60612

Copley Memorial Hospital  
2000 Ogden Avenue  
Aurora, IL 60505

Crawford Memorial Hospital  
1000 North Allen  
Robinson, IL 62454

Crossroads Community Hospital  
8 Doctors Park Road  
Mt. Vernon, IL 62864

**Decatur Memorial Hospital**  
2300 North Edward Street  
Decatur, IL 62526

**Delnor Community Hospital**  
300 Randall Road  
Geneva, IL 60134

**Diagnostic Center, Ltd**  
43 Park & Shop Lane  
Elk Grove Village, IL 60007

**Diagnostic Health Services**  
840 West Bartlett Road  
Bartlett, IL 60103

**Diagnostic Health Services**  
800 East Locust Street  
Olney, IL 62450

**Diagnostic Imaging Center**  
9680 Golf Road  
Des Plaines, IL 60016

**Doctors General Laboratory**  
9243 South Roberts Road  
Hickory Hills, IL 60457

**Doctors Hospital**  
5230 South Sixth Street  
Springfield, IL 62794

**Doctors Hospital of Hyde Park**  
5800 Stony Island Avenue  
Chicago, IL 60637

**Dreyer Medical Clinic**  
1221 North Highland Avenue  
Aurora, IL 60506

**DuPage Imaging Center**  
908 N. Elm Street, Suite 404  
Hinsdale, IL 60521

**DuPage Nuclear Medicine Clinic**  
710 East Ogden Avenue, #450  
Naperville, IL 60563

**Edgewater Medical Center**  
5700 North Ashland Avenue  
Chicago, IL 60660

**Edward Cardiovascular Institute**  
120 Spalding Drive  
Naperville, IL 60566

**Edward Hospital**  
801 South Washington Street  
Naperville, IL 60566

**Elmhurst Memorial Hospital**  
200 Berteau  
Elmhurst, IL 60126

**Endocrine and Diabetes, S.C.**  
900 Main Street, #400  
Peoria, IL 61603

**Evangelical Hospitals Corp.**  
Trinity Hospital  
2320 East 93rd Street  
Chicago, IL 60617

**Evanston & Glenbrook Hospitals**  
2650 Ridge Avenue  
Evanston, IL 60201

**Evanston Northwestern Healthcare**  
Glenbrook Hospital  
2100 Pfingsten Road  
Glenview, IL 60025

**Fairfield Memorial Hospital**  
Northwest 11th Street  
Fairfield, IL 62837

Family Medicine Specialists, Inc.  
Formerly B.I.O.Y.A  
109 West Bangs Street  
Wauconda, IL 60084

Fox Valley Ear, Nose, And Throat Associates,  
S.C.  
1015 Summit Street  
Elgin, IL 60120

Fox Valley Equine Clinic  
26996 North Darrell Road  
Wauconda, IL 60084

Franklin Community Care Services  
Formerly Franklin Hospital  
201 Bailey Lane  
Benton, IL 62812

Freeport Memorial Hospital  
1045 West Stephenson Street  
Freeport, IL 61032

Galesburg Cottage Hospital  
695 North Kellogg Street  
Galesburg, IL 61401

Genesis Clinical Laboratory  
3231 South Euclid Avenue  
Berwyn, IL 60402

George G. Kuritza, M.D.  
110 North Home Avenue  
Park Ridge, IL 60068

Glass Clinical Laboratory  
19150 South Kedzie, #205  
Homewood, IL 60430

Glen Oaks Medical Center  
701 Winthrop Avenue  
Glendale Heights, IL 60139

Glenwood Medical  
Formerly Diagnostica, P.C.  
2000 Glenwood Avenue, Suite 102  
Joliet, IL 60435

