



New York State Department of Environmental Conservation  
Division of Solid & Hazardous Materials

# 2002 New York State Low-Level Radioactive Waste Transportation Report



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## Executive Summary

Low-level radioactive waste (LLRW) is transported into, within and through New York State in three general categories of shipments. LLRW is transported by New York State based waste brokers who collect waste from individual generators in New York State and New England and bring it back to their facilities in New York. LLRW is also transported by out-of-state waste brokers who collect waste from New York generators and those in New England and bring it back to their facilities located outside New York State. Lastly, LLRW is transported by non-broker transporters (and New York based brokers in consolidated shipments) who carry large shipments of waste from New York and New England and take the waste directly to treatment or disposal facilities located outside New York. These three general categories of shipments are discussed in greater detail in this report.

The total amount of LLRW transported by highway shipment into, within, and through New York State in the three general categories mentioned above for calendar year 2002 was 431,881.4 cubic feet (12,229.5 cubic meters) with a total radioactivity level of 7,359.324 curies<sup>1</sup> (272,294,988 megabecquerels)<sup>2</sup>. The waste was contained in 4,974 packages in a total of 1,039 shipments.

LLRW waste classes are established and defined by the United States Nuclear Regulatory Commission (NRC). The classes are distinguished by different allowable maximum concentrations of isotopes and requirements for stability, packaging, and segregation from other wastes. Examples of Class A wastes are trash, paper, plastic, lower specific activity resins from nuclear power plants, and most medical and institutional wastes; Class B wastes generally consist of evaporator concentrates, resins, filters, and sealed sources; and Class C wastes include sealed sources and nuclear power plant irradiated reactor components.

Based on waste volume, ninety-nine percent (99.1 %) of waste transported was Class A, less than one percent (0.6%) Class B, and less than one percent (0.3%) Class C. The NRC stipulates in NUREG/BR-0204 that waste generators shipping to waste processors need not indicate waste class on the NRC uniform LLRW manifest, although in 2002, almost all generators did so.

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<sup>1</sup>Curie (Ci) - the basic unit of activity of any radionuclide that undergoes an average transformation rate of 37 billion transformations per second. One curie is the approximate activity of one gram of radium.

<sup>2</sup>Becquerel - A unit, in the International System of Units (SI), of measurement of radioactivity equal to one transformation per second.

Of all the waste transported through New York State in 2002, approximately twenty-three percent (23.4%) of the volume and thirty-four percent (33.8%) of the activity was generated in New York State. This consisted of 101,093 ft<sup>3</sup> ( 2,862.63 m<sup>3</sup>) with a total activity of 2,491.08 Ci ( 92,169,960 MBq). The remaining seventy-seven percent (76.6%) of the waste volume transported through New York State came in single generator shipments from the states of Massachusetts, Pennsylvania, Connecticut, New Hampshire, New Jersey, Vermont, Delaware, Tennessee, Virginia, South Carolina, and Maine, and in shipments from brokers (consolidated shipments and local broker collections). Connecticut was the single greatest out-of-state contributor, with 280,088 ft<sup>3</sup> (7,931.2 m<sup>3</sup>) and 3,138.855 Ci (116,137,635 MBq) transported by non-broker transporters and 2,877.92 ft<sup>3</sup> (81.49 m<sup>3</sup>) and 55.149 Ci (2,040,513 MBq) carried in broker collections.

New York State generated waste was sent for treatment or disposal primarily to the GTS Duratek facility in Oak Ridge, TN; Envirocare facility in Clive, Utah; Chem-Nuclear Disposal Facility in Barnwell, SC; U.S. Ecology- Oak Ridge, TN; and the Studsvik Processing Facility, Erwin, TN. Other treatment or disposal facilities that received waste generated in New York State or surrounding New England states include: Allied Technology Group (ATG) in Richland, WA; Diversified Scientific Services, Inc. (DSSI), Kingston, TN; Alaron Corporation, Wampum, PA; NSSI / Recovery Services, Houston, TX; Texas Ecologist, Robstown, TX; Mississauga Metals & Alloys, Inc., Brampton, Ontario, Canada; Hanford-DOE, Hanford, WA; and Perma-Fix of Florida, Gainesville, FL. Wastes transported through New York State either were brought into New York for temporary storage for consolidation and forwarding (New York State based brokers) or were shipped on New York State roads en route to another state for disposal, storage, or treatment.

Waste was carried by ten (10) permitted transporters, consisting of one (1) New York State based broker, two (2) out-of-state brokers, and seven (7) non-broker transporters.

*The reader should be aware that individual data entries in the text and tables of this report have been rounded. Because the totals shown in the tables represent the sum of rounded entries, they may vary slightly from one table to another.*

## **SECTION I: INTRODUCTION**

### **Enabling Legislation**

The legislative directive for establishing a LLRW permit and manifest tracking system is set forth in Chapter 508 of the Laws of 1986 of New York State. This Act directed the New York State Department of Environmental Conservation (NYSDEC) to issue an annual report based on the LLRW manifests received. The law directed that such report shall include, but not be limited to, information on the origin, destination, types of LLRW, and frequency of highway shipments into, within, and through New York State.

Chapter 508 amended sections 27-0303 and 27-0305 of Article 27, Title 3 of the Environmental Conservation Law (ECL) to include LLRW as a regulated waste, require a permit for LLRW transportation into, within, and through New York State, require a manifest tracking system and require promulgation of regulations to implement this program.

On January 1, 1987, the NYSDEC amended on an emergency basis the Waste Transporter Permit Regulations codified as 6 NYCRR Part 364 to include LLRW as a regulated waste, to require a permit for its transport within the State, and to require that manifest copies be sent to the Department.

On February 27, 1987, the Low-Level Radioactive Waste Transporter Permit and Manifest System Regulations (6 NYCRR Part 381) were adopted on an emergency basis and the emergency rule making for Part 364 with similar requirements was allowed to lapse. The emergency Part 381 regulations were maintained in effect until they became a final rule on September 15, 1988, after the issuance of a final environmental impact statement (FEIS). This impact statement was issued in July 1988, and was entitled "Final Generic Environmental Impact Statement for Promulgation of 6 NYCRR Part 381: Regulations for Low-Level Radioactive Waste Transporter Permit and Manifest System."

### **Purpose and Need**

Low-level radioactive waste is defined in Chapter 508 as:

. . . radioactive material that:

- a. is not high-level radioactive waste, transuranic waste, spent nuclear fuel, or the tailings or wastes produced by the extraction or concentration of uranium or thorium from any ore processed primarily for its source material content; and

- b. the United States Nuclear Regulatory Commission consistent with federal law and in accordance with paragraph a. of this subdivision, classifies as low-level radioactive waste.

The Low-Level Radioactive Waste Transporter Permit and Manifest System Regulations regulate the transport of LLRW as defined above. These regulations do not, however, regulate radioactive material (RAM) that is not low-level radioactive waste. In addition, LLRW that is generated by the United States Department of Energy (DOE) and the United States Department of Defense (DOD) is not tracked on the manifest system. These agencies and their prime contractors are exempt from 6 NYCRR Part 381 and are, therefore, not required to obtain permits or submit manifests to the NYSDEC. Part 381 regulates the transport of LLRW by highway only. Therefore, shipments of LLRW by rail or water are not regulated.

As stated in the FEIS for Part 381, low-level radioactive waste when properly transported does not constitute a significant environmental impact. The Part 381 regulations were promulgated to ensure the proper transport of LLRW. Manifest copies submitted to the Department in accordance with 6 NYCRR Part 381, Section 381.13 provide the Department and the people of the State of New York with information on LLRW transport within the State. This information is useful in tracking LLRW from its point of origin to its disposal, assessing potential transportation hazards, and assisting emergency response plans where necessary. The manifest tracking system thus provides documentation that LLRW is properly disposed of and assists in enforcement actions to assure that it is.

The establishment of a manifest tracking system results in New York State meeting its Agreement State obligations to implement NRC manifest requirements set forth in 10 CFR Part 61, 10 CFR Part 20 section 20.2006 and Appendix G. All licensees are required to use Appendix G which, among other things, requires the use of the NRC uniform manifest (form 540, form 541, etc.).

The NRC has evaluated the NYSDEC's regulatory programs dealing with LLRW transportation and release of radioactive materials to the environment. The New York State LLRW transportation permit and manifest program (6 NYCRR Part 381) has been determined to be compatible with the NRC regulatory program for NRC regulated RAM.

## **General Manifest Data Base Structure**

Three basic types of LLRW transport movements occur in New York State. These types are: (1) collection of LLRW within and outside of the State by New York State based brokers and storage within the State for a period of time; (2) pickup of LLRW by out-of-state brokers for storage in their respective states; and (3) transport by non-broker transporters and New York State brokers (consolidated shipments) to treatment, storage, or disposal facilities (TSDF) located outside of the State.

One data base was established to track out-of-state broker collections, non-broker transporter shipments, and New York State broker consolidated shipments which all leave the State for treatment, storage, or disposal. The broker consolidated shipments may represent waste collected in the previous year as well as some waste collected during the present year. Evaluation of this data base provides information on all waste that travels through or from New York State en route to a TSDF.

A second separate data base was established for New York State based broker collections which are temporarily stored in New York State. New York State based brokers (in 2002, Radiac Research Corporation was the only one) frequently make collections from New York State LLRW generators and those of neighboring states and store the waste at their facilities for a period of time prior to shipping the waste for treatment or disposal out-of-state. This time period can be up to a year in some cases. This data base provides information on the LLRW movements within the State that are not immediately shipped out of the State for treatment or disposal. The New York State generated portion of this waste is added to the total annual waste production for New York. However, this waste is not counted as leaving New York State until it is placed in the consolidated shipments mentioned above.

This report describes the three general categories of LLRW transport in three separate sections. The first category is LLRW collections by New York State based brokers. The second category is LLRW collections by out-of-state brokers. The third category consists of non-broker transport and New York State broker consolidated shipments. In addition, the New York State generated component of these consolidated broker shipments is also described.