Good Samaritan Hospital  
3815 Highland Avenue  
Downers Grove, IL 60515

Good Samaritan Reg. Health Center  
605 North 12th  
Mt. Vernon, IL 62864

Good Shepherd Hospital  
450 West Highway 22  
Barrington, IL 60010

Gottlieb Memorial Hospital  
701 West North Avenue  
Melrose Park, IL 60160

Graham Hospital  
210 West Walnut Street  
Canton, IL 61520

Grant Square Imaging  
333 Chestnut Street  
Hinsdale, IL 60521

Greenberg Radiology Institute  
1535 Park Avenue West  
Highland Park, IL 60035

Gurnee Radiology Center  
Greenleaf Center  
25 Tower Court, Suite A  
Gurnee, IL 60031

Harrisburg Medical Center  
100 Hospital Drive  
Harrisburg, IL 62946

**Heart Care Center**  
9011 South Commercial Avenue  
Chicago, IL 60617

**Heart Centers of Illinois**  
3611 West 183rd Street  
Hazel Crest, IL 60429

**Heartcare Midwest**  
5401 North Knoxville Avenue, Suite 28  
Peoria, IL 61614

**Hektoen Institute for Medical Research**  
627-637 South Wood Street  
Chicago, IL 60612

**Herrin Hospital**  
201 South 14th Street  
Herrin, IL 62948

**Highland Nuclear Imaging LLP**  
2340 Highland Avenue, Suite 160  
Lombard, IL 60148

**Highland Park Hospital**  
718 Glenview Avenue  
Highland Park, IL 60035

**Hillsboro Area Hospital**  
1200 East Tremont  
Hillsboro, IL 62049

**Hinsdale Hospital**  
120 North Oak Street  
Hinsdale, IL 60521

**Holy Cross Hospital**  
2701 West 68th Street  
Chicago, IL 60629

**Holy Family Hospital**  
100 North River Road  
Des Plaines, IL 60016

**Illini Hospital**  
801 Hospital Road  
Silvis, IL 61282

**Illinois Masonic Medical Center**  
836 West Wellington Avenue  
Chicago, IL 60657

**Illinois Valley Community Hospital**  
925 West Street  
Peru, IL 61354

**Ingalls Memorial Hospital**  
1 Ingalls Drive  
Harvey, IL 60426

**Intercommunity Cancer Center of Western IL**  
450 Mayo Drive  
Galesburg, IL 61401

**Iroquois Memorial Hospital**  
Nuclear Medicine Department  
200 Fairman Ave.  
Watseka, IL 60970

**Jackson Park Hospital**  
7531 South Stony Island Avenue  
Chicago, IL 60649

**Joliet Imaging Services**  
2435 Glenwood Avenue  
Joliet, IL 60435

**Katherine Shaw Bethea Hosp.**  
403 East First Street  
Dixon, IL 61021

**Lab Corp of America**  
Lab Corp Bloomington  
1703 Clearwater Avenue  
Bloomington, IL 61704

Laboratory Corporation of America  
321 West Lake Street  
Elmhurst, IL 60126

LaGrange Memorial Hospital  
5101 South Willowsprings Road  
LaGrange, IL 60525

Lake Forest Hospital  
660 North Westmoreland Road  
Lake Forest, IL 60045

Little Company of Mary Hospital  
2800 West 95th Street  
Evergreen Park, IL 60642

Loretto Hospital  
645 South Central Avenue  
Chicago, IL 60644

Louis A. Weiss Memorial Hospital  
Nuclear Medicine Dept.  
4646 North Marine Drive  
Chicago, IL 60640

Loyola University Medical Center  
2160 South First Avenue  
Maywood, IL 60153

Lutheran General Hospital  
1775 West Dempster Street  
Park Ridge, IL 60068

MacNeal Hospital  
3249 South Oak Park Avenue  
Berwyn, IL 60402

Marion Memorial Hospital  
917 West Main Street  
Marion, IL 62959

Marvin Rosecan, M.D.  
29 North 64th Street  
Belleville, IL 62223

Mason District Hospital  
615 North Promenade Street, P. O. Box 530  
Havana, IL 62644