## **Classes of Low-Level Radioactive Waste**

The LLRW carried by the transporters in this report has been subdivided into three classes by the NRC in 10 CFR Part 61. The classes of LLRW are:

### **Class A**

Class A wastes are wastes for which there are no stability requirements, but which must be disposed of in a manner segregated from other wastes if not stabilized. These wastes, termed Class A “segregated” wastes, are defined in terms of maximum allowable concentrations of certain isotopes and certain minimum requirements on waste form packaging that are necessary for safe handling. Class A wastes are often referred to as Class AS (stabilized) or Class AU (unstabilized). If it meets the stability requirements, it can be disposed of with Class B wastes. These wastes would be typically composed of materials with low concentrations of radionuclides. The large majority of LLRW in New York would fall in this category. These include trash, paper, plastic, low specific activity resins, and most medical and institutional wastes.

### **Class B**

Class B wastes are wastes which need to be placed in stable form (i.e., last a long time and not change its size and shape significantly during that period of time) and disposed of in a manner segregated from unstable waste forms (Class AU). Class B wastes are defined in terms of allowable concentrations of specific isotopes, and for disposal must satisfy both stable waste form and minimum handling requirements. These wastes would be composed of moderate concentrations of short-lived radionuclides and possible low concentrations of some long-lived radionuclides. Examples of Class B wastes include evaporator concentrates, resins, filters, etc., from nuclear power plants or from medical isotope production facilities.

### **Class C**

Class C wastes are wastes which need to be placed in stable form, disposed of in a manner segregated from non-stable waste forms, and disposed of so that a barrier is provided against potential inadvertent intrusion after institutional controls have lapsed. These wastes are termed Class C wastes and are defined in terms of allowable concentrations of isotopes. These wastes have high concentrations of either or both long- and short-lived radionuclides. Class C wastes generally account for less than ten percent (10%) of the volume of all LLRW generated in New York State. In 2002, Class C wastes accounted for less than one percent. These wastes are generated primarily by nuclear power plants.

## **SECTION II: LLRW TRANSPORT BY NEW YORK STATE BROKERS**

Radiac Research Corporation (RRC) was the only New York State licensed broker operating during 2002. A total of two hundred and fifty-seven (257) manifests were submitted by RRC for the year 2002. Information such as generator, broker, and transporter names and addresses are entered into the data base. Information regarding LLRW waste class, waste description, and shipment date are entered. Numeric fields such as total packages, disposal volume, and total activity are entered and summed.

LLRW brokers (also called collectors) typically collect LLRW from various generators (both within and outside New York State) and bring the material back to their facilities for storage. The waste packages are eventually consolidated in a number of large loads and transported either by the broker or another transporter to a disposal or waste compaction/treatment facility. The amount of LLRW shipped out of the State in any one year is often close to the amount collected in that year. The waste collected in one year may, or may not, be shipped out of the State in that year. The date the waste is shipped depends, in part, on accumulating sufficient waste for a full consolidated load. RRC collected 6,940.5 ft<sup>3</sup> (196.53 m<sup>3</sup>) of LLRW in 2002 from New York and other states. The waste was contained in 1,034 packages and had a total activity of 104.51 Ci (3,866,870 MBq). The maximum activity for any one collection was 48.917 Ci (1,809,929 MBq).

RRC shipped 3,888.35 ft<sup>3</sup> (110.10 m<sup>3</sup>) out of the State in consolidated shipments for disposal or treatment during the same time period (See Table IV-1, page 11). The total activity of these consolidated shipments was 26.628 Ci ( 985,236 MBq) and was contained in 667 waste containers.

### **Origin and Destination**

RRC collected LLRW from seven (7) states other than New York during 2002. This waste was brought back to their facility in Brooklyn, New York. Thirty-nine percent (38.7%) of the waste collected (by volume) came from New York State generators in 142 of the 257 waste collections. The New York State waste component of these collections had an activity of 5.984 Ci (221,408 MBq) which represents about six percent (5.7%) of all waste activity collected. The following list in Table II-1 tabulates the states from which waste was collected in the year 2002.

**TABLE II-1  
ORIGIN OF LLRW IN NYS BROKER COLLECTIONS**

Generators	Volume		Activity		Number of Collections
	ft <sup>3</sup> (cubic feet)	m <sup>3</sup> (cubic meters)	Ci (curie)	MBq (megabecquerel)	
New York	2,690.34	76.18	5.984	221,408	142
New Jersey	531.14	15.04	34.696	1,283,752	26
Connecticut	2,877.92	81.49	55.149	2,040,513	43
Pennsylvania	99.97	2.83	0.184	6,808	8
Vermont	15.0	0.42	0.00126	46.62	1
Massachusetts	717.3	20.31	8.457	312,909	34
Maine	1.36	0.03	0.03701	1,369	2
Delaware	7.5	0.21	0.0002	7.4	1
Rhode Island	None	None	None	None	0
New Hampshire	None	None	None	None	0
Illinois	None	None	None	None	0
<b>Totals</b>	<b>6,940.5</b>	<b>196.5</b>	<b>104.51</b>	<b>3,866,870</b>	<b>257</b>

### Collection Frequency

LLRW was collected by RRC several days a week, except for holidays and weekends, and in all months of 2002. These LLRW collections consisted mainly of local pickups and return of the waste to the broker's facility. RRC performed approximately twenty-one (21) collections per month for the 12-month period. The minimum number of collections per month was six (6) and the maximum number was 46. A total of 129 generators were serviced by RRC during 2002. Fifty-six (56) of these generators were located in New York State.

## Waste Categories

New York State based brokers (in this case RRC) transported LLRW in 257 individual collections. Ninety-seven percent (97.3%) of this waste was Class AU and three percent (2.7%) was Class C. There was no Class B waste collected. A variety of LLRW types are collected by brokers from hospitals, universities, and other businesses. Materials contaminated by radioactive isotopes are grouped in general categories or types. The following is a listing of LLRW types collected by brokers and the total number of collections (shipments) for each type (see Table II-2).

**TABLE II-2  
LLRW TYPES COLLECTED BY NYS BROKERS**

Waste Type	Waste Class	# of Collections	Percent
Compactible Trash (DAW)	AU	104	40.5
Scintillation Fluids	AU	53	20.6
Other	AU/AS	29	11.3
Gas	AU	1	0.4
Aqueous Liquids	AU	31	12.0
Incinerator Ash	AU	1	0.4
Animal Carcass	AU	7	2.7
Other EPA Hazardous	AU	5	2.0
Contaminated Equipment	AU	1	0.4
Sealed Sources	AU/C	18	7.0
Organic Liquid	AU	6	2.3
Demolition Rubble/Soil	AU	1	0.4
<b>Totals</b>		<b>257</b>	<b>100%</b>

## Package Types

LLRW brokers collect primarily Class A waste that is packaged in United States Department of Transportation (DOT) Type A packaging or strong tight containers (STC), if the waste is low-specific activity (LSA). LSA material packaged in STC must be

carried in exclusive use vehicles. "Exclusive use" is defined in 49 CFR 173.403 as meaning ". . . the sole use of a conveyance by a single consignor and for which all initial, intermediate, and final loading and unloading are carried out in accordance with the direction of the consignee or consignor. Any loading or unloading must be performed by personnel having radiological training and resources appropriate for safe handling of the consignment." There were zero (0) New York State broker shipments designated as "exclusive use" in 2002. The Type A packaging used for local broker collections consists primarily of 55 gallon (7.5 ft<sup>3</sup>), 30 gallon (4.01 ft<sup>3</sup>), or 5 gallon (.67 ft<sup>3</sup>) metal drums. In some cases wood or fiber boxes (5.0 ft<sup>3</sup>) or plastic pails (.67 ft<sup>3</sup>) are used.

## **Placarding**

The DOT specifies packaging, labeling, and placarding requirements in 49 CFR 172 for all hazardous material transport, including radioactive material. The DOT labeling requirements are based on the transport index (T.I.), maximum surface radiation levels, and fissile class. The three labels possible for radioactive packages are "White I," "Yellow II," or "Yellow III" (lowest to highest category). For the most part, brokers transport LLRW in packages bearing either the "White I" or "Yellow II" labels. In some cases, a small number of packages may bear the "Yellow III" label. Broker collections containing packages with "Yellow III" labels are required to have radioactive placards placed on the vehicle pursuant to 49 CFR, section 172.504. In 2002, there were no packages collected by a broker that had a "Yellow III" label on them.

## **SECTION III: LLRW TRANSPORT BY OUT-OF-STATE BROKERS**

ADCOM Express, Inc. (ADCO) and Emerson RSI (RSI) are the two out-of-state LLRW brokers that transported waste within or through New York State during 2002. A total of 81 manifests were submitted to the Department by these two brokers during 2002. These out-of-state brokers are required to submit manifests for collections that originate in, or pass through New York. RSI performed nine (9) New York State manifested collections from New York State generators and one from Rhode Island. ADCO performed 71 LLRW collections servicing primarily universities and hospitals. The manifests submitted indicate that 17 of the 71 collections performed by ADCO were from New York State generators and the rest were from New England.

The total activity of LLRW collected by these brokers was 4.228 Ci (156,436 MBq). The total volume collected was 1,409.56 ft<sup>3</sup> (39.91 m<sup>3</sup>). The breakdown by broker is:

ADCO	1,374.2 ft <sup>3</sup> (38.9 m <sup>3</sup> ) - 97.5% of total volume
	3.615 Ci (133,755 MBq) - 85.5% of total activity

RSI                    35.36 ft<sup>3</sup> (1.0 m<sup>3</sup>) - 2.5% of total volume  
                          0.6126 Ci (22,666.2 MBq) - 14.5% of total activity

### **Origin and Destination**

New York State generators produced the LLRW for 26 of the 81 collections by out-of-state brokers. There were 55 manifests submitted to the Department from these two brokers that showed LLRW shipments from neighboring states passing through New York. The waste collected by the two out-of-state brokers was taken back for storage at their respective facilities. Approximately 1,374.2 ft<sup>3</sup> (38.9 m<sup>3</sup>) of LLRW went back to ADCO in Illinois and 35.36 ft<sup>3</sup> (1.0 m<sup>3</sup>) went back to RSI in New Jersey.