McDonough District Hospital  
525 East Grant Street  
Macomb, IL 61455

Medasys  
601 South Vermont Street  
Palatine, IL 60067

Medcentre Laboratories  
555 West Court Street, Suite 300  
Kankakee, IL 60901

Medway Diagnostic Labs, Inc.  
3138 West Cermak Road  
Chicago, IL 60623

Medx Incorporated  
3456 Ridge Avenue  
Arlington Heights, IL 60004

Memorial Hospital  
4500 Memorial Drive  
Belleville, IL 62226

Memorial Hospital  
1900 State Street, Box 609  
Chester, IL 62233

Memorial Hospital of Carbondale  
405 W. Jackson  
Carbondale, IL 62902

Memorial Medical Center  
800 North Rutledge  
Springfield, IL 62781

**Memorial Medical Center**  
3701 Doty Road, P. O. Box 1990  
Woodstock, IL 60098

**Mercy Center for Health Care Serv.**  
1325 North Highland Avenue  
Aurora, IL 60506

**Mercy Hospital Medical Center**  
Stevenson Expressway at King Drive  
Chicago, IL 60616

**Methodist Hospital of Chicago**  
5025 North Paulina  
Chicago, IL 60640

**Methodist Medical Center of IL**  
221 N.E. Glen Oak Avenue  
Peoria, IL 61636

**Metromed Laboratory Inc.**  
5330 North Elston Avenue  
Chicago, IL 60630

**Metropolitan Medical Laboratory**  
1520 7th Street  
Moline, IL 61265

**Michael Reese Hospital**  
Formerly Columbia Michael Reese Hospital &  
Med. Ctr.  
2929 South Ellis Avenue  
Chicago, IL 60616

**Midwest Heart Specialists**  
3825 Highland Avenue, Suite 400  
Downers Grove, IL 60515

**Midwest Heart Specialists-Carol Stream**  
383 Schmale Road  
Carol Stream, IL 60018

**Midwest Heart Specialists-Elmhurst**  
386 North York Road  
Elmhurst, IL 60126

**Midwestern Regional Medical Center**  
Formerly American International Hospital  
Shiloh Boulevard  
Zion, IL 60099

**Midwestern Regional Medical Center**  
Shiloh & Emmaus Blvd.  
Zion, IL 60099

**MIE America Inc.**  
2340 Brickvale  
Elk Grove Village, IL 60007

**Misbah Uddin Ahmed**  
555 West Court Street, Suite 200  
Kankakee, IL 60901

**Morris Hospital**  
150 West High Street  
Morris, IL 60450

**Mt. Sinai Hospital Medical Center**  
California Avenue at 15th Street  
Chicago, IL 60608

**New Grant, LLC**  
Formerly Grant Hospital  
550 West Webster  
Chicago, IL 60614

**North Suburban Cardiology Group, Ltd.**  
800 Austin, Suite 3408  
Evanston, IL 60202

**Northern Illinois Medical Center**  
4201 Medical Center Drive  
McHenry, IL 60050

Northwest Cardiovascular Assocs  
1100 West Central Road, Suite 301  
Arlington Heights, IL 60005

Northwest Community Hospital  
800 West Central Road  
Arlington Heights, IL 60005

Northwest Heart Specialists  
1632 West Central Road  
Arlington Heights, IL 60005

Northwest Suburban Medical Center  
140 West Higgins Road  
Hoffman Estates, IL 60195

Northwestern Memorial Hospital  
250 East Superior Street, Room 398  
Chicago, IL 60611

Norwegian American Hospital  
1044 North Francisco Avenue  
Chicago, IL 60622

Nuclear Diagnostics Inc.  
Formerly Nuclear Diagnostic Imaging  
18158 Country Club Road  
Girard, IL 62640

Oak Forest Hospital of Cook County  
15900 South Cicero  
Oak Forest, IL 60452

Oak Park Hospital  
520 South Maple Avenue  
Oak Park, IL 60304

Oncology Therapy Services  
Oncology Care Center  
4000 North Illinois  
Belleville, IL 62226