This waste is eventually placed in consolidated loads and sent to a disposal or waste processing facility.

### **Shipment Frequency**

LLRW was collected by out-of-state brokers in all months of the year. During the twelve-month period of 2002 in which the collections were performed, waste was collected approximately seven (6.75) times per month (average). The months of January, April, May, July, October, November and December had the highest number of collections (average of 9.3). The waste types (e.g., compactible trash) collected by the two out-of-state brokers are similar to those collected by New York State brokers.

### **Generator Category**

There are five general categories of LLRW generators that are serviced by out-of-state brokers. These generator categories are: industry, hospitals, universities, research organizations, and government.

### **Placarding**

LLRW which meets the DOT criteria for low specific activity (LSA) can be transported in DOT Type A containers and labeled with the appropriate label or can be stenciled "Radioactive Material LSA" and transported in "exclusive use vehicles." The DOT regulations in 49 CFR require that all vehicles carrying "Yellow III" packages or "LSA" packages carried in exclusive use vehicles must be placarded with the appropriate DOT placard. Out of 81 shipments carried by ADCO and RSI, 70 shipments were designated as "exclusive use" shipments.

## **SECTION IV: LLRW TRANSPORT BY NON-BROKER TRANSPORTERS AND NEW YORK STATE BROKERS IN CONSOLIDATED SHIPMENTS**

Non-broker transporters are those carriers of LLRW that do not perform small broker collections and are not licensed to store LLRW for load consolidation or perform other broker functions. Non-broker transporters typically pick up one large shipment of LLRW from the waste generator and transport it directly to a disposal facility or licensed waste processor. Consolidated shipments by New York State based brokers are included in this section because the loads are generally of the same volume and the waste is leaving New York State for disposal, or treatment prior to disposal.

Seven (7) non-broker transporters and one New York State based broker transported LLRW from or through New York State directly to a disposal facility or a licensed waste processor during 2002. These transporters carried 423,531.31 ft<sup>3</sup> (11,993.07 m<sup>3</sup>) of LLRW in 701 shipments within or through New York State during 2002. This is more than the volume of LLRW transported in 2001 by these transporters (253,083.63 ft<sup>3</sup> [7,166.5 m<sup>3</sup>] in 380 shipments).

The total activity of the LLRW transported in the 701 shipments by non-broker transporters and brokers in consolidated shipments was 7,250.585 Ci (268,271,645 MBq). This is a decrease from year 2001 (97,048.027 Ci [3,590,777,000 MBq]).

New York State broker consolidated shipments represent an amalgamation of waste collected and stored at broker facilities in the State. The individual waste packages that are packed and labeled by the generator remain intact and are consolidated into one large load destined for disposal or waste treatment. Broker consolidated shipments are comprised of primarily Class AU (A unstabilized) LLRW and are transported in Type A packages. The amount of waste in consolidated shipments is shown in Table IV-1.

Non-broker transporters generally service large industrial or manufacturing firms, and nuclear power plants. Many of the shipments carried by these transporters are of lower volume than the broker consolidated shipments, but have higher activity. Non-broker transporters carry waste Classes AS (A stabilized), AU, B, and C. Some of this waste is carried in Type B packages.

### **Origin and Destination**

Eleven (11) states, other than New York State, have their waste transported through this State by these transporters. In addition, broker consolidated shipments

contained LLRW collections from various New England states. Table IV-1 shows the volume and activity of LLRW leaving or going through the State.

**TABLE IV-1  
STATES TRANSPORTING LLRW WITHIN OR THROUGH NEW YORK**

State of Origin	Total Volume		Total Activity	
	ft <sup>3</sup> (cubic feet)	m <sup>3</sup> (cubic meters)	Ci (curie)	MBq (megabecquerel)
Broker Consolidated <sup>1</sup>	2,541.5	71.96	3.033	112,221
Broker Consolidated <sup>2</sup>	1,346.8	38.13	23.595	873,015
New York <sup>3</sup>	95,734.1	2,710.88	2,480.780	91,788,860
Maine	1,748.7	49.51	563.927	20,865,299
Massachusetts	21,930.0	620.98	748.580	27,697,460
Vermont	10,442.5	295.69	0.647	23,939
Connecticut	280,088.6	7,931.22	3,138.855	116,137,635
Tennessee	272.8	7.72	0.080	2,971.1
New Jersey	1,067.9	30.24	10.700	395,900
New Hampshire	7,885.7	223.29	206.578	7,643,386
Delaware	45.0	1.27	<.001	0.14
Pennsylvania	113.7	3.22	.001	51.8
South Carolina	298.0	8.43	.006	244.2
Virginia	15.6	0.44	73.798	2,730,526
<b>Totals</b>	423,531.3	11,993.07	7,250.585	268,271,645

<sup>1</sup> Portion of broker consolidated shipment generated in New York State.