Our Lady of The Resurrection  
5645 West Addison  
Chicago, IL 60634

Palos Community Hospital  
80th and McCarthy Road  
Palos Heights, IL 60463

Paris Community Hospital  
East Court Street  
Paris, IL 61944

Passavant Memorial Hospital  
1600 West Walnut Street  
Jacksonville, IL 62650

Pekin Memorial Hospital  
600 South 13th Street  
Pekin, IL 61554

Pinckneyville Community Hospital  
101 North Walnut Street  
Pinckneyville, IL 62274

Prairie Cardiovascular Consultants  
301 North 8th Street, Suite 3-B 301  
Springfield, IL 62701

Proctor Hospital  
5409 North Knoxville  
Peoria, IL 61614

Provena Covenant Medical Center  
Formerly Covenant Medical Center  
1400 West Park  
Urbana, IL 61801

Provena United Samaritan Medical Center  
Formerly United Samaritan Medical Center  
812 North Logan Avenue  
Danville, IL 61832

**Provident Hospital of Cook County**  
500 East 51st Street  
Chicago, IL 60615

**Quality Medical Lab Inc.**  
318 West Madison  
Maywood, IL 60153

**Quest Diagnostics**  
Metpath, Corning Clinical Laboratories  
1355 Mittel Boulevard  
Wood Dale, IL 60191

**Radiocat L.L.C.**  
372 South Milwaukee Avenue  
Wheeling, IL 60090

**Ravenswood Hospital Medical Center**  
4550 North Winchester  
Chicago, IL 60640

**Regional Organ Bank of Illinois**  
800 South Wells St., Suite 190  
Chicago, IL 60607

**Resurrection Medical Center**  
7435 West Talcott Avenue  
Chicago, IL 60631

**Riverside Medical Center**  
350 North Wall Street  
Kankakee, IL 60901

**Rockford Health Systems**  
Rockford Memorial Hospital  
2400 North Rockton Avenue  
Rockford, IL 61103

**Roseland Community Hospital**  
45 West 111th Street  
Chicago, IL 60628

**Royal Crown Lab, Inc.**  
720 N. Dearborn, 3rd Flr  
Chicago, IL 60610

**Rush-North Shore Medical Center**  
9600 Gross Point Road  
Skokie, IL 60076

**Rush-Presbyterian-St. Luke's Medical Center**  
1653 West Congress Parkway  
Chicago, IL 60612

**Sacred Heart Hospital**  
3240 West Franklin Boulevard  
Chicago, IL 60624

**Sarah Bush Lincoln Health Center**  
East Route 16, P. O. Box 372  
Mattoon, IL 61938

**Schering-Plough Animal Health**  
Formerly Malinckrodt Veterinary, Inc.  
909 Orchard Street  
Mundelein, IL 60060

**Shaukat Ali Shah, M.D.**  
9029 South Western Avenue  
Chicago, IL 60620

**Sherman Hospital**  
934 Center Street  
Elgin, IL 60120

**Silver Cross Hospital**  
1200 Maple Road  
Joliet, IL 60432

**South Shore Hospital**  
8015 South Crandon Ave.  
Chicago, IL 60617

South Suburban Hospital  
178th & Kedzie Avenue  
Hazel Crest, IL 60429

South Suburban Nuclear & Card. Diag., Ltd.  
17577 South Kedzie, Suite 110  
Hazel Crest, IL 60429

Sparta Community Hospital  
818 East Broadway  
Sparta, IL 62286

Springfield Imaging Center, Ltd  
319 East Madison Street  
Springfield, IL 62701

St. Anthony's Health Center  
St. Anthony's Way  
Alton, IL 62002

St. Alexius Medical Center  
Formerly Hoffman Estates Medical Center  
1555 North Barrington Road  
Hoffman Estates, IL 60194