<sup>2</sup> Portion of broker consolidated shipments generated in other states

<sup>3</sup> LLRW generated in New York State and transported by non-broker transporters

*The reader should be aware that individual data entries in the text and tables of this report have been rounded. Because the totals shown in the tables represent the sum of rounded entries, they may vary slightly from one table to another.*

A total of fourteen (14) different TSDFs were used by New York State permitted transporters during 2002. These facilities are:

GTS Duratek, Oak Ridge, TN;  
Barnwell Waste Management Facility, Barnwell, SC;  
Envirocare of Utah, Clive, UT;  
Allied Technology Group, Inc. (ATG), Richland, WA;  
Studsvik Processing Facility, Irwin, TN;  
U.S. Ecology- Oak Ridge, TN;  
Diversified Scientific Services, Inc. (DSSI), Kingston, TN;  
Alaron Corporation, Wampum, PA;  
U. S. Department of Energy (DOE), Hanford, WA;  
NSSI, Inc., Houston, TX;  
Radiological Assistance, Consulting & Engineering (RACE) Memphis, TN;  
Mississauga Metals & Alloys, Inc., Brampton, Ontario, Canada;  
Perma-Fix of Florida, Gainesville, FL;  
Texas Ecologist, Robstown, TX; and  
Generator facilities receiving returns of non-conforming waste

The majority (92.4% by volume) of the waste transported by non-broker transporters and brokers in consolidated shipments went to the GTS Duratek Facility in Oak Ridge, TN. This waste was processed prior to disposal. The Barnwell Waste Management Facility in Barnwell, SC, received about two percent (1.8%) by volume. Less than one percent (0.5%) was shipped to the Envirocare Facility in Clive, UT. The remaining four percent (5.3%) went to the other TSDFs. Table IV-2 lists the TSDFs and the amounts each received.

**TABLE IV-2  
TSDFs RECEIVING LLRW TRANSPORTED FROM OR  
THROUGH NEW YORK STATE**

TSDFs	Volume		Activity	
	ft <sup>3</sup> (cubic feet)	m <sup>3</sup> (cubic meters)	Ci (curie)	MBq (megabecquerel)
GTS Duratek	391,189.6	11,077.25	440.755	16,307,935
Barnwell	7,729.2	218.86	5,485.262	202,954,694
Envirocare	2,374.5	67.23	0.334	12,358
ATG, Inc. (Richland)	1,211.5	34.30	1.743	64,491
Mississauga Metals & Alloys, Inc	298	8.43	0.006	222
RACE	6,299	178.36	17.204	636,548
Alaron Corporation	1,655	48.86	0.344	12,728
Perma-Fix of Florida	3,016.2	85.40	425.472	15,742,464
Studsvik Processing	5,609	158.82	617.839	22,860,043
NSSI, Inc.	856.8	24.26	0.108	3,996
U.S. Ecology- Oak Ridge	1,524	43.15	4.806	177,822
U.S. DOE - Hanford	994	28.14	243.187	8,997,919
DSSI	486	13.76	13.417	496,429
Texas Ecologist	15	0.42	0.023	851
Return to Generator - Non-Conforming	272.8	7.72	0.080	2,960
<b>Totals</b>	423,531.3	11,993.07	7,250.585	268,271,645

Note: This table does not include TSDF's used by out-of-state brokers discussed in Section III .

## **Shipment Frequency**

Seven hundred and one (701) shipments of LLRW were transported out of or through New York State during 2002 by non-broker transporters or New York State brokers in consolidated shipments. This averages out to about 58.4 shipments per month. The number of shipments ranged from 33 to 89 per month. Of the 701 shipments, 654 were shipments of Class A LLRW, 25 of Class B, and 22 of Class C.

## **Waste Categories**

The waste types carried by brokers in consolidated loads are essentially the same as those found in small broker collections except that the volume is larger. The waste is typically Class AU and consists primarily of compactible trash and scintillation fluids. Hospitals, universities, government, research, and non-nuclear industry are serviced primarily by brokers and are represented in the broker consolidated shipments.

The majority of waste types transported by non-broker transporters are derived from nuclear power plants and large industrial and manufacturing firms. These waste types include mixed bed ion exchange resins, evaporator bottoms, filter media, irradiated reactor components, solidified liquids, contaminated soil and debris (asphalt, asbestos, soil), and compactible trash.