St. Anthony Medical Center  
5666 East State Street  
Rockford, IL 61108

St. Anthony's Memorial Hospital  
503 North Maple  
Effingham, IL 62401

St. Bernard Hospital  
64th Street & Dan Ryan Expr.  
Chicago, IL 60621

St. Elizabeth Medical Center  
2100 Madison Avenue  
Granite City, IL 62040

St. Elizabeth's Hospital  
211 South Third Street  
Belleville, IL 62222

St. Elizabeth's Hospital  
1431 North Claremont Avenue  
Chicago, IL 60622

St. Francis Hospital  
1215 Franciscan Drive, P.O. Box 1215  
Litchfield, IL 62056

St. Francis Hospital  
12935 South Gregory Street  
Blue Island, IL 60406

St. Francis Hospital  
355 Ridge Avenue  
Evanston, IL 60202

St. Francis Medical Center  
530 North East Glen Oak Avenue  
Peoria, IL 61637

St. James Hospital  
610 East Water Street  
Pontiac, IL 61764

St. James Hospital Medical Center  
Chicago Road at Lincoln Highway  
Chicago Heights, IL 60411

St. John's Hospital  
800 East Carpenter  
Springfield, IL 62769

St. Joseph Hospital  
2900 North Lake Shore Drive  
Chicago, IL 60657

**St. Joseph Hospital**  
77 North Airlite Street  
Elgin, IL 60123

**St. Joseph Medical Center**  
2200 East Washington Street  
Bloomington, IL 61701

**St. Joseph Medical Center**  
Cancer Care Center  
333 North Madison Street  
Joliet, IL 60435

**St. Joseph's Hospital**  
1515 Main Street  
Highland, IL 62249

**St. Joseph's Hospital**  
9519 Holy Cross Lane  
Breese, IL 62230

**St. Margaret's Hospital**  
600 East First Street  
Spring Valley, IL 61362

**St. Mary Medical Center**  
3333 North Seminary Street  
Galesburg, IL 61401

**St. Mary of Nazareth Hospital**  
2233 West Division Street  
Chicago, IL 60622

**St. Mary's Hospital**  
111 East Spring Street  
Streator, IL 61364

**St. Mary's Hospital**  
129 North Eighth Street  
East St. Louis, IL 62201

**St. Mary's Hospital**  
400 North Pleasant  
Centralia, IL 62801

**St. Mary's Hospital**  
1800 East Lake Shore Drive  
Decatur, IL 62525

**St. Mary's Hospital**  
500 West Court Street  
Kankakee, IL 60901

**St. Therese Medical Center**  
2615 Washington Street  
Waukegan, IL 60085

**St. Vincent Memorial Hospital**  
201 East Pleasant Street  
Taylorville, IL 62568

**Swedish American Hospital**  
1400 Charles Street  
Rockford, IL 61104

**Swedish Covenant Hospital**  
5145 North California Avenue  
Chicago, IL 60625

**Synquest**  
Formerly Steriods, Ltd.  
2201 West Campbell Park Drive  
Chicago, IL 60612

**The Center for Human Reproduction**  
750 North Orleans Street  
Chicago, IL 60610

**The Children's Memorial Hospital**  
2300 Children's Plaza  
Chicago, IL 60614

**Thorek Hospital and Medical Center**  
850 West Irving Park Road  
Chicago, IL 60613

**Touchette Regional Hospital**  
5900 Bond Avenue  
East St. Louis, IL 62207

**Trinity Medical Center**  
500 John Deere Road  
Moline, IL 61265

**Trinity Medical Center**  
2701 17th Street  
Rock Island, IL 61201

**Unilab, Inc.**  
418 North Austin, 2A  
Oak Park, IL 60302