## **Package Types**

The DOT has established two basic types of packaging for radioactive material transport. These package types are Type A and Type B. Generally speaking, Type A packaging is designed to withstand the stress of transportation under normal non-accident conditions, while Type B packaging is designed to withstand the stress associated with actual or hypothetical accident conditions. Normally, any radioactive material exceeding the A1 or A2 values established in 49 CFR 173.435 must be transported in a Type B container. The NRC regulations had provided for an exemption to this requirement in 10 CFR 71.52 for low specific activity (LSA) material carried in an exclusive use vehicle. In this case, the LSA LLRW was allowed to be transported in Type A casks that are much more substantial than typical Type A packaging and have significant shielding. These casks, however, are not designed to meet the accident resistant design criteria for Type B packages. This exemption changed on April 1, 1999, and all waste packages must now meet the requirements of 49 CFR 173.427 (a)(1). If the requirements of this section for the unshielded dose at one meter are satisfied, then the waste may be transported in the non-accident resistant package mentioned above. If the

waste package exceeds the unshielded dose rate limit, then the waste must be transported in a Type B package.

A total of 3,726 LLRW packages were transported by these transporters during 2002. A total of 601 of the 701 shipments transported by non-broker transporters and New York State brokers in consolidated shipments were designated as “exclusive use.”

## **Transporters**

In 2002, RRC was the New York State based broker that, in addition to local broker collections, also transported LLRW directly to disposal or processing facilities in consolidated shipments and direct pickups for disposal. RRC transported 3,888.35 ft<sup>3</sup> (110.10 m<sup>3</sup>) with an activity of 26.628 Ci ( 985,236 MBq) in 2002. The other transporters include:

Hittman Transport Services, Inc. (414,201.42 ft<sup>3</sup> [11,728.87 m<sup>3</sup>], 6,782.671 Ci [ 250,958,827 MBq]);

T.A.G. Transport, Inc. (805.33 ft<sup>3</sup> [22.8 m<sup>3</sup>], 427.045 Ci [ 15,800,665 MBq]);

Tri-State Motor Transit (TRISM) (793.65 ft<sup>3</sup> [22.47 m<sup>3</sup>], 0.017 Ci [ 629 MBq]);

Landstar Ranger (540 ft<sup>3</sup> [15.29 m<sup>3</sup>],0.0726 Ci [2,686 MBq]);

R & R Transport, Inc. (679.03 ft<sup>3</sup> [19.22 m<sup>3</sup>], 2.271 Ci [ 84,027 MBq]);

RSB Logistics (19.5 ft<sup>3</sup> [0.55 m<sup>3</sup>], 0.0015 Ci [55.5 MBq]) ; and

Dart Trucking (2,604.03 ft<sup>3</sup> [73.73 m<sup>3</sup>], 11.876 Ci [ 439,412 MBq]).

## **SECTION V: COMPARISON WITH NYSERDA DATA**

The volume and activity of LLRW presented in this report for New York State generators may or may not closely coincide with New York State generator data contained in the New York State Energy, Research and Development Authority's (NYSERDA) LLRW Status Report for the same year. This is due to a number of reasons.

Some nuclear power plants find it more economical or more practical to ship heavy casks of irradiated reactor components directly to LLRW burial sites by rail and/or barge. Shipment of LLRW by rail car or barge is not regulated under 6 NYCRR Part 381 and, therefore, these shipments are not tracked on the manifest data base. The generator of this waste will, however, report it to NYSEDA for that year.

Some radioactive material is shipped out of New York State for decontamination and recycling to facilities such as GTS Duratek in Oak Ridge, Tennessee. These materials are shipped as RAM rather than LLRW. Some of this RAM is eventually determined to be LLRW at these out-of-state facilities and is shipped to a disposal site. No LLRW manifests are received by NYSDEC in these cases and, therefore, this LLRW is not tracked on the manifest data base. Generators of this material are, however, notified of the resultant volume and activity of the LLRW and include that material in their report to NYSEDA.

Low-level radioactive waste volumes that are contained in this document represent initial volume shipped before compaction. Much of the LLRW sent to treatment facilities is volume reduced. In many cases, waste volumes found in the NYSEDA LLRW status report are after volume reduction has been performed.

In some cases, shipments of LLRW which are en route to compaction or treatment facilities may have shipment dates near the end of one year and actual disposal dates early in the following year. The NYSDEC manifest data base uses the shipment date to determine whether a shipment is listed in one annual report or the following one. Generators will often send NYSEDA information they received from disposal sites based on the actual date of burial. Waste shipped in one year could conceivably be listed in the next year's NYSEDA LLRW Status Report.

Lastly, the data in this document is based on LLRW manifests received by NYSDEC from permitted LLRW transporters. This report relies on transporter compliance with requirements for sending in manifests. Non-compliance will result in missing data.

## SECTION VI: GENERAL CONCLUSIONS

A total of 1,039 manifests with their associated continuation sheets were received by the NYSDEC from all LLRW transporters for 2002 LLRW shipments in accordance with 6 NYCRR Part 381. The manifest data presented in this report provides useful information on the types of LLRW transported, the number of shipments and their frequency, and the origin and destination of the LLRW transported.