**University of Chicago Physicians Group**  
222 North LaSalle Street, Suite 250  
Chicago, IL 60601

**Valley Cancer Center**  
600 East First Street  
Spring Valley, IL 61362

**Value Diagnostics**  
3235 Vollmer Road  
Flossmoor, IL 60422

**Victory Memorial Hospital**  
1324 North Sheridan Road  
Waukegan, IL 60085

**Vishnu D. Gaiha, M.D., S.C.**  
800 Austin Avenue, Suite 602  
Evanston, IL 60202

**Washington County Hospital**  
705 South Grand  
Nashville, IL 62263

**West Suburban Hospital Medical Center**  
Erie at Austin  
Oak Park, IL 60302

**Westlake Community Hospital**  
1225 Superior Street  
Melrose Park, IL 60160

**White County Medical Center**  
Formerly Welborn White County Medical  
Center  
400 Plum Street  
Carmi, IL 62821

**Wood River Township Hospital**  
Edwardsville Road  
Wood River, IL 62095

## **REACTOR**

**Commonwealth Edison Company**  
Braidwood Nuclear Power Station  
RR#1, Box 84  
Braceville, IL 60407

**Commonwealth Edison Company**  
Byron Station  
4450 N. Germanchurch Road  
Byron, IL 61010

**Commonwealth Edison Company  
Dresden Nuclear Power Facility  
6500 N. Dresden Road  
Morris, IL 60450**

**Commonwealth Edison Company  
LaSalle County Nuclear Station  
2601 N. 21st Road  
Marseilles, IL 61341**

**Commonwealth Edison Company  
Quad-Cities Station  
22710 206th Avenue N.  
Cordova, IL 61242**

**Commonwealth Edison Company  
Zion Nuclear Generating Station  
101 Shiloh Blvd.  
Zion, IL 60099**

**Illinois Power Company  
Clinton Power Station  
P. O. Box 678  
Clinton, IL 61727**



**APPENDIX C**  
**Historical Volume and Activity Shipped by Illinois**  
**Nuclear Power Facilities**  
**1970-1985**

**APPENDIX C**  
**HISTORICAL VOLUME AND ACTIVITY SHIPPED BY ILLINOIS**  
**NUCLEAR POWER FACILITIES**

**1970-1985**

Historical Disposal Volume of LLRW  
Generated by Illinois Nuclear Power Facilities

**1970-1985**

Year	Dresden (BWR) (ft <sup>3</sup> )	Quad Cities (BWR) (ft <sup>3</sup> )	Zion (PWR) (ft <sup>3</sup> )	LaSalle (BWR) (ft <sup>3</sup> )	Byron (PWR) (ft <sup>3</sup> )	Braidwood (PWR) (ft <sup>3</sup> )	Clinton (BWR) (ft <sup>3</sup> )	Total (ft <sup>3</sup> )
1970	22,786	0	0	0	0	0	0	22,786
1971	42,135	2,110	0	0	0	0	0	44,245
1972	56,224	37,953	0	0	0	0	0	94,177
1973	78,037	35,597	14,708	0	0	0	0	128,342
1974	105,342	19,811	57,038	0	0	0	0	182,191
1975	209,659	48,854	52,901	0	0	0	0	311,414
1976	250,235	35,464	72,427	0	0	0	0	358,126
1977	79,562	48,553	69,684	0	0	0	0	197,799
1978	64,413	47,427	57,421	0	0	0	0	169,261
1979	36,727	27,616	21,083	0	0	0	0	85,426
1980	40,894	58,974	57,915	0	0	0	0	157,783
1981	40,205	60,576	54,095	0	0	0	0	154,876
1982	31,634	51,340	31,120	0	0	0	0	114,094
1983	50,146	55,736	32,525	24,091	0	0	0	162,498
1984	44,492	47,485	22,712	29,647	0	0	0	144,336
1985	79,421	46,890	23,512	42,730	6,278	0	0	198,831

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**Historical Disposal Volume of LLRW  
Generated by Illinois Nuclear Power Facilities  
1970-1985**

Year	Dresden (BWR) (m <sup>3</sup> )	Quad Cities (BWR) (m <sup>3</sup> )	Zion (PWR) (m <sup>3</sup> )	LaSalle (BWR) (m <sup>3</sup> )	Byron (PWR) (m <sup>3</sup> )	Braidwood (PWR) (m <sup>3</sup> )	Clinton (BWR) (m <sup>3</sup> )	Total (m <sup>3</sup> )
1970	645	0	0	0	0	0	0	645
1971	1,193	60	0	0	0	0	0	1,253
1972	1,592	1,075	0	0	0	0	0	2,667
1973	2,210	1,008	417	0	0	0	0	3,635
1974	2,983	561	1,615	0	0	0	0	5,160
1975	5,938	1,384	1,498	0	0	0	0	8,819
1976	7,087	1,004	2,051	0	0	0	0	10,142
1977	2,253	1,375	1,973	0	0	0	0	5,602
1978	1,824	1,323	1,626	0	0	0	0	4,793
1979	1,040	782	597	0	0	0	0	2,419
1980	1,158	1,670	1,640	0	0	0	0	4,468
1981	1,139	1,716	1,532	0	0	0	0	4,386
1982	896	1,454	881	0	0	0	0	3,231
1983	1,420	1,578	921	682	0	0	0	4,602
1984	1,260	1,345	643	840	0	0	0	4,088
1985	2,249	1,328	666	1,210	178	0	0	5,631

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**Historical Disposal Activity of LLRW  
Generated by Illinois Nuclear Power Facilities  
1970-1985**

Year	Dresden (BWR) (Ci)	Quad Cities (BWR) (Ci)	Zion (PWR) (Ci)	LaSalle (BWR) (Ci)	Byron (PWR) (Ci)	Braidwood (PWR) (Ci)	Clinton (BWR) (Ci)	Total (Ci)
1970	12	0	0	0	0	0	0	12
1971	45	<1	0	0	0	0	0	45
1972	124	9	0	0	0	0	0	133
1973	150	293	<1	0	0	0	0	443
1974	755	735	5	0	0	0	0	1,495
1975	7,201	2,374	16	0	0	0	0	9,591
1976	4,302	2,351	68	0	0	0	0	6,721
1977	11,317	8,221	225	0	0	0	0	19,763
1978	1,878	3,270	1,862	0	0	0	0	7,010
1979	845	4,260	2,690	0	0	0	0	7,795
1980	4,461	4,070	2,550	0	0	0	0	11,081
1981	4,592	5,161	3,441	0	0	0	0	13,194
1982	2,920	3,958	2,170	0	0	0	0	9,048
1983	2,854	5,847	2,970	30	0	0	0	11,701
1984	4,360	1,661	2,617	180	0	0	0	8,818
1985	3,092	2,522	688	487	14	0	0	6,803

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**Historical Disposal Activity of LLRW  
Generated by Illinois Nuclear Power Facilities  
1970-1985**

Year	Dresden (BWR) (TBq)	Quad Cities (BWR) (TBq)	Zion (PWR) (TBq)	LaSalle (BWR) (TBq)	Byron (PWR) (TBq)	Braidwood (PWR) (TBq)	Clinton (BWR) (TBq)	Total (TBq)
1970	0.4	0	0	0	0	0	0	0.4
1971	1.7	<1	0	0	0	0	0	1.7
1972	4.6	0.3	0	0	0	0	0	4.9
1973	5.6	10.8	<1	0	0	0	0	16.4
1974	27.9	27.2	0.2	0	0	0	0	55.3
1975	266.4	87.8	0.6	0	0	0	0	354.8
1976	159.2	87.0	2.5	0	0	0	0	248.7
1977	418.7	304.2	8.3	0	0	0	0	732.2
1978	69.5	121.0	68.9	0	0	0	0	239.4
1979	31.3	157.6	99.5	0	0	0	0	288.4
1980	165.1	150.6	94.3	0	0	0	0	410.0
1981	169.9	191.0	127.3	0	0	0	0	488.2
1982	108.0	146.4	80.3	0	0	0	0	334.7
1983	105.6	216.3	109.9	1.1	0	0	0	432.9
1984	161.3	61.5	96.8	6.7	0	0	0	326.3
1985	114.4	93.3	25.5	18.0	0.5	0	0	251.7

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