The following general conclusions are based on these data:

1. **LLRW Shipments** - Transporters permitted under Part 381 in 2002 performed a total of 257 in-state broker collections and 782 shipments to TSDFs located outside of New York State. The latter 782 shipments consisted of 81 out-of-state broker shipments and 701 non-broker transporter and broker consolidated shipments.
- 2.. **New York State Based Brokers** - A substantial amount of the LLRW (61.3%) collected by New York State based brokers was generated in states other than New York. These states are primarily in New England. RRC collected 6,940.5 ft<sup>3</sup> (196.53 m<sup>3</sup>) of LLRW with a total activity of 104.51 Ci (3,866,870 MBq). RRC shipped in consolidated shipments about 3,888.35 ft<sup>3</sup> (110.10 m<sup>3</sup>) with an activity of 26.628 Ci (985,236 MBq) for disposal (see #4 below).
3. **Out-Of-State Brokers** - Two out-of-state brokers permitted under Part 381 to transport LLRW into, within and through New York collected a total of 1,409.5 ft<sup>3</sup> (39.9 m<sup>3</sup>) with a total activity of 4.228 Ci (156,436 MBq). Nine percent (9%) of this waste was generated in New York State.
4. **Non-Broker Transporters** - A total of 423,531.31 ft<sup>3</sup> (11,993.07 m<sup>3</sup>) of LLRW having a total activity of 7,250.585 Ci (268,271,645 MBq) was transported into, within, or through New York State in 2002 by non-broker transporters and brokers in consolidated shipments. These shipments were en route to TSDFs located outside New York. This is a larger volume of waste than was transported in year 2001.
5. **TSDF's** - The LLRW disposal facility in Barnwell, SC, received about two percent (1.8%), by volume, of the waste transported from or through New York State. The GTS Duratek LLRW treatment facility in Oak Ridge, TN, received approximately ninety-two percent (92.4%) of the waste. Less

than one percent (0.5%) of the LLRW was transported to Envirocare of Utah in Clive, UT. The remaining five percent (5.3%) went to facilities such as: ATG, Richland, WA; U.S. DOE, Hanford, WA; Studsvik Processing Facility, Erwin, TN; Perma-Fix of Florida, Gainesville, FL; NSSI, Inc., Houston, TX; DSSI, Kingston, TN; U.S. Ecology, Oak Ridge, TN; Alaron Corporation, Wampum, PA; RACE, Memphis, TN; Mississauga Metals & Alloys, Inc. Brampton, Ontario, Canada; and Texas Ecologists, Robstown, TX. A small amount of the waste was also transported to the broker storage facilities of Emerson RSI in Cranbury, NJ, and ADCOM Express in Tinley Park, IL. The final destination of the LLRW collected by out-of-state brokers is undetermined because it is taken to facilities outside of New York State and shipped for disposal at a later date.

6. ***Broker Shipment Frequency*** - The frequency of LLRW transport varies depending on whether the shipment is a broker collection or a load destined for treatment or disposal. New York State based broker collections occurred several days a week except holidays and weekends. These brokers averaged twenty-one (21) collections per month. Broker collections in New York by out-of-state brokers averaged about seven (6.75) collections per month.
7. ***Non-Broker Transporter Shipment Frequency*** - In 2002, a total of 701 shipments of LLRW were transported out of or through New York State by non-broker transporters and broker consolidated shipments. These shipments were destined for waste treatment (i.e., volume reduction) or disposal. The frequency of this type of transport averaged out to 58 shipments per month. The range of shipments was 33 to 89 per month.
8. ***Waste Class*** - New York State based brokers and out-of-state brokers transported primarily Class A LLRW. Approximately 93.3 percent of the LLRW volume transported by non-broker transporters or brokers in consolidated shipments was Class A waste. Approximately three and one half percent (3.5%) of the LLRW was Class B. Three percent (3.2%) was Class C waste.
9. ***Waste Type*** - Contaminated compactible trash constituted the major waste type carried by both New York State brokers and out-of-state brokers. Scintillation vials, aqueous liquids, biological, sealed sources, and organic liquids constituted the remainder. The major waste types carried by

non-broker transporters are primarily derived from nuclear power plants and large industrial or manufacturing firms. These waste types are (in order of magnitude), non-compactible dry active waste (DAW), compactible DAW, contaminated equipment, contaminated soil and rubble debris, EPA and State hazardous mixed, mixed bead ion exchange resins, evaporator bottoms, filter media, and activated material.

10. **Exemptions** - Part 381 has provisions for exemption from permit and manifest requirements, provided that the applicant can meet existing criteria (381.5(a)-(f)). Currently, six (6) applicants have applied for and received exemptions.
  
11. **Transport Safety** - The safety record for LLRW transport in New York State is excellent. Only eighteen (18) transportation events occurred in New York State during the period 1971 to 2002, and none of these events involved a release of radioactivity to the environment. A transportation event can be anything from an improperly sealed waste package (called an incident) to a vehicular accident. Of the 18 LLRW transportation events during this 31-year period (1971-2002), seven (7) were vehicular accidents and 11 were incidents of minor contamination of empty shipping casks that exceeded regulatory limits. This data is from radioactive materials incident reports (RMIR) maintained at the Sandia National Laboratory in Albuquerque, New Mexico. Recent incident data (from 1999 to present) is available from Research and Special Programs Administration (RSPA) within the United States Department of Transportation